

PRIZE
ST. THOMAS'S HOSPITAL



COMPARATIVE
ANATOMY,
1847.



KING'S
College
LONDON

TOV 112 Q1 2011 1

Library

610.01 (500)

THE HISTORY OF THE

1217

20111863 1



KING'S COLLEGE LONDON




Awarded as the Prize
for Comparative Anatomy 1847 to
Mr J. S. Bristowe



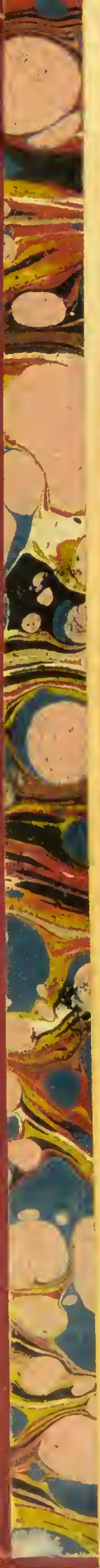


16. a. 18.



Digitized by the Internet Archive
in 2015

<https://archive.org/details/b2130774x>



16.2.18.

THE VEGETABLE KINGDOM;

OR,

The Structure, Classification, and Uses of Plants,

ILLUSTRATED UPON THE NATURAL SYSTEM.

BY

JOHN LINDLEY, PH. D., F.R.S., & L.S.,

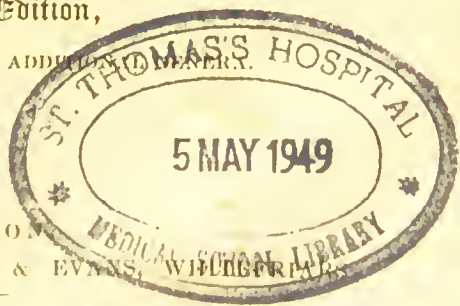
PROFESSOR OF BOTANY IN THE UNIVERSITY OF LONDON, AND IN THE ROYAL INSTITUTION OF GREAT BRITAIN.

“Methodum intelligo naturæ convenientem quæ nec alienas species conjungit, nec cognatas separat.”—*Raii Sylloge, præf.*, p. 15.

WITH UPWARDS OF FIVE HUNDRED ILLUSTRATIONS.

Second Edition,

WITH CORRECTIONS AND ADDITIONS.



LONDON
PUBLISHED BY BRADBURY & EVANS, WINDSOR.

MDCCCXLVII.

830912

Top 1114

LONDON:
BRADBURY AND EVANS, PRINTERS, WHITEFRIARS



PREFACE.

THIS work originated in a desire, on the part of the Author, to make his countrymen acquainted with the progress of Systematical Botany abroad, during the previous quarter of a century. When it first appeared, the science was so little studied that the very names of some of the best writers on the subject were unfamiliar to English ears. In our own language there was nothing whatever; and the Natural System of arranging plants, although occasionally mentioned as a something extremely interesting, was currently regarded as the fond speculation of a few men with more enthusiasm than sound judgment; and this, too, was the opinion expressed by persons who stood at the head of English Botany, in the estimation of many British Naturalists. The Author had himself severely experienced the want of some guide to this branch of Natural History, and he felt anxious to relieve others from the inconvenience which he had encountered; the more especially after he had undertaken the responsibility of filling the Botanical Chair in the then London University. At that time, too, there was nothing of foreign origin which could be advantageously consulted; for Bartling's *Ordines* had not reached England, Perleb's *Lehrbuch* was unknown, and both it and Agardh's *Classes* were of too slight a texture to be generally useful to any except Botanists themselves.

The importance of the Natural System in a practical country like Great Britain was too manifest to leave any doubt in the mind of the Author that the good sense of his countrymen would lead to its universal reception when once placed within their reach. Nor has he been disappointed. Fifteen years have sufficed to render the once popular, but superficial and useless, system of Linnaeus a mere matter of history. *Frit. Hilm.*

The Natural System of Botany being founded on these principles, that all points of resemblance between the various parts, properties, and qualities of plants shall be taken into consideration; that thence an arrangement shall be deduced in which plants must be placed next each other which have the greatest degree of similarity in those respects; and that consequently the quality of an imperfectly known plant may be judged of by that of another which is well known, it must be obvious that such a method possesses great superiority over artificial systems, like that of Linnæus, in which there is no combination of ideas, but which are mere collections of isolated facts, having no distinct relation to each other. The advantages of the Natural System, in applying Botany to useful purposes, are immense, especially to medical men, who depend so much upon the vegetable kingdom for their remedial agents. A knowledge of the properties of one plant enables the practitioner to judge scientifically of the qualities of other plants naturally allied to it; and therefore, the physician acquainted with the Natural System of Botany, may direct his inquiries, when on foreign stations, not empirically, but upon fixed principles, into the qualities of the medicinal plants which have been provided in every region for the alleviation of the maladies peculiar to it. He is thus enabled to read the hidden characters with which Nature has labelled all the hosts of species that spring from her teeming bosom. Every one of these bears inscribed upon it the uses to which it may be applied, the dangers to be apprehended from it, or the virtues with which it has been endowed. The language in which they are written is not indeed human; it is in the living hieroglyphics of the Almighty, which the skill of man is permitted to interpret. The key to their meaning lies enveloped in the folds of the Natural System, and is to be found in no other place.

The great obstacle to the adoption of the Natural System of Botany in this country was the supposed difficulty of mastering its details; but of that difficulty it may be observed, in the first place, that it is only such as it is always necessary to encounter in all branches of human knowledge; and secondly, that it has been much exaggerated by persons who have written upon the subject without understanding it.

It has been pretended that the characters of the Natural classes of plants are not to be ascertained without much laborious research; and that not a step can be taken until this preliminary difficulty

is overcome. But it is hardly necessary to say, that in natural history many facts which have been originally discovered by minute and laborious research, are subsequently ascertained to be connected with other facts of a more obvious nature; and of this Botany offers perhaps the most striking proof that can be adduced. One of the first questions to be determined by a student of Botany, who wishes to inform himself of the name, affinities, and uses of a plant, seems to be, whether it contains spiral vessels or not, because some of the great divisions of the vegetable kingdom are characterised by the presence or absence of those minute organs. It is true that careful observation, and multiplied microscopical analyses, have taught Botanists that certain plants have spiral vessels, and others have none; but it is not true, that in practice so minute and difficult an inquiry needs to be instituted, because it has also been ascertained that plants which bear flowers have spiral vessels, and that such as have no flowers are usually destitute of spiral vessels, properly so called; so that the inquiry of the student, instead of being directed in the first instance to an obscure but highly curious microscopical fact, is at once arrested by the two most obvious peculiarities of the vegetable kingdom.

Then, again, among flowering plants two great divisions have been formed, the names of which, Monocotyledons and Dicotyledons, are derived from the former having usually but one lobe to the seed, and the latter two,—a structure much more difficult to ascertain than the presence or absence of spiral vessels. But no Botanist would proceed to dissect the seeds of a plant for the purpose of determining to which of those divisions it belongs, except in some very special case. He knows from experience that the minute organisation of the seed corresponds with a peculiar structure of the stem, leaves, and flowers, the most highly developed, and most easily examined parts of vegetation; a Botanist, therefore, prefers to examine the stem, the flower, or the leaf of a plant, in order to determine whether it is a Monocotyledon or a Dicotyledon, and rarely finds it necessary to anatomise the seed.

The presence or absence of albumen, the structure of the embryo, the position of the seeds or ovules, the nature of the fruit, the modifications of the flower, are not to be brought forward as other difficult points peculiar to the study of the Natural System, because, whatever system is followed, the student must make himself acquainted with such facts, for the purpose of determining genera. The common Toad-flax cannot be discovered by its

characters in any book of Botany, without the greater part of this kind of inquiry being gone through.

In the determination of genera, however, facility is entirely on the side of the Natural System. Jussieu has well remarked "that whatever trouble is experienced in remembering, or applying the characters of Natural Orders, is more than compensated for by the facility of determining genera, the characters of which are simple in proportion as those of Orders are complicated. The reverse takes place in arbitrary arrangements, where the distinctions of classes and sections are extremely simple and easy to remember, while those of genera are in proportion numerous and complicated."

But really all considerations of difficulty ought to be put aside when it is remembered how much more satisfactory are the results to which we are brought by the study of Nature philosophically, than those which can possibly be derived from the most ingenious empirical mode of investigation.

Such were the motives which led to the publication, in 1830, of the first edition of the present work, under the name of an *Introduction to the Natural System of Botany*. No one would have more readily than the Author transferred the labour to another hand, if any other had been found. Indeed, he confesses that it was because the most capable of those whom he knew belonged to the class of men described by Lord Bacon, who "object too much, consult too long, adventure too little, repent too soon, and seldom drive business home," that he undertook a task for which no man's abilities are in reality high enough. He could not but feel that: "To think nothing done while anything remains to be done is a good rule for perseverance, but to think that nothing should be done while a main thing remains undone, would be a most idle and thriftless maxim. If there be a good presently practicable, it may be done without any desertion of another good not so immediately attainable. And in effecting all secondary amendments, we have the satisfaction of feeling assured that there is a link between all real improvements, and that every sound reform is a step to others, though the connexion may not be broadly distinguishable."

The *Introduction to the Natural System* was originally written in illustration of the popular system of De Candolle; but daily experience showed the insufficiency of that system, and the necessity of forming sub-divisions of the primary groups of plants higher than their so-called Natural Orders became so apparent, as

to lead to serious attempts to carry out a plan of Alliances, in imitation of a few continental writers. These attempts were embodied in the second edition of the present work, which appeared in 1836, under the name of *A Natural System of Botany*. Notwithstanding some glaring defects in the method then proposed, and a host of errors of a less manifest description, the views of the Author were favourably received by those best able to judge of their value. On the other hand, they have been severely criticised by writers who show a singular want of knowledge of the true bearing of such works. Those persons have imagined that a natural classification of plants is something which is suddenly to start into existence, perfect in all its parts, and their criticisms betray a total ignorance of the difficulties by which such a subject is surrounded. The Natural System of Botany may be likened to the plan of a vast edifice, at the construction of which many are labouring. Certain courts and quadrangles are easily set out; a particular style of architecture is agreed upon, and it may be even settled irrevocably in what places the state apartments and cellars are to be stationed. But when further details are to be discussed, many unsatisfactory attempts must be made by the architects, and many an awkward arrangement of the rooms proposed, before a final plan can be produced. If perfection in such small matters is impracticable, if it is impossible so to arrange all the details of even an edifice as to satisfy all critics, how much more hopeless must be the task of classifying the infinite works of the creation! To demand perfection in a work of that nature is little less than impious; for perfection is the attribute, not of man, but of his Maker.

The Author may now be equally charged with inconsistency in not adhering to his former plan of classification after having promulgated it. But he is not conscious of having ever pretended that it even approached permanency.—See *Natural System*, p. xiii. In fact, there is no such thing as stability in these matters. Consistency is but another name for obstinacy. All things are undergoing incessant change. Every science is in a state of progression, and of all others the sciences of observation most so. Since 1836 the views of the Author have, of course, been altered in some respects, although they have experienced but little modification in others. This is inevitable in such a science as that of Systematic Botany, where the discovery of a few new facts or half a dozen fresh genera may instantly change the point of view from which a given object is observed. The Author cannot

regard perseverance in error commendable, for the sake of what is idly called consistency; he would rather see false views corrected as the proof of their error arises. His object, and, he thinks he may say that of every one else who has turned his attention to this question of late, has not been to establish a system of his own, which shall be immutable, but to contribute to the extent of his ability towards that end. He indeed must be a very presumptuous person, having a microscopically small acquaintance with his subject, who should even dream of being able to accomplish such a purpose. All that we can do is to throw our pebbles upon the heap, which shall hereafter, when they have sufficiently accumulated, become the landmark of Systematical Botany.

Having stated thus much by way of preface, it only now remains to explain the plan of the work in its new form. Its object is to give a concise view of the state of Systematical Botany at the present day, to show the relation or supposed relation of one group of plants to another, to explain their geographical distribution, and to point out the various uses to which the species are applied in different countries. The names of all known genera, with their synonyms, are given under each Natural Order, the numbers of the genera and species are in every case computed from what seems to be the best authority, and complete Indices of the multitudes of names embodied in the work are added, so as to enable a Botanist to know immediately under what Natural Order a given genus is stationed, or what the uses are to which any species has been applied. Finally, the work is copiously illustrated by wood and glyphographic cuts, and for the convenience of Students, an artificial analysis of the system is placed at the end. Some of these points demand a few words of comment.

In offering to the public a view of the present state of Systematical Botany, the Author has pursued the plan developed in the succeeding pages, of first taking certain characters common to very extensive assemblages of plants, by means of which Classes have been constituted; and, secondly, of breaking up those Classes into minor groups called Alliances, whose common characters are also more extensive than those of Natural Orders, and under which the Natural Orders are themselves assembled. Very short characters have been proposed, under the name of Diagnoses, for both Alliances and Orders; these are intended to express the prevailing tendency observable in each group, but do not include casual exceptions, for which the reader is referred to the descriptions immediately

following the Diagnosis. The Alliances are the most important feature in the arrangement; and it is to be hoped will be found much better limited than they formerly were. The serious fault committed in the Author's former work, of founding Alliances upon single Natural Orders, has been avoided in every case except that of Palms, which in reality seem to form an Alliance by themselves. The name Alliance has been preserved in preference to that of class, family, circle, cohort, &c., because it is not susceptible of two interpretations, as is the case with all the others; it is employed as an English equivalent for the Latin term *nixus*, which some have imagined was a misprint for *nexus*, but which was used in the sense of Cicero, and intended to express a tendency to assume some particular form of structure. If any one should inquire why no synonyms have been quoted to these Alliances, concerning which so many Botanists have lately occupied themselves, the Author's answer is, that they have hitherto been much too little agreed upon, except in a few very special cases, and that an examination of their history would involve an inquiry which must extend back to the Anthemides of Cæsalpinus, and which belongs to the history of Systematical Botany rather than to its actual condition. The whole practice, indeed, of quoting synonyms is carried by Botanists beyond useful limits. It is in many cases a matter of courtesy rather than of utility; and for this reason, as no one is bound to be courteous to himself, the Author has very generally refrained from making references to his own writings, except when some real necessity for doing so appeared to exist. He may also state in this place, that throughout the present work he has struck out many of the citations given in the last edition, conceiving it useless again to occupy space with the names of authorities which can be always found by those who are desirous to search for them.

In pointing out the affinities of plants the opinions of the most judicious systematists have been consulted; among these the names of Arnott, Auguste de St. Hilaire, Bennett, Bentham, Ad. Brongniart, Brown, Cambessédes, Decaisne, the De Candolles, Endlicher, the Hookers, the Jussiers, Martins, Miers, and Richard, stand in the first rank. In addition to the short discussion upon this subject which always follows the paragraph descriptive of a Natural Order there is appended to the list of genera a plan of indicating affinity now adopted for the first time. It consists of printing the name of the Order under discussion in capital letters; placing right

and left of it in small Roman letters the names of those Orders which are supposed to be in nearest alliance to it; and above and below it in italic type the names of such as are only analogous, or at least have a more distant affinity. The idea of this is borrowed from Mr. Strickland's excellent paper on the true method of discovering the Natural System in Zoology and Botany, printed in the *Annals of Natural History*, vol. vi. p. 184.

The uses to which plants are applied has been re-examined with great care, and principally re-written. This part was originally intended as a mere sketch of so vast and important a subject, and in truth it is little more even now. It is, however, materially enlarged, and the Author hopes better arranged. In preparing it great numbers of works have been consulted, and most especially the special treatises of Dierbach, Fée, Geiger, Guibourt, Martius, Nees v. Esenbeck, Pereira, Richard, and Royle, together with the capital condensation published by Endlicher in his *Enchiridion*. The Author was also strongly advised by one whose opinion has great weight with him, to introduce among the properties of plants an account of their proximate principles and ultimate constituents. But after a full consideration of the subject, he has come to the conclusion that it is not expedient to do so. In the first place, such matters belong to Chemistry, and not to Botany; secondly, it does not appear possible to connect them with any known principle of botanical classification; and, moreover, the extremely unsteady condition of the opinions of chemists themselves upon the result of their own researches, and the uncertainty at present connected with the details of organic chemistry, would render the introduction of the supposed results of chemists embarrassing rather than advantageous. If it is true, as appears to be admitted, that such principles as Caffeine and Theine are identical, and that oils of Anise and Tarragon are chemically undistinguishable, it is clear that these substances can have no connexion with structure, or Botanical classification, if indeed they are not altogether artificial products produced by chemical processes, like Dr. Fownes's furfurool—a vegeto-alkali resulting from the distillation of bran, sulphuric acid, and water.

In forming the lists of genera, the Author is called upon to acknowledge the great assistance that he has derived from those of Professor Endlicher, which indeed he has ventured to take as the foundation of his own, making however considerable additions and material changes in some, and entirely re-writing others;

in which troublesome but necessary task he has been most essentially assisted by the Rev. M. J. Berkeley, who furnished the list of Fungals, and by Mr. Bentham, to whom he is indebted for those of Leguminous and Labiate plants and of Figworts. The reader will perceive that according to the custom of Botanists the names of genera which the Author adopts, are printed in Roman letters, and succeeded by others indented and printed in italics. The latter are either synonyms, or subgenera which do not at present appear to be of importance enough to be regarded as true genera.

In computing the number of species, attention has been paid not only to published statements, but also to such appearances of undescribed species as the Author's own herbarium indicates, assisted occasionally by a little guess-work, where Natural Orders have not been recently examined with care, or where species have been notoriously founded upon trifling and unimportant characters. He does not however doubt that the numbers are in all cases too low. All they pretend to is as near an approach to truth as, under existing circumstances, is possible.

The illustrations are partly original, partly derived from other authorities. It would have been more useful if a larger number could have been introduced; but costly embellishments are not possible beyond a certain limit. Should the present work be favourably received, others may be inserted hereafter in the numerous blanks that have been left among the pages.

Finally, the artificial analysis of Orders given in former editions has again been improved, and is now adapted to the volume in its new dress. It is, however, no longer placed at the beginning of the work, but will be found immediately before the indices. It has been gratifying to the Author to know that this table is habitually consulted by some of the most experienced Botanists.

There is still another point in which the Author has endeavoured to effect some improvement, and that is the nomenclature. Since the days of Linnæus, who was the great reformer of this part of Natural History, a host of strange names, inharmonious, sesquipedalian, or barbarous, have found their way into Botany, and by the stern but almost indispensable laws of priority are retained there. It is full time, indeed, that some stop should be put to this torrent of savage sounds, when we find such words as *Calucechinus*, *Oresigenesa*, *Finaustrina*, *Kraschenminikovia*, *Gravenhorstia*, *Andrzejofskya*, *Mielichoferia*, *Monactincirma*, *Pleuroschismatypus*, and hundreds of others like them, thrust into the records of Botany without

even an apology. If such intolerable words are to be used, they should surely be reserved for plants as repulsive as themselves, and instead of libelling races so fair as flowers, or noble as trees, they ought to be confined to Slimes, Mildews, Blights, and Toadstools. The Author has been anxious to do something towards alleviating this grievous evil, which at least need not be permitted to eat into the healthy form of Botany clothed in the English language.

No one who has had experience in the progress of Botany, as a science, can doubt that it has been more impeded in this country by the repulsive appearance of the names which it employs than by any other cause whatever; and that, in fact, this circumstance has proved an invincible obstacle to its becoming the serious occupation of those who are unacquainted with the learned languages, or who, being acquainted with them, are fastidious about euphony, and Greek or Latin purity. So strongly has the Author become impressed with the truth of this view, that on several occasions he has endeavoured to substitute English names for the Latin or Greek compounds by which the genera of plants are distinguished. Upon turning over the late volumes of the *Botanical Register* many such instances will be found, in imitation of the well-known and usual English words, Houndstongue, Loosestrife, Bugloss, Soapwort, Harebell, &c. He cannot, however, boast of any success in these feeble attempts at reforming a great evil; nor, perhaps, ought he to have expected it. If such English names are not universally adopted, it is to be suspected that the circumstance is traceable to the indifference of the public to partial and inconsiderable changes, which are unseen in the ocean of Botanical nomenclature. That they are important must be admitted; that the person most careless as to the difficulties of articulation would prefer to speak of a Fringe-Myrtle rather than of a *Chamælaucium*, or of a Gritberry than of a *Comarostaphylis*, will probably be allowed on all hands; and therefore the Author does not confess discouragement at failure; but would rather invite suggestions as to more probable means of success. Mere translation is neither necessary nor desirable in all cases. Many Latin names have, from custom, been adopted into the English language, and no wisdom would be shown in attempting to alter such words as *Dahlia*, *Croesus*, *Ixia*, or even *Orehis*. Others again are so easily sounded, and so much in harmony with the English tongue, that nothing could be gained

by interfering with them; such as *Penæa*, *Hugonia*, *Parkia*, *Mimosa*, *Arbutus*, &c. And, finally, there is a large class of scientific words which are best Englished by an alteration of their foreign terminations; for example, *Melanthium* may be changed to *Melanth*; *Desmanthus* to *Desmanth*; *Lecythis* to *Lecyth*; *Myrospermum* to *Myrospermi*; and such an alteration would at once possess the great advantage of rendering English plural terminations possible. *Melanthiums*, *Desmanthuses*, *Lecythises*, &c., sound offensively to classical ears; *Melanthia*, *Desmanthi*, *Lecythides*, are, if not pedantic, at least beyond the skill of uneducated readers; but *Desmanths*, *Melanths*, and *Lecyths*, are formed by the ordinary English plural termination without difficulty.

It is, however, to be feared that a long time will elapse before these views are carried out in such a manner as to insure their adoption. But in the meanwhile a commencement of the plan is practicable, and the Author hopes it will meet with support. The names by which the great groups of plants are known are few in number, and very often in use. There is certainly no reason why we should not at once English them; the practice, indeed, is already adopted to some extent by the substitution of the words *Monocotyledons*, *Dicotyledons*, *Exogens*, *Endogens*, *Cryptogams*, *Phænogams*, &c., for *Monocotyledones*, *Dicotyledones*, *Exogenæ*, *Endogenæ*, *Cryptogamæ*, *Phænogamæ*, &c. It is even carried further by speaking of *Rosaceous* plants instead of *Rosacæ*, *Orchidaceous* or *Orchidous* plants instead of *Orchidacæ*, or *Orchideæ*, &c. But these amended names are still too long, and too un-English in sound to be in favour with the world which lies without the narrow circle of mere systematists; and no valid reason seems to exist for not immediately reforming that part of the nomenclature of Botany. The attempt has been already made in the Author's *School Botany*, where it will be found that by availing himself of well-known English names, or of the English word "wort," or by merely remodelling the terminations, a uniform English nomenclature has been secured for all the common European Natural Orders of plants. Thus for *Nymphæacæ*, *Ranunculacæ*, *Tamaricacæ*, *Zygophyllacæ*, *Elatinacæ*, are substituted *Water-Lilies*, *Crowfoots*, *Tamarisks*, *Beau-Capers*, and *Water-Peppers*; for *Malvacæ*, *Aurantiacæ*, *Gentianacæ*, *Primulacæ*, *Urticacæ*, *Euphorbiacæ*, are employed *Mallow-worts*, *Citronworts*, *Gentianworts*, *Prinworts*, *Nettleworts*, *Spurge-worts*; and the terms *Orchids*, *Hippurids*, *Amaryllids*, *Irids*, *Typhads*, *Arads*, *Cucurbits*, are taken as English equivalents for *Orchi-*

daceæ, Haloragaceæ, Amaryllidaceæ, Iridaceæ, Typhaceæ, Araceæ, and Cucurbitaceæ. The principles kept in view in effecting those changes have been also observed throughout the present work, so that standard English names for Classes and Orders are now no longer wanting. The Author confidently believes that every intelligent reader will admit that such names as *Urn-mosses*, *Taccads*, *False Hemps*, *Pepperworts*, *Bristleworts*, *Chenopods*, *Hydrocharads*, *Scale-mosses*, *Birthworts*, and *Fringe-Myrtles* are preferable to *Bry-a-cæ-æ*, *Tac-ca-cæ-æ*, *Da-tis-ca-cæ-æ*, *El-a-ti-na-cæ-æ*, *Che-no-po-di-a-cæ-æ*, *Des-vaux-i-a-cæ-æ*, *Hy-dro-cha-ri-da-cæ-æ*, *Jun-ger-man-ni-a-cæ-æ*, *A-ris-to-lo-chi-a-cæ-æ*, *Cha-mæ-lau-ci-a-cæ-æ*, and other sesquipedalian expressions.

UNIVERSITY COLLEGE, LONDON.

October, 1845.

CONTENTS.

	PAGE.
PREFACE	vii
INTRODUCTION	xxi
SYSTEMS OF RAY, 1703	xxxiii
— LINNÆUS, 1751	xxxiii
— JUSSIEU, A. L., 1789	xxxiv
— BROWN, 1810	xxxv
— DE CANDOLLE, 1813	xxxv
— AGARDII, 1825	xxxvi
— PERLEB, 1826	xxxvii
— DUMORTIER, 1827	xxxvii
— BARTLING, 1830	xxxvii
— LINDLEY, 1830	xl
— HESS, 1832	xl
— SCHULTZ, 1832	xl
— LINDLEY, 1833	xli
— HORANINOW, 1834	xliv
— FRIES, 1835	xliv
— MARTIUS, 1835	xlv
— BROMHEAD, 1836	xlvi
— LINDLEY, 1836	xlvi
— ENDLICHER, 1836-40	xlvii
— LINDLEY, 1838	xlix
— PERLEB, 1838	xlix
— LINDLEY, 1839	xlix
— BASKERVILLE, 1839	1
— TRACTVETTER, 1841	1
— BRONGNIART, 1843	1
— MEISNER, 1843	lii
— HORANINOW, 1843	liv
— JUSSIEU, ADG., 1844	liv
— LINDLEY, 1845	lv

	PAGE.
THE VEGETABLE KINGDOM	1
THALLOGENS.	5
ACROGENS.	51
RHIZOGENS	83
ENDOGENS.	95
DICTYOGENS.	211
GYMNOGENS	221
EXOGENS	235
GENERA INSUFFICIENTLY KNOWN	795
ERRATA AND ADDITIONAL GENERA	796
ESTIMATED NUMBER OF GENERA AND SPECIES	797
ARTIFICIAL ANALYSIS OF THE ORDERS	801
INDEX OF THE SCIENTIFIC AND VERNACULAR NAMES OF SPECIES, AND OF VEGETABLE PRODUCTS.	811
INDEX OF GENERA, ORDERS, CLASSES, &c.	833
ABBREVIATIONS	905

INTRODUCTION.

THAT part of the material world which bears the name of the Vegetable Kingdom, consists, like the Animal, of a vast multitude of species, whose outer and inner forms alike offer a prodigious diversity of modifications of one common simple plan of structure. Organic vesicles, usually extending into tubes of various kinds, exclusively constitute what we call Vegetation ; but this simplicity of nature is attended by very complex details of arrangement, as is shown in trees, whose framework is knit together by countless myriads of such vesicles and tubes, entangled with an astonishing intricacy of simple arrangement.

Any living combination whatsoever of such vesicles constitutes a plant ; but as the combinations themselves are countless, so are the resulting external forms ; for, although two or three words may suffice to express all combinations whatsoever in their most general sense, as when the name of thallus is given to the simplest expansion of vegetable matter, while all the more complex forms are included under the name of axis and its appendages, yet ingenuity is exhausted in the attempt to distinguish by appropriate terms the manifold external forms assumed by that axis and the parts which it bears.

Hence it is that wherever the eye is directed it encounters an infinite multitude of the most dissimilar forms of vegetation. Some are cast ashore by the ocean in the form of leathery straps or thongs, or are collected into pelagic meadows of vast extent ; others crawl over mines and illuminate them with phosphorescent gleams. Rivers and tranquil waters teem with green filaments, mud throws up its gelatinous scum, the human lungs, ulcers, and sordes of all sorts bring forth a living brood, timber crumbles to dust beneath insidious spawn, corn crops change to fetid soot, all matter in decay is seen to teem with mouldy life ; and those filaments, that scum-bred spawn and mould, alike acknowledge a vegetable origin. The bark of ancient trees is carpeted with velvet, their branches are hung with a grey-beard tapestry, and microscopical scales overspread their leaves ; the face of rocks is stained with ancient colours, coeval with their own exposure to air ; and those too are citizens of the great world of plants. Heaths and moors wave with a tough and wiry herbage, meadows are clothed with an emerald mantle, amidst which spring flowers of all hues and forms, bushes throw abroad their many-fashioned foliage, twiners scramble over and choke them, above all wave the arms of the ancient forest, and these too acknowledge the sovereignty of Flora. Their individual forms too change at every

step. With every altered condition and circumstance new plants start up. The mountain side has its own races of vegetable inhabitants, and the valleys have theirs; the tribes of the sand, the granite, and the limestone are all different; and the sun does not shine upon two degrees on the surface of this globe the vegetation of which is identical: for every latitude has a Flora of its own. In short, the forms of seas, lakes, and rivers, islands and peninsulas, hills, valleys, plains, and mountains, are not so infinitely diversified as that of the vegetation which adorns them.*

Botanists have gathered together these endless forms, have studied and arranged them, and calculated their numbers, which amount to more than 92,000 species: a mighty host whose ranks are daily swelled by new recruits.

This vast assemblage has not been gathered together in a few years; it is coeval with man, and we cannot but feel that the study of the distinctions between one plant and another commenced with the first day of the creation of the human race. The name indeed of Botany is modern; but its antiquity dates from the appearance of our first parents. We may assume it as a certain fact that the Vegetable Kingdom was the first to engage the attention of man, for it was more accessible, more easily turned to useful purposes, and more directly in contact with him than the Animal. Plants must have yielded man his earliest food, his first built habitation; his utensils and his weapons must alike have been derived from the same source. This could not fail to produce experience, and especially the art of distinguishing one kind of plant from another, if it were only as a means of recognising the useful and the worthless species, or of remembering those in which such qualities were most predominant. This would involve from the very beginning the contrivance of names for plants, together with the collection of individuals into species; and the mental process by which this was unconsciously effected gradually ripened into the first rude classifications that we know of. By placing together individuals identical in form and the uses they could be applied to, species were distinguished; and by applying a similar process to the species themselves, groups analogous to what we now call genera were obtained. The last step was to constitute classes, which were recognised under the well-known names of "grass, and herbs yielding seed, and fruit trees yielding fruit."

* It is in the tropics that the prodigious diversity of appearance among plants is most strikingly exemplified. The beautiful forest scene, given as a frontispiece to this work, is copied from a plate in the *Flora Brasiliensis* of Dr. Von Martius, who describes it thus: "The landscape is divided into two unequal parts by a tree (*) rising to the height of 70 or 80 feet; it is *Eschweilera angustifolia*. It is overrun with ropes which cling around it, or hang down in various festoons; these ropes yield a milky white or yellowish juice when wounded, and probably belong to the Dogbanes or *Asclepiads*; other twiners, decorated with fine, large, beautifully green leaves, consist of species of *Banisteria*, *Smilax*, *Serjania* and *Bignonia*, voluptuously intertwined and entangled. A little above there is a tuft of the large leaves of *Anthericum glaucum*, and from the summit of all hangs down some unknown kind of *Bromelwort*. On the left stands a slender *Acacia*, whose bark is embraced by some parasitical climber; then comes the *Couratari legalis*, a high tree, whose timber is used in house-building; it forms a stem 60 or 70 feet high without a branch, and then spreads into a hemispherical head; owing to the slowness of its growth it is overrun with epiphytes. In front of the *Acacia* is a low tree with a close head and a shining bark; that is a *Ficus americana*, and *Banisterias* are shooting downwards from among its branches. Before this lie the bones of some fallen giant of the forest, overspread with great tufts of *Anthericum* and *Epiphyllum phyllanthus*. Close by, some *Psychotria* expands its large leaves and wide branches. A *Heliconia* and a *Phrynium* start from the mud and marshy foreground; a great patch of *Anthericum umbellatum* flourishes on the rotten trunk, and just in front is a group of *Agaries*, such as we see in the woods of Europe. The tall tree on the right of *Eschweilera*, with a smooth bark and pinnated leaves, is an *Inga*; next it is a small bush of *Leandra seabra*, behind which is a thicket of *Palicuria* and *Renealmia nutans*, backed by the *Eriodendron leiantherum*. The beautiful Palm to the right of them is *Geonoma Pohlana*. The foreground on the right is occupied by *Ficus longifolia*, conspicuous with its ample foliage, and loaded with epiphytes of various kinds, especially with *Anthericum glaucum*, *umbellatum*, and *longifolium*, and *Caladium auritum*. These and different kinds of *Bilbergia* have also taken possession of the rotten trunks in the neighbourhood. Near these is the white-barked *Cecropia peltata*, with large green leaves hoary with down on the under side." The cable-like climbers on the extreme right are not named by Dr. Von Martius.

But as human intelligence advanced, and a knowledge of things increased, such rude distinctions were improved, and when no means existed of appreciating the value of minute or hidden organs, the functions and existence of which were unknown, objects were at first collected into groups, characterised by common, external, and obvious signs. Theophrastus had his water-plants and parasites, pot-herbs and forest trees, and corn-plants; Dioscorides had aromatics, and gum-bearing plants, eatable vegetables and corn-herbs; and the successors, imitators, and copiers of those writers, retained the same kind of arrangement for ages. It was not till 1570 that Lobel, a Fleming, improved the ancient modes of distinction, by taking into account characters of a more definite nature than those which had been employed by his predecessors; but he was soon succeeded by others, among the most distinguished of whom were Cæsalpinus, an Italian who wrote in 1583, the celebrated Tournefort, and especially our countryman, John Ray, who flourished in the end of the seventeenth century. The latter added much to the knowledge of his predecessors, and had so clear and philosophical a conception of the true principles of classification, as to have left behind him in his *Historia Plantarum* the real foundation of all those modern views which, having been again brought forward at a more favourable time by Jussieu, are generally ascribed exclusively to that most learned Botanist and his successors. Ray, however, laboured under the great disadvantage of being too far in advance of his contemporaries, who were unable to appreciate the importance of his views or the justness of his opinions; and who therefore, instead of occupying themselves with the improvement of his system, set themselves to work to discover some artificial method of arrangement, that should be to Botany what the alphabet is to language, a key by which the details of the science may be readily ascertained. With this in view, Rivinus invented, in 1690, a system depending upon the formation of the corolla; Kamel, in 1693, upon the fruit alone; Magnol, in 1720, on the calyx and corolla; and finally, Linnæus, in 1731, on variations in the stamens and pistil. The method of the last author has enjoyed a degree of celebrity which has rarely fallen to the lot of human contrivances, chiefly on account of its clearness and simplicity; and in its day it effected a large amount of good.

It was soon, however, perceived by those who studied the Vegetable Kingdom profoundly, that no improvement could be made in the knowledge of its true nature, of the best manner of arranging it, or even of the purposes to which it might be applied, unless the philosophy of the subject was investigated; and this became daily more apparent as the materials collected by botanical travellers accumulated. It was found that the few thousand ill-examined plants which inhabit Europe gave a most imperfect idea of the vegetation of the globe; that methods of classification which were tolerable so long as species were few, became useless, or an incumbrance as the number increased, and that no real progress in Botany, as a branch of science, could be hoped for so long as a few arbitrary signs were taken as the basis of all arrangement. The older Botanists knew little of vegetable physiology; and of the laws of vegetable structure they had at the most but a glimmering perception. Yet those subjects are the foundation of all sound principles of classification. The recognition of that fact immediately led to the investigation of new branches of knowledge, in which discoveries were daily made, and it has terminated in a universal adoption of the principles of Ray, improved and extended by the admirable views of Jussieu, as developed in his *Genera Plantarum secundum Ordines*

Naturales disposita,—a book of wonderful sagacity and most profound research.

Since the appearance of that work Botany has assumed a new position in the ranks of science, and the evidence from which conclusions are to be drawn has multiplied beyond all that could have been anticipated. Twenty thousand species at the utmost could have been known to Jussieu in 1789; we have seen that the number actually on record at the present day amounts to more than 92,000. Vegetable Anatomy, the foundation of Vegetable Physiology, was at the former period in the state in which it had been left by Grew and Malpighi; it has since engaged the attention of the most acute and indefatigable observers, now armed with optical instruments of surprising excellence. The resources of Chemistry and Natural Philosophy have been enlisted in its cause; and the result is the accumulation of a prodigious mass of facts, the best mode of arranging which is the great problem that modern science has to solve.

That no artificial mode of classifying the vast materials of Botany could satisfy the human mind was clearly perceived and fully admitted by Linnæus himself, when he declared a Natural System to be the *primum et ultimum in botanicis desideratum* (Phil. Bot. § 77). That no insuperable obstacle to its attainment could exist in the nature of things became evident the moment that the work of Jussieu was before the world. That Botanist for the first time proposed distinctive characters for the groups of genera, which he called Natural Orders, and those characters were framed with such skill that a large proportion of his distinctions is still unaffected by the progress of modern discovery. The manner in which he obtained the distinctions of his Natural Orders was thus described by himself:—“*C'est ainsi que sont formées les familles très naturelles et généralement avouées. On extrait de tous les genres qui composent chacune d'elles les caractères communs à tous, sans excepter ceux qui n'appartiennent pas à la fructification, et la réunion de ces caractères communs constitue celui de la famille. Plus les ressemblances sont nombreuses, plus les familles sont naturelles, et par suite le caractère général est plus chargé. En procédant ainsi, on parvient plus sûrement au but principal de la Science, qui est, non de nommer une plante, mais de connoître sa nature et son organisation entière.*”

The Natural Orders thus obtained were bound together into a system by adopting the important distinctions of Acotyledons, Monocotyledons, and Dicotyledons, and then by subdividing the two latter into Classes mainly characterised by the insertion of the stamens or the condition of the corolla; as will be more particularly explained hereafter.

It was not, however, to be expected that the views of Jussieu should be just in all respects, or that his scanty materials would enable him to form a plan of classification sound and perfect in all its parts. On the contrary, his system abounded in errors and imperfections, and, in fact, the latter years of his life were occupied in striving to improve and consolidate it. The same object has been sought by great numbers of those who have succeeded him, and every few years of late have witnessed the production of some scheme of classification which, although founded essentially upon the groundwork of Jussieu, differed nevertheless in numerous details. In another place, the principal of these schemes will be mentioned. It will be for the present sufficient to say that, beginning with Brown in 1810, and ending with Adolphe Brongniart in 1843, the mass of suggestions and improvements which has been collected renders comparatively easy the task of applying Jussieu's principles of classification to the vast multitudes of species now forming the Vegetable Kingdom.

The true principles of classification, however much they may have been amplified and refined upon, were in reality expressed by Ray, when he defined a Natural System to be that *which neither brings together dissimilar species, nor separates those which are nearly allied*. However much the words of this definition may have been varied, it still retains the very meaning given to it by its author. A species, said Jussieu, *consists of individuals very much alike in all their parts, and retaining their resemblances from generation to generation. Those species are to be associated which correspond in the greater number of their characters; but one constant is of more importance than several inconstant characters. On these two axioms hangs the whole principle of Natural classification.*—(Genera Plantarum Præf.) And then he proceeded to show how a group of species combined upon this principle forms a Genus, of Genera an Order, and of Orders a Class; the same rules of combination being observed throughout, with this difference only, that the larger the group the fewer the characters by which it is limited (*Quò generalior enim extat plantarum ordinatio quælibet, cò paucioribus utitur signis definitibus*).

But it is far more easy to lay down principles than to put them in execution. The definition of Ray is perfect, but its application is surrounded with difficulty. The very first point to settle in attempting to carry out his views is by what rule the dissimilarity or alliance of species is to be determined. In fact, very different ideas of likeness or unlikeness are entertained by different observers. The common people can see no difference of moment between a Daphne, and a Cherry, and a Rhododendron, but call them all Laurels, although a Botanist fails to perceive their resemblance. On the other hand, there seems to the vulgar eye no connection between the Hemp plant and the Mulberry tree, and yet the Botanist brings them into close alliance. Nor are these conflicting views confined to the ignorant and the uneducated; such differences of opinion may be found among Botanists themselves. For instance, Linnæus joined Arum with *Phytolæa* under his *Piperitæ*, and *Convolvulus* with *Viola* under his *Campanacei*, combinations which modern Botanists entirely repudiate; and in like manner the association of *Hugonia* with *Chlenads* by Endlicher, of *Nepenthes* with *Birthworts* by Brown, of *Planes* with *White Hazels* by Adolphe Brongniart, of *Vines* with *Berberries* by the Author of this work, of *Spurgeworts* with *Heathworts* and *Chenopods* by Fries, are so many modern instances of peculiar views from which other Botanists withhold their assent.

It is therefore of the first importance to settle with something like precision what it is that constitutes likeness among plants, or, as it is technically called, their affinity.

The reason why the vulgar commit mistakes in judging of natural affinity is, because they draw their conclusions from unimportant circumstances, the chief of which are size, form, and colour. The similitude of size gave rise to the old notion that all trees made a class by themselves; which is as if in a classification of animals the horse, the lion, and elephant were placed in a different part of the animal kingdom from the rat, the cat, and the goat. Form is another of the false guides which lead to error; if all round-leaved or square-stemmed plants are to be associated, so ought glass to be classed with the diamond when it is cut to the same shape. Colour is less a source of mistake, and yet it is sometimes unconsciously employed by the superficial observer, as when he calls all yellow-flowered *Composites* *Marigolds*, and all white-flowered vernal bushes *Thorns*. It

must be evident to the most careless thinker that such resemblances are trifling.

That which really determines affinity is correspondence in structure. It may be said that those plants are most nearly related which correspond in the greatest number of points, and those the most distantly in which we find the fewest points of correspondence; and this must be true when we remember that if every point in the structure of any two plants is found to be alike, then those two must be identical. But it will be obvious that an examination of all plants through every detail of their organisation is impracticable; it has never in fact been accomplished in any one case. Experience must have shown that the organs of vegetation are of very different degrees of value in determining resemblance in structure, that some are of paramount importance, others of less consequence, and others of comparative insignificance. Hence the relative value of characters forms a most important part of the study of the Botanist; it is in fact the pivot upon which all the operations of a systematist must turn.

The only intelligible principle by which to estimate their respective value is according to their known physiological importance; regarding those organs of the highest rank which are most essential to the life of the plant itself; placing next in order those with which the plant cannot dispense if its race is to be preserved; assigning a still lower station to such organs as may be absent without considerable disturbance of the ordinary functions of life; and fixing at the bottom of the scale those parts, or modifications of parts, which may be regarded as accessory, or quite unconnected with obviously important functions.

The first office which all organised beings have to perform is that of feeding; for it is thus only that their existence is maintained. The second is that of propagating, by means of which their species is perpetuated. These being functions of the highest importance, it is reasonable to conclude that the organs provided for their proper execution must be of the highest importance also, and hence that they are beyond all others valuable for the purposes of classification. And, again, because the power of feeding must come before that of propagating, it might be conjectured beforehand that the organs destined for the former operation would afford the first elements of a Natural method. But since the action of feeding is very simple in the Vegetable Kingdom, because of the similar modes of life observable among plants, while, on the contrary, the act of propagation is highly diversified, on account of the very varied nature or structure of the parts by which it is accomplished; so might we conjecture that the organs of nutrition would afford but few distinctions available for purposes of classification, while those of fructification would furnish many. And such is the fact. Hence it is that the great classes of plants are principally distinguished by their organs of growth, and that in the numerous minor groups such peculiarities are comparatively disregarded, their chief distinctions being derived from their parts of reproduction. These principles are more fully expressed in the following axioms:—

1. Peculiarities of structure which are connected with the manner in which a plant is developed are *physiological*; those which are connected with the manner in which parts are arranged are *structural*. Physiological characters are of two kinds, viz., those which are connected with the *mode of growth* (*the organs of vegetation*), and those which regulate *reproduction* (*the organs of fructification*). Physiological characters are of greater importance in regulating the natural classification of plants than structural

2. All modifications of either are respectively important, in proportion to their connection with the phenomena of life.

3. If we allow ourselves to be steadily guided by these considerations, we shall find that the internal or anatomical structure of the axis, and of the foliage, is of more importance than any other character; because these are the circumstances which essentially regulate the functions of growth, and the very existence of an individual.

4. That next in order is the internal structure of the seed, by which the species must be multiplied. Thus the presence of an embryo, or its absence, the first indicating a true seed, the latter a spore, are most essential circumstances to consider. And so also the existence of albumen in abundance round the embryo, or its absence, must be regarded as a physiological character of the highest value: because, in the former case, the embryo demands a special external provision for its early nutriment, as in oviparous animals; while, in the latter case, the embryo is capable of developing by means of the powers resident in itself, and unassisted, as in viviparous animals.

5. Next to this must be taken the structure of the organs of fructification, by whose united action the seed is engendered; for without some certain, uniform, and invariable action on their part, the race of a plant must become extinct. Thus we find that the structure of the anthers, placenta, and ovules, are more uniform than that of the parts surrounding them, while their numbers are variable; and the condition of the filament, which appears of so little importance in a physiological point of view, is also inconstant. So also the texture and surface and form of the pericarp, which acts as a mere covering to the seeds, is not to be regarded in these inquiries, and, in fact, differs from genus to genus; as, for instance, between *Pyrus* and *Stranvæsia*, or *Rubus* and *Spiræa*, in the truly natural Rosaceous Order.

6. On the other hand, the floral envelopes seem to be unconnected with functions of a high order, and to be designed rather for the decoration of plants, or for the purpose of giving variety to the aspect of the vegetable world; and, consequently, their number, form, and condition, presence or absence, regularity or irregularity, are of low and doubtful value, except for specific distinction. There seems, indeed, reason to expect that every Natural Order will, sooner or later, be found to contain within itself all the variations above alluded to. Even in the cases of regularity and irregularity we already know this to be so; witness *Veronica* and *Scoparia* in Figworts, and *Hyoscyamus* in Nightshades, *Delphinium* in Crowfoots, and *Pelargonium* in Cranesbills.

7. The consolidation of the parts of fructification is a circumstance but little attended to in a general point of view, except in respect to the corolla; but as it seems to indicate either the greatest change that the parts can undergo, or, where it occurs between important and usually unimportant organs, that in such cases the latter become essential to the former, it probably deserves to be regarded with great attention. For instance, the presence or absence of the corolla is often a point of little moment, and is, we know, a very fluctuating circumstance. This is especially true of those Natural Orders in which the stamens and petals are separated; as in Roseworts, Rhamnads, Onagrads, &c. On the other hand, when the stamens, which are indispensable organs, adhere to the petals, the latter are more constantly present, as in Figworts, Acanthads, Nightshades, &c.

There are also certain other principles which experience tells us the systematist must keep in view; and most especially that of regarding of

importance whatever appears to be constant in its nature among nearly allied species. Nothing which is thus constant can be considered unimportant, for everything constant is dependent upon or connected with some essential function. Therefore all constant characters, of whatever nature, require to be taken into account in classifying plants according to their natural affinities. Of this nature are the internal structure of stems and leaves, the anatomical condition of tissue, the organisation of the anther, pollen, and female apparatus, and the interior of the seed.

On the other hand, whatever points of structure are variable in the same species, or in species nearly allied to each other, or in neighbouring genera, are unessential to the vital functions, and should be set aside, or be regarded as of comparative unimportance. Hence the badness of the Monopetalous, Polypetalous, and Apetalous divisions of Jussieu, depending upon the mere presence or absence, and union or disunion, of petals. The genus *Fuchsia*, for example, has petals highly developed; but in *F. excorticata* they are absent, and yet the plant differs no otherwise from the rest of the genus: the same is true of species of *Rhamnus*. Again, the *Rue* has the petals separate; and *Correa*, very nearly allied to it, has them combined.

All classifications in which the foregoing principles are observed are natural; and that will be the most stable in which they are employed with the greatest skill. Some writers, indeed, maintain that there cannot be more than one really natural system, any more than one planetary system; and in a certain sense this may be true, inasmuch as we must suppose that one plan only has been observed in the creation of living things, and that a natural system is the expression of that plan. But, on the other hand, it must not be forgotten that such a plan may be represented in many ways; and that although the order of nature is in itself settled and invariable, yet that human descriptions of it will vary with the mind of the describer. A universal history is a collection of events; but it is not necessary that all universal histories should follow the same order of narration. The events themselves are unalterable, but the way of combining them and causing them to illustrate each other is manifold.

In natural science, indeed, the mode of arranging the matter is susceptible of infinitely more variation than history: because in the latter subject time is an inflexible leader who cannot be lost sight of. But in natural science there is no beginning and no end. It is impossible, from the nature of things, that any arrangement should exist which shall represent the natural relations of plants in a consecutive series. It is generally admitted by those who have turned their attention to a consideration of the manner in which organised beings are related to each other, that each species is allied to others in different degrees, and that such relationship is best expressed by rays (called affinities) proceeding from a common centre (the species). In like manner, in studying the mutual relationship of the several parts of the Vegetable Kingdom, the same form of distribution constantly forces itself upon the mind; Genera and Orders being found to be apparently the centre of spheres, whose surface is only determined by the points where the last traces of affinity disappear. But although the mind may conceive such a distribution of organised beings, it is impossible that it should be so presented to the eye, and all attempts at effecting that object must of necessity fail. If in describing the surface of a sphere we are compelled to travel in various directions, continually returning back to the point from which we started; and if in presenting it to the eye at one glance we are compelled to project it upon a plane, the effect of which is to

separate to the greatest distance some objects which naturally touch each other; how much more impossible must it be to follow the juxtaposition of matter in treating of the solid contents of a sphere!

An arrangement, then, which shall be so absolutely correct an expression of the plan of nature as to justify its being called *the* Natural System is a chimera.* All that the Naturalist can do is to carry into effect the principles above explained, with a greater or less amount of skill; the result of which will be a Natural System.

When Linuæus attempted to form a Natural System, he merely threw together such genera as he knew into 67 groups, which he called Fragments, and which were equivalent to the Natural Orders of Modern Botany. Jussieu advanced a step further, by forming 15 Classes, under which he placed 100 Natural Orders. At a later period the name Class was reserved for the three great divisions of Acotyledons, Monocotyledons, and Dicotyledons; and the Orders were collected into smaller groups called Sub-classes; and thus, by degrees, the necessity of forming three grades of distinctive characters superior to genera was recognised. But our countryman, Dr. Robert Brown, whose sagacity is not the least remarkable part of his scientific character, long ago pointed out the insufficiency of even this amount of subdivision, and proposed the combination of Natural Orders into groups intermediate between Orders and Sub-classes. The necessity of this measure is now universally acknowledged; attempts have been made for some years, by various Botanists, to work out the problem; and I think it must be conceded that a real advance has thus been made, by the efforts of various independent observers, to the accomplishment of so very desirable an object. To such attempts the present work is an addition.

The leading idea which has been kept in view in the compilation of it has been this maxim of Fries: *Singula sphaera (sectio) ideam quandam exponit, indeque ejus character notione simpliciter optimè exprimitur*. I cannot but think that the true characters of all natural assemblages are extremely simple; nothing can be more certain than that their value diminishes in proportion to their complexity. If two objects are not to be distinguished by a few simple circumstances, they can hardly be called distinguishable at all. In the highest groups or classes it is always so, (see p. 4;) and there is no apparent reason why the same rule should not obtain in groups of a minor rank. Nevertheless, we find that this is too often lost sight of, and that long details of structure are substituted for precise words of distinction.

It may be, and certainly is in some measure, true, that insuperable difficulties are, in the present state of our knowledge, opposed to strict definitions of Natural Orders, and *à fortiori* of their Alliances, &c. But that is no reason why we should not endeavour to render their distinctive characters as precise as the nature of the subject will permit. Vague distinctions, which are at once the bane and opprobrium of Natural History, are so repulsive to the understanding as to deter the mass of mankind from giving it their attentive study. And it is not too much to assert that this vagueness arises more frequently out of the prejudices or mistiness of the Naturalist's own mind than out of things themselves. It will constantly happen that two groups may stand, by common consent, in the nearest conceivable relation to each other; it is quite possible, by one way of arranging

* Systema illud naturæ ipsius absolutum (quod mera empiria captant!) mens humana capere non potest; est quoddam supra naturale cujus clavem, manibus v. ingenio humano non prensandam, summus tantum tenet Naturæ auctor.—Fries *Corpus Florarum*, p. xvii.

them, to render their distinctions nugatory, and by another, clear and precise. Now, if the supposed groups are really as closely allied, as for this argument we may assume them to be, it can be of no possible importance theoretically, whether a given Genus or Order is placed in the one or the other. The near consanguinity of the two does away with all importance in such a case. In Physical Geography it is of no consequence whether London is stationed in Middlesex or Surrey; and in like manner, in Theoretical Botany, the place of a given Order may be equally indifferent. But it may be of great consequence practically, because a definition of limits may be possible or not, according to the arrangement. For example, let us take the Solanal and Bignonial Alliances. These touch at the Orders of Nightshades and Figworts respectively. If Nightshades are placed in the Bignonial Alliance because of their intimate relation to Figworts, no apparent means remain of clearly defining what is meant by the Bignonial Alliance. If, on the other hand, Figworts are stationed in the Solanal Alliance, then the distinctive characters of that Alliance are also rendered obscure and difficult, or impossible of application. But place Nightshades in the Solanal, and Figworts in the Bignonial Alliance, and the language of Botanists affords as clear a discrimination as can be wished for. And so of other cases. Indeed, I am so persuaded of this, that in my opinion all instances of confused and vague characters are only so many proofs of Botanists not having clearly understood the plants that they have endeavoured to classify.*

It will, perhaps, be alleged that the doctrine just inculcated is directly opposed to the first principles of a Natural System: but such is not the case. No absolute limits, in fact, exist, by which groups of plants can be circumscribed. They pass into each other by insensible gradations, and every group has apparently some species which assumes in part the structure of some other group. Two countries are separated by a river whose waters are common to both banks: in a geographical division of territory the river may be assigned to either the left bank or the right bank, but such an arrangement is arbitrary; and yet the interior of the countries is unaffected by it. So with the groups of plants; it cannot be of any possible consequence whether an intermediate or frontier plant be assigned to one group or another, and convenience alone should be considered in such a matter. This long since led me to offer the following observations, the justice of which, much more experience entirely confirms:—"All the groups into which plants are thrown are in one sense artificial, inasmuch as Nature recognises no such groups. Nevertheless, consisting in all cases of species very closely allied in nature, they are in another sense natural. But as the Classes, Sub-classes, Alliances, Natural Orders, and Genera of Botanists, have no real existence in nature, it follows that they have no fixed limits, and consequently that it is impossible to define them. They are to be considered as nothing more than the expression of particular *tendencies* (nexus), on the part of the plants they comprehend, to assume a particular mode of development. Their characters are only a declaration of their prevailing tendencies."

We must not, however, deceive ourselves with the expectation that by this or any other expedient definitions in Botany will become possible. Mathematical precision is unknown in such subjects, and exceptions occur

* No Botanist will regard this as an offensive remark. It is the misfortune, not the fault, of men of science, that they cannot investigate everything with their own eyes, and that they are compelled, from the vastness of their subject, to take much of all they study upon trust. In Botany this is most especially the case; for who has ever been able to examine one-tenth of all the plants he speaks of, with minute accuracy?

to all known rules. "When Zoology," says Mr. Milne Edwards, "is only studied in systematic works, it is often supposed that each class, each family, and each genus, present to us boundaries precisely defined, and that there can be no uncertainty as to the place to be assigned, in a natural classification, to every animal the organisation of which is sufficiently known. But when we study this science from Nature herself, we are soon convinced of the contrary, and we sometimes see the transition from one plan of structure to an entirely different scheme of organisation take place by degrees so completely shaded one into the other that it becomes very difficult to trace the line of demarcation between the groups thus connected."—*Ann. Sc. Nat.* 1840, *Sept.* Ray long ago pointed this out in a very remarkable passage, which cannot be too often quoted.

"Verum quod alias dixi illud hic repeto et inculco, non sperandam à me Methodum undequaque perfectam et omnibus suis numeris absolutam, quæ et plantas in genera ita distribuatur ut universæ species comprehendantur, nullâ adhuc anomala et sui generis reliqua, et unumquodque genus notis suis propriis et characteristicis ita circumscribat, ut nullæ inveniantur species incerti, ut ita dicam, laris, et ad plura genera revocabiles. Nec enim id patitur natura rei. Nam, cum Natura (ut dici solet) non faciat saltus, neque ab extremo ad extremum transeat nisi per medium, inter superiores et inferiores, rerum ordines nonnullas mediæ et ambiguae conditionis producere solet, quæ de utroque participant, et utrosque velut connectant, ut ad utrum pertineant omnino incertum sit. Præterea eadem alma parens in methodi cujuscunque angustias coerceri repugnat, sed ad libertatem et *αὐτονομίαν* suam nullis legibus obnoxiam ostentandam, in unoquoque rerum ordine nonnullas species creare solet, tanquam exceptiones à regulis generalibus, singulares et anomalas."—(RAY, *Hist. Plant.* vol. i. Præf.) Linnæus did but copy this when he asserted that Nature makes no leaps (*Natura non facit saltus.*—*Phil. Bot.* 77.)

This doctrine has, however, been lately called in question by no less eminent a writer than M. Alphonse De Candolle, who requires that absolute limits should be assigned to all groups of whatever degree. "If," he says, "we cannot state in what respect two families differ permanently and *universally*, those two families are but one. Two pieces of land which touch each other form one island, and not two; but two pieces of land which are separated by an arm of the sea, form two islands, and not one."—*Annales des Sciences*, series 3, vol. 1. p. 254. But this is a kind of reasoning wholly inapplicable to Natural History, for the reasons so admirably given by Ray, and is contrary to all experience. If the groups limited by M. Alphonse De Candolle himself are examined by this standard they alone suffice to demonstrate how visionary are such expectations. Mr. Bentham has satisfactorily answered the learned Botanist of Geneva. "We Botanists," he says, "cannot be so mathematically exact as geographers, and where an isthmus is very narrow, we must class the peninsula with the island. How often does it happen that two large Orders, say of five hundred to two thousand or three thousand species, totally distinct from each other in all those species by a series of constant characters, are yet connected by some small isolated genus of a dozen, half a dozen, nay a single species, in which these very characters are so inconstant, uncertain, or variously combined as to leave no room for the strait through which we ought to navigate between the two islands."—*London Journal of Botany*, 4. 232. It would be very convenient to find that the views of M. Alphonse De Candolle were practicable, but in truth they are quite Utopian.

While, however, the impracticability of absolute definitions is thus insisted upon, there can be no doubt that much more precision may be introduced than is too frequently found among them. Exceptions, although to some extent inevitable, are not uncommonly apparent, not real. It will frequently be found that a particular species is at variance with the definition of its Genus, or of a Genus with that of its Order, or of an Order with that of its Alliance; but, upon a full examination of all the structure of such supposed exceptions, it will turn out that they are misplaced, and do not in fact belong to the station which they occupy. Exceptions of this kind were formerly very common, but they are disappearing under the diligent criticism of modern observers. The genus *Rhynchotheca* may be taken as an example. The great feature of the Cranesbills is their beaked torus and folded-up embryo, and it is by that circumstance that they are essentially distinguished from their neighbours. But *Rhynchotheca* was described as having a beaked fruit and straight embryo; it therefore formed an apparent exception to the definition of Cranesbills. Investigation of the plant has however shown that its beak belongs to the carpels and not to the torus; and, therefore, it is merely an Oxalid, with a tendency towards the structure of a Cranesbill.

The manner in which the foregoing principles have been applied to practice has differed greatly, and the result has been schemes of various degrees of merit, some of which have dropped still-born from the press, while others continue to enjoy a well-deserved reputation. It would be alike unjust to their authors and the public to omit all mention of even the most obscure of these, each of which has been the result of much thought and patient study, and has doubtless contributed something to the progress of systematic science. But it would be beyond the object of the present sketch to treat them all at length, nor would the student derive any advantage from doing so. While, therefore, the following pages will be occupied by some account of every plan for a Natural classification of which I have any knowledge,* since the year 1789 inclusive, and of those of Ray and Linnæus of an earlier date, such as are comparatively unimportant will be dismissed in a few words, and those only which have been really employed in practice will be stated at length. In order to render the latter more useful, references are given to the pages in the present work where an account of each Order may be found; so that those who are accustomed to the use of other systems may not experience inconvenience from the arrangement proposed in the work now submitted to their consideration.

* I do not, however, include the arrangements of the German Naturphilosophists; not, indeed, from any disrespect to those learned men, but because I must confess my inability to master their ideas, or to comprehend how their views are made applicable to any intelligible classification. The student will, I believe, find full information upon the subject in Oken's *Lehrbuch der Naturphilosophie*, edition of 1843. See also Reichenbach's *Conspectus Regni Vegetabilis*, 1828, the same author's *Flora Germanica Excursoria*, 1830-2, and Schultz *Natürliches System des Pflanzenreichs*, 1832.

NATURAL SYSTEMS.

[Where references are given after the names of Orders, in this part of the present work, they refer to the page where such Orders are to be found in the succeeding sheets].

1703. RAY, JOHN.—(*Methodus Plantarum emendata et aucta*).

Here we have the germ of the present methods of natural arrangement. In fact the first divisions of the Vegetable Kingdom, proposed by Ray, are identical with those of Jussieu. Like him, he proceeded from the more imperfect to the most highly organised forms; the only difference being that he placed Dicotyledons before Monocotyledons. The author's words are "Floriferas dividemus in *dicotyledones*, quarum semina sata binis foliis anomalis, seminalibus dictis, quæ cotyledonum usum præstant, è terrâ exeunt, vel in binos saltem lobos dividuntur, quamvis eos supra terram foliorum specie non efferant; et *monocotyledones* quæ nec folia seminalia bina efferunt nec lobos binos condunt. Hæc divisio ad arbores etiam extendi potest: siquidem palmæ et congeneres hoc respectu eodem modo a reliquis arboribus differunt quo monocotyledones à reliquis herbis."

His plan was this:—

Plants are either
Flowerless, or
Flowering; and these are
Dicotyledones, or
Monocotyledones.

Among the genera of Ray, which were what we now call Natural Orders, were Fungi, Mosses, Ferns, Composites, Cichoraceæ, Umbellifers, Papilionaceous plants, Conifers, Labiates, &c., under other names, but with limits not very different from those now assigned to them.

1751. LINNÆUS, CHARLES.—(*Philosophia Botanica*).

"Plantæ omnes utrinque affinitatem monstrant, uti Territorium in mappa geographica."

The following is the Natural distribution first proposed by Linnæus, under the name of Fragments. Many of his groups were taken from his predecessors; others were contrived by himself. At a later period they underwent some alteration; but the list now given will serve to show the learned author's plan. He never assigned any characters to these Fragments.

- | | |
|--|--|
| <p>1. PIPERITÆ. Atum, &c. Piper, Phytolacca.
2. PALMÆ. Corypha, &c., Cycas.
3. SCITAMINA. Musa, Canna, Amomum, &c.
4. ORCHIDÆ. As now.
5. ENSATÆ. Iris, &c., Xyris, Eriocaulon, Aphyllanthes.
6. TRIPETALOIDÆ. Butomus, Alisma, Sagittaria.
7. DENDRATÆ. Crocus, &c.
8. SPATHACÆ. Leucium, Amaryllis, &c.
9. CORONARIÆ. Ornithogalum, Scilla, &c.
10. LILIACÆ. Liliun, Tulipa, &c.
11. MERICATÆ. Bromella, &c.
12. COADENATÆ. Anona, Magnolia, &c., Thea.
13. CALAMARIÆ. Scirpus, &c., Juncus?
14. GRAMINA. As now.
15. CONIFERÆ. Abies, Pinus, &c.
16. AMENTACÆ. Pistacia, Alnus, Populus, Juglans, Quercus, &c.
17. NUCAMENTACÆ. Xanthium, Iva, &c.
18. AGROGATÆ. Statice, Protea, Hebenstroïtia, Brunia, Valeriana, Boerhaavia, Circea? &c.
19. DUMOSÆ. Viburnum, Rondeletia, Cassina, Rhus, Ilex, Callicarpa, Lawsonia, &c.
20. SCABRIDÆ. Ficus, &c.
21. COMPOSITÆ. As now, nearly.
22. UMBELLATÆ. As now.
23. MULTISILIQUÆ. Modern Crowfoots.</p> | <p>24. BICORNES. Azalea, Myrsine, Memecylon, Santalum, &c.
25. SEPIARIÆ. Jasminum, Ligustrum, Brunfelsia, &c.
26. CULMINIÆ. Tilia, Bixa, Dillenia, Clusia, &c.
27. VAGINALES. Polygonum, Laurus, &c.
28. CORYDALES. Melianthus, Epimedium, Fumaria, Monotropi? &c.
29. CONTORTI. Ranwolfia, Vinca, Asclepias, &c.
30. RUBEADÆ. Papaver, Podophyllum, &c.
31. PUTAMINEÆ. Capparid, &c.
32. CAMPANACÆ. Convolvulus, Lobelia, Viola, &c.
33. LURIDÆ. Solanum, &c., Celsia, Digitalis.
34. COLIMNERIÆ. Camellia, Gossypium, Mentzella, &c., but chiefly Mallowworts.
35. SENTICOSÆ. Rosworts exclusively.
36. COMOSÆ. Spirea, Filipendula, Arnicus.
37. POMACÆ. Punica, Pyrus, &c., Ribes.
38. DRUPACÆ. As now.
39. ARBUSTIVA. Philadelphus, and Myrtleblooms.
40. CALYCANTHEMÆ. Oenothera, &c., Lythrum, Glaux, Rhexia.
41. HESPERIDÆ. Citrus, Styra, Garcinia.
42. CARYOPHYLLI. Cloveworts, with Frankenia and Scleranthus.
43. ASPERIFOLIÆ. The modern Borageworts.</p> |
|--|--|

- 44. STELLATÆ. Galium, &c., Hedysotis, Spigelia, Cornus? Coffea, &c.
- 45. CUCURBITACÆ. Passiflora and Cucurbits.
- 46. SUCCULENTÆ. Cactus, Mesembryanthemum, Sedum, Oxalis, Fagonia, &c. &c.
- 47. TRICOCCÆ. Cambogia, Euphorbia, &c., Cliffortia, Sterculia, &c.
- 48. INUNDATÆ. Hippuris, Elatine, Ruppia, Typha, &c.
- 49. SARMENTACEÆ. Vitis, Hedera, Houstonia, Ruscus, Smilax, Menispermum, Aristolochia, &c.
- 50. TRIHILATÆ. Sapindus, Malpighia, Begonia, Berberis? &c.
- 51. PRECIÆ. Part of modern Primworts.
- 52. ROTACEÆ. Gentiana, Lycimachia, Anagallis, &c.
- 53. HOLRACÆÆ.—Spinacia, &c., Herniaria, Callitriche, Petiveria, &c.
- 54. VERRESCULÆ. Rhamnus, &c., Lycium, Daphne, &c.
- 55. PAPILIONACEÆ. As now.
- 56. LOMENTACEÆ. Leguminous plants, with jointed pods, Cæsaliinæ and Mimoseæ.
- 57. SILIQUOSÆ. Crucifers.
- 58. VERTICILLATÆ. Labiates.
- 59. PRÆSONATÆ. Figworts, Sesamum, Justicia, Bignonia, Verbena, &c.
- 60. PERFORATÆ. Hypericum, Cistus, Telephium.
- 61. STATMINATÆ. Ulinus, Celtis, Bosen.
- 62. CANDELARÆ. Rhizophora, Mimusops, Nyssa.
- 63. CYMOSÆ. Lonicera, Loranthus, Ixora, Cinchona? &c.
- 64. FILICES. As now.
- 65. MUSCI. As now.
- 66. ALGÆ. Nearly as now.
- 67. FUNGI. As now.
- 68. VAGÆ. All his doubtful genera.

At a later period Nos. 7, 10, II, 17, 26, 27, 36, 38, 39, 60, 61, 62 and 63, were cancelled; and four added. viz.
 GRUNALÆ. Cranesbills.
 CALYCFLOREÆ. Osyris, Trophis, Hippophæe, Eleagnus.
 HEDERACEÆ. Hedera and Vitis, &c.
 MISCELLANÆ. A curious mixture.

1789. JUSSIEU, Antoine Laurent de.—(*Genera Plantarum secundum ordines naturales disposita, juxta methodum in horto regio Parisiensi exaratum, anno MDCCCLXXIV.*)

Adopting the views of Ray as to primary divisions, Jussieu applied them to the system of Tournefort, which had been in common use in France from the year 1694, and which was by far the best suited for the state of knowledge of the age in which it was promulgated. To this he added the position of the stamens with respect to the ovary, and thus constructed his 15 classes in the following manner:—

		CLASS.	
Acotyledones.		I.	
Monocotyledones.	{ Stamina hypogyna.	II.	
	{ ————— perigyna.	III.	
	{ ————— epigyna.	IV.	
	{ Stamina epigyna.	V.	
Dicotyledones.	{ ————— perigyna.	VI.	
	{ ————— hypogyna.	VII.	
	{ Apetalæ.	{ Corolla hypogyna.	VIII.
		{ ————— perigyna.	IX.
	{ Monopetalæ.	{ ————— epigyna.	X.
		{ Antheris connatis.	XI.
		{ Antheris distinctis.	XII.
	{ Polypetalæ.	{ Stamina epigyna.	XIII.
		{ ————— hypogyna.	XIV.
		{ ————— perigyna.	XV.
Dielines irregulares.		XVI.	

Under each of these classes he arranged his Natural Orders as follows, usually deriving their name from some genus, which he regarded as a good illustration of their general structure.

Class I.	Class IV.	Class VIII.	Class X.
1. Fungi, 29	19. Muscæ, 163	34. Lysimachieæ, 644	53. Cichoraceæ, 702
2. Algæ, 8	20. Cannæ, 165	35. Pedicularæ, 681	54. Cinarocephalæ, 702
3. Hepaticæ, 58	21. Orchidæ, 173	36. Acanthi, 678	55. Corymbifereæ, 702
4. Musci, 64	22. Hydrocharides, 141	37. Jasmineæ, 650	
5. Filices, 74		38. Vitices, 603	Class XI.
6. Naiades, 143	Class V.	39. Labiatæ, 659	56. Dipsacææ, 699
	23. Aristolochiæ, 792	40. Scrophulariæ, 681	57. Rubiacææ, 761
Class II.		41. Solanææ, 618	58. Caprifolia, 766
7. Aroidææ, 127	Class VI.	42. Boraginææ, 655	
8. Typhææ, 126	24. Elæagni, 257	43. Convolvuli, 630	Class XII.
9. Cyperoidææ, 117	25. Thymelææ, 530	44. Polemonia, 635	59. Araliææ, 730
10. Graminææ, 106	26. Proteææ, 532	45. Bignoniææ, 675	60. Umbellifereæ, 773
	27. Lauri, 535	46. Gentianææ, 612	
Class III.	28. Polygoneræ, 502	47. Apocinææ, 599	Class XIII.
11. Palmaræ, 134	29. Atripliceæ, 512	48. Sapotææ, 590	61. Ranunculacææ, 425
12. Asparagi, 200			62. Papaveracææ, 430
13. Junci, 191	Class VII.	Class IX.	63. Crucifereæ, 351
14. Lilia, 200	30. Amaranthi, 510	49. Guaiacacææ, 595	64. Capparides, 357
15. Bromeliæ, 147	31. Plantaginææ, 642	50. Rhododendra, 453	65. Sapindi, 382
16. Asphodeli, 200	32. Nyctaginææ, 506	51. Ericææ, 453	66. Acerææ, 387
17. Narcissi, 155	33. Plumbaginææ, 640	52. Campanulacææ, 689	67. Malpighiææ, 388
18. Irides, 159			68. Hypericææ, 405

69. Guttiferae, 400	78. Berberides, 437	85. Cacti, 746	94. Terebintaceae, 465
70. Aurantia, 457	79. Tiliaceae, 371	86. Portulacae, 500	95. Rhamn. 581
71. Melia, 463	80. Cisti, 349	87. Ficoideae, 525	
72. Vites, 439	81. Rutaceae, 469	88. Onagriae, 724	Class XV.
73. Gerania, 493	82. Caryophylleae, 496	89. Myrti, 734	96. Euphorbiae, 274
74. Malvaceae, 368	Class XIV.	90. Melastomae, 731	97. Cucurbitaceae, 311
75. Magnoliae, 417	83. Sempervivae, 344	91. Salicariae, 574	98. Urticae, 258
76. Anonae, 420	84. Saxifragae, 567	92. Rosaceae, 563	99. Amentaceae, 248
77. Menispermata, 307		93. Leguminosae, 544	100. Coniferae, 226

1810. BROWN, Robert.—(*Prodromus Florae Novae Hollandiae, &c.*)

In this work the system of Jussieu is principally followed, but the Classes are omitted, and the sequence of the Orders is changed. The author states that he regards most of the Orders of Jussieu as being truly natural, but his classes, as the latter candidly admits, often artificial, and apparently founded upon doubtful principles. It was the intention of Dr. Brown to publish a second volume of his work, and then to explain his views upon this and other subjects; but that intention has not yet been carried into execution. It is here that we find the importance of the æstivation of the flower pointed out, and applied to the characters of Natural Orders. Those characters have been a model for succeeding writers.

1813. DE CANDOLLE, A. P.—(*Théorie Élémentaire de la Botanique, ou Exposition des Principes de la Classification Naturelle et de l'Art de décrire et d'étudier les Végétaux.*)

In this work is to be found the explanation of the principles which guided its clear-minded author to the construction of a method of arrangement which has now almost superseded all others, partly because of its easiness and simplicity, and most especially because it is that which has been followed in the author's *Prodromus*, or celebrated description of species. He himself explains the course he has taken, to the following effect:—"I place Dicotyledons first, because they have the greatest numbers of distinct and separate organs. Then, as I find families where some of these organs become consolidated, and consequently seem to disappear, I refer them to a lower rank. This principle gives me the following series:—

1. Dicotyledons; polypetalous and hypogynous.
2. —————; ————— and perigynous.
3. —————; monopetalous and perigynous.
4. —————; ————— and hypogynous.
5. —————; apetalous, or with a single perianth.
6. Monocotyledons; phænogamous.
7. —————; cryptogamous.
8. Acotyledons; leafy and sexual.
9. —————; leafless and without any known sexes.

I have adopted this series partly because I think it that which is least removed from a natural sequence, and partly because it is convenient and easy for study. But let no one imagine that I attach the least importance to it. The true science of general Natural History consists in the study of the symmetry peculiar to each family, and of the relation which these families bear to each other. All the rest is merely a scaffolding, better or worse suited to accomplish that end."—p. 206, *first edition.*

At this time De Candolle made no attempt to combine the Natural Orders in Alliances; but at a later period (1819), in a second edition of the *Théorie*, he proposed a few such groups, under the name of Cohorts, as will be seen by the following list of his Orders, taken from the edition of 1819. In that of 1844, published by his son after his death, these Cohorts are all broken up, and considerable alterations are made in the sequence of the Natural Orders. I, however, prefer publishing his plan of forming Alliances, rather than his last list, even although that does give his latest views of affinity.

I. VASCULAR OR COTYLEDONOUS PLANTS; that is to say, furnished with cellular tissue and vessels, and whose embryo is provided with one or more cotyledons.	A. Perianth double; that is, where the calyx and corolla are distinct.	6. Berberideae, 437	18. Droseraceae, 431
	THALAMIFLORE	7. Podophylleae, 430	19. Frankeniaceae, 340
I. Exogens or Dicotyledons; that is to say, where the vessels are arranged in concentric layers, of which the youngest are the outermost, and where the embryo has opposite or verticillate cotyledons.	Petals distinct, inserted on the receptacle.	8. Nymphiaceae, 409	20. Cistinea, 349
	Cohort I. Carpels numerous, or stamens opposite the petals.	Cohort II. Carpels solitary or consolidated, placentae parietal.	Cohort III. Ovary solitary, placentae central.
1. Ranunculaceae, 425	9. Papaveraceae, 430	21. Caryophylleae, 496	22. Linnaeae, 485
2. Dilleniaceae, 423	10. Punnariaceae, 435	23. Malvaceae, 368	24. Chileniaceae, 486
3. Magnoliaceae, 417	11. Cruciferae, 351	25. Bytterliniaceae, 363	26. Sterculiaceae, 360
4. Anonaceae, 420	12. Capparideae, 357	27. Tillaceae, 371	28. Elmoocarpeae, 371
5. Menispermata, 307	13. Flacourtiaceae, 327	29. Sapindaceae, 382	30. Hippocastaneae, 382
	14. Passiflorae, 332		
	15. Violaceae, 338		
	16. Polygalae, 375		
	17. Resedaceae, 359		

31. Aceraceæ, 387
 32. Malpighiaceæ, 368
 33. Ihipocraticeæ, 584
 34. Ilypericineæ, 405
 35. Guttiferæ, 400
 36. Marcravilaceæ, 403
 37. Sarmenlaceæ, 439
 38. Geraniæ, 493
 39. Cedreleæ, 461
 40. Meliaceæ, 463
 41. Hesperidæ, 457
 42. Camellieæ, 396
 43. Olacineæ, 443
 44. Rutaceæ, 469
- Cohort IV. Fruit gynobasic.
45. Simaroubeæ, 476
 46. Ochnaceæ, 474
- CALYCFLOREÆ.
- Petals free or more or less united, always perigynous or inserted on the calyx.
47. Fraugulaceæ, 581
 48. Samydeæ, 330
 49. Zanthoxyloæ, 472
 50. Juglandæ, 292
 51. Terebiathaceæ, 465
 52. Leguminaloæ, 544
 53. Rosaceæ, 563
 54. Salicariæ, 574
 55. Tanaariscineæ, 341
 56. Melastomeæ, 731
 57. Myrtineæ, 734
 58. Coabretaceæ, 717
 59. Cucurbitaceæ, 311
 60. Loasæ, 744
 61. Onagrariæ, 734
 62. Ficoïdeæ, 525
 63. Paronychiæ, 510
 64. Portulacæ, 500
 65. Nopaleæ, 746
 66. Grossulaceæ, 750
 67. Crassulaceæ, 344
68. Saxifrageæ, 567
 69. Cunoniaceæ, 571
 70. Umbellifereæ, 773
 71. Araliaceæ, 780
 72. Caprifoliæ, 766
 73. Loranthæ, 789
 74. Rubiaceæ, 761
 75. Operculariæ, 761
 76. Valerianæ, 697
 77. Dipsaceæ, 699
 78. Calycereæ, 701
 79. Compositæ, 702
 80. Campaaulaceæ, 689
 81. Lobeliaceæ, 692
 82. Gesneriæ, 671
 83. Vacuiiæ, 757
 84. Ericiæ, 453
- COOLLIFLOREÆ.
- Petals united into an hypogynous corolla, or not attached to the calyx.
85. Myrsinæ, 647
 86. Sapoteæ, 590
 87. Terustroniæ, 396
 88. Ebenaceæ, 595
 89. Oleinæ, 616
 90. Jasiinæ, 650
 91. Strychnæ, 602
 92. Apocynæ, 599
 93. Gentianæ, 612
 94. Bignoniaceæ, 675
 95. Sesaniæ, 669
 96. Polemoaldeæ, 635
 97. Convolvulaceæ, 630
 98. Boraginæ, 655
 99. Solanæ, 618
 100. Aatirrhiaæ, 681
 101. Rhlmanthaceæ, 681
 102. Labiatæ, 659
 103. Myoporinæ, 665
 104. Pyrenaceæ, 663
 105. Acanthaceæ, 678
 106. Lentibulariæ, 686
 107. Primulacæ, 644
 108. Globulariæ, 666
- B. MONOCHLAMYDEÆ.
- Perianth simple, or whose calyx and corolla form only one envelope.
109. Plumbagineæ, 640
 110. Plantagineæ, 642
 111. Nyctagineæ, 506
 112. Amaranthaceæ, 510
 113. ? Euphorbiaceæ, 512
 114. Begoniaceæ, 318
 115. Polygoæ, 502
 116. Laurinæ, 535
 117. Myristicæ, 301
 118. Proteaceæ, 532
 119. Thymcleæ, 530
 120. Santalaceæ, 787
 121. Elæagacæ, 257
 122. Aristolochiæ, 792
 123. ? Euphorbiaceæ, 274
 124. Mouinieæ, 298
 125. Urticæ, 260
 126. Piperitæ, 515
 127. Ametaceæ, 254
 128. Coniferæ, 226
2. Eadogeas or Monocotyledons; that is to say, plants whose vessels are arranged in bundles, the youngest belag in the middle of the trunk, and whose embryo is furnished with solitary or alternate cotyledons.
- A. PHANEROGAMS.
- Fructification visible, regular.
129. Cycadæ, 223
 130. Hydrocharidæ, 141
 131. Alismaceæ, 209
 132. Orchidæ, 173
 133. Drymyrhizæ, 165
 134. Musaceæ, 163
135. Iridæ, 159
 136. Ilæmodoraceæ, 151
 137. Amarylloideæ, 155
 138. Hemerocallidæ, 200
 139. ? Dioscoreæ, 214
 140. Smilacæ, 215
 141. Liliacæ, 200
 142. Colchicæ, 198
 143. Juncæ, 191
 144. Conneliæ, 188
 145. Palmæ, 133
 146. Paadaæ, 130
 147. Typhacæ, 126
 148. Aroïdeæ, 127
 149. Cyperaceæ, 117
 150. Graminæ, 106
- B. CRYPTOGAMS. Fructification hidden, unknown or irregular.
151. Nafades, 143
 152. Equisetaceæ, 61
 153. Marsilicæ, 71
 154. Lycopodineæ, 69
 155. Filices, 78
- II. CELLULOSA ACOTYLEDONOUS PLANTS; that is to say, composed of cellular tissue only, not furnished with vessels, and whose embryo is without cotyledons.
- A. POLIACEÆ, having leaf-like expansions, and known sexes.
156. Musci, 64
 157. Hepaticæ, 58
- B. APHYLLÆ, not having leaf-like expansions, and no known sexes.
158. Lichenes, 45
 159. Hypoxylo, 29
 160. Fungi, 29
 161. Algæ, 8

1825. AGARDH, Carl von.—(*Classes Plantarum*).

This is a duodecimo pamphlet of 22 pages, with a coloured map, and is a recapitulation of the views of classification promulgated by its author between 1821 and 1826, in his *Aphorismi Botanici*. The object is to group Natural Orders in Classes, that is to say, in divisions subordinate to the primary ramifications of a system, and equivalent to my Alliances. "Classes," says Bishop Agardh, "should be formed by the same rules and on the same principles as Genera and Orders; and therefore not by the breaking up of higher groups, but by the gathering together of lower groups. Yet, up to this time, all the so-called natural classes of plants have been formed upon an opposite principle, with the exception of the arrangement of Batsch.—We must distinguish, with Linæus, between the character of a plant and its affinity. The former is derived from the latter, and not *vice versa*. Plants will sometimes agree in very few characters, which nevertheless are bound together by the strongest possible affinity. For instance, *Ceratonia* is very different from Leguminous plants, and *Fraxinus* from *Jasmines*; yet they are nearly allied."

Agardh's primary divisions are nine; namely,

1. Acotyledons.
2. Pseudocotyledons.
3. Cryptocotyledons.
4. Phanerocotyledons; incomplete.
5. _____; complete, hypogyaous, monopetalous.
6. _____; _____, polypetalous.
7. _____; _____, discigynous, monopetalous.
8. _____; _____, polypetalous.
9. _____; _____, perigynous.

But he adds, that the perigynous and discigynous structures run together, and that no fixed difference can be found between the monopetalous and polypetalous conditions.

The Classes or Alliances which are formed within these primary groups are contrived without sufficient regard to the definitions which precede them, and by which alone they are to be recognised. In fact, the principle of disregarding characters and trusting

merely to (presumed) affinity, is carried to such a length as to diminish the value of the groups; and hence, no doubt, Agardh's method has never been adopted, notwithstanding its merits in some respects.

He describes, in the following words, what he conceives to be the fundamental principles of natural classification:—

“Forma normalis in omnibus plantis non æque perspicua, sed sæpissime in quacunque sectione sensum magis magisque prominet et explicatur, ita ut in quibusdam plantis perfectissima appareat, et in aliis vix perspicienda.

“Forma normalis constantior cernitur in fructificatione, h. e. in flore et fructu, quam in habitu, tam quia in unum tantum finem illa explicatur, cum organa vegetationis indirecte etiam florem et fructum præparare debent, quam etiam quia partes vegetationis individuum tantum servant, fructus vero formam normalem perennem tueri debet.

“Sequitur tamen sæpissime habitus fructificationem, ita ut plantæ quæ flore et fructu non differant, habitu etiam quodam generali conveniant. Non autem semper nec necessario.

“Hinc systema in fructificatione nititur.

“Ceterum observandum, quod fructus jamdudum plantam quamvis non explicitam continet, et quod planta antequam flos et fructus eam coronet, non perfecta est.

“In sectione vero illa, quam speciem vocamus, non fructus solus characteres præbet, quia in omnibus notis, præter quod e causis accidentalibus pendeat, convenire debent individua ejusdem speciei.

“Affinitas plantarum componitur secundum nostram sententiam tam e multitudine characterum quorumcumque in quibus conveniunt, quam ex eorum præstantia et prominentia.

“Sic sufficit vel levis nota in flore et fructu, si multis notis habitualibus conveniunt plantæ; et quo pauciores notæ præstantiorum partium communes sunt, eo pluribus convenire debent in partibus minoris momenti. Sic etiam quo magis prominet character quidam, eo minus dilaceranda sectio, etiam si pluribus aliis notis differunt plantæ sub ea incluse.”

1826. PERLEB, C. J.—(*Lehrbuch der Naturgeschichte der Pflanzenreichs.*)

See this author's *Clavis*, 1838. p. xlix.

1827. DUMORTIER, B. C.—(*Florula Belgica.*)

The following is the system of this author, who does not appear to have given any account of its principles. His Orders are equivalent to Alliances. His *Staminiacia* begins with Conifers and ends with Lemnads, and is the only part concerning which I find any details:—

CLASSES.	SUB-CLASSES.	DIVISIONS.	ORDERS.
Staminiacia	Corticalia	Simplitegmia	1. Julitegmia
			2. Fructitegmia
		Tubifloria	3. Thalamitegmia
			4. Thalamitubia
			5. Fructitubia
			6. Fructungulia
	Unguifloria	7. Calicungulia	
		8. Thalamungulia	
		9. Thalamifloria	
		10. Fructifloria	
Decorticalia	Bitegmia	11. Calicifloria	
		12. Fructaulia	
	Solitegmia	13. Thalamaulia	
		14. Realyptria	
Pollinacia	Capsella	15. Calyptria	
	Encapsella	16. Scutellinea	
Fluidacia	Soligrania	17. Fungia	
	Plurigrania	18. Granulina.	
			19. Cocculina
			20. Farthia.

CHARACTERS OF THE ORDERS.

1. Julitegmia.—Flowering scales, placed on a cutkin.
2. Fructitegmia.—Floral envelope one, epigynous.
3. Thalamitegmia.—Floral envelope one, hypogynous.
4. Thalamitubia.—Tube of a monopetalous corolla hypogynous.
5. Fructitubia.—Tube of a monopetalous corolla hypogynous.
6. Fructungulia.—Claws of a polypetalous corolla epigynous.
7. Calicungulia.—Claws of a polypetalous corolla perigynous.
8. Thalamungulia.—Claws of a polypetalous corolla hypogynous.
9. Thalamifloria.—Corolla hypogynous.
10. Fructifloria.—Corolla epigynous.
11. Calicifloria.—Corolla perigynous.
12. Fructaulia.—Floral envelope one, epigynous.
13. Thalamaulia.—Floral envelope one, hypogynous.

1830. BARTLING, Fr. Th.—(*Ordines Naturales Plantarum, eorumque Characteres et Affinitates, adjectâ generum enumeratione*).

In this work the Vegetable Kingdom is divided into 8 principal divisions, and 60 subdivisions or Alliances, called by the author Classes. The latter are furnished with detailed characters drawn up in the same manner as those of the Orders, and to the whole is prefixed an abridgment of the plan of classification. The synonyms of the Alliances are slightly given; but it is remarkable that they do not contain any allusion to the anterior works of Perleb and Agardh. As this work is the first in which considerable details are introduced into the characters of Alliances, it seems worth stating, at length, its nature, which is as follows:—

Plants are				
CELLULAR	OF	VASCULAR.		
			
Homogeneous or Heterogeneous.	Cryptogamic	Phanerogamic.		
			
		Monocotyledonous	or	Dicotyledonous.
		With the embryo included in a vitellus,	or	With the embryo naked.
Fungi. Lichenes. Alge.	Rhizocarpe. Filices. Lycopodiace. Gonyopterides.	Glumace. Juncace. Fasace. Liliace. Orchide. Scitamine. Pabne. Aroid. Helobie. Hydrocharide.	Conifere. Amentace. Urticace. Fagopyrine. Protéac. Salicac.	<i>Polypetalous.</i> Loranth. Umbelliflor. Cocculac. Trisepal. Polycarpic. Rhocead. Pepomifer. Cistiflor. Tubiflor. Contort. Rubiace. Ligustrac.
	" " Musci.			

Class I. FUNGI.
 Coniomyces, 29
 Gasteromyces, 29
 Pyrenomycetes, 29
 Hymenomyces, 29

Class II. LICHENES.
 Coniothalami, 45
 Hymenothalami, 45
 Pyrenothalami, 45

Class III. ALGÆ.
 Nostochineæ, 18
 Confervaceæ, 14
 Florideæ, 23
 Fucaceæ, 20

Class IV. MUSCI.
 Hepaticæ, 58
 Bryaceæ, 64

Class V. RHIZOCARPEÆ.
 Salviniaceæ, 71
 Marsiliaceæ, 71
 Isoëtæ, 71

Class VI. FILICES.
 Polypodiaceæ, 78
 Osmundaceæ, 78
 Ophioglossæ, 77

Class VII. LYCOPODI-
 NEÆ.
 Lycopodiaceæ, 69

Class VIII. GONIOPE-
 RIDES.
 Characeæ, 26
 Equisetaceæ, 61

Class IX. GLUMACEÆ.
 Gramineæ, 106
 Cyperaceæ, 117

Class X. JUNCINÆ.
 Restiaceæ, 121
 Juncaceæ, 191
 Xyridæ, 1-7
 Comnelinaceæ, 188

Class XI. ENSATÆ.
 Burmanniaceæ, 171
 Hypoxilacæ, 159
 Hemodoraceæ, 151
 Iridæ, 151
 Amaryllidæ, 155
 Bromeliaceæ, 147

Class XII. LILIACEÆ.
 Asphodelæ, 200
 Colchicaceæ, 198
 Smilacæ, 215
 Dioscoreæ, 214

Class XIII. ORCHIDEÆ.
 Orchidæ, 173

Class XIV. SCITAMI-
 NÆÆ.
 Amomoneæ, 165
 Cannaceæ, 168
 Mniaceæ, 163

Class XV. PALMÆ.
 Palmæ, 123

Class XVI. ARTHRO-
 CALLACEÆ.
 Callaceæ, 193

Orontineæ, 193
 Typhaceæ, 126

Class XVII. HELONIÆ.
 Najadeæ, 143
 Podostemeæ, 482
 Alismaceæ, 209
 Butomeæ, 208

Class XVIII. HYDRO-
 CHARIDÆÆ.
 Hydrocharidææ, 141

Class XIX. ARISTO-
 LOCHIEÆ.
 Balanophoreæ, 89
 Cytineæ, 91
 Asurineæ, 792
 Taccææ, 149

Class XX. PIPERINÆ.
 Saurureæ, 521
 Piperaceæ, 515
 Chloranthææ, 519

Class XXI. HYDROPEL-
 TIDEÆ.
 Cabombeæ, 412
 Nymphaeaceæ, 409
 Nelumboneæ, 414

Class XXII. CONIFERÆ.
 Cycadeæ, 223
 Abietinæ, 226
 Cupressinæ, 226
 Taxinæ, 230

Class XXIII. AMENTA-
 CEÆ.
 Casuarineæ, 249
 Myricææ, 256
 Betulaceæ, 251
 Cupuliferæ, 290
 Ulmaceæ, 580

Class XXIV. UATICINÆ.
 Morimieæ, 298
 Artocarpeæ, 269
 Urticææ, 269

Class XXV. FAGOPY-
 RINÆ.
 Polygonicæ, 502
 Nyctagineæ, 506

Class XXVI. PROTÆI-
 NÆÆ.
 Laurineæ, 545
 Santalaceæ, 787
 Ebenaceæ, 257
 Thymelææ, 529
 Proteaceæ, 532

Class XXVII. SALICI-
 NÆÆ.
 Salicinæ, 254

Class XXVIII. AGGRE-
 GATEÆ.
 Plantaginæ, 612
 Plantaginæ, 619
 Colobariacæ, 666
 Dipsacæ, 669
 Valerianicæ, 667

Class XXIX. COMPO-
 SITEÆ.
 Calyceræ, 701
 Synantherææ, 702

Class XXX. CAMPANU-
 LINEÆ.
 Goodenovicæ, 694
 Stylidææ, 696
 Lobeliaceæ, 692
 Campanulaceæ, 689

Class XXXI. ERICINÆÆ.
 Vacciniææ, 757
 Ericææ, 453
 Epacridææ, 448

Class XXXII. STYRA-
 CINÆÆ.
 Styraceæ, 592
 Ebenaceæ, 595
 Sapoteæ, 590

Class XXXIII. MYR-
 SINEÆÆ.
 Ardisiaceæ, 647
 Primulaceæ, 644

Class XXXIV. LABIA-
 TIFLORÆÆ.
 Lentibulariæ, 686
 Scrophularinæ, 681
 Orobanchææ, 609
 Gesneriææ, 671
 Sesameæ, 669
 Myoporinæ, 665
 Selaginææ, 666
 Verbeuaceæ, 663
 Labiatæ, 659
 Acanthaceæ, 678
 Iignoninææ, 675

Class XXXV. TURI-
 FLORÆÆ.
 Polemoniaceæ, 635
 Hydroleaceæ, 638
 Convolvulaceæ, 630
 Cuscutææ, 633
 Solanaceæ, 618
 Hydrophyllææ, 638
 Borraginææ, 655

Class XXXVI. CON-
 TORTÆÆ.
 Gentianeæ, 612
 Asclepiadææ, 623
 Apocynææ, 599
 Loganiææ, 602

Class XXXVII. RUBIA-
 CINÆÆ.
 Lygodysodeaceæ, 761
 Rubiaceæ, 761
 Caprifoliaceæ, 766
 Viburnææ, 766

Class XXXVIII. LIGU-
 STRINÆÆ.
 Jasminææ, 650
 Oleinææ, 616

Class XXXIX. LO-
 BANTHERÆÆ.
 Loranthææ, 789

Class XL. UMBELLU-
 FLORÆÆ.
 Umbelliferæ, 773
 Araliaceæ, 770
 Pedaceææ, 770
 Hamamelidææ, 784

Class XLI. COCCULINÆÆ.
 Berberidææ, 437
 Menispermææ, 397

Class XLII. TRISK-
 IALÆÆ.
 Myristicææ, 301
 Anonnceææ, 420

Class XLIII. POLYCAR-
 PICÆÆ.
 Magnoliaceæ, 417
 Dilleniaceæ, 423
 Ericaceææ, 425
 Ranunculaceææ, 425

Class XLIV. RHÆ-
 DEÆÆ.
 Tremandreeæ, 374
 Polygalææ, 375
 Resedaceææ, 356
 Fumariaceææ, 435
 Papaveraceææ, 430
 Crucifereææ, 351
 Capparidæææ, 357

Class XLV. PEPONI-
 FERÆÆ.
 Samydeææ, 330
 Honallicææ, 742
 Passifloreææ, 332
 Turneræææ, 347
 Lonsæææ, 744
 Cneurbitaceææ, 311
 Grossulariæææ, 750
 Nopalæææ, 746

Class XLVI. CISTIFLO-
 RÆÆÆ.
 Flacourtiaceææ, 327
 Marsegraviæææ, 403
 Bixineæææ, 327
 Cistinæææ, 349
 Violariæææ, 338
 Droseraceæææ, 433
 Tamarisicæææ, 341

Class XLVII. GUTTI-
 FERÆÆÆ.
 Sauvagesiereææ, 343
 Frankeniaceææ, 340
 Hypericineæææ, 405
 Garcinææææ, 400

Class XLVIII. CARYO-
 PHYLLINÆÆÆ.
 Chenopodiæææ, 512
 Amaranthaceæææ, 510
 Phytolacææææ, 509
 Scleranthææææ, 528
 Paronychiææææ, 499
 Portulacææææ, 500
 Aisinetææææ, 496
 Silenæææææ, 496

Class XLIX. SUCCU-
 LENTÆÆÆÆ.
 Ficoidææææ, 525
 Crassulicææææ, 344
 Saxifragæææææ, 567
 Cunonidæææææ, 571

Class L. CALYCIFLORÆÆÆÆÆ.
 Haloragæææææ, 722
 Lythraceæææææ, 574
 Umbelliferæææææ, 721
 Chizophoreæææææ, 726
 Vochyidææææææ, 479
 Combretaceæææææ, 717

Class LI. CALYCAN-
 THINÆÆÆÆÆÆ.
 Graminææææææ, 734
 Calycanthææææææ, 510

Class LII. MYRTINÆ. Memecylacæ, 731 Melastomacæ, 731 Myrtacæ, 734	Class LV. GRUINALIS. Geraniacæ, 493 Linææ, 485 Oxalidacæ, 488	? Rhizophoracæ, 398 Tropæolacæ, 366	Diosmeacæ, 469 Rutacæ, 469 Zygophylacæ, 478 Aurantiacæ, 457 Amyridacæ, 459 Comaracæ, 463 Cassinviacæ, 465 ? Juglandacæ, 292
Class LIII. LAMPRO- PHYLLÆ. Camelliacæ, 396 Ternstroemiacæ, 396 Chlencæ, 486	Class LVI. AMPELIDRÆ. Samentacæ, 439 Leencæ, 439 Meliacæ, 463 Cedreleræ, 461	Class LVIII. TRICOCCLÆ. Stackhouseacæ, 589 Euphorbiacæ, 274 Empetræ, 285 Bruniacæ, 785 Rhamnacæ, 581 Aquifoliacæ, 597 Pittosporæ, 441 Celastrinæ, 586 ? Hippocrateacæ, 584 ? Staphyleacæ, 381	Class LX. CALOPHYTÆ. Pomacæ, 559 Rosacæ, 563 Dryndæ, 563 Spiræacæ, 563 Amygdalæ, 557 Chrysobalanæ, 542 Papilionacæ, 544 Swartziacæ, 544 Cassalpinæ, 544 Mimosæ, 544
Class LIV. COLUMNI- FERÆ. Tiliacæ, 371 Sterculiacæ, 360 Buttneriacæ, 363 Hernaniacæ, 363 Dombeyacæ, 363 Malvacæ, 368	Class LVII. MALPIG- HINÆ. Malpighiacæ, 388 Acerinæ, 387 Coriariæ, 475 Erythroxylæ, 391 Sapindacæ, 382 Hippocastanæ, 382	Class LIX. TEREBIN- THINÆ. Oclnacæ, 474 Sinnamibæ, 476 Zauthoxylæ, 472	

1830. LINDLEY, JOHN.—(*An Introduction to the Natural System of Botany, &c.*)

This was a slight modification of De Candolle's plan, with the apetalous and polypetalous plants thrown together, and consequently with a different sequence of the Natural Orders. No attempt was made at forming the minor groups, now called Alliances.

Class I. VASCULARS, or Flowering Plants.

Sub-class 1. Exogens or Dicotyledons.

Tribe 1. Angiospermæ.

§ 1. Polypetalous, apetalous, and ahlamydeous plants.

§ 2. Monopetalous plants.

Tribe 2. Gymnospermæ.

Sub-class 2. Endogens or Monocotyledons.

Tribe 1. Petaloideæ.

Tribe 2. Glumacæ.

Class II. CELLULARS, or flowerless plants.

Tribe 1. Filicoidæ; or Fern-like plants.

Tribe 2. Muscoidæ; or Moss-like plants.

Tribe 3. Aphyllæ; or Leafless plants.

1832. HESS, J.—(*Uebersicht der Phanerogamischen natürlichen pflanzenfamilien mit einer kurzen charakteristik derselben*).

This is essentially an imitation of the method of De Candolle, with some changes in the sequence of Orders. No attempt is made at forming groups higher than Natural Orders, and it cannot be said that the work has contributed to the progress of Natural classification. The great object of the author seems to have been to form a good series.

1832. SCHULTZ, Carl Heinrich.—(*Natürliches System des Pflanzenreichs nach seiner inneren organization*).

In some respects this is like the system of De Candolle. The author first breaks up the Vegetable Kingdom into *Homorgana*, which have an exclusively cellular construction, and *Heterorgana*, which are formed with spiral vessels, and laticiferous vessels in addition. These are evidently the Cellular and Vascular plants of De Candolle. His Heterorgana he divides into *Synorgana* and *Dichorgana*, the first having all the forms of tissue dispersed through a common cellular mass, the latter having them separated in the form of bark and wood; *Synorgana* are therefore Endogens, and *Dichorgana* Exogens. The principal peculiarity consists in laticiferous vessels or cinenchyma being made a mark of classification, a certain number of flowering plants being thus combined with flowerless, under the name of *Homorgana florifera*; viz., Charads, Naiads, Hornworts, Podostemads, Seawracks, Hydrocharids, Lemnads, &c. Another peculiar feature is the formation among *Synorgana*, or Endogens, of a Class called *Synorgana dichorganoideæ*, which is regarded as intermediate in nature between *Synorgana* and *Dichorgana*. This Class is divided into 2 groups, of which the first consists of Peppers, Saururads, and Chloranths, the second of Nyctagos, Waterstars, Hippurids, Amaranths, Cycads, Waterlilies, &c. The plan of this classification is as follows:—

Vegetabilia.	Heterogama.	Homorgana . . .	{	1. sporifera . . .	{	Class I. Homorgana rhizospora.
				2. florifera . . .		— II. Homorgana phyllospora.
		Synorgana . . .	{	1. sporifera . . .	{	— III. Homorgana caulospora.
				2. florifera . . .		— IV. Homorgana florifera.
		Dichorgana (omnifa florifera . . .)	{	{	— V. Synorgana sporifera.	
					— VI. Synorgana gymnautha.	
					— VII. Synorgana coronautha.	
					— VIII. Synorgana palmarum.	
					— IX. Synorgana dichorganoidea.	
					— X. Dichorgana lepidantha.	
					— XI. Dichorgana perianthina.	
					— XII. Dichorgana authodonta.	
					— XIII. Dichorgana siphonantha.	
					— XIV. Dichorgana petalantha monocarpa.	
					— XV. Dichorgana petalantha polycarpa.	

1833. LINDLEY, John.—(*Nixus Plantarum*).

This was an attempt, in imitation of Agardh and Bartling, to reduce the Natural Orders into groups subordinate to the higher divisions. Such groups were called *Nixus* (tendencies). The author threw aside the distinctions between perigynous and hypogynous insertion as uncertain and leading to bad grouping; insisted upon the value of albumen as a primary character, and objected to the general principle that the sections of plants are to furnish their character, and not a character the section. Finally, he maintained that no sections are capable of being positively defined, except such as depend upon physiological peculiarities; and that all other collections of species, by whatever name they are known, whose distinguishing marks are dependent upon structure alone, merely exhibit tendencies to resemblance in certain points, for which tendencies definitions are impracticable.

Keeping these principles in view, the following was the arrangement:—

		CLASSES.
Sexuales	{	I. EXOGENÆ. ANGIOSPERMÆ.
		II. EXOGENÆ. GYMNOSPERMÆ.
V. ESEXUALES.	{	III. ENDOGENÆ.
		IV. RHIZANTHÆ.

Class I. EXOGENÆ.

Sub-class I. POLYPETALÆ.

Cohort 1. ALBUMINOSÆ; embryo much smaller than the albumen.

<p>N. 1. <i>Ranales</i>.</p> <p>Ranunculaceæ § Sarraceniacæ Papaveraceæ § Fumariaceæ Nymphaeaceæ § Podophylleæ § Hydropeltideæ</p>	<p>N. 2. <i>Anonales</i>.</p> <p>Nelumboneæ Cephaloteæ Myristicæ Magnoliaceæ Winteræ Anonaceæ</p>	<p>§ Schizandreæ Dilleniaceæ</p> <p>N. 3. <i>Umbellales</i>.</p> <p>Umbellifereæ Araliaceæ</p> <p>N. 4. <i>Grossales</i>.</p> <p>Grossulaceæ</p>	<p>N. 5. <i>Pittosporales</i>.</p> <p>Vites Pittosporæ Olcinereæ ? Diourea</p>
--	---	--	--

Cohort 2. GYNOSIACÆ; carpels arranged round an elevated axis.

<p>N. 1. <i>Rutales</i>.</p> <p>Ochnaceæ Simarubaceæ Rutaceæ § Diosmeæ</p>	<p>Zygophylleæ Xanthoxyleæ</p> <p>N. 2. <i>Geraniales</i>.</p> <p>Hydrocerææ</p>	<p>Tropaeolææ Geraniaceæ Oxalidææ Balsamiuææ</p>	<p>N. 3. <i>Coriales</i>.</p> <p>Coriariææ</p> <p>N. 4. <i>Florkales</i>.</p> <p>Linnauntheæ</p>
--	--	--	--

Cohort 3. EPIGYNÆ; ovary inferior, generally with an epigynous disk.

<p>N. 1. <i>Gnagrates</i>.</p> <p>Gnagraceæ § Circæaceæ § Halimaceæ Combretaceæ Alangieæ Rhizophoreæ</p>	<p>Salicariæ</p> <p>N. 2. <i>Myrtales</i>.</p> <p>Memecyleæ Myrtaceæ Melastomaceæ Lecythidææ</p>	<p>Philadelphææ</p> <p>N. 3. <i>Cornales</i>.</p> <p>Hamamelidææ Cornææ Loranthææ</p>	<p>N. 4. <i>Cucurbitales</i>.</p> <p>Cucurbitaceæ Lonsææ Cactææ Homaliniææ</p> <p>N. 5. <i>Begoniæles</i>.</p> <p>Begoniaceæ</p>
--	--	---	--

Cohort 4. PARIETALES; placentæ parietal.

<p>N. 1. <i>Cruciales</i>.</p> <p>Crucifereæ Capparidææ Resedaceæ</p>	<p>N. 2. <i>Violales</i>.</p> <p>Violaceæ Famylidææ Morinææ Droseraceæ Frankeniaceæ</p>	<p>N. 3. <i>Passionales</i>.</p> <p>Passifloreæ Papayaceæ Flacourtiaceæ Male herbaceæ Turneraceæ</p>	<p>N. 4. <i>Bixales</i>.</p> <p>Bixaceæ</p>
---	---	--	---

Cohort 5. CALYCOSÆ; calyx incompletely whorled; two of the sepals being exterior.

<p>N. 1. <i>Guttates</i>.</p> <p>Guttiferæ Rhizophoræ Marscearvineæ Hypericineæ</p>	<p>N. 2. <i>Theales</i>.</p> <p>Terminatiaceæ Acorineæ Sapindaceæ</p>	<p>Hippocastaneæ Polygalææ Vochynceæ</p> <p>N. 4. <i>Cistales</i>.</p> <p>Linææ</p>	<p>N. 3. <i>Urticales</i>.</p> <p>Urticaceæ Cistaceæ Rentiuriææ</p> <p>N. 5. <i>Berberales</i>.</p> <p>Berberidææ</p>
---	---	---	---

Cohort 4. *PERSONATE*; hypogynous, irregular-flowered, with a dicarpous ovary.

N. 1. <i>Labiales</i> .	Stilbiaceæ	N. 3. <i>Scrophulales</i> :	N. 4. <i>Acanthales</i> .
Labiatae	N. 2. <i>Bignoniales</i> .	Scrophulariaceæ	Acanthaceæ
Verbenaceæ	Bignoniaceæ	Orobanchææ	N. 5. <i>Lentibales</i> .
Myoporineæ	Pedaliaceæ	Gesneriæ	Leutibulariæ
Selaginæ	Cyrtandraeæ		

Cohort 5. *AGREGATE*; ovary 1-celled.

N. 1. <i>Asterales</i> .	N. 2. <i>Dipsales</i> .	N. 3. <i>Brunoniales</i> .	Globularineæ
Calyceræ	Dipsacæ	Brunoniaceæ	N. 5. <i>Plumbales</i> .
Compositæ	Valerianæ	N. 4. <i>Plantales</i> .	Plumbagineæ
		Plantagineæ	

Class II. *GYMNOSPERMÆ*.

Cycadææ
Coniferæ
Taxinææ
Equisetaceæ

Class III. *ENDOGENÆ*.Cohort 1. *EPIGYNÆ*; stamens distinct, ovary inferior.

N. 1. <i>Anomales</i> .	N. 2. <i>Narcissales</i> .	Taceæ	N. 4. <i>Bromeliales</i> .
Scitamineæ	Hypoxidææ	N. 3. <i>Ixiales</i> .	Bromeliaceæ
Marantaceæ	Amaryllidææ	Iridææ	N. 5. <i>Hydrales</i> .
Musaceæ	Hæmodoraceæ		Hydrocharidææ
	Burmanniæ		

Cohort 2. *GYNANDRÆ*; anthers united, ovary inferior.

Orchidææ
Cypripediææ
Apostasiææ

Cohort 3. *HYPOGYNÆ*; flowers on a plan of 3, coloured, ovary superior.

N. 1. <i>Palmales</i> .	Melanthaceæ	N. 3. <i>Commelales</i> .	Alismaceæ
Palmæ	Gilliesiææ	Coumulinaceæ	N. 5. <i>Juncales</i> .
N. 2. <i>Liliales</i> .	Asphodeleæ	N. 4. <i>Alismales</i> .	Juncææ
Pontederææ	Liliaceæ	Butomeæ	Philydreæ

Cohort 4. *IMPERFECTÆ*; flowers herbaceous, or imperfect, or none; or finally of two parts and coloured, with a superior ovary.

N. 1. <i>Pandales</i> .	N. 2. <i>Arales</i> .	N. 4. <i>Smilales</i> .	N. 5. <i>Fluviales</i> .
Cyclanthææ	Aroidææ	Dioscoreææ	Fluviales
Pandaneæ	Acoroidææ	Smilacææ	Juncaginææ
	N. 3. <i>Typhales</i> .	Roxburghiaceæ	Pistiaceæ
	Typhaceæ		

Cohort 5. *GLUMACEÆ*; scale-like bracts in place of a perianth.

Graminææ
Cyperaceæ
Desvauxiææ
Restlaceæ
Eriocauloneææ
Xyridææ

Class IV. *RHIZANTHÆÆ*.

Rafflesiaceæ
Cytinææ
Balanophoreææ
Cynomoriææ

Class V. *ESEXUALES*.

N. 1. <i>Filicales</i> .	Ophloglossææ,	N. 3. <i>Muscales</i> .	N. 4. <i>Charales</i> .
Polypodiaceæ	N. 2. <i>Lycopodales</i> .	Musci	Characeæ
Gleicheniaceæ	Lycopodiaceæ	Andriaceææ	N. 5. <i>Fungales</i> .
† Parkoriaceæ	Maraliaceæ	Jungernunniaceæ	Fungi
Osmundaceæ	Salvinieæ	Hepaticææ	Lichenes
Diantheææ			Alge

1834. HORANINOW, Paul.—(*Prima linea Systematis Naturæ, nexui naturali omnium evolutionique progressivæ per nexos reascendentes superstructi.*)

Here the Vegetable Kingdom is divided into 4 Circles, viz.—

- Circle 1. Sporophoræ (or Acotyledons).
2. Pseudospermæ (containing Gymnosperms and Rhizanthis).
3. Coccephoræ (or Monocotyledons).
4. Spermophoræ (or Dicotyledons).

Each of these is broken up into classes. Water-lilies, Sarraceniads, Peppers and their allies, with Nepenthes, are placed in the third circle; while Cistustrapes and Taccads stand in the fourth. The classes are in some instances extremely large, as, for example, the Thalamopetaleæ, which contain 58 Orders, and are the equivalent of the Thalamifloral section of De Candolle. By this author, as by some of the German Naturalists, Fungals and Algals are expelled from the Vegetable Kingdom, and form a part of a kingdom of Phytozoa; for Mr. Horaninow divides the organic world into Vegetables, Phytozoa, Animals, and Man.

1835. FRIES, Elias.—(*Corpus Florarum provincialium Sueciæ.*)

In this work the author has given a general scheme of arrangement according to his own peculiar views, and has applied it to the Flora of Scania. He prefaces his plan with an exposition of his ideas as to the manner of constructing a Natural System, and, among other things, maintains that it is more likely to be perfected by a small number of good observations clearly expressed than by a multitude of them. He regards germination as the first in rank of all the phases of vegetable life, manner of growth second, of flowering third, and of fruiting lowest of all, observing that the latter is the last stage of metamorphosis, beyond which there is nothing but the seed, whose constitution has nothing to do with that of the fruit. The seed is the beginning of germination. He regards the fruit as of importance in distinguishing Orders, and employs three forms of it, to which paramount importance is assignable. These are 1, simple, with a central placenta; 2, apocarpous, with the carpels disjoined; and 3, syncarpous, in which the carpels are all consolidated. The first he divides into *a*, with one stigma, and *b*, with two or more stigmas. The following is the general plan of his system, in which those numbers and letters have the value just assigned to them.

Class 1. DICOTYLEDONS.

† Perianth genuine, complete, with a thickened disk for the insertion of the petals and stamens.
Stamens inserted,

A. on the Corolla. I. COROLLIFLORÆ.

a. epigynous.	b. amphigynous.	c. hypogynous.
I. SEMINIFLORÆ.	II. ANNEFLORÆ.	III. TUBIFLORÆ.
1. a. Symplocaceæ Dipsacæ	1. a. Campanulaceæ b. Gesneriæ Polemoniaceæ	1. a. Solanaceæ Personiæ b. Gentianæ
2. Rubiaceæ	2. Boraginæ Labiæ	2. Asclepiadæ
3. Caprifoliaceæ	3. Hydroceæ	3. Primulaceæ

B. on the Receptacle. II. THALAMIFLORÆ.

a. epigynous.	b. amphigynous.	c. hypogynous.
IV. DISCIFLORÆ.	V. BASIFLORÆ.	VI. COLUMNIFLORÆ.
1. a. Cornæ b. Clastrinæ Muphigiaceæ	1. a. Berberidæ b. Cruciferæ Papaveraceæ	1. a. Cistinæ b. Tiliaceæ Hypericinæ
2. a. Araliaceæ b. Umbelliferæ	2. a. Nymphaeaceæ b. Ranunculaceæ	2. a. Grinales b. Malvaceæ
3. Loranthæ	3. Balsaminæ	3. Caryophyllæ

C. on the Calyx. III. CALYCIFLORÆ.

a. epiperigynous.	b. amphigynous.	c. hypogynous.
VII. FAUCIFLORÆ.	VIII. TORIFLORÆ.	IX. CENTRIFLORÆ.
1. a. Calycanthemæ b. Rhamnæ Ribesæ	1. a. Leguminosæ Drupaceæ b. Pontaceæ	1. a. Ericinæ b. Empetretæ Aquilolincæ
2. Succulentæ	2. Senticosæ	2. Euphorbiacæ
3. Portulacaceæ	3. Paronychiæ	3. Polygonæ Chenopodeæ

†† Apetalous. IV. INCOMPLETE, with the disk not thickened or stamiferous.
Perianth

a. <i>gamosepalous, concentrated.</i> X. BRACTEIFLORE.	b. <i>squamaceous, imbricated.</i> XI. JULIFLORE.	c. <i>none or doubtful.</i> XII. NUDIFLORE.
1. a. Veprucula b. Aristolochiæ Cucurbitaceæ 2. Artocarpeæ 3. Urticæ Balanophoræ ? Lycopodiaceæ	1. a. Fraxineæ b. Juglandinæ Amentaceæ 2. Salicinæ 3. Myricæ Coniferæ Equisetum	1. a. Chloranthæ b. Piperacæ 2. Samnreæ Callitrichinæ Naladeæ 3. Ceratophylleæ Chara

Class II. MONOCOTYLEDONS.

† <i>complete in 2 rows.</i> a stamens epigynous. XIII. FRUCTIFLORE.	b. stamens amphigynous. XIV. LILIFLORE.	†† <i>incomplete or 0.</i> c. stamens hypogynous. XV. SPANICIFLORE.
1. a. Orchideæ b. Irideæ Narcissæ 2. Hydrocharideæ 3. Valisneria	1. a. Liliacæ b. Melanthacæ 2. Alismacæ 3. Juncacæ	1. a. Callacæ b. Orontiacæ 2. Potamogetonæ 3. Cyperacæ
This series is conspicuous for its fruit, epigynous, retrogressive.	This series is conspicuous for its flowers, central, amphigynous.	This series is conspicuous for its vegetation, progressive, hypogynous.
††† <i>bracteate, valvate.</i> XVI. GLUMIFLORE. Gramineæ		

Class III. CRYPTOGAMS, or NEMEE.

A. HETERONEMEE. Germinating threads	
a. <i>solitary, simple.</i> XVII. FILICES.	b. <i>several, ramifying.</i> XVIII. MUSCI.
B. HOMONEMEE. Gonidia	
a. <i>present.</i> Colour herbaceous. XIX. ALGÆ.	b. <i>absent.</i> Colour metallic. XX. FUNGI.
This series is conspicuous for its vegetation, and progressive.	This series is conspicuous for its fruit, and retrogressive.

1835. MARTIUS, C. Fr. Ph. v.—(*Conspectus Regni Vegetabilis secundum characteres morphologicos præsertim carpicos in classes ordines et familias digesti, &c.*)

The motto prefixed to this treatise, "Ye shall know them by their fruit," explains the principles upon which Dr. Von Martius has constructed his system. He assumes that "because the fruit and its seed, or the parts analogous to them, constitute the crown and end of the whole nature and vitality of plants, on that very account it must be superior to the other parts in dignity." Accordingly its variations are scrutinised with much care, and many new terms are proposed for the sake of expressing those variations with great precision.

Two primary divisions of the Vegetable Kingdom are admitted, viz.—1. *Primitive Vegetation*, consisting of all known plants except Fungals, which form of themselves the other division called 2, *Secondary Vegetation*.

Primitive vegetation is separated into the following classes, viz.: I. Ananths, or flowerless plants; II. Loxines, or Monocotyledons; III. Tympanochetes, or Gymnogens; IV. Orthoines, or Dicotyledons. Each of the more extensive classes is broken up into certain sub-classes and series, under which are stationed Cohorts (or Alliances), in which the Natural Orders are finally marshalled. As the plan, which is very artificial, has never been adopted, it will be sufficient to give the Cohorts of one of the subdivisions, for which purpose a portion of the second Sub-class of Orthoines may be selected.

- Cohort 1. *Monocarpæ scabrifolia*.—Urticæ, Moreæ, Artocarpeæ, Umicæ, Stilaginéæ, Hencloviacæ.
- Cohort 2. *Haplocarpæ columnifera*.—Myristicæ.
- Cohort 3. *Haplocarpæ chromanthæ*.—Tymelacæ, Elæagnæ, Anthoboleæ, Osyridæ, Illgeriæ, Hernandiæ, Aquilarinæ, Proteacæ, Santalacæ, Nyssacæ.
- Cohort 4. *Polyplocarpæ chromanthæ*.—Pensacæ.
- Cohort 5. *Haplocarpæ auranthæ*.—Chenopodiaceæ, Petiveriacæ, Nyctaginæ, &c.

1836. BROMHEAD, Sir E. Freuch, Bart.

This author's system first appeared in the *Edinburgh Journ. Apr.* 1836, and has since been more than once revised to embrace the later discoveries of the science. The last published revision was in the *Mag. Nat. Hist. July*, 1840. The writer proposes to proceed wholly by induction. The families are collected into Alliances, designated by a termination in *ales*, from some characteristic or well-known family contained in the assemblage. Each family is placed in that Alliance in which it may meet the greatest number of families of admitted affinity to it, the character being subsequently deduced from the assemblage so constituted, and used as a test of admissibility in the more doubtful cases. —See *Mag. Nat. Hist. April*, 1838. A sketch of characters for the whole series of Alliances as they stood in 1838 appeared in the *Edinb. Phil. Journ. April and July* of that year. He considers it an advantage that above 60 of his Alliances are to be found indicated or adopted with more or less accuracy by other Botanists. He has given some of these synonyms in the *Phil. Mag. July*, 1837, and in the *Mag. Nat. Hist. July*, 1840. The author arranges with great care the contents of each Alliance in the order of the immediate affinities and transitions, and then places each Alliance between the two Alliances into which it passes. He considers himself to have thus established by induction a continuous series of Alliances, commencing with Algae and ending with Fungals, in which each family in a continuous succession stands between the two families of nearest affinity. The system thus resulting presents the aspect of two parallel races meeting in the Rhizanthus, and presenting in their progress, at equal distances from the commencement, analogous Alliances, such, for instance, as Rosales and Fabales, Boraginales and Laniales, Geraniales and Rutales, &c. In the Alliances, and in the grouping of the Alliances, the system accords with the quinary method; but to this the author does not bind himself, remarking that quinary combinations very frequently occur, and that he has extended them for the sake of convenience, by leaning towards that method in cases where the limits of families are ambiguous.

He considers the theory of the circulation of organic forms to be confirmed by his method, but does not look on them as closed or re-entering circles. He would rather compare them to the approach of the returning parts of a spiral or to the similarity of the opposite ends of a fusiform figure.

The subjoined table of his Alliances shows their succession, but the transitions and contents of the Alliances could not be exhibited without giving his tables at length.

RACE OF THE ALGÆ.

- A.—Nostocales.
- B.—Fucales, rhodomelales, ulvales, charales, osmundales.
- C.—Fphedrales, myricales, ulmales, piperales, haloragales, ænotherales, myrtales, rosales, saxifragales, cucurbitales, portulacales, chenopodiales, polemoniæles, boraginales, solanales, gentiannaes, apocynales, cinchonales, sambucuales, cornuales, geraniales, cistales, brassicales, nymphæales, aristolochiales.
- C. C.—Alismales, restiales, agrostidales, coccoales, typhales.
- C. C. C.—Cytinales.

RACE OF THE FUNGI.

- A.—Mucorales.
- B.—Auriculariales, lycoperdales, usneales, Jungermanniales, lycopodiales.
- C.—Cupressales, betulales, rhamnales, euphorbiales, æsculales, hypericales, limoniales, fabales, violales, passiflorales, homaliales, cleagnales, acanthales, lamiales, rhizanthales, ericales, campanulales, asterales, dipsacales, myrsinales, rutales, malvales, laurales, magnoliales, menispermiales.
- C. C.—Asparagales, juncales, orchidales, zingiberales, narcissales.
- C. C. C.—Cytinales.

1836. LINDLEY, John.—(*A Natural System of Botany, &c., second edition.*)

The arrangement here adopted was nearly the same as that proposed in the *Nixus Plantarum* (see p. xli.) An attempt was also made to reform the nomenclature of the Natural System, by making all the names of divisions of the same value end in the same way. The Orders were distinguished by ending in *accæ*, the Sub-orders in *cæ*, the Alliances in *ales*, and certain combinations, called groups, in *osæ*. It was conceived that certain advantages and conveniences would attend the establishment of uniformity in these matters. Botanists do not, however, appear to be as yet disposed to entertain this opinion, and the terminations have not been generally adopted, in part, no doubt, because of the difficulty of adapting them to Greek and Latin compounds.

1836-1840. ENDLICHER, Stephen.—(*Genera Plantarum secundum ordines naturale disposita.*)

Upon this system has been published the most important systematical work that has appeared since the *Genera Plantarum* of Jussieu, in 1789. It commences with plants of the simplest kind, and closes with what the author regards as most complicated, viz., leguminous plants. It has been executed with great skill, but is too much dependent

upon mere theoretical considerations, and is difficult to use in consequence of the looseness of the characters assigned to what the author names Classes, which are equivalent to my Alliances. The following are the details of his system:—

- No opposition of stem and root. No spiral vessels. No sexes. Spores lengthening in all directions } THALLOPHYTA.
 Born without soil: feeding by the surface: fructification vague PROTOPHYTA.
 Born on languid or decaying organisms: feeding from within: developing all the organs at once. } HYSTEROPHYTA.
 Opposition of stem and root. Spiral vessels. Sexes in the more perfect CORMOPHYTA.
 Stem growing at the point only, using the lower part only for conveying fluids. } ACROBRYA.
 Sp.-vessels 0. Both sexes present. Spores loose in spore-cases Anophyta.
 Sp.-vessels . . Male sex missing. Spores loose in one or many-celled spore-cases. } Protophyta.
 Both sexes present. Seeds embryoless, of many spores Hysterophyta.
 Stem growing at the circumference AMPHIBRYA.
 Stem growing at both point and circumference ACRAMPHIBRYA.
 Ovules naked, receiving impregnation immediately by the foramen Gynnosperma.
 Perianth 0, rudim. or simple, calycine or coloured, free or adherent Apetala.
 Perianth double, outer calycine inner corolline, monopet. occasionally abortive. Gamopetala.
 Perianth double, outer calycine inner corolline, parts distinct or united by the base of the stamens, occasionally abortive. } Dialypetala.

Region 1. THALLOPHYTA.

Section 1. PROTOPHYTA.

Class 1. <i>Algae</i> .	Class 2. <i>Lichenes</i> .
Diatomaceæ, 12	Coniothalami, 45
Nostochinæ, 18	Idiothalami, 45
Confervaceæ, 14	Gasterothalami, 45
Characeæ, 26	Hymenothalami, 45
Ulviceæ, 18	
Florideæ, 23	
Fucaceæ, 20	

Section 2. HYSTEROPHYTA.

Class 3. *Fungi*.

- Gymnomyces, 29
- Hyphomycetes, 29
- Gasteromycetes, 29
- Pyrenomycetes, 29
- Hymenomyces, 29

Region II. CORMOPHYTA.

Section 3. ACROBRYA.

Cohort I. ANOPHYTA.	Cohort II. PROTOPHYTA.	Class 8. <i>Hydropterides</i> .	Cohort III. HYSTEROPHYTA.
Class 4. <i>Hepaticæ</i> .	Class 6. <i>Equiseta</i> .	Salviniaceæ, 71	Class 11. <i>Rhizanthææ</i> .
Hieriacæ, 57	Equisetaceæ, 61	Marsiliaceæ, 71	Balanophoræ, 89
Anthocerotæ, 60	Class 7. <i>Filices</i> .	Class 9. <i>Selagines</i> .	Cytinæ, 91
Tarsoniaceæ, 53	Polypodiaceæ, 78	Isoeteæ, 71	Rafflesiaceæ, 93
Marchantiaceæ, 58	Hymenophyllæ, 80	Lycopodiaceæ, 69	
Jungermanniaceæ, 59	Gleicheniaceæ, 80	Class 10. <i>Zamiæ</i> .	
Class 5. <i>Musci</i> .	Schizaceæ, 80	Cycadeaceæ, 223	
Andreaceæ, 63	Osmundaceæ, 81		
Splachnaceæ, 61	Marattiaceæ, 82		
Bryaceæ, 64	Ophioglossæ, 77		

Section 4. AMPHIBRYA.

Class 12. <i>Glumaceæ</i> .	Pontederaceæ, 206	Class 19. <i>Scitamineæ</i> .	Taxinæ, 230
Gramineæ, 106	Liliaceæ, 200	Zingiberaceæ, 165	Gnetaceæ, 232
Cyperaceæ, 117	Smilacæ, 215	Cannaceæ, 168	
Class 13. <i>Enantioblastæ</i> .	Class 16. <i>Artorhizæ</i> .	Musaceæ, 163	Cohort II. APETALA.
Centrolepidæ, 120	Dioscoreæ, 214	Class 20. <i>Fluriales</i> .	Class 24. <i>Piperitæ</i> .
Restiaceæ, 121	Taccaceæ, 149	Naiades, 143	Chloranthaceæ, 519
Eriocaulonæ, 122	Class 17. <i>Enxatæ</i> .	Class 21. <i>Spadicifloræ</i> .	Piperaceæ, 515
Xyridæ, 1-7	Hydrocharidæ, 141	Aroidæ, 127	Sauraceæ, 521
Commelynacæ, 198	Burmanniaceæ, 171	Typhaceæ, 126	Class 25. <i>Aquaticæ</i> .
Class 14. <i>Helobieæ</i> .	Iridæ, 187	Pandaneæ, 130	Centrophyllæ, 263
Alismaceæ, 266	Hamodorræ, 151	Class 22. <i>Principes</i> .	Callitricheæ, 284
Butomaceæ, 208	Hypoxidæ, 154	Palmeæ, 133	Podostemæ, 482
Class 15. <i>Coronariæ</i> .	Amaryllidæ, 155	Cohort I. GYMNOSPERMÆ.	Class 26. <i>Julifloræ</i> .
Juncaceæ, 191	Bromellicæ, 147	Class 23. <i>Coniferæ</i> .	Casuarinæ, 249
Philydræ, 1-6	Class 18. <i>Gynandryæ</i> .	Cupressinæ, 225	Myricæ, 256
Melanthaceæ, 198	Orchidæ, 173	Abietinæ, 226	Betulaceæ, 251
	Apostasiaceæ, 1-4		Cupuliferæ, 290

Section 5. ACRAMPHIDAYA.

Ulmaceæ, 580	Class 35. <i>Nuculifera</i> .	Capparidæ, 357	Sapindaceæ, 382
Celtidæ, 580	Labiatæ, 659	Resedaceæ, 356	Rhizoboleæ, 398
Moreæ, 266	Verbenaceæ, 663	Datisceæ, 316	Class 53. <i>Polygalina</i> .
Artocarpeæ, 269	Stilbinæ, 607		Tremandraceæ, 374
Urticaceæ, 269	Globulariaceæ, 666	Class 44. <i>Nelumbia</i> .	Polygaleæ, 375
Cannabineæ, 265	Selagineæ, 666	Nymphæaceæ, 409	
Antidismaceæ,	Myoporaceæ, 665	Sarraceniæ, 429	Class 54. <i>Frangulaceæ</i> .
Platanæ, 272	Cordiaceæ, 628	Calombeteæ, 412	Pittosporæ, 441
Balsamifluæ, 253	Asperifoliæ, 655	Nelumbouæ, 414	Staphyleaceæ, 381
Salicinæ, 254			Celastrineæ, 586
Henslowiaceæ, 570	Class 53. <i>Tubifloræ</i> .	Class 45. <i>Parietales</i> .	Hippocrateaceæ, 584
Lacistemeæ, 329	Convolvulaceæ, 630	Cistaceæ, 349	Illicineæ, 579
Class 27. <i>Oleraceæ</i> .	Polemoniaceæ, 635	Droseraceæ, 433	Rhamnæ, 581
Chenopodæ, 512	Hydrophyllæ, 638	Violaceæ, 338	Chaillietaceæ, 583
Amarantaceæ, 510	Hydroleuceæ, 638	Sauvagesiaceæ, 343	
Polygonæ, 502	Solanaceæ, 618	Frankeniaceæ, 340	Class 55. <i>Tricoceæ</i> .
Nyctagineæ, 506	Class 37. <i>Personatæ</i> .	Turneraceæ, 347	Empetree, 285
Class 28. <i>Thymelææ</i> .	Scrophularinæ, 681	Samydaceæ, 330	Stackhousiaceæ, 580
Monimiaceæ, 298	Acanthaceæ, 678	Bixaceæ, 327	Euphorbiaceæ, 274
Atherospermeæ, 300	Bigoniaceæ, 675	Homaliaceæ, 742	
Laurinæ, 535	Gesneraceæ, 671	Nolaniaceæ, 332	Class 56. <i>Terebinthina</i> .
Gyrocarpeæ, 535	Cyrtandree, 671	Malesherbiaceæ, 335	Juglandæ, 292
Santalaceæ, 787	Pedalineæ, 669	Loasaceæ, 744	Ancardiaceæ, 465
Daphnoidæ, 530	Orobanchæ, 609	Papayaceæ, 301	Bursaraceæ, 459
Aquiliaceæ, 579	Utricularinæ, 686		Connaraceæ, 468
Elaeagnæ, 257	Class 38. <i>Petalanthæ</i> .	Class 46. <i>Peponiifera</i> .	Oelnaceæ, 474
Penæaceæ, 577	Primulaceæ, 644	Nandhiboreæ, 311	Simarubaceæ, 476
Proteaceæ, 532	Myrsinæ, 647	Cucurbitaceæ, 311	Xanthoxyleæ, 472
Class 29. <i>Serpentariæ</i> .	Sapotaceæ, 590	Begoniaceæ, 318	Diosmeæ, 469
Aristolochiaceæ, 792	Ebenaceæ, 590	Class 47. <i>Opuntia</i> .	Rutaceæ, 469
Nepenthaceæ, 287	Class 29. <i>Bicornes</i> .	Cactaceæ, 746	Zygophylleæ, 478
Cohort III. GAMOPETALÆ	Epacridæ, 448	Class 48. <i>Caryophyllinæ</i> .	
Class 30. <i>Plumbaginæ</i> .	Lnicæ, 453	Mesembryaceæ, 525	Class 57. <i>Gruinales</i> .
Plantaginæ, 642	Vacciniæ, 757	Portulacaceæ, 500	Geraniaceæ, 493
Plumbaginæ, 640		Caryophylleæ, 496	Linææ, 485
Class 31. <i>Aggregatæ</i> .	Cohort IV. DIALYPE-	Chytolaceneæ, 609	Oxalidæ, 488
Valerianæ, 697	TALA.	Class 49. <i>Columniferæ</i> .	Balanneæ, 490
Dipsacæ, 699	Class 40. <i>Discanthe</i> .	Malvaceæ, 368	Tropæoleæ, 365
Compositæ, 702	Umbellifera, 773	Sterculiaceæ, 360	Linumtheæ, 366
Calyceæ, 701	Amilicæ, 789	Eutneriaceæ, 363	Class 58. <i>Calycifloræ</i> .
Class 32. <i>Campanulinæ</i> .	Amplidæ, 439	Tiliacæ, 371	Vochysiaceæ, 379
Brunoniæ, 657	Corniceæ, 782	Class 50. <i>Guttifera</i> .	Combretaceæ, 717
Goodeniaceæ, 694	Loranthaceæ, 789	Dipterocarpeæ, 393	Alangieæ, 719
Lobeliaceæ, 692	Humamelidæ, 784	Chenaceæ, 486	Rhizophoreæ, 726
Campanulicæ, 639	Bruniaceæ, 785	Ternstromiaceæ, 396	Philadelphicæ, 753
Styidiæ, 696	Class 41. <i>Corniculatæ</i> .	Chinacæ, 400	Oenotheræ, 724
Class 33. <i>Caprifolia</i> .	Crossulaceæ, 344	Marcgraviaceæ, 403	Haloragæ, 722
Rubiaceæ, 761	Saxifragaceæ, 567	Hypericaceæ, 405	Lythricæ, 754
Lonicereæ, 766	Ribesicæ, 750	Elatinæ, 480	Class 59. <i>Myrtifloræ</i> .
Class 34. <i>Contortæ</i> .	Class 42. <i>Polycarpicæ</i> .	Reaurinæ, 407	Melastomaceæ, 731
Jasminæ, 650	Menispermaceæ, 307	Tamariacineæ, 341	Myrtaceæ, 734
Olaceæ, 616	Myristicaceæ, 301	Class 51. <i>Hesperidæ</i> .	Class 60. <i>Rosifloræ</i> .
Loganiaceæ, 602	Anonacæ, 420	Humicæ, 417	Pomaceæ, 559
Strychnæ, 602	Schizandraceæ, 395	Olaceæ, 443	Calycanthæ, 540
Apocynæ, 599	Magnoliaceæ, 417	Aurantiacæ, 457	Rosaceæ, 563
Aselepiadæ, 623	Dilleniaceæ, 423	Melicæ, 463	Amygdalæ, 557
Gentianæ, 612	Ranunculaceæ, 425	Cedrelaceæ, 461	Chrysobalanæ, 542
Spigeliaceæ, 602	Berberidæ, 316	Class 52. <i>Aceræ</i> .	Class 61. <i>Leguminosæ</i> .
	Class 43. <i>Rhaadæ</i> .	Acerinæ, 387	Papilionaceæ, 544
	Papaveraceæ, 430	Malpighiaceæ, 388	Swartzicæ, 544
	Crucifere, 351	Erythroxyleæ, 391	Mimoseæ, 544

1838. LINDLEY, John.—(Article "Exogens" in the Penny Cyclopaedia.)

In this place the author's views, as explained in previous works, were considerably modified so far as regards Exogens. He proposed in the first place to abandon altogether the old divisions of Polypetalous, Monopetalous, and Apetalous plants, and to reconstruct the whole fabric of Exogenous classification, upon the following principles:—

In the first place, the Orders whose embryo is furnished with an excessive quantity of albumen (a great physiological distinction), were formed into an Albuminous group. —The remainder of Exogens then consists of Orders in which some have the sexes

in distinct flowers, and others hermaphrodite flowers. As we know of no character intimately connected with the reproduction of the species which is upon the whole so important as this, a Diclinous group was established, as had formerly been done by Jussieu.—The hermaphrodite Orders were then separated into those with the calyx, corolla, and stamens confluent at the base with each other and with the ovary, that is, having an inferior ovary, and those in which those parts are distinct, either altogether or at least from each other, the former constituting an Epigynous group.—Finally, the remainder of the Orders were divided into those with a monopetalous corolla combined with an ovary upon a binary plan (Dicarpous), and those which, if monopetalous, have the ovary simple or complex (Polycarpous).

The following table will put this in a clearer point of view:—

Albumen extremely abundant; embryo minute	1. ALBUMINOSÆ.
Albumen absent, or in small quantity.	
Sexes in the same flower.	
Ovary inferior	2. EPIGYNOSÆ.
Ovary superior.	
Flowers, if monopetalous, not with a dicarpous ovary	3. POLYCARPOSÆ.
Flowers monopetalous, with a dicarpous ovary	4. DICARPOSÆ.
Sexes in different flowers	5. DICLINOSÆ.

Each of these groups would form a series by itself, the sequence of which ought to be natural, and to exhibit various lateral analogies with other groups. And thus the three Monopetalous, Apetalous, and Polypetalous divisions were exchanged for five others founded upon totally different principles. It will be seen that this scheme has been partly adopted in the present volume.

1833. PERLEB, C. J.—(*Clavis Classium ordinum et familiarum, atque Index generum regni vegetabilis.*)

This author admits nine Classes, each of which is subdivided into 48 Orders, which are themselves the equivalents of Alliances, and under these are arranged 330 Natural Orders, which he calls Families. Professor Perleb states that most of the Alliances employed in this book were proposed by him in his work entitled *Lehrbuch der Naturgeschichte des Pflanzenreichs*, published in 1826, which I have not seen.

The *Clavis* deserves to be studied. The Alliances are often well constructed, but not having the genera arranged under them, they are extremely troublesome to use; and this is no doubt the reason why the work has attracted so little notice among Botanists. Sir Edward Bromhead has analysed it (*Mag. of Nat. Hist., new series*, 1840, p. 329), and speaks of it as “a work of very great value.” Professor Perleb’s Classes are the following:—

Cellulares or Acotyledons	{ leafless (usually with a thallus; fruit imperfect	I. PROTOPHYTA.		
	{ leafy; fruit perfect, capsular.	II. MUSCOSÆ.		
Vasculares or Cotyledoneous.	Endogens or Monocotyledons	{ cryptogamous	III. FELICINÆ.	
		{ phanerogamous	IV. TERNARIÆ.	
	Exogens or Dicotyledons.	Perianth simple, often incomplete, sometimes 0		V. MONOCLAMYDEÆ.
				Corolla monopetalous
			{ Corolla perigynous	
		Perianth double (both calyx and corolla).	Corolla pleiopetalous	{ petals perigynous . . . . .	VIII. CALYCOPEALÆ.
	{ petals hypogynous			IX. THALAMOPETALÆ.

1839. LINDLEY, JOHN.—(*Botanical Register*, p. 77, *Miscellaneous Matter.*)

On this occasion the author directed his attention to an extension of the primary Classes of plants, which he proposed to raise to 8, in the following manner:—

STATE I. SEXUAL OR FLOWERING PLANTS.

Division 1. Exogens.	{	<i>Cyclogens.</i>	{ Class I. Exogens.
			{ Class II. Gymnogens.
Division 2. Endogens.	{	<i>Spermatogens.</i>	{ Class III. Homogens.
			{ Class IV. Dictyogens.
			{ Class V. Endogens.
			{ Class VI. Sporogens. (<i>Althæanthæ.</i>)

STATE II. ASEXUAL OR FLOWERLESS PLANTS.

Division 3. Azoogens.	—	{ Class VII. Cormogens.
		{ Class VIII. Thallogens.

To what extent these views can be sustained will be discovered in the present volume.

1839. BASKERVILLE, Thomas.—(*Affinities of Plants, with some Observations upon Progressive Development.*)

The author of this tract was a very young man, with little experience; but he possessed strong perceptive powers, and would doubtless have distinguished himself had life been spared to him. But he died almost as soon as his little book saw the light. In the main he adopted the scheme of Orders in the *Nixus Plantarum*, p. xli.; but he criticised that arrangement with some skill, and avoided many of its worst errors. Baskerville's main purpose was to establish a theory of progressive development in the Vegetable Kingdom, and to show by maps and other schemes all existing affinities. The following observations deserve to be quoted:—

“Before we endeavour to establish any plan of affinity, it will be necessary to make a few observations upon a subject bearing closely upon that, namely, the respective rank or dignity of plants, and the means we possess of ascertaining the same. That this is no easy matter will appear when we reflect that imperfection is impossible in any work of supreme intelligence: our ideas of one plant having a station above that of another will not be drawn from any positive defect observable in the lowest, but from excellency we fancy to discover in the higher being. A Moss or Lichen is as perfectly fitted to the conditions it is intended to fulfil, and its organs as completely adapted to that purpose as the stately Palm, or magnificent forest tree. To imagine one plant, therefore, more noble than another, we merely imply that we consider its organisation, either by its complexity or some other character, to raise the plant possessing such qualifications above the surrounding species. When our investigations are confined to plants upon, or nearly upon, the same level, the problem is so intricate that it scarcely admits of solution; but when we take species separated by a long interval, the sum of additional properties enables us to decide with more certainty; yet the amount of difference is so trifling, and probably so exquisitely compensated for, that the balance is by no means so great as might be expected. In consequence of this it does not appear that any one has as yet been able to suggest what ought properly to be considered as the highest kind of plant; and the same difficulty would occur with regard to the lowest, were it not decided by the degree of proximity to the animal kingdom.

“It will be seen, therefore, that this kind of study is essentially comparative, and our proper attainment of it dependent upon the extent of our acquaintance with the vegetable species and their organisation, and on a proper interpretation of the importance of the characters which we construct from these, which, as character scarcely ever maintains an equal value in all its relations, lays open another source of difficulty.”—p. 39.

1841. TRAUTVETTER, Ernst Christian.—(*De Novo Systemate Botanico.*)

This is a speculative disquisition upon the philosophical way of classing plants. The author begs that he may be understood to have executed his task not like a Botanist, but like a philosopher (non botanico sed philosophico munere perfungi). He divides the Vegetable Kingdom into *semi-plants* and *true plants*; the former into *Favi* or *Acotyledons*, and *Trunculi* or *Monocotyledons*; and the latter into *Herbs* and *Trees*. The views of the author cannot be given better than in his own words:—“*Flagrant nature venatores nova semper et incognita visendi cupiditate. Nos vero antiquitatis alumni aliter sumus affecti.*” The treatise will be found in the *Bulletin de la Société Impériale des Naturalistes de Moscou*, 1841, p. 509.

1843. BRONGNIART, Adolphe.—(*Énumération des Genres de Plantes cultivés au Muséum d'Histoire Naturelle de Paris, suivant l'Ordre établi dans l'école de Botanique en 1843.*)

The apetalous division of Jussieu is abandoned on the ground that the Orders belonging to it are an imperfect state of polypetalous Orders, (called after Endlicher dialypetalous). The impracticability of a lineal natural arrangement is insisted upon. Rules are to be formed upon *à posteriori* not *à priori* considerations. Albumen is regarded of high value, especially the difference between farinaceous albumen, and that which is fleshy, oily, and horny, which last are taken to be slight modifications of each other. Finally, the direction of the embryo is regarded of more importance in its relation to the pericarp than to the hilum. The following are the details of the system:—

- Division 1. CRYPTOGRAMÆ. No sexual organs, &c.
 Branch 1. AMPHIGENÆ. No distinct axis or appendages, &c.
 Branch 2. ACROGENÆ. Distinct axis and appendages, &c.
- Division 2. PHANEROGAMÆ. Sexual organs evident, &c.
 Branch 3. MONOCOTYLEDONS. Embryo with one cotyledon, &c.
 Ser. 1. *Albuminose.* Albumen.
 Ser. 2. *Exalbuminose.* No albumen.

Branch 4. DICOTYLEDONS. Embryo with two cotyledons, &c.

Sub-branch 1. *Angiospermeæ*. Ovules in an ovary.Ser. 1. *Gamopetalæ*. Monopetalous.

§ 1. *Perigynæ*. Stamens and corolla inserted on a calyx adhering to the ovary.
 § 2. *Hypogynæ*. Stamens and corolla inserted under the ovary.

Ser. 2. *Dialypetalæ*. Petals distinct.

§ 1. *Hypogynæ*.
 § 2. *Perigynæ*.

Sub-branch 2. *Gymnospermeæ*. Ovules naked.

Division 1. CRYPTOGAMEÆ.

Branch 1. AMPHIGENÆ.

Class 1. *Algæ*.

Zoosporeæ, 8
 Aplosporeæ, 8
 Choristosporeæ, 8

Class 2. *Fungi*.

Hyphomycetes, 29
 Gastromycetes, 29
 Hymenomycetes, 29
 Scleromycetes, 29

Class 3. *Lichenoidæ*.

Lichenes, 45

Branch 2. ACROGENÆ.

Class 4. *Muscineæ*.

Hepaticeæ, 58
 Musci, 64

Class 5. *Filicineæ*.

Filices, 78
 Marsiliceæ, 71
 Lycopodiaceæ, 69
 Equisetaceæ, 61
 ? Characeæ, 26

Division 2. PHANEROGAMÆ.

Branch 3. MONOCOTYLEDONS.

Ser. 1. ALBUMINOSÆ.

* * * Perianth 0, or sepals
 glumaceous. Albumen
 farinaceous.

Class 6. *Glumaceæ*.

Gramineæ, 106
 Cyperaceæ, 117

Class 7. *Juncineæ*.

Restiaceæ, 121
 Eriocauloneæ, 122
 Xyrideæ, 187
 Commelyneæ, 188
 Juncaceæ, 191

Class 8. *Aroideæ*.

Araceæ, 127
 Typhaceæ, 126

* * * Perianth 0, or dou-
 ble, sepaloïd or peta-
 loïd. Albumen not
 farinaceous.

Class 9. *Pandanoideæ*.

Cyclantheæ, 130
 Freycinetiæ, 130
 Pandaceæ, 130

Class 10. *Phanicoideæ*.

Nipaceæ, 133
 Phylephasiæ, 133
 Palmæ, 133

Class 11. *Lirioideæ*.

Melanthaceæ, 198
 Liliaceæ, 209
 Gilliesiaceæ, 196

Amaryllidaceæ, 155
 Hypoxidaceæ, 154
 Asteliæ, 191
 Taccaceæ, 149
 Dioscoreæ, 214
 Iridaceæ, 159
 Burmanniaceæ, 171

* * * Perianth double, the
 innermost or both peta-
 loïd. Albumen farina-
 ceous.

Class 12. *Bromloïdeæ*.

Hæmodoraceæ, 151
 Vellosiæ, 151
 Bromeliaceæ, 147
 Pontederiaceæ, 206

Class 13. *Scitamineæ*.

Musaceæ, 163
 Cannaceæ, 168
 Zingiberaceæ, 165

Ser. 2. ENALBUMINOSÆ.

Class 14. *Orchioideæ*.

Orchidaceæ, 173
 Apostasiæ, 184

Class 15. *Fluviales*.

Hydrocharideæ, 141
 Butomeæ, 208
 Alismaceæ, 209
 Naiadeæ, 143
 Lemnaceæ, 124

Branch 4. DICOTYLEDONS.

Sub-branch 1. *Angiospermeæ*.

Ser. 1. GAMOPETALÆ.

* * * Perigynous.

Class 16. *Campanulinoæ*.

Campanulaceæ, 689
 Lobeliaceæ, 692
 Goodeniaceæ, 694
 ? Stylidiæ, 696
 ? Calyceræ, 701
 Brunoniaceæ, 657

Class 17. *Asteroidæ*.

Compositæ, 702

Class 18. *Lomicerinoæ*.

Dipsacæ, 699
 Valerianæ, 697
 Caprifoliaceæ, 705

Class 19. *Coffineæ*.

Rubiaceæ, 761

* * * Hypogynæ.

† Anisogynæ.

* Anisostemonæ.

Class 20. *Asclepiadoideæ*.

Spigeliaceæ, 602
 Loganiaceæ, 602
 Apocynaceæ, 599
 Asclepiadaceæ, 623
 Gentiaceæ, 612

Class 21. *Convolvulinæ*.

Polemoniaceæ, 635
 Nolaneæ, 654
 Convolvulaceæ, 630

Class 22. *Asperifoliæ*.

Cortilineæ, 628
 Boraginæ, 655
 Hydrophyllaceæ, 628
 ? Hydrocoleæ, 638

Class 23. *Solanineæ*.

Cestrineæ, 618
 Solanæ, 618

* * * Anisostemonæ.

Class 24. *Personatæ*.

Scrophulariæ, 681
 Utriculariæ, 686
 Orobanchæ, 609
 Gesneriæ, 671
 Cyrtandracæ, 671
 Bignoniaceæ, 675
 Pedalinee, 669
 Acanthaceæ, 678

Class 25. *Selaginoideæ*.

? Jasinineæ, 650
 Globulariæ, 666
 Selaginæ, 666
 Myoporineæ, 665

Class 26. *Verbenineæ*.

Verbenaceæ, 663
 Labiatæ, 659
 Stilledineæ, 607
 ? Plantagineæ, 642

†† Isogynæ.

Class 27. *Primulineæ*.

Primulaceæ, 644
 Myrsinaceæ, 647
 Theophrasteæ, 647
 Egicereæ, 647
 Plumbaginæ, 640

Class 28. *Ericoïdeæ*.

Epacrideæ, 448
 Ericaceæ, 453
 Pyroloceæ, 450
 ? Monotropæ, 452
 ? Hexalaceæ, 573

Class 29. *Diospyroideæ*.

Ebenaceæ, 595
 ? Oboloneæ, 616
 Nicheæ, 597
 Empetreeæ, 285
 Sapoteæ, 599
 ? Styrcaceæ, 592

SER. 2. DIALYPETALÆ.

§ 1. *Hypogynæ.*

† Flowers complete.

A. Calyx permanent.

* Polystemonææ.

Class 30. *Guttifera.*

- Clusiaceæ, 400
- Maregraviaceæ, 403
- Hypericineæ, 405
- Reaumuriaceæ, 407
- ? Tamariaceæ, 341
- Cistineæ, 349
- Bixaceæ, 327
- Ternstroemiaceæ, 396
- Chlenaceæ, 486
- Dipterocarpaceæ, 393

exalbuminous.
albuminous.

Class 31. *Malvoideæ.*

- Tiliaceæ, 371
- Malvaceæ, 368
- Stereuliaceæ, 360
- Buttneriaceæ, 363

** Oligostemonææ.

Class 32. *Crotonineæ.*

- Antidesmeæ, 259
- Forestiereæ, 283
- Euphorbiaceæ, 274

Class 33. *Polygalineæ.*

- ? Tremandrea, 374
- Polygaleæ, 375

Class 34. *Geranioidæ.*

- Balsaminæ, 490
- Tropacoleæ, 366
- Geraniaceæ, 493
- ? Limnantheæ, 366
- ? Coriariaceæ, 474
- Lineæ, 485
- Oxalideæ, 488
- Zygophylleæ, 478

Class 35. *Terebinthineæ.*

- Rutaceæ, 469
- Diosmeæ, 469
- Ochnaceæ, 474
- Sinuarubeæ, 476
- Xanthoxyleæ, 472
- Anacardiæ, 465
- ? Conuareæ, 468

Class 36. *Hesperideæ.*

- Bursereæ, 459
- Aurantiaecæ, 457
- Cedreæ, 461
- Meliaceæ, 463
- Nimeneæ, 443
- Nitrariaceæ, 388
- ? Humiriaceæ, (bis) 447
- Erythroxyloæ, 391

Class 37. *Æsculineæ.*

- Malpighiaceæ, 388
- Æcerineæ, 387
- Pippocastaneæ, 382
- ? Rhizoboleæ, 398
- Sapiudaceæ, 382
- Voehysieæ, 379

Class 38. *Celastroidæ.*

- Viniferæ, 439
- Hippocrateæ, 584
- Celastraceæ, 586
- Staphyleaceæ, 381
- Pittosporeæ, 441

Class 39. *Violineæ.*

- ? Sauvagesiere, 343
- Violaceæ, 338
- Droseraceæ, 433
- Frankeniaceæ, 340

B. Calyx deciduous.

* Albumen none or thin.

Class 40. *Cruciferineæ.*

- Rosedaceæ, 356
- Capparidaceæ, 357
- Crucifereæ, 351

** Albumen thick, fleshy, or horny.

Class 41. *Papaverineæ.*

- Fumariaceæ, 435
- Papaveraceæ, 430

Class 42. *Berberineæ.*

- Berberider, 437
- Lardizabaleæ, 303
- Menispermaceæ, 307

Class 43. *Magnolineæ.*

- Schizandrea, 305
- Myristiceneæ, 301
- Anonaceæ, 420
- Magnoliaceæ, 417

Class 44. *Ranunculineæ.*

- Dilleniaceæ, 423
- Ranunculaceæ, 425
- ? Sarraeceniaceæ, 429

*** Albumen double, the outer farinaceous.

Class 45. *Nymphaeineæ.*

- Nelumboneæ, 414
- Nymphaeaceæ, 409
- Câbonbeæ, 412

†† Flowers incomplete. Never a corolla.

Class 46. *Piperineæ.*

- Saurureæ, 521
- Piperaceæ, 515

Class 47. *Urticineæ.*

- Urticereæ, 260
- Artocarpereæ, 269

- Moreæ, 266
- Cetideæ, 580
- Cannabiueæ, 265

Class 48. *Polygonoidæ.*

- Polygoucæ, 502

§ 2. *Perigynæ.*

† Embryo curved round farinaceous albumen.

Class 49. *Caryophyllineæ.*

- Nyctagineæ, 506
- Phytolaceæ, 509
- Chenopodieæ, 512
- Baselleæ, 524
- Amaranthaceæ, 510
- Sileneæ, 496
- Alsineæ, 496
- Paronycheiæ, 499
- Portulacæ, 500

Class 50. *Cactoidæ.*

- Mesembryantemereæ, 525
- Cacteæ, 746

†† Albumen fleshy or horny.

Class 51. *Crassulineæ.*

- Crassulaceæ, 344
- Elatinæ, 480
- Datisææ, 316

Class 52. *Saxifragineæ.*

- Franeoneæ, 451
- Philadelphereæ, 753
- Saxifragaceæ, 567
- Ribesieæ, 750

Class 53. *Passiflorineæ.*

- Loasææ, 744
- Papayaceæ, 321
- Turneraceæ, 347
- Malesherbiæ, 335
- Passifloreæ, 332
- Samydeæ, 330
- Homalineæ, 742

Class 54. *Hamamelineæ.*

- Platanæ, 272
- Balsamifluræ, 253
- Hamamelideæ, 784
- Alaugieæ, 719
- Bruniaceæ, 785

Class 55. *Umbellineæ.*

- Umbellifereæ, 773
- Araliaceæ, 780
- Corueæ, 782
- ? Garryaceæ, 295

Class 56. *Santalineæ.*

- ? Ceratophyllereæ, 263
- ? Chloranthaceæ, 519
- Leanthææ, 789
- Santalaceæ, 787
- Oleaceæ, 443

Class 57. *Asarineæ.*

- ? Balanophoreæ, 89
- Rafflesiaceæ, 93
- Cytineæ, 91
- Nepenthereæ, 287
- Aristolochiaceæ, 792

†† Albumen 0, or little.

Class 58. *Cucurbitineæ.*

- Begoniaceæ, 318
- Nandirhobeæ, 311
- Cucurbitaceæ, 311
- Gronovieæ, 744

Class 59. *Ænotherineæ.*

- Halorageæ, 722
- Ænotherereæ, 724
- Melastomaceæ, 731
- Lythraceæ, 574
- ? Rhizophoreæ, 726
- Memecyleæ, 731
- Cembretaceæ, 717
- ? Myrtaceæ, 734

Class 60. *Daphnoideæ.*

- Gyrocarpeæ, 535
- Lauraceæ, 535
- Hernandiaceæ, 535
- Thymelaceæ, 530

Class 61. *Proticineæ.*

- Protaceæ, 532
- Elæagnaceæ, 257

Class 62. *Rhamnoideæ.*

- Penaceæ, 577
- Rhamneæ, 581
- Stackhousieæ, 589

Class 63. *Myrtoideæ.*

- Myrtaceæ, 734
- Leeythidieæ, 739
- Gramteæ, 734
- Calycanthææ, 540
- ? Moumieæ, 298

Class 64. *Rosineæ.*

- Pomaceæ, 559
- Neuradeæ, 563
- Spireaceæ, 563
- Roseneæ, 563
- Amygdaleæ, 557
- Chrysobalanaceæ, 542

Class 65. *Leguminosæ.*

- Papilionaceæ, } 544
- Cæsalpiniæ, } 544
- Mimosereæ, } 544
- ? Moringeæ, 536

Class 66. *Amentaceæ.*

- Juglandæ, 292
- ? Saliereæ, 264
- Quercuæ, 290
- Betulineæ, 251
- Myriceæ, 256
- Casuarineæ, 249

Sub-branch 2. *Gymnosperma.*

Class 67. *Conifereæ.*

- Gnetaceæ, 232
- Taxineæ, 230
- Cupressineæ, 226

- Abietineæ, 226

Class 68. *Cycadoideæ.*

- Cycadeæ, 223

The great faults of this arrangement, in bringing Amentaceous into contact with Leguminous plants, in separating Chloranths from Pepperworts, Myrtleblooms from Hippurids, and many such instances, need not be insisted on. Such a system cannot be founded on sound principles. It has, however, merits, and is decidedly the most forward step that the Botanists of the Modern French School have yet taken. The abandonment of the Apetalæ of Jussieu is more especially important.

1843. MEISNER, Carl Friedrich.—(*Plantarum vascularium genera secundum Ordines naturales digesta, eorumque differentia et affinitates tabulis diagnosticis exposita.*)

In the beginning of this large and useful work Professor Meisner intended to follow nearly the order observed by De Candolle in his *Prodromus*; and accordingly he commenced without any plan for throwing the Natural Orders into higher groups. But as he advanced in his labour he found the inconvenience of neglecting the latter, and, as early as p. 13, he commenced with his Class Malpighinæ. His final views are given in a *Conspectus diagnosticus*, the skeleton of which is the following:—

A. VASCULAR PLANTS.

I. DICOTYLEDONS.

† Diplochlamyds.

* Dialypetalous or Polypetalous.

I. THALAMIFLORALS.

Class 1. <i>Polycarpicæ.</i>	Class 5. <i>Parietales.</i>	Class 8. <i>Lamprophyllæ.</i>	Class 11. <i>Gruinales.</i>
Ranunculaceæ, 425	Pittosporæ, 441	Dipterocarpeæ, 393	Geraniaceæ, 493
Dilleniaceæ, 423	Frankeniaceæ, 340	Chlænaceæ, 486	Lineæ, 485
Magnoliaceæ, 417	Tamariscinæ, 341	Ternstroemiaceæ, 396	Oxalideæ, 488
Anonaceæ, 420	Podostemæ, 482	Guttifera, 400	Ledocarpeæ, 488
Menispermaceæ, 307	Droseraceæ, 433	Marcgraviaceæ, 403	Vivianaceæ, 365
Berberidaceæ, 437	Violariæ, 338	Hypericinæ, 405	Balsaminæ, 490
	Cistinæ, 349	Rhizoboleæ, 398	Tropæoleæ, 366
Class 2. <i>Nymphæoidæ.</i>	Bixaceæ, 327		
Nelumboneæ, 414	Samydeæ, 330	Class 9. <i>Malpighinæ.</i>	Class 12. <i>Rutaceæ.</i>
Hydroptelidæ, 412	Homalineæ, 742	Hippocastaneæ, 382	Zygophyllaceæ, 478
Nymphæaceæ, 409		Sapindaceæ, 382	Rutææ, 469
Sarraceniacæ, 429	Class 6. <i>Caryophyllinæ.</i>	Malpighiaceæ, 388	Diosmeæ, 469
	Caryophyllææ, 496	Acerinæ, 387	Zanthoxylaceæ, 472
Class 3. <i>Rhæadæ.</i>	Scleranthææ, 528	Erythroxyleæ, 391	Simarubeæ, 476
Papaveraceæ, 430	Paronychiææ, 499	Hippocrateæ, 584	Ochnaceæ, 474
Fumariaceæ, 435	Portulacææ, 500	? Coriariæ, 475	? Pittosporæ, 441
Crucifera, 351	Elatinææ, 480		
Capparidææ, 357	Class 7. <i>Columnifera.</i>	Class 10. <i>Hesperidæ.</i>	Class 13. <i>Terebinthaceæ.</i>
Resedaceæ, 356	Malvaceæ, 368	Humiriaceæ, 447	Juglandæ, 292
	Buttneriaceæ, 363	Olacinææ, 443	Amyridææ, 459
Class 4. <i>Polygalinæ.</i>	Sterculiaceæ, 360	Melioidææ, 463	Cassuviææ, 465
Tremandrea, 374	Tiliaceæ, 371	Aurantiaceæ, 457	Spondiaceæ, 459
Polygalææ, 375		Ampelidææ, 439	Bursacerææ, 459
			Connaraceæ, 468

II. CALYCIFLORALS.

Class 14. <i>Leguminosæ.</i>	Onagraceæ, 724	Class 18. <i>Peponifera.</i>	Rhamnææ, 581
Leguminosæ vera, 544	Combretaceæ, 717	Papayaceæ, 321	Bruviaceæ, 785
Moringææ, 396	Rhizophoraceæ, 726	Turneraceæ, 347	Aquilarinææ, 579
	Vochysiææ, 379	Malesherbiaceæ, 335	Chaillietiacæ, 583
Class 15. <i>Rosiflora.</i>		Passifloraceæ, 332	
Rosaceæ, 563	Class 17. <i>Corniculata.</i>	Belvisiææ, 728	Class 20. <i>Umbelliflora.</i>
Calycanthææ, 540	Saxifragaceæ, 567	Lourea, 744	Hamamelidææ, 784
Myrtinææ, 734	Crassulaceæ, 344	Grossulariææ, 759	Umbelliferæ, 773
	Surianææ	Cactere, 746	Araliacere, 780
Class 16. <i>Calycanthemæ.</i>	Francoaceæ, 451	Cucurbitaceæ, 311	Cornepæ, 782
Melastomoidææ, 731	Ucoideæ, 525	Class 19. <i>Fragulaceæ.</i>	Alangieæ, 719
Lythriarææ, 574		Celastrinææ, 586	Loranthaceæ, 789

** Monopetalous.

a. Fruit inferlor.

Class 21. <i>Rubiaceæ.</i>	Class 22. <i>Aggregatæ.</i>	Calyceææ, 701	Brunoniaceæ, 657
Rubiaceæ, 761	Valerianææ, 697	Class 23. <i>Campanulinæ.</i>	Goodeniaceæ, 694
Lygodysodeaceæ, 761	Dipsacææ, 696	Stylidææ, 696	Lobeliaceæ, 692
Caprifoliaceæ, 766	Compositæ, 702		Campanulaceæ, 689
			Pogoniacæ, 689
		b. Fruit superlor.	
Class 24. <i>Ericinæ.</i>	Class 25. <i>Ligustrinæ.</i>	Class 26. <i>Plantagoideæ.</i>	Class 27. <i>Petalanthæ.</i>
Vacciniææ, 757	Collumellaceæ, 759	Plantaginææ, 642	Primulacææ, 644
Ericaceæ, 453	Boliviariææ, 612	Plumbaginææ, 640	Myrsinææ, 617
Monotropææ, 452	Jasminææ, 620	Salvadoraceæ, 652	
Epacridææ, 443	Oleaceæ, 616		

Class 28. <i>Styracineæ</i> .	Apocynaceæ, 599	Solanaceæ, 618	Pedaliaceæ, 669
Styracæ, 592	Asclepiadeæ, 623	Nolanaceæ, 654	Bignoniaceæ, 675
Ebenaceæ, 595	Class 30. <i>Tubifloræ</i> .	Erycibæ, 595	Cyrtandraceæ, 671
Sapotæ, 590	Cuscutæ, 633	Cordiaceæ, 628	Gesneriaceæ, 671
Aquifoliaceæ, 597	Diapensiaceæ, 606	Ehretiaceæ, 653	Scrophulariaceæ, 681
Class 29. <i>Contortæ</i> .	? Retziaceæ, 618	Borragineæ, 655	Stilbineæ, 607
? Rousseaceæ	Polemoniaceæ, 635	Class 31. <i>Labiatifloræ</i> .	Myoporineæ, 665
Loganiaceæ, 602	Hydroleaceæ, 638	Labiata, 659	Selaginæ, 666
? Gentianaceæ, 612	Hydrophyllæ, 638	Verbenaceæ, 633	Orobanchæ, 609
	Convolvulaceæ, 630	Acanthaceæ, 678	Utriculariæ, 686
			Globulariæ, 666

†† Monochlamyds.

Class 32. <i>Oleraceæ</i> .	Phaleriæ	Class 36. <i>Julifloræ</i> .	Artocarpæ, 269
Petiveriaceæ, 509	Aquilarinæ, 579	Cupuliferæ, 290	Trewiaceæ, 274
Polygonaceæ, 502	Thymelæ, 530	Gunneraceæ, 780	Cannabineæ, 265
Eriogonæ, 502	Hernandiæ, 530	Cynocrambeæ	Betulaceæ, 251
Nyctaginæ, 506	Proteaceæ, 532	Garryaceæ, 295	Ulmaceæ, 580
Chenopodiaceæ, 512	Penaceæ, 577	Datiscæ, 31	Myricæ, 256
Amarantaceæ, 510	Elaagneæ, 237	Putranjivæ	Casuarineæ, 249
Phytolacææ, 509	Myristicæ, 301	Forestiereæ	Class 37. <i>Piperinæ</i> .
Class 33. <i>Daphnoideæ</i> .	Class 34. <i>Serpentaria</i> .	Scepacæ, 283	Chloranthæ, 519
Monimiæ, 298	Aristolochiaceæ, 792	? Heuslowiaceæ, 569	Piperaceæ, 515
Atherospermeæ, 300	Nepentheæ, 287	Lacistemæ, 329	Saurureæ, 521
Laurinæ, 535	? Sarraceniæ, 429	Balsamifluræ, 253	Class 38. <i>Coniferæ</i> .
Gyrocarpæ, 535	Class 35. <i>Tricocæ</i> .	Platanæ, 272	Gnetaceæ, 232
Grubbinæ	Begoniaceæ, 318	Aulidesmiæ, 259	Cupressinæ, 226
Nyssææ, 592	Euphorbiaceæ, 274	Salicinæ, 254	Abietinæ, 226
Helvingiaceæ, 296	Stackhousiaceæ, 589	Batidæ, 286	Taxinæ, 230
Santalaceæ, 787	Eupetreeæ, 285	Celtidæ, 580	Cycadæ, 223
Anthoboleæ		Urticaceæ, 260	
		Moreæ, 266	

II. MONOCOTYLEDONS.

Class 39. <i>Rhizontheæ</i> .	Butomæ, 208	Iridæ, 159	Class 46. <i>Enantioblastæ</i> .
Balanophoræ, 89	Hydrocharidæ, 141	Themodoraceæ, 151	Commelynacæ, 188
Cytinæ, 91	Class 42. <i>Gynandror</i> .	Hypoxidæ, 154	Mayaceæ, 189
Rafflesiaceæ, 93	Orchidæ, 173	Anaryllidæ, 155	Nyridæ, 187
Class 40. <i>Spaticifloræ</i> .	Apostasiæ, 184	Bromeliaceæ, 147	Eriocaulæ, 122
Palmæ, 133	Class 43. <i>Settanineæ</i> .	Class 45. <i>Conorariæ</i> .	Restiaceæ, 121
Pandanaceæ, 130	Zingiberaceæ, 165	Pontederaceæ, 206	Centrolepididæ, 120
Typhaceæ, 126	Cannaceæ	Liliacæ, 200	Class 47. <i>Glumacæ</i> .
Aroidæ, 127	Muscæ, 163	Dioscoreaceæ, 214	Cyperaceæ, 117
Class 41. <i>Helobiæ</i> .	Class 44. <i>Ensotæ</i> .	Ophiopogonæ, 200	Graminæ, 106
Najadæ, 143	Burmanniaceæ, 171	Taccæ, 149	
Alismaceæ, 209		Melanthaceæ, 198	
		Juncaceæ, 191	
		Philydræ, 186	

B. CELLULAR PLANTS.

III. ACOTYLEDONS.

1843. HORANINOW, Paul.—(*Tetractys Naturæ, seu systema quadrimembre omnium naturalium.*)

In this work the views of the author, as expressed nine years before in his *Primæ linæ* (p. xlv.), are repeated with some modifications of detail. His 4th Circle, or Spermophoræ, are called Enspermæ, and the number of the Alliancæ, called Orders, much increased. They are, moreover, distinguished by the termination *astræ*, as Rutastræ, Araliastræ, &c. No distinctive characters are proposed for any of the groups, so that means are not afforded by the learned author of judging of the principles which have guided him in the details of his classification.

1844. JUSSIEU, Adrien de.—(*Cours Élémentaire d'Histoire Naturelle: Botanique.*)

This little work contains all the Natural Orders of plants now admitted, arranged on the plan of Jussieu, by his son. It is therefore the most recent exposition of the views of the learned authors. In addition to the names, an analysis of their distinctive characters is introduced in the original, to which a student may be usefully referred. The arrangement is not however extracted, because it is merely artificial, and contrived for the purpose of finding a plant easily; in which respect it may be compared to the Artificial Analysis affixed to the present work.

1845. LINDLEY, John.—(*The Vegetable Kingdom, &c.*)

The following is the system employed in the present Work :—

CLASSES.

Asexual, or Flowerless Plants.

- Stems and leaves undistinguishable I. THALLOGENS.
- Stems and leaves distinguishable II. ACROGENS.

Sexual, or Flowering Plants.

- Fructification springing from a thallus III. RHIZOGENS.
- Fructification springing from a stem.
 - Wood of stem youngest in the centre; cotyledon single.
 - Leaves parallel-veined, permanent; wood of the stem always confused IV. ENDOGENS.
 - Leaves net-veined, deciduous; wood of the stem, when perennial, arranged in a circle with a central pith V. DICTYOGENS.
 - Wood of stem youngest at the circumference, always concentric; cotyledons 2 or more.
 - Seeds quite naked VI. GYMNOGENS.
 - Seeds inclosed in seed-vessels VII. EXOGENS.

Class I. THALLOGENS.

ALLIANCES OF THALLOGENS

1. ALGALES.—*Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in water or very damp places; propagated by zoospores, coloured spores, or tetraspores.*
2. FUNGALES.—*Cellular flowerless plants, nourished through their thallus (spawn or mycelium); living in air; propagated by spores, colourless or brown, and sometimes inclosed in asci; destitute of green gonidia.*
3. LICHENALES.—*Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in air; propagated by spores usually inclosed in asci; and always having green gonidia in their thallus.*

NATURAL ORDERS OF THALLOGENS.

ALLIANCE I. ALGALES, p. 8.

- Crystalline, angular, fragmentary bodies, brittle, and multiplying by spontaneous separation 1. *Diatomaceæ* or *Brittleworts*, p. 12
- Vesicular, filamentary or membranous bodies, multiplied by zoospores generated in the interior at the expense of their green matter 2. *Confervaceæ* or *Confervas*, p. 14
- Cellular or tubular unsymmetrical bodies, multiplied by simple spores formed externally 3. *Fucaceæ* or *Seaweeds*, p. 20
- Cellular or tubular unsymmetrical bodies, multiplied by tetraspores 4. *Ceramiceæ* or *Rosctangles*, p. 23
- Tubular symmetrically branched bodies, multiplied by spiral coated nucleules, filled with starch 5. *Characeæ* or *Charads*, p. 26

ALLIANCE 2. FUNGALES, p. 29.

- Spores generally quaternate on distinct sporophores. Hymenium naked 6. *Hymenomyces*, *Agaricaceæ*, or *Toadstools*.
 - Spores generally quaternate on distinct sporophores. Hymenium inclosed in a peridium. 7. *Gasteromyces*, *Lycoperdaceæ*, or *Puffballs*.
 - Spores single, often septate, on more or less distinct sporophores. Flocci of the fruit obsolete or mere peduncles 8. *Coniomyces*, *Uredinaceæ*, or *Blights*.
 - Spores naked, often septate. Thallus floccose 9. *Hyphomyces*, *Botrytaceæ*, or *Mildews*.
 - Sporidia contained (generally eight together) in asci 10. *Ascomyces*, *Heliwellaceæ*, or *Moulds*.
 - Spores surrounded by a vesicular veil, or sporangium. Thallus floccose 11. *Physomyces*, *Mucoraceæ*, or *Moulds*.
- } p. 29

ALLIANCE 3. LICHENALES, p. 45.

- Nucleus breaking up into naked spores 12. *Graphidaceæ*, or *Letter-Lichens*.
 - Nucleus bearing asci; thallus homogeneous, gelatinous or cartilaginous 13. *Collemaceæ* or *Jelly-Lichens*.
 - Nucleus bearing asci; thallus heterogeneous, pulverulent or cellular 14. *Parmelinaceæ* or *Leaf-Lichens*.
- } p. 45

Class II. ACROGENS.

ALLIANCES OF ACROGENS.

4. MUSCALES.—*Cellular (or vascular). Spore-cases immersed or calyptrate (i. e. either plunged in the substance of the frond, or inclosed within a hood having the same relation to the spores as an involucre to a seed-vessel).*
5. LYCOPODALES.—*Vascular. Spore-cases axillary or radicle, one or many-celled. Spores of two sorts.*
6. FILICALES.—*Vascular. Spore-cases marginal or dorsal, one-celled, usually surrounded by an elastic ring. Spores of but one sort.*

NATURAL ORDERS OF ACROGENS.

ALLIANCE 4. MUSCALES, p. 54.

1. HEPATICÆ.

- Spore-cases valveless, without operculum or elaters } 15. *Ricciaceæ*, or *Crystalworts*, p. 57
- Spore-cases valveless or bursting irregularly, without operculum, but with elaters } 16. *Marchantiaceæ*, or *Liverworts*, p. 58
- Spore-cases opening by a definite number of equal valves, without operculum, but with elaters } 17. *Jungermanniaceæ*, or *Scalcmosses*, p. 59
- Spore-cases peltate, splitting on one side, without operculum, and with an elater to every spore } 18. *Equisetaceæ*, or *Horsetails*, p. 61

2. MUSCI.

- Spore-cases opening by valves, with an operculum, without elaters } 19. *Andræaceæ*, or *Splitmosses*, p. 63
- Spore-cases valveless, with an operculum, without elaters } 20. *Bryaceæ*, or *Urn-mosses*, p. 64

ALLIANCE 5. LYCOPODALES, p. 68.

- Spore-cases 1-3-celled, axillary; reproductive bodies similar } 21. *Lycopodiaceæ*, or *Clubmosses*, p. 69
- Spore-cases many-celled, radicle (or axillary); reproductive bodies dissimilar } 22. *Marsileaceæ*, or *Pepperworts*, p. 71

ALLIANCE 6. FILICALES, p. 74.

- Spore-cases ringless, distinct, 2-valved, formed on the margin of a contracted leaf } 23. *Ophioglossaceæ*, or *Adders' Tongues*, p. 77
- Spore-cases ringed, dorsal or marginal, distinct, splitting irregularly } 24. *Polypodiaceæ*, or *Ferns*, p. 78
- Spore-cases ringless, dorsal, connate, splitting irregularly by a ventral cleft } 25. *Danæaceæ*, or *Danæads*, p. 82

Class III. RHIZOGENS.

ALLIANCE THE SAME AS THE CLASS, p. 83.

- Ovules solitary, pendulous; fruit one-seeded. } 26. *Balanophoraceæ*, or *Cynomoriums*, p. 89
- Ovules 00, parietal; fruit many-seeded; ealyx 3-4-6-parted; anthers opening by slits } 27. *Cytinaceæ*, or *Cistusrapes*, p. 91
- Ovules 00, parietal; fruit many-seeded, ealyx 5-parted, anthers opening by pores } 28. *Ruflesiaceæ*, or *Palmarworts*, p. 93

Class IV. ENDOGENS.

ALLIANCES OF ENDOGENS.

* Flowers glumaceous; (that is to say, composed of bracts not collected in true whorls, but consisting of imbricated colourless or herbaceous scales).

7. GLUMALES.

** Flowers petaloid, or furnished with a true calyx or corolla, or with both, or absolutely naked; ♂ ♀ (that is having sexes altogether in different flowers, without half-formed rudiments of the absent sexes being present).

8. ARALES.—*Flowers naked or consisting of scales, 2 or 3 together, or numerous, and then sessile on a simple naked spadix; embryo axile; albumen mealy or fleshy. (Some have no albumen).*

9. PALMALES.—*Flowers perfect (with both calyx and corolla), sessile on a branched scaly spadix; embryo vague, solid; albumen horny or fleshy. Some Palms are ♀.*

10. HYDRALES.—*Flowers perfect or imperfect, usually scattered; embryo axile, without albumen.—Aquatics. (Some are ♂.)*

**.—*Flowers furnished with a true ealyx and corolla, adherent to the ovary; ♀.*

11. NARCISSALES.—*Flowers symmetrical; stamens 3 or 6, or more, all perfect; seeds with albumen; (Some Bromeliaceæ have a free calyx and corolla).*

12. ANOMALES.—*Flowers unsymmetrical; stamens 1 to 5, some at least of which are petaloid; seeds with albumen.*

13. ORCHIDALES.—*Flowers unsymmetrical; stamens 1 to 3; seeds without albumen.*

* * * Flowers furnished with a true calyx and corolla, free from the ovary; ♀.

- 14. XYRIDALES.—Flowers half herbaceous, 2-3-petaloidous; albumen copious.
- 15. JUNCALLES.—Flowers herbaceous, dry, and permanent, scarious if coloured; albumen copious. (Some *Callas* have no albumen).
- 16. LILIALES.—Flowers hexapetaloidous succulent, and withering; albumen copious.
- 17. ALISMALES.—Flowers 3-6-petaloidous, apocarpal; albumen none. (Some *Alismads* are absolutely ♀ ♂).

NATURAL ORDERS OF ENDOGENS.

ALLIANCE 7. GLUMALES, p. 105.

- Ovary 1-celled, with 2 or more distinct (or united) styles; ovule ascending; embryo lateral, naked 29. *Graminacæ*, or *Grasses*, p. 106
- Ovary 1-celled, with 2 or more (distinct or united) styles; ovule erect; embryo basal. 30. *Cyperacæ*, or *Sedges*, p. 117
- Ovaries several (sometimes united) with 1 style to each; ovule pendulous; glumes only; styles 1-2; anthers 1-celled; embryo terminal. 31. *Desvauxiacæ*, or *Bristleworts*, p. 120
- Ovary 1-2-3-celled, with 2 or 3 styles always; ovule pendulous; glumes only; styles 2-3; anthers 1-celled; embryo terminal. 32. *Restiacæ*, or *Cordleaves*, p. 121
- Ovary 2-3-celled, with 1 style to each cell; ovule pendulous; a membranous 3-lobed cup within the glumes; anthers 2-celled; embryo terminal. 33. *Eriocaulacæ*, or *Pipcworts*, p. 122

ALLIANCE 8. ARALES, p. 123.

- Flowers 2 or 3, of which one only is ♀. Spadix 0. Ovary one-celled. Ovules erect. Embryo slit 34. *Pistiaceæ*, or *Lemnads*, or *Duckweeds*, p. 124
- Flowers 00, on a naked spadix. Calyx scaly or hairy. Anthers with long filaments. Ovule solitary, pendulous. Seed adherent to the pericarp. Embryo slit. 35. *Typhacæ*, or *Typhads*, or *Bulrushes*, p. 126
- Flowers 00, naked, on a solitary spadix covered by a single hooded spathe. Anthers sessile. Seed loose. Embryo slit, axile. 36. *Aracæ*, or *Arads*, p. 127
- Flowers 00, naked or scaly, on a spadix covered by many spathes. Anthers stalked. Seeds loose. Embryo solid, minute 37. *Pandanacæ*, or *Screw-pines*, p. 130

ALLIANCE 9. PALMALES, p. 133.

- 38. *Palmacæ*, or *Palms*, p. 133

ALLIANCE 10. HYDRALES, p. 140.

- Stamens epigynous; ovary adherent 39. *Hydrocharidacæ*, or *Hydrocharads*, p. 141
- Stamens hypogynous; ovary free; pollen globose 40. *Naiadacæ*, or *Naiads*, p. 143
- Stamens hypogynous; ovary free; pollen con-fervoid 41. *Zosteracæ*, or *Sea-wracks*, p. 145

ALLIANCE 11. NARCISSALES, p. 146.

- Flowers tripetaloidous, 6-leaved, imbricated. Albumen mealy 42. *Bromeliacæ*, or *Bromelworts*, p. 147
- Flowers half tripetaloidous, tubular. Albumen fleshy 43. *Taccacæ*, or *Taccads*, p. 149
- Flowers hexapetaloidous, tubular, scarcely imbricated. Stamens 3, opposite the petals, or 6, anthers turned inwards. Radicle remote from the hilum, which is naked 44. *Hæmodoracæ*, or *Bloodroots*, p. 151
- Flowers hexapetaloidous, much imbricated. Stamens 6; anthers turned inwards. Radicle remote from the hilum, which is often strophilolate 45. *Hypoxidacæ*, or *Hypoxids*, p. 154
- Flowers hexapetaloidous, much imbricated. Stamens 6, or more; anthers turned inwards. Radicle next the hilum 46. *Amarylhidacæ*, or *Amarylhids*, p. 155
- Flowers hexapetaloidous. Stamens 3, opposite the sepals; anthers turned outwards. 47. *Iridacæ*, or *Irids*, p. 159

ALLIANCE 12. AMOMALES, p. 162.

- Stamens more than 1; (anthers 2-celled, no vitellus) 48. *Musacæ*, or *Musads*, p. 163
- Stamen but 1; anther 2-celled; embryo in a vitellus 49. *Zingiberacæ*, or *Gingerworts*, p. 165
- Stamen but 1; anther 1-celled (halved), no vitellus 50. *Marantacæ*, or *Marants*, p. 168

ALLIANCE 13. ORCHIDALES, p. 170.

- Flowers regular. Stamens free, perizynous. 51. *Burmanniacæ*, or *Burmanniads*, p. 171
- Flowers irregular, gynandrous. Placenta perietal 52. *Orchidacæ*, or *Orchids*, p. 173
- Flowers regular, half gynandrous. Placenta axile 53. *Apostasiacæ*, or *Apostasiads*, p. 184

ALLIANCE 14. XYRIDALES, p. 185.

- Sepals 0. Petals 2. Stamens 3, of which 2 are abortive. Embryo axile, in fleshy albumen. } 54 *Philydraceæ*, or *Waterworts*, p. 186
- Sepals 3. Petals 3. Stamens 3, fertile. Carpels opposite sepals. Placentæ parietal. Embryo minute, on the outside of fleshy albumen } 55. *Xyridaceæ*, or *Xyrids*, p. 187
- Sepals 3. Petals 3. Stamens 6 (or 3). Carpels opposite sepals. Placentæ axile. Embryo trochlear, half immersed in fleshy albumen } 56. *Commelynaceæ*, or *Spiderworts*, p. 188
- Sepals 3. Petals 3. Stamens 3; (anthers 1-celled). Carpels opposite petals. Placentæ parietal. Embryo minute, on the outside of fleshy albumen } 57. *Mayaceæ*, or *Mayacs*, p. 189

ALLIANCE 15. JUNCEALES, p. 190.

- Flowers scattered. Embryo minute, undivided. } 58. *Juncaceæ*, or *Rushes*, p. 191
- Flowers spadicæous. Embryo axile, with a conspicuous cleft on one side } 59. *Orontiacæ*, or *Orontiad*s, p. 193

ALLIANCE 16. LILIALES, p. 195.

- Perianth surrounded by a calycine involuere, the inner bracts of which are coloured and petaloid } 60. *Gilliesiaceæ*, or *Gilliesiads*, p. 196
- Perianth naked, flat when withering. Anthers turned outwards; styles distinct; albumen fleshy } 61. *Melanthaceæ*, or *Melanths*, p. 198
- Perianth naked, flat when withering. Anthers turned inwards. Styles consolidated. Albumen fleshy } 62. *Liliaceæ*, or *Lillyworts*, p. 200
- Perianth naked, circinate when withering. Anthers turned inwards. Albumen mealy } 63. *Pontederaceæ*, or *Pontederads*, p. 206

ALLIANCE 17. ALISMALES, p. 207.

- Flowers 3-petaloideous. Placentæ many-seeded, netted and parietal } 64. *Butomuceæ*, or *Butomads*, p. 208
- Flowers 3-petaloideous. Placentæ few-seeded, simple, and axile, or basal. Embryo solid } 65. *Alismaceæ*, or *Alismads*, p. 209
- Flowers scaly. Placentæ few-seeded, simple and axile, or basal. Embryo slit on one side, with a very large plumule } 66. *Juncaginaceæ*, or *Arrow-grasses*, p. 210

Class V. DICTYOGENS.

ALLIANCE THE SAME AS THE CLASS, p. 211.

- Flowers ♂ ♀. Perianth free. Carpels 00, one-seeded } 67. *Triuridaceæ*, or *Tailworts*, p. 213
- Flowers ♂ ♀. Perianth adherent. Carpels consolidated, several-seeded } 68. *Dioscoreaceæ*, or *Yams*, p. 214
- Flowers ♂ ♀. Carpels several, quite consolidated. Placentæ axile. Flowers hexapetaloideous } 69. *Smilacææ*, or *Sarsaparillas*, p. 215
- Flowers ♀. Carpels several, quite consolidated. Placentæ parietal. Flowers 3-6-petaloideous } 70. *Philesiaceæ*, or *Philesiads*, p. 217
- Flowers ♀. Carpels several, half-consolidated. Placentæ axile. Flowers 3-petaloideous } 71. *Trilliaceæ*, or *Parids*, p. 218
- Flowers ♀. Carpels solitary, simple, many-seeded, with long-stalked anatropal seeds and a basal placenta } 72. *Roxburghiaceæ*, or *Roxburghworts*, p. 219

Class VI. GYMNNOGENS.

ALLIANCE THE SAME AS THE CLASS, p. 221.

- Stem simple, continuous. Leaves parallel-veined, pinnate. Scales of the cone antheriferous } 73. *Cycadaceæ*, or *Cycads*, p. 223
- Stem repeatedly branched, continuous. Leaves simple, acerose. Females in cones } 74. *Pinaceæ*, or *Conifers*, p. 226
- Stem repeatedly branched, continuous. Leaves simple, often fork-veined. Females solitary. Membrane next the nucleus inclosed. Anthers 2-celled, opening longitudinally } 75. *Taxaceæ*, or *Taxads*, p. 226

Stem repeatedly branched, jointed. Leaves simple, net-veined. Membrane next the nucleus tubular, protruded. Anthers 1-celled, opening by pores } 76. *Gnetaceæ*, or *Joint Firs*, p. 232

Class VII. EXOGENS.

ALLIANCES OF EXOGENS.

SUB-CLASS I. DICLINOUS EXOGENS.

Flowers ♂ ♀, without any customary tendency to ♂.

18. AMENATALES.—Flowers in catkins, achlamydeous or monochlamydeous; carpels superior; embryo small, with little or no albumen.
19. URTICALES.—Flowers scattered, monochlamydeous; carpel single, superior; embryo large, lying in a small quantity of albumen.
20. EUPHORBIALES.—Flowers scattered, monodichlamydeous; carpels consolidated, superior; placenta axile; embryo surrounded by abundant albumen. (Albumen occasionally absent).
21. QUERNALES.—Flowers in catkins, monochlamydeous; carpels inferior; embryo amygdaloid, without albumen.
22. GARRYALES.—Flowers monochlamydeous, sometimes amentaceous; carpels inferior; embryo minute, in a large quantity of albumen.
23. MENISPERMALES.—Flowers monodichlamydeous; carpels superior, disarticulated; embryo surrounded by abundant albumen.
24. CUCURBITALES.—Flowers monodichlamydeous; carpels inferior; placenta parietal; embryo without albumen.
25. PAPAYALES.—Flowers dichlamydeous; carpels superior, consolidated; placenta parietal; embryo surrounded by abundant albumen.

SUB-CLASS II. HYPOGYNOUS EXOGENS.

Flowers ♂, or ♂ ♀; stamens entirely free from the calyx and corolla.

26. VIOLALES.—Flowers monodichlamydeous; placenta parietal or sutural; embryo straight, with little or no albumen.
27. CISTALES.—Flowers monodichlamydeous; placenta parietal or sutural; embryo curved or spiral, with little or no albumen.
28. MALVALES.—Flowers monodichlamydeous; placenta axile; calyx valvate in aestivation; corolla imbricated or twisted; stamens definite or 00; embryo with little or no albumen.
29. SAPINDALES.—Flowers monodichlamydeous, unsymmetrical; placenta axile; calyx and corolla imbricated; stamens definite; embryo with little or no albumen. (Stamens rarely 00).
30. GUTTIFERALES.—Flowers monodichlamydeous; placenta axile; calyx imbricated; corolla imbricated or twisted; stamens 00; embryo with little or no albumen. (Stamens sometimes definite in number).
31. NYMPHALES.—Flowers dichlamydeous; placenta axile or sutural; stamens 00; embryo on the outside of a very large quantity of mealy albumen. (A part have no albumen).
32. RANALES.—Flowers monodichlamydeous; placenta sutural or axile; stamens 00; embryo minute, inclosed in a large quantity of fleshy or horny albumen.
33. BERBERALES.—Flowers monodichlamydeous, unsymmetrical in the ovary; placenta sutural, parietal, or axile; stamens definite; embryo inclosed in a large quantity of fleshy albumen.
34. ERICALES.—Flowers dichlamydeous, symmetrical in the ovary; placenta axile; stamens definite; embryo inclosed in a large quantity of fleshy albumen. (Stamens occasionally adherent to the corolla).
35. RUTALES.—Flowers monodichlamydeous, symmetrical; placenta axile; calyx and corolla imbricated, if present; stamens definite; embryo with little or no albumen. (Occasionally ♂ ♀).
36. GERANIALES.—Flowers monodichlamydeous, symmetrical; placenta axile; calyx imbricated; corolla twisted; stamens definite; embryo with little or no albumen.
37. SILENALES.—Flowers monodichlamydeous; placenta free, central; embryo external, curved round a little mealy albumen; carpels more than one, completely combined into a compound fruit. (Some slightly perigynous, others ♂ ♀).
38. CHENOPODALES.—Flowers monochlamydeous; placenta free, central; embryo external, either curved round or applied to the surface of a little mealy or horny albumen; carpels solitary, or, if more than one, distinct. (Some slightly perigynous, others ♂ ♀).
39. PIPERALES.—Flowers achlamydeous; embryo minute, on the outside of a large quantity of mealy albumen. (Occasionally ♂ ♀).

SUB-CLASS III. PERIGYNOUS EXOGENS.

Flowers ♂, or ♂ ♀; stamens growing to the side of either the calyx or the corolla; ovary superior, or nearly so.

40. FIGOIDALES.—Flowers monodichlamydeous; placenta central or axile; corolla, if present, polypetalous; embryo external, and curved round a small quantity of mealy albumen.
41. DAPHNALES.—Flowers monochlamydeous; carpel solitary; embryo amygdaloid, without albumen.
42. ROSACEÆ.—Flowers monodichlamydeous; carpels more or less distinct; placenta sutural; seeds definite; corolla, if present, polypetalous; embryo amygdaloid, with little or no albumen.
43. SAXIFRAGALES.—Flowers monodichlamydeous; carpels consolidated; placenta sutural or axile; seeds 00; corolla, if present, polypetalous; embryo taper, with a long radicle and a little or no albumen.

- 43. RHAMNALES.—Flowers monodichlamydeous; carpels consolidated; placenta axile; fruit capsular, berried, or drupaceous; seeds definite; embryo amygdaloid, with little or no albumen.
- 45. GENTIANALES.—Flowers dichlamydeous, monopetalous; placenta axile or parietal; embryo minute, or with the cotyledons much smaller than the radicle, lying in a large quantity of albumen.
- 46. SOLANALES.—Flowers dichlamydeous, monopetalous, symmetrical; placenta axile; fruit 2-3-celled; embryo large, lying in a small quantity of albumen. (Occasionally achlamydeous or polypetalous).
- 47. CORTUSALES.—Flowers dichlamydeous, monopetalous, symmetrical; placenta free, central; embryo lying among a large quantity of albumen. (Occasionally monochlamydeous, or polypetalous).
- 48. ECHIALES.—Flowers dichlamydeous, monopetalous, symmetrical, or unsymmetrical; fruit nucameneaceous, consisting of several one-seeded nuts, or of clusters of them separate or separable; embryo large, with little or no albumen. (Very rarely hypogynous!)
- 49. BIGNONIALES.—Flowers dichlamydeous, monopetalous, unsymmetrical; fruit capsular or berried, with its carpels quite consolidated; placenta axile, or parietal, or free central; embryo with little or no albumen.

SUB-CLASS IV. EPIGYNOUS EXOGENS.

Flowers ♀ or ♂ ♀ ♀; stamens growing to the side of either the calyx or corolla; ovary inferior or nearly so.

- 50. CAMPANALES.—Flowers dichlamydeous, monopetalous; embryo with little or no albumen.
- 51. MYRTALES.—Flowers dichlamydeous, polypetalous; placenta axile; embryo with little or no albumen. (Occasionally monochlamydeous).
- 52. CACTALES.—Flowers dichlamydeous, polypetalous; placenta parietal; embryo with little or no albumen.
- 53. GROSSALES.—Flowers dichlamydeous, polypetalous; seeds numerous, minute; embryo small, lying in a large quantity of albumen.
- 54. CINCHONALES.—Flowers dichlamydeous, monopetalous; embryo minute, lying in a large quantity of albumen.
- 55. UMBELLALES.—Flowers dichlamydeous, polypetalous; seeds solitary, large; embryo small, lying in a large quantity of albumen.
- 56. ASARALES.—Flowers monochlamydeous; embryo small, lying in a large quantity of albumen.

NATURAL ORDERS OF EXOGENS.

ALLIANCE 18. AMENTALES, p. 248.

- | | |
|---|--|
| Ovary 1-celled. Ovule 1 or 2, ascending. Radicle superior | } 77. <i>Casuarinaceæ</i> , or <i>Beefwoods</i> , p. 249 |
| Ovary 2-celled. Ovule 1, pendulous. Radicle superior | |
| Ovary 2-celled. Ovules 00. Seeds winged. | 79. <i>Altingiaceæ</i> , or <i>Liquidambar</i> , p. 253 |
| Ovary 1-celled. Ovules 00. Seeds cottony. | 80. <i>Salicaceæ</i> , or <i>Willowworts</i> , p. 254 |
| Ovary 1-celled. Ovule 1, erect. Radicle superior | } 81. <i>Myricaceæ</i> , or <i>Galeworts</i> , p. 256 |
| Ovary 1-celled. Ovule 1, ascending. Radicle inferior | |

ALLIANCE 19. URTICALES, p. 258.

- | | |
|---|--|
| Radicle superior. Ovules twin, suspended. Embryo straight, albuminous. Anthers 2-lobed, with vertical fissures | } 83. <i>Stilaginaceæ</i> , or <i>Antidesmads</i> , p. 259 |
| Radicle superior. Ovule solitary, erect. Embryo straight, albuminous. Juice limpid. Stipules small, flat | |
| Radicle inferior. Embryo exalbuminous. Plumule many-leaved, large | 85. <i>Ceratophyllaceæ</i> , or <i>Hornworts</i> , p. 263 |
| Radicle superior. Ovule solitary, suspended. Embryo hooked, exalbuminous | 86. <i>Cannabaceæ</i> , or <i>Hempworts</i> , p. 265 |
| Radicle superior. Ovules solitary, suspended. Embryo hooked, albuminous | 87. <i>Moraceæ</i> , or <i>Morals</i> , p. 266 |
| Radicle superior. Ovule solitary, erect or suspended. Embryo straight, exalbuminous. Juice milky. Stipules large, convolute | } 88. <i>Artocarpaceæ</i> , or <i>Artocarpads</i> , p. 269 |
| Radicle inferior. Embryo albuminous. Plumule minute. Juice limpid. Stipules large, deciduous | |

ALLIANCE 20. EUPHORBIALES, p. 273.

- | | | |
|--|--|-----|
| Ovules definite, suspended, anatropal. Radicle superior | } 90. <i>Euphorbiaceæ</i> , or <i>Spurgeworts</i> , p. 274 | V L |
| Ovules definite, suspended, campylotropal. Radicle inferior, albumen mealy | | |
| Ovules definite, suspended, anatropal. Radicle superior. ♂ amentaceous | 91. <i>Scopaceæ</i> , or <i>Scopads</i> , p. 283 | |
| Ovules definite, suspended, amphitropal. Radicle superior | 92. <i>Callitricheæ</i> , or <i>Starworts</i> , p. 284 | |
| Ovules definite, ascending, anatropal. Radicle inferior | } 93. <i>Empetraceæ</i> , or <i>Crowberries</i> , p. 285 | |
| Ovules solitary, ascending. ♀ naked, combined into a succulent cone | | |
| Ovules 00, ascending. Radicle inferior. Seeds scobiform | 94. ? <i>Nepentheæ</i> , or <i>Nepenths</i> , p. 287 | |

ALLIANCE 21. QUERNALES, p. 289.

- Ovary 2- or more celled. Ovules pendulous } 95. *Corylaceæ*, or *Mastworts*, p. 290
 or peltate. }
 Ovary 1-celled. Ovule solitary, erect } 96. *Juglandacæ*, or *Juglands*, p. 292

ALLIANCE 22. GARRVALES, p. 294.

- Flowers amentaceous. Leaves opposite, ex- } 97. *Garryacæ*, or *Garryads*, p. 295
 stipulate }
 Flowers fascicled. Leaves alternate, stipulate. } 98. *Helwingiacæ*, or *Helwingiads*, p. 296

ALLIANCE 23. MENISPERMALES, p. 297.

- Albumen copious, solid. Seeds pendulous; } 99. *Monimiacæ*, or *Monimiads*, p. 298
 embryo small, external. Stamens perigynous. }
 Albumen copious, solid. Seeds erect. An- } 100. *Atherospermacæ*, or *Plume-Nutmegs*,
 —thers opening by recurved valves } p. 300
 Albumen copious, ruminated. Sepals united } 101. *Myristicacæ*, or *Nutmegs*, p. 301
 into a valvate cup }
 Albumen copious, solid. Seeds parietal; em- } 102. *Lardizabalacæ*, or *Lardizabalads*, p. 303
 bryo minute }
 Albumen copious, solid. Seeds pendulous; } 103. *Schizandraceæ*, or *Kadsurads*, p. 305
 embryo minute, internal. Stamens hypogy- }
 nous }
 Albumen sparing, solid. Seeds amphitropal; } 104. *Menispermacæ*, or *Menispermads*, p. 307
 embryo large }

ALLIANCE 24. CUCURBITALES, p. 310.

- Fruit pulpy. Placentæ strictly parietal. Mo- } 105. *Cucurbitacæ*, or *Cucurbits*, p. 311
 nopetalous }
 Fruit dry. Placentæ strictly parietal. Ape- } 106. *Datisacæ*, or *Datiscads*, p. 316
 talous }
 Fruit dry. Placentæ projecting and meeting } 107. *Begoniacæ*, or *Begoniads*, p. 318
 in the axis. Monodichlamydeous }

ALLIANCE 25. PAPAYALES, p. 320.

- Corolla monopetalous; ♀ without scales . . . 108. *Papayacæ*, or *Papayads*, p. 321
 Corolla polypetalous; ♀ with scales in the } 109. *Pangiaceæ*, or *Pangiads*, p. 323
 throat }

ALLIANCE 26. VIOLALES, p. 326.

- Flowers scattered, apetalous or polypetalous. }
 Petals and stamens both hypogynous. Leaves } 110. *Flacourtiacæ*, or *Bivads*, p. 327
 dotless, or with round dots only }
 Flowers in catkins, apetalous, scaly, polyga- } 111. *Lacistemacæ*, or *Lacistemads*, p. 329
 mous. Stamens unilateral }
 Flowers scattered, apetalous, tubular, herma- } 112. *Samydecæ*, or *Samyds*, p. 330
 phrodite. Leaves marked with both round }
 and linear transparent dots. (Stamens peri- }
 gynous). }
 Flowers polypetalous or apetalous, coronetted. } 113. *Passifloracæ*, or *Passionworts*, 332
 Petals perigynous, imbricated. Stamens on }
 the stalk of the ovary. Styles simple, ter- }
 minal. Seeds arillate. Leaves stipulate . . }
 Flowers polypetalous, coronetted. Petals peri- } 114. *Malsherbicacæ*, or *Crownworts*, p. 335
 gynous, imbricated. Stamens on the stalk }
 of the ovary. Styles simple, dorsal. Seeds }
 without aril. Leaves without stipules . . }
 Flowers polypetalous. Calyx many-leaved. } 115. *Moringacæ*, or *Moringads*, p. 336
 Petals perigynous. Anthers 1-celled. Fruit }
 stipitate, consolidated, siliquose. Seeds }
 without albumen. Stamens perigynous. . . }
 Flowers polypetalous. Calyx many-leaved. } 116. *Violacæ*, or *Violetworts*, p. 338
 Petals hypogynous. Stamens all perfect; }
 anthers crested, and turned inwards. Fruit }
 consolidated. Seeds albuminous }
 Flowers polypetalous. Calyx tubular, fur- } 117. *Frankeniaceæ*, or *Frankeniads*, p. 340
 rowed. Petals hypogynous, unguiculate. }
 Flowers polypetalous. Calyx many-leaved. } 118. *Tamaricacæ*, or *Tamarisks*, p. 341
 Petals hypogynous. Styles distinct. Fruit }
 consolidated. Seeds 90, basal, coriaceous, with- }
 out albumen }
 Flowers polypetalous. Calyx many-leaved. } 119. *Sauvagesiacæ*, or *Sauvageads*, p. 343
 Petals hypogynous. Stamens partly sterile }
 and petaloid; anthers opposite the petals, }
 naked, turned outwards. Fruit consolidated. }
 Seeds albuminous }
 Flowers polypetalous or monopetalous. Calyx } 120. *Crasulacæ*, or *Houseleeks*, p. 344
 many-leaved. Petals hypogynous. Fruit }
 follicular, apocarpous }
 Flowers polypetalous. Petals perigynous, con- } 121. *Turneracæ*, or *Turnerads*, p. 347
 torted. Styles forked. Leaves exstipulate . }

ALLIANCE 27. CISTALES, p. 348.

- Stamens not tetradynamous, generally indefinite. Flowers $\sqrt[3]{}$ or $\sqrt[5]{}$. Seeds with albumen. Fruit closed up } 122. *Cistaceæ*, or *Rock Roses*, p. 349
- Stamens tetradynamous. Flowers $\sqrt[4]{}$ } 123. *Brassicaceæ*, or *Crucifers*, p. 351
- Stamens not tetradynamous, definite. Flowers not tetramerous. Seeds without albumen. Fruit usually open at the point } 124. *Rosaceæ*, or *Weldworts*, p. 356
- Stamens not tetradynamous. Flowers $\sqrt[4]{}$. Seeds without albumen. Fruit closed up } 125. *Capparidaceæ*, or *Capparids*, p. 357

ALLIANCE 28. MALVALES, p. 359.

- Stamens columnar, all perfect. Anthers 2-celled, turned outwards } 126. *Sterculiaceæ*, or *Sterculiads*, p. 360
- Stamens monadelphous, in most cases partly sterile. Anthers 2-celled, turned inwards } 127. *Byttneriaceæ*, or *Byttneriads*, p. 363
- Stamens free. Disk none. Seeds with albumen. Embryo curved. Petals permanent. Calyx ribbed } 128. *Vivianiaceæ*, or *Virianads*, p. 365
- Stamens free. Disk none. Seeds without albumen. Embryo amygdaloid } 129. *Tropæolaceæ*, or *Indian Cresses*, p. 366
- Stamens columnar, all perfect. Anthers 1-celled, turned inwards } 130. *Malvaceæ*, or *Mallowworts*, p. 368
- Stamens free, on the outside a disk. Seeds with albumen. Embryo straight } 131. *Tiliaceæ*, or *Lindenblooms*, p. 371

ALLIANCE 29. SAPINDALES, p. 373.

- Flowers complete, partially symmetrical. Calyx valvate. Anthers 2-4-celled, opening by pores } 132. *Tremandræceæ*, or *Foreworts*, p. 374
- Flowers complete (irregular), unsymmetrical. Petals naked. Anthers 1-celled, opening by pores. Seeds carunculate } 133. *Polygalaceæ*, or *Milkworts*, p. 375
- Flowers complete, unsymmetrical, very irregular. Petals naked. Anthers opening longitudinally. Carpels 3. Seeds winged. (In one case the ovary is adherent) } 134. *Vochyaceæ*, or *Vochyads*, p. 379
- Flowers complete, partially symmetrical. Calyx imbricated. Ovules ascending. Stigmas simple. Leaves opposite, with stipules } 135. *Staphyleaceæ*, or *Bladder Nuts*, p. 381
- Flowers complete, unsymmetrical. Petals usually with an appendage or 0. Anthers opening longitudinally. Carpels 3. Seeds usually arillate, wingless } 136. *Sapindaceæ*, or *Soapworts*, p. 382
- Flowers apetalous. Carpel solitary } 137. *Peliveriaceæ*, or *Peliveriads*, p. 386
- Flowers complete, unsymmetrical. Petals naked or 0. Anthers opening longitudinally. Carpels 2. Seeds without an aril } 138. *Aceraceæ*, or *Maples*, p. 387
- Flowers complete, partially symmetrical. Calyx imbricated. Petals naked, stalked. Ovules hanging by cords. Stigmas simple. Embryo usually convolute } 139. *Malpighiaceæ*, or *Malpighiads*, p. 388
- Flowers complete, partially symmetrical. Calyx imbricated. Petals with an appendage. Ovules sessile, pendulous. Stigmas capitate. Embryo straight } 140. *Erythroxylaceæ*, or *Erythroxyls*, p. 391

ALLIANCE 30. GUTTIFERALES, p. 392.

- Leaves simple, alternate, with large convolute stipules. Flowers symmetrical. Petals equilateral. Calyx unequal, permanent, winged. Anthers beaked. Fruit one-celled, one-seeded } 141. *Dipteraceæ*, or *Dipterads*, p. 393
- Leaves simple, alternate, without stipules or with very small ones. Flowers symmetrical. Petals equilateral. Anthers versatile. Seeds few or single. Stigmas on a long style } 142. *Ternströmiaceæ*, or *Theads*, p. 396
- Leaves digitate, opposite. Flowers symmetrical. Petals equilateral. Stigmas sessile. Seeds solitary. Embryo with an enormous radicle } 143. *Rhizobolaceæ*, or *Rhizobols*, p. 398
- Leaves simple, opposite, without stipules. Flowers symmetrical. Petals equilateral. Anthers adnate, beakless. Seeds solitary or few. Stigmas sessile, radiating } 144. *Clusiaceæ*, or *Guttifers*, p. 400
- Leaves simple, alternate, without stipules. Flowers unsymmetrical. Petals equilateral. Anthers versatile. Seeds innumerable, minute. Stigmas sessile } 145. *Marcgraviaceæ*, or *Marcgraviads*, p. 403
- Petals oblique, glandular. Seeds numerous, naked. Styles long, distinct } 146. *Hypericaceæ*, or *Tutsans*, p. 405
- Petals oblique, glandless. Seeds few, shaggy. Styles long, distinct } 147. *Reaumuriaceæ*, or *Reaumuriads*, p. 407

ALLIANCE 31. NYMPHAELES, p. 408.

- | | |
|--|---|
| Carpels united into a many-celled fruit, with dissepimental placentæ | } 148. <i>Nymphaeaceæ</i> , or <i>Waterlilies</i> , p. 409 |
| Carpels distinct. Albumen copious. Torus absent | |
| Carpels distinct. Albumen 0. Torus honey-combed, very large | } 149. <i>Cabombaceæ</i> , or <i>Water-shields</i> , p. 412 |
| | } 150. <i>Nelumbiaceæ</i> , or <i>Waterbeans</i> , p. 414 |

ALLIANCE 32. RANALES, p. 416.

- | | |
|--|--|
| Carpels distinct. Stipules large, convoluted. Corolla imbricated. Albumen homogeneous. | } 151. <i>Magnoliaceæ</i> , or <i>Magnoliads</i> , p. 417 |
| Carpels distinct. Stipules 0. Corolla valvate. Albumen ruminant | |
| Carpels distinct. Stipules 0. Corolla imbricated. Albumen homogeneous. Seeds arilate | } 152. <i>Anonaceæ</i> , or <i>Anonads</i> , p. 420 |
| Carpels distinct. Stipules 0. Corolla imbricated. Albumen homogeneous. Seeds without an aril | } 153. <i>Dilleniaceæ</i> , or <i>Dilleniads</i> , p. 423 |
| Carpels consolidated. Calyx permanent. Placentæ axile | } 154. <i>Ranunculaceæ</i> , or <i>Crowfoots</i> , p. 425 |
| Carpels consolidated. Calyx deciduous. Placentæ usually parietal | |
| | } 155. <i>Sarraceniacæ</i> , or <i>Sarraceniads</i> , p. 429 |
| | } 156. <i>Papaveraceæ</i> , or <i>Poppyworts</i> , p. 430 |

ALLIANCE 33. BERBERALES, p. 432.

- | | |
|--|---|
| Flowers regular and symmetrical. Placentæ parietal. Stamens alternate with the petals, or twice as many | } 157. <i>Droseraceæ</i> , or <i>Sundews</i> , p. 433 |
| Flowers irregular and unsymmetrical. Placentæ parietal. Stamens opposite the petals | |
| Flowers regular, symmetrical. Placentæ sutural. Stamens opposite the petals. Anthers with recurved valves | } 158. <i>Fumariaceæ</i> , or <i>Fumeworts</i> , p. 435 |
| Flowers regular, symmetrical. Placentæ axile. Stamens opposite the petals. Anthers opening longitudinally | } 159. <i>Berberidaceæ</i> , or <i>Berberids</i> , p. 437 |
| Flowers regular, symmetrical. Placentæ axile and parietal. Stamens alternate with the petals. Ovules ascending or horizontal. Corolla imbricated | } 160. <i>Vitaceæ</i> , or <i>Vineworts</i> , p. 439 |
| Flowers regular, symmetrical. Placentæ axile. Stamens alternate with the petals. Ovules pendulous. Corolla valvate | |
| Flowers regular, symmetrical. Placentæ axile. Stamens alternate with the petals if equal to them in number. Ovules pendulous. Corolla imbricated | } 161. <i>Pittosporaceæ</i> , or <i>Pittosporads</i> , p. 441 |
| | } 162. <i>Oleaceæ</i> , or <i>Oleacads</i> , p. 443 |
| | } 163. <i>Cyrillaceæ</i> , or <i>Cyrillads</i> , p. 445 |

ALLIANCE 34. ERICALES, p. 446.

- | | |
|--|---|
| Flowers polypetalous. Stamens all perfect, monadelphous. Anthers 2-celled, with a long membranous connective | } 164. <i>Humiriaceæ</i> , or <i>Humiriads</i> , p. 447 |
| Flowers monopetalous. Stamens all perfect, free. Seeds with a firm skin. Anthers 1-celled, opening longitudinally | |
| Flowers half-monopetalous. Stamens all perfect, free. Seeds with a loose skin. Embryo at the base of the albumen | } 165. <i>Epacridaceæ</i> , or <i>Epacrids</i> , p. 448 |
| Flowers polypetalous. Stamens half-sterile and scale-like, free. Seeds with a firm skin | } 166. <i>Pyrolaceæ</i> , or <i>Winter-green</i> , p. 450 |
| Flowers half-monopetalous. Stamens all perfect, free. Seeds with a loose skin or wing. Embryo at the apex of the albumen | |
| Flowers monopetalous. Stamens all perfect, free. Seeds with a firm or loose skin. Anthers 2-celled, opening by pores | } 167. <i>Francoaceæ</i> , or <i>Francoads</i> , p. 451 |
| | } 168. <i>Monotropaceæ</i> , or <i>Fir-rapes</i> , p. 452 |
| | } 169. <i>Ericaceæ</i> , or <i>Heathworts</i> , p. 453 |

ALLIANCE 35. RUTALES, p. 456.

- | | |
|--|--|
| Fruit consolidated, succulent, indehiscent. Petals imbricated. Stamens free, or nearly so. Leaves dotted | } 170. <i>Aurantiacæ</i> , or <i>Citronworts</i> , p. 457 |
| Fruit consolidated, hard, dry, somewhat valvular. Petals valvate. Stamens free. Leaves generally dotted | |
| Fruit consolidated, capsular. Stamens deeply monadelphous or free. Seeds numerous, winged | } 171. <i>Anycidaceæ</i> , or <i>Anygrids</i> , p. 459 |
| Fruit consolidated, berried, or capsular. Stamens deeply monadelphous. Seeds few, wingless. Leaves dotless | } 172. <i>Cedrelaceæ</i> , or <i>Cedrelids</i> , p. 461 |
| Fruit apocarpous. Ovule single, suspended by a cord rising from the base of the carpel | } 173. <i>Meliaceæ</i> , or <i>Meliads</i> , p. 463 |
| | } 174. <i>Anacardiaceæ</i> , or <i>Anacards</i> , or <i>Treeblights</i> , p. 465 |

- Fruit apocarpous. Ovules collateral, ascending, orthotropal, sessile } 175. *Connaraceæ*, or *Connarads*, p. 463
- Fruit finally apocarpous, few-seeded, with the pericarp separating in two layers. Ovules sessile, pendulous. Flowers ♀ } 176. *Rutaceæ*, or *Ruceorts*, p. 469
- Fruit finally apocarpous, few-seeded, with the pericarp separating in two layers. Ovules sessile, pendulous. Flowers ♂-♀-♀ } 177. *Xanthoxylaceæ*, or *Xanthoxyls*, p. 472
- Fruit finally apocarpous, one-seeded, with the pericarp not laminating, and a succulent conical torus } 178. *Ochnaceæ*, or *Ochnads*, p. 474
- Fruit finally apocarpous, one-seeded, with the pericarp not laminating, and a dry inconspicuous torus. Albumen wanting. Leaves alternate, without stipules } 179. *Simarubaceæ*, or *Quassiads*, p. 476
- Fruit finally apocarpous, few-seeded, with the pericarp not laminating, and a dry inconspicuous torus. Albumen present. Leaves opposite, with stipules } 180. *Zygophyllaceæ*, or *Beancapers*, p. 478
- Fruit finally apocarpous, many-seeded. Flowers polyptalous } 181. *Elatinaceæ*, or *Water-peppers*, p. 480
- Fruit finally apocarpous, many-seeded. Flowers apetalous, very imperfect } 182. *Podostemaceæ*, or *Podostemads*, p. 482

ALLIANCE 36. GERANIALES, p. 484.

- Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with little or no albumen } 183. *Linaceæ*, or *Flaxworts*, p. 485
- Flowers regular, unsymmetrical, with a permanent cup-like involucre. Stamens monadelphous. Albumen abundant } 184. *Chloneæ*, or *Chloneads*, p. 486
- Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with abundant albumen } 185. *Oxalidaceæ*, or *Oxalids*, p. 488
- Flowers very irregular and unsymmetrical, without an involucre. Stamens distinct. Albumen none } 186. *Balsaminaceæ*, or *Balsams*, p. 490
- Flowers usually symmetrical. Styles and carpels combined round a long heaked torus . . } 187. *Geraniaceæ*, or *Cranesbills*, p. 493

ALLIANCE 37. SILENALES, p. 495.

- Calyx and corolla usually both present and symmetrical (4 and 4, or 5 and 5), the latter conspicuous. Ovules amphitropal. Leaves opposite, without stipules } 188. *Caryophyllaceæ*, or *Cloveworts*, p. 496
- Calyx and corolla usually both present and symmetrical (4 and 4, or 5 and 5), the latter rudimentary. Ovules amphitropal. Leaves with scarious stipules } 189. *Illecebraceæ*, or *Knolworts*, p. 499
- Calyx and corolla both present and unsymmetrical (2 and 5), the latter usually conspicuous. Ovules amphitropal. Leaves alternate, succulent, without stipules . . . } 190. *Portulacææ*, or *Purslanes*, p. 500
- Calyx only present, but often coloured. Ovules orthotropal. Nut usually triangular . . . } 191. *Polygonaceæ*, or *Buckwheals*, p. 502

ALLIANCE 38. CHENOPODALES, p. 505.

- Sepals united into a long (often coloured) plaited tube, which separates from its base, the latter becoming hard, and forming a spurious pericarp } 192. *Nyctaginaceæ*, or *Nyctagos*, p. 506
- Sepals separate, flat. Stamens alternate with the sepals or 00. Carpels several (or 1) . . } 193. *Phytolaccaceæ*, or *Phytolaccads*, p. 509
- Sepals separate or nearly so, flat. Stamens opposite the sepals. Anthers often 1-celled. Ovary 1, often several-seeded. (Flowers scarious, surrounded by imbricated bracts) . } 194. *Amarantaceæ*, or *Amaranths*, p. 510
- Sepals separate, or nearly so, flat. Stamens opposite the sepals. Anthers 2-celled. Ovary 1, always one-seeded. (Flowers herbaceous, naked) } 195. *Chenopodiaceæ*, or *Chenopods*, p. 512

ALLIANCE 39. PIPERALEs, p. 514.

- Carpel solitary. Ovule erect. Embryo lying in vitellus. Leaves opposite or alternate, with or without stipules } 196. *Piperaceæ*, or *Peppeworts*, p. 515
- Carpel solitary. Ovule suspended. Embryo naked. Leaves opposite, with intermediate stipules } 197. *Chloranthaceæ*, or *Chloranths*, p. 519
- Carpels several, distinct. Ovule erect. Embryo lying in vitellus. Leaves alternate, with stipules } 198. *Saururaceæ*, or *Saururads*, p. 521

ALLIANCE 40. FICOIDALES, p. 523.

- Petals absent. Sepals distinct. Fruit inclosed
in a membranous or succulent calyx. Carpel
single, solitary. Seed erect } 199. *Basellaceæ*, or *Basellads*, p. 524
- Petals numerous, conspicuous. Carpels several,
consolidated } 200. *Mesembryaceæ*, or *Ficoids*, p. 525
- Petals absent. Carpels several, consolidated
Petals absent. Sepals united into a tube.
Carpel single, solitary. Fruit inclosed in
the hardened calyx tube } 201. *Tetragoniaceæ*, or *Aizoons*, p. 527
- } 202. *Scleranthaceæ*, or *Scleranth*s, p. 528

ALLIANCE 41. DAPNNALES, p. 529.

- Anthers bursting lengthwise. Apetalous or
polypetalous. Ovule solitary, suspended.
Calyx imbricated } 203. *Thymelaceæ*, or *Daphnads*, p. 530
- Anthers bursting lengthwise. Apetalous.
Ovules erect. Calyx valvate } 204. *Proteaceæ*, or *Proteads*, p. 532
- Anthers bursting by recurved valves. Leaves
perfect. Fruit naked } 205. *Lauraceæ*, or *Lanrels*, p. 535
- Anthers bursting by recurved valves. Leaves
mere colourless scales. Fruit hurried in a
succulent permanent calyx } 206. *Cassythaceæ*, or *Dodder-lanrels*, p. 538

ALLIANCE 42. ROSALES, p. 539.

- Flowers consisting of numerous imbricated
scales. Cotyledons convolute } 207. *Calycanthaceæ*, or *Calycanths*, p. 540
- Flowers polypetalous (or apetalous), nearly
or quite regular. Carpel solitary. Style
proceeding from the base of the ovary . . . } 208. *Chrysobalanaceæ*, or *Chrysobalans*, p. 542
- Flowers polypetalous (or apetalous), papi-
lionaceous or leguminous. Carpel solitary,
with the style proceeding from the apex of
the ovary } 209. *Fabaceæ*, or *Leguminous plants*, p. 544
- Flowers polypetalous, regular, drupaceous.
Carpel solitary, with the style proceeding
from the apex of the ovary } 210. *Drupaceæ*, or *Almondworts*, p. 557
- Flowers polypetalous, regular. Carpels ad-
hering to the calyx by their back } 211. *Pomaceæ*, or *Appleworts*, p. 559
- Flowers apetalous. Carpel solitary, inclosed
in a hardened calyx-tube forming a false
pericarp } 212. *Sanguisorbaceæ*, or *Sanguisorbs*, p. 561
- Flowers polypetalous. Carpels free from the
calyx, and quite or nearly so from each
other } 213. *Rosaceæ*, or *Roseworts*, p. 563

ALLIANCE 43. SAXIFRAGALES, p. 566.

- Styles distinct. Leaves alternate } 214. *Saxifragaceæ*, or *Saxifrages*, p. 567
- Styles distinct. Leaves opposite, without
stipules } 215. *Hydrangeaceæ*, or *Hydrangeads*, p. 569
- Styles distinct. Leaves opposite, with large
interpetiolar stipules } 216. *Cunoniaceæ*, or *Cunoniads*, p. 571
- Styles consolidated. Calyx many-leaved.
Albumen 0. Leaves alternate } 217. *Brexiaceæ*, or *Brexiads*, p. 573
- Styles consolidated. Calyx tubular, perma-
nent, with the petals in the margin. Albu-
men 0. Leaves opposite } 218. *Lythraceæ*, or *Loosestrifes*, p. 574

ALLIANCE 44. RHANNALES, p. 577.

- Flowers apetalous. Ovary composed of 4
carpels. Calyx tubular, with definite di-
visions. Cotyledons consolidated } 219. *Penaceæ*, or *Sarcocollads*, p. 577
- Flowers apetalous. Ovary composed of 2
carpels. Calyx tubular, with a definite
number of divisions. Cotyledons amygdal-
oid } 220. *Aquilariaceæ*, or *Aquilarids*, p. 579
- Flowers apetalous. Ovary composed of 2
carpels. Calyx imperfect, and irregularly
divided at the edge. Cotyledons thin and
leafy } 221. *Ulmaceæ*, or *Elmeworts*, p. 580
- Flowers polypetalous. Calyx valvate. Sta-
mens opposite petals. Seeds erect } 222. *Rhamnaceæ*, or *Rhamnads*, p. 581
- Flowers polypetalous. Calyx valvate. Sta-
mens alternate with petals. Seeds pendu-
lous } 223. *Chaillitiaceæ*, or *Chaillitiads*, p. 583
- Flowers polypetalous. Calyx imbricated.
Stamens 3 monadelphous } 224. *Hippocrateaceæ*, or *Hippocrateads*, p. 584
- Flowers polypetalous. Calyx imbricated.
Stamens (✓) distinct } 225. *Celastraceæ*, or *Spindle-trees*, p. 586
- Flowers monopetalous. Stamens epipeta-
lous } 226. *Stackhousiaceæ*, or *Stackhousiads*, p. 589
- Flowers monopetalous. Stamens epipeta-
lous. Ovules ascending. Itadicle short.
Cotyledons amygdaloid } 227. *Sapoteæ*, or *Sapotads*, p. 590

Flowers monopetalous. Stamens epipetalous. Ovules, in part at least, suspended. Radicle long. Cotyledons leafy . . . } 228. *Styracaceæ*, or *Storaxworts*, p. 592

ALLIANCE 45. GENTIANALES, p. 594.

Stipules 0. Stigmas simple, sessile, radiating } 229. *Ebenaceæ*, or *Ebenads*, p. 595
 Stipules 0. Stigmas simple, at the end of a }
 manifest style. Placentæ axile. Seeds }
 definite, pendulous. Corolla imbricated . } 230. *Aquifoliaceæ*, or *Hollyworts*, p. 597
 Stipules 0. Stigmas collected into a massive }
 head, expanded at the base in the form of }
 a ring or membrane, and contracted in the }
 middle. (Albumen sometimes 0) . . . } 231. *Apocynaceæ*, or *Dogbanes*, p. 599
 Leaves opposite, with intervening stipules . }
 Stipules 0. Stigmas simple, at the end of a }
 manifest style. Placentæ axile. Seeds }
 indefinite, peltate. Stamens interpetalous } 232. *Loganiaceæ*, or *Loganiads*, p. 602
 Stipules 0. Stigmas simple, at the end of a }
 manifest style. Placentæ axile. Seeds }
 definite, erect. Corolla valvate. Flowers }
 unsymmetrical } 234. *Stilbaceæ*, or *Stilbids*, p. 607
 Stipules 0. Stigmas simple, at the end of a }
 manifest style. Placentæ parietal. Flow- }
 ers didynamous } 235. *Orobanchaceæ*, or *Broomrapes*, p. 609
 Stipules 0. Stigmas simple, at the end of a }
 manifest style. Placentæ parietal. Flow- }
 ers regular } 236. *Gentianaceæ*, or *Gentianworts*, p. 612

ALLIANCE 46. SOLANALES, p. 615.

Stamens free, 2 or 4 } 237. *Oleaceæ*, or *Oliveworts*, p. 616
 Stamens free, 5. Placentæ axile. Embryo }
 terete } 238. *Solanaceæ*, or *Nightshades*, p. 618
 Anthers and stigma consolidated into a eo- }
 lum } 239. *Asclepiadaceæ*, or *Asclepiads*, p. 623
 Stamens free, 5. Placentæ axile. Cotyle- }
 dons leafy, folded longitudinally . . . } 240. *Cordiaceæ*, or *Sebestens*, p. 628
 Stamens free, 5. Placentæ basal. Cotyle- }
 dons leafy, doubled up } 241. *Convolvulaceæ*, or *Bindweeds*, p. 630
 Stamens free, 5. Placentæ basal. Embryo }
 filiform, spiral } 242. *Cuscutaceæ*, or *Dodders*, p. 633
 Stamens free, 5. Placentæ axile. Cotyle- }
 dons straight, plano-convex } 243. *Polemoniaceæ*, or *Phloxworts*, p. 635

ALLIANCE 47. CANTUSALES, p. 637.

Stamens alternate with the petals. Styles 2. }
 Inflorescence circinate } 244. *Hydrophyllaceæ*, or *Hydrophyls*, p. 638
 Stamens opposite the petals. Fruit membra- }
 nous, one-seeded. Styles 5. Stem her- }
 baceous } 245. *Plumbaginaceæ*, or *Leadworts*, p. 640
 Stamens alternate with the petals. Style 1. }
 Inflorescence straight } 246. *Planaginaceæ*, or *Ribworts*, p. 642
 Stamens opposite the petals. Fruit capsular, }
 many-seeded. Style 1. Stem herbaceous } 247. *Primulaceæ*, or *Primworts*, p. 644
 Stamens opposite the petals. Fruit indehis- }
 cent, drupaceous. Style 1. Stem woody } 248. *Myrsinaceæ*, or *Ardisiads*, p. 647

ALLIANCE 48. ECHIALES, p. 649.

*Regular-flowered Orders, passing from Solanales.

Flowers regular, $\frac{2}{2}$, unsymmetrical. Sta- }
 mens 2. Fruit 2-lobed. Stigma naked } 249. *Jasminaceæ*, or *Jasminworts*, p. 650
 Flowers regular, symmetrical. Stamens 4. }
 Fruit simple. Stigma naked } 250. *Salvadoraceæ*, or *Salvadorads*, p. 652
 Flowers regular, symmetrical. Stamens 5. }
 Stigma naked. Nuts 4, confluent. Inflo- }
 rescence circinate } 251. *Ehretiaceæ*, or *Ehretiads*, p. 653
 Flowers regular, symmetrical. Stamens 5. }
 Nuts 5 or $\frac{5}{5}$. Stigma naked. Inflores- }
 cence straight } 252. *Nolanaceæ*, or *Nolanads*, p. 654
 Flowers regular, symmetrical. Stamens 5. }
 Nuts 4 or $\frac{2}{2}$. Stigma naked. Inflores- }
 cence circinate } 253. *Boraginaceæ*, or *Borageworts*, p. 655
 Flowers regular, symmetrical. Nut solitary. }
 Stigma indusiate. (Stamens hypogynous !) } 254. *Brunoniaceæ*, or *Brunoniads*, p. 657

**Irregular-flowered Orders, passing into Bignoniales.

Flowers irregular, unsymmetrical. Nuts 4. }
 Ovule erect } 255. *Lamiaceæ*, or *Labiates*, p. 659
 Flowers irregular, unsymmetrical. Nuts }
 confluent. Ovules erect } 256. *Verbenaceæ*, or *Verbens*, p. 663
 Flowers irregular, unsymmetrical. Nuts }
 confluent. Ovules pendulous. Anthers }
 2-celled } 257. *Myoporaceæ*, or *Myoporads*, p. 665

- Flowers irregular, unsymmetrical. Nuts }
 confluent. Ovules pendulous. Anthers 1- } 258. *Setaginaceæ*, or *Selagids*, p. 666
 celled }
- ALLIANCE 49. BIGNONALES, p. 668.
- Placentæ parietal. Fruit bony or capsular. } 259. *Pedaliaceæ*, or *Pedaliads*, p. 669
 Embryo amygdaloid. Radicle short . . . }
- Placentæ parietal. Fruit capsular or baccate. } 260. *Gesneraceæ*, or *Gesnerworts*, p. 671
 Embryo with minute cotyledons. Radicle }
 long }
- Placentæ parietal. Fruit succulent, hard- } 261. *Crescentiaceæ*, or *Crescentiads*, p. 673
 shelled. Embryo amygdaloid. Radicle short. }
- Placentæ axile. Seeds winged, sessile, without } 262. *Bignoniaceæ*, or *Bignoniads*, p. 675
 albumen. Cotyledons large, leafy . . . }
- Placentæ axile. Seeds wingless, attached to } 263. *Acanthaceæ*, or *Acanthads*, p. 678
 hard placental processes, without albumen. }
 Cotyledons large, fleshy }
- Placentæ axile. Seeds albuminous. Cotyle- } 264. *Scrophulariaceæ*, or *Figworts*, p. 681
 dons scarcely larger than, or not so large as, }
 the radicle }
- Placentæ free, central. Seeds minute, without } 265. *Lentibulariaceæ*, or *Butterworts*, p. 686
 albumen. Cotyledons much smaller than }
 the radicle }
- ALLIANCE 50. CAMPANALES, p. 688.
- Ovary 2- or more-celled. Anthers free, or } 266. *Campanulaceæ*, or *Bellworts*, p. 689
 half united. Stigma naked. Corolla valvate. }
 regular }
- Ovary 2- or more-celled. Anthers syngene- } 267. *Lobeliaceæ*, or *Lobeliads*, p. 692
 sious. Stigma surrounded by hairs. Corolla }
 valvate, irregular }
- Ovary 2- or more-celled. Anthers syngenesious } 268. *Goodeniaceæ*, or *Goodeniads*, p. 694
 or free. Stigma indusiate. Corolla indu- }
 plicate }
- Ovary 2- or more-celled. Stamens and style } 269. *Stylidiaceæ*, or *Stylworts*, p. 696
 united into a column. Corolla imbricated. }
- Ovary 1-celled. Corolla imbricated. Anthers } 270. *Valerianaceæ*, or *Valerianworts*, p. 697
 free. Ovule pendulous. Albumen none. }
- Ovary 1-celled. Corolla imbricated. Anthers } 271. *Dipsacaceæ*, or *Teaselworts*, p. 699
 free. Ovule pendulous. Seeds albuminous. }
- Ovary 1-celled. Corolla valvate. Anthers syn- } 272. *Calyceraceæ*, or *Calycers*, p. 701
 genesious. Ovule pendulous. Seeds albu- }
 minous }
- Ovary 1-celled. Corolla valvate. Anthers syn- } 273. *Asteraceæ*, or *Composites*, p. 702
 genesious. Ovule erect. Albumen none . }
- ALLIANCE 51. MYRTALES, p. 716.
- Ovary 1-celled. Ovules pendulous. Leaves } 274. *Combretaceæ*, or *Myrobalans*, p. 717
 dotless. Seeds without albumen. Cotyle- }
 dons convolute }
- Ovary 1-celled. Ovules pendulous. Leaves } 275. *Alangiaceæ*, or *Alangiads*, p. 719
 dotless. Seeds albuminous. Cotyledons flat. }
- Ovary 1-celled. Ovules ascending. Leaves } 276. *Chamælauciaceæ*, or *Fringe Myrtles*, p. 721
 dotted. Embryo fused into a solid mass. }
- Ovary with more than one cell. Flowers poly- } 277. *Haloragaceæ*, or *Hippurids*, p. 722
 petalous or apetalous. Calyx open, minute. }
 Stamens definite. Ovules pendulous. Co- }
 tyledons minute. (Occasionally one-celled) . }
- Ovary with more than one cell. Flowers poly- } 278. *Onagraceæ*, or *Onagrads*, p. 724
 petalous or apetalous. Calyx valvate. Sta- }
 mens definite. Ovules horizontal or ascend- }
 ing. Cotyledons flat, much larger than the }
 radicle }
- Ovary with more than one cell. Flowers poly- } 279. *Rhizophoraceæ*, or *Mangroves*, p. 726
 petalous. Calyx valvate. Stamens indefinite. }
 Cotyledons flat, much shorter than the radi- }
 cle, which germinates before the fruit falls . }
- Ovary with more than one cell. Flowers mono- } 280. *Helvisiaceæ*, or *Napolconworts*, p. 728
 petalous, coronetted. Calyx valvate. Sta- }
 mens indefinite, monadelphous. Cotyledons }
 amygdaloid }
- Ovary with more than one cell. Flowers poly- } 281. *Melastomaceæ*, or *Melastomads*, p. 731
 petalous. Calyx imbricated. Stamens defi- }
 nite. Anthers rostrate. Leaves usually }
 dotless }
- Ovary with more than one cell. Flowers poly- } 282. *Myrtaceæ*, or *Myrtleblooms*, p. 734
 petalous or apetalous (or valvate). Calyx }
 imbricated. Stamens 60. Anthers oblong. }
 Leaves usually dotted }
- Ovary with more than one cell. Flowers poly- } 283. *Lecythidaceæ*, or *Lecyths*, p. 739
 petalous. Calyx valvate or imbricated. }
 Stamens 60, in part collected into a fleshy }
 hood. Anthers oblong. Leaves dotless . }

ALLIANCE 52. CACTALES, p. 741.

- Sepals and petals distinct. Stamens opposite the petals. Styles separate. Ovules pendulous } 284. *Homaliaceæ*, or *Homaliads*, p. 742
- Sepals and petals distinct. Stamens scattered. Styles confluent. Ovules pendulous. Seeds albuminous } 285. *Loasaceæ*, or *Loasads*, p. 744
- Sepals and petals numerous, undistinguishable. Stamens scattered. Styles confluent. Ovules horizontal. Seeds without albumen. } 286. *Cactaceæ*, or *Indian Figs*, p. 746

ALLIANCE 53. GROSSALES, p. 749.

- Fruit pulpy. Placentæ parietal } 287. *Grossulariaceæ*, or *Currantworts*, p. 750
- Fruit capsular. Placentæ axile. Style and stamens definite. Calyx imbricated } 288. *Escalloniaceæ*, or *Escalloniads*, p. 752
- Fruit capsular. Placentæ axile. Styles divided. Stamens 00. Calyx valvate } 289. *Philadelphicææ*, or *Syringas*, p. 743 } 4
- Fruit pulpy or fibrous. Placentæ axile. Style 1. Stamens 00. Calyx imbricated } 290. *Barringtoniaceæ*, or *Barringtoniads*, p. 754

ALLIANCE 54. CINCHONALES, p. 756.

- Stamens epigynous; anthers opening by pores. Stamens epipetalous, bursting longitudinally; anthers sinuous. Flowers unsymmetrical } 291. *Vacciniaceæ*, or *Cranberries*, p. 757
- Stamens epipetalous, bursting longitudinally; anthers straight. Leaves with interpetiolar stipules } 292. *Columelliaceæ*, or *Columelliads*, p. 759
- Stamens epipetalous, bursting longitudinally; anthers straight. Fruit consolidated. Leaves without stipules } 293. *Cinchonaceæ*, or *Cinchonads*, p. 761
- Stamens epipetalous, bursting longitudinally; anthers straight. Fruit didymous. Leaves verticillate, without stipules } 294. *Caprifoliaceæ*, or *Caprifoliads*, p. 766
- Stamens epigynous; anthers opening by pores. Stamens epipetalous, bursting longitudinally; anthers sinuous. Flowers unsymmetrical } 295. *Galiaceæ*, or *Stellates*, p. 768

ALLIANCE 55. UMBELLALES, p. 772.

- Fruit didymous, with n double epigynous disk. Fruit not didymous, without a double epigynous disk, 3- or more-celled. Pentamerous flowers. Corolla valvate. Leaves alternate, without stipules. Anthers turned inwards, opening lengthwise } 296. *Apiaceæ*, or *Umbellifers*, p. 773
- Fruit not didymous, without a double epigynous disk, 2- or more celled. Tetramerous flowers. Corolla valvate. Leaves opposite, without stipules } 297. *Araliaceæ*, or *Ivyworts*, p. 780
- Fruit not didymous, without a double epigynous disk, 2-celled. Corolla imbricated. Leaves alternate, with stipules. Anthers with deciduous valves } 298. *Cornaceæ*, or *Cornels*, p. 782
- Fruit not didymous, without n double epigynous disk, 3- (or 1-) celled. Corolla imbricated. Leaves alternate, without stipules. Anthers turned outwards, opening lengthwise } 299. *Hamamelidaceæ*, or *Witch-Hazels*, p. 784
- Fruit not didymous, without n double epigynous disk, 3- (or 1-) celled. Corolla imbricated. Leaves alternate, without stipules. Anthers turned outwards, opening lengthwise } 300. *Bruniaceæ*, or *Bruniads*, p. 785

ALLIANCE 56. ASARALES, p. 786.

- Ovary 1-celled. Ovules definite, with a coated nucleus } 301. *Santalaceæ*, or *Sandalworts*, p. 787
- Ovary 1-celled. Ovules definite, with n naked nucleus } 302. *Loranthaceæ*, or *Loranthids*, p. 789
- Ovary 3-6-celled. Ovules 00 } 303. *Aristolochiaceæ*, or *Birthworts*, p. 792

THE

VEGETABLE KINGDOM.

WHEN the Animal Kingdom is studied as a vast whole, and not merely in the highly-developed classes of Mammals, Birds, and Reptiles, the naturalist perceives forms with which he is most familiar gradually changing, organs which are indispensable to the highest orders of Animals disappearing, the limbs ceasing to be formed, all the internal structure of the body simplified, and, at last, nothing left but pulpy and seemingly shapeless masses, such as inhabit shells. Let his power of vision be enlarged, and the microscope discovers to his amazement, that the Animal Kingdom has not ceased with the soft-bodied creatures at which his inquiry had stopped, but that a new and vast field of observation opens before him, teeming with myriads of forms, which are, as it were, the beginning of another kingdom of nature. Nevertheless, he soon finds that the smallness of the size of these creatures is no hindrance to their possessing the peculiar attributes of animal life. Though bones, and muscles, and external limbs, with veins, arteries, and nerves, may have disappeared, or become too fine for human vision, yet there is still left the animal motion, and the power of hunting for prey, of feeding by a mouth and by the destruction of other species, which is one of the great marks of animal structure. He sees that cells, although so small that the acutest vision and the most powerful instruments are alone sufficient to detect them, are the recipients of a stomach, of eyes, of a mouth. He perceives in such bodies all those elements of activity, by which the Animal Kingdom is in general so well distinguished from the passive Region of plants.

And hence it is that those who deal in generals only, without descending to particulars, pronounce with a voice of authority that the Animal and Vegetable Kingdoms are sundered by decisive characteristics. The zoologist declares that the power of spontaneous motion, and the feeding by a stomach, are qualities confined to the Animal Kingdom. But numerous plants move with all the appearance of spontaneity; the spores of those *Confervæ* which are sometimes called *Zoosporous*, swim in water with great activity; the filaments of *Zygnemata* combine with the energy of animal life; and as for a stomach, it is impossible to say, that the whole interior of a living independent cell is not a stomach. Chemists once referred to the presence of nitrogen as a certain characteristic of animals; but plants abound in nitrogen. With more reason they now appeal to the existence of starch in plants, an organic compound unknown among the animal creation. And this is perhaps the

best mark of distinction that has hitherto been found ; for it is universally present in plants, and has enabled Mr. Payen to confirm by chemical evidence the vegetable nature of certain productions till lately regarded as Zoophytes, and therefore as belonging to the Animal Kingdom. (*Ann. Sc. Nat.* 2. ser. xx. 65.)

But it has been long ago asserted by Bory de St. Vincent, and others, that there exist in nature organised bodies which are animal at one period of their lives, and vegetable at another ! This, if true, would for ever put an end to the possibility of distinguishing the two kingdoms when they shall each have arrived at their lowest forms. Its truth has, however, been denied. On the contrary, Kützing, in his recent magnificent work on Algæ, insists that it happens in his *Ulothrix zonata*, (Fig. I.) He asserts that in the cells of that plant there are found minute animalcules, with a red eye-point, and a

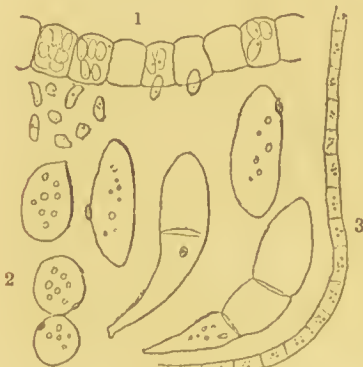


Fig. I.

transparent mouth-place ; that they are not in fact, distinguishable from Ehrenberg's *Microglæna monadina* ; these bodies, however, are animals only for a time. At last they grow into vegetable threads, the lowest joint of which still exhibits the red eye-point. This phenomenon, which Kützing assures us he has ascertained beyond all possibility of doubt, puts an end to the question of, whether animals and plants can be distinguished at the limits of their two kingdoms, and sufficiently accounts for the conflicting opinions that naturalists entertain as to the nature of many of the simpler forms of organisation.

Such being the case, it is not worth attempting to decide, whether the lowest forms of structure, to be presently mentioned, belong to the one Kingdom or the other. It will be sufficient that they have been regarded as plants by many eminent naturalists.

It is in this microscopical cellular state of existence that the Animal Kingdom ends, and the Vegetable commences. It is from this point that the naturalist who would learn how to classify the Kingdom of Plants must take his departure. He perceives that those species which consist of cells, either independent of each other (*Protococcus*, *Uredo*), or united into simple threads (*Conserva*, *Monilia*), are succeeded by others in which the threads collect into nets (*Hydrodictyon*), or plates (*Ulva*), or the cells into masses (*Laminaria*, *Agaricus*) ; peculiar organs make their appearance, and at last, as the complication of structure increases, a leaf and stem unfold as distinctly limited organic parts.

Those simpler plants which exist without the distinction of leaf and stem, are also destitute of flowers ; they are equally without the breathing-pores so abundantly formed in the skin of more complex species, and they multiply by the spontaneous formation in their interior, or upon their surface, of reproductive spheroids called spores. Among the many names that Botanists have given such plants, that of THALLOGENS is here preferred. A thallus is a fusion of root, stem and leaves, into one general mass ; and that is much the nature of these elements of Vegetable structure.

Fig. I. *ULOTHRIX ZONATA*, after Kützing.—1. A portion of the plant discharging its vegeto-animalcules ; 2. the latter much enlarged, and in various states of progress into a thread ; 3. a young thread, or plant, three or four days old, much less magnified.

Beyond Thallogens are found multitudes of species, which like the former are not furnished by nature with flowers, but which otherwise approach closely to the higher forms of structure, occasionally acquiring the stature of lofty trees. They have breathing-pores in their skin; their leaves and stem are distinctly separated; in some of them, those spiral threads which form so striking a portion of the internal anatomy of a more perfect species, exist in considerable abundance; and finally, they multiply by reproductive spheroids, or spores, either formed without the agency of sexes, or, if the contrary shall be proved, at all events not possessing bodies constructed like stamens on the one hand and embryos on the other. Their stem, however, does not increase in diameter; it only grows at the end, and hence it has given to such plants the name of ACROGENS.*

The changes which thus occur in the races of Thallogens and Acrogens, represent the progress of development in the remainder of the Vegetable Kingdom. A sphere, called a pollen grain, protrudes a tube into a soft pulpy receptacle in the interior of an ovule: there the new plant takes its birth, at first in the form of a cell, which by degrees forms a thread (the suspensor), then generates a cellular mass (the young embryo), and eventually becomes a mass of cells arranged in the form of stem and leaves (the perfect embryo, with its cotyledons, radicle, and plumula). But this is not the end of growth; it is rather the beginning. A loftier destiny awaits such plants; flowers are to be formed, seeds to be fertilised, and this is to be effected by a complex apparatus unknown in Acrogens or Thallogens.

Foremost among the more perfect races comes a most anomalous collection of species, called RHIZOGENS, or Rhizanth. These plants, leafless and parasitical, have the loose cellular organisation of Fungi; a spiral structure is usually to be found among their tissue only in traces. Some of them spring visibly from a shapeless cellular mass which stands in place of stem and root, and seems to be altogether analogous to the thallus of Fungi; and it is probable, that they all partake in this singular mode of growth. Their flowers are like those of more perfect plants; their sexual apparatus is complete; but their embryo, which is not furnished with any visible radicle or cotyledons, appears to be a spherical or oblong homogeneous mass. Rhizogens seem, in fact, of an intermediate nature between Fungal Thallogens and Endogens.

The remainder of the Vegetable Kingdom consists of plants having flowers, and propagated by seeds; that is to say, by bodies procreated by the mutual action of two manifest and undoubted sexes. Such plants are therefore called Phænogamous or SEXUAL.

Sexual plants are themselves divisible into two unequal masses. Of these masses one consists of species whose germination is endorhizal, whose embryo has but one cotyledon, whose leaves have parallel veins, and whose trunk is formed of bundles of spiral and dotted vessels guarded by woody tubes; which bundles are arranged in a confused manner, and are reproduced in the centre of the trunk. These are ENDOGENS.

The other mass is composed of innumerable races having an exorhizal germination, an embryo with two or more cotyledons, leaves having a network of veins, and a trunk consisting of woody bundles composed of dotted and woody tubes, or of woody tubes alone, arranged around a central pith, and either in concentric rings, or in a homogeneous mass, but always having medullary plates, forming rays from the centre to the circumference, and

* Thallogens and Acrogens together constitute the ACOTYLEDONES of Jussieu, the EXEMBRYONATA of Arnica of Richard, the AGAME, CRYPTOGAME, or AETHESGAMIE of others, the NEMRA of Fries.

reproduced in the circumference of the trunk, whence their name of EXOGENS.

Among Exogens there are, however, two totally different modes in which the influence of the pollen is communicated to the seed. The larger part of this great class consists of plants provided with the apparatus called style and stigma, through which pollen-tubes are introduced into the ovary during the act of fertilisation. But others are so constructed that the pollen falls immediately upon the ovules, without the introduction of any intermediate apparatus; a peculiarity analogous to what occurs among reptiles in the Animal Kingdom: and, as was to have been anticipated, the plants in which this singular habit occurs prove, upon being collected together, to form a group having no direct affinity with those among which they had been previously associated. Hence Exogens have been broken up into 1. *Exogens* proper, or those having an ovary, style, and stigma; and 2. GYMNOGENS, which have neither.

Among Endogens no difference has been remarked in the mode of propagation, but a material peculiarity has been noticed in the manner of growth. In the great mass of the class the stem and root are formed in a similar way, or there is no considerable difference between them, and the leaves have no articulation with the stem; but in a part of them the root is exactly like that of an Exogen without concentric circles, and the leaves fall off the stem by a clean fracture, just as in that class. Such fundamental distinctions have given rise to the separation by me of Endogens into 1. Endogens proper, and 2. DICTYOGENS.

This gives us for the whole Vegetable Kingdom the following

CLASSES.

Asexual, or Flowerless Plants.

- | | |
|--|----------------|
| Stems and leaves undistinguishable | I. THALLOGENS. |
| Stems and leaves distinguishable | II. ACROGENS. |

Sexual, or Flowering Plants.

- | | |
|---|-----------------|
| Fructification springing from a thallus | III. RHIZOGENS. |
| Fructification springing from a stem. | |

Wood of stem arranged in a confused manner, youngest in the centre :
cotyledon single.

Leaves parallel-veined, permanent; Root much
like the stem internally IV. ENDOGENS.

Leaves net-veined, deciduous; Root with the
wood in a solid concentric circle V. DICTYOGENS.

Wood of stem arranged in a concentric or uniform manner, youngest at
the circumference; cotyledons 2 or more.

Seeds quite naked VI. GYMNOGENS.

Seeds enclosed in seed-vessels VII. EXOGENS.

CLASS I. THALLOGENS.

Anandre, *Link. in Berl. Mag. III.* Cellulares, *DC. Fl. Fr. 1. 68.* (1815). Acotyledonæ, *Agardh. Aph. 72.* Homonemæ, *Fries Syst. 1825.* Aphyllæ, *Ed. prim. Cryptophyta, Link. Handb. 163.* Thallogyta, *Endl. Gen. p. 1.* Amphiganæ, *Ad. Brong. Enumeration, p. xi.* (1843).

The whole of the plants stationed in this class are remarkable for the extreme simplicity of their structure. They have no wood, properly so called, although in the case of some sea-weeds and Fungi they must acquire considerable age. Those spirally-coated tubes which the old anatomists called tracheæ, because of their respiratory office, are unknown among them, unless occasionally in the form of local cells connected with the reproductive organs only; and consequently upon the surface of even the most perfect of them there is no sign of the organic apertures in the skin called stomates or breathing-pores. They are mere masses of cells. On their surface nothing is discoverable which can be regarded as analogous to leaves; for even in such sea-weeds as *Hypnea*, which resemble mosses in appearance, and in some of the Lichens which seem leafy, the exact symmetry which, without exception, characterises true foliage is wanting. In *Chara* alone, which is wholly leafless, do we find a symmetrical arrangement even of the divisions of the axis. Their mode of reproduction is not by pollen and ovules, or by sexual apparatus, as it is usual to call those parts, of which there is no sign, but by a special disintegration and solidification of some part of their tissue, spontaneously effected in various ways according to their kinds. It is true that such names as Antheridia and Pistillidia are met with in the writings of Cryptogamic Botanists, from which it might be inferred that something analogous at least to sexes was observable among such plants; but these are theoretical expressions, and unconnected with any proof of the parts to which they are applied performing the office of anthers and pistils. If it should be assumed, as it has been by some, that they do represent sexual organs, it is to be remembered that it is a mere assumption unsupported by sufficient evidence. Even in *Charas*, in whose globule some writers have seen a true anther, so little reason is there to suppose that it deserves such a name, that, on the contrary, an observer, worthy of credit, assures us that he has seen it grow. So entirely, in the simplest forms of Thallogens, is all trace of sexes missing, that in some of them their reproductive matter has been regarded by certain writers as altogether of an ambiguous nature. In their opinion, it is even uncertain whether this matter will reproduce its like, and whether it is not a mere representation of the vital principle of vegetation, capable of being called into action either as a Fungus, an Alga, or a Lichen, according to the particular conditions of heat, light, moisture, and medium, in which it is placed; producing Fungi upon dead or putrid organic beings; Lichens upon living vegetables, earth, or stones; and Algæ where water is the medium in which it is developed. Kützing, (*Ann. des Sc. n. s. vol. ii. p. 225*), endeavours to maintain the following propositions connected with this subject: "1st, the formation of organic matter can only take place by means of the previously dissolved elements of other organic principles; 2nd, simple globules, such as *Cryptococcus*, *Palmella*, and *Protooccus*, can give birth to different formations according to the influence of light, air, and tempera-

ture ; 3rd, we must regard all the forms of lower Algæ as vegetations of a very simple structure, and distinguish them from each other, notwithstanding that in certain circumstances they may raise themselves to vegetations of a higher form ; for in other circumstances they can exist and multiply independently ; 4th, the same superior formation may be produced by primitive formations of altogether different kinds."

It is not easy to settle the limits of the alliances of Thallogens. Linnæus and Jussieu had but two divisions, viz., Algæ (including Lichens) and Fungi ; and they have been followed by some modern botanists, particularly Fries and Wahlenberg. Others have been satisfied with separating the Lichens from Algæ, which, indeed, was virtually done by most of those who acknowledged but two divisions ; and with admitting three equally distinct groups. Some, on the contrary, have sought to multiply the orders, as De Candolle and others, by introducing a tribe called Hypoxyla ; Greville by adopting the latter, Gastromyci, Byssoidæ, and Epiphytæ, and proposing a new group under the name of Chætophoroideæ ; and finally, Adolphe Brongniart, who carries the number of groups in this division of Acotyledones as far as 12, viz. Lichens, Hypoxyla, Fungi, Lycoperdaceæ, Mucedineæ, Uredineæ, Fucaceæ, Ulvaceæ, Ceramiaceæ, Confervæ, Chaodineæ, and Arthrodiæ ; part of which have originated with himself, and others with Bory de St. Vincent. It is clear, however, that these groups are of very unequal degrees of importance, and that after all they must be reduced under the three great forms whose existence is universally recognised.

In what way those forms can be best defined is a very difficult question. It has been said that Algæ are aquatics, while Lichens and Fungi are terrestrial ; but Fungi will develop in water, when they assume the form of Algæ. Lichens have been characterised by their shields, or reproductive disks containing spores lying in the fusiform spore-cases called asci ; but a whole division of Lichens consist of genera without such asci. Then as to Fungi, they have been characterised by the want of a thallus, which is essential to Lichens ; but the mycelium or spawn of Fungi is really a thallus ; and it is impossible to distinguish by that character the genus *Verrucaria* of Lichens from *Sphæria* of Fungi. According to two of the most skilful of our modern systematists, the following are the distinctions of the three great groups :—

AGARDH (1821).

1. ALGÆ. Aquatic plants, filamentous, lamelliform, or leafy, intensely and brightly coloured, including spores, which are either contained in pericarps or scattered over the surface.
2. FUNGI. Fugacious, pulverulent, flocculent, crustaceous or fleshy plants, arising out of the destruction of organic matter (or capable of doing so), whitish, or coloured, not green, with their spores immersed.
3. LICHENS. Perennial plants, crustaceous, laminated or filiform, not of a leaf-green, including spores plunged in a thallus as well as in shields.

ADOLPHE BRONGNIART (1843).

1. ALGÆ. Frond cellular, living in fresh or salt water (rarely in very moist air), fixed by suckers or little roots.
2. FUNGI. Thallus filamentous (or Mycelium), developed on land or in dead or living organic-bodies, producing reproductive organs externally.
3. LICHENS. Frond of various forms, living in air, fixed by cellular fibrils, without a thallus developed in subjacent bodies. Fructification, occupying limited spaces on the surface of the frond, formed of them mixed with paraphyses.

Neither of these definitions is however satisfactory ; they hold indeed in many cases ; but many Fungi have not a filamentous thallus ; again some Lichens (especially if *Collema* be included) have a filamentous thallus, and some species are all but aquatic, *e. g.* *Verrucaria submersa*. In Algals again,

in the terrestrial Vaucheriæ, the terrestrial Sphærozyga, &c., the fruit is developed in free air; so also in Botrydium, Trentepohlia, and some others.

Mr. Berkeley finds that "the main distinction between Fungi and Algals (including Lichens) consists in the fact that Fungi are universally nourished by the matrix by means of their mycelium, while Lichens and Algals are nourished at the expense of the medium in which they vegetate. In a few cortical species of Lichens, indeed, there is a very intimate connection between the bark and stroma, but then in these cases there are the green gonidia which do not exist in Fungi. It is true that moulds will vegetate in fluids; but as soon as they assume their normal form, there is a distinction between the immersed and free portion."

Following these views, I venture to propose the following as the characteristic mark of the

ALLIANCES OF THALLOGENS.

ALGALES.—*Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in water or very damp places; propagated by zoospores, coloured spores, or tetraspores.*

FUNGALES.—*Cellular flowerless plants, nourished through their thallus (spawn or mycelium); living in air; propagated by spores colourless or brown, and sometimes inclosed in ascæ; destitute of green gonidia.*

LICHENALES.—*Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in air; propagated by spores usually inclosed in ascæ, and always having green gonidia in their thallus.*

ALLIANCE I. *ALGALES*.—THE ALGAL ALLIANCE.

Algæ, *Juss. Gen.* 5. (1788); *DC. Fl. Fr.* 2. 2. (1815); *Agardh Synops. Alg.* (1817); *Species Alg.* (1821-1828); *Syst. Alg.* (1824); *Greville Alg. Brit.* (1830); *Hooker, Brit. Fl.* vol. 2. pt. 1. (1833); *Agardh JG. Algæ Maris Mediterranei*; *Decaisne in Ann. Sc. Nat.* 2 ser. vols. 17 & 18, *passim*; *Kützing, Phycologia Generalis. Endlicher, Gen. Suppl.* 3.—*Phyceæ, Acharius* (1807?).—*Thalassiophyta, Lamouroux Ann. Mus.* 20. (1812); *Gaillon in Dict. des Sc.* 53. 350. (1828).—*Hydrophyta, Lyngb. Tentam.* (1819).—*Arthrodiææ, Bory in Dict. Class.* 1. 591. (1822).—*Hydronemateæ, Nees in Nov. Act. Nat. Cur.* 11. 509. (1823); *Ann. des Sc.* 13. 439. (1828).—*Chaodineæ, Confervæ and Ceramiriææ, Bory in Dict. Class.* 3. and 4. (1823).—*Chatophoroideæ, Greville Fl. Edin.* 321. (1824).—*Hydrophyceæ, Fries Syst. Orb. Veg.* 320. (1825).—*Nemazoaires, Gaillon in Ann. Sc. Ser.* 2. 1. 44. (1834); *Phycées, Mont. Dict. Univ. d'Hist. N. sub. Algis* (1843).

DIAGNOSIS.—*Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in water or very damp places; propagated by zoospores, coloured spores, or tetraspores.*

It is here that the transition from animals to plants, whatever its true nature may be, occurs; for it is incontestable, as the varying statements of original observers testify, that no man can certainly say whether many of the organic bodies placed here belong to the one kingdom of nature or the other. Whatever errors of observation may have occurred, those very errors, to say nothing of the true ones, show the extreme difficulty, not to say impossibility, of pointing out the exact frontier of either kingdom. If those ambiguous marine productions, which Pallas considered to be plants, but which Lamarek and much later writers have mostly placed among Zoophytes, have been shown by Kützing and Decaisne to be merely sea-vegetables coated with calcareous matter, we have in that fact another testimony to the near approach of the two realms being through the Algal alliance. Indeed, if any faith is to be placed in the observations of Kützing and Hornschuch, the one is capable of giving birth to the other. The former of these writers mentions (*Ann. Sc. Nat.* 2. ser. 5. 376) a very extraordinary fact, if it be one. He cut to pieces the marine animal called *Medusa aurita*, washed the pieces carefully in distilled water, put them into a bottle of distilled water, corked it close, and placed it in a window facing the east. The bits of *Medusa* soon decomposed, and emitted a very offensive odour, during which time no trace of Infusoria was discoverable. After a few days the putrid smell disappeared, and myriads of Monads came forth. Shortly after the surface of the liquid swarmed with extremely small green points, which eventually covered the whole surface; similar points attached themselves to the sides of the bottle; seen under a microscope they appeared to be formed of numberless Monads, united by a slimy mass; and at last, after some weeks, the *Conferva fugacissima* of Lyugbye developed itself in perfection.

Reissek, of Vienna, goes still further. He professes to have observed the green colouring matter of ordinary flowering plants metamorphosed into confervæ; such forms were even witnessed by him proceeding from the pollen cells of plants (*Bot. Zeit.* 1844. July 19). Kützing also believes that the lower forms of Algals are capable of being changed into more highly organised species, or even into species belonging to different families of the higher cellular plants. With regard to these astounding statements I cannot do better than avail myself of the excellent remarks of the Rev. M. J. Berkeley, than whom no one has a more intimate knowledge of the subject in question. In Taylor's *Annals of Natural History*, vol. xiv. p. 434, he observes, "that such observations cannot be considered conclusive, apart from all prejudice either way, till a certain number of bodies ascertained to be precisely of the same nature be isolated, and the changes of these observed with every possible precaution to avoid error. At present it seems that there is not by any means sufficient proof that the objects in question really arise from germs of the same nature. The second remark we would make is, that there appears too often in treatises of this description to be great indistinctness as to the notion of what a species really is. We know that in the course of development higher bodies go through a vast variety of phases which resemble very closely true substantial species which have arrived at their full development; but we are not therefore to suppose, that in passing through their phases the production has really consisted of such a number of real species. In the sense of Agardh this may be true enough; for when he pronounces the vessels and cells of phanogamous plants to be *Algæ*, his meaning appears to be, however strongly he expresses himself, merely that they are representatives of *Algæ*, and resemble them in structure.

"We would remark, also, that the real difficulty of the case does not depend on the question as to the difference of animal and vegetable life. These evidently in certain parts of the creation are so intimately combined, that it is quite impossible to say where the one ceases and the other begins; and there is really no reason why we should be

incredulous as to the possibility of the same object being at one time endowed more especially with animal, and at another with vegetable life. Late observations on the reproductive bodies of some Algeæ show that their motion is produced by vibratile cilia, exactly in the same way as in certain animals. But it is exceedingly difficult to imagine the transformation of one real species into another. The same species may assume a vast variety of forms according to varying circumstances, and it is highly instructive to observe these changes; but that the same spore should under different circumstances be capable of producing beings of an almost entirely different nature, each capable of reproducing its species, is a matter which ought not to be admitted generally without the strictest proof."

For what wise purpose the Creator has filled the sea and the rivers with countless myriads of such plants, so that the Flora of the deep waters is as extensive as that of dry land, we can only conjecture; the uses to which they are applied by man are, doubtless, of but secondary consideration; and yet they are of no little importance in the manufactures and domestic economy of the human race. One of the most curious facts connected with them is their property of growing occasionally upon living animals, which they destroy; this is the case with *Aehlya prolifera*, to be hereafter noticed.

Their history and classification have occupied the attention of some of the most acute botanists of the present day. Bishop Agardh and his son, Greville, Harvey, Decaisne, and Kützing, deserve to be especially named as most excellent and skillful investigators of a very obscure and difficult subject. It is those only who have made the subject their peculiar study who can determine which of the classifications proposed by these authors has the strongest claim on attention. I, at least, am unable to decide; and therefore I have preferred to employ the arrangement made use of by Endlicher in his last Supplement, as that which is most likely to be permanently employed for some years to come. Those who wish to acquaint themselves with the views of the great Algologists of the day should consult the younger Agardh's *Algæ Maris Mediterraneæ*, &c. (1842); Greville's *Algæ Britannicæ* (1830); Harvey's *Manual of British Algæ* (1841); Decaisne's papers in the *Annales des Sciences Naturelles*, 2 Series, vol. xvii. (1842); Kützing's *Phycologia generalis, oder Anatomie, Physiologie und Systemkunde der Tange* (1843), a most elaborate work, illustrated with eighty exquisite plates; the *Kieselaligigen Bacillarien oder Diatomæen* by the same author, with three plates, 1844, which we regret to say we know only by name; the younger Agardh's *Adversaria in Systemata Algarum hodierna*, 1844, and various papers of *Dr. Montagne*.

NATURAL ORDERS OF ALGALS.

- | | | |
|--|---|--------------|
| <i>Crystalline, angular, fragmentary bodies, brittle, and multiplying by spontaneous separation</i> | 1 | DIATOMACEÆ. |
| <i>Vesicular, filamentary or membranous bodies, multiplied by zoospores generated in the interior at the expense of their green matter</i> | 2 | CONFERVACEÆ. |
| <i>Cellular or tubular unsymmetrical bodies, multiplied by simple spores formed externally</i> | 3 | FUCACEÆ. |
| <i>Cellular or tubular unsymmetrical bodies, multiplied by tetraspores</i> | 4 | CERAMIACEÆ. |
| <i>Tubular symmetrically branched bodies, multiplied by spiral coated nucleæ, filled with starch</i> | 5 | CHARACEÆ. |

* * For the information of those who may wish to know something of the system of Kützing, which I do not adopt, the following list is extracted from his great work, to which the reader is referred for an explanation of the peculiar views of its author.

* I. CLASS.—ISOCARPEÆ.

Tribus I.—*Gymnospermeæ*.

ORDER I.—EREMOSPERMEÆ.

Subordo I.—*Myrophyceæ*.

- I. CRYPTOCOCCACEÆ.—*Cryptococcus*, *Clvina*, *Sphaerellus*.
- II. LEPTOMITREÆ.—*Hygrococcus*, *Sirococcus*, *Leptomitris*, *Mycotium*, *Chlamydomonas*, *Nematococcus*, *Chionophæ*.
- III. SAPROLEGNIÆ.—*Saprolegnia*, *Mycocœlium*.
- IV. PLEONEMEÆ.—*Stereonema*, *Phæonema*.

Subordo II.—*Chamaephyceæ*.

- V. DESMIDIEÆ.—*Closterium*, *Microtheca*, *Pentastherias*, *Euastrum*, *Xanthidium*, *Staurastrum*, *Crucigenia*, *Merismopodia*, *Scenedesmus*, *Tessartheri*, *Micrasterias*, *Sphaerast*

trum, *Gomphosphaeria*, *Desmidiium*, *Didymoprium*.

- VI. PALMELLEÆ.—*Protooccus*, *Microhaloa*, *Botryocystis*, *Microcystis*, *Botrydina*, *Polycoccus*, *Palmella*, *Moderna*, *Coccolithoris*, *Gleocapsa*, *Tetraspora*, *Fahnogla*.
- VII. HYDROCOCCÆÆ.—*Actinococcus*, *Entophyllis*, *Hydrococcus*, *Hydririus*, *Helminthomena*.

Subordo III.—*Tiloblasteæ*.

A. GLÆOSITHEÆ.

a.) *Arenosporineæ*.

- VIII. OSCILLARIÆÆ.—*Spirillum*, *Oscillaria*, *Acetinocephalus*, *Phormidium*, *Hydrocoleum*, *Chthonoblastus*.

IX. LEPTOTRICHÆÆ. — Leptothrix, Asterothrix, Synphyothrix, Synplocia, Dictyothrix, Entothrix, Inactis.

b.) Mesospermeæ.

X. LIMNOCHLIDÆÆ. — Limnochlide.

XI. NOSTOCÆÆ. — Nostoc, Hormosiphon, Anabæna, Sphaerozyga, Cylindrospermum, Spermosira, Nodularia.

XII. SCYTONEMÆÆ. — Drilosiphon, Scytonema, Synchaeta, Symphysisiphon, Sirosiphon.

c.) Paraspermeæ.

XIII. LYNGBYÆÆ. — Siphoderma, Amphithrix, Leiblieuir, Lyngbya, Blennothrix.

XIV. CALOTRICHÆÆ. — Tolypothrix, Calothrix, Hypheothrix, Schizothrix, Schizodictyon, Dictyonema.

d.) Hypospermeæ.

XV. MASTICOTRICHÆÆ. — Merizomyria, Mastichothrix, Mastichonema, Schizosiphon, Geocyclus.

XVI. RIVULARIÆÆ. — Physactis, Heteractis, Charactis, Ainactis, Limnactis, Rivularia, Dasyactis, Euactis.

B. DERMATOSIPHÆÆ.

a.) Endospermeæ.

XVII. HORMIDIÆÆ. — Hormidium, Goniotrichium, Allogonium, Glæotila, Schizogonium, Schizomeris, Bangia.

XVIII. ULOTRICHÆÆ. — Ulothrix, Stygoclonium.

XIX. CONFERVÆÆ. — Dedogonium, Psychohormidium, Conferva, Spongopsis, Rhizoclonium, Sphaeropele, Cladophora, Crenacautha, Agagropila, Spongomorpha, Periplegrammum, Piliuia, Fischeria.

XX. ZYGNEMÆÆ. — Mougeotia, Sirogonium, Staurospermum, Spirogyra, Zygnema, Zygonium.

XXI. HYMODICTYÆÆ. — Hydrodictyon.

b.) Ectospermeæ.

XXII. PROTONEMÆÆ. — Gongrosira, Protonema.

XXIII. CHANTRANSIÆÆ. — Chroolepus, Chantransia, Chlorotylum.

XXIV. DRAPARNALDIÆÆ. — Draparnaldia.

XXV. ECTOCARPÆÆ. — Ectocarpus.

XXVI. SPHACELARIÆÆ. — Sphacelaria, Hialopteris, Stylocaulon, Ballia, Chactopteris, Cladostephus.

Subordo IV. — Dermatoblasteæ.

XXVII. ULVACÆÆ. — Phyllactidium, Protoderma, Prasiola, Ulva.

XXVIII. PHYCOSERIÆÆ. — Phycoseris, Diplostroium, Phycolapathum.

XXIX. ENTEROMORPHEÆÆ. — Entromorpha, Chlorosiphon, Stetyosiphon, Dictyosiphon.

Subordo V. — Caloblasteæ.

XXX. VAUCHERIÆÆ. — Botrydium, Vaucheria, Bryopsis, Valonia.

XXXI. CAULERPÆÆ. — Caulerpa.

XXXII. CODIÆÆ. — Codium, Rhizozonium, Halimeda, Corallocephalus, Rhizocephalus.

XXXIII. ANADYOMENEÆÆ. — Anadyomene.

XXXIV. POLYPHYSEÆÆ. — Acetabularia, Polyphysa.

XXXV. DASYCLADÆÆÆ. — Cymopolia, Dasycladus, Ascothamium.

XXXVI. CHAREÆÆ. — Nitella, Charopsis, Chara.

Ordo II. — CRYPTOSPERMEÆÆ.

XXXVII. LEMNIEÆÆ. — Thermocellium, Lemnia, Halysium.

XXXVIII. CHATOPHOREÆÆ. — Chatophora, Chatoderma, Thorea.

XXXIX. BATRACHOSPERMEÆÆ. — Batrachospermum.

XI. LIAOREÆÆ. — Liagora.

XLI. MESOGLEACEÆÆ. — Cladosiphon, Myriactis, Phycophila, Corynophlæa, Corynephora, Mesoglaea, Chordaria.

Ordo III. — PYCNOSPERMEÆÆ.

XLII. CHOREÆÆ. — Chorda, Spermatochnus, Halorhiza.

XLIII. ENCELLEÆÆ. — Encellum, Hiodictyon, Striaria.

XLIV. DICTYOTRÆÆ. — Dichophyllum, Cutleria, Stæochospermum, Spatoglossum, Halioglossum, Halyscris, Stypopodium, Phycopteris, Zonaria, Phyllitis.

XLV. SPONOCHEÆÆ. — Sporochus, Carponitra, Desmarestia, Arthrocladia.

XLVI. LAMINARIÆÆ. — Phlecorhiza, Laminaria, Hafgygia, Phycocastanum, Alaria, Costeria, Agarum, Thalassiphyllum, Lessoula, Macrocyctis, Nereocystis.

Tribus II. — Angiospermeæ.

XLVII. FUCEÆÆ. — Splachnidium, Durvillea, Hormosira, Ecdonia, Himantalia, Fucus, Carpoglossum, Physocolou, Scytothalia, Phylopora, Sirococcus.

XLVIII. CYSTOSIREÆÆ. — Treptacautha, Halerica, Phyllacantha, Cystosira, Hormophysa, Halidrys, Pycnophysus.

XLIX. SARGASSEÆÆ. — Pterocaulon, Sargassum, Turbiaria, Carpophyllum, Phycotryps.

L. HALOCHLOÆÆ. — Blossvillea, Spongocarpus, Hialochlon, Mycropsis, Carpacanthus, Sirophysalis, Coccophora, Scapheria, Carpodetula.

II. CLASS. — HETEROCARPÆÆ.

Tribus III. — Paracarpææ.

Ordo I. — TRICHOBLASTEÆÆ.

LI. CALLITHAMNIÆÆ. — Callithamnion, Griffithsia, Halurus, Phlebothamnion, Wrangelia, Spyridia, Ptilota.

LII. CERAMIEÆÆ. — Hormoceras, Gongoceras, Echinoceras, Acanthoceras, Ceramium, Centroceras, Microcladia.

Ordo II. — EPIBLASTEÆÆ.

LIII. PORPHYRÆÆ. — Porphyra, Hildenbrandtia, Peyssonelia.

LIV. SPONGITRÆÆ. — Hapalidium, Pncophyllum, Melohesia, Spongites.

LV. CORALLINEÆÆ. — Amphiroa, Corallina, Jania.

Ordo III. — PERIBLASTEÆÆ.

LVI. GYMNOPHLEACEÆÆ. — Gymnophleæa, Helminthora, Naccaria.

LVII. CHÆTANOIÆÆ. — Chætangium, Thamnocolonium, Sarcophycus.

LVIII. HALYMENIÆÆ. — Myelonium, Halymenia, Dumontia, Halarachnion, Cateuella.

LIX. CALLACANTHEÆÆ. — Caulacanthus, Acanthobolus.

LX. GIOARTINEÆÆ. — Iridæa, Chondrodictyon, Grateloupia, Mastocarpus, Chondros, Chondracanthus, Euhymenia, Constantinea, Callophyllis, Sarcophyllis, Soliera, Furcellaria, Gigartina.

LXI. RHYNCHOCOCCÆÆ. — Rhynchococcus, Callihlepharis.

LXII. CYSTOCLONIEÆÆ. — Cystoclonium, Hypnophysus.

LXIII. GELIDIEÆÆ. — Acrocarpus, Echiocaulon, Gelidium, Ctenodus.

LXIV. SPHEROCOCCEÆÆ. — Bowlesia, Sphaerococcus, Trematocarpus.

LXV. TYLOCARPEÆÆ. — Tylocarpus, Oncotylus, Pachycarpus, Phylotylus, Coccotylus, Phyllophora, Acauthotylus.

Tribus IV. — Choristocarpææ.

Ordo IV. — AXONBLASTEÆÆ.

LXVI. DASYÆÆ. — Dasya, Eupogonium, Trichothamnion.

LXVII. POLYSIPHONIEÆ.—Polysiphonia, Hellicothamnion, Halopithys, Digenea, Bryothamnion, Physcophora, Alsidium.

LXVIII. CHONDRIKÆ.—Lophura, Carpecaulon, Chondria, Acanthophora.

ORDO V.—CÆLOBLASTEÆ.

LXIX. CHONDROSIPHÆÆ.—Bonnemaisonia, Choudrothamnion, Chondrosiphon, Halosaccion.

LXX. CHAMPIÆÆ.—Champia, Lomentaria, Gastroclonium.

ORDO VI.—PLATYNOBLASTEÆ.

LXXI. DELESSERIEÆ.—Æglophyllum, Schizo-

glossum, Inochorion, Cryptopleura, Phycodrys, Hypoglossum, Delesseria.

LXXII. BOTRYOCARPEÆÆ.—Neuroglossum, Botryocarpa.

LXXIII. AMANSIÆÆ.—Polyzonia, Amansia.

LXXIV. RYTIPLÆACEÆÆ.—Rytiphidae, Dictyomenia.

LXXV. CARPOBLEPHARIDEÆÆ.—Carpoblepharis, Odonthalia.

LXXVI. PLOCAMEÆÆ.—Plocamium, Thamnocarpus, Thamnophora.

LXXVII. CLAUDIÆÆ.—Claudea.

ORDER I. DIATOMACEÆ. BRITTLEWORKS.

Diatomaceæ, *Agardh, Syst. xii.* (1824); *Kützing, in Linnæa*, 8. 529; *Part of Chaodineæ and Fragillariæ, Bory in Dict. Class. 3. and 4.* (1823); *Endlich. Gen. I.*; *Ralfs. in Ann. Nat. Hist. 11 et seq.*

DIAGNOSIS.—*Crystalline, angular, fragmentary bodies, brittle, and multiplying by spontaneous separation.*

Crystalline fragmentary bodies, generally bounded by right lines, rarely included in curved lines, flat, stiff, brittle, usually nestling in slime, uniting into various forms, and then separating again.

Those who have ever examined the surface of stones constantly moistened by water, the glass of hothouses, the face of rocks in the sea, or of walls where the sun never shines, or the hard paths in damp parts of gardens after rain, cannot fail to have remarked a green mucous slime with which such places are covered. This slime consists of Algals in their simplest state of organisation; they have been called Chaodineæ by Bory de St. Vincent, whose account of them is to the following effect: "The slime resembles a layer of albumen spread with a brush; it exfoliates in drying, and finally becomes visible by the manner in which it colours green or deep brown. One might call it a provisional creation waiting to be organised, and then assuming different forms, according to the nature of the corpuscles which penetrate it or develop among it. It may further be said to be the origin of two very distinct existences, the one certainly animal, the other purely vegetable. This matter lying among amorphous mucus consists, in its simplest state, of solitary, spherical corpuscles; these corpuscles are afterwards grouped, agglomerated, or chained together, so producing more complex states of organisation. Sometimes the mucus, which acts as the basis or matrix of the corpuscles, when it is found in water, which is the most favourable medium for its development, lengthens, thickens, and finally forms masses of some inches extent, which float and fix themselves to aquatic plants. These masses are at first like the spawn of fish, but they soon change colour, and become green, in consequence of the formation of interior vegetable corpuscles. Often, however, they assume a milky or ferruginous appearance;

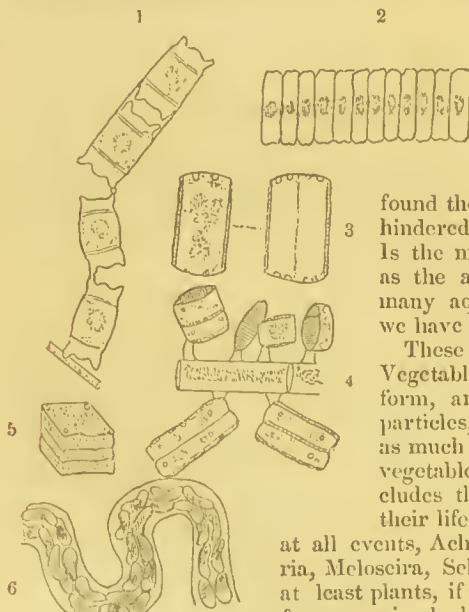


Fig. II.

found their way to such a nidus, and have they hindered the development of the green corpuscles? Is the mucus in which they lie the same to them as the albuminous substance in which the eggs of many aquatic animals are deposited? At present we have no means of answering these questions."

Are they developed here, or have they hindered the development of the green corpuscles? Is the mucus in which they lie the same to them as the albuminous substance in which the eggs of many aquatic animals are deposited? At present we have no means of answering these questions."

These form, no doubt, the extreme limits of the Vegetable and Animal Kingdom. Their regular form, and the power of separating into distinct particles, which the most of them have, are almost as much the attributes of the mineral, as of the vegetable, or even animal kingdom. Agardh includes them among plants. Kützing asserts that their life is as much animal as vegetable; and that

at all events, Achnanthes, Gomphonema, Exilaria, Fragillaria, Meloseira, Schizonema, Micromega, and Berkleya, are at least plants, if Frustulia, Cymbella, Navicula, Surirella, &c., are animalcules. He has also recently ascertained, that the frustules of Micromega are metamorphosed into green globular spores. Dr. Dickie of Aberdeen has observed some-

thing of the same kind. Mr. Ralfs, who has paid great attention to the history of these

Fig. II.—1. Biddulphia; 2. Grammonema; 3. Eunotia; 4. Achnanthes; 5. Amphitetras; 6. Cloionema, a production once referred to this order, but determined by Mr. Berkeley to be the eggs of an insect.

ORDER II. CONFERVACEÆ.—CONFERVAS.

Confervaceæ, *Endl. gen. Suppl. III.*, p. 10. Zoospermææ, *J. Agh. Alg. Med.* 1. Synsporeæ and Zoospermææ, *Decaisne in Ann. Sc. N. 2 ser.* 18. 305.

DIAGNOSIS.—*Vesicular, filamentary or membranous bodies, multiplied by zoospores generated in the interior, at the expense of their green matter.*

Water plants, not commonly of a green colour, but occasionally olive, violet, and red ; inhabiting the ocean in some instances, but more commonly found in fresh water ; some of them even belonging to both kinds of fluids ; some found in mud, others floating freely, most attached, in some way, on rocks or as parasites. Cells solitary or many, globose, elliptical, cylindrical, or tubular ; sometimes variously branched ; sometimes formed in slimy matter in which they are scattered, or irregularly heaped, or placed one above the other in a regular series forming an articulated frond ; some disposed in several rows and forming a thin layer, or some combined in the form of a net. Their mode of growth by a subdivision of the cells, of ramification by a lateral extension of such cells, a dividing partition being eventually formed. The propagation by sporidia (internal cells, or a gelatinous substance which organizes itself into cells,) found in each cell, singly, or in a definite, or indefinite number, formed from the colouring matter of one or more cells, or sometimes by the copulation of distinct individuals, and discharged by the opening or absorption of the mother cell.—*Endl.*

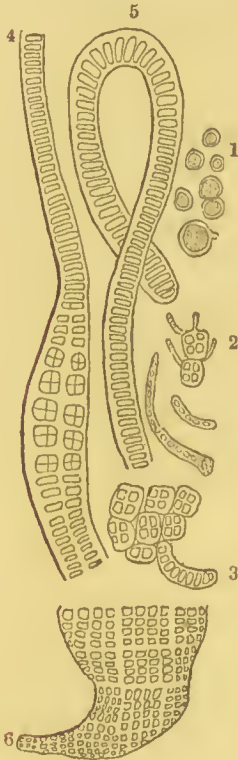


Fig. III.

about actively, just like animalcules ; and at last retreating to a shady place, attach themselves to a stone or some other body, lose their locomotive quality, and thenceforward germinate and grow like plants.—(*J. Ag. Ann. Sc. Nat. 2 ser. vol. 6.*)* It is

* "The filaments of *Conferva ærea*," says the younger Agardh, "are, as is well known, articulated or divided at equal distances into little compartments (joints), which have no communication among themselves other than what results from the permeability of the dissepiments. The green matter contained in these joints appears at first altogether homogeneous, as if it were fluid ; but in a more advanced state it becomes more and more granular. The granules are, at their formation, found adhering to the inner surface of the membrane, but they soon detach themselves, and the irregular figure which they present at first passes to that of a sphere. These granules congregate by degrees in the middle of the joint, into a mass, at first elliptical, but which at length becomes perfectly spherical. All these changes are conformable to phenomena known in vegetable life ; those which are to follow have more analogy with the phenomena of animal life. At this stage an important metamorphosis exhibits itself, by a motion of swarming (*un mouvement de fourmillement*) in the green matter. The granules of which it is composed detach themselves from the mass, one after another, and having thus become free, they move about in the vacant space of the joint with an extreme rapidity. At the same time, the exterior membrane of the joint is observed to swell in one point, till it there forms a little mammilla, which is to become the point from which the moving granules finally issue. By the extension of the membrane for the formation of the mammilla, the tender fibres of which it is composed separating, cause an opening at the end of the mammilla, and it

Fig. III.—1. *Protococcus viridis* ; 2. the same beginning to develop ; 3. the same more advanced ; 4 & 5. *Schizogonium murale* ; 6. A fragment of *Ulva (Prasiola furfuracea)* (*Kützinger*).

even asserted by M. Thuret, that in *Conferva glomerata* and *rivularis*, the spores have special organs of motion, of the nature of ciliae or tentacula, and that it is by their rapid action that the spores swim so freely in fluid.—(*Ibid.* xix. 267.) Motions of another kind have been noticed in the *Oscillatorias*; and in the species called *Zygnemas*, they are so extraordinary as to approach nearly to the act of copulation in animals. In the language of M. Decaisne, “the spores of these plants result from the coupling of two

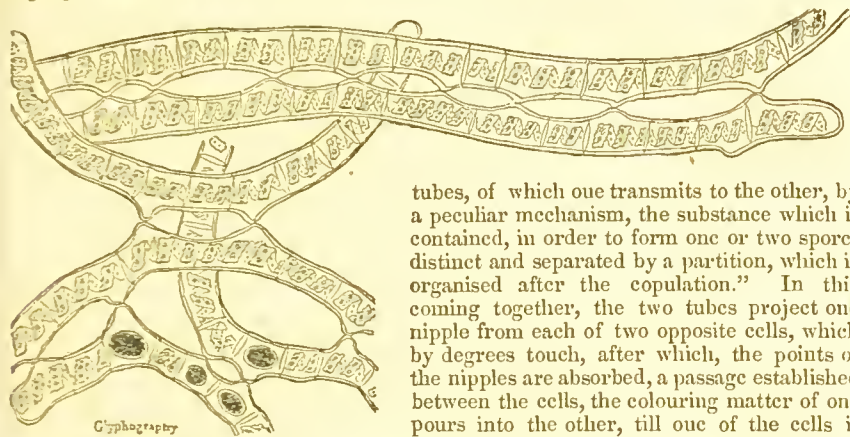


Fig. IV.

Snowplants, which have been described as *Confervæ*, and assigned to the genus *Protococcus*, are nothing more than the animalcules called *Enchelis sanguinea*, and *Pulvisculus*. But this does not affect the genus *Protococcus*, which contains productions respecting whose vegetable nature no doubt is entertained.

Hydrodictyon utriculatum has the appearance of a green net. According to M. Areschong, the cells of this plant, when nearly ripe, contain a number of active spherical granules, which in the process of reproduction become elliptical, and are attached by their extremities, when an articulation is soon produced, so as to form pentagons or hexagons. Each granule becomes a cell of the new *Hydrodictyon*. (*De Hydr. utric. dissertatio.*)

is by this passage that the granules escape. At first they issue in a body, but soon those which remain, swimming in a much larger space, have much more difficulty in escaping, and it is only after innumerable knockings (titubations) against the walls of their prison, that they succeed in finding an exit. From the first instant of the motion one observes that the granules or sporules are furnished with a little beak, a kind of anterior process, always distinguishable from the body of the seed by its paler colour. It is on the vibrations of this beak that the motion, as I conceive, depends; at least, I have never been able to discover any ciliae. However, I will not venture to deny the existence of these, for with a very high power of a compound microscope one sees the granules surrounded with a hyaline border, as we find among the ciliated Infusoria on applying a glass of insufficient power. The sporules, during their motion, always present this beak in front of their body, as if it served to show them the way; but when they cease to move, by bending it back along the side of their body, they resume the spherical form, so that before and after the motion one sees no trace of this beak. The motion of the sporules before their exit from the joint consists principally in quick dartings along the walls of the articulation, knocking themselves against them by innumerable shocks; and in some cases we are almost forced to believe that it is by this motion of the sporules that the mamilla is formed. Escaped from their prison they continue their motion for one or two hours, and retiring always towards the darker edge of the vessel sometimes they prolong their wandering courses, sometimes they remain in the same place, causing their beak to vibrate in rapid circles. Finally, they collect in dense masses, containing innumerable grains, and attach themselves to some extraneous body at the bottom or on the surface of the water, where they hasten to develop filaments like those of the mother plant. The spherical sporules elongate at first into egg-shaped forms, attached to the strange body by the narrowest end. Their development only consists in a continual expansion, without emitting any root. The green internal matter divides in the middle by a partition, which appears at first sight as a hyaline mucilage, but which gradually changes into a complete diaphragm. It is thus, by successive divisions of the joint first formed, that the young plant increases. The position of the mamilla in each joint is uncertain, at least I have seen it very different in neighbouring joints. The exit of the sporules does not take place at the same time in the different joints. One often sees those of one of the articulations already escaped, while in the neighbouring one they are not yet completely formed. Commonly the uppermost joints empty themselves first, so that it is not rare to see all the upper part of a filament entirely transparent, whilst the lower part continues still to develop. In this manner the formation and dissemination of the seeds continue during the whole summer, and thus a single filament suffices for the formation of an infinite quantity of sporules. If one remembers that each joint contains perhaps many hundred of spores, it is not astonishing that the water becomes perfectly covered with them; so that we might readily take for a *Protococcus*, or other simple Alga, what are only the spores of a *Conferva*. I suspect that from such a mistake have arisen the theories of metamorphosis proposed by many modern algologists.”

Fig. IV.—*Spirogyra quinqua* (Kütz.).

Confervas are more frequently found in the temperate parts of the world than within the tropics, occupying both salt and fresh water, but more especially the latter, and several species are common to both. One of them, the *Tiresias ericetorum*, grows on the ground, but in places that are very damp, and often inundated; others among the oscillating species cover the humid surface of rocks or earth, and the interstices in the pavement of cities; some even grow in hot springs of a very high temperature. *Ulva thermalis* lives in the hot springs of Gastein, in a temperature

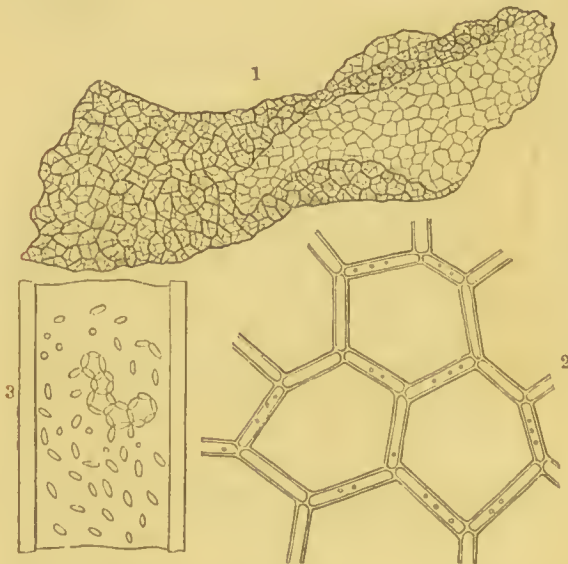


Fig. V.

of about 117° Fahr. Dr. Lankester speaks of *Oscillatorias* found in the sulphuretted hydrogen water of Harrowgate (*Ann. N. H.* vii. 107); and *Calothrix nivea* is said to have occurred there also. They often give a peculiar colour to large bodies of water. The Red Sea has derived its name from the abundance of *Trichodesmium erythreum* which floats in it, and concerning which MM. Evernor Dupont and Montagne have given a curious account.* Dunal states that the crimson colour of the salt-water tanks on the coast of the Mediterranean is owing to the presence of *Protococcus salinus* and *Hæmatococcus salinus*, two of the most simple of this order. *Hæmatococcus Noltii* stains crimson the marshes of Sleswick.

Dr. Drummond ascertained that the Irish lake of Glaslough, which is remarkable for its peculiar greenness, owes its colour to the presence of his *Oscillatoria ærugescens*. (*Ann. N. H.* i. 1.) The green of the Grand-canal docks near Dublin has been found to arise from the presence of a *Sphærozyga* (*Trichornus Albm.*) and in like manner Mr. Thompson found that the water of Ballydrain lake is coloured green by *Sphærozyga* (*Anabaina*) *spiralis*, and that in the same place broad verdigris patches proceed from collections of *Aphanizomenon incurvum*. (*Ann. N. Hist.* v. 83.) It has also occurred that acres of inundated meadow land have been clothed to the depth of an inch with a thick entangled layer of *Conferva crispa*, which then forms a texture not unlike that of some woollen fabric, whence it has gained the name of water-flannel. *Confervæ* sometimes attack diseased animal tissue. Mr. Goodsir has described such an instance in the case of a gold-fish. (*Ann. Nat. Hist.* ix. 336.)

It has been ascertained that this is of very common occurrence, and that the plant which makes the attack is the *Achlya prolifera*. This production has been carefully

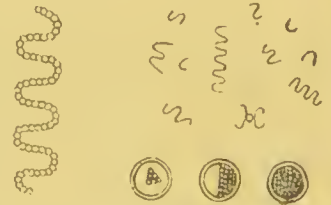


Fig. VI.

* "On the 8th July 1843, I entered the Red Sea by the straits of Babelmandel, on board the *Atalanta* steamer. On the 15th the burning sun of Arabia suddenly awoke me with its brilliancy unannounced by the dawn. I was leaning mechanically out of the poop windows, to catch a little of the fresh air of night before the sun had devoured it, when, imagine my surprise to find the sea stained red as far as the eye could reach behind the vessel.—If I was to attempt to describe this phenomenon, I would say that the surface of the ocean was entirely covered with a close thin layer of fine matter, the colour of brickdust, but slightly orange. Mahogany sawdust would produce such an appearance.—When put into a white glass bottle, it became in the course of a day deep violet, while the water itself had become a beautiful rose colour. This appearance extended from Cosseir, off which we were at daybreak on the 15th May, to Tor, a little Arabian village, which we made about noon the next day, when it disappeared, and the sea became blue as before. During this time we must have passed through about 256 miles of the red plant." *Comptes rendus*, xix. 171.—Similar appearances have been mentioned by Mr. Darwin; and Mr. Hinds, when at anchor off Libertad in the Pacific, and at the Ahrolhos, perceived large quantities of another species of *Trichodesmium*, which exhaled a most disagreeable smell. To this cause, or one of the same kind, is probably referable the phenomenon mentioned in the *Colombo Herald* of May 14, 1844: "The sea to the southward of Colombo, and, more lately, opposite the fort itself, has presented a very uncommon appear-

Fig. V.—1. *Hydrodictyon utriculatum*; 2. portion of full-grown plant; 3. portion of a joint in which the granules have commenced to dispose themselves in pentagons, the rudiments of the new plant.

Fig. VI.—*Sphærozyga spiralis*.

examined by Dr. Unger. When arrived at its full growth, it consists of transparent threads of extreme fineness, packed together as closely as the pile of velvet; they greatly resemble, in general appearance, certain kinds of mouldiness. These threads are terminated by an extremity about $\frac{1}{1200}$ of an inch in diameter, consisting of a long single cell, within which is collected some green mucilage intermixed with granules.

Dr. Unger assures us that at this time no starch is present, but the whole of the green matter is of the nature of gum, as is proved by the action of iodine upon it. The contents of the cell are seen to be in constant motion, directing themselves in lines such as are represented at Fig. 5. While this is going on, the end of the cell continues to grow, and at the same time the contents collect at the extremity, and distend it into a small head in form resembling a club, immediately after which a chamber is formed, and then the first stage of fructification is accomplished. The next change is observed to take place in the granular matter of the clubhead, which itself enlarges, while the contents gain opaqueness, and by degrees arrange themselves in five or six-sided meshes, which are in reality the sides of angular bodies, that are rapidly forming at the expense of the mucilage above mentioned,

which has disappeared. It is not the least surprising part of this history, that all the changes above mentioned take place in the course of an hour or an hour and a half, so that a patient observer may actually witness the creation of this singular plant. At this time all the vital energy seems directed towards changing the angular bodies in the inside of the clubhead into propagating germs or spores. Meanwhile the clubhead grows, and gives them a little room, and they in their turn alter their form and become oval. Then it is that is witnessed the surprising phenomenon of spontaneous motion in the spores, which, notwithstanding the narrow space in which they are born, act with such vigour that at last they force a way through the end of the clubhead. At first one spore gets out into the water, then another, and another, till at last the clubhead is emptied. All this takes place with such rapidity that a minute or two suffice for the complete evacuation of the clubhead or spore-chamber. The spores, when they find their way into the water, are generally egg-shaped, and swim with their small end foremost; but they are often deformed, in consequence of the narrowness of the hole through which they have had to pass. It even happens that they stick fast in the hole, and perish there. They are extremely small, their breadth not exceeding the 1896th

ance for some days past. Instead of its usual brightness, the surface has been to a considerable extent covered with what appears to the naked eye a sort of nasty froth or scum, emitting a fetid smell. In the mornings, when it has been usually calm, this scum has presented itself in broad belts and fields, and by the afternoon, after being exposed to the sea-breeze, it is broken down into streaks, lying in the direction of the wind, which, if it blows pretty fresh, disperses it altogether. We have examined some of this unusual substance in a tumbler of salt water, and were not a little surprised to find, that while it floated on the surface, in the form of a scum, some parts of a yellowish-green, and some of a purplish-brown colour, it tinged the whole water of a beautiful violet. We afterwards found that the whole water in the bucket, in which it was brought from the sea, had acquired the same colour; and, indeed, it appeared to us the other day, when it was very abundant, as if the sea itself had been stained of this beautiful tint. We found, on minute inspection, that it consisted of an infinite multitude of small spindle-shaped bodies, each of which, in its turn, was a bundle of small threads jointed but unbranched, and seemingly very brittle. We have no doubt but it is a vegetable production in the sea, something similar to the green substance which covers stagnant pools of fresh water. The most remarkable and unpleasant feature is its fetid odour. When we read in books of voyages, of ships sailing for so many hours through seas of a blood-colour, and similar wonders, we are apt to suppose the author is taking the liberty of a traveller; but witnessing such a phenomenon as this, is calculated to prepare us for giving them more credit."

Fig. VII. *Achlya prolifera*.—1. The club-shaped spore-chamber; 2. the same emptied of its spores; 3, 4. as spore-chamber much less magnified, containing two germinating spores, and a dead one; 5. a piece of the thread at an early period, with the lines of motion.

part of an inch. Their small end is the most transparent, and it is curious to see how constantly this is pushed forwards in the rapid evolutions made in the water by these living particles. This sort of *quasi* animal life does not last long—a few seconds, some minutes, or at the most half-an-hour. They often die: Unger assures us that he has seen them in the agonies of death, and *struggling convulsively* (!), with all the appearance of animal life.

Porphyra laciniata and *vulgaris* are stewed, and brought to our tables as a luxury, under the name of Laver; and even the *Ulva latissima*, or green Laver, is not slighted in the absence of the *Porphyrae*. *Ulva compressa*, a common species on our shores, is regarded, according to Gaudichaud, as an esculent by the Sandwich Islanders. Common Nostoc, commonly called star-jelly, a trembling gelatinous plant, that springs up suddenly after rain, is by superstitious persons supposed to possess virtue as a vulnerary, and in pains of the joints; oyster green or *Ulva lactuca* (the *βρίον θαλάσσιον* of Dioscorides) is sometimes employed in serofula; the ancients used it in inflammations and gouty affections; its taste is so bitter and salt that it is usually given with lemon juice.

The Confervals found in many thermal springs, mostly species of *Sphærozyga*, are used empirically as external applications to goitre, enlarged glands, &c. Henry has examined the Confervals in the springs of Vichy, Neris, and Vaux, and found small quantities of an alkaline iodide in each. (*Chem. Gaz.* 1844, p. 447.)

GENERA.

- Suborder I. — *Palmetaceae*. Cells somewhat globose or elliptical, free, and more or less distinct, or collected by means of a slimy layer into a frond.
- Tribe I. *Protococcidae*. — *The slimy substratum obsolete*.
- Protococcus*, Ag.
Spherella, Somm.
Coccolophyllum, Link.
Globulina, Turp.
Protosphaeria, Turp.
- Hæmatococcus*, Ag.
Gloiococcus, Shutt.
Chlorococcum, Græv.
Globulina, Turp.
Protosphaeria, Turp.
- Pleurococcus*, Menegh.
Hornospora, Bréb.
Stereococcus, Kütz.
- Tribe 2. *Coccoloridae*. — *The slimy substratum evident*.
- Palmetta*, Lyngb.
Priestleya, Meyen.
Chaos, Bory.
Phytoconis, Bory.
Coccodea, Pal.
Merrettia, Gray.
Sarcoderma, Ehr.
Coccolioris, Spr.
Microcystis, Kütz.
Bichatia, Turp.
Anacystis, Menegh.
Oncobrysa, Ag.
Hydrococcus, Kütz.
Micaloa, Biass.
Hydrothrombium, Ktz.
Botrydina, Brébiss.
- Suborder II. — *Nostocheae*. Cells somewhat globose or elliptical, coalescing into a simple or branched thread; united into several rows by means of a slimy substratum of various forms.
- Nostoc*, Vauch.
Linkia, Mich.
Undina, Fries.
Hydrococcus, Link.
- Thrombium*, Wallr.
Monormia, Berkel.
- Sphærozyga*, Ag.
Anabaena, Bory.
Trichormus, Allm.
Anhaltia, Schwabe.
- Suborder III. — *Oscillatoriae*. Cells tubular, naked or furnished with a slimy or gelatinous layer, continuous, but seeming to be jointed in consequence of interruptions of the colouring matter.
- Tribe I. *Rivularidae*. — *Tubes proceeding singly, or in pairs, from a transparent globule; collected into a frond by means of a gelatinous layer*.
- Gloiotrichia*, J. Ag.
Rivularia, Roth.
Lynckia, Lyngb.
Gaillardotella, Bory.
Stylobasis, Schw.
Slypnion, Raf.
Zonotrichia, J. Ag.
Diplotrichia, J. Ag.
- Tribe 2. *Oscillatoridae*. — *Tubes cylindrical, free, or woven into a frond, falsely jointed in consequence of the ringed or streaked appearance of the colouring matter*.
- Oscillatoria*, Bosc.
Oscillaria, Bosc.
Trichophora, Bonnem.
Spirogyra, Nees.
Spirulina, Turp.
Loten, Adams.
- Trichodesmium*, Ehrenb.
Microcoleus, Desmaz.
Vaginaria, Bory.
Mérisomyria, Poll.
Calothrix, Ag.
Hempelia, Meyen.
Ulothrix, Kütz.
Dillwynella, Bory.
Lyngbya, Ag.
Cyclosperma, Bonnem.
Hauvita, Gray.
Scytonema, Ag.
- Percursaria*, Bonnem.
Sphaeroclea, Ag.
Cadmus, Bory.
Sphaerogona, Link.
Sphaeropletha, Duby.
Beggiatoa, Trev.
- Suborder IV. — *Confervae*. — *Cellules resembling joints, arranged in a net, or more frequently in simple or branched threads, separate, or combined by common slime*.
- Tribe I. *Hydrodictidae*. — *Cells tubular, combined by their pointed extremities into a net-like frond*.
- Hydrodictyon*, Roth.
Microdictyon, Deaaisnc.
Dietyloma, Raf.
Talerodictyon, Endl.
- Tribe 2. *Zygnemidae*. — *Cells tubular, united by their truncated extremities into jointed threads, which are at first distinct, and then, by the aid of transverse tubelets which discharge the colouring matter, brought into copulation*.
- Mougeotia*, Ag.
Serpentinaria, Gray.
Conjugata, Lk.
Zygnema, Ag.
Agardhia, Gray.
Globulina, Lk.
Stellulina, Lk.
Lucernaria, Roussel.
Diadema, Pal.
Tyndaridea, Bory.
Leda, Bory.
Spirogyra, Lk.
Chonaspis, Gray.
Salmacis, Bory.
- Tribe 3. *Confervidae*. — *Cells tubular, united by their truncated extremities into free, simple, or branched threads*.
- Myxonema*, Fries.
Myrotrix, Fries.
Nematix, Fries.
- Conferva*, Fries.
Polysperma, Vauch.
Chloroniton, Gall.
Horniscia, Fries.
Nodularia, Mertens.
Aphanizoaenon, Morren.
Tiresias, Bory.
Edegonium, Lk.
Draparnaldia, Bory.
Charospermum, Lk.
Leptomitus, Ag.
Saprolegnia, Nees.
Pylhium, Nees.
Sphaerotilus, Kg.
Achlya, Nees.
Hydronema, Carus.
Hygrocrocis, Ag.
- Tribe 4. *Chetophoridae*. — *Cells tubular, adhering by truncated extremities in jointed branched threads coalescing into a gelatinous frond*.
- Chetophora*, Schrank.
Myriodactylon, Desv.
Hydrocoryne, Schwab.
Coleochæte, Bréb.
- Suborder V. — *Siphonaeae*. Frond either monosiphonous, that is, consisting of a single cell, usually branched in various ways, with the branches continuous or jointed, distinct or variously united; or pleiosiphonous, consisting of many tubular cells, placed in contact, branched, and variously united or held together by means of intercellular matter. — Marine plants usually covered with calcareous incrustations.
- Tribe I. *Caulerpidae*. — *Frond monosiphonous, continuous, variously branched, and filled with the reticulated fibres of the continuous branch*.
- Caulerpa*, Lamr.
Chaovinta, Bory.
Tricladia, Dec.

Tribe 2. <i>Acetabulariæ</i> .--Frond monosiphonous, jointed, with radiating or flabelliform branches at the end; the branches continuous, separate, or combined.	Tribe 3. <i>Halymedidæ</i> .--Frond polysiphonous, made up of tubes which are continuous or jointed, and branched more or less densely.	<i>Coralliodendron</i> , Kütz. <i>Espera</i> , Dec. <i>Amalyomene</i> , Lamx. <i>Dictyosphaeria</i> , Dec. <i>Tetraspora</i> , Dec. <i>Pezisperma</i> , Raf. <i>Bangia</i> , Lyngb. <i>Spermagonia</i> , Bonnem. <i>Prasiola</i> , Menegh. <i>Stigonema</i> , Ag. <i>Girardia</i> , Gray. <i>Zignoa</i> , Trevis. <i>Percursaria</i> , Bory.	<i>Enteromorpha</i> , J. Ag. <i>Ulva</i> , Ag. <i>Enteromorpha</i> , Lk. <i>Ica</i> , Fries. <i>Hydrosolen</i> , Mart. <i>Tubularia</i> , Rouss. <i>Fistularia</i> , Grev. <i>Ulvastrum</i> , D. C. <i>Halithridæ</i> , Targ. <i>Ramularia</i> , Ronss. <i>Phylloma</i> , Wigg. <i>Trepposa</i> , Lk. <i>Porphyra</i> , Ag.
<i>Polyphisa</i> , Lamx. <i>Acetabularia</i> , Lamx. <i>Acetabulum</i> , Touru. <i>Callophilophorum</i> , Don. <i>Olivia</i> , Bert. <i>Rhipidosiphon</i> , Mont.	<i>Udotea</i> , Lamx. <i>Flabellaria</i> , Link. <i>Rhipozonium</i> , Kütz. <i>Astrainvillæa</i> , Dec. <i>Halymeda</i> , Lamx. <i>Penicillus</i> , Lamx. <i>Nesca</i> , Lamx.		

NUMBERS. GEN. 66. Sp. 368. (Endl.)

POSITION.—Diatomaceæ. CONFERVACEÆ.—Fucaceæ.

ORDER III. FUCACEÆ.—SEAWEEDS.

Phyceæ, *Endl. Gen. Supp.* iii. p. 19. (1843).—Aplosporeæ, *Decaisne in Ann. Sc. Nat.* 2 ser. 17, 305.

DIAGNOSIS.—Cellular or tubular unsymmetrical bodies, multiplied by simple spores formed externally.

Plants sometimes inhabiting fresh water, but more frequently salt water; the former approaching closely to Confervas. Frond either monosiphonous, consisting of a single cell, which is sometimes uninterruptedly branched, or more commonly polysiphonous, composed of several cells, various in form, placed one above the other, or interwoven, barked or barkless, jointed or continuous, thread-shaped, or of various figures, and not uncommonly divided into a sort of trunk and leaflike blade. Mode of growth by division of the cells; of branching by lateral increase or a vague proliferousness. Mode of propagation by spores, contained in superficial cells, which are often bladderly (and called VESICLES), growing singly out of thin colouring matter, consisting of a single nucleus clothed by its proper cellular membrane (or EPISPORE), and discharged by the opening of a transparent mother cell (or PERISPORE). VESICLES (or original mother cells) scattered through the whole frond, or seated in particular parts of it, (often the points of the branches), sometimes on a peculiar receptacle, naked, or supported by small branches.—(*Endlicher.*)

The reproductive bodies of these plants distinguish them from others of the alliance. In the words of Decaisne "they are simple, and result neither from a modification of green matter, nor from its concentration in a pre-existing cell; their structure is quite peculiar. In the beginning they are little warts, invested by a very thin membrane, placed close over an inner sac filled with green granules." (The black or brown colour assigned to them by Mr. Harvey is a mistake arising out of imperfect observation.) "All the spores are external, that is to say, inserted on the surface of a vesicle upon which they are generated. They are never found in the interior of the frond as in Confervas; and if in Seaweeds they can be compared, in consequence of their being contained in a common chamber or conceptacle, to the spores of certain Rosetangles, it can only be to the corpuscles enclosed in the organs named Ceramidia by the younger Agardh, which however never have the double integument of Seaweeds. In most of the latter the spores appear at the base of certain flocks or filaments, which are simple or jointed, thread-shaped or dilated, or more or less filled with green matter; these flocks are wanting however in the greater part of the Dictyotidæ, and their use is wholly unknown. There is no reason to suppose them male organs." Decaisne, indeed, in one place, treats as an absurdity Donati's calculation that a single individual of a *Cystoseira* (*Acinaria*) bears 545,000 male flowers and 1,728,000 females.

The younger Agardh, however, has within a few months expressed his deliberate opinion that in the Rosetangles (his Floridæ) organs analogous to sexes are present. "I am very much inclined," he says, "to adopt the opinion that the two sorts of fructification observable among them are the first attempts at the agency which in higher plants perform the office of sexes, without however having their qualities established, and each capable of producing a new plant without the aid of the other." See his pamphlet called *In systemata Algarum hodierna Adversaria* (p. 8.) in which the reader will find abundant criticism of the views of Kützing and others concerning the Algal alliance.

M. Decaisne seems also to have altered his opinion upon this subject, for (*Comptes Rendus*, Nov. 11, 1844,) he and M. Thuret now describe what they suppose to be sexual organs in *Fucus serratus*, and other species, to which they even apply the Linnæan names Monœcious and Dicecious. They describe the conceptacles of the males as being filled with articulated filaments bearing numerous antheridia in the form of vesicles containing red granules. "These antheridia are expelled by the orifice of the conceptacles; if we examine them with a microscope, we see issue from one of their extremities transparent somewhat pear-shaped bodies, each enclosing a red granule. Every one of such bodies is furnished with very thin ciliæ, by means of which it moves with very great

Fig. VIII.—1. *Batrachospermum moniliforme*; 2. portion of a branch; 3. summit of a branch, bearing a cluster of spores. (*Decaisne.*)

activity." Such bodies are regarded as analogous to the spiral threads of mosses and other cryptogamic plants. Indeed, according to M. Thuret, such threads are also furnished with ciliary locomotive organs. But what proof is there that these curious bodies are pollen?

One of the most remarkable plants of the order is the *Hydrogastrum*, which Endlicher describes as a perfect plant, with root, stem, bud, and fruit, in imitation of the most highly developed races, but all produced by the branching of one single cell.

Professor Morren thinks that he has ascertained that the animaleule called *Rotifer vulgaris*, is actually generated in the cells of *Vaucheria clavata*. He lives in certain protuberances formed on the stem of that plant, travels quite at his ease within them, traverses the partitions, displaces the colouring matter. (*Ann. Nat. Hist.* vi. 346.)

Like all this alliance the Seawracks have no particular geographical limits, but occur wherever the ocean or rivers spread themselves over the land. They are, however, remarkable for the enormous space which single species of them occasionally occupy; some of them forming subaqueous forests in the ocean, emulating in their gigantic dimensions the boundless element that enfolds them. *Scytosiphon filum*, a species common in the North Sea, is frequently found of the length of 30 or 40 feet; in Scalpa Bay, in Orkney, according to Mr. Neill, this species forms meadows, through which a pinnace with difficulty forces its



Fig. IX.

way. *Lessonia fuscescens* is described by Bory de St. Vincent as 25 or 30 feet in length, with a trunk often as thick as a man's thigh. But all these, and indeed every other vegetable production, is exceeded in size by the prodigious fronds of *Macrocystis pyrifera*. "This appears to be the sea-weed reported by navigators to be from 500 to 1500 feet in length: the leaves are long and narrow, and at the base of each is placed a vesicle filled with air, without which it would be impossible for the plant to support its enormous length in the water; the stem not being thicker than the finger, and the upper branches as slender as common packthread." This plant, and *Durvillaea utilis*, was seen by Dr. Joseph Hooker in lat. 61° S. in large vegetating patches, wherever the water was free of icebergs; and *Scytothalia Jacquinotii* as low as 63° S.

Some of the species are eatable, owing doubtless to the large quantity of gelatinous matter that they secrete. The young stalks of *Laminaria digitata* and *saccharina* are eaten under the name of "tangle." In Asia, *Sargassum acanthocarpum* and *pyriforme*, with *Laminaria bracteata*, and in the Sandwich Islands, *Sargassum euneifolium*, are also used for food. When stripped of the thin part, the beautiful *Alaria esculenta* forms a part of the simple fare of the poorer classes of Ireland, Scotland, Iceland, Denmark, and the Faroe Islands. The large *Laminaria potatorum* of Australia furnishes the aborigines with a proportion of their 'instruments, vessels, and food.' On the authority of Bory de St. Vincent, the *Durvillaea utilis* and other *Laminariidæ* constitute an equally important resource to the poor on the west coast of South America. In some of the Scottish islands, horses, cattle, and sheep, feed chiefly upon *Fucus vesiculosus* during the winter months; and in Gothland it is commonly given to pigs. *Fucus serratus* also, and *Scytosiphon filum*, constitute a part of the fodder upon which cattle are supported in Norway. In the manufacture of kelp, for the use of the glass-maker and soap-boiler, Seawracks take their place among the more useful vegetables. The species most valued for this purpose are, *Fucus vesiculosus*, *nodosus*, and *serratus*, *Laminaria digitata* and *bulbosa*, *Himantalia lorea*, and *Scytosiphon filum*. It is principally, indeed, because of the quantity of soda which they contain that they are found so useful as manures. In medicine they have been occasionally employed, as, for instance, *Fucus vesiculosus* in Europe against scrofula, *Sargassum vulgare* in Portuguese India against calculus, and *Sarg. hacciferum* with some *Laminarias* in South America against tumours and strangury. But whatever medical value they possess seems to be owing to the presence of iodine, which may be obtained either from the plants themselves, or from kelp. French kelp, according to Sir Humphry Davy, yields more iodine than British; and, from some experiments made at the Cape of Good Hope, *Ecklonia buccinalis* is found to contain more than any European sea-weed. Iodine is known to be a

powerful remedy in cases of goitre. The burnt sponge formerly administered in similar cases, probably owed its efficacy to the Iodine it contained; and it is also a very curious fact, that the stems of a sea-weed are sold in the shops, and chewed by the inhabitants in South America, wherever goitre is prevalent, for the same purpose. This remedy is termed by them Palo Coto (literally, goitre-stick), and consists of fragments of the *Sargassum bacciferum* and *Laminarias* above alluded to. Iodine is principally obtained in Europe from the ashes of the *Fuci vesiculosus, nodosus, ceranoides, and serratus*.

GENERA.

- Suborder I.—*Vaucheria*.
 Frond mono- or pleiosiphonous, without bark. The utricles forming a lateral branchlet, proceeding either from the upper joint of the branch, or occasionally from the lowest.
- Tribe 1. *Hydrogastri-*
tridæ.—Frond produced from a single vesicle or tube, rarely from several that are continuous and loosely interwoven.
- Hydrogastrium, Desv.*
Botrydium, Wallr.
Rhizococum, Desmaz.
Vaucheria, D. C.
Ectosperma, Vauch.
Bryopsis, Lamx.
Valonia, Ginnan.
Physidrum, Raf.?
Codium, Stack.
Lamackia, Olivi.
Azardhia, Cabrera.
Spongodium, Lamx.
- Tribe 2. *Dasycladidæ*.
 —Frond monosiphonous, continuous, or jointed, with verticillate branchlets, which are fastigiate, jointed, and have the last joint transformed into a vesicle.
- Chanædoris, Moul.*
Dasycladus, Agh.
Myrsidium, Raf.
Neomeris, Lamx.
Cynopolia, Lamx.
- Tribe 3. *Eetocarpidæ*.
 —Threads jointed, consisting of a single row of cells, variously branched. Vesicles derived from one joint, either at the end of the branches, or of the laterals.
- Leiblinia, Endl.*
Desmarestella, Bory.
Chautransia, Fries.
Audrianelia, Bory.
Genicularia, Rons.
Eetocarpus, Lyngb.
Lyngbya, Gaillon.
Macrocarpus, Bonnem.
Opospermum, Raf.?
Calospermum, Raf.?
Pylæicella, Bory.
Lyngbyella, Bory.
Bulbochaete, Agh.
- Tribe 4. *Batrachosperm-*
idæ.—Frond polysiphonous, composed of a primary thread surrounded by parallel accessory ones. Vesicles
- terminal or lateral, clustered.*
- Batrachospermum, Roth.*
Charospermum, Lk.
Draparnaldia, Bory.
Monilina, Bory.
Thorinia, Bory.
Leuauina, Bory.
Gelatinaria, Roussel.
Torularia, Bonnem.
Liagora, Lamx.
Actinotrichia, Decaisne.
Galaxaura, Lamx.
Dichotomaria, Lamk.
Alysium, Agh.
Microthoe, Dec.
Thorea, Bory.
Polycoma, Palis.
Myriocladia, J. Agh.
Egira, Fries?
- Tribe 5. *Chordaridæ*.—
 Frond polysiphonous, with stocks proceeding in all directions from the medullary substance, free in the circumference.
- Cruoria, Fries.*
Myrionema, Grev.
Elachista, Aresch.
Mesogloia, Agh.
Chordaria, Agh.
Leathina, Gray.
Corymophora, Agh.
Clavetella, Bory.
Liebmanna, J. Agh.
- Suborder II.—*Halysce-*
reæ. Frond polysiphonous, barked, jointed, or continuous. Vesicles scattered over the surface of the frond, or collected into heaps.
- Tribe 1. *Sphaelariidæ*.
 —Frond jointed; vesicles lateral, solitary.
- Sphaelaria, Lyngb.*
Delisella, Bory.
Lyngbyella, Bory.
Myriotrichia, Harvey.
Cladostephus, Agh.
- Tribe 2. *Dictyotidæ*.—
 Frond continuous, unbranched. Vesicles supported by stocks, collected in heaps, or scattered over the upper surface of the frond.
- Halyscra, Targ.*
Neurocarpon, Web.
Dictyopteris, Lamx.
Polypodioides, Stack.
Dictyosiphon, Grev.
Dictyota, Lamx.
Zonaria, J. Agh.
Stiffia, Nardo.
Zanardinia, Nardo.
- Padina, Adans.*
Trattinickia, Web.
Padinella, Aresch.
Cutleria, Grev.
Arthrocladia, Duby.
Elatonema, Berk.
Scytosiphon, Agh.
Chorda, Stack.
Filum, Stack.
Chordaria, Lk.
Soranthera, Postels.
Punctaria, Grev.
Asperococcus, Lamx.
Encatium, Agh.
Hydroclathrus, Bory.
Striaria, Grev.
Carmichaelia, Grev.
Stilophora, J. Agh.
 ? *Hildebrandia, Nardo.*
Ralfsia, Berk.
- Tribe 3. *Laminaridæ*.
 —Frond continuous, coriaceous, sometimes bearing bladders. Vesicles scattered, or collected in heaps, supported by stocks, growing on both sides of the frond.
- Lessonia, Bory.*
Macrocystis, Agh.
Nereocystis, Postels.
Ecklonia, Hornem.
Laminaria, Lamx.
Gigantea, Stack.
Succharina, Stack.
Muscifolia, Stack.
Potyschidia, Stack.
Palmaria, Lk.
Laminastrum, Duby.
Fasciata, Gray.
Capea, Moutagn.
Haligeria, Dec.
Alaria, Grev.
Orgya, Stackh.
Thalassiophyllum, Post.
Agarum, Grev.
Myriotrema, Lapy.
Costaria, Grev.
- Tribe 4. *Sporochnidæ*.
 —Frond continuous, between cartilaginous and membranous, stocks formed astride a capitate receptacle, bearing the vesicles.
- Sporochnus, Agh.*
Desmarestia, Lamx.
Desmia, Lyngb.
Dichlora, Grev.
Trinitaria, Bory.
Hippurina, Stack.
Ilyalina, Stack.
Flagellaria, Stack.
- Suborder III.—*Fucæ*.
 Frond polysiphonous, often bladdery. Vesicles seated in hollow conceptacles formed of
- a fold, in of the frond, pierced by a pore, and surrounded by flocks; conceptacles scattered or collected upon a receptacle.
- Tribe 1. *Lemauidæ*.—
 Frond hollow, wholly converted into a receptacle.
- Lemanea, Bory.*
Nodularia, Link.
Gongylocodon, Link.
Trichogonea, Palis.
Vertebraria, Rouss.
- Tribe 2. *Fucidæ*.—
 Conceptacles not collected upon a receptacle.
- Fucus, L.*
Cerium, Gray.
Halidrys, Stack.
Bifurcaria, Stack.
Ozothalia, Dec. and Th.
Pelvetia, Dec. and Th.
Carpodesmia, Grev.
Myriodesma, Dec.
Himantalia, Lyngb.
Lorea, Stack.
Xiphophora, Montagu.
Splachidium, Grev.
Durvillea, Bory.
Hormosira, Endl.
Moniliformia, Lamx.
Monilia, A. Rich.
Custraltia, A. Rich.
Scaberia, Grev.
- Tribe 3. *Cystoseiridæ*.
 —Conceptacles or receptacles distinct from the frond.
- Cocceophora, Grev.*
Halidrys, Lyngb.
Siliquaria, Gray.
Blossevillea, Dec.
Cystophora, J. Agh.
Cystoseira, Agh.
Actinaria, Targ.
Machaia, Gray.
Calenaria, Raf.
Ascophylla, Stack.
Ericaria, Stack.
Monilifera, Stack.
Sargassum, Rumph.
Baccularia, Gray.
Hatochloa, Kütz.
Myagropsis, Kütz.
Spongocarpus, Kütz.
Tarbinaria, Bory.
Carpacanthus, Kütz.
Phyllospora, Agh.
Carpophyllum, Grev.
Marguarin, A. Rich.
Scytothalia, Grev.
Stackhousia, Lamx.
Seirococcus, Grev.
Polyplocum, Agh.
Osmundaria, Lamx.

NUMBERS. GEN. 81. Sp. 452. (Endl.)

POSITION.—Confervaceæ. FUCACEÆ.—Ceramiceæ.

ORDER IV. CERAMIACEÆ.—ROSETANGLES.

FLORIDÆ. J. Agardh, *Aty. Med.* 54, (1842); *Endl. Gen. Supp.* iii, 33.—CHORISTOSPHEREÆ, DeCaisne in *Ann. Nat. Hist.* 2 ser. 17, 306, (1842).

DIAGNOSIS.—Cellular or tubular unsymmetrical bodies, multiplied by tetraspores.

Seaweeds of a rose or purplish colour, seldom olive or violet. Their cells long and tubular, or round and short, or polygonal; sometimes arranged in a single row; sometimes disposed in several parallel rows, and of equal length, forming an articulated frond; sometimes in several rows, and of unequal length, when they constitute a cellular frond. The propagation by means of spores (called also Sphærospores and Tetraspores), formed in fours (or threes), within a transparent perispore, or mother cell, and collected in bodies of many different forms and structure.*

The subdivision of the reproductive bodies or tetraspores into four, or occasionally three particles, is the great feature of this natural order, and at once distinguishes it from the rest of the alliance. M. DeCaisne lays great stress upon this point, first used by himself for systematical purposes, and he attaches quite a secondary value to the various modes in which such spores are grouped. To rank those modes more highly *c'était sacrifier évidemment une foule des considérations de la*

plus haute valeur à un caractère qui n'a d'autre importance que d'être plus visible, et par suite plus facile à saisir que le premier. It is, however, a very striking peculiarity of the Rosetangles, that they should have so much greater a variety of fructification than their allies, and this, in connection with the quaternary structure of their spores, seems to indicate their being the highest form of the Algal alliance.

Although the subdivision of the spores by four is of uniform occurrence among these plants, yet it takes place in different ways, and is subject to certain modifications, concerning which the language of M. DeCaisne is instructive. "I have shewn," he says, "in another place, that the sphærospores, or quaternary reproductive bodies, which M. Kützing has perhaps better called Tetraspores, offer three modifications. They are either little spheres, which divide into four wedge-shaped particles with a round base (*Delesseria*, *Ceramium*, &c.); or oblong bodies, which are cut across into four distinct spores (*Hypnea*, *Catenella*, &c.); or, finally, oblong bodies, which divide vertically and transversely, so as to form segments of cylinders, rounded at one extremity, and truncate at the other, as in *Peysonnella*. The mode of formation, and the essential organisation of these spores, is the same in each type, whether the tetraspores project beyond the tissue, or are organised in the interior of the frond. When young, the tetraspores show no exterior membrane, but appear as a reddish spherule, the development of which may be followed

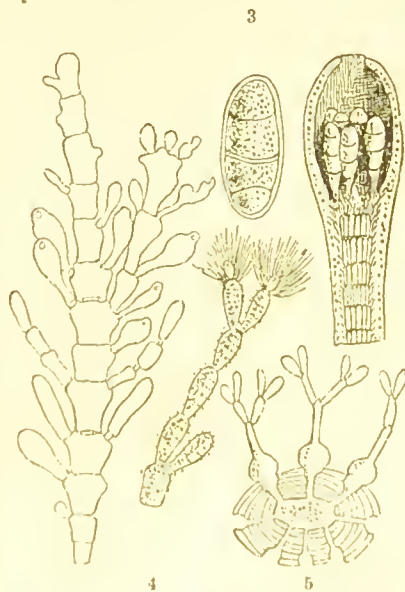


Fig. XI.

Fig. X.—1. *Chordia obtusa*; 2. *Griffithsia spherica*; 3. *Gr. corallina*.

Fig. XI.—Magnified branch of *Corallina officinalis*; 2. a section of its spore case (ceramidium) with the tetraspores in situ; 3. a tetraspore; 4. *Cymopolia barbata*; 5. a cross section of the stem of *Dasycladus claviformis*, showing its rings of growth.

* For the explanation of the terms invented to express these forms, see DeCaisne in *Ann. des Sc. Nat.* 2 ser. 17, 345.

in the different species of *Griffithsia*. We see them enlarge for a certain space of time, and present the appearance of a rose-coloured globule; but at a more advanced period the external envelope dilates, becomes transparent, and the central body, considerably increased in size, tends to separate into four parts or distinct spores, each invested with a special envelope, and of the most brilliant carmine colour. This structure brings to mind, with some slight differences, that of pollen grains." And then M. Decaisne goes on to explain how, by a stoppage of growth, or by interior multiplication, the quaternary character of these bodies may be affected.

According to Endlicher, the maximum of this order is found in the ocean between 35° and 48° N. lat. They are entirely marine. Towards the pole and the equator they diminish in numbers, and are comparatively rare in the southern hemisphere. *Rhododermis Drummondii* covers the rocks of eaves with patches of a dark blood or brick-red colour.

It is among the genera of this order that occur the seaweeds whose gelatinous qualities render them valuable as food. Many species are so used among Indian nations. Of them *Plocaria tenax*, and *candida*, are the principal; and the material out of which the swallows construct the esulent nests which are so highly valued by the Chinese, is supposed to be a sort of Gelidium. The British *Plocaria compressa*, and *Chondrus crispus* (or Carrageen moss), have been found to possess similar qualities; and another species of the order, on the south-west coast of New Holland, furnishes a jelly of great excellence. *Rhodomenia palmata*, the dulse of the Scots, dillesk of the Irish, and saccharine Fucus of the Icelanders, is consumed in considerable quantities throughout the maritime countries of the north of Europe, and in the Grecian Archipelago; *Iridæa edulis* is still occasionally used, both in Scotland and the south-west of England. *Laurentia pinnatifida*, distinguished for its pungency, and hence called Pepperdulse, is eaten in Scotland; and even now, though rarely, the old cry, "Buy dulse and tangle," may be heard in the streets of Edinburgh.

But it is not to mankind alone that such marine Algae have furnished luxuries, or resources in times of scarcity. Several species are greedily sought after by cattle, especially in the north of Europe. *Rhodomenia palmata* is so great a favourite with sheep and goats, that Bishop Gunner named it Fucus ovinus. One species is invaluable as a glue and varnish to the Chinese. This is the *Plocaria tenax*, the Fucus tenax of Turner's *Historia Fucorum*. Though a small plant, the quantity annually imported at Canton from the provinces of Fokien and Tcheking is stated by Mr. Turner to be about 27,000 lbs. It is sold at Canton for 6d. or 8d. per pound, and is used for the purposes to which we apply glue and gum-arabic. The Chinese employ it chiefly in the manufacture of lanterns, to strengthen or varnish the paper, and sometimes to thicken or give a gloss to silks or gauze. It seems probable that this is the principal ingredient in the celebrated gummy matter called Chin-chon, or Hai-tsai, in China and Japan. Windows made merely of slips of Bamboo, crossed diagonally, have frequently their lozenge-shaped interstices wholly filled with the transparent gluten of the Hai-tsai. On the southern and western coasts of Ireland, our own *Chondrus crispus* is converted into size, for the use of house-painters.

In medicine we are not altogether indebted to Rosetangles. The *Plocaria Helminthochorton*, or Corsican Moss, as it is frequently called, is a native of the Mediterranean, and had once a considerable reputation as a vermifuge. To *Hypnea musciformis* similar qualities are ascribed in the Greek Archipelago. Several species furnish Iodine, which gives them an odour of violets. *Rytiphloea tinctoria* yields a red dyeing matter, the *Fucus* of the ancients. The *Plocaria candida*, or Fucus amylaceus, has been found to consist of pectine, gum, and starch, with a pretty considerable quantity of inorganic matter, especially sulphate of lime. (*Ch. Gaz.* 1843, 638.) The Tsantjan or Kantan (called Fucus cartilagosus), used in China as a substitute for the edible birds'-nests, seems to have a similar composition.

GENERA.

Suborder I. — <i>Cerameæ</i> .	<i>Spyridia</i> , Harv.	tinous envelope. Tetra-	<i>Helminthora</i> , Fries.
Fronde tubular, jointed.	<i>Bidens</i> , J. Agh.	spores globose or ob-	b) <i>Nemastoniadæ</i> .
Favellæ containing a	<i>Ceramium</i> , Adams.	long, formed out of	<i>Catenella</i> , Grev.
loose mass of semi-	<i>Boryna</i> , Gratel.	cells of the circum-	<i>Endocladia</i> , J. Agh.
transparent granules	<i>Dictyoderma</i> , Bonnem.	ference.	<i>Iridæa</i> , Bory.
in a gelatinous enve-	<i>Ptilota</i> , Agh.	a) <i>Gloiocladidæ</i> .	<i>Nemastoma</i> , J. Agh.
lope. Tetraspores ex-	<i>Plumaria</i> , Stackh.	<i>Crouania</i> , J. Agh.	<i>Dilsea</i> , Stackh.
ternal.	<i>Microcladia</i> , Grev.	<i>Dudresnaya</i> , Bonnem.	c) <i>Spongiocarpidæ</i> .
<i>Callithamilon</i> , Lyngb.	? <i>Haplolegma</i> , Mont.	<i>Naccaria</i> , Endl.	<i>Furcellaria</i> , Lamx.
<i>Ballia</i> , Harvey.	Suborder II.— <i>Cryptone-</i>	<i>Chaetospora</i> , Agh.	<i>Fastigiaria</i> , Stackh.
<i>Griffithsia</i> , Agh.	<i>mææ</i> . Fronde cellular.	<i>Capillaria</i> , Stackh.	<i>Polydies</i> , Agh.
<i>Plumaria</i> , Lk.	Favellidæ containing a	<i>Gloiocladia</i> , J. Agh.	<i>Spongiocarpus</i> , Grev.
<i>Polychroma</i> , Bonnem.	firm mass of compact	<i>Gloiopeltis</i> , J. Agh.	<i>Rhododermis</i> , Harv.
<i>Wrangelia</i> , Agh.	granules within a gela-	<i>Nemaliou</i> , Targ.	<i>Thuretia</i> , Dec.

- Peysonnellia, Dec.
Squamaria, Zanard.
Pterigospermum, Targ.
 Phyllophora, Grev.
Prolifera, Stackh.
Membranifolia, Stackh.
 Stenogramma, Harv.
 Chondrus, Grev.
Polymorpha, Stackh.
 Gymnogongrus, Mart.
Ahnfeldia, Fries.
 Dasyphlea, Mont.
 d) Gasterocarpidæ.
 Duuontia, Lamx.
 Halymenia, Agh.
 Kallymenia, Agh.
Constantinea, Postels.
 Ginannia, Mont.
 e) Coecocarpidæ.
 Cryptonemia, J. Agh.
 Gelidium, Lamx.
 Suhria, J. Agh.
 Grateloupia, Agh.
Phoracis, Raf.
 Gigartina, Lamx.
Mammillaria, Stackh.
 Chrysmenia, J. Agh.
 f) Ctenodontidæ, Mont.
 Ctenodus, Kütz.
 Nothogenia, Mont.
 Suborder III.—*Lomentaria*. Frond cellular. Ceramidia having pear-shaped granules at the base of a cup-shaped envelope, which finally bursts by a pore. Tetraspores scattered within the branches.
 Lomentaria, Lyngb.
Chylocladia, Grev.
Gastridium, Grev.
- Kalifornia*, Stackh.
Sedoidea, Stackh.
 Champia, Agh.
Mertensia, Roth.
 Laurencia, Lamx.
 Cornua, Stackh.
Osmundia, Stackh.
 Asparagopsis, Mont.
Lictoria, J. Agh.
 Bonnemaisonia, Agh.
Capillaria, Stackh.
Calocladia, Grev.
 Bouiesia, Grev.
 Thysuocladia, Endl.
 Lamx.
 Mammea, J. Agh.
Lenormandia, Mont.
 Suborder IV.—*Rhodomeleæ*. Frond jointed. Ceramidia as before. Tetraspores enclosed in transformed branches or Stichidia.
 Dasya, Agh.
Stichocarpus, Agh.
Rhodomena, Martius.
Asperocaulon, Grev.
Grateloupia, Bonnem.
Ellisius, Gray.
Gaillona, Bonnem.
Baillouviana, Gris.
 Polysiphonia, Grev.
Hutchinsia, Agh.
Grammita, Bonnem.
Corradoria, Mart.
Ferlebrata, Gray.
Dicarpella, Bory.
Brongniartella, Bory.
Gratiloupella, Bory.
 Heterosiphonia, Mont.
 Alsidium, Agh.
Amphibia, Stackh.
Bostrychia, Mont.
- Helicothamnium*, Kütz.
 Digenea, Agh.
 Rhodomela, Agh.
Fuscaria, Stackh.
Acuthophora, Lamx.
 Pollexfexia, Harv.
 Dictyomeuia, Grev.
Volubilaria, Lanix.
Spirhymenia, Dec.
Carpophyllum, Suhr.
 Botryocarpa, Grev.
 Odonthalia, Lyngb.
Finbriaria, Stackh.
 Rytiphlea, Agh.
 Polyzonia, Suhr.
 Leveillea, Dec.
 Amansia, Lamx.
 Heterocladia, Dec.
 *Corallineæ.
 Corallina, Tourm.
Titanephyllum, Nardo.
 Jania, Lamx.
 Haliptilou, Dec.
 Amphiroa, Lamx.
 Arthrocardia, Dec.
 Eurytion, Dec.
 Cheilosporum, Dec.
 Meloesia, Lamx.
Agardhia, Meugh.
Lithophyllum, Philip.
 Spongites, Kütz.
 Nullipora, Lam.
 **Anomalophylleæ.
 Dictyurus, Bory.
Calidictyon, Grev.
 Hemitrema, R. Br.
Martensia, Her.
 Claudea, Lamx.
Lamourouxia, Agh.
Oncellia, Agh.
 ? Thaumasia, Agh.
 Suborder V.—*Sphaerococceæ*. Frond cellular.
- Coccidia enclosing closely-packed oblong granules arising from the base, within a spherical cellular envelope which finally bursts: Tetraspores in indefinite heaps, scattered over the frond.
 Hypnea, Lamx.
 Plocaria, Nees.
Gracilaria, Grev.
Helminthochortos, Lk.
 Rhodomenia, Grev.
Palmaria, Stackh.
Bifidia, Stackh.
Ciliaria, Stackh.
 Heriugia, J. Agh.
 Sphaerococcus, Grev.
Coronopifolia, Stackh.
 Suborder VI.—*Delesseria*. Frond cellular. Coccidiæ as before. Tetraspores in definite heaps, or collected in Sporophylls.
 Plocamium, Grev.
Nercidea, Stackh.
 Thamnophora, Agh.
 Aglaophyllum, Mont.
Nitophyllum, Grev.
Papyracea, Stackh.
Dawsonia, Bory.
Formskioidia, Spreng.
 Hymenena, Grev.
 Delesseria, Lamx.
Hydrotopatha, Stackh.
Membranoptera, Soleria, J. Agh.
 Acropeltis, Mont.
 ? Hydroputia, Mont.

NUMBERS. GEN. 88. Sp. 682. (Endl.)

POSITION.—FUCACEÆ. CERAMIACEÆ.—CHARACEÆ.

ORDER V. CHARACEÆ.—CHARAS.

CHARACEÆ, Rich in *Humb. et Bonpl. N. G. Pl.* 1, 45. (1815); *A. Brong. in Dict. Class.* 3, 474. (1823); *Grevel. Fl. Edin.* xvii. (1824); *Endlich. Gen.* iv.; *Schnitzl. ic.*—CHARACEÆ, Kützling, *Phycologia*, p. 313.

DIAGNOSIS.—*Tubular symmetrically branched bodies, multiplied by spiral-coated nucules, filled with starch.*

Water plants composed of an axis, consisting of parallel tubes, which are either transparent or encrusted with carbonate of lime, and of regular whorls of symmetrical tubular branches. Organs of reproduction, lateral, round, succulent, brick-red globules, and axillary nucules. The globules, consisting of triangular valves, enclosing centripetal tubes and slender annular threads; the nucules having two coats, of which the external is transparent and usually surmounted by five teeth; the internal firm, spirally-ribbed, filled with starch granules of various sizes.

The genera of which this little order is composed are among the most obscure of the vegetable kingdom, in regard to the nature of their reproductive organs; and accordingly we find them, under the common name of Chara, placed

by Linnæus among Cryptogamous plants near Lichens; then referred by the same author to Phærogamous plants, in *Monœcia Monandria*; retained by Jussieu and De Candolle among Naiads, by Brown at the end of Hydrocharaceæ, and by Lemm in Haloragaceæ; referred to Confervas by Von Martius, Agardh, and Wallroth; and finally admitted as a distinct order, upon the proposition of Richard, by Kunth, De Caudolle, Adolphe Brongniart, Greville, Hooker, and others. Such being the uncertainty about the place of these plants, it will be useful to give a rather detailed account of their structure, in which I avail myself chiefly of Ad. Brongniart's remarks in the place above referred to, and of Agardh's observations in the *Ann. des Sciences*, 4, 61.

Charas are aquatic plants, found in stagnant fresh or salt water; always submersed, giving out a fetid odour, and having a dull greenish colour. Their stems are regularly branched, brittle, and surrounded here and there by whorls of smaller branches. In *Nitella* the stem consists of a single transparent tube with transverse partitions; Agardh remarks that it is so like the tubes of some Algals, as to offer a strong proof of the affinity of the orders. In *Chara*, properly so called, there is, in addition to this tube, many other external ones, much smaller, which only cease to cover the central tube towards the extremities. In the axils of the uppermost whorls of these branchlets the organs of reproduction take their origin; they are of two kinds, one called the nucule, the other the globule; the former has been supposed to be the pistil, the latter the anther.

The nucule is described by Greville as being "sessile, oval, solitary, spirally striated, having a membranous covering, and the summit indistinctly cleft into five segments; the interior is filled with minute sporules." *Fl. Edin.* xvii. This is the general opinion entertained of its structure. But Brongniart describes it thus:—Capsule unilocular, monospermous; pericarp composed of two envelopes: the outer membranous, transparent, very thin, terminated at the upper end by five spreading



Fig. XII.

Fig. XII.—1. *Chara vulgaris*; 2. a portion of a branch with a nucule and globule; 3. the globule more magnified; 4. the spiral tubes of the latter; 5. a nucule cut open; 6. a nucule in germination.

teeth; the inner hard, dry, opaque, formed of five narrow valves, twisted spirally." *Dict. Class. l. c.* He founds his opinion of the nucule containing but one germinating body upon the experiments of Vaucher, of Geneva, who ascertained that if ripe nucules of Chara, which have fallen naturally in the autumn, are kept through the winter in water, they will germinate about the end of April; at that time a little body protrudes from the upper end between the five valves, and gradually gives birth to one whorl of branches, which produce a second. Below these whorls the stem swells, and little tufts of roots are cutted. The nucule adheres for a long time to the base of the stem, even when the latter has itself begun to fructify. Hence it is reasonable to conclude that the nucule is really one-seeded. Brongniart remarks, that it is true, when a fresh nucule of Chara is cut across, an infinite number of little white grains are squeezed out; but if these were really all reproductive particles, how would they ever find their way out of the nucule, which is indelhiscent? he considers them rather of the nature of albumen. And he is the more confirmed in his opinion, because in *Pilularia*, the theca of which also contain many similar grains, but one plant is produced by each theca. These grains have been ascertained by the observations of Kützing to be really starch, iodine colouring them violet; yet Endlicher describes them as spirally-striated spores. Finally, Amici has described (*Ann. des Sc. 2.*) the nucule in another way. He admits it to be one-seeded, but he considers the points of the five valves to be stigmata, and the valves themselves to be at once pericarp and style. These observations seem to show that the five valves of the nucule, as they are called, are a whorl of leaves, straight at first, and twisted afterwards; and that the nucule itself is analogous to the bud of flowering plants.

The globule is described by Greville as "a minute round body, of a reddish colour, composed externally of a number of triangular (always?) scales, which separate and produce its dehiscence. The interior is filled with a mass of elastic transversely undulated filaments. The scales are composed of radiating hollow tubes, partly filled with minute coloured spherical granules, which freely escape from the tubes when injured." Vaucher describes them as "tubercles formed externally of a reticulated transparent membrane, containing, in the midst of a mucilaginous fluid, certain white articulated transparent filaments, and some other cylindrical bodies, closed at one end, and appearing to open at the other. These latter are filled with the red matter to which the tubercles owe their colour, and which disappears readily and long before the maturity of the nucule." The account of the globule by Agardh is at variance with both these. "Their surface," he remarks, "is hyaline, or colourless; under this membrane is observed a red and reticulated or cellular globe, which has not, however, always such an appearance; often, instead of this reticulated aspect, the globe is colourless, but marked by rosettes or stars, the rays of which are red or lauceolate. In the figures given by authors, one finds sometimes one of these forms, sometimes the other. I have myself found them both on the same species; and I am disposed to believe that the last state is the true kernel of the globule, concealed under the reticulated scale. (When the globule is very ripe, one may often succeed, by means of a slight degree of pressure, in separating it into several valves, as is very well shown in Wallroth's figures, tab. 2. f. 3. and tab. 5. These valves are rayed, and no doubt answer to the stars, of which mention has been made.) The kernel contains some very singular filaments; they are simple (I once thought I saw them forked), curved and interlaced, transparent and colourless, with transverse striae, parallel and closely packed, as in an *Oscillatoria* or *Nostoc*; but what is very remarkable, they are attached, several together, to a particular organ formed like a bell, which is itself also colourless, but filled with a red pigment. This bell, to the base of which on the outside they are fixed, differs a little in form in different species. It is slender and long in *Chara vulgaris*, thicker in *C. firma*, shorter in *C. delicatula*, and shorter still in *C. collabens*. I have not succeeded in determining the exact position of these bells in the kernel. I have often thought they were the same thing as the rays of the rosettes or stars upon the globule above mentioned; whence it would follow that they are placed near the surface, while the filaments have a direction towards the centre. The bells are not numerous; they often separate from the filaments, and readily part with their pigment, which renders it difficult to observe them, and has caused them to be overlooked." That these globules, whatever their nature may be, have no resemblance in structure to anthers, is clear from these descriptions, whichever may be eventually admitted. Nevertheless Fritsche, the patient investigator of pollen, regards them as anthers! Wallroth says he has sown them, and that they have germinated; but this observation requires to be verified.

In the annular or chambered threads of Chara are found in abundance little spiral bodies having an active motion when discharged into water, and resembling entirely the so-called animalcules in mosses, &c. M. Thuret, who finds tentacula in the spores of *Confervas*, ascribes a similar moving apparatus to these bodies, adding that they are turned

brown by iodine and not dissolved by ammonia as animalecules are. (*Ann. Sc. N. 2 ser.* 14, 65.) They are probably analogous to the elastic spires of Equisetum.

There are two other points deserving of attention in Charas; 1st, the calcareous incrustation of some species; and 2dly, the visible and rapid motion of the sap in the articulation of the stem.

Of the genera, Nitella is transparent and free from all foreign matter; but Chara contains, on the outside of its central tube, a thick layer of calcareous matter, which renders it opaque. This incrustation appears, from the observations of Greville (*Fl. Edin.* 281), not to be a deposit upon the outside, and of an adventitious nature, but a result of some peculiar economy in the plant itself; and according to Brewster, it is analogous to the siliceous deposit in Equisetum, exhibiting similar phenomena.

Whatever is known of the motions of the fluids of vegetables has been necessarily a matter of inference, rather than the result of direct observation; for who could ever actually see the sap of plants move in the vessels destined to its conveyance? It is true that it was known to botanists that a certain Abbé Corti, of Lucea, had, in 1774, published some remarkable observations upon the circulation of fluid in some aquatic plants, and that the accuracy of this statement had been confirmed by Treviranus so long ago as 1817; but the fact does not seem to have attracted general attention until the publication, by Amici, the celebrated professor at Modena, of a memoir in the 18th volume of the *Transactions of the Italian Society*, which was succeeded by another in the 19th. From all these observers it appears, that if the stems of any transparent species of Chara, or of any opaque one, the incrustation of which is removed, are examined with a good microscope, a distinct current will be seen to take place in every tube of which the plant is composed, setting from the base to the apex of the tubes, and returning at the rate, in Chara vulgaris, of about two lines per minute (*v. Ann. des Sc.* 2. 51, line 9); and according to Treviranus this play is at any time destroyed by the application of a few drops of spirit, by pressure, or by any laceration of the tube. Such is the nature of the singular phenomena that are to be seen in Charas. Those who are anxious to become acquainted with the details of Amici's observations will find his first paper translated in the *Annales de Chimie*, 13. 384, and his second in the *Ann. des Sc.* 2. 41; that of Treviranus is to be found in the latter work, 10. 22. The observations made upon



Fig. XII.*

Chara circulation by the foregoing authors have been much extended by the careful inquiries of Solly, Slack, and Varley, whose remarks are to be found in the *Transactions of the Society of Arts*, vol. 49, p. 177, and vol. 50, p. 171; and by Donné, Dutrochet, and others, in the *Ann. Sc. Nat. 2 ser. vol. 9, pp. 5, 65, 80, and 10, p. 346*. As however they relate to physiological and not to systematical questions I forbear to dwell upon them in this place.

The creation of plants of this order would appear to have been of a very recent date, compared with that of Ferns and Palms, or even Algals, if we are to judge by their fossil remains, called Gyrogonites, which are found for the first time in the lower fresh-water formation, along with numerous Dicotyledonous plants resembling those of our own æra. In the recent Flora of the world they make their appearance everywhere in stagnant waters, in Europe, Asia, and Africa, in North and South America, in New Holland, and in either India. They are most common in temperate countries.

We can scarcely claim any knowledge of their uses. Their stems, often encrusted with lime in the state of carbonate according to some, and of the phosphate according to others, are probably useful as a manure. The fetid effluvia arising from them is regarded as very unhealthy, and one of the sources of the malaria of the Campagna of Rome.

GENERA.

Chara, L.

Nitella, Ag.

Charopsis, Kütz.

NUMBERS. GEN. 3. Sp. 35.

POSITION.—Ceramiales. CHARACEÆ. —————
Equisetaceæ.

Fig. XII.*—A magnified view of Nitella, with the motion of its sap shown by arrows.

ALLIANCE II. FUNGALES.—THE FUNGAL ALLIANCE.*

Fungi, *Juss. Gen. 3.* (1789); *DC. Fl. Fr. 2.* 65. (1815); *Nees das System der Pilze und Schwämme*, (1817); *Fries Syst. Mycolog.* (1821); *Syst. Orb. Veg.* (1825); *Elench. Fung.* (1828); *Adolphe Brongn. in Dict. Class. 5.* 155. (1824); *Grev. Scott. Crypt. Fl. 6.* (1828); *Hooker British Flora*, 457. (1830); *Berk. in Id. vol. 2. pt. 2.* (1835); *Montagne in Hist. de Cuba Bot. p.* 239. (1838-1842), translated, with *Nobis*, in *Ann. of Nat. Hist. vol. 9. p. 1.* by *Berk.* (1842); *Corda Anleitung*, (1842).—Epiphyte, *Link; Grev. Fl. Edin. xxv.* (1824).—Gasteromycei, *Grev. Fl. Edin. xxiv.* (1824).—Mycetes, *Spreng. Syst. 4.* 376. (1827).—Uredineæ, Mucedineæ, and Lycoperdaceæ, *Ad. Brongn. in Dict. Class. l. c.* (1824).—Byssaceæ, (in part) *Fr. Syst. Orb. Veg.* (1825).

DIAGNOSIS.—Cellular flowerless plants, nourished through their thallus (spawn or mycelium); living in air; propagated by spores colourless or brown, and sometimes inclosed in asci; destitute of green gonidia.

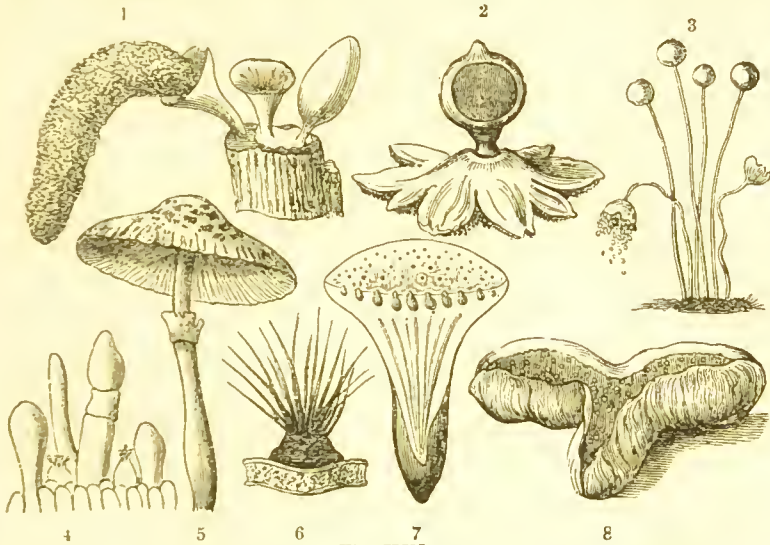


Fig. XIII.

Plants consisting of a congeries of cellules or filaments, or both variously combined, increasing in size in the more perfect species by addition to their inside, their outside undergoing no change after its first formation, chiefly growing upon decayed organic substances, or soil arising from their decomposition, frequently ephemeral, and variously coloured, never accompanied as in Lichens by reproductive germs of a vegetable green called gonidia; nourished by juices derived from the matrix. Fructification either spores attached externally, and often in definite numbers, to the cellular tissue, and frequently on peculiar cells called sporophores or basidia, which are in many cases surmounted by fine processes which immediately support the spores, and called spicules or sterigmata; or inclosed in membranous sacs or asci, and then termed sporidia. Vessels of the latex have been observed in *Agaricus foetens*, by *Corda*. Spiral filaments, like the elaters of *Jungermannia*, exist in *Trichia* and *Batarrea*. They were first detected by the younger *Hedwig*, and described afterwards by *Kunze* and *Corda*. *Mr. Berkeley* detected them in the latter genus, and has very recently observed them, but very sparingly in *Podaxon*. The spores of fungi germinate either by a simple elonga-

* It is impossible to look at the huge mass of genera collected by Botanists under the name of Fungi, without perceiving that they in truth consist of groups equivalent to those called Natural Orders in the Algal Alliance, as well as in other parts of this arrangement. And if I had such an acquaintance with the subject as would justify my doing so, I should have presumed to break up the members of this Alliance into similar orders. It would, however, be presumptuous in me, with whom Fungi have never been a special study, to disturb the arrangements of those learned men who have made this investigation the business of their lives.

The following admirable account of the Alliance has been most kindly prepared by the *Rev. M. J. Berkeley*, whose knowledge of the species is unequalled in this or my other country. This gentleman permits me to state, that in his opinion the divisions here called orders may be regarded as Natural Orders, in the sense in which that term is applied to Algae.

Fig. XIII.—1. *Arcyria fava*; 2. *Geastrum multifidum*; 3. *Mucor caninus*; 4. Hymenium of an *Agaric*; 5. *Agaricus epaxetipes*; 6. *Vermicularia trichella*; 7. Vertical section of *Hypoxylon punctatum*; 8. *Angorioidium sinuosum*. From *Greville's Cryptogamic Flora*, with the exception of No. 4.

tion of the episporium, or by the protusion of the inner membrane which exists in most cases, and is easily separated from the outer in the asci of many species of *Sphaeria*. Fungals absorb oxygen and exhale carbonic acid. They abound in nitrogen.

Fungals are distinguished from Lichens by their more fugitive nature, their more succulent texture, their want of a thallus or expansion independent of the part that bears the reproductive matter, but more especially, as Fries has pointed out in his *Lichenographia Europaea*, in their never containing germs distinct from the fructifying bodies of a vegetable green so constant in Lichens. Many species indeed of *Sphaeria* accord very closely in their mode of fructification, producing like the Lichens distinct nuclei in the centre of their substance, which at length burst through the cortical layer, though the fructifying disc is not exposed. In the Phacidiaei, however, the cups sometimes approach very nearly to the shield of Lichens; so nearly, indeed, that they are occasionally mistaken for one another.

From Algals there is, as regards structure, scarcely any palpable difference; but the most obvious distinction between Fungals and the two great divisions just mentioned consists in their mode of growth. Lichens and Algals do not derive nutriment from the substance on which they grow, but from the medium in which they are generated. Both are produced occasionally on the hardest substances, from which it is impossible that

they should derive much nutriment.* Fungals, on the contrary, live by imbibing juices impregnated with the peculiar principles of their matrix. It is true that many species of moulds will vegetate in liquids without any peculiar point of attachment, but these in general are in a very anomalous condition, and are in consequence often referred to Algals; but as soon as they begin to revert to their true characters, there is a distinction between the free and submerged portion, the former being supported by the juices imbibed by the latter. A few species indeed of Fungals may almost be called aquatic, such as *Cantharellus lobatus*, *Agaricus epichysium*, *Peziza clavus*, *Vibrissea truncorum*, *Leotia uliginosa*; but in most of such cases it will be observed, that it is not the habit of the whole genus but merely exceptional; and in all there is an attachment to a matrix, from which it is highly probable that a portion at least of their nutriment is derived, especially in an

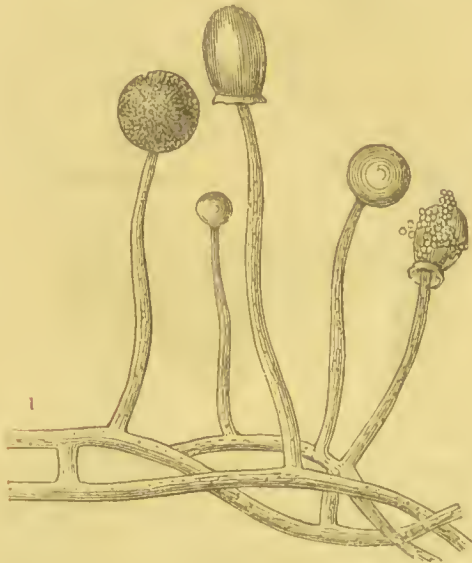


Fig. XII.

early stage of growth. In fact, these cases having been stated by way of anticipating objections, it is rather the medium in which Fungals and Algals are developed that distinguishes them, than any peculiarity in their own organisation. While there is so near an approximation of these families to each other, particularly in the simplest forms, it is important to remark that, "with a single exception," perhaps, no spontaneous motion has been observed in Fungals, which, therefore, cannot be considered so closely allied to the Animal Kingdom as Algals, notwithstanding the presence of nitrogen in them, and the near resemblance of the substance by chemists called Fungine, to animal matter. Molecular motion, indeed, takes place in the particles which give consistence to the milk of the lactescent Agarics, but this is very different from that which has been so repeatedly observed in Algals, and which is produced in many instances by minute cilia which invest the reproductive bodies exactly as in the Animal Kingdom. Spontaneous motion has, however, been observed in *Achlya prolifera*, which is possibly a species of *Mucor* developed in water; *Linn.* 1843, p. 129.

Fungals are almost universally found growing upon decayed animal or vegetable substances, and scarcely ever, except in the lower groups, upon living bodies of either

* It is, however, to be remembered, that observation has shown that Lichens corrode the hard bodies on which they grow, from which it is, perhaps, to be inferred, that they do to a certain extent really feed upon them.

Kingdom ; in which respect they differ from Lichens, which very commonly grow upon



Fig. XII .

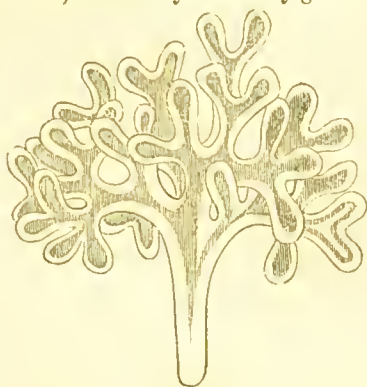


Fig. XIV.

the living bark of trees. The more simply organised species are not confined to dead or putrid substances, as is shown by their attacking various plants when in a state of perfect life and vigour ; for it has been incontestably proved by the discoveries of L veill  and Corda, that the extensive tribe of Epiphyllous Fungi really belong to this division, and are not mere anamorphoses of the cellular tissue, as is the case with some productions usually referred to Fungi, as *Erineum*, *Taphrina*, &c.* Many observations, also, have been made of late years on the development of Fungi on living animal tissues. Of this

* It is not merely alterations of the epidermis of plants which assume the appearance of Fungi ; galls also, or tubercles caused by the attacks of insects, bear occasionally a wonderful resemblance to such

bodies so much so indeed, that they have been referred to them even by good botanists, on a hasty and superficial inspection. For here, as in other branches of the creation, we observe somewhat of that wonderful analogy by which, in each distinct class or even division of natural productions, the same, or extremely similar forms are repeated, though accompanied by an organisation totally different ; and it is this amongst other circumstances which makes it so absolutely necessary to examine into the intimate structure of the works of the creation, before venturing to pronounce upon their proper place in the system. Several of these galls have been figured by Mr Curtis in his interesting entomological articles in the "Gardener's Chronicle," such, for example, as Oak-spangles, produced by *Diplolepis lenticularis*; Oak-currants, by *Cynips Quercus peduncul.*, Woolly-oak galls, which owe their origin to the puncture of *Cynips Quercus ramuli* ; Elm-galls, brought on by the attacks of the *Aphis* ; in the case of galls, however, it is but a superficial examination which can possibly deceive, for



Fig. XV.

Fig. XIII.—*Erineum Juglandis*.

Fig. XIV.—*Erineum botryocephalum* (Corda).

Fig. XV.—Oak Spangles.—3. Upper side ; 4. under side ; 2. silk button galls ; 6. a section of one with a larva in the interior. See Curtis in *Gardener's Chronicle*, 1843, p. 52.

nature are the *Guêpes végétales* of the West Indies ; the Muscardine, which is so destructive to silkworms, and on which so many excellent Memoirs have been written ; the mould, which so often causes the death of the common house-fly in autumn ; and above all, the curious instances which have been recorded of the development of moulds in the inucous membrane of the viscera of vertebrate animals, and in certain cutaneous disorders in man.

Mouldiness, for instance, has been found by M. Deslongchamps on the internal surface of the air-cells of an Eider-duck while alive ; and Mr. Owen observed a similar growth in the lungs of a Flamingo.—*Ann. Nat. Hist.* viii. 230. Col. Montagu had previously remarked it in the same situation in the Scarp-duck.—*Ib.* ix. 131. Gruby observed the

even where the little grub which produced them has vanished, the total absence of all parts of fructification will at once decide the point. If, for instance, the cup-shaped gall, which is so common on Oak leaves, be the object in question, any one who has once examined the hymenium of a *Peziza*, and observed the fructifying cells arranged vertically like the pile of velvet, with their row of eight mostly elliptic spordia, cannot for a moment be deceived. It does, however, sometimes happen that galls are extremely like Fungi ; a remarkable instance of which has been figured in the Transactions of the Linnean Society. It was sent by Mr. Macleay, from Cuba, on the leaf of some plant of the Natural Order Ochnaceæ. In this case there is not merely an extraordinary development of the external cellular tissue, but the gall is formed within the substance of the leaf, and after a time bursts through the skin, and presents a little ovate body with a crenate border, and within this an operculum which is perforated, or at least apparently perforated in the centre, so as to present a very close resemblance to some strange para-



Fig. XVI.



Fig. XVII.

site. And, as if to make the resemblance to some Fungus more close, the gall appears to make an abortive attempt to penetrate the opposite surface of the leaf, almost exactly in the way which is observable in the curious production which is sometimes so injurious to Pear-trees. But even in this case, where there is no trace of the inclosed grub or pupa, the texture of the walls of the gall is so different from that of Fungals that it can scarcely deceive, on any moderately accurate examination.

There is yet another production, referred to Fungals by Bernharti, and after him by Fries and others, which, however, is probably to be regarded neither as a disease nor parasite. These are the tuberous bodies so common on the roots of leguminous plants. Their exact nature and use at present is not known ; but a Memoir on them has been prepared some time by M. Desmazières. They appear a very few days after the germination of the seeds, and are accompanied by a little bed of vessels, in which they are nestled. At an early stage of growth, the contents of their cells become blue, when treated by iodine, which is not the case when their pulpy contents have acquired a salmon-coloured hue, when in some cases the granules are simple and ohlong, in others forked. There can be little doubt that they are of some importance to the plant, though they are not, like common tubers, destined for the reproduction of the species, as they pass through the phases of vegetation in a short time, and soon become ruptured and discharge their contents. No insect has ever been observed in them, nor indeed does it at all appear that they are of the nature of galls. It is possible that in very dry situations, and in time of drought, the nutriment collected in them is serviceable to the plant ; but this is very doubtful.

Fig. XVI.—Galls on the leaf of an Ochnaceous plant.

Fig. XVII.—Woolly Oak-gall, produced by *Cynips Quercus ramuli*.—(Curtis.)

crusts of *Tinea favosa* and *Porrigo lupinosa* to be accompanied by moulds, *Comptes Rend. Aug.* 1841; and these observations have been extended by Dr. Bennett, *Trans. Roy. Soc. Ed.*, vol. xv., Part 2, p. 277, who has also observed a mould growing on the lining membrane or cheesy matter of tubercular cavities in the lungs of man; as also the development of a mould on the skin of living gold-fish. Much information will be found on the subject in the place above quoted.

In their simplest form Fungi are little articulated filaments, composed of simple cellules placed end to end; such is the mouldiness that is found upon various substances, the mildew of the Rose-bush, and, in short, all the tribes of *Mucor* and *Mucedo*; in some of these the joints disarticulate, and appear to be capable of reproduction; in others, spores collect in the terminal joints, and are finally dispersed by the rupture of the cellule that contained them. In a higher state of composition, Fungi are masses of cellular tissue of a determinate figure, the whole centre of which consists of spores attached, often four together, to the cellular tissue, which at length dries up, leaving a dust-like mass intermixed more or less with flocci, as in the puff-balls, or sporidia contained in membranous tubes or asci, like the theca of Lichens, as in the *Sphaeria*. In their most complete state they consist of two surfaces, one of which is even and imperforate,

like the cortical layer in Lichens; the other separated into plates or cells, and called the hymenium, to whose component cells, which form a stratum resembling the pile of velvet, the spores are attached by means of little processes, and generally in fours, though occasionally the number is either less or greater. Many of these cells remain barren; but after a time there is a succession of fertile cells constantly making its appearance above the surface of the hymenium; and, what is more remarkable, the spicules or sterigmata, which support and give rise to the spores, have been observed by Corda to produce a succession of fruit, a new spore being produced where the old one had fallen. This, he informs us, is very easy of observation in *Agaricus pluteus*. Besides the barren and fertile cells, other bodies are observed which have been supposed by authors to perform the office of anthers. These have long been known in the dung-hill *Agarics*, but they appear to be pretty generally distributed. The true structure of the more perfect Fungi has only been recognised within a few years, though Müller, half a century since, gave a correct figure of it in *Agaricus comatus*, and there are indications of it scattered through many works. Lévillé's Memoir in *Annales des Sciences Naturelles*, that of Berkeley in the *Annals of Nat. History*, of Phœbus in *Nova Acta Cæs. Leop.*, and those of Berkeley and Tulasne in the *Ann. of Nat. Hist. and Ann. des Sc. Nat.* on the fructification of *Lycoperdons*, as also that of the Messrs. Tulasne on *Hypogeous Fungi*, may be consulted on this subject.

Upon this kind of difference of structure, Fungi have not only been divided into distinctly marked tribes, but it has been proposed to separate certain Orders from them under the name of *Byssaceæ*, *Gasteromyci*, and *Hypoxyla*: the first comprehending the filamentous Fungi found in cellars, and similar plants; the second *Lycoperdons* and the like; and the third species which approach Lichens in the formation of a distinct nucleus for the sporules, such as *Sphaeria*. But Fries considers the first as a distinct group, and the two last as Fungi.

Some writers have questioned the propriety of considering Fungi as plants, and



Fig. XXI.

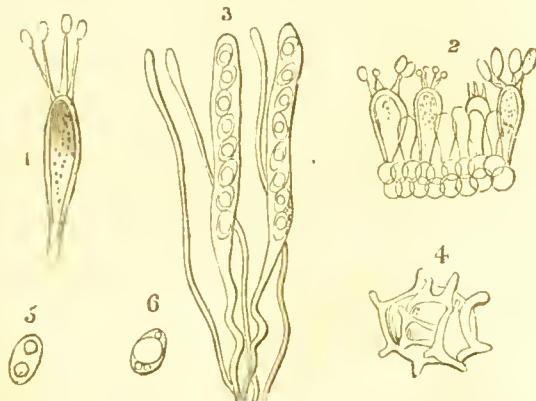


Fig. XXII.

Fig. XXI.—*Botrytis curta*.

Fig. XXII.—1. Spore-stalk of *Agaricus elixas*, with its four long sterigmata and small spores; 2. spore stalks of *Ag. semiovatus*, with spores in various states of development; 3. ascus and sporidia of *Helvella elastica*; 4. sporidium of *Tuber maceratum* Piedmontese Truffle, from a sketch by Dr. Mantique; 5. sporidium of *Periza aurantia* with its two nuclei; 6. single sporidium of *Helvella elastica*, with a large globose nucleus.

have proposed to establish them as an independent Kingdom, equally distinct from animals and vegetables; others have entertained mere fortuitous developments of vegetable matter,



Fig. XXII.

weight in all questions relating to Fungi, argues against these notions in the following manner: "The sporules are so infinite (in a single individual of *Reticularia maxima* I have reckoned above 10,000,000), so subtile (they are scarcely visible to the naked eye, and often resemble thin smoke), so light (raised, perhaps, by evaporation into the atmosphere), and are dispersed in so many ways (by the attraction of the sun, by insects, wind, elasticity, adhesion, &c.), that it is difficult to conceive a place from which they can be excluded." I give his words as nearly as possible, because they may be considered the sum of all that has to be urged against the doctrine of equivocal generation in Fungi; but without admitting, by any means, so much force in his statement as is required to set the question at rest. In short, it is no answer to such arguments as those just adverted to. It seems to me that a preliminary examination is necessary into the existence of an exact analogy between all the plants called Fungi; a question which must be settled before any further inquiry can be properly entered upon. That a number of the fungus-like bodies found upon leaves are mere diseases of the cuticle, or of the subjacent tissue, is by no means an uncommon opinion; that many more are irregular and accidental expansions of vegetable tissue in the absence of light, is not improbable; and it is already certain that no inconsiderable number of the Fungi of botanists are actually either, as various *Rhizomorphas*, the deformed roots of flowering plants growing in cellars, clefts of rocks, and walls; or mere stains upon the surface of leaves, as *Vennularia grammica*; or the rudiments of other Fungi, as many of Persoon's *Fibrillarias*. Those who are anxious to inquire into these and other points, are referred to Fries'

doubts of their being more than called into action by special conditions of light, heat, earth, and air—doubts which have been caused by some remarkable circumstances connected with their development, the most material of which are the following: they grow with a degree of rapidity unknown in other plants, acquiring the volume of many inches in the space of a night, and are frequently meteoric, that is, sprung up after storms, or only in particular states of the atmosphere. It is possible to increase particular species with certainty, by an ascertained mixture of organic and inorganic matter exposed to well-known atmospheric conditions, as is proved by the process adopted by gardeners for obtaining *Agaricus campestris*, a process so certain, that no one ever saw any other kind of *Agaricus* produced in Mushroom-beds, except a few of the dunghill tribe, where raw dung has been placed near the surface of the bed; this could not happen if the Mushroom sprang from seeds or sporules floating in the air, as in that case many species would necessarily be mixed together; Fungi are often produced constantly upon the same kind of matter, and upon nothing else, such as the species that are parasitic upon leaves: all which is considered strong evidence of the production of Fungi being accidental, and not analogous to that of perfect plants. Fries, however, whose opinions must have great

Fig. XXIII.—*Asceae pentactina*.

works generally, to the various writings of Nees von Esenbeck, and to the Scottish Cryptogamic Flora of Greville. In the ensuing list of genera, I have chiefly availed myself of the writings of Fries. The disposition, however, of the genera has been modified in conformity with recent discoveries as to the real structure of the more highly organised species, and the numerous discoveries of Corda, where their affinities were at all clear, have been recorded. That it must be a matter of extreme difficulty to form any precise opinion concerning Fungi, without long experience, will be apparent from the observations of Fries upon the genus *Thelephora*. (*Elenchus*, p. 158.) He asserts that out of mere dégenerations or imperfect states of *Th. sulphurea*, the following genera, all of which he has identified by means of unquestionable evidence, have been constructed; viz., *Athelia* of Persoon, *Ozonium* of Persoon, *Himantia* of Persoon, *Sporotrichum* of Kunze, *Alytosporium* of Link, *Xylostroma*, *Racodium* of Persoon, *Ceratonema* of Persoon, and some others. Th. Fr. Nees von Esenbeck also assures us that the same fungoid matter which produces *Sclerotium mycetospora* in the winter, develops *Agaricus volvaceus* in the summer. It would thus seem that the opinions of those who have asserted that the species or genus of a Fungus depends not upon the seed from which it springs, but upon the matrix by which it is nourished, are at least specious; especially if we take the above fact in connection with the experiments of Dutrochet, who obtained different genera of Mouldiness at will, by employing different infusions. He says that certain acid fluids constantly yield *Monilia*, and that certain alkaline mixtures equally produce *Botrytis*. *Ann. des Sc.* 2 ser. 1. 30. For a description of the gradual development of an *Agaric*, see this ingenious observer's Memoir in the *Nouv. Ann. du Mus.* vol. iii. p. 76. For the views of Unger upon spurious Fungi, which he considers nothing but morbid conditions (eruptions) of vegetable matter, see the *Ann. des Sc.* vol. ii. n. s. 209; and Berkeley's remarks thereupon, in *Hook, Brit. Fl.* vol. ii. pt. 2, p. 361.

Since, however, the remarks of Unger were published, Léveillé and Corda, almost at the same time, and quite independently of each other, made their discovery of the Mycelium of Uredines and Pucciniæ, and Corda has succeeded in making many germinate. Unger's speculations, therefore, must be considered as much invalidated, at least so far as their being mere transformations of the cellular tissue, as is the case in *Erineum*. Whether animal and vegetable bodies are ever produced without pre-existent germs, belongs to quite another question. And, as regards the genera *Ozonium*, *Himantia*, &c., they are now regarded by all good mycologists as mere barren states, or anamorphoses of other species; and the same is probably true of many of the more anomalous Fungi; and the observations of Léveillé, in the *Annales des Sciences Naturelles*, go very far to prove that the whole genus *Sclerotium* belongs to the same category. Some of them, as *Acrosporum cornutum*, and *Sclerotium mycetospora*, are undoubtedly mere forms, and have no right whatever to be considered as species; others arise from the condensation of the filamentous tufts of moulds; others, as *S. lotorum*, are little excrescences upon the roots, and the celebrated Ergot is produced by the action of a minute parasite. There is indeed a difficulty about such species as *Sclerotium scutellatum*; but there is little doubt that, in the main, Léveillé's observations, even though from the nature of the subject the proof is not rigorous, are founded in fact. Some supposed species of *Uredo* are merely the young of *Puccinia*, *Aragria*, &c.; but there are also true species of the genus. See *Henslow, Journ. of Roy. Soc. Ag.* 1841, vol. ii. p. 2.

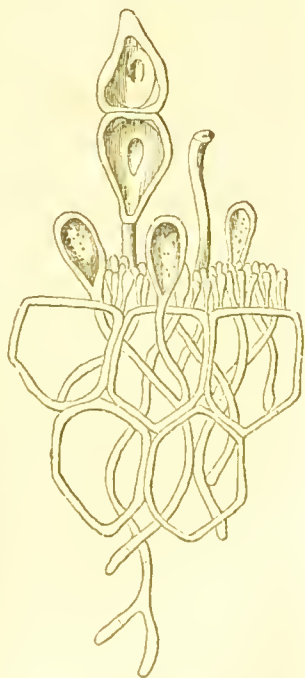


Fig. XXIV.

Kützing, in his Prize Essay on the Transformation of Plants, asserts that from one and the same organic material, even when it has acquired form and colour, different vegetables may be developed, which, according to the circumstance of the surrounding medium, are Algae, Fungi, Lichens, or Mosses; and that even the spores of these, when pro-

Fig. XXIV.—*Puccinia graminis* (common Mildew), with its spawn or mycelium penetrating the cell of the plant on which it grows.

duced, are capable of generating plants belonging to different Orders. This has been long a favourite theory in Germany, but it has not been so fully developed before. *Naturkundige Verhandlungen van de Holl. Maatsch. der Wetensch. te Haarlem. Tweede Verz. 1. Deel.*

The subject, as regards the possible development of Algae, &c., from Infusoria, has been rehandled by the same author in a Memoir just published at Nordhausen. Those who are not convinced by his reasonings, will at least be ready to acknowledge the great research and patience with which they have been followed out. His observations are entitled to the greater attention, because he is well acquainted with the various forms assumed by cellular plants, though his great work on Algae scarcely shows him to have accurate notions as to the limits of genera and species.

The Fungi by which most extra-tropical countries are inhabited are so numerous, that no one can safely form even a conjecture as to the number that actually exists. If they are ever fortuitous productions, the number must be indeterminable; if many are mere diseases, and the remainder fixed species, then the knowledge of their nature must be reduced to a more settled state before any judgment upon their number can be formed. Fries discovered no fewer than 2000 species within the compass of a square furlong in Sweden; of Agaricus alone above 1000 species are described; and of the lower tribes the number must be infinite. Sprengel, however, does not enumerate in his *Systema Vegetabilium* more than between 2700 and 2800; but when we consider that his genus Agaricus does not go beyond number 646, although 1000 at least are described, it is not improbable that the rest of his enumeration is equally defective, and that the number of described Fungi perhaps amounts to between 4000 and 5000. Of tropical species we know but little; their fugitive nature, the difficulty of preserving them, and perhaps the incuriousness of travellers, as well as their scarcity in the damp parts of equinoctial countries, have been the causes of the proportion in such climates between Fungi and other plants being unknown. Mr. Berkeley has taken occasion, from the publication of a list of Java Fungi by Junghuhn, to institute a comparison between those of Java and the Philippine collection made by Mr. Cuming. Neither list can, indeed, be considered as complete, but in both cases the proportion of Fungi remaining to be described is probably much the same. Parts of the Philippines are situated in a degree of latitude in the northern hemisphere exactly corresponding with that of Java in the southern. The number of species described by Junghuhn is 113, that collected by Cuming about 40. Of these only $\frac{1}{5}$ of the species are common to the two localities, and out of these four are species of Polyporus common to all tropical countries. Of Junghuhn's Fungi $3 = \frac{1}{37}$ are Coniomyces, $9 = \frac{1}{12}$ are Hyphomyces, $7 = \frac{1}{14}$ Gasteromyces, $18 = \frac{1}{6}$ Pyrenomyces, $10 = \frac{1}{11}$ * Discomycetes, and 66, or above $\frac{1}{2}$, Hymenomyces. In Mr. Cuming's collection there are no species of the first, second, and fifth Families; of the remaining Families $1 = \frac{1}{40}$ belongs to Gasteromyces, $5 = \frac{1}{8}$ are Pyrenomyces, and 33, or more than $\frac{3}{4}$, are Hymenomyces. It will be observed that the proportion of Pyrenomyces is the same, and there is even a greater proportion of Hymenomyces in the Philippines. Of the Hymenomyces in Java, 40 are Polypori; in the Philippines, 19, taking the genus in its widest sense. There is now an opportunity of contrasting with these the Fungi of Cuba, which have been so well worked out by Dr. Montagne. The species of that island, as far as at present recorded, are 115, of which $4 = \frac{1}{28}$ are Coniomyces, $10 = \frac{1}{11}$ Hyphomyces, $9 = \frac{1}{13}$ Gasteromyces, $25 = \frac{1}{5}$ Pyrenomyces, $8 = \frac{1}{14}$ Discomycetes, and $59 = \frac{1}{2}$ Hymenomyces. The proportion of Pyrenomyces is nearly the same as in Java and the Philippines, and the predominance of Hymenomyces is equally striking. Of this number 28, or $\frac{1}{4}$, are European species; whereas among the Philippine Fungi there are but 2, while in Java there are 42. Of these the greater part are very common species. With the exception of European species, 5 only are common to Cuba and Java, and 4 to Cuba and the Philippines; and these, with one exception, species universally distributed. The species which forms an exception is *Micropeltis appanata*, which, as it is a minute Epiphyllous plant, may possibly have been overlooked in other countries. The number of Fungi peculiar to Cuba is very large. Cuba, then, has but little in common with Java and the Philippines, when the cosmopolites and European species are excepted. Several species, however, are identical with those of North and South America, extending in one instance even as far as Juan Fernandez; and there are one or two isolated species which call to mind Mauritius, Ceylon, and Australia. The genus Polyporus, as usual, predominates, counting 31 species, of which 8 are European; or, if Favolus and Hexagonia be included, the number

* It will be observed that in the list of genera given below, the Discomycetes and Pyrenomyces are comprised in one group under the name of Ascomycetes. The Discomycetes correspond with the three first Suborders.

amounts to 35. When the climates are at all analogous, and the range of the thermometer at certain seasons similar, it is astonishing how great a resemblance, and even identity, there is between the Fungi of very distant portions of the globe. North America produces far the greater part of the European species, with a certain portion peculiar to itself. Hundreds of the same species of *Sphaeria* and *Agaricus* occur in that country which are found with us. The curious genus *Mitromyces*, which seemed peculiar to that country, has been found in Java, Van Diemen's Land, and New Holland. And it would, perhaps, be difficult to point out any specific group peculiarly characteristic of the country. But the same resemblance exists, to a great extent, also in the southern hemisphere. In the island of Juan Fernandez, which was so carefully investigated by Bertero, scarce a third of the species differ from European Fungi. The same is the case in the Flora of New Zealand and Australia, from whence I possess a large quantity of species; and though there are many new forms, and some belonging to genera not hitherto found in Europe, a large proportion of the species are identical. In the genus *Agaricus* the species in countries of every variety of climate are often identical. The African Mycology is remarkable for the varied forms it produces amongst the puff-balls and allied genera, especially in that tribe which is called *Podaxineæ*. They commence at the south of Europe, in the environs of Marseilles; abound at the Cape of Good Hope, and form a very remarkable feature still in the Fungi of Swan River. Two species of the African genus *Secotium* occur at the Swan River; and possibly a third, and a very beautiful species, occurs in New Zealand. A species of *Podaxon* was found by Dr. Hooker at Porto Praya, identical with the East Indian species. A single imperfectly known species occurs in the warmer parts of North America. The genus *Clathrus*, which is perhaps the most beautiful amongst Fungi, though unknown in the more northern latitudes, has a most extensive geographical range. A line, running obliquely from the Isle of Wight through Germany, defines its northern limits: two species, one of the allied genus *Ileodictyon*, occur at the Swan River; and a magnificent species of that genus occurs in New Zealand, and is eaten by the natives. On the whole, then, it will be seen that the geographical limits of Fungi are by no means so definite as those of *Phænogamous* plants. Some species are found in every part of the globe; and several tropical forms are either universally dispersed, or occur in spots separated from each other by many thousands of miles. In the genus *Polyporus* every country seems to have species peculiar to itself; and from the number of new forms which daily occur, the genus seems to be almost co-extensive with *Agaricus*. It is in this genus, probably, if in any, that the species will be found to follow the most nearly a geographical arrangement.

A large volume might be written upon the qualities and uses of Fungi. They may be said to be important, either as food or as poison, or as parasites destructive to the plants upon which they grow. As food, the most valuable are the *Agaricus campestris*, or common Mushroom, the various species of *Helvella* or Morel, and *Tuber* or Truffle; but a considerable number of other kinds are used for food in various parts of the world, of which a useful account will be found in De Candolle's excellent *Essai sur les Propriétés Médicales des Plantes*, in Persoon's work, *Sur les Champignons comestibles*, in a paper by Greville in the 4th volume of the *Transactions of the Wernerian Society*, and in Roque's *Hist. des Champ. comestibles et vénéneux*, ed. 2, 1841. A long list might be given of works on the subject, some of them like those of Vitadini, Phœbus, and Krombholz, very admirably got up.

About half a dozen species only are eaten in London, and in Paris none are permitted to appear in the markets except the common Truffle, Morel, and Mushroom, the latter being cultivated to a very considerable extent in the ancient quarries which run under parts of the city.

It is necessary to exercise the utmost care in employing Fungi the nature of which is not perfectly well ascertained, in consequence of the resemblance of poisonous and wholesome species, and the dreadful effects that have followed their incautious use. But the greatest caution and knowledge will not always avail, for it appears that some species which are in general perfectly wholesome, sometimes produce very disastrous consequences. A family at Cambridge a few years since suffered from eating mushrooms; a part of what were gathered were submitted to the writer of the present remarks, and proved to be *Ag. personatus*, a species sold sometimes in the London markets, and ascertained by Mrs. Hussey, who has paid great attention to the subject, to be most excellent for food. The case perhaps is similar to that of the prejudicial effects sometimes experienced by persons after eating mussels, and may be considered as a mere exception.

It is true that many kinds are named by Pallas as being commonly used by the Russians, which are plentiful in countries where they are not employed for food; but, in the first place, it is not perhaps quite certain that poisonous and wholesome species

are not confounded under the same name; in the next place, climate may make a difference; and lastly, much depends upon the mode in which they are cooked. Upon this subject DeFile observes, that it was ascertained by Paulet, in 1776, that salt and vinegar removed every deleterious principle from that most poisonous plant the *Agaricus bulbosus*; that it is the universal practice in Russia to salt the Fungi, and that this may be the cause of their harmlessness, just as the pickling and subsequent washing of the poisonous *Agaric* of the Olive renders it eatable in the Cevenues; but that, nevertheless, it is much wiser to run no risk with unknown Fungi, even taking such precautions—a remark to which he was led by the lamentable death of a French officer and his wife, in consequence of breakfasting off some poisonous *Agarics*, which were nevertheless eaten by other persons in the same house with impunity. It was probable that in that case a difference in the cooking was the cause of the difference in the effect of the Fungi; but it was a sufficient ground for distrusting all Fungi except the cultivated ones. So strongly did the late Professor L. C. Richard feel the prudence of this, that although no one was better acquainted with the distinctions of Fungi, he would never eat any except such as had been raised in gardens in mushroom beds. One of the most poisonous of our Fungi is the *Amanita muscaria*, so called from its power of killing flies when steeped in milk. Even this is eaten in Kamchatka, with no other than intoxicating effects, according to the following account by Langsdorf, as translated by Greville, from whom I borrow it:—

“This variety of *Amanita muscaria* is used by the inhabitants of the north-eastern parts of Asia in the same manner as wine, brandy, arrack, opium, &c. is by other nations. Such Fungi are found most plentifully about Wischna, Kamchatka, and Wilkowa Derecona, and are very abundant in some seasons, and scarce in others. They are collected in the hottest months, and hung up by a string in the air to dry; some dry of themselves on the ground, and are said to be far more narcotic than those artificially preserved. Small deep-coloured specimens, thickly covered with warts, are also said to be more powerful than those of a larger size and paler colour. The usual mode of taking the Fungus is, to roll it up like a bolus, and swallow it without chewing, which, the Kamchatkades say, would disorder the stomach. It is sometimes eaten fresh in soups and sauces, and then loses much of its intoxicating property; when steeped in the juice of the berries of *Vaccinium uliginosum*, its effects are those of strong wine. One large, or two small Fungi, are a common doze to produce a pleasant intoxication for a whole day, particularly if water be drunk after it, which augments the narcotic principle. The desired effect comes on from one to two hours after taking the Fungus. Giddiness and drunkenness result in the same manner as from wine or spirits; cheerful emotions of the mind are first produced; the countenance becomes flushed; involuntary words and actions follow, and sometimes at last an entire loss of consciousness. It renders some remarkably active, and proves highly stimulant to muscular exertion: by too large a dose, violent spasmodic effects are produced. So very exciting to the nervous system in many individuals is this Fungus, that the effects are often very ludicrous. If a person under its influence wishes to step over a straw or small stick, he takes a stride or a jump sufficient to clear the trunk of a tree; a talkative person cannot keep silence or secrets; and one fond of music is perpetually singing. The most singular effect of the *Amanita* is the influence it possesses over the urine. It is said that, from time immemorial, the inhabitants have known that the Fungus imparts an intoxicating quality to that secretion, which continues for a considerable time after taking it. For instance, a man moderately intoxicated to-day will, by the next morning, have slept himself sober, but (as is the custom) by taking a teacup of his urine he will be more powerfully intoxicated than he was the preceding day. It is, therefore, not uncommon for confirmed drunkards to preserve their urine as a precious liquor against a scarcity of the Fungus. The intoxicating property of the urine is capable of being propagated; for every one who partakes of it has his urine similarly affected. Thus, with a very few *Amanitæ*, a party of drunkards may keep up their debauch for a week. Dr. Langsdorf mentions, that by means of the second person taking the urine of the first, the third of the second, and so on, the intoxication may be propagated through five individuals.”

It is universally known that the common *Agaric* is cultivated with as much certainty by good gardeners as any other vegetable. The excellent *Boletus edulis* has been partially cultivated in the south of France by inclosing a portion of a wood, and watering the ground with water in which the tubes had been steeped. Borch raised *Tuber Borchii* from the sporidia about the year 1780, and the growth of the common Truffle has been attempted with more or less success. Mr. Drummond has sent over the spawn of a large variety of *Agaricus campestris* from the Swan River, which he says is as far superior to the common mushroom as the improved peas to the old varieties, and it has been submitted to Mr. J. Henderson, but it is feared that it is too old to run.

Polyporus fomentarius has been artificially produced in Germany, but merely by placing wood in a favourable situation, and keeping it well moistened. Five or six crops were obtained in the year. (*Rom. and Uster. Mag.* iv. p. 182.)

A curious species which grows on the living branches of the South American beeches, and which has been described by Mr. Berkeley in the Transactions of the Linnæan Society, under the name of *Cyttaria Darwinii*, forms a principal part of the food of the natives of Tierra del Fuego during many months of the year.

Fungi are much used in Anstralia by the natives, especially of the genus *Boletus*. The large truffle *Mylitta australis*, Berk., which attains a weight of more than two pounds, is known under the name of native bread. The marsupial animals are particularly fond of Fungi, and some species they hunt for so greedily, devouring them before they burst through the earth, that it is very difficult to obtain a well-grown specimen.

Mr. Backhouse also informs us that Fungi are much used by the natives. Two to which he particularly alludes are probably *Polyporus portentosus*, Berk., a species which could only be eaten in the absence of all other food, and a species of *Cyttaria* hitherto unrecorded by botanists.

One or two species are used in medicine. *Sphæria sinensis*, Berk., described in Hook, Lond. Journ. of Bot., is a celebrated remedy amongst the Chinese, and is much praised in Du Halde's book, but probably without reason.

Many Fungi were admitted into the old Pharmacopœias, as *Exidia auricula Judæ*, *Polyporus officinalis*, *Tremella mesenterica*, but at present they are little if at all used.

Lysurus mokusii is considered by the Chinese as an excellent remedy in gangrenous ulcers. It is also eaten, but is often poisonous. The jelly-like volva of the nearly allied genus *Heodictyon* is eaten in New Zealand.

Ergot of rye is well known for its specific action on the uterus, and is in consequence one of the most valuable remedies of the modern Pharmacopœia. It is, however, said to be uncertain. It is unhappily no less notorious for the dreadful effects it produces on the human frame when it exists in considerable quantities in bread-corn, causing the most terrible ulcers and gangrenes, which at length destroy the limbs. Similar effects have been experienced from the use of mouldy provisions. Interesting details on the subject will be found in Burnett's Outlines, and in Professor Henslow's Report on the Diseases of Wheat, in the Journal of the Royal Society of Agriculture, 1841, vol. ii. part 1. Copious details will also be found in Phœbus's Deutschlands Cryptogamische Gewächse. On the real nature of Ergot Smith and Quekett's Memoir, Linn. Tr. xviii. p. 452, 3, and xix. p. 137, should be consulted. Corda has lately confirmed the observations of

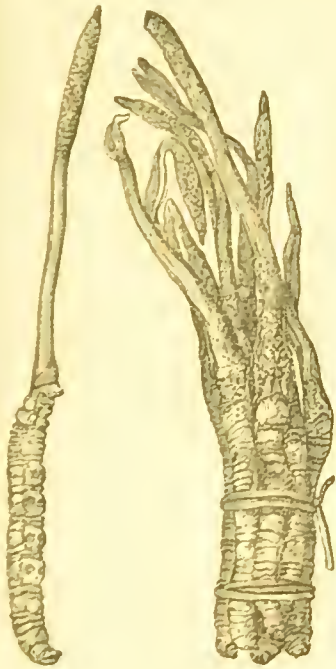


Fig. XXIV.*

Messrs. Smith and Quekett; and more recently a Memoir on the subject has been published by Fée.

Of parasitical Fungi, the most important are those which are called dry rot, such as *Polyporus destructor*, *Merulius lacrymans* and *vastator*, &c., which are the pest of wooden constructions; next to these come the blight in corn, occasioned by *Puccinia graminis*; the smut and ergot, if they are really anything more than the diseased and disorganised tissue of the plants affected; the rust, which is owing to the ravages of *Uredos* and *Puccinias*; and finally, in this class is to be included what we call mildew, minute simple articulated Mucors, and Mucedos. The effects of different moulds on bread, preserves, &c., are but too well known. In some cases, however, as in cheese, provisions are thought to be improved by them. The decay of fruit, according to the observations of Mr. Hassall, appears to be in great measure produced by them. The genus *Rhizomorpha* (which it may be observed is a spurious genus, consisting of imperfectly developed *Sphæria*, *Polypori*, &c.) vegetates in dark mines far from the light of day, and is remarkable for its phosphorescent proper-

Fig. XXIV * — *Sphæria sinensis*. The right hand figure represents the manner in which it is made up for sale.

ties. In the coal mines near Dresden the species are described as giving those places the air of an enchanted castle; the roof, walls, and pillars, are entirely covered with them, their beautiful light almost dazzling the eye. The light is found to increase with the temperature of the mines. *Ed. P. J.* xiv.

Several species of genuine Fungi have been observed to be phosphorescent in various parts of the world. *Agaricus Gardneri*, Berk., which grows on a sort of Palm called *Pintada* in Brazil is highly luminous. Such also is the case with *Agaricus olearius* in the South of Europe, as observed by Delile. (*Arch. de la Bot.* vol. ii. p. 519.) Mr. Drummond has found two or more luminous species at the Swan River, (*Hook. Lond. Journ. of Bot.* ii. p. 263 ;) and Rumphius observed the same phenomenon in Amboyna.

It is a most remarkable circumstance, and one which deserves particular inquiry, that the growth of the minute Fungi, which constitute what is called mouldiness, is effectually prevented by any kind of perfume. It is known that books will not become mouldy in the neighbourhood of Russia leather, nor any substance, if placed within the influence of some essential oil. *Polyporus fomentarius*, or an allied species, is used in India as a styptic, as well as for Amadou. It is also employed by the Laplanders and others as Moxa. (*Ainslie*, i. 5.) The Boleti, when wounded, heal much in the same manner as the flesh of animals. (*Edin.*



Fig. XXV.

Philosoph. Journ. xiv. 369.)

A very curious phenomenon takes place in several species of the genus *Boletus*, and analogous appearances present themselves in other genera. The flesh, when broken, changes very rapidly from yellow or white to deep blue, and if the juice be squeezed out, though at first colourless, it quickly becomes blue. Professor Robinson of Armagh has ascertained that this is not a chemical action, but believes it to arise from some change in the molecular arrangement. Tannin, though prejudicial to most vegetables, is not so always to Fungi. A species of *Rhizomorpha* is often developed in tan-pits. The greatest proper heat met with by Dutrochet in the Vegetable Kingdom, with the

Fig. XXV.—*Spharia Robertsii*, growing from the caterpillar of a New Zealand moth called *Hepialus virescens*.

exception of that of the spadix of *Arum*, was in *Boletus teneus*. (*Ann. des Sc. Nat.* Feb. 1849.) Fungine, which was considered as a simple body, has been shown by Payen to consist of cellulose and a fatty matter. Payen communicated to Dr. Montagne, as the result of his analysis, the following list of substances which enter generally into the composition of Fungi: 1. Water. 2. Cellulose, constituting all the solid part of the membranes of the tissue. 3. Three nitrogenized substances; one insoluble in water; a second soluble, coagulable by heat; a third soluble in alcohol. 4. Fatty matter analogous to wax. 5. Fatty substances, one fluid at an ordinary temperature, the other solid, crystallisable at the same temperature. 6. Sugar. 7. Matter capable of being turned brown by the action of free air. 8. An aromatic substance. 9. Traces of sulphur. 10. Traces of salts of silex and potash. (*Ann. of Nat. Hist.* vol. ix. p. 294.) Some species, as *Agaricus cantharellus*, *Clavaria coralloides*, and *Agaricus piperatus*, contain a sweet sugary matter, which, according to Liebig, is *Mannite*.—(*Annalen*, Feb. 1844.) M. Bonjean, is of opinion that the poisonous qualities of Ergot are owing to an oily aerid principle. (*Journ. de Ch. Med.*) Unlike other plants, Fungi, instead of purifying the air by robbing it of its carbonic acid and restoring the oxygen, vitiate it by exhaling carbonic acid and absorbing oxygen. This has been proved experimentally by Dr. Mareet of Geneva, and will probably explain the cause of Fungi being so universally destitute of green colouring matter, which we know results from the decomposition of carbonic acid. Certain Fungi in an imperfect state are said by Caignard-Latour, Schwann, and others, to be connected with the process of fermentation. The curious circumstance that in certain bakehouses all the bread becomes ropy, and though sometimes prevented from assuming this condition by repeated washing of the walls and floor with chloride of lime, the evil is occasionally so obstinate as to prove the ruin of the establishment, is probably dependent on the same cause. Dutrochet believes that he has witnessed the growth of a *Penicillium* from the globules of milk. (*Caignard-Latour, L'Institut.* Feb. 1837; *Meyen Jahresh.* 1833; *Dutrochet Ann. des Sc. Nat. N. S. Zool.* vol. viii.)

*. * Although the Fungal Alliance is not here formally broken up into NATURAL ORDERS, yet the following may be regarded as their names and peculiar characters:—

<i>Spores generally quaternate on distinct Sporophores, Hymenium naked</i>	{	6. HYMENOMYCETES, OF AGARICACEÆ.
<i>Spores generally quaternate on distinct Sporophores, Hymenium inclosed in a Peridium</i>	{	7. GASTEROMYCETES, OF LYCOPENDACEÆ.
<i>Spores single, often septate, on more or less distinct Sporophores, Flocci of the fruit obsolete or mere peduncles</i>	{	8. CONIOMYCETES, OF UREDINACEÆ.
<i>Spores naked, often septate. Thallus floccose</i>	{	9. HYPHOMYCETES, OF BOTRYTACEÆ.
<i>Sporidia contained (generally eight together) in asci</i>	{	10. ASCOMYCETES, OF HELVELLACEÆ.
<i>Spores surrounded by a vesicular veil, or Sporangium. Thallus floccose</i>	{	11. PHYSONOMYCETES, OF MUCORACEÆ.

GENERA.

COHORS I.—Sporiferi.

Ordo I—HYMENOMYCETES.

Suborder I. <i>Agaricini</i> , Fr.	* <i>Psilocybe</i> , Fr.	<i>Xerotus</i> , Fr.	Suborder III. <i>Hydnci</i> , Fr.
<i>Agaricus</i> , L.	* <i>Peathyra</i> , Fr.	<i>Troglia</i> , Fr.	<i>Fistulina</i> , Bull.
* <i>Amanita</i> , Fr.	* <i>Panæolus</i> , Fr.	<i>Schizophyllum</i> , Fr.	<i>Hydnum</i> , L.
* <i>Lepiota</i> , Fr.	* <i>Psathyrella</i> , Fr.	<i>Lenzites</i> , Fr.	<i>Manina</i> , Scop.
* <i>Armillaria</i> , Fr.	<i>Coprinus</i> , P.	<i>Hymenogramme</i> , Mont. & Berk.	<i>Hericium</i> , Fr.
* <i>Tricholoma</i> , Fr.	<i>Bohbitus</i> , Fr.	<i>Junghuhnia</i> , Corda.	<i>Sistotrema</i> , Fr.
* <i>Cyrtocybe</i> , Fr.	<i>Cortinarius</i> , Fr.		<i>Irpex</i> , Fr.
* <i>Omphalia</i> , Fr.	* <i>Phlegmacium</i> , Fr.	Suborder II. <i>Polyporei</i> , Fr.	<i>Radulum</i> , Fr.
* <i>Clithyia</i> , Fr.	* <i>Myxaciium</i> , Fr.	<i>Boletus</i> , Dill.	<i>Phlebia</i> , Fr.
* <i>Mycena</i> , Fr.	* <i>Inoloma</i> , Fr.	<i>Ceratomyces</i> , Batt.	<i>Grandinia</i> , Fr.
* <i>Pleurotus</i> , Fr.	* <i>Derinocybe</i> , Fr.	<i>Hypodryas</i> , Pers.	<i>Odontia</i> , Fr.
* <i>Volvaria</i> , Fr.	* <i>Telamonia</i> , Fr.	<i>Sulitus</i> , Mich.	<i>Kneiffia</i> , Fr.
* <i>Pluteus</i> , Fr.	* <i>Hygrocybe</i> , Fr.	<i>Polyporus</i> , Mich.	Suborder IV. <i>Auricul-</i>
* <i>Entoloma</i> , Fr.	<i>Paxillus</i> , Fr.	<i>Trameles</i> , Fr.	<i>larini</i> , Fr.
* <i>Clitopilus</i> , Fr.	<i>Gomphidium</i> , Fr.	<i>Dreadnau</i> , Pers.	<i>Craterellus</i> , Fr.
* <i>Reclia</i> , Fr.	<i>Stylobates</i> , Fr.	<i>Cyclomyces</i> , Klotzsch.	<i>Thielophora</i> , Ehr.
* <i>Leptonia</i> , Fr.	<i>Ilygrophorus</i> , Fr.	<i>Hexagonia</i> , Fr.	<i>Cladoderia</i> , P.
* <i>Nolanea</i> , Fr.	<i>Lactarius</i> , P.	<i>Favolus</i> , P. B.	<i>Stereum</i> , Lk.
* <i>Pholota</i> , Fr.	<i>Russula</i> , P.	<i>Frvulus</i> , Fr.	<i>Hypolyssus</i> , Berk.
* <i>Helveloma</i> , Fr.	<i>Cantharellus</i> , Adans.	<i>Gleoporus</i> , Mont.	<i>Auricularia</i> , Fr.
* <i>Flammula</i> , Fr.	<i>Phlebochora</i> , Lr.	<i>Lanolin</i> , Fr.	<i>Corn</i> , Fr.
* <i>Nanocoria</i> , Fr.	<i>Heliomyces</i> , Lævell.	<i>Merulius</i> , Hall.	<i>Dictyonema</i> , P.
* <i>Galera</i> , Fr.	<i>Pterophyllum</i> , Kewell.	<i>Epichysium</i> , Voudç.	<i>Midotium</i> , Fr.
* <i>Coprodæus</i> , Fr.	<i>Nyctalla</i> , Fr.	<i>Porthelium</i> , Fr.	<i>Corticium</i> , Fr.
* <i>Panhotia</i> , Fr.	<i>Marasmius</i> , Fr.		<i>Guepinia</i> , Fr.
* <i>Hylholoma</i> , Fr.	<i>Lentinus</i> , Fr.		
	<i>Panus</i> , Fr.		

Cyphella, Fr.
Hypochinus, Ehb.

Suborder V. *Clavati*.
Sparassis, Fr.

Clavaria, L.
Calocera, Fr.
Crinula, Fr.
Typhula, Fr.
Pistillaria, Fr.

Suborder VI. *Tremci-
lini*.
Tremella, Dill.
Coryne, Nees.

Exidia, Fr.
Nematelia, Fr.
Dacrymyces, Fr.
Lemalis, Fr.
Hymenula, Fr.

Ordo II.—GASTEROMYCETES.



Fig. XXVI.

Suborder I. *Podaxinei*,
Mont.
Montagnea, Fr.
Gyrophragmium, Mont.
Polyplocium, Berk.
Secotium, Kze.
Podaxon, Desv.
Cauloglossum, Fr.
Cycloderma, Kl.

Suborder II. *Hypogai*,
Berk.
Gautieria, Vitt.
Splanchnomyces, Corda.
Hymenangium, Kl.
Octaviana, Tul.
Melanogaster, Cord.
Hyperhiza, Bosc.
Hydnangium, Wallr.
Hysterangium, Vitt.

Suborder III. *Phalloidei*,
Fr.

Phallus, L.
Aseroe, Labill.
Calathiscus, Mont.
Lysurus, Fr.
Simblum, Kl.
Clathrus, Mich.
*Latranea, Turp.
*Colens, Car. & Sech.
*Clethria, Brown.
Heodietyon, Tul.

Suborder IV. *Tricho-
gastres*.

Batarrea, P.
Tulostoma, P.
Lycoperdon, Tourn.
Scolecotrichum, Berk.
Phellorinia, Berk.
Broomeia, Berk.
Genster, P.
Plecostoma, Desv.
Myriostoma, Desv.
Diploderma, Lk.
Bovista, Dill.

Hippoperdon, Mont.
Mycenastrum, Desv.
Scleroderma, P.
Polysaccuum, Desp.
Polyangium, Lk.
Ciliocarpus, Corda.
Arachnion, Schwein.
Polygaster, Fr.
Mitrenyces, Nees.
Cenococcum, Fr.
Pilacre, Fr.

Subord., V. *Myzogastres*.
Lycogala, Mich.
Reticularia, Bull.
Ethalium, Lk.
Ptychogaster, Corda.
Spumaria, P.
Ididerma, P.
Polyschismium, Corda.
Didymium, P.

Tripotrichia, Corda.
Trichamphora, Jungh.
Physarum, P.
Angioridium, Grev.
Trichoseytele, Corda.
Craterium, Trent.
Stegobolus, Mont.
Stegasma, Corda.
Diachea, Fr.
Stemonitis, Gled.
Dietydium, Schrad.
Cribraria, Schrad.
Areyria, Hill.
Trichia, Hall.
Perichæna, Fr.
Licea, Schrad.
Cirrhulus, Mart.

Suborder VI. *Nidula-
riacei*.

Nidularia, P.
Cyathus, Hall.
Crucibulum, Tul.
Sphaerobolus, Tode.
Thelebolus, Tode.
Atractobolus, Tode.

Ordo III.—CONIOMYCETES, Fr.

Suborder I. *Sphaerone-
mei*, Corda.
Microthyrium, Desm.
Coniothyrium, Corda.
Sacidium, Nees.

Leptostroma, Fr.
Phoma, Fr.
Leptothyrium, Kze.
Actinothyrium, Kze.
Apiosporium, Kze.
Microthecium, Corda.
Cryptosporium, Kze.
Sphaeronema, Fr.
Apospheria, Berk.
S. acuta, Hoffm.
Aerospermum, Tode.
Diplodia, Fr.
Hendersonia, Berk.
Lichenopsis, Schwein.
Pyrenotrichum, Mont.
Vermicularia, Tode.
Phlyctidium, Not.
Septoria, Fr.
Dilophosporium, Desm.
Neottiospora, Desm.
Pestalozzia, Not.

Angiopoma, Lév.
Prosthemium, Kze.
Asteroma, D. C.
Couturia, Castg.
Bryocladium, Kze.

Suborder II. *Melancon-
nici*, Corda.

Melanconium, Lk.
Stegonosporium, Corda.
Stilbospora, P.
Seimatosporium, Corda.
Asterosporium, Kze.
Cytispora, Fr.
Ceuthospora, Grev.
Nemaspora, P.
Coryneum, Kze.
Selenosporium, Corda.
Bactridium, Kze.
Botryospora, Schwein.
Myriocephalum, Not.
Hyperomyxa, Corda.

Suborder III. *Phragmo-
trichaceti*.

Endotrichum, Corda.

Schizoxylon, Fr.
Schizothecium, Corda.
Pilidium, Kze.
Excipula, Fr.
Seiridium, Nees.
Phragmotrichum, Kze.
Endotrichum, Corda.
Schizoxylon, P.

Suborder IV. *Torulacci*.
Cord.

Torula, P.
Conoplea, P.
Ceratospora, Schwein.
Clasterispora, Schwein.
Spira, Corda.
Dictyosporium, Corda.
Gyrocernis, Corda.
Helicomyces, Corda.
Bispora, Corda.
Septonema, Corda.
Trimmatostroma, Corda.
Alternaria, Corda.
Dicoecum, Corda.
Sporidesmium, Lk.

Coniothecium, Corda.
Hymenopodium, Corda.
Echinobotrys, Corda.
Spilocaea, Fr.

Suborder V. *Pucciniæi*.

Xenodochus, Schlecht.
Aegma, Fr.
Triphragmium, Lk.
Puccinia, P.
Gymnosporangium, Lk.
Podisoua, Lk.

Suborder VI. *Cœomacci*,
Corda.

Uredo, P.
Pileolaria, Castg.
Ustilago, Lk.
Sporisorium, Ehb.
Testicularia, Kl.
Tubercinaria, Fr.
Cronartium, Fr.
Rastelia, Reb.
Graphiola, Poit.
Æcidium, Gmel.

Fig. XXVI.—1. Polyplocium inquinans, divided vertically, natural size; 2. flocci and spores; 3 and 4, the same more highly magnified.—Berkeley.

Ordo IV.—HYPHOMYCETES.

<p>Suborder I. <i>Isariacei</i>, Corda. Isaria, <i>Hill</i>. Podosporium, <i>Schwein</i>. Ceratocladium, <i>Corda</i>. Aethlia, <i>Fr</i>. Pterula, <i>Fr</i>. Scorina, <i>Fr</i>. Dacriana, <i>Fr</i>. Ceratum, <i>A. & S</i>. Byssocaulon, <i>Mont</i>.</p> <p>Suborder II. <i>Stilbacci</i>. Graphium, <i>Corda</i>. Stilbum, <i>Tode</i>. Corallo dendron, <i>Jungb</i>. Ceratopodium, <i>Corda</i>. Hyalopus, <i>Corda</i>. Doratomyces, <i>Corda</i>. Ptericonia, <i>Tode</i>. Phycomyces, <i>Kze</i>. Tubercularia, <i>Tode</i>. Periola, <i>Fr</i>. Cliticiopodium, <i>Corda</i>. Chaetostroma, <i>Corda</i>. Volutella, <i>Tode</i>. Blennoria, <i>Moug</i>. Fusarium, <i>Lk</i>. Illosporium, <i>Mart</i>. Epicoccum, <i>Lk</i>. Sphaerospora, <i>Schwein</i>.</p>	<p>Suborder III. <i>Dematiici</i>, Fr. Stachybotrys, <i>Corda</i>. Cephalotrichum, <i>Fr</i>. Rhopalomyces, <i>Corda</i>. Sporocyebe, <i>Fr</i>. Edemium, <i>Fr</i>. Myxotrichum, <i>Kze</i>. Gonatrichum, <i>Nees</i>. Helminthosporium, <i>Lk</i>. Exosporium, <i>Lk</i>. Blastotrichum, <i>Corda</i>. Leptotrichum, <i>Corda</i>. Mystrosporium, <i>Corda</i>. Stemphylium, <i>Wallr</i>. Septosporium, <i>Corda</i>. Trichogum, <i>Corda</i>. Amphitrichum, <i>Corda</i>. Triposporium, <i>Corda</i>. Helicoma, <i>Corda</i>. Helicosporium, <i>Corda</i>. Cladotrichum, <i>Corda</i>. Dematium, <i>P</i>. Polychitricum, <i>Kze</i>. Calsosporium, <i>Lk</i>. Helicotrichum, <i>Nees</i>. Macrosporium, <i>Fr</i>. Arbitrinium, <i>Kze</i>. Clososporium, <i>Lk</i>. Sporophleum, <i>Nees</i>. Camptom, <i>Lk</i>.</p>	<p>Suborder IV. <i>Mucedines</i>, Fr. Aspergillus, <i>Mich</i>. Botrytis, <i>Mich</i>. Chaetopsis, <i>Grev</i>. Streptothrix, <i>Corda</i>. Campotrichum, <i>Ehb</i>. Menispora, <i>P</i>. Sporophleum, <i>Nees</i>. Polyactis, <i>Lk</i>. Cladohytrium, <i>Nees</i>. Gonatobotrys, <i>Corda</i>. Botryosporium, <i>Corda</i>. Clonostachys, <i>Corda</i>. Sceptromyces, <i>Corda</i>. Verticillium, <i>Nees</i>. Pteronospora, <i>Corda</i>. Actinocladium, <i>Ehb</i>. Gliocladium, <i>Corda</i>. Acosporium, <i>Corda</i>. Corethropsis, <i>Corda</i>. Cephalothecium, <i>Corda</i>. Haplotrichum, <i>Lk</i>. Cephalosporum, <i>Corda</i>. Brachycladium, <i>Corda</i>. Arthrobotrys, <i>Corda</i>. Penicillium, <i>Lk</i>. Coremium, <i>Corda</i>. Rhodocephalus, <i>Corda</i>. Briarea, <i>Corda</i>. Stysaurus, <i>Corda</i>.</p>	<p><i>Monilia</i>, <i>Hill</i>. Dactylium, <i>Nees</i>. Dendryphium, <i>Corda</i>. Rhinotrichum, <i>Corda</i>. Sporodum, <i>Corda</i>. Gonatorhodius, <i>Corda</i>. Sporotrichum, <i>Lk</i>. Acremonium, <i>Lk</i>. Oidium, <i>Lk</i>. Lanosa, <i>Fr</i>. Fusidium, <i>Lk</i>.</p> <p>Suborder V. <i>Sepedoniwi</i>, Fr. Asterophora, <i>Ditm</i>. Sepedonium, <i>Lk</i>. Zygodesmus, <i>Corda</i>. Monotospora, <i>Corda</i>. Amphiblastum, <i>Corda</i>. Collarium, <i>Lk</i>. Fusisporium, <i>Lk</i>. Epochium, <i>Lk</i>. Scolicotrichum, <i>Lk</i>. Mysothecium, <i>Ditm</i>. Pisilonia, <i>Fr</i>. Gyrotrix, <i>Corda</i>. Tricholeonium, <i>Corda</i>. Aleurisma, <i>Lk</i>. Dendrina, <i>Fr</i>.</p>
--	---	---	--

Cohors II.—Sporidifera.

Ordo V.—ASCOMYCETES, Berk.

<p>Suborder I. <i>Elvellacei</i>, Fr. Merchella, <i>Dill</i>. Helvelia, <i>L</i>. Verpa, <i>Su</i>. Geoglossum, <i>P</i>. Mitrula, <i>Fr</i>. Spathulea, <i>Fr</i>. Leotia, <i>Hill</i>. Rhizina, <i>Fr</i>. Peziza, <i>Dill</i>. Desmazierella, <i>Lb</i>. Solenia, <i>P</i>. Ascobolus, <i>Pers</i>. Agyrium, <i>Fr</i>. Stictis, <i>P</i>. Cryptodiscus, <i>Corda</i>. Melittosporium, <i>Corda</i>. Cryptomyces, <i>Grev</i>. Propolis, <i>Corda</i>. Bulzaria, <i>Fr</i>. Cytara, <i>Berk</i>. Vibrisea, <i>Fr</i>. Sarea, <i>Fr</i>. Ditiola, <i>Fr</i>.</p>	<p>Suborder II. <i>Tuberacci</i>, Fr. Tuber, <i>Mich</i>. Choiromyces, <i>Vitt</i>. Pachyphlaeus, <i>Tul</i>. <i>Choir. Melanoxanthus</i>, <i>Tul</i>. Hydnobolites, <i>Tul</i>. Balsamia, <i>Vitt</i>. Picoa, <i>Vitt</i>. Genea, <i>Vitt</i>. Sphaerosoma, <i>Klotzsch</i>. Endogone, <i>Lk</i>. Elaphomyces, <i>Nees</i>. Mylitta, <i>Fr</i>.</p> <p>Suborder III. <i>Phacidi-</i> <i>acci</i>, <i>Fr</i>. Stegia, <i>Fr</i>. Patellaria, <i>Fr</i>. Tympanis, <i>Tod</i>. Dermea, <i>Fr</i>. Cenangium, <i>Fr</i>. Cordierites, <i>Mont</i>. *Scleroderma, <i>Fr</i>.</p>	<p>*Triblidium, <i>Fr</i>. *Clithris, <i>Fr</i>. *Heterosporia, <i>Grev</i>. Glonium, <i>Muhl</i>. Lophium, <i>Fr</i>. Actidium, <i>Fr</i>. Cleistomum, <i>Fr</i>. Rhytisma, <i>Fr</i>. Phacidium, <i>Fr</i>. Hysterium, <i>Fr</i>. Sporomega, <i>Fr</i>. Ailographum, <i>Lb</i>. Hysterographium, <i>Corda</i>. Labrella, <i>Fr</i>.</p> <p>Suborder IV. <i>Sphar-</i> <i>iaci</i>, <i>Fr</i>. Hypocrea, <i>Fr</i>. Acrospharia, <i>Corda</i>. Thamomyces, <i>Ehb</i>. Hypoxydon, <i>Bull</i>. Sphæria, <i>L</i>. Stigmaea, <i>Fr</i>. Saccothecium, <i>Mont</i>.</p>	<p>Splanchnonema, <i>Corda</i>. Melanospora, <i>Corda</i>. Haplosporium, <i>Mont</i>. Pempidium, <i>Mont</i>. Micropeltis, <i>Mont</i>. Discosia, <i>Lib</i>. Cheilaria, <i>Lib</i>. Dothidea, <i>Fr</i>. Corynelia, <i>Fr</i>.</p> <p>Suborder V. <i>Perispori-</i> <i>acci</i>, <i>Fr</i>. Lasiobotrys, <i>Kze</i>. Erysiphe, <i>Hedw. Fil</i>. Perisporium, <i>Fr</i>. Chaetomium, <i>Kze</i>. Meliola, <i>Fr</i>.</p> <p>Suborder VI. <i>Ouygeni</i>, <i>Berk</i>. Spadonia, <i>Fr</i>. Ouygena, <i>P</i>.</p>
--	---	--	--

Ordo VI.—PHYCOMYCETES, Berk.

<p>Suborder I. <i>Antennariici</i>, Corda. Antennaria, <i>Lk</i>. Pleuroyxia, <i>Corda</i>. Pisomyxa, <i>Corda</i>.</p> <p>Suborder II. <i>Mucorini</i>, Fr.* Phycomyces, <i>Ag</i>. Ascophora, <i>Tode</i>. Pilobolus, <i>Tode</i>. Pycnopodium, <i>Corda</i>. Chordostylum, <i>Tode</i>. Hydrophora, <i>Tode</i>. Mucor, <i>Mich</i>. Chionophe, <i>Thien</i>. Sporodhula, <i>Lk</i>.</p>	<p>Calyssosporium, <i>Corda</i>. Hemisicyphe, <i>Corda</i>. Crateromyces, <i>Corda</i>. Rhizopus, <i>Ehb</i>. Acrostalagmus, <i>Corda</i>. Thelactis, <i>Mart</i>. Helicostylum, <i>Corda</i>. Endodromia, <i>Berk</i>. Diamphora, <i>Mart</i>. Didymocrater, <i>Mart</i>. Syzdites, <i>Ehb</i>. Mellidium, <i>Eschew</i>. Eurotium, <i>Lk</i>. Myriococcum, <i>Fr</i>. Chaogaster, <i>Corda</i>. Egerita, <i>P</i>. Dichosporium, <i>Nees</i>.</p>
---	---



Fig. XXVII.

* The mode of fructification is exactly intermediate between that of Agaricus and Sphæria. The reproductive bodies appear to spring from some definite point, and the same point produces a success-

Fig. XXVII. Antennaria Robinssonii.—1. The evolution of a spore; 2. a portion of the threads from a germinating spore.

Genera not sufficiently known.

Papularia, Fr.
Phyllædium, Fr.
Hypodermium, Lk.
Schizoderma, Kze.
Protomyces, Unger.
Gymnosporium, Corda.
Leucosporium, Corda.
Chromosporium, Corda.
Conisporium, Lk.
Coccularia, Corda.
Entomyclium, Wallr.
Myxosporium, Corda.
Fusoma, Corda.
Apotomnium, Corda.
Ramularia, Unger.
Athelia, P.
Acrothamnium, Nees.
Alytosporium, Lk.
Capillaria, P.
Circinotrichum, Nees.
Plectricium, Corda.
Miaionomyces, Corda.
Chrysosporium, Corda.
Chromelosporium, Corda.
Myxonema, Corda.
Melanotrichum, Corda.
Memnonium, Corda.
Merosporium, Corda.

Coccotrichum, Corda.
Didymaria, Corda.
Scolicotrichum, Kze.
Myxocladium, Corda.
Soredosporium, Corda.
Azozma, Corda.
Mydonotrichum, Corda.
Macroon, Corda.
Coccosporium, Corda.
Diplosporium, Lk.
Mydonosporium, Corda.
Ghiotrichum, Eschw.
Balanium, Wallr.
Gongylocladium, Wallr.
Osprisporium, Corda.
Trichostroma, Corda.
Medusula, Corda.
Spodylocladium, Mart.
Acrophyton, Eschw.
Clisosporium, Fr.
Tipularia, Chev.
Asterothecium, Wallr.
Amphisporium, Lk.
Hyphelia, Fr.
Trichoderma, P.
Ostracodermia, Fr.
Ostracococcum, Wallr.
Myrosorium, Corda.
Gylichium, Wallr.
Goupilia, Meral.

Diploderma, Lk.
Anixia, Fr.
Ceratophora, Humb.
Hydnocaryon, Wallr.
Ascospora, Fr.
Hercospora, Fr.
Coccobolus, Fr.
Ostropa, Fr.
Hypospila, Fr.
Gibbera, Fr.
Valsa, Fr.
Podostromium, Kze.
Collacystis, Kze.
Pyronium, Tode.
Acinula, Fr.
Sclerococcum, Fr.
Sarea, Fr.
Phymatostroma, Corda.
Melanostroma, Corda.
Gliostroma, Corda.
Dermosporium, Lk.
Chroostroma, Corda.
Crocysporium, Corda.
Myxaciium, Wallr.
Myxomphalon, Wallr.
Hirneola, Fr.
Amphicorda, Fr.
Epichysium, Tode.
Gyrolophium, Kze.
Sporendonoua, Desm.

Cælosporium, Lk.
Dryophilum, Schwein.
Malacharia, Fée.

Spurious Genera.

Rhizomorpha, Ach.
Byssus, L.
Mycoderma, P.
Mycomater, Fr.
Tophora, Fr.
Herpotrichum, Fr.
Fibrillaria, P.
Himantia, P.
Capillaria.
Ozonium, Lk.
Chaetosporium, Corda.
Erineum, P.
Septotrichum, Corda.
Physoderma, Wallr.
Cephaleros, Kze.
Sphinctriua, Fr.
Sclerotium, P.
Rhizoctonia, Fr.
Sperma-dia, Fr.
Pachyma, Fr.
Nosophlæa, Fr.
Peribotryou, Fr.
Ectostroma, Fr.
Institate, Fr.
&c. &c. &c.

NUMBERS.—GEN. 598. Sp. 4000? M. J. B.



Fig. XXVIII.

sion of spores. At least this is the case, according to Corda, in some genera. Should this structure be found to prevail generally, it would become a question whether they should not be associated with the sporiferous fungi, the vesicle being regarded simply as a veil. I am myself inclined to this view, but at present think it savours too much of theory to venture to propose it.

Fig. XXVIII. *Acrostalagnus cinnabarinus*.—1. A patch, the natural size; 2. plants very highly magnified; 3. a portion of the fructification still more magnified; 4, 5. spores contained in gelatinous heads; 6. a point of a branch with two spores remaining upon it.

ALLIANCE III. LICHENALES.—THE LICHENAL ALLIANCE.

Algae, § 3. Lichenes, *Juss. Gen.* 6. (1789).—Lichenes, *Hoffm. Enumeral. Lichenum*, (1784); *Acharius Prodr. Lichen.* (1798); *Id. Methodus*, (1803); *Id. Lichenogr. Univers.* (1810); *DC. Fl. Fr.* 2. 321. (1815); *Fries in Act. Holm.* (1821); *Agardh Aph.* 89. (1821); *Eschweiler Syst. Lich.* (1824); *Wallroth Naturgesch. der Flechten.* (1824); *Grev. Flora Edin.* xix. (1824); *Meyer über die Entwicklung, &c. der Flecht.* (1825); *Fée Méth. Lich.* (1825); *Fries Syst. Orb. Veg.* 224. (1825); *Martius in Bot. Zeitung*, 193. (1826); *Fée in Dict. Class.* 9. 360. (1826); *Fries Lichenogr. Europea.* (1831); *Esche. in Marl. Fl. Bras.* 1. 51. (1833); *Hooker Brit. Fl.* vol. ii. pt. 1. 129. 1833; *Endlich. Gen.* p. 11; *Link Ausgew. Anatom. Botan. abbild. fasc.* 3.—*Graphidæ, Chevalier Hist. des Graphidées.* (1824, &c.)

DIAGNOSIS.—Cellular flowerless plants, nourished through their whole surface by the medium in which they vegetate; living in air; propagated by spores usually inclosed in asci, and always having green gonidia in their thallus.

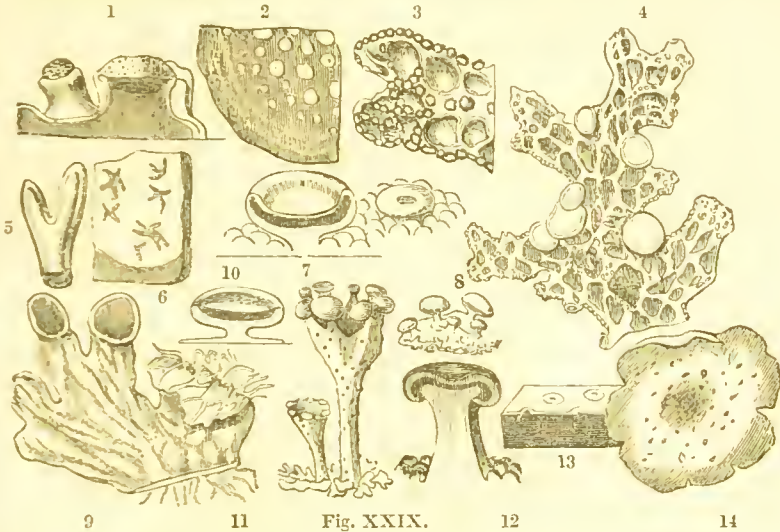


Fig. XXIX.

Perennial plants, often spreading over the surface of the earth, or rocks, or trees, in dry places, in the form of a lobed and foliaceous, or hard and crustaceous, or leprous substance, called a thallus. This thallus is formed of a cortical and medullary layer, of which the former is simply cellular, the latter both cellular and filamentous; in the crustaceous species the cortical and medullary layer differ chiefly in texture, and in the former being coloured, the latter colourless; but in the fruticulose or foliaceous species, the medulla is distinctly floccose, in the latter occupying the lower half of the thallus, in the former enclosed all round by the cortical layer. Reproductive matter of two kinds; 1, spores naked, or lying in membranous amylo-aceous tubes (these) immersed in nuclei of the medullary substance, which burst through the cortical layer, and colour and harden by exposure to the air in the form of little discs called shields; 2, the separated



Fig. XXX.

cellules of the medullary layer of the thallus.

These, called gonidia, or gongyli, are

Fig. XXIX.—1. Shields of *Variolaria amara*; 2, a portion of the thallus of the same plant; 3. a piece of the thallus of *Sticta pulmonacea*, with lacunae and soredia; 4. thallus of the same, bearing shields; 5. shield of *Opograpta scripta*; 6. thallus of the same; 7. shields, young and old, of *Lecanora perrella*; 8. shields of *Brevomyces rufus*; 9. part of thallus of *Peltidea canina*; 10. section of a shield of *Sticta pulmonacea*; 11. *Podetia* of *Canomyces corallina*; 12. section of a shield of *Brevomyces rufus*; 13. shields of *Endocarpon minutum*; 14. thallus of the same. Chiefly from Greville's *Flora Edinensis*.

Fig. XXX.—Section of a shield of *Parmella parietina*. Link.

universally of a green colour, and either lie singly or in clusters beneath the cortical layer of the thallus, or break out in clusters called soredia, or in cups called cyphelia.

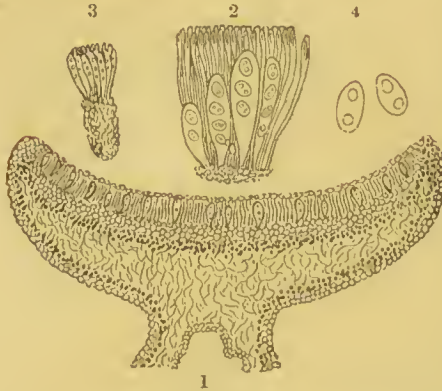


Fig. XXXI.

yellow; others spread upon the ground in plantations and heaths—these have usually a much larger growth; some again hang from the branches of venerable trees, which they clothe with a slaggy beard of grey; and, finally, a few start up upon the heath, grey and deformed, but eventually fashioning themselves into tiny goblets, the border of which is studded with crimson shields. According to Fries, Lichens “are types of Algals born in the air, interrupted in their development by the deficiency of water, and stimulated into forming a nucleus by light. No Lichen is ever submerged (*Verrucaria submersa* is an exception); there is none of which the vegetation is not interrupted by the variable hygrometrical state of the atmosphere; and, finally, none that ever develop in mines, caverns, or places deprived of light. On this account, their shields are more rare in the fissures of mountains, or in shady groves, than in places fully exposed to light. In wet places, also, their shields are not produced; for so long as they are under the influence of water they are hardly distinguishable from Hydrophyceæ (forms of Algals); as, for instance, *Collema*, &c. But these plants, when exposed to the sun, do perfect their shields, as is found by *Nostoc lichenoides*, *foliaceum*, &c., which, when dry, are ascertained to be *Collema limosum*, *flaccidum*, &c., surcharged with water.” By being acquainted with this rule, the same author says, he has succeeded in discovering many Swedish Lichens with shields, which have for many years been constantly found sterile; as *Parmelia conoplea*, *lanuginosa*, *gelida*, &c.; and he even asserts that he has succeeded artificially in inducing sterile Lichens to become fruitful, as *Usnea jubata*, and others.—*Plant. Hom.* 224. Lichens consist, according to Eschweiler, of a medullary and a cortical layer of tissue, of which the former is imperfectly cellular or filamentous, and bursts through the latter in the form of shields (apothecia), which contain a nucleus, consisting of a flocculent gelatinous substance, among which lie the cases of spores. These cases (thecæ) are transparent membranous tubes, either simple or composed of several placed end to end, which either lie free in the nucleus, or are themselves contained in other membranous cases (asci). In the beginning Lichens are stated to be in all cases developed in humidity, and to be, in fact, at that time, mere Phycæ or Confervæ; but as soon as the humidity diminishes, the under part dies, and an inert leprous crust is formed, which ultimately becomes the basis of the plant. Hence Lichens consist of two distinct sorts of tissue,—living cellules forming the vegetating part, and dead cellules the cohesion of which is lost; when separate, the former is *Palmella botryoides*, and the latter *Lepraria*. Of these two sorts of matter, the leprous is incapable of perpetuating the Lichen, while every part of the living stratum has been ascertained to become reproductive matter. See Fries, as above quoted, and Meyer *Ueber die Entwicklung, &c., der Flechten*. The investigations of the latter are exceedingly interesting. By sowing Lichens, he arrived at some curious conclusions, the chief of which are, that, like other imperfect plants, they may owe their origin either to an elementary, or a reproductive, generating power—the latter capable of development like the plant by which they are borne: that decomposed vegetable, and some inorganic, matter, are equally capable of assuming organisation under the influence of water and light; and that the pulverulent matter of Lichens is

Fig. XXXI.—Section of the shield of *Parmelia tiliaea*; the green gonidia are the black dots beneath the skin; 2. a portion of the same more magnified, showing the spore-cases and paraphyses; 3. a morsel of the shield of *Cladonia coccifera*; 4. spores of *Parmelia parietina*.

that which is subject to this kind of indefinite propagation, while the spores lying in the shields are the only part that will really multiply the species. He further says, that he has ascertained, by means of experiments from seed, that supposed species and even some genera of Acharius, are all forms of the same; as, for instance, *Lecanora ceriua*, *Lecidea luteo-alba*, and others, of the common *Parmelia parietina*.

The distinction between Lichens and Fungals has already been fully explained by Mr. Berkeley (p. 30). It is, therefore, only necessary, in this place, to give a few details concerning the geographical distribution and uses of the order, or cluster of orders, which Botanists combine under the name of Lichens.

Pulverulent Lichens are the first plants that clothe the bare rocks of newly-formed islands in the midst of the ocean, foliaceous Lichens follow these, and then Mosses and Liverworts. (*D'Urville, Ann. Sc. 6. 54.*) They are found upon trees, rocks, stones, bricks, pales, and similar places; and the same species seem to be found in many different parts of the world: thus, the Lichens of North America differ little from those of Europe. They are not met with on decaying matter, where they give way to fungi; but they often occupy the surface of living plants, especially their bark. In the tropics they lay hold of evergreen leaves. Their chosen climate is one that is temperate and moist; aspects to the north or west are also their favourite resort, for they shun the rays of the noon-day sun. No place seems to be a more constant haunt than the surface of sand-stone rocks, and buildings, in cool and moist countries. They are met with, in one place or other, from the equator to the pole, and from the sea-shore to the limits of eternal snow. The finest species are found near the equator; the most imperfect, such as the crustaceous genera, which can hardly be distinguished from the rocks they grow upon, are chiefly observed on mountain-tops, and near the pole. The *Idiothalam* are most abundant in tropical America.

Lichens have been remarked by De Candolle to possess two distinct classes of characters, the one rendering them fit for being employed as dyes after maceration in urine, the other making them nutritive and medicinally useful to man. Braconnot has ascertained that oxalate of lime exists in great abundance in Lichens, particularly in those which are granular and crustaceous. The common *Variolaria*, which is found upon almost every old beech-tree, contains rather more than twenty-nine per cent. (*Ed. P. J. 13. 194.*) Lichens that grow on the summit of fir-trees have been found by John, of Berlin, to contain an uncommon proportion of oxide of iron, a curious illustration of the peculiar powers which various plants possess of separating the inorganic matters presented to them in their food. (*Ibid. 2. 394.*) Of those used in dyeing, the principal crustaceous kinds are, *Lecanora perella*, the *Orseille de terre*, or *Perelle d'Auvergne* of the French, *Lecanora tartarea* (or *Cudbear*), *hæmatomma* and *atra*, *Variolaria lactea*, *Urceolaria scruposa* and *cinerea*, *Isidium Westringii*, *Lepraria chlorina*; of the foliaceous species, *Parmelia saxatilis*, *omphalodes*, *eneasta*, *conspersa*, and *parietina*, *Sticta pulmonacea*, *Solorina crocea*, and *Gyrophora densa* and *pustulata*; but the most important are *Rocella tinctoria* and *fusiformis*, the dye of which makes litmus, and is largely used by manufacturers under the name of *Orchall*, or *Archill*, or *Orseille des Canaries*; there are other species capable of being employed in a similar manner, as *Usnea plicata*, *Evernia prunastri*, *Alectoria jubata*, *Ramalina scopulorum*, and several *Cenomyces*. Dr. Robert Thomson finds the common yellow pale Lichen (*Parmelia parietina*) to contain a peculiar colouring matter, called *Parietin*, of a bright yellow. This is heightened by a drop of nitric, muriatic, or sulphuric acid; while minute quantities of ammonia, or other alkalis, change it to a rich red inclining to purple.

Azard considers Lichens more nearly allied to Fungals than to Algals: he remarks, that if *Sphærias* or *Pezizas* had a thallus, they would be Lichens, and that the same part is all that determines such genera as *Calycium*, *Verrucaria*, or *Opegrapha* to be Lichens, and not Fungi. He adds, that all the transitions from Algals to the state of Lichens, which have been detected by modern inquirers, are mere degenerations into the form of the Lichen tribe, and by no means into Lichens themselves.

According to Fries, Lichens have the vegetation of Algals, and the fruit of Fungals. (*Systema, 52.*)

Fries refers *Byssaceæ* to Lichens with the following short character:—"Aerial, perennial, constantly growing, with a filamentous texture; consisting of solid fibres (either few or several glued together with a common bark), unclunged and permanent. Fructification homogeneous, growing externally, and naked." *Syst. Orb. Veg. 291.* Some of these plants appear to be meteoric productions; on one occasion they are said to have suddenly overrun all the leaves of pines on the side next the wind in the neighbourhood of Dresden; on another, on the 25th of Aug. 1830, to have in an instant spread over the sails and masts of a ship at Stockholm; and Fries is disposed to consider the cobweb-

like matter, that overruns the grass in the mornings of spring and autumn, of this nature, and not of an animal origin. See *S. O. Veg.* 318.*



Fig. XXXII.

which forms the winter food of that animal, is *Cenomyce rangiferina*. *Parmelia parietina*, *Borreria furfuracea*, *Evernia prunastri*, *Cenomyce pyxidata* and *coccifera*, are reputed astringents and febrifuges, and *Peltidea aphthosa* an anthelmintic. *Alectoria Arabum* (Oschmah) is said to be sedative and soporific. *Peltigera canina* was once regarded as a specific in hydrophobia. *Stictia pulmonacea* is used in Siberia for giving a bitter to beer, and in this country is employed, under the name of Lungs of the Oak, as a nourishing diet for weak persons. *Evernia vulpina*, called Ulfmossa by the Swedes, is believed by that people to be poisonous to wolves; but this requires confirmation. See *De Cand. Essai Méd.* 313, and *Agardh, Aph.* 94.

According to the chemists, Lichens contain several peculiar principles; such as Cetrarine, Pierolichenine, Stictine, and Varioline, which are bitter; and the colouring matters called Oreine, Erythrine, Parmelochromine (also called Vulpuline and Vulpinic acid), Strychnochromine, Strychnerythrine, Lecanorine, &c.: and finally, from *Usnea florida*,

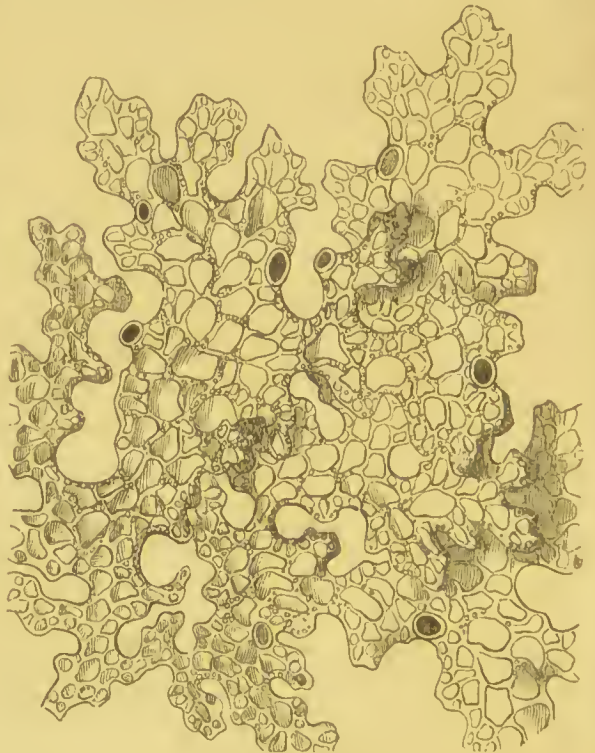


Fig. XXXIII.

* Nothing, however, can be more heterogeneous than the mass of genera collected by Fries under the unfortunate name of *BYSSACEÆ*. Many of them are spurious genera, others true Fungals, a few anomalous Lichens, and a small portion not easily arranged under Fungals, Algae, or Lichens. An excellent notice will be found by Dr. Montagne in the History of Cuba, and the latest information on the subject in the article *Byssacées* in the new *Dict. d'Hist. Nat.* By excluding such genera as *Clicia* and *Cœnogium*, which the example of *Parmelia gossypina* will justify us in uniting with Lichens, we have remaining a very natural, though small group, which may be distinguished under the name of *Collemaeæ*; and Dr. Montagne, who has lately had some correspondence on the subject with

Fig. XXXII.—*Cetraria islandica*: *a a.* its shields; *b.* a shield magnified and divided vertically.
Fig. XXXIII.—*Stictia pulmonaria*, or Lungs of the Oak.

hirta and plicata, Parmelia fraxinea and farinacea, and various others, M. Knop has obtained a substance called Usnine or Usnic acid. This author finds the sulphur-coloured and yellowish-green lichens are especially rich in usnine, for instance, Lecidea geographica and Parmelia sarmentosa. Usnine acts a conspicuous part by its various metamorphoses and combinations in the alterations of colour of many lichens. In all lichens however it is accompanied by yellow or green resins, which in common with it partake of the property of becoming red by ammonia and exposure to the air; this red colouring however is destroyed by sulphuretted hydrogen. Usnine occurs in the thallus as well as in the fruit-dises. The shields of the Cladonia contain near the fruit-bearing vesicles quill-shaped cylindrical cells, which are coloured pale red at the base, but darker towards the apex by a colouring substance, which dissolves in ammonia and potash with a wine-red, in sulphuric acid with a carmine-red colour; the sulphatic solution is precipitated by water; the alkaline solution is not decolorized by sulphuretted hydrogen. The nearly scarlet-red fruit-dises of the Cladonia become brown and blackish-brown with age. In fact, the fruit-dises of the lichens containing usnine are precisely similar in colour to the thallus, or brown, reddish-brown and carmine-red. The sulphur-yellow lichens contain most usnic acid, and indeed in a free state; the other colours are probably produced by the action of the alkalis and earths of the vegetable salts in the lichens, the ammonia of the rain-water assisting the chemical action of the usnic acid, which is otherwise insoluble in water. In this manner the green, red and brown colours may originate. The silver-white Cladonia rangiferina probably contains the usnic acid in the state of an earthy salt. Lecidea geographica is sometimes sulphur-yellow, sometimes yellowish-green. If some pure yellow specimens be suspended in a glass over a solution of carbonate of ammonia, they become covered with carmine-red globules, after frequent washing entirely lose the usnic acid, and finally become grayish-white like dead lichens. The Parmelia and Usnea continue of a brilliant green colour in shady and moist places, but when exposed to the heat of the sun they become brownish-black; if treated as above with ammonia and dried, they likewise present similar colours. The fruit-dises of the Cladonia also turn brown under similar treatment. The cause of all these changes is the usnic acid, which itself is of a yellow colour, but becomes oxidized in combination with bases by exposure to the air, forming various coloured compounds. *Chem. Gaz.* 1844. 182.



Fig. XXXIII*

In this, as in the Fungal alliance, I have forborne formally to break up Lichens into several Natural orders, and have preferred to leave the task to others more skilled than myself in this branch of Botany; but it is not to be doubted, that hereafter the pro-

Mr. Berkeley is not averse to this reduction. The Collemaeae have strictly the thallus of an Alga, and the fruit of a Lichen. The following genera are comprised in the group:—

Collema, Ach.	Synalaxis, Fr.	Omphalidium, Mey. et	Lichina, Ag.
Leptogium, Fr.	Mytopunctin, Mont. et	Flohu,	Myriogium, Mont. and
	Dur.	Paulin, Fr.	Berk.

It is better for the present, in a matter confessedly so difficult, to throw out the above in the form of a Hint, rather than to propose a distinct natural order. But every thing seems to indicate the necessity of placing them apart under some kind of denomination.

Fig. XXXIII*. -Parmelia tillacea.

1.



privity of carrying out the principles of ordinal division recognised elsewhere, will be introduced among Lichens. In the meanwhile the evidence that has been collected seems to point to such a mode of grouping as is indicated in the following proposed

NATURAL ORDERS OF LICHENALS.

- Nucleus breaking up into naked spores* 12. GRAPHIDACEÆ.
Nucleus bearing asci; thallus homogeneous, gelatinous or cartilaginous . . . 13. COLLEMACEÆ.
Nucleus bearing asci; thallus heterogeneous, pulverulent or cellular . . . 14. PARMELIACEÆ.

GENERA.*

I.— <i>Coniothalamaceæ</i> . Shields open; the nucleus breaking up into naked spores.	<i>Sarcographa</i> , Fée. <i>Asteriscea</i> , Meyer. <i>Chiodecton</i> , Ach. <i>Glyphis</i> , Ach.	<i>Ophthalmidium</i> , Eschw. <i>Ocellularia</i> , Meyer. *** <i>Endocarpidæ</i> . <i>Pertusaria</i> , DC. <i>Porina</i> , Ach. <i>Porophora</i> , Meyer. <i>Sagedia</i> , Ach. <i>Stigmatidium</i> , Meyer. <i>Enterographa</i> , Fée. <i>Endocarpon</i> , Hedw. <i>Dermatocarpon</i> , Eschw. **** <i>Sphaerophoridæ</i> . <i>Siphula</i> , Fr. <i>Dufourea</i> , Ach. <i>Sphaerophoron</i> , Pers. <i>Coralloides</i> , Hoffm.	<i>Ptyxidaria</i> , Bory. <i>Pycnothelia</i> , Achar. <i>Stereocaulon</i> , Schreb. <i>Thamnium</i> , Vent. *** <i>Parmeliadæ</i> . <i>Gyalecta</i> , Ach. <i>Dirina</i> , Fr. <i>Cilicia</i> . <i>Cænogium</i> . <i>Parmelia</i> , Fr. <i>Lcanora</i> , Achar. <i>Squamaria</i> , DC. <i>Ureccotaria</i> , Fr. <i>Phytetis</i> , Wallr. <i>Patellaria</i> , Fr. <i>Psora</i> , Fr. <i>Placodium</i> , Fr. <i>Zeora</i> , Fr. <i>Amphiloma</i> , Fr. <i>Panaria</i> , Delis. <i>Lobaria</i> , Hoffm. <i>Physcia</i> , Fr. <i>Ilagenia</i> , Eschw. <i>Imbricaria</i> , Fr. <i>Platisma</i> , Hoffm. <i>Sticta</i> , Schreb. <i>Pulmonaria</i> , Hoffm. <i>Reticularia</i> , Baumg. <i>Crocodia</i> , Link. ? <i>Plectocarpon</i> , Fée. <i>Peltigera</i> , Willd. <i>Peltidea</i> , Ach. <i>Antilyssus</i> , Hall. <i>Eriodermo</i> , Fée. <i>Solorina</i> , Ach. <i>Sommerfeltia</i> , Flörk. <i>Nephroma</i> , Achar. **** <i>Usneidæ</i> . <i>Cetraria</i> , Ach. <i>Physcia</i> , DC. <i>Cornicularia</i> , Hoffm. <i>Coclocaulon</i> , Link. <i>Rocella</i> , DC. <i>Ramalina</i> , Achar. <i>Platyphyllum</i> , Vent. <i>Beveria</i> , Ach. <i>Borrera</i> , Ach. <i>Bryopogon</i> , Lk. ? <i>Neuropogon</i> , Nees. <i>Usnea</i> , Hoffm. <i>Reichenbachia</i> , Spr.
* <i>Pulverariadæ</i> . <i>Arthronia</i> , Ach. <i>Arthronaria</i> , Fr. <i>Pulveraria</i> , Achar. <i>Lepraria</i> , Achar. <i>Pulina</i> , Adams. <i>Phyloconis</i> , Bory. <i>Leptuberia</i> , Rafin.	*** <i>Limboridæ</i> . <i>Ureccolaria</i> , Ach. <i>Polystroma</i> , Clement. <i>Thelotrema</i> , Ach. <i>Hymenoria</i> , Ach. <i>Anthrocarpum</i> , Meyer. ? <i>Pyrenula</i> , Fée. ? <i>Ascidium</i> , Fée. <i>Limborea</i> , Ach. <i>Gyrostomum</i> , Fr. <i>Clostomum</i> , Fr.	IV.— <i>Hymenothalamaceæ</i> . Shields open; nucleus forming a disk, permanent and bearing asci. * <i>Ephebidæ</i> . <i>Micarea</i> , Fr. <i>Ephebe</i> , Fr. <i>Coenogonium</i> , Ehrenb. ** <i>Leclidæ</i> . <i>Lecidea</i> , Ach. <i>Catillaria</i> , Achar. <i>Echinoplaea</i> , Fée. <i>Myriotrema</i> , Fée. <i>Rhizocarpon</i> , Ramond. <i>Patellaria</i> , Pers. <i>Biatra</i> , Fr. <i>Lepidoma</i> , Ach. <i>Psora</i> , Hoffm. <i>Chevriaria</i> , Fée. <i>Pulveraria</i> , Willd. <i>Verrucaria</i> , Hoffm. <i>Sphaerothollio</i> , Nees. <i>Baeomyces</i> , Pers. <i>Sphyridium</i> , Flot. <i>Cladonia</i> , Hoffm. <i>Cenomyce</i> , Achar. <i>Capitularia</i> , Flörk. <i>Scyphophorus</i> , DC. <i>Helopodium</i> , DC. <i>Cladonia</i> , Ach. <i>Schasmaria</i> , Ach. <i>Corania</i> , Ach. <i>Ptyxidium</i> , Schreb.	
** <i>Calycidæ</i> . <i>Coniocarpon</i> , DC. <i>Conioluma</i> , Flörk. <i>Trachilia</i> , Fr. <i>Calycium</i> , Pers. <i>Cyphellum</i> , Ach. <i>Acolum</i> , Fée. <i>Conioeyba</i> , Ach. <i>Sclerophora</i> , Chev. <i>Fulgia</i> , Chev.	**** <i>Pyxinidæ</i> . <i>Unbillicaria</i> , Hoffm. <i>Lasallia</i> , Merat. <i>Gyrophora</i> , Achar. <i>Gyromium</i> , Wahlenb. <i>Capnia</i> , Vent. <i>Pyxine</i> , Fr.		
II.— <i>Idiothalamaceæ</i> . Shields closed at first, afterwards open; the nucleus gelatinous, made up of naked spores.	III.— <i>Gasterothalamaceæ</i> . Shields always closed, or opened by the irregular separation of the thallocal covering. Nucleus enclosed, containing asci, deliquescent or shrivelling up.		
* <i>Graphidæ</i> . <i>Coniangium</i> , Fr. <i>Ustalia</i> , Fr. <i>Pyrochroa</i> , Eschw. <i>Platygramma</i> , Meyer. <i>Sclerophyton</i> , Eschw. <i>Lecanactis</i> , Eschw. <i>Lecanotis</i> , Rehb. <i>Opegrapha</i> , Pers. <i>Hysterina</i> , Ach. <i>Oxystroma</i> , Eschw. <i>Scopis</i> , Eschw. <i>Leucogramma</i> , Meyer. <i>Graphis</i> , Eschw. <i>Fissurina</i> , Fée. <i>Graphis</i> , Fr. <i>Leiorreuma</i> , Eschw. <i>Platygramma</i> , Meyer.	* <i>Verrucariidæ</i> . <i>Diorygma</i> , Eschw. <i>Pyrenotheca</i> , Fr. <i>Leprantha</i> , Dufour. <i>Throubium</i> , Wallr. <i>Gelatinaria</i> , Flörk. <i>Pyrenastrum</i> , Eschw. <i>Parmentaria</i> , Fée. <i>Verrucaria</i> , Pers.		
** <i>Glyphidæ</i> . <i>Medusula</i> , Eschw.	** <i>Trypethelidæ</i> . <i>Sphaeromphale</i> , Reichb. <i>Segestria</i> , Fr. <i>Segestrella</i> , Fr. <i>Mycoporum</i> , Meyer. <i>Porothelium</i> , Eschw. <i>Porolithium</i> , Fr. <i>Astrothelium</i> , Eschw. <i>Tripethelium</i> , Spr. <i>Bathelium</i> , Achar.		

NUMBERS. GEN. 58. Sp. 2400. (Fée.)

POSITION.—Marchantiaceæ.—LICHENALES.—Fungales.

* Arranged principally according to Endlicher.

CLASS II. ACROGENS.

PSEUDOCOTYLEDONEÆ, *Agardh, Aph. 72. (1821).*—HETERONEMEA, *Fries, Syst. Orb. Veg. 1. 30. (1825).*
 ACROBRYA, *Mohl. in Mart. Pl. Crypt. p. 56; Endlich. Gen. p. 42. (in Part.)*—ACROGENÆ,
Ad. Brongn. Enum. p. XIII. (1843).

WITH this class a great advance in structure is accomplished. The simplicity which is so remarkable in Thallogens is exchanged for a complicated apparatus of many kinds. All the species have stomates or breathing-pores on their surface: in the great majority there is a distinct stem and leaves, the latter of which are always arranged with perfect symmetry; and in those species which approach Thallogens, (as the Crystalworts, which stand close upon Lichens) the thallus has all the texture of leaves, although a separate stem is refused to them. There is, however, no trace of flowers, properly so called; and yet in the involucre of many Liverworts, and in the spore-cases of Mosses, an arrangement of leaves occurs, which appears to be the forerunner of the flowers of more perfect plants. Sexes, however, are wholly missing; that is to say, nothing can be found which resembles the anthers and pistil of flowering plants, except in some vague external circumstance: there is no evidence to show that any one order of Acrogens possesses organs which require to be fertilised the one by the other in order to effect the generation of seeds. Hence those reproductive bodies of Acrogens which are analogons to seeds are called spores. Mr. Griffith takes, however, a very different view of this question, and assigns true sexes to Acrogens.

He thinks it probable that we have at least three modifications of the phenomenon of fecundation "among the higher acotyledonous plants. In one the male influence is applied to the apex of a pistillum, in the second to a nucleus without the intervention of a pistillary apparatus. In the third the male influence is exerted on a frond itself, and is followed by the development of the young capsule from a point in the substance of the frond corresponding to and sometimes distant from the place to which the male influence has been applied. This is founded on observations made on *Anthoceros* in 1836, from which it would appear that the place of exertion of the future capsules is pointed out by a slight protuberance, over the apex of which a flake of matter like the so called male matter of *Musci* and *Salvinia* is spread, sending down to some distance within the frond a tube-like process, which causes the dislocation of the cells of the tissue with which it comes into contact. The future capsule is stated in his notes not to be appreciably pre-existent, and its situation is only pointed out by a bulbiform condensation of the tissue of the frond. The young capsule during its development ascends along the same line, and pushes before it a corresponding cylindrical body of the tissue of the frond, the calyptra of authors." But, it seems to me, that this very complexity of action is more like variations in self-propagation, than phenomena of fecundation, which, among the plants in which that action certainly takes place, is subject to no such modifications.

A large number of Acrogens have no true spiral vessels, which are confined to the more highly developed forms, such as Ferns, Clubmosses, and Horsetails; but there is a very general tendency to the production of spiral

threads in their cells. This has been long known to exist in the bodies called elaters among Liverworts, and traces of it have been recognised in the leaves of certain mosses, such as Sphagnum.

“So far as I am aware,” says Schleiden, “the occurrence of a spiral formation has been observed in the reproductive organs of Hepaticæ only in the elaters or fruit-valves. But it is not less strikingly developed in the organs of vegetation in Marchantiacæ. The parenchyma of the leaf of *Marchantia polymorpha* and *Fegatella conica* consists almost entirely of cells whose partitions appear distinctly porous, or (especially in *M. polymorpha*) beautifully thickened with net-work. This thickening of the partitions of the cell takes place to so great a degree in the older parts and in the proximity of the midrib, that by transverse sections the pore-channels may be plainly recognised. Amongst mosses, the true *Dicrana*, for example *D. Schraderi*, *spurium*, &c., are distinguished by the cells of the leaf having very thick sides, and their partitions evidently pierced by very wide, or funnel-shaped pore-channels, just as happens in the epidermis of many phanerogamous plants; and still more conspicuously do these spiral and porous formations display themselves in Sphagneæ, and in the nearly related group of Leucophaneæ established by Hampe.”—(*Ann. Nat. Hist.* v. 73.) The same tendency is still more remarkably apparent in a curious formation of loose short spiral threads generated in the cells of the bodies called Antheridia, and elsewhere; which, because of an apparently spontaneous motion when they are floating in water, have been thought to be animalcules of the genera *Spirillum* or *Vibrio*.

In general, Acrogens are plants of very small stature. But in Ferns they occasionally acquire the size of trees; always however growing with a simple stem in such cases, unless when their growth is interrupted by accident. If they branch naturally, they do so in a forking manner. Their stem, instead of increasing by the deposition of matter originating in the leaves, appears to be a mere extension of one common vegetating point, which becomes cylindrical and long, when it is capable of being acted upon by the influence of light. It may be regarded indeed as a mere combination of the bases of leaves, gradually evolved one from the bosom of the other.

The orders of Acrogens seem to resolve themselves into three Alliances, of which the lowest in organization in some respects is the highest in others. This which is named the Muscal, inasmuch as it includes the true Mosses, has no spiral vessels, no veins to its leaves, and its species are of diminutive size; but it has reproductive organs of two very distinct kinds, and its spore-cases are usually elaborately provided with elaters at least, and often with a complicated arrangement of rudimentary leaves. The two others have a far larger stature, are abundantly furnished with scalariform or true spiral vessels in their stem, but their reproductive organs are of the most simple kind, and never assume different forms in the same individual. The one called the Lycopodal Alliance has scaly leaves and pulverulent spores, always of two sorts, contained in cases which usually open by definite valves; the other, called the Filical Alliance, has thin expanded veiny leaves and granular spores of only one kind enclosed in cases which burst irregularly.

The affinities of Acrogens are well ascertained. *Riccia* and its neighbours are closely allied to Lichens. Horsetails may be looked upon as an approach towards the structure of *Ephedra* among Gnetaceæ, or of *Casuarina* in Galeworts. The Clubmosses evidently approach Coniferous Gymnogens in their small scale-like imbricated leaves and coniferous fructification.

Ferns themselves have in their foliage the peculiar veining of certain genera belonging to the order of Yews in Gymnogens; they also approach Cycadaceous Gymnogens in their simple cylindrical stems and gyrate foliage, which bears the fructification on the margin. Nor are the Urn Mosses (Bryaceæ) without their resemblance to the order of Yews when we compare some of the larger species with the little *Daerydia* of New Zealand, which are only a few inches high.

ALLIANCES OF ACROGENS.

MUSCALES.—*Cellular (or vascular). Spore-cases immersed or calyptrate (i. e. either plunged in the substance of the frond, or enclosed within a hood having the same relation to the spores as an involucre to a seed-vessel.)*

LYCOPODALES.—*Vascular. Spore-cases axillary or radical, one or many celled. Spores of two sorts.*

FILICALES.—*Vascular. Spore-cases marginal or dorsal, one-celled, usually surrounded by an elastic ring. Spores of but one sort.*

ALLIANCE IV.—MUSCALES.—THE MUSCAL ALLIANCE.

CELLULARES FOIACEÆ, DC. *Theor. Elem.* 249. (1819).—PSEUDOCOTYLEDONEÆ, Class I. Agardh, *Aph.* 103. (1822).—HETERONEMEA, *Fries Syst. Orb. Veg.* 33. (1825) *in part.*—ACOTYLEDONEÆ, Class 2. *Ad. Brongniart in Diet. Class.* 5. 159. (1824).—CRYPTOGAMICÆ, 2d Circle, T. F. L. Nees v. Ešenbeck and Ebermaier *Handb. der Med. Bot.* 1. 18. (1830).—HEPATICÆ and MUSCI, *Endlicher Gen.* 42. and 46.

DIAGNOSIS.—Cellular or vascular Acrogens, with the spore-cases either plunged in the substance of the frond, or enclosed in a cap-like hood.

NEXT after the Algal series follows that which derives its name from Mosses, presenting at one point a structure nearly as simple as that of Lichens, and at another a complexity of organization unknown elsewhere among Acrogens. The Crystalworts (Ricciaceæ), by which the series begins, are mere lobes of green or purple parenchyma floating in water or spreading over mud, and multiplied by reproductive particles (spores) generated in hollow flask-like cases. Then follow masses of species gathered together under the names of Liverworts (Marchantiaceæ) and Scalemosses (Jungermanniaceæ), whose stems and leaves are, in the majority of instances distinctly separate, and among whose spores are formed elastic threads with a powerful hygrometric quality and of unknown use. Finally the ranks are closed by Splitmosses (Andraceæ), and Urn-Mosses (Bryaceæ), which have in all cases a distinct axis of growth, symmetrical leaves, and a complicated reproductive apparatus formed by the adhesion of leaves in rings or whorls: in emulation, as it were, of flowers, in the more completely organized classes of Endogens and Exogens.

In the opinion of a large number of modern observers there are two sexes in all these plants, the one bearing the name of Antheridia (or false anthers), and the other of

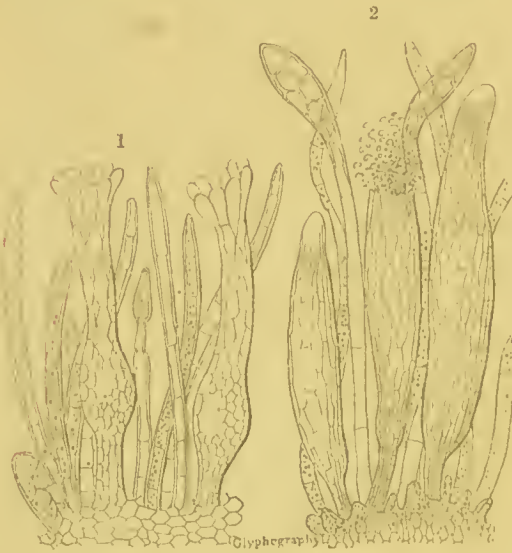


Fig. XXXIV.

Pistillidia (or false pistils). That such organs exist is certain; the question is whether or not they are to be looked upon as connected with sexual qualities. Those who regard them in that light have naturally taken the imbedded oblong antheridia of Marchantia, and the stalked reticulated ones of Jungermannia, for anthers; but Hooker, in his beautiful *Monograph* of the latter genus, and also in his *British Flora*, (p. 459,) is unsatisfied as to their nature. Greville, in the *Flora Edinensis*, is in a similar state of uncertainty; and Agardh admits nothing more in them than a resemblance to male organs, adopting the opinion that they are a particular form of gemmules. Mirbel considers the cups or baskets of Marchantia to be filled with little buds, and the peltate receptacles to be male flowers, while the stalked recep-

tacles are masses of pistils. (See his admirable *Memoir*, tt. vi. et vii.) On the other hand Greville and Arnott, in the fourth volume of the *Transactions of the Wernerian Society*, speak thus positively against the sexuality of the organs in question:—
“What the organs really are, in the plants under review, which the acemrate Hedwig so well figured and described under the name of stamens, we leave to others to decide; but we cannot help entering our protest against those bodies called Stamina and Pistilla (the young theæ) being regarded in a similar light with the same organs in more perfect plants. ‘Though,’ says Sprengel, ‘I have formerly been a zealous advocate for Hedwig’s *Theory of the Fructification of Mosses*, it has nevertheless appeared to me an insurmountable objection, that the supposed anther can again produce buds and strike roots; which is certainly the case with regard to the disks of *Polytrichum commune*,

Fig. XXXIV.—1. Young spore-cases and paraphyses of *Maian cuspidata*. 2. Antheridia and paraphyses of *Polytrichum commune*. Link.

Bartramia fontana, *Bryum palustre*, *undulatum*, *cuspidatum*, *punctatum*, and with those of *Tortula ruralis*. In *Bryum argenteum* we see the buds containing the supposed anthers constantly drop off, strike root, and produce new plants; this I have observed myself times out of number. Still more in point is the experiment first made by David Mees, of sowing the stellule of *Polytrichum commune*, containing merely club-shaped bodies, when he found that plants came up, which in their turn produced fruit. Another excellent naturalist, Dr. Roth, has made similar observations with regard to *Hypnum squarrosum* and *Bryum argenteum*. It is more probable, therefore, that these supposed anthers are mere gemmæ, produced by the superabundance of the juices, and hence surrounded by succulent filaments." Fries also, in his *Plantæ homonecæ*, xxxi., expresses himself thus, "Musci sunt cœxuales et in diæta organa masculina meras esse gemmas vix dubium videtur."

Nevertheless, in the face of this evidence, Adolphe Brongniart retains a belief in the sexuality of Mosses, and in the male functions of the axillary bodies; and he says, with justice, that it appears from Brown's mode of describing Mosses, that he entertains a similar opinion. Dr. Taylor also thinks that the Liverworts show the presence of two sexes in the most evident manner. (*Linn. Trans.* xvii. 375.) That the flask-like bodies called pistillidia are female organs he considers proved by the germination of the dark brown particles (spores) that are contained within them. He admits that no direct evidence exists to show that the antheridia are male organs; but he says that they discharge a viscid whitish liquor, which is rapidly dissolved in the air, uniformly precede the pistillidia, and have fulfilled their office before the seeds (spores) are ripe. Dr. Montagne follows on the same side (*Ann. Sc. Nat.* 2 Ser. ix. 100), with the sweeping assertion that "no body now-a-days (1838) doubts that Mosses and Liverworts have two sexes." Mr. Valentine, in two elaborate papers (*Linn. Trans.* xvii. 465, and xviii. 499), denies the sexuality of some plants at least of the Muscal Alliance; justly observing, however, that the experiments mentioned by Sprengel and Mees are unsatisfactory, there being no proof in them that it was the antheridia which grew; it might have been the whole mass of the stellate disks in which the antheridia occur. Mr. Valentine relies upon the very important fact, first remarked by himself, that the pistillidium, in which the spores are produced, is not in existence at the time when the antheridia are in action. Like Mohl and Agardh, he maintains that the spores, although equivalent to seeds, are almost identical with pollen grains. "The only difference," he adds, "that I can find between pollen and sporules is, that the coat of the latter is of a more rigid and opaque texture. From this difference it is that the sporules rarely burst in a sudden manner upon the application of water; but when they do, the moving particles are discharged loose in the water, precisely in the same manner as are those of pollen."

Upon this point however Mr. Griffith observes, that "it is to be borne in mind, that whereas pollen is the result of a simple separation constituting a primary and independent process; in Musci, Hepaticæ, Salvinidæ, the spores, otherwise so similar to pollen, are the result of a secondary process, dependent on a primary one which appears to be remarkably analogous to planerogamic fecundation."

Finally, Unger in his account of the anatomy of *Riccia* (*Linnaea*, xiii. 13), states that antheridia and pistillidia are alike at first, that the contents of the first are lost, of the second retained, and that the first perishes while the second is permanent,—whence it is reasonable to presume that the emission from the antheridia is a necessary condition for the formation of spores. He therefore regards them as male and female.

It seems clear from all these statements, that the question of sexes in the Muscal Alliance is undecided. There is no doubt that two very different sorts of organs exist among its species; but it does not appear to me that we have sufficient evidence at present to show that the antheridia are male organs. So far as they are concerned we have conjecture and nothing more. All that is proved is: 1. That the spores are bodies which reproduce the plant, and are, therefore, analogous to seeds; and 2. That the structure of the antheridia and pistillidia is wholly at variance with that of nutters and pistils properly so called.

Mr. Griffith, nevertheless, in an elaborate Memoir on *Azolla* and *Salvinia*, published in the *Calcutta Journal of Natural History*, adopts in the fullest extent the opinion that Acrogens have sexes, as will appear hereafter. It is, however, to be remarked that the question is not, whether there may not be in such plants as these some trace of a male and female principle, or certain organs in which it is probable that such a principle resides; but whether there is any such structure as that which we know to be sexual in all the classes of plants higher than Acrogens. And I must confess, after reading Mr. Griffith's very learned and ingenious observations, that my opinion remains unshaken as to the existence of most essential differences between Acrogens and other plants in all that regards the organs of reproduction.

A remarkable point of structure in Liverworts is the spiral filament, or elater, as it is called, lying among the sporules within the spore-case. This consists of a single fibre, or of two, twisted spirally in different directions, so as to cross each other, and contained within a very delicate, transparent, perishable tube. They have a strong elastic force, and have been supposed to be destined to aid in the dispersion of the sporules,—a most inadequate end for so curious and unusual an apparatus. It is more probable that they are destined to fulfil, in the economy of these plants, some function of which we have no knowledge.

One of the most extraordinary points in the history of the Muscal Alliance, is the fact that in the cells of the antheridia are generated bodies having what seems to be spontaneous motion, and apparently of the same nature as the spermiatic animalcules of animals. This unexpected fact has been fully and correctly described by Meyen, (*Ann. Sc. Nat. N. S. x. 319*), who has found the same creatures (?) in the correspond-

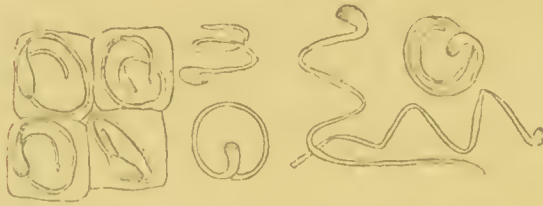


Fig. XXXV.

ing organs of Chara and Marchantia. Unger has also published an elaborate Memoir upon this singular subject. (*Ann. Sc. N. S. xi. 257 and 274.*) He describes the spiral threads of Sphagnum thus:—"These animalcules consist of a thick and swollen body having a slender threadlike appendage. The length varies between the $\frac{1}{1000}$ to $\frac{1}{500}$ of a line Vienna measure. The length of the appendage is about $4\frac{1}{2}$ longer than the body, so that the total length of the animal may be stated to be the 0.01 of a line." It is to be observed by those who may search for such bodies that they can only be found just when the antheridium is completely formed, and that a magnifying power of at least 600 diameters is required for their detection. Unger regards them as analogous to the genus of animalcules called Spirillum. It is so improbable that animals should be generated in the cells of plants, unless accidentally, that we cannot but entertain grave doubts whether, notwithstanding their locomotive powers, these bodies are really any thing more than a form of vegetable matter; and it is worth considering if they may not after all be a diminutive representation of the clavate processes surrounding the spore of Equisetum, and perhaps of the elaters found in the spore-cases of Liverworts. This is certain, that the spores and elaters of Equisetum, when at rest, have very much the appearance of the Spirilla in the antheridium of an Urn Moss or a Chara; and since it has been proved that the spiral filaments of Equisetum arise from the splitting of a cell in which a spore is generated, there seems no reason why a similar action should not take place in cells that are destitute of spores. As to the motion, how are we to tell that it is not a hygrometrical action? There is as active a motion in the elaters of Equisetum as in the spirilla of Mosses, only it arises in the former from drying and in the latter from floating in water. Nägeli has lately found the spiral threads of Liverworts in the leaves of Ferns.

Equisetum may be regarded as a link between this alliance and Chara on the one hand, while its high degree of composition brings it into the neighbourhood of Ferns and Clubmosses.

By some Botanists the orders of the Muscal Alliance are separated into two great groups, Hepaticæ and Musci; of which the former are without an operculum and have for the most part elaters, while the latter have an operculum and always want elaters. But such distinctions seem to be of hardly sufficient importance to be employed for higher purposes than the distinction of Natural orders.

NATURAL ORDERS OF MUSCALS.

1. HEPATICÆ.

- Spore-cases valveless, without operculum or elaters* 15. RICCIACEÆ.
- Spore-cases valveless or bursting irregularly, without operculum, but with elaters* } 16. MARCHANTIACEÆ.
- Spore-cases opening by a definite number of equal valves, without operculum, but with elaters* } 17. JUNGERMANNIACEÆ.
- Spore-cases peltate, splitting on one side, without operculum, and with an elater to every spore* } 18. EQUISETACEÆ.

2. MUSCI.

- Spore-cases opening by valves, with an operculum, without elaters* } 19. ANDREACEÆ.
- Spore-cases valveless, with an operculum, without elaters* } 20. BRYACEÆ.

ORDER XV. RICCIACEÆ.—CRYSTALWORTS.

RICCIÆ, *Nees Leberm.* 86; *Bischoff in Nov. Act.* xvii. 2. 964; *Lindb. ibid.* xviii. 412.—RICCIACEÆ, *Endl. Gen.* xvii.

DIAGNOSIS.—*Spore-cases valveless, without operculum or elaters.*

Terrestrial herbs, of diminutive size, inhabiting mud or water, swimming or floating, usually annual, their leaves and stems blended into a frond of a cellular structure, creeping, green or purple underneath, with a distinct epidermis, and a cavity of air-passages beneath it in some species. Antheridia immersed in the frond, with their mouth projecting in the form of a papilla, or a slender cone. Pistillidia in the frond of the same or a different individual, immersed or superficial, sessile or stalked; the common involucre either missing or scaly; the involucels none, or in the form of little bladders perforated at the point. Spore-cases membranous, united to a calyptra, or distinct from it, globose, bursting irregularly when ripe. Spores triangular, pyramidal, and half round, without elaters.—*Endl.*

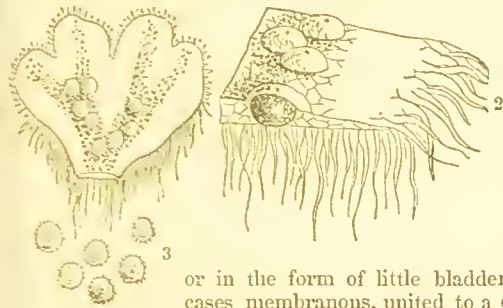


Fig. XXXVI.

These little plants form a plain transition from Thallogens to Acrogens. They have that combination of leaves and stem into what is called a frond, which is characteristic of Lichens, and their spores may be not unaptly compared to the tetraspores of the Rose-tangle order. But, on the other hand, their spores are collected in large numbers within organs resembling the pistils of phænogamous plants; they have a distinct axis of growth, and an epidermis is distinctly formed with stomates for breathing with. (See *Lindenberg*, l. c.) While, however, for the latter reasons, they are to be regarded as more elevated in the scale of organization than Lichens, or similar plants, they are inferior to Liverworts and Scale-mosses, because of the absence of those spiral springs called elaters, by which, in the latter orders, the spores are dispersed; and to Split-mosses and Urn-mosses, because they want the complicated apparatus which is added to the spore-cases of those orders, under the form of either an operculum, or peristome. According to Endlicher, the Crystalworts pass through *Corsinia* into the tribe of Liverworts, and by *Sphærocarpus* into that of Scalemosses. There is a detailed account, by Unger, of the anatomy of *Ricciæ glauca*, in the *Linnaea*, vol. xiii. p. 1. The genus *Duriæa* is regarded by Messrs. Bory and Montagne as forming the nearest transition to Liverworts; they describe it as fructifying under water, which is very seldom the case with the other Crystalworts. *Ann. Sc. N.* 3 ser. i. 225.

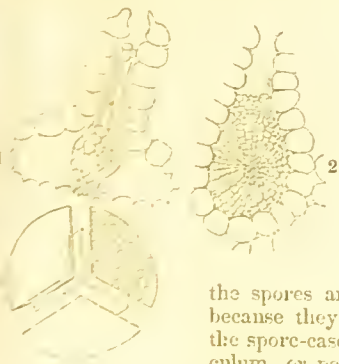


Fig. XXXVII.

Of the species hitherto known, two-thirds have been observed in Europe, and the remainder in various parts of the world. Several species in North America, the Cape of Good Hope, and Brazil, appear to be very similar to those of Europe.—*Endl.*

The uses of Crystalworts are unknown.

GENERA.

<i>Duriæa</i> , B. & Mont.	<i>Hemisæumata</i> , Bisch.	<i>Sphærocarpus</i> , Mich.	<i>Glynteria</i> , Trevir.
<i>Ricciæ</i> , Mich.	<i>Ricciocarpus</i> , Cord.	<i>Oxymitra</i> , Bisch.	<i>Brissocarpus</i> , Bisch.
<i>Leberoides</i> , Bisch.	<i>Salmicella</i> , Hüb. n.	<i>Ruppina</i> , Corda.	<i>Tesselinia</i> , Dum. part.
<i>Ricciella</i> , A. Braun.	<i>Honna</i> , Raf.	<i>Corsinia</i> , Radcl.	

NUMBERS. GEN. 3. Sp. 29.

Lichenaceæ.

POSITION. Bryaceæ.—RICCIACEÆ.—Marchantiaceæ.

Crumiaceæ.

Fig. XXXVI.—1. *Ricciæ patens*, a lobe magnified; 2. a portion of it, showing the spore cases cut off; 3. spores.
Fig. XXXVII.—*Ricciæ glauca*. 1. A young spore case; 2. an antheridium; 3. spores as they lie in the mother cell. (*Unger*.)

ORDER XVI. MARCHANTIACEÆ.—LIVERWORTS.

Hepaticæ, *Juss. Gen.* 7. (1789); *DC. Fl. Fr.* 2. 415. (1815); *Agardh Aph.* 104. (1822); *Nees ab Esenb. in Martius, Fl. Bras.* 1. 295. (1833); *Hooker's British Flora*, vol. ii. p. 97. (1833); *Bischoff de Hepaticis in Act. Acad. Nat. Cur.* xvii. pars 2. (1836); *Ann. des Sc.* 2. ser. 4. 309. (1836).—*Marchantiaceæ and Targioniaceæ*, *Ed. pr. Endl. Gen.* xx.—*Marchantieæ and Targioniæ*, *Nees Lebermoose*, 84.—*Marchantieæ*, *Taylor in Linn. Trans.* 17. 377.

DIAGNOSIS.—*Spore-cases valveless, or bursting irregularly, without operculum, but with elaters.*

Plants growing on the earth or trees in damp places, composed entirely of cellular tissue, emitting roots from their under-side, and consisting of an axis or stem which is leafless, but bordered by membranous expansions, which sometimes unite at their margins, so as to form a broad lobed frond, having a distinct epidermis pierced by stomates. Antheridia either immersed in the frond, or placed on disk-like sessile or stalked peltate receptacles. Pistillidia lurking within involucre, either placed below the edge of the frond, or on the edge or under-side of stalked heads. Spore-cases stalked, opening by irregular fissures, or by separate teeth. Spores globose, with elaters.

With these plants organization advances another step. To the spores of the Crystalworts are added spiral threads or elaters for their dispersion; and various lacerated membranes surrounding the spore-cases seem to be imitating the calyx and corolla of perfect plants. There is still, however, a want of true leaves, which are fused, with the stem, into a frond. The principal part of the order has the spore-cases raised on a long stalk, and clustered into a head; but this character is missing in Targioneæ, which Endlicher regards as a distinct order. In these plants, as in Mosses and Charas, each cell of what are called the antheridia contains a body resembling an animalcule of the genus *Vibrio*, which moves about rapidly in water, as soon as it is liberated from its birth-place. Germination takes place by an universal increase and enlargement of the spore, which becomes lobed, as it were, by the swelling of the cellulæ, and is afterwards nourished by the emission of a radicular fibre. The original development of Ferns and Liverworts is much the same. *Fl. Bras.* i. 299.

The Liverworts differ from Crystalworts in having elaters and involucrete spore-cases, and from Sealemosses or Jungernanniaceæ, in the want of power to separate their spore-cases into distinct valves.

Natives of damp shady places in all climates; two were found in Melville Island. The only atmospheric condition to which they cannot submit is excessive dryness.

Little is known of their uses. De Candolle thinks it probable that the larger kinds will be found to resemble foliaceous Lichens in their qualities. A few are slightly fragrant, with a subacid taste. They have been employed in liver complaints, but their use seems a mere superstition. It is, however, alleged that *Marchantia hemisphærica* has really proved advantageous in dropsical affections.

GENERA.

Suborder I. MARCHANTIEÆ.—Spore-cases capitate. Involucre membranous, regularly slit.	<i>Dictyochiton</i> , Cord. <i>Pegatella</i> , Radd. <i>Conoccephalus</i> , Vaill. <i>Cymoccephalum</i> , Wigg. <i>Lunularia</i> , Michel. <i>Sedgwickia</i> , Bowd. <i>Plagiochasma</i> , Lehm. <i>Ottona</i> , Cord. <i>Sedgwickia</i> , Blsch. <i>Aitonia</i> , Forst. <i>Ruppinia</i> , L. f. <i>Antrocephalus</i> , Lehm. <i>Rebouillia</i> , Radd.	<i>Asterella</i> , Palis. <i>Rhachiocarpon</i> , Cord. <i>Achilon</i> , Cord. <i>? Mesoregma</i> , Cord. <i>Sauteria</i> , Nees. <i>Hampya</i> , Nees. <i>Dumortiera</i> , Nees. <i>Hypophila</i> , Mack. <i>Hypophylla</i> , Tayl. <i>? Spathysia</i> , Nees. <i>Marchantia</i> , March. <i>Astromarchantia</i> , Nees <i>Chlamidium</i> , Cord.	<i>Preissia</i> , Nees. <i>Choniocarpon</i> , Cord.
Grimaldia, Radd. <i>Pneurochiton</i> , Radd. <i>Spudoniseæ</i> , Radd. <i>Mannia</i> , Cord. <i>Duvalia</i> , Nees. <i>Petalophyllum</i> , Nees. <i>Fimbriaria</i> , Nees. <i>Hypnandron</i> , Cord.			Suborder II. TARGIONIÆÆ.—Spore-cases submarginal, solitary. Involucre wanting. <i>Targionia</i> , Michel. <i>Cyathodium</i> , Lehm. <i>? Carpototus</i> , Schwein.

NUMBERS. GEN. 15. Sp. 20 !

Equisetaceæ.

POSITION. *Ricciaceæ*.—MARCHANTIACEÆ.—*Jungernanniaceæ.*

Lichenaceæ.

Fig. XXXVIII.—1 *Marchantia cuneata*, natural size; 2 a head of spore-cases; 3 a section of the disk which bears the spore-cases; 4 elater; 5 granular spore.

ORDER XVII. JUNGERMANNIACEÆ.—SCALEMOSES.

Hepaticarum, § § Jungermanniaceæ et Lejeuniaceæ, Dumort. *Comment. Botan.* 112. (1822).—Jungermanniaceæ et Anthocerinæ, Id. *Syllog. Jungerm.* 6. (1831).—Hepaticarum § of most other Authors.—Jungermanniaceæ, *Nixus Pl.* 24. (1833).—Nees v. Esenb. *Naturgeschichte der Europäischen Lebermoose*, vol. i. (1833).—Endl. *Gen.* xxi.

DIAGNOSIS.—Spore-cases opening by a definite number of equal valves, without operculum, but with claters.

Creeping moss-like plants, either with imbricated very cellular leaves surrounding a central axis, or with the leaves and axis all fused into one common leafy expansion.

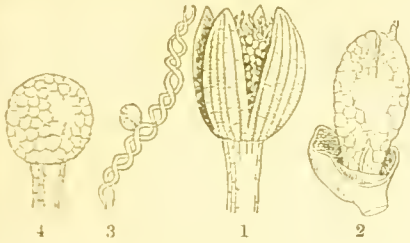


Fig. XXIX.



Fig. XLI.

Antheridia scattered, free, or immersed. Pistillidia solitary, with both involucre and involucl. Spore-cases without an operculum, 4-parted, or 4-valved, with or without a central columella. Spores mixed with elaters.



Fig. XLII.

Here the approach to a higher organization becomes more manifest. Instead of a frond consisting of a stem and the leaves not distinguishable from it, we have, in the majority of cases, well-defined separate symmetrical leaves; and in the section Anthocerotæ there is a central columella, which is evidently a transition to the structure of the Urmosses. These Scalemosses differ from the Liverworts in the regularly valvate condition of the spore-cases, and in their long-stalked simple fruits. In *Blasia* and others, the habit is that of the Liverworts.

Shady woods in hot climates appear to be most prolific in these plants, which, however, seem capable of growing wherever the climate will produce Lichens. The tropics are very rich in them.

Their uses are unknown.

GENERA.

Suborder I. JUNGERMANNIACEÆ.—Spore-cases 1 or 4 valved without a columella.	<i>Römeria</i> , Radd. <i>Metzgeria</i> , Cord. <i>Sarcomitrium</i> , Cord.	<i>Diploloma</i> , Dumort. <i>Dilawa</i> , Dumort. <i>Cardaca</i> , Nees. <i>Diplomitrium</i> , Cord.	<i>Bryopteris</i> , Nees. <i>Schultesia</i> , Radd. <i>Physanantlius</i> , Lach. <i>Physanantlius</i> , Nees.
Metzgeria, Radd.	<i>Blasia</i> , Michx. <i>Symphogyna</i> , Nees et Mont.	<i>Codonide</i> , <i>Fossombronia</i> , Radd. <i>Codonia</i> , Dumort.	? <i>Falkenoides</i> , Radd. <i>Mudlothea</i> , Dumort. <i>Bellincinia</i> , Radd. <i>Antoira</i> , Radd.
<i>Echinomitrium</i> , Cord. <i>Echinogyna</i> , Dumort. <i>Fasciola</i> , Dumort.	<i>Pellia</i> , Radd. <i>Scopulina</i> , Dumort.	<i>Jubulida</i> , <i>Lejeunia</i> , Lib. <i>Pharmanouca</i> , Dumort. <i>Prallania</i> , Nees.	<i>Porella</i> , Dickes. <i>Radula</i> , Dumort.
Aneurida. <i>Trichogyna</i> , Cord. <i>Aneuria</i> , Dumort.	<i>Diplomitrida</i> , <i>Hollia</i> , Endl. <i>Hyla</i> , Endl.	<i>Jubula</i> , Dumort.	<i>Rachistopus</i> , Dumort. <i>Gandollen</i> , Radd. part.

Fig. XXXIX.—1. Spore case of *Jungermannia hypnina* ripe and bursting; 2. the same, very young and covered with the claters; 3. Clater and spore; 4. Antheridium.

Fig. XLI.—1. *Monoclea capitata*, a little magnified; 2. Spore case and clater; 3. Clater and spore.

Fig. XLII.—1. *Monoclea capitata*, a little magnified; 2. Spore case and clater; 3. Clater and spore.

Ptilidæ.	Mastigobryum, <i>Nees</i> .	Lophocolea, <i>Nees</i> .	Sarcoscyphus, <i>Cord</i> .
Ptilidium, <i>Nees</i> .	<i>Pleuroschismatypus</i> ,	Jungermannia, <i>Dill</i> .	<i>Marsupia</i> , Dumort.
<i>Blepharozia</i> , Dumort.	Dum.	<i>Aplozia</i> , Dumort.	<i>Marsupella</i> , Dumort.
Trichocolea, <i>Nees</i> .	<i>Calypogeia</i> , Radd. part.	<i>Lophozia</i> , Dumort.	Gymnomitrium, <i>Nees</i> .
<i>Tricholea</i> , Dumort.	<i>Cincinnulus</i> , Dumort.	<i>Cephalozia</i> , Dumort.	<i>Acolea</i> , Dumort.
<i>Thricolca</i> , Dumort.	Geocalycidæ.	<i>Anthelia</i> , Dumort.	Haplomitrium, <i>Nees</i> .
Mastigophoridaæ.	Gongylanthus, <i>Nees</i> .	<i>Blepharostoma</i> , Dum.	<i>Mniopsis</i> , Dumort.
Sendtnera, <i>Endl</i> .	Geocalyx, <i>Nees</i> .	<i>Odontoschisma</i> , Dum.	
<i>Mastigophora</i> , <i>Nees</i> .	Saccogyna, Dumort.	Plagioclila, <i>Nees et Mont</i> .	Suborder II. ANTHOCER-
Schisma, Dumort.	<i>Syckorea</i> , Cord.	<i>Radula sect.</i> , Dumort.	OTÆ.— <i>Nees</i> . Spore-
Trichomanidæ.	Jungermannidæ.	<i>Scapania</i> , Dumort.	cases pod-shaped, split
Physotium, <i>Nees</i> .	Gymnoscyphus, <i>Cord</i> .	<i>Candollea</i> , Radd.	on one side, or 2-valved,
Herpetium, <i>Nees</i> .	Cheiloscyphus, <i>Cord</i> .	? <i>Notarisia</i> , Coll.	with a columella.
<i>Mastigophora</i> , <i>Nees</i> .	<i>Marsupella</i> , Dum. part.	Gymnowitridæ.	Anthoceros, <i>Mich</i> .
<i>Pleuroschisma</i> , Dum.	Harpantus, <i>Nees</i> .	Alicularia, <i>Cord</i> .	<i>Anthocrites</i> , <i>Corda</i> .
Lepidozia, Dumort.	Gyuananthe, <i>Taylor</i> .	<i>Mesophylla</i> , Dumort.	Monoclea, <i>Hook</i> .
		Acrobolbos, <i>Nees</i> .	Cladobryum, <i>Nees</i> .

NUMBERS. GEN. 42. Sp. 650 ?

POSITION. Marchantiaceæ.--JUNGERMANNIACEÆ.—Andriaceæ.

ORDER XVIII. EQUISETACEÆ.—HORSETAILS.

Equisetaceæ, DC. *Fl. Fr.* 2, 580. (1805); *Agardh Aph.* 119. (1822); *Kaulfuss Enum. Filicum*, 1. (1824); *Adolphe Brongniart Hist. Veg. Foss.* 99. (1828).—*Endl. Gen.* xxv. *Link filic. sp.* p. 9.

DIAGNOSIS.—*Spore-cases peltate, splitting on one side, without operculum, and with an elater to every spore.*

Leafless branched plants with a striated fistular stem, in the cuticle of which silex is secreted; the articulations separable and surrounded by a membranous toothed sheath. Stem fistular, with many longitudinal cavities in its circumference; chiefly consisting of cellular substance, but coated externally with a layer of hard woody tubes, from which plates of a similar nature project towards the centre, partially dividing the longitudinal cavities from each other. Stomates arranged longitudinally on the cuticle. Spiral vessels very small but abundant. Spore-cases opening inwards by a longitudinal slit, attached to the lower face of peltate scales, which are collected into terminal cones. Spores, oval grains, wrapped round with a pair of highly elastic clavate elaters.

The remarkable plants known by the vulgar name of Horsetails, seem to have no very decided affinity to any existing order. With Ferns their relation is not obvious. In the arrangement of their reproductive organs they have a striking resemblance to *Zamia*, and in their general aspect to *Ephedra* or *Casuarina*. Their germination is that of Cellular plants, and approaches nearly to Urmosses. The structure of their stem is well described by Ad. Brongniart in his *History of Fossil Vegetables*, as are, indeed, other parts of their organisation: see Tables 11 and 12 of that work. This ingenious writer entertains the opinion that the green body, which is known to be the spore, is a naked ovule, and the four swollen filaments that surround it four grains of pollen united in pairs to the base of the ovule. In the last edition of this work I adopted M. Brongniart's view, and accordingly placed *Equisetum* with *Coniferæ*, an error so very obvious, as to have called forth rebukes, which were richly deserved. The development of the swollen filaments has been carefully observed by Mohl, Henderson, and others, who have demonstrated that they are really produced by the spiral splitting of the cell in which the spore is formed; in fact, they appear quite analogous, as Mr. Griffith has stated, to the elaters of *Marchantia* and its allies, to which the order bears, perhaps, a nearer relation than to any other plant. To regard Horsetails as a high form of the Muscal alliance seems to me more expedient than to station them with Ferns and Clubmosses, to which they seem to have no immediate affinity. The resemblance between the peltate scales of *Equisetum* and the heads of spore-cases in *Marchantia*, is too obvious not to strike the most unpractised observer. Link calls these scales *Sporidochia*.

The germination of the spores has been explained, both by Agardh and Bischoff. The former (*Aphor.* 120) describes it thus: from three to fourteen days after they are sown, they send down a filiform, hyaline, somewhat clavate, simple root, and protrude a confervoid, cylindrical, obtuse, articulated, torulose thread, either two-lobed (in *E. pratense*) at the apex, or simple (in *E. palustre*). Some days after, several branches grow out and are agglutinated together, forming a body resembling a bundle of confervoid threads, each of which pushes out its own root. The account of Bischoff (*Nov. Act. Acad. N. Cur.* 11, t. 44.) is not materially different: he finds the confervoid threads, or numerous processes of cellular development, go on

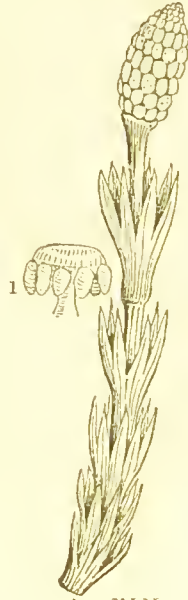


Fig. XLII.



Fig. XLIII.

Fig. XLII.—*Equisetum arvense*. 1. A peltate disk seen from the side.

Fig. XLIII.—*Equisetum*; its spores wrapped round by elaters.

growing and combining, until a considerable cellular mass is formed; then this mode of development ceases, and a young bud is created, which springs up in the form of the stem of the *Equisetum*, at once completely organised, with its air-cells, its central cavity, and its sheaths, the first of which is formed before the elongation of the stem, out of the original cellular matter.

Horsetails are found in ditches and rivers in most parts of the world, within and without the tropics.

None are of importance in a medical point of view; they are said to be slightly astringent and stimulating, and have even been recommended as diuretics and emmenagogues; they are, however, not now employed. In economical purposes they are found to be useful for polishing furniture and household utensils—a property which is due to the presence of a great quantity of silex in their cuticle. According to the observations of John of Berlin, they contain full thirteen per cent. of siliceous earth. The ashes have been found by chemists to contain half their weight of silica. The quantity of silex contained in the cuticle of *Equisetum hyemale* is so great, that Sivright succeeded in removing the vegetable matter and retaining the form. On subjecting a portion of the cuticle of *Equisetum hyemale* to the analysis of polarised light under a high magnifying power, Brewster detected a beautiful arrangement of the siliceous particles, which are distributed in two lines parallel to the axis of the stem, and extending over the whole surface. The greater number of the particles form simple straight lines, but the rest are grouped into oval forms, connected together like the jewels of a necklace, by a chain of particles forming a sort of curvilinear quadrangle, these rows of oval combinations being arranged in pairs. Many of those particles which form the straight lines do not exceed the 500th of an inch in diameter. Brewster also observed the remarkable fact, that each particle has a regular axis of double refraction. In the straw and chaff of Wheat, Barley, Oats, and Rye, he noticed analogous phenomena; but the particles were arranged in a different manner, and displayed figures of singular beauty. From these data it is concluded that the crystalline portions of silex and other earths, which are found in vegetable tissues, are not foreign substances of accidental occurrence, but are integral parts of the plant itself, and probably perform some important function in the process of vegetable life. A very large quantity of starch is found during winter in the rhizomes; in whose cells, during the month of October, the particles may be seen in active motion, passing up one side, and retreating by the other, much in the same way as in *Chara*. This I have often noticed in *Equisetum fluviatile*.

GENUS.

Equisetum, L.

NUMBER. GEN. 1. Sp. 10

Characea.
POSITION. Marenantiaceæ.—EQUISETACEÆ.
Gracilacea.

ORDER XIX. ANDRÆACEÆ.—SPLITMOSES.

Andræaceæ, *Nixus Pl.* 24. (1833); *Endl. Gen.* xxii.DIAGNOSIS.—*Spore-cases opening by valves, with an operculum, without elaters.*

Branching moss-like reddish or brown plants, with imbricated ribbed or ribless leaves.

Spore-case with a calyptra, seated on a fleshy apophysis, splitting longitudinally into four equal valves whose summits are always bound together by the persistent operculum. Peristome 0. Spores surrounding a central columella.

Linnaeus considered the only genus of which this order consists, the same as *Jungermannia*; more recent observers have withdrawn it to associate with *Urmosses*. It hardly, however, belongs more to the one than the other; if it agrees with *Urmosses* in having an operculum, it disagrees in having a valvular spore-case; and if it accords with the *Sealemosses* in the latter circumstance, it differs from them in the former, and in the want of elaters.

Natives of cold and temperate regions, especially on rocks in bleak places, as high as the limits of eternal snow, where they form a close mat.

Their uses are unknown.

GENERA.

Andræa, Ehr. *Acroschisma*, Hook. *fl.*
Petrophila, Brid.

NUMBERS. GEN. 2. Sp. 13.

POSITION.—*Jungermanniaceæ*.—
ANDRÆACEÆ.—*Bryaceæ*.

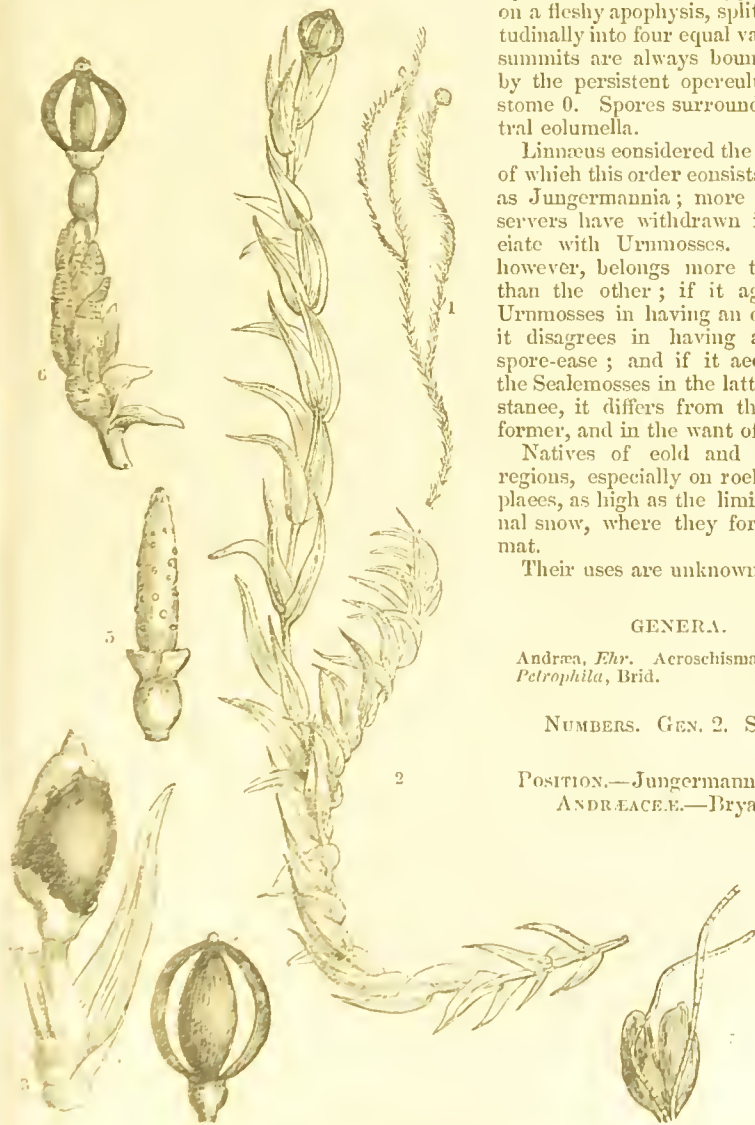


Fig. XLIV.

Fig. XLIV.—1. *Andræa nivalis*, natural size; 2. the same much magnified; 3. spore-case with the torn calyptra; 4. spore-case after the discharge of the spores; 5. columella with a few spores adhering; 6. *Andræa rupestris* much magnified; 7. its antheridia and thread-like paraphyses.—*Hooker*.

ORDER XX. BRYACEÆ.—URNMOSSES.

Musci, *Juss. Gen.* 10. (1789); *Hedwig Deser. et Adumb.* (1787-1797); *Bridel Muscolog. recentiorum* (1797-1803); *Hedw. Species Muscor. Frondos.* (1801); *Pulisol Prodrôme des 5 et 6 Fam. de l'Éthérogam.* (1805); *Bridel Suppl.* (1806-1819); *Weber Tabul. Musc. Frondos.* (1813); *DC. Fl. Fr.* 2. 438. (1815); *T. F. L. Nees de Muscor. Propag.* (1818); *Hooker and Taylor, Musc. Brit.* (1818); *Hooker, Musci Erotici* (1818-1820); *Agardh Aphor.* 105. (1822); *Greville and Arnott in Wern. Trans.* 4. 109, &c. (1822); *Nees v. Eschbeck, Hornschuch, and Sturm, Bryolog. Germ.* (1823); *Grev. Fl. Edin.* xiii. (1824); *Ad. Brongn. in Dict. Class.* 11. 248. (1827); *Hooker. Brit. Fl.* 1. 459. (1830).—Bryaceæ, *Ed. pr.* (1836); *Endl. Gen.* xxiv.—Sphagnaceæ, *Endl. Gen.* xxiii.

DIAGNOSIS.—Spore-cases valvulose, with an operculum, without claters.

Erect or creeping, terrestrial or aquatic, cellular plants, having a distinct axis of growth, destitute of a vascular system, and covered with minute imbricated, entire, or serrated leaves. Reproductive organs of two kinds, viz. 1. Antheridia, which are axillary,

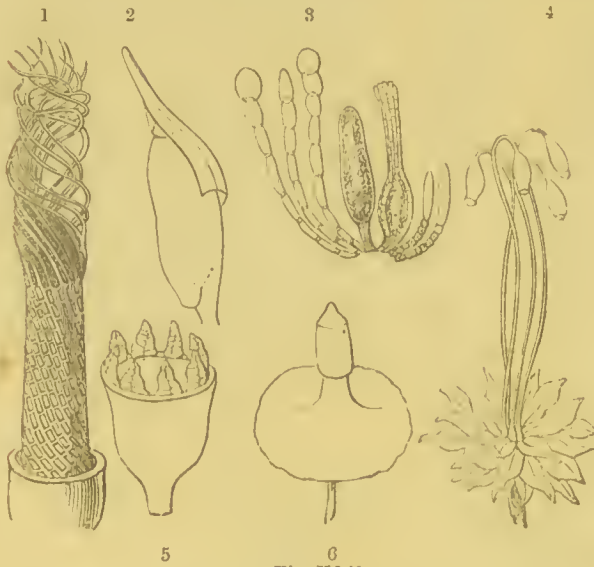


Fig. XLV.

cylindrical or fusiform stalked sacs, containing a multitude of spherical or oval particles emitted upon the application of water, and coiled up bodies which move in water with activity; 2 Pistillidia, or flask-like bodies inclosed within a convolute braet, which is eventually carried up upon the point of the spore-case. Spore-cases, or ripened pistillidia, hollow urnlike vessels, seated upon a seta or stalk, covered by a membranous calyptra, closed by a lid or operculum, beneath which are one or more rows of cellular rigid processes, called collectively the peristome, and separately teeth, which are always some multiple of four,

and combined in various degrees; the centre of the theca is occupied by an axis or columella, and the space between it and the sides of the theca is filled with spores. Spores in germination protruding confervoid filaments, which afterwards ramify, and form an axis of growth at the point of the ramifications.

These little plants, which form one of the most interesting departments of Cryptogamic Botany, are distinctly separated from all the previous tribes by the peculiar structure of their reproductive organs, in which they resemble no others, except the Scalemosses, whose approach, however, is more apparent than real. In their organs of vegetation they are strikingly similar to many Clubmosses, to which, perhaps, an approach is made by Sphagnum, whose spore-case has no peristome, on which account, indeed, that genus is regarded as a distinct Natural Order by Endlicher.

For a long time Urnmosses were considered to be destitute of stomates; but first Treviranus, and afterwards Valentine, distinctly proved those organs to be present; (*Linna. Trans.* 18, 239). In addition to such apertures, some of the cells of certain species of Sphagnum are pierced with large round openings; and Rœper has observed, that such perforated cells are the habitation of the animalcule called Rotifer vulgaris. (*Flora*, 1838, p. 17.) Mohl has observed similar openings in the cells of *Leucobryum vulgare*, (*Dicranum glaucum*), and *Octoblepharum albidum*; he thinks they are formed subsequently to the construction of the cells. *Ann. Sc. N. s.* xiii. 103. Schleiden confirms

Fig. XLV.—1. Peristome of *Tortula ruralis*; 2. Theca of *Ceratodon purpureus*; 3. Supposed representatives of sexual organs in *Mesia longiseta*; 4. *Bryum roseum*; 5. Peristome of *Octoblepharum albidum*; 6. Apophysis and theca of *Splachnum luteum*.

this, and adds to the list of porous Urmosses, *Octoblepharum cylindricum*, *Didymodon sphagnoides*, and *Leucobryum minus, albidum, and longifolium*.

Mr. Griffith (*Calc. Journ.* v.) strenuously advocates the sexuality of the Antheridia and Pistillidia, regarding the former as a true male apparatus, and the latter as a pistil containing an ovule. I do not know that he has anywhere adduced proof of the validity of this opinion; and it is difficult to comprehend upon what evidence that theory depends; it may, however, be presumed, that he considers the spores to be analogous to embryos, formed in vast numbers. This admirable observer thinks, that evidence in favour of fecundation in some way in Mosses and Liverworts, is afforded by the breaking up of the tissue, terminating and closing what he calls the style, that is to say, the point of the pistillidium, subsequently to the application of a particular matter, whereby the style becomes a canal, opening externally by a brownish observable in the orifice of this canal, extending downwards until it reaches the cavity of the (his) ovary, and by a corresponding enlargement of a cell (his ovule) existing in that cavity. Mr. Valentine, however, does not regard these appearances as connected with fecundation.

An uninitiated person, reading the definition of a genus of Urmosses, might suppose that to be the tribe in which an approach to the animal creation most nearly takes place. Unacquainted with the exact meaning of the Latin words employed by Bryologists, he might understand by the peristomium a jaw, by the calyptra a nightcap, and by the struma a kind of goitre; and when he saw that teeth belonged to this jaw, he would naturally conclude that it was really a vegeto-animal of which he was reading. Struck with the evident absurdity of giving such names to parts of plants, without at the same time explaining their real nature, I formerly ventured to call the attention of naturalists to the subject by the following paragraph in the *Outlines of the First Principles of Botany*.

“The calyptra may be understood to be a convolute leaf; the operculum another; the peristomium one or more whorls of minute flat leaves; and the theca itself to be the excavated distended apex of the stalk, the cellular substance of which separates in the form of sporules.”

The reasoning upon which I conceived this hypothesis to be sustained, was the following:—Every one agrees in describing the calyptra as a membrane arising from between the leaves and the base of the young spore-case, and as enveloping the latter, but having no organic connexion with it: when the stalk of the spore-case lengthens, no corresponding extension of the parts of the calyptra takes place; so that it must be either ruptured at its apex (as in *Jungermannia*), or at the base; and in the latter case it would necessarily be carried up upon the tip of the spore-case, which it originally enveloped. Now, what can be more reasonable than that such an organ, situated as thus described, should be one of the last convolute leaves of the axis which the spore-case terminates, bearing the same relation to the latter as the convolute bractea to the flower of *Magnolia*, or, to speak more precisely still, as the calyptiform bractea to the flower of *Pileanthus*? If the calyptra be anatomically examined, especially in such genera as *Tortula* and *Dicranum*, no difference in its tissue and that of the leaves will be observable; and that very common tendency to dehiscence on one side only as the diameter of the theca increases, which characterises the dimidiate calyptra, may be understood to be a separation at the line where the margins of the supposed leaf united; in the mitriform calyptra this separation at a given line does not take place, and the consequence is an irregular laceration of its base. The analogy of the calyptra being of this nature, the next inference would naturally be, that the part it contains corresponds with a flower-bud. Upon this supposition, the external series of parts belonging to this supposed bud would be the operculum; the adhesion of this organ to the spore-case, which would answer to the apex of the axis, or to the tube of the calyx of flowering plants, would be analogous to what occurs in *Eucalyptus*, or perhaps more exactly to that of *Eschscholtzia*. As to the number of the parts, in a state of cohesion, of which it is made up, it will be observed that in the paragraph above quoted, it is stated to be one only. My reason for adopting this conclusion was the absence of any trace of division upon its surface or in the substance of its tissue, and also the apparent identity of nature between it and the calyptra when both are young, in the *Tortula* and *Dicranum* genera already cited. With regard to the peristomium:—The teeth, as they are called, occupy one or more whorls; they are evidently not mere lacerations of a membrane, because they are in a constant and regular number in each genus, and that number is universally some multiple of 4, as the floral leaves of flowering plants are ordinarily of 3, 4, or 5; they have the power of contracting an adhesion with each other by their contiguous margins, as the floral leaves of flowering plants; they alter their position from being inflexed with their points to the axis, to being recurved with their points turned outwards, exactly as happens in flowering plants; the teeth of the inner

peristomium often alternate with those of the outer, thus conforming to the law of alternation prevalent in the floral leaves of flowering plants; and, finally, if we compare the various states of the leaves of *Buxbaumia aphylla* with the teeth of other Urnmosses, it is impossible not to be struck with the great similarity in the anatomical structure of the two. These considerations led me to the conclusion, that the calyptra, operculum, and teeth of Urnmosses, are all modified leaves; and hence that the spore-case is to be considered more analogous to a flower than to a seed-vessel. With regard to the membrane, or epiphragma, which occasionally closes up the orifice of the spore-case, it may be considered as formed by the absolute cohesion of the leaves of the peristome, just as the operculum of the genus *Eudesmia* is formed by the cohesion of petals; and this is confirmed, first, by *Calymperes*, in which the membrane ultimately separates into teeth, and by the fact that the horizontal membrane exists most perfectly in such genera as *Polytrichum* and *Lyellia*, in which there is no distinct peristome. As to the internal structure of this curious apparatus we may regard the spore-case as the hollow apex of the axis, the sporules as a partial dissolution of its cellular tissue, and the columella as the unconverted centre. That the end of the axis or growing point of plants frequently becomes much more thickened than the spore-case of Urnmosses, requires no illustration for those who are acquainted with *Eselischoltzia*, *Rosa*, or *Calycanthus*. That tissue is frequently disintegrated for particular purposes, is proved by the production of pollen out of the cellular tissue of an anther, and by the general law of propagation that seems to prevail in all the lower alliances of plants; the same phenomenon may be therefore expected in Urnmosses. That the columella should be left in this dissolution of the tissue might be expected, from its being a continuation of the seta or axis of development, the tissue of which is more compact, and of course less liable to separation, than the looser tissue that surrounds it; this is analogous to the separation of the pollen from the connective of most plants, or from parts only of the anther of all those genera which, like *Viscum*, *Ægiceras*, or *Rafflesia*, have what are called cellular anthers.

Mr. E. Quekett has lately proved the general accuracy of these views by the discovery of a monstrous moss, in which common leaves take the place of the spore-case, its peristome, and other apparatus. As this is a very curious subject, I extract at length his observations, with a few unimportant omissions:—"Soon after Mr. Ward made known his plan of growing plants in closely-glazed cases I had constructed a small case, in which were placed various Mosses, both in fruit, and having the tendency to form fruit. Among the number was a mass of *Tortula fallax*, showing, at the time, the early condition of the seta, capped with a calyptra. After watching the progress of the plants, it was discovered that the *Tortula*, which, when placed in it, showed every tendency to produce fruit, now presented, instead of fruit advancing to maturity, a miniature forest of elevated stems, leafy above and below, but in the intermediate portion, destitute of leaves; in fact, all appearance of capsules approaching maturity was dissipated. On placing some of the plants under the microscope, it was evident that the specimens were furnished with the usual leaves at the base of the plant,—the seta existed, and presented the usual brown colour, quite destitute of leaves, but in the place of the capsule, there was a continued elongation of the seta, of a green colour, bearing several green leaves, varying in number in different specimens, being generally from about twelve to twenty. It appears that the capsule had scarcely commenced to be formed, when the elements of the modified leaves, (which I conceive would have otherwise formed the capsule and peristome), having received an increased degree of heat, combined with more moisture than is natural to these plants, occasioned by the structure of the case, and by its position, instead of being converted into the ordinary capsule and peristome, the matters which entered the plants were not appropriated to the development of organs of reproduction, but underwent a change into a state fitting them apparently for the purposes of nutrition."

Mr. Quekett objects, however, to that part of the theory which assumes the spore-case to be the hollowed apex of the axis; he considers the theca and operculum to be the representatives of a consolidated calyx; the corolla to be the lining membrane, whose fringed edge constitutes a peristome, which is either single or double, and appears to be the representative of the reproductive apparatus; and the columella to be the receptacle, torus or axis on which these several organs are arranged.

Fine illustrations of the Anatomy of Urnmosses will be found in Link's *Ausgew. Anat. Bot. Abbild. Fasc. 4.*

Urn-mosses are found in all parts of the world where the atmosphere is humid: but they are far more common in temperate climates than in the tropics. They are among the first vegetables that clothe the soil with verdure in newly-formed countries, and they are the last that disappear when the atmosphere ceases to be capable of nourishing vegetation. The first green crust upon the cinders of Ascension consisted of minute

Mosses; they form more than a quarter of the whole Flora of Melville Island; and the black and lifeless soil of New South Shetland is covered with specks of Mosses struggling for existence. How they find their way to such places, and under what laws they are created, are mysteries that human ingenuity has not yet succeeded in unveiling. The Sphagna occupy vast tracts of morass with their spongy stems and leaves.

The slight astringency and diuretic qualities of Polytrichum and others caused them to be formerly employed in medicine, but they are now disused. In the economy of man they perform but an insignificant part; but in the economy of nature, how vast an end! Sphagnum forms part of the food of the reindeer; and in the polar regions the inhabitants dry it and make it into a sort of bread "miseræ vitæ delicias." *Endl.*

GENERA.

Archidium, <i>Brid.</i>	Ulota, <i>Mohr.</i>	Acidodontium, <i>Schw.</i>	Anoetangium, <i>Hedw.</i>
Phascum, <i>L.</i>	Leiotheca, <i>Brid.</i>	Pohlia, <i>Hedw.</i>	Hedwigia, <i>Hook.</i>
Pyxidium, <i>Ehrh.</i>	Cryptocarpus, <i>Dozy.</i>	Amphirrhinum, <i>Green.</i>	Erypodium, <i>Brid.</i>
Pleuridium, <i>Brid.</i>	Macromitrium, <i>Brid.</i>	Lagenium, <i>Brid.</i>	Endotrichum, <i>Dozy.</i>
Bruchia, <i>Schwaegr.</i>	Schlottheimia, <i>Brid.</i>	Paludella, <i>Ehrh.</i>	Symphysodon, <i>Dozy.</i>
Voitia, <i>Moug. et Nestl.</i>	Schizodon, <i>Swartz.</i>	Mnium, <i>Dill.</i>	Neckera, <i>Hedw.</i>
Saprona, <i>Brid.</i>	Orthodontium, <i>Schw.</i>	Orthopyxis, <i>Palis.</i>	Eleutheria, <i>Palis.</i>
Physidium, <i>Brid.</i>	Zygodon, <i>Hook.</i>	Aulacomnium, <i>Schw.</i>	Cyrtopus, <i>Brid.</i>
Voitia, <i>Hornsch.</i>	Amphidium, <i>Nees.</i>	Gymnocephalus, <i>Schw.</i>	Distichia, <i>Brid.</i>
Gymnostomum, <i>Hedw.</i>	Gagea, <i>Radd.</i>	Fusiconia, <i>Palis.</i>	Cryptopodia, <i>Röhl.</i>
Pottia, <i>Ehrh.</i>	Codonoblepharum, <i>Schw.</i>	Bryum, <i>Hedw.</i>	Actinodontium, <i>Schw.</i>
Anodontium, <i>Brid.</i>	Weissia, <i>Hedw.</i>	Peromnion, <i>Schwaegr.</i>	Actinodon, <i>Brid.</i>
Physomitrium, <i>Brid.</i>	Azelia, <i>Ehrh.</i>	Arrhenopterum, <i>Hedw.</i>	Daltonia, <i>Hook.</i>
Hymenostomum, <i>R. Br.</i>	Stearzia, <i>Ehrh.</i>	Maschalarren, <i>Spr.</i>	Macradon, <i>Arn.</i>
Hymenostylium, <i>Brid.</i>	Cavanilla, <i>Barkh.</i>	Bartramia, <i>Hedw.</i>	Dendropogon, <i>Schimy.</i>
Pyramidium, <i>Brid.</i>	Brachyodus, <i>Furnr.</i>	Cephaloxis, <i>Palis.</i>	Rhegmatodon, <i>Brid.</i>
Pyramidula, <i>Brid.</i>	Brachyodontium, <i>Furnr.</i>	Philonotis, <i>Brid.</i>	Sclerodontium, <i>Schwaegr.</i>
Hyophila, <i>Brid.</i>	Discellum, <i>Brid.</i>	Cyrtopodium, <i>Brid.</i>	Prionodon, <i>K. Mull.</i>
Rottleria, <i>Brid.</i>	Catascopium, <i>Brid.</i>	Cryptoscle, <i>Hook.</i>	Leucodon, <i>Schraeger.</i>
Entosthymenium, <i>Brid.</i>	Melania, <i>Brid.</i>	Glyphocarpus, <i>R. Br.</i>	Fuscina, <i>Schrank.</i>
Schistidium, <i>Brid.</i>	Coscinodon, <i>Spr.</i>	Plagiopus, <i>Brid.</i>	Cecatyphum, <i>Palis.</i>
Harrisonia, <i>Adans.</i>	Anacalypta, <i>Röhl.</i>	Conostomum, <i>Sw.</i>	Pterohryon, <i>Hornsch.</i>
Grizmia, <i>Ehrh.</i>	Trimatium, <i>Fröhl.</i>	Entosthodon, <i>Schwaegr.</i>	Leptodon, <i>Web.</i>
Hydropogon, <i>Brid.</i>	Mielichoferia, <i>Hornsch.</i>	Funaria, <i>Hedw.</i>	Lasia, <i>Brid.</i>
Dryopodon, <i>Brid.</i>	Eurybasis, <i>Brid.</i>	Koelreutera, <i>Hedw.</i>	Dicnemon, <i>Schwaegr.</i>
Racomitrium, <i>Brid.</i>	Oreas, <i>Brid.</i>	Strephegium, <i>Palis.</i>	Eucomis, <i>Brid.</i>
Holomitrium, <i>Brid.</i>	Auchenangium, <i>Brid.</i>	Meesia, <i>Hedw.</i>	Hollia, <i>Sieh.</i>
Orthotheca, <i>Brid.</i>	Calymperes, <i>Sw.</i>	Ambliodum, <i>Palis.</i>	Astrodonium, <i>Schwaegr.</i>
Cinclidotus, <i>Palis.</i>	Cryphia, <i>Palis.</i>	Diplocomium, <i>Web.</i>	Plaubelia, <i>Brid.</i>
Trochilus, <i>Hedw.</i>	Octohelepharum, <i>Hedw.</i>	Tristichis, <i>Ehrh.</i>	Symphlyodon, <i>Mont.</i>
Tetradontium, <i>Schw.</i>	Campyodontium, <i>Schw.</i>	Timmia, <i>Hedw.</i>	Antitrichia, <i>Brid.</i>
Tetraena, <i>Brid.</i>	Leucophanes, <i>Brid.</i>	Omphalophora, <i>Brid.</i>	Anomodon, <i>Hook.</i>
Georgia, <i>Ehrh.</i>	Oncophorus, <i>Brid.</i>	Polytrichum, <i>L.</i>	Climacium, <i>Web.</i>
Tetrapilia, <i>Hedw.</i>	Trematodon, <i>Rich.</i>	Pogonatum, <i>Palis.</i>	Porotrichum, <i>Brid.</i>
Erythropodon, <i>Schwaegr.</i>	Dicranum, <i>Hedw.</i>	Catharina, <i>Ehrh.</i>	Zygotrichia, <i>Brid.</i>
Cleistanoma, <i>Brid.</i>	Ceratodon, <i>Brid.</i>	Oligotrichum, <i>DC.</i>	Trachyloma, <i>Brid.</i>
Campylopus, <i>Brid.</i>	Agciceras, <i>Green.</i>	Atrichum, <i>Palis.</i>	Hookeria, <i>Smith.</i>
Thysanomitrium, <i>Schw.</i>	Trichostomum, <i>Hedw.</i>	Callibryum, <i>Web.</i>	Pterygophyllum, <i>Brid.</i>
Oedipodium, <i>Schwaegr.</i>	Trichomodon, <i>Hedw.</i>	Psilopilum, <i>Brid.</i>	Hypopterygium, <i>Brid.</i>
Orthodon, <i>Bory.</i>	Ditrichum, <i>Timm.</i>	Lyellia, <i>R. Br.</i>	Heticophyllum, <i>Brid.</i>
Eremodon, <i>Brid.</i>	Pilipozon, <i>Brid.</i>	Gomphophorus, <i>Brid.</i>	Cyathophorum, <i>Palis.</i>
Cyrtodon, <i>R. Br.</i>	Mauheba, <i>Brid.</i>	Buxbaumia, <i>Hall.</i>	Chaetophora, <i>Brid.</i>
Dicodon, <i>Grev. et Arn.</i>	Desmatodon, <i>Brid.</i>	Saccophorum, <i>Palis.</i>	Racomium, <i>Palis.</i>
Aplodon, <i>R. Br.</i>	Leucoloma, <i>Brid.</i>	Hippopodium, <i>Röhl.</i>	Aubertia, <i>Palis.</i>
Plachnum, <i>L.</i>	Barbula, <i>Hedw.</i>	Diphyscium, <i>Web. et M.</i>	Cryphaea, <i>Brid.</i>
Pyrenopphyllum, <i>Rehb.</i>	Mollia, <i>Schrank.</i>	Hymenopogon, <i>Palis.</i>	Pilotrichum, <i>Palis.</i>
Apophyxis, <i>Hedw.</i>	Streblotrichum, <i>Palis.</i>	Dawsonia, <i>R. Br.</i>	Meteorium, <i>Brid.</i>
Diacasophyllum, <i>Rehb.</i>	Tortula, <i>Hedw.</i>	Triplocoma, <i>La-Pyl.</i>	Erypodium, <i>Brid.</i>
Cytasophyllum, <i>Rehb.</i>	Syntrichia, <i>Web. et Mohr.</i>	Stylocomium, <i>Brid.</i>	Carovaglin, <i>Endl.</i>
Apodanthus, <i>La-Pyl.</i>	Eucalypta, <i>Hedw.</i>	Hypnum, <i>Linn.</i>	Esenbeckia, <i>Brid.</i>
Sclatophyllum, <i>Endl.</i>	Lorisia, <i>Hedw.</i>	Stereodon, <i>Brid.</i>	Lepidopilum, <i>Brid.</i>
Systylum, <i>Hornsch.</i>	Cynodontium, <i>Brid.</i>	Fabronia, <i>Raddi.</i>	Trachypodium, <i>Brid.</i>
Scouleria, <i>Hook.</i>	Cynodontium, <i>Hedw.</i>	Stereophyllum, <i>Brid.</i>	Fontinalis, <i>L.</i>
Wardia, <i>Hook. et Hore.</i>	Ptychostomum, <i>Hornsch.</i>	Maschalanthus, <i>Schulz.</i>	Spirideus, <i>Nees.</i>
Trilonium, <i>Hook.</i>	Brachycomium, <i>Hook.</i>	Pterigymnandrum, <i>Hed.</i>	Rhizidium, <i>Brid.</i>
Raineria, <i>Nobur.</i>	Hemilinaapsium, <i>Brid.</i>	Pterogonium, <i>Sw.</i>	Schistostegia, <i>Web.</i>
Tayloria, <i>Hook.</i>	Clastodium, <i>Brid.</i>	Maschalocarpus, <i>Spr.</i>	Dicksonia, <i>Ehrh.</i>
Pluvaticchia, <i>Brid.</i>	Bryum, <i>L.</i>	Leptohymenium, <i>Schw.</i>	Drepanophyllum, <i>Rich.</i>
Brachyteleum, <i>Heichenb.</i>	Whelea, <i>Hedw.</i>	Haplohyminium, <i>Schw.</i>	Phyllogonium, <i>Brid.</i>
Brachyotium, <i>Brid.</i>	Trentopohlia, <i>Hoffm.</i>	Anacamptodon, <i>Brid.</i>	Phyllogium, <i>Brid.</i>
Glyptomitrium, <i>Brid.</i>	Polia, <i>Adans.</i>	Pylaisaea, <i>Desv.</i>	Eustichia, <i>Brid.</i>
Glyptomitrium, <i>Schw.</i>	Cynellidium, <i>Swartz.</i>	Leskea, <i>Hedw.</i>	Octodilecras, <i>Brid.</i>
Criphlia, <i>R. Br.</i>	Amblyodon, <i>Palis.</i>	Omalla, <i>Brid.</i>	Fissidens, <i>Hedw.</i>
Orthotrichum, <i>Hedw.</i>	Leptostomum, <i>R. Br.</i>	Hemtragus, <i>Brid.</i>	Fuscina, <i>Schrank.</i>
Naria, <i>Borkh.</i>	Leptotheca, <i>Schwaegr.</i>	Helicodontium, <i>Schw.</i>	Schistophyllum, <i>Palis.</i>
Leptotrichum, <i>Röhl.</i>	Megalanthum, <i>Brid.</i>	Isoetium, <i>Brid.</i>	Sphagnum, <i>Dill.</i>
	Macrothecium, <i>Brid.</i>		

NUMBERS. GEN. 41. Sp. 1100 1

POSITION. Jungermanniaceæ. — BRYACEÆ. — Andraceæ.

ALLIANCE V.—LYCOPODALES.—THE LYCOPODAL ALLIANCE.

DIAGNOSIS.—*Vascular Acrogens, with axillary or radical one—or many-celled spore-cases, and spores of two sorts.*

The formation of leaves, which in the Muscal Alliance had become complete, is in this group carried still further ; for the leaves are now capable of generating spore-cases in their axils. That tendency to form spiral vessels which in Muscales is confined to the cellular tissue, with the single exception of the Horsetails, is now a characteristic of this Alliance, the axis containing in all cases spiral tubes in abundance. The larger of the Clubmosses seem to imitate Coniferous Gymnogens in their manner of growth, and in their tendency to collect their spore-cases in cones. The Pepperworts evidently exhibit an approach to that system of converting leaves into seed-vessels which is so generally characteristic of flowering plants. Here too it would seem that we have a great approach to the manner in which sexual organs are formed in the more perfect classes.

NATURAL ORDERS OF LYCOPODALS.

- | | |
|--|--------------------|
| <i>Spore-cases 1-3-celled, axillary ; reproductive bodies similar</i> | 21. LYCOPODIACEÆ. |
| <i>Spore-cases many-celled, radical (or axillary) ; reproductive bodies dissimilar</i> | } 22. MARSILEACEÆ. |

ORDER XXI.—LYCOPODIACEÆ.—CLUBMOSES.

Lycopodiaceæ, *Sicartz Synopsis Filicum* (1806); *R. Brown Prodr.* 164. (1810); *Agardh Aph.* 112. (1822); *Greville Flor. Edin.* xii. (1824); *Martius Ic. pl. crypt.* 37. (1834).—Lycopodiaceæ, *DC. Fl. Fr.* 2. 257. (1815); *Ad. Brongn. in Dict. Class.* 9. 561. (1826); *Link. Filic. Sp.* 155; *Endl. Gen.* xxxvi.

DIAGNOSIS.—*Lycopodal Acrogens*, with 1-3-celled axillary spore-cases, and the reproductive bodies all of the same nature.

Usually moss-like plants, with creeping stems and imbricated leaves, the axis consisting of one solid cord of annular vessels, or of a reticulated column of such vessels intersected by cellular tissue; or stemless plants, with erect subulate leaves, and a solid corn. Spore-cases 1-3-celled, axillary, sessile, either bursting by distinct valves, or indehiscent, and containing either minute powdery matter, or sporules, marked at the apex with three minute radiating elevated ridges upon their proper integument, or irregularly imbricated.

Intermediate as it were between Ferns and Coniferæ on the one hand, and Ferns and Mosses on the other; related to the first of those tribes in the want of sexual apparatus, and in the abundance of annular ducts contained in their axis; to the second in the aspect of the stems of some of the larger kinds; and to the last in their whole appearance, Lycopodiaceæ are distinctly characterised by their organs of reproduction. These are generally considered to be of two kinds, both of which are axillary and sessile, and have from 1 to 3 regularly dehiscing valves, the one containing a powdery substance, the other bodies much larger in size, which have been seen to germinate. In conformity with the theory that all plants have sexes, the advocates of that doctrine have found anthers in the former, and pistils in the latter; but, as in other similar

cases, this opinion is entirely conjectural, and founded upon no direct evidence: all that we really know is, that the larger bodies do germinate, and, if we are to credit Wildenow, the powdery particles grow also. He says he has seen them. I think it is hardly to be doubted that the latter are the abortive state of the former. Link, however, takes quite a different view of the matter, and regards the larger bodies as Antheridia, while the smaller he calls spores. (*Ausgew. Anat. Bot. Abbild. fasc. 4. t. 4.*) According to Salisbury, in the *Linnean Transactions*, vol. 12. tab. 19, *Lycopodium denticulatum* emits two cotyledons upon germinating; but, supposing this observation, which requires confirmation, to be exact, it is much more probable that the two little scales so emitted are primordial leaves than analogous to cotyledons. The genus *Phylloglossum* is remarkable for having the foliage, and mode of growth of *Isetes* combined with the fructification of a *Lycopodium*, and offers a strong argument

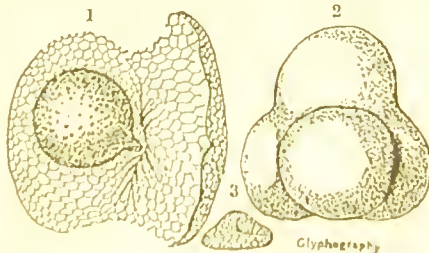


Fig. XLVII.

Fig. XLVI. — 1. *Bernhardia dichotoma*; 2. its spore-case; 3. the same, cut across; 4. *Lycopodium annotinum*; 5. its spore-case, with the scale to which it is axillary.

Fig. XLVII. — 1. Spore-case of *Lycopodium denticulatum* opened; 2. antheridium; 3. spore.—Link,

to those who would place the former genus in this natural order. It is said to have quite the appearance of *Plantago pusilla*.

According to Ad. Brongniart, the stem of a *Lycopodium* is almost identical, anatomically, with the root of Ferns.

In geographical distribution these follow the same laws as Ferns, being most abundant in hot humid situations in the tropics, and especially in small islands. As they approach the north they become scarcer; but even in the climate of northern Europe, in Lapland itself, whole tracts are covered with *Lycopodium alpinum* and *Selaginoides*.

The powder contained in the spore-cases of *Lycopodium clavatum* and *Selago* is highly inflammable; shaken out and collected it is employed under the name of Lycopode, or vegetable brimstone, on the Continent, in the manufacture of fireworks, and in pharmacy to roll up pills, which when coated with it may be put into water without being moistened. The plant of *Lycopodium clavatum* has long been used as an emetic, and that of *L. Selago* as a cathartic; but it is said that if the dose is not small it is followed by faintness and convulsions; it is regarded as a powerful irritant, and has been externally employed for keeping blisters open, and as a counter-irritant in cases of inflamed eyes. The most remarkable plant of the order, however, is the *Yatum condensado* (*Yatum Great Devil*, and *condenado accursed*), which appears to be the *Lycopodium rubrum* of Chamisso. Sir W. Hooker, who calls it *L. catharticum*, states that it acts most vehemently as a purgative, and has been administered successfully in Spanish America in cases of elephantiasis. According to Vastring, Clubmosses are likely to become of importance in dyeing; he asserts, that woollen cloths boiled with *Lycopodiums*, especially with *L. clavatum*, acquire the property of becoming blue when passed through a bath of Brazil wood. *Lycopodium Phlegmaria* is reputed an aphrodisiac. So also the rock-lily, a name sometimes given to *Selaginella convoluta*, Spring, also called *Lycopodium squamatum*, a plant remarkable for its hygrometrical properties, rolling up into a ball when dry and unrolling again when damped, is asserted by Martius, who found it abundantly in the provinces of Bahia and Pernambuco, to act upon the mucous membrane, especially of the uropoetic system. "Potentiam virilem amissam ejus decocto reduci posse perhibent, quo jure nescio." He, however, advises a full trial to be made of these and the East Indian species.



Fig. XLVIII.

GENERA.

<i>Tmesipteris</i> , Bernh.	<i>Tristeca</i> , Palis.	<i>Lepidotis</i> , Palis.	<i>Diplostachyum</i> , Palis.
<i>Psilotum</i> , Swartz.	<i>Lycopodium</i> , Linn.	<i>Chamaectinis</i> , Mart.	<i>Gymnogymum</i> , Palis.
<i>Bernhardtia</i> , Willd.	<i>Selago</i> , Hook. et Gren.	<i>Selaginella</i> , Spring.	<i>Phylloglossum</i> , Kunze.
<i>Hoffmannia</i> , Willd.	<i>Huperzia</i> , Bernh.	<i>Stachygyndrum</i> , P's.	

NUMBERS. GEN. 1. Sp. 200. (*Hooker*.)

Coniferae.

POSITION.—*Ophioglossaceae*.—LYCOPODIACEÆ.—*Marsileaceae*.

Fig. XLVIII.—*Phylloglossum Drummondii*: 1. whole plant, natural size; 2. spike magnified.

ORDER XXII. MARSILEACEÆ.—PEPPERWORTS.

Rhizocarpe, *Batsch. Tab. Aph.* (1802); *Agaroth Aph.* 111. (1822).—*Rhizospermeæ*, *Roth. DC. Fl. Fr.* 2. 577. (1815).—*Hydropterides*, *Willd. Sp. Pl.* 5. 531. (1810).—*Marsileaceæ*, *R. Brown Prodr.* 166. (1810); *Gregr. Fl. Edinens.* xii. (1824); *Ad. Brongn. in Dict. Class.* 10. 196. (1826); *DC. and Duby.* 542. (1828); *Martius, Ic. Pl. Crypt.* 121. (1834); *Endl. gen.* xxxiv. —*Salviniceæ*, *Juss. in Mirb. Elém.* 553. (1815).—*Salviniceæ*, *Bartl. Ord. Nat.* 15. (1830); *Martius, Ic. Plant. Crypt.* 123. (1834); *Ed. Pr. Endlich gen.* xxxiii.—*Isoteæ*, *Rich. Bartl. Ord.* 16. *Endlich, gen.* xxxv. —*Salvinineæ* and *Azolineæ*, *Griffith in Calcutta Journ.*, vol. v.

DIAGNOSIS.—*Lycopodal Acrogens*, with many-celled radical spore-cases, and the reproductive bodies of two different kinds.

Stemless plants, creeping, or floating; leaves usually stalked, sometimes sessile and sealy, occasionally destitute of lamina, and rolled up in vernation. Reproductive organs enclosed in involucre, and of two kinds; the one, clustered and stalked, or crowded confusedly without stalks, and distinct from the second, or mixed with it, or in contact with it; the other, simple oval bodies, sometimes having a terminal nipple, from which germination uniformly proceeds. [Stem and leafstalks filled with longitudinal cells. A central simple fascicle of vessels composed of scalariform ducts and prosenchyma, enclosing in the middle a quantity of elongated cells containing starch. Leaves with nerves, veins and stomates.—*Martius.*]

The Order to which *Pilularia* and *Marsilea* belong consists of floating or creeping plants, often having the circinate vernation of Ferns, with their reproductive organs in close cases, called involucre, springing either from the root, or from the petioles of the leaves. These involucre contain oval bodies of two kinds, one of which has been called anther, and the other capsule. Figures of *Marsilea vestita* and *polycarpa* have been published by Hooker and Greville, at t. 159 and 160 of their noble *Icones Filicum*. From these, and the more detailed observations of Esprit Fabre, it is clear that the involucre of that genus consists of an involute leaf analogous to the carpellary leaf of flowering plants.

Esprit Fabre has also shown, (*Ann. Sc. Nat.* 2 ser. 7. 221, 9. 115 and 361, and 12. 255,) that on the side of a mucilaginous cord, which I regard with Braun as a midrib, proceeding from the involucre when it opens, there arise oblong plates bearing two sorts of bodies packed closely, sometimes intermixed, but sometimes separated, so that each occupies a different side of the plates (which are leaflets). He regards these two sorts of bodies as anthers and ovules, and says, that their mutual position is such, that the side which bears the ovules is above that which bears the anthers. The "ovules" are from 10 to 15 on each side, whitish, semitransparent, ovoid, obtuse at one end, and terminated

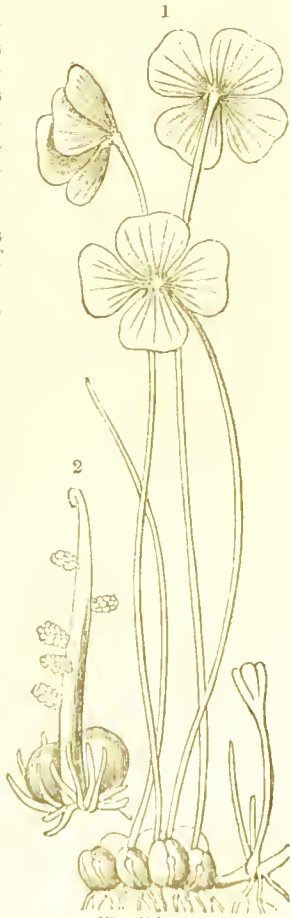


Fig. XLIX.

together in water, he has seen the sides of the "anthers" burst, and the "grains of

Fig. XLIX. 1. Growing plant of *Marsilea pubesens*; 2. an involucre opened by 2 valves, from which rises a leaf whose lateral leaflets are loaded with spores; 3. an involucre which has opened, and from which the spermatophyte leaf is descending itself; at A is seen the side which Fabre regards as anthers.

pollen" collect about the nipple at the surface of the water, after which the "ovules" fall to the bottom, where, at the end of seven or eight days germination commences. These observations, however, require to be repeated: for Braun (*Flora*, 1839, p. 297,) and Griffith each regards both sorts of bodies as sporules. Fabre's experiment calls to mind those of Professor Savi of Pisa, upon *Salvinia*, another plant of this Order. He put into different vessels, 1st, the seeds alone; 2d, the male globules alone; and 3d, both mixed. In the first two vessels nothing appeared; in the 3d, the seeds rose to the surface of the water and fully developed. But Duverney has since published a dissertation upon this plant, in which he states that, having repeated the experiments of Savi, he has not obtained the same results, and that the seeds, when separated from the supposed male organs, developed perfectly.

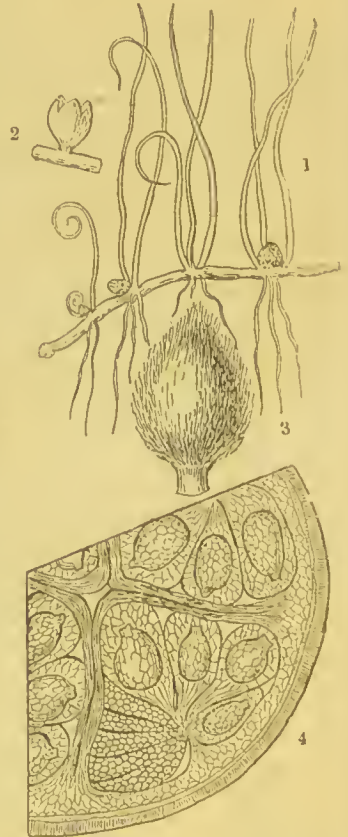


Fig L.

nothing but abortive spores.

Following Jussieu, *Salvinia* and *Azolla* were separated in the last edition of this work as a distinct Natural Order, a view that Endlicher has since taken. But upon a full consideration of the structure of these plants, or of what is known of it, it does not appear to justify the separation. Like *Pilularia* and *Marsilea*, they have two distinct kinds of reproductive bodies enclosed in involucre, and that seems to be the main feature by which *Pepperworts* are known as an Order from *Lycopodiaceæ*. For the same reason it appears better to combine with them *Isoetes*, instead of regarding that too as the type of still another Order. Mr. Griffith does not include *Isoetes* among these plants; but I cannot assent to the propriety of erecting every genus in this curious Order into a Suborder.

The genera *Salvinia* and *Azolla* have been the subject of some elaborate observations by Mr. Griffith, (*Calcutta Journal*, vol. v.), who elevates each into a Suborder, and throws an entirely new light upon their structure. He regards them as having true sexes, the male being certain necklace-shaped threads found at an early stage, in contact with what he denominates an orthotropous ovulum. But strange to say, this so called ovulum, instead of giving birth to an embryo, becomes the parent of reproductive bodies of two totally different kinds, having not even the smallest resemblance the one to the other, although the matrix out of which they are evolved is identical at an early period of the organisation. I regret that Mr. Griffith's most curious memoir only reached me as this sheet was going to press, so that it was impossible to have cuts prepared to illustrate his observations, for which the reader is referred to the work above quoted. All I can do is to give in a note the substance of his descriptions of *Salvinia* and *Azolla*.*



LI.

* *Salvinia verticillata*.—Male organs? articulated hairs on the stalks of the ovula; each joint containing a nucleus and a brownish fluid; Ovula nearly sessile, concealed by the roots, and partly covered

Fig. L.—*Marsilea pubescens* in different states of germination; advancing from 1. the spore, up to 4. the perfect young plant.

Fig. LI.—1. *Pilularia globulifera*; 2. spore-case, natural size, bursting; 3. the same younger and magnified; 4. a section of the spore-case, showing the large and small spores, (after Valentine).

Delile has published an account of the germination of *Isoetes setacea*, from which it appears that its sporules sprout upwards and downwards, forming an intermediate solid body, which ultimately becomes the stem, or eorn; but it is not stated whether the points from which the ascending and descending axes take their rise are uniform. In *Pilularia* Mr. Valentine finds, that germination takes place invariably from a fixed point. Delile points out the great affinity that exists between *Isoetes* and *Lycopodium*, particularly in the relative position of the two kinds of reproductive matter. In *Lycopodium*, he says the pulverulent spore-cases occupy the upper ends of the shoots, and the granular spore-cases the lower parts: while, in *Isoetes*, the former are found in the centre, and the latter at the circumference. If this comparison is good, it will afford some evidence of the identity of nature of these bodies, and that the pulverulent ones are at least not anthers, as has been supposed; for in *Isoetes* the pulverulent inner bodies have the same organization, even to the presence of what has been called their stigma, as the outer granular ones; so that, if *Isoetes* has sexes, it will offer the singular fact of its anther having a stigma. The anatomy of *Isoetes* is described by Mohl in the *Linnaea*, xiv. 181.

The Pepperworts evidently approach the Clubmosses through *Isoetes*, which is sometimes referred to the one Order, sometimes to the other. Their genus *Azolla* appears to bring them into contact with *Jungermanniaceæ*. According to Mr. Griffith, *Marsilea* evidently appears to connect *Salvinia* with *Fernus*; "its important differences from *Salvinia* consist in the capsules, which correspond to the secondary capsules of that family, being developed within the substance of a modified leaf, in their occurring mixed with each other, and in the spores of the pedicellate capsules not becoming imbedded in apparently cellular masses."

All are inhabitants of ditches or inundated places. They do not appear to be affected by climate so much as by situation, wherefore they have been detected in various parts of Europe, Asia, Africa, and America; chiefly however in temperate latitudes.

Uses unknown.

GENERA.

Pilularia, Linn.
Marsilea, Linn.
Lemna, Juss.
Zaluzianskia, Neck.

Azolla, Lam.
Carpantus, Raf.
Rhizosperma, Meyen.
Salvinia, Michel.

Isoetes, Linn.
Calamaria, Dill.

NUMBERS. GEN. 5. Sp. 24.

Filices.

POSITION.—*Lycopodiaceæ*.—*MARSILEACEÆ*.—*Jungermanniaceæ*.

with hairs; tegument open at the top; mature reproductive organs solitary, or in racemes of 3-5, about the size of a pea, covered with brown rigid hairs. The upper ones of each raceme, (or lowest as regards general situation,) contain innumerable spherical bodies, of a brownish colour and reticulated cellular surface, terminating capillary simple filaments. These again contain a solid whitish opaque body. The other, which occupies the lowest part of the raceme, and which is the first and often the only one developed, is more oblong, containing 6-18 larger, oblong-ovate bodies, on short stout compound stalks: colour brown, surface also reticulated. Each contains a large, embossed, opaque, ovate, free body, of a chalky aspect: it is three-lobed at the apex, and contains below this a eavty lined by a yellowish membrane, filled with granular and viscid matter and oily globules.

Azolla pinnata.—The growing points present a number of minute confervoid filaments, the assumed male organs, which at certain periods may be seen passing into the foramen, the ovula becoming resolved into their component cells within the cavity of that body; organs of reproduction in pairs, attached to the stem and branches, one above the other, concealed in a membranous involucrium; ovula atropous, oblong-ovate, with a conspicuous foramen and nucleus, around the base of which are cellular protuberances; capsules of each pair either difform—in which case the lowest one is oblong-ovate, the upper globose—or both of either kind, generally perhaps the globose, presenting at the apex the brown remains of the foramen, and still enclosed in the involucrium; upper half generally tinged with red; the oblong-ovate capsule opens by circumscision; with the apex separate the contents, which consist of a large yellow sac contained in a fine membrane, the remains of the nucleus (or the secondary capsule.) The sac is filled with oleaginous granular fluid, and surmounted by a mass of fibrous tissue, by which it adheres slightly to the calyptra; on the surface of the fibrous tissue are 9 cellular lobes (the three upper the largest, which when pulled away, separate with some of the fibrous tissue, and so appear provided with radicles. The globose capsule has a rugose surface from the pressure of the secondary capsules within; these are many in number, spherical, attached by long capilliform pedicels to a central much branched receptacle; each contains two or three cellular masses, presenting on their contiguous faces two or three radiceform prolongations. In their substance may be seen imbedded numerous yellow grains, the spores.

ALLIANCE VI.—*FILICALES*.—THE FILICAL ALLIANCE.

Filices, *Juss. Gen.* 14. (1789); *Swartz Synops. Filicum* (1806); *Willd. Sp. Pl.* vol. v.; *R. Brown Prod.* 145; *Agardh Aph.* 115. (1822); *Kaulfuss Enum.*; *Hooker and Greville Icones Filicum*; *Blume, Fl. Javae*; *Schott's Genera Filicum*; *Mohl et Martius Plantæ Cryptogamicæ Brasilienses*, p. 40. (1834); *Hooker Species Filicum*; *Brongniart, Veg. Fossiles*, p. 141; *Presl Tentamen pteridographiæ*; *J. Smith in Hooker Journ. Bot.*; *Endl. gen.* p. 58; *Hooker and Bauer, Genera Filicum*; *Link, Filicum Species*.

DIAGNOSIS.—*Vascular Acrogens, with marginal or dorsal one-celled spore-cases, usually surrounded by an elastic ring; and spores of only one kind.*

These are leafy plants, producing a rhizome, which creeps below or upon the surface of the earth, or rises into the air like the trunk of a tree; this trunk consists of a woody cylinder, of equal diameter at both ends, growing at the point only, containing a loose cellular substance which often disappears; it is coated by a hard, cellular, fibrous rind, which is much thicker next the root than at the apex, and it is itself composed of the united bases of leaves. Wood, when present, consists almost exclusively of large scalariform or dotted ducts, imbedded in hard plates of thick-sided elongated tissue, which usually assumes an interrupted sinuous appearance, but occasionally, according to Brown, forms a complete tube in *Dipteris*, *Platyzoma*, and *Anemia*. Leaves coiled up in veneration, with annular ducts in the vascular tissue of their petiole, either simple or divided in various degrees, traversed by simple, dichotomous, or netted veins of equal thickness, which are composed of elongated cellular tissue, with occasional ducts; cuticle frequently with stomates. Reproductive organs consisting of spore-cases arising from the veins upon the under surface of the leaves or from their margin, either pedicellate, with the stalk passing round them in the form of an elastic ring, or sessile and destitute of such a ring; either springing from beneath the cuticle, which they then force up in the form of a membrane (or indusium), or from the actual surface of the leaves. Spores arranged without order within the spore-cases. Sometimes the leaves are contracted about the cases, so as to assume the appearance of forming a part of the

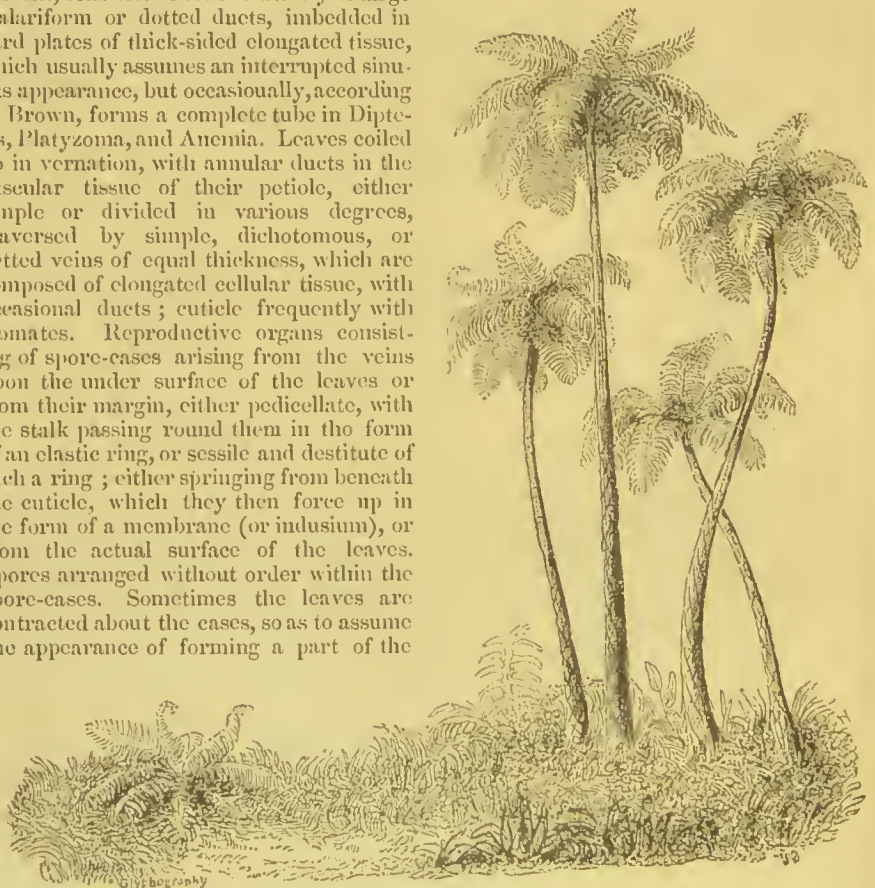


Fig. LII.

reproductive organs, and sometimes the place of spore-case is supplied by the depauperated lobes of the leaves.

The plants called Ferns are the most gigantic of Acrogens, sometimes having trunks forty feet high. They approach Flowering classes by *Cycadaceæ*, which may be considered to have much affinity with them, on account of the imperfect degree in which the vascular system of that Order is developed, of their pinnate leaves with a gyrate venation,

Fig. LII.—Tree-Ferns, from *Blume*.

and their naked ovules borne upon the margin of contracted leaves, as the spore-cases of Ferns are upon the leaves of *Osmunda*. To Coniferous Gymnosperms they also advance very closely through *Salisburia*, whose leaves might be mistaken for those of a Fern. The affinity of Ferns with *Equisetum*, consists more in a want of flowers, and the presence of annular vessels, than in any similarity of habit. Clubmosses are readily known by their axillary spore-cases dehiscent by regular valves. Pepperworts are so very different, that it is difficult to find points of comparison between them, except the gyrate leaves of some of the genera.

The organ in Ferns which deserves the most particular attention is the theca, or case that contains the reproductive matter. By many it is named capsule; but as that kind of pericarp is essentially connected with the power of conveying fertilisation from the male apparatus to the ovules, and implies the existence of a certain definite relation between the various parts that it contains, nothing of which kind is found in the spore-case of Ferns, it is not necessary to insist upon the impropriety of applying such a name. Easy as it is to show that the spore-case is not analogous to a capsule, it is far less so to demonstrate with what organs or modifications of organs it really has an analogy. I am not, indeed, aware that this had been attempted, all botanists seeming to consider it a special organ, until, in the *Outlines of the First Principles of Botany*, I ventured to hazard the following theory: "The theca may be considered minute leaves, having the same gyrate mode of development as the ordinary leaves of the tribe; their stalk the petiole, the annulus the midrib, and the theca itself the lamina, the edges of which are united." I was led to this opinion, first, by the persuasion that there was no special organ in Ferns to perform a function which in flowering plants is executed by modifications of leaves; and, secondly, by the examination of viviparous species. Observation has shown us that the leaves of flowering plants have the power of producing leaf-buds from their margin or any point of their surface; and in certain kinds of Grasses it has been found that they can produce flower-buds also. In Ferns, which are exceedingly subject to become viviparous, the young plants often grow from the same places as the spore-cases, or from the margin; and in a viviparous Fern, of which a morsel was given me by Dr. Wallich, the young plants form little clusters of leaves in the place of sori. Upon examining these young plants, it appears that the more perfect, though minute, leaves are preceded by still more minute primordial leaves or scales, the cellular tissue of which has nearly the same arrangement as the cellulose of the spore-case; and the resemblance between the midrib of one of these scales and the ring of a *Polypodium* is striking. It is, however, necessary to add, what is only implied in the little work from which the foregoing extract is taken, that this explanation applies only to the gyrate Ferns. With regard to those with striated spore-cases, or with what is called a broad transverse ring, they may either be considered not to have the midrib of the young scale, out of which the case is supposed to be formed, so much developed; or the case may be still considered a nucleus of cellular tissue, separating both from that which surrounds it and also from its internal substance, which latter assumes the form of sporules, in the same way as the internal tissue of an anther separates from the valves under the form of pollen. This conjecture seems confirmed by the anatomical structure of those striated cases which consist of a cluster of spore-like areolae of cellular tissue at the base and apex, connected by extended cellulose of the same description, as in *Gleichenia*; and is far from being weakened by such cases as those of *Parkeria*. In *Ophioglossum* another kind of provision is made for the production of spores, which in that genus seem to have no spore-case beyond the involute contracted segments of the leaf which bears them. What are called the thecae in *Ophioglossum* seem more analogous to the involucre of *Marsilea*.

It has been thought that sexes occur in these plants, and different parts have been pointed out as the anthers; more especially little threads which contain a grumous matter, sometimes exuded in the form of a crust, and spring up among the spore-cases. Some probability seems to have been given to the presence of anthers by what has been considered an occurrence of Mule ferns, principally belonging to the genus *Gymnogramma*, some account of which will be found in the *Gardener's Chronicle* 1844, p. 500; but it does not appear to me that there is good evidence to show that such instances are



Fig. 1111.

connected with hybrid action; and I agree with Link, in his first view of the question that the function of the Antheridia *nondum sit perspectu et declarata*, an opinion which he has, however, since abandoned in favour of these bodies being anthers. They may be bodies analogous to anthers; but if so they have none of their structure.

Nägeli has lately mentioned that the spiral threads, with an active motion, already mentioned under Mosses, also exist in some Ferns. He found them abundantly in the germinating leaf of *Aspidium augescens*, and elsewhere, traced their development, and determined that they are produced among the earliest cells that go to the composition of a fern-leaf. (*See Schleiden and Nägeli, Zeitschrift für Wissensch. Bot. s. 1. 168. t. 4.*)

The stems of Ferns, when arborescent, are objects of great interest to the botanist, partly on account of their rarity, secondly, because of their singular structure, and especially because they offer the highest form of development in Flowerless Plants. It has not been till lately that they have been well understood; they have now, however, received full illustration from Mohl, in Martius's beautiful *Icones Plantarum Cryptogamicarum*. One of the most interesting of them is that of the Barauetz or Baronetz, called also the Scythian Lamb, in which, by cutting off the leaves, except a small portion of the stalk, of a woolly-stemmed species, and turning it upside-down, simple people have been persuaded that there existed in the deserts of Scythia creatures half animal half plant.

The veins of the leaves of Ferns have been sometimes described as dichotomous; it is only, however, in a certain number that this peculiarity occurs. In some they are simple, in others they are collected in lozenge-shaped meshes, and in some they are still differently arranged. Langsdorf and Fischer seem to have been the first to pay attention to these peculiarities, which have been admirably applied to the characters of genera by Adolphe Brongniart and Presl, who have shown them to be of the first importance in distinguishing genera.

Bory de St. Vincent elevates Ferns to the rank of a class, intermediate between Monocotyledons and Acotyledons; but at the same time he attaches no importance to the descriptions of those writers who, having seen the germination of the sporules, have attempted to prove an identity between them and Monocotyledons in that respect. He justly observes, that the irregular unilateral scale which has been seen to sprout forth upon the first commencement of their growth is extremely different from the cotyledon of Monocotyledons, which pre-exists in the seed and never quits it, but swells during germination, and acts as a reservoir of nutriment for the young plantlet. He most properly regards it as an imperfectly developed primordial leaf.

In some modern books of Botany Ferns are broken up into several distinct natural orders, which in my opinion are not to be maintained. But it does appear that three essentially distinct groups exist among them. Of these the largest portion consists of what were once named "dorsiferous ferns," in all which the spore-case is furnished with an elastic ring or band; in two other groups, of inconsiderable extent, the spore-cases have no such band. In one of them the cases are often immersed in the tissue of the back of the leaf, and partially, or entirely, united by their touching edges into many-celled bodies; in the other, the spore-cases appear to be nothing more than an alteration of the edge of a contracted leaf. Hence arise the three following orders:—

NATURAL ORDERS OF FILICALS.

<i>Spore-cases ringless, distinct, 2-valved, formed on the margin of a contracted leaf</i>	} 23. OPHIOGLOSSACEÆ.
<i>Spore-cases ringed, dorsal or marginal, distinct, splitting irregularly</i>	} 24. POLYPODIACEÆ.
<i>Spore-cases ringless, dorsal, connate, splitting irregularly by a ventral cleft</i>	} 25. DANÆACEÆ.

ORDER XXIII. OPHIOGLOSSACEÆ.—ADDERS' TONGUES.

Ophioglossæ, *R. Br. l. c.* 163. (1810); *Agardh Aph.* 113. (1822); *Mart. ic. Pl. Crypt.* 39. (1834); *Link. Filicum Species*, p. 15; *Endl. Gen.* xxxii.

DIAGNOSIS.—*Filical Acrogens*, with ringless, distinct, 2-valved spore-cases, formed on the margin of a contracted leaf.

Stem erect, or pendulous, with a cavity in the middle, instead of pith, and two or three woody bundles placed round it in a ring. Below, the stalks of the leaves and the spike become blended together. Leaves with netted veins sometimes forked. Spore-cases collected into a spike formed out of the sides of a contracted leaf, 2-valved, without any trace of an elastic ring. Spores resembling fine powder.

These little plants exhibit a manifest transition to Club-mosses, with which they closely agree in the valvate nature of their spore-cases; but in the latter they are axillary, while in the former they are planted on the margin of a contracted leaf. The curious little genus *Phylloglossum* seems to be an imitation among Clubmosses of the habit of Adders' tongues. Link finds, in the hollow stem, whose cavity is surrounded by woody bundles, a structure intermediate between that of Clubmosses and Horsetails.

Adders' tongues are most abundant in the islands of tropical Asia, occurring however in the West Indies, and by no means uncommon in temperate latitudes of both worlds. In the tropical parts of Africa, and in Barbary, they seem unknown; at the Cape of Good Hope and in Tasmania they are uncommon.

The herbage of the order is mucilaginous, whence the species have been employed in broths. *Ophioglossum vulgatum* and *Lunaria botryoides* have been used in medicine as vulneraries, but they seem to possess that quality as little as the magical virtues once ascribed to them. *Helminthostachys dulcis* is regarded in the Moluccas as a slight aperient, is used as a pot-herb, and its young shoots as asparagus.



Fig. LIV.

The Haytiens fancy *Botrychium cicutarium* to be an alexipharmic.

GENERA.

Ophioglossum, Linn.
Ophioderma, Blum.

Helminthostachys, Klf.
Botryopteris, Presl.
Ophiala, Desv.

Botrychium, Swartz.
Botrypus, Rich.

NUMBERS. GEN. 4. Sp. 25?

POSITION.—*Polypodæ* (*Osmundidæ*). *Lycopodiaceæ*.
OPHIOGLOSSACEÆ.—*Danæaceæ*.
Equisetaceæ.

Fig. LIV.—*Ophioglossum lusitanicum*.

ORDER XXIV. POLYPODIACEÆ.—FERNS.

Gyralæ, *Swartz Synopsis Filicum*, (1806).—Filices veræ, *Willd. Sp. Pl.* 5. 99. (1810).—Polypodiaceæ, *R. Brown Prodr.* 145. (1810); *Agardh Aph.* 116. (1822); *Kaulfuss Enumeratio*, 55. (1824); *Bory in Dict. Class.* 6. 586. (1824); *Martius Ic. Pl. Crypt.* 83. (1834).

DIAGNOSIS.—*Filical Acrogens, with ringed spore-cases, growing on the back or edge of the leaves, distinct, and splitting irregularly.*

The vast number of plants of the Filical Alliance, collected under this head, are so much alike in many respects, that to separate them into distinct natural orders seems to me contrary to all the rules that govern Botanists in their limitation of such groups.

The great mark by which they are known is the presence on the spore-cases of a ring or band of coarse meshes, distinctly different from the tissue of their sides, and too strong to be broken through when the case opens to discharge its contents. Whether the band is vertical or horizontal, complete, incomplete, or otherwise, seems unconnected with any physiological peculiarities that can be pointed out, and to be of no greater importance than for the subordinate purposes of classification. The order consists for the most part of species bearing their spore-cases on the back of leaves, usually named fronds; with the exception of the suborder called Hymenophylleæ, a group of thin, delicate, membranous species, whose leaves open their edges for the protrusion of a vein, over whose surface the spore-cases are arranged. But, independently of all other reasons for regarding the Hymenophylleæ as a mere form of the great order of Ferns, the existence of such genera as *Cibotium*, *Deparia*, &c., among Ferns not Hymenophylleous, forbids our attaching much importance to that peculiarity. A very remarkable deviation from the common plan of structure seems at first sight to occur in *Osmundæ* and *Schizææ*, in which the spore-cases are collected together upon contracted leaves, after the manner of the Adders' tongues; but such plants have no combining character, occurring among



Fig. LV.

Hymenophylleæ as well. The passage of the true Ferns into neighbouring orders is not very gradual. If we regard them as resting on the one hand upon *Danaea*-worts, they can scarcely be said to touch Adders' tongues on the other, unless the great character of the ringed spore-cases is left out of consideration, and then *Osmundæ* may be taken as the connecting link.

The following proportions borne by Ferns to other plants in different latitudes will serve to give some idea of the manner in which they are geographically distributed. There is an enormous disproportion between Ferns and the rest of the Flora in certain tropical islands, such as *Jamaica*, where they are 1-9th of the *Phenogamous* plants; *New Guinea*, where *D'Urville* found them as 28 to 122; *New Ireland*, where they were as 13 to 60; and in the *Sandwich Islands*, where they were as 40 to 160; and it is clear, from the collections of *Wallich*, that Ferns must form a most important feature in the *Indian Archipelago*. Upon continents, however, they are far less numerous: thus, in *equinoctial America* *Humboldt* does not estimate them higher than 1-36th; and in *New Holland* *Brown* finds them 1-37th. They decrease in proportion towards either pole: so that in *France* they are only 1-63d; in *Portugal*, 1-116th; in the *Greek Archipelago*, 1-227th; and in *Egypt*, 1-971st. Northwards of these countries their proportion again augments, so that they form 1-31st of the *Phenogamous* vegetation of *Scotland*; 1-35th in *Sweden*; 1-18th in *Iceland*; 1-10th in *Greenland*; and 1-7th at *North Cape*. (See a very good paper upon this subject by *D'Urville*, in the *Ann. des Sc. Nat.* 6. 51.; also *Brown's Appendix to the Congo Voyage*, 461.) *Brown* has observed (*Flinders*, 584), that it is remarkable, that although *arborescent Ferns* are found at the southern extremity of *Van Dieman's Island*, and even at *Dusky Bay* in *New Zealand*,

Fig. LV.—1. Part of the leaf of *Aspidium Lonchitis*; 2. a magnified view of a morsel of *Aspidium exaltatum*.

in nearly 46° south latitude, yet they have in no case been found beyond the northern tropic. For an excellent account of the geographical distribution of Tree Ferns, see *Martius Icones Plantarum Cryptogamicarum*, p. 81.

The leaves generally contain a thick astringent mucilage, with a little aroma, on which account many are considered pectoral and lenitive, especially *Adiantum pedatum* and *Capillus Veneris*; but almost any others may be substituted for them. Capillaire is so called from being prepared from the *Adiantum Capillus Veneris*, a plant which is considered to be undoubtedly pectoral and slightly astringent; though its decoction, if strong, is, according to Ainslie, a certain emetic. The Peruvian *Polypodium Calaguala*, *Acrostichum Huacсарo*, and *Polypodium crassifolium*, are said to be possessed of important medicinal properties, especially the former; their effects are reported to be solvent, deobstruent, sudorific, and antirheumatic; antiveneal and febrifugal virtues are also ascribed to them. The leaves of *Adiantum melanocaulon* are believed to be tonic in India. (*Ainslie*, 2. 215.) The tubes of the pipes of the Brazilian negroes are manufactured from the stalk of *Mertensia dichotoma*, which they call *Samaubaya*. The stem of many species is both bitter and astringent; whence that of several, especially *Aspidium Filix Mas*, and *Pteris aquilina*, has been employed as an anthelmintic; and *Nothochlæna piloselloides* has been used in India to subdue sponginess in the gums. They have also been given as emmenagogues and purgatives. *Osmunda regalis* has been employed successfully, in doses of 3 drachms, in the rickets. The rhizomes of *Nephrodium esculentum* are eaten in Nipal, according to Buchanan. *Diplazium esculentum*, *Cyathea medullaris*, *Pteris esculenta*, and *Gleichenia Hermanni*, are also occasionally employed for food in different countries. Speaking of *Pteris esculenta*, the Tasmannian fern-root, Mr. Backhouse says, "Pigs feed upon this root where it has been turned up by the plough; and in sandy soils, they will themselves turn up the earth in search of it. The Aborigines roast it in the ashes, peel off its black skin with their teeth, and eat it with their roasted kangaroos, &c. in the same manner as Europeans eat bread. The root of the Tara-fern possesses much nutritive matter; yet it is to be observed, that persons who have been reduced to the use of it, in long excursions through the bush, have become very weak, though it has prolonged life." *Pteris aquilina* and *Aspidium Filix Mas* have been used in the manufacture of beer, and *Aspidium fragrans* as a substitute for tea. *Agdh.* The fragrance which gives its name to the latter species occurs occasionally elsewhere. *Polypodium phymatodes* is employed, along with *Angiopteris evecta*, in preparing the cocoa-nut oil of the South Sea islands; *Aneimia tomentosa* smells of myrrh, and *Mohria thurifera* of benzoin.

GENERA.

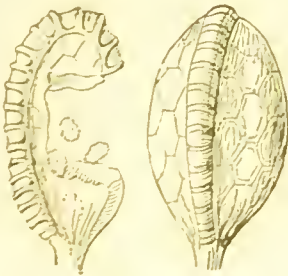


Fig. LVI.

- I. — *Polypodiæ*. Endl.
- Gen. XVI. spore-cases stalked, with a vertical rim; spores roundish or oblong.
- Acrostichum*, L.
- Polybotrya*, H. B.
- Egenolfia*, Schott.
- Glossaria*, Radd.
- Flaphylozoum*, Schott.
- Rhipidopteris*, Schott.
- Stenochlæna*, J. Sm.
- Lomogramma*, J. Sm.
- Aconopteris*, Presl.
- Senecium*, Presl.
- Campium*, Presl.
- Platyserium*, Desv.
- Alcioconium*, Gaudich.
- Cyrtogonium*, J. Sm.
- Photinopteris*, J. Sm.
- Pœcilopteris*, Kuhn.
- Bobbitia*, Schott.
- Gymnopteris*, Presl.
- Hymenolepis*, Kaulf.
- Leptochilus*, Kaulf.
- Anaptychia*, Presl.
- Hemiantis*, Linn.
- Antrophyum*, Kaulf.
- Loxogramma*, Blum.
- Polytaenium*, Desv.
- Leptogramma*, J. Sm.
- Gymnogramma*, Desv.

- Neurogramma*, Presl.
- Calomelanos*, Presl.
- Ceterach*, Adans.
- Grammitis*, Swartz.
- Xiphopteris*, Kaulf.
- Micropteris*, Desv.
- Chilopteris*, Presl.
- Synammia*, Presl.
- Cryptogramma*, R. Br.
- Diblemna*, J. Sm.
- Selliguea*, Bory.
- Diagramma*, Blum.
- Microgramma*, Presl.
- Stegnogramma*, Blum.
- Sphaerostephanos*, J. Sm.
- Meniscium*, Schreb.
- Tænitis*, Swartz.
- Pleurogramma*, Presl.
- Trinopsis*, J. Sm.
- Pteropsis*, Presl.
- Chilogramme*, Blum.
- Monogramma*, Commers.
- Cochlidium*, Kaulf.
- Adenophorus*, Gaudich.
- Amphoradenium*, Desv.
- Nothochlæna*, R. Br.
- Cincinnatia*, Desv.
- Dryno tossum*, Presl.
- Polypodium*, Linn.
- Ctenopteris*, Blum.
- Discanopteris*, Blum.
- Phagopteris*, Presl.
- Lascaux*, Bory.
- Goniopteris*, Presl.
- Pleocnemis*, Presl.
- Amblya*, Presl.
- Goniophlebium*, Blum.
- Marginaria*, Presl.
- Pleurogonium*, Presl.
- Cyrtophlebium*, R. Br.
- Campyloneurum*, Presl.
- Phlebodium*, R. Br.
- Dictyopteris*, Presl.
- Phymatodes*, Presl.
- Anaxetum*, Schott.
- Pleuridium*, Presl.
- Dryostachyum*, J. Sm.
- Drynaria*, Presl.
- Dipteris*, Reinw.
- Microsorius*, Link.
- Agnomorpha*, Schott.
- Psidium*, Presl.
- Pleopeltis*, H. et B.
- ? *Paragramma*, Bl.
- Niphobolus*, Kaulf.
- Caulocolla*, Mirb.
- Pyrrhosia*, Mirb.
- Cyclophorus*, Desv.
- Cyclophorus*, Presl.
- Seyopteris*, Presl.
- Lecanopteris*, Reinw.
- Oncidium*, Reinw.
- Glynnodon*, Presl.
- Cissilanthus*, Swartz.
- Hypolepis*, Presl.
- Oriopteris*, J. Sm.
- Leucopis*, Linn.
- Adiantum*, Linn.

Fig. LVI.—Spore cases of *Hymenocystis caucasicæ*.

Hewardia, J. Sm.
 Casseboera, Kt.
 Platyloma, J. Sm.
 Doryopteris, J. Sm.
 Pteris, Linn.
 Allosorus, Bernh.
 Oryzoidictyis, J. Sm.
 Phacelobus, Desv.
 Amphiblestra, Presl.
 Litobrochia, Presl.
 Camptera, Presl.
 Monogonia, Presl.
 Jamesonia, Hook.
 Salpichlana, J. Sm.
 Blechnum, Linn.
 Scleria, Kaulf.
 Acropteris, Link part.
 Haplopteris, Presl.
 Lomatia, Willd.
 Sagenia, R. Br.
 Vittaria, Smith.
 Struthiopteris, Willd.
 Onoclea, Linn.
 Acrostichum, Mitch.
 Calypterium, Bernh.
 Raciopteris, Presl.
 Neoptopteris, J. Sm.
 Aepidium, Linn.
 Ceteris, Bernh.
 Buxaria, Mirb. part.
 Acrostichum, Link.
 Thamnopteris, Presl.
 Daru, Juss.
 Ceteris, Berg.
 Helictium, Presl.
 Allantodia, R. Br.
 Doodia, R. Br.
 Woodwardia, Smith.
 Scelopendrium, Smith.
 Antigramma, Presl.
 Campylopus, Link.
 Onychium, Kaulf.
 Lindsaea, Don.
 Diploium, Swartz.
 Ceteris, Bory.
 Anagodium, Presl.
 Ugrammaria, Presl.
 Oxyanum, Presl.
 Dilyscellaena, Desv.
 Mischoloma, Gaud.
 Hymenocystis, Gaudich.
 Taphrosia, Reinw.
 Ceteris, Reinw.
 Hymenocystis, Laugs.
 Nephrolepis, Schult.
 Nephrodium, Rich.
 Oeandra, C. Chr.
 Neurogramma, Don.

Ophioporus, Reinw.
 Dryopteris, Ad. Ne.
 Lindsaea, Presl.
 Thelypteris, Schult.
 Arthrobotrys, Presl.
 Aspidium, Swartz.
 Fend. polium, Nees.
 Polystichum, Roth.
 Tactaria, Cav.
 Kaulf.ia, Radd.
 Phanerophlebia, Presl.
 Fudgenia, Hooker.
 Cycloidiium, Presl.
 Cyrtomium, Presl.
 Sagenia, Presl.
 Bathmium, Presl.
 Cyclopteris, Bernh.
 Acrophorus, Presl.
 ? Leucocystis, Presl.
 Lindsaea, Dryand.
 Schizoloma, Gaud.
 Hymenocystis, Gaud.
 Isoloma, J. Sm.
 Dietyoxiphium, Hooker.
 Synaphlebium, J. Sm.
 Odontosoria, J. Sm.
 Davallia, Smith.
 Microlepia, Presl.
 Saccoloma, Kaulf.
 Humata, Chr.
 Pachypleuria, Presl.
 Colposoria, Presl.
 Vitis, Bernh.
 Odontosoria, Presl.
 Stenolobus, Presl.
 Proscaptia, Presl.
 Cystidium, J. Sm.
 Dicksonia, Hort.
 Balantium, Kaulf.
 Culcita, Presl.
 Stelobium, Desv.
 Dens, Bernh.
 Leptopleuria, Presl.
 Patania, Presl.
 Passia, S. Hb.
 Cibotium, Kaulf.
 Pinnia, Gaudich.
 Deparia, Hook et Grav.
 Woodsia, R. Br.
 Physma, Kaulf.
 Pinalpe, Bernh.
 Hymenocystis, C. A. Mey.
 Hypodermis, R. Br.
 Spheropteris, R. Br.
 Peranema, Don.
 Pteridium, R. Br.
 Pteris, Wall.

II. — Ceteris, K.
 Fum., 1824; spore-cases with a vertical ring, usually sessile, on a more or less elevated receptacle; spores 3-cornered or 3-lobed.
 Thyrsopteris, Kunz.
 Pinnularia, Coll.
 ? Ceteris, Molin.
 Schizochlana, J. Sm.
 Hemitelia, R. Br.
 Cnemidaria, Presl.
 Alsophila, R. Br.
 Haplophlebia, Mart.
 Dieranophlebia, Mart.
 Metaxya, Presl.
 ? Anomalegium, Scht.
 Trichopteris, Park.
 Trichipteris, Presl.
 Chacabura, Kaulf.
 Arachniodes, Blum.
 Gymnosphaera, Blum.
 Cyathes, Smith.
 Sphaeropteris, Bernh.
 Schizococca, J. Sm.
 Notocarpia, Presl.
 Disphenia, Presl.
 Cnemidaria, Presl.
 Matonia, R. Br.
 III. Parkeria, Hooker, *trans. A. p. 147.* (1825); spore-cases very thin, surrounded by a broad imperfect, sometimes obsolete ring.
 Ceratopteris, Brown.
 Heterocarpus, Kaulf.
 Tiliopsis, R. Br.
 Cryptogramma, Rich.
 Furcraea, Desv.
 Cryptogramma, Grev.
 Parkeria, Hooker.

F. C. XXXVII.— Spore-cases marginal, placed upon the surface of a vein extended beyond the edge of the leaf, with a complete horizontal ring; spores convexo-tetraedral.
 Hymenophyllum, Smith.
 Trichomanes, Linn.
 Didymopogon, Desv.
 Hymenocystis, Bory.
 Foss, Bory.
 Leucidium, Presl.
 Cnemidaria, Presl.
 Boreopteris, Presl.
 Ophioporus, Presl.
 Neurophylloides, Presl.
 Microphorum, Presl.
 Adiantum, Presl.
 Mertensia, Presl.
 Hymenocystis, Presl.
 Lepidophorum, Presl.
 Myriophyllum, Presl.
 Platyneuron, Presl.
 Sphaerocarpus, Presl.
 Hymenocystis, Presl.
 Leucoma, R. Br.

V. — Gleichenia, Schizmatopterides, Willd. l. c. 69. 1810. — Gleichenia, R. Br. l. c. 160. 1810; Kaulfuss l. c. 86. 1824. — Bory, l. c. 1824. — Pleurogyratae, Bernh. — Gleicheniaceae, Mart. ic. pl. 105. 1824; Fend. gen. xviii; spore-cases dorsal, with a transverse occasionally oblique ring nearly sessile, and bursting lengthwise internally; spores oblong, or kidney-shaped.

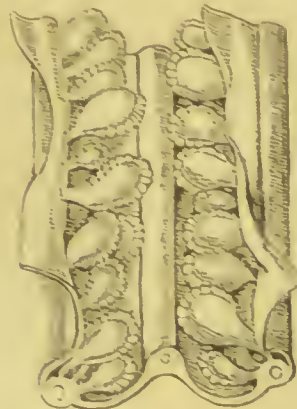


Fig. LVII.



Fig. LVIII.



Fig. LIX.

Gleichenia, Smith.
 Mertensia, Willd.
 Dieranopteris, Bernh.
 Sticheris, Presl.
 Platyneuron, R. Br.
 Calymella, Presl.

VI. — Schizoneuron, Mart. *trans. p. 113.* 1834; Fend. gen. xxix; spore-cases dorsal, with a complete terminal contracted ring; spores pyramidal or conical.

IV. Hymenophyllum, Fend. *prod. No. 16.* 1833; Martii *ib. p. 102.* 1834; crypt.

Anemia, Swartz.
 Oryzoidictyis, Bernh.
 Anemidictyon, J. Sm.

Schizaea, Smith.
Rhipidium, Bernh.
Lophidium, Rich.
Actinostachys, Wall.
Lygodium, Swartz.
Hydroglossum, Willd.
Ugena, Cav.
Cleisium, Rich.
Ranondia, Mirb.
Odontopteris, Bernh.

Gisopteris, Bernh.
Vallisneria, Thouars.
Lygodictyon, J. Sm.
Mohria, Swartz.
 VII. — *Osmundaceæ*. *Osmundaceæ*, R. Br. l. c. 161. (1810); *Agardh*, l. c. 115. (1822); *Naud-fuss*, l. c. 42. (1824); *Endl. gen. xxx.*; *Acro-*

gyrate, Bernh.; spore-cases dorsal, or panicled, stalked, with a broad dorsal incomplete ring, opening vertically; spores oblong or roundish.
Osmunda, Linn.
Aphyllocarpa, Cav.
Todea, Willd.



Fig. LXI.



Fig. LX.

NUMBERS. GEN. 183. Sp. 2000.

POSITION.—*Danaeaceæ*.—*POLYPODIACEÆ*.—*Ophioglossaceæ*.

Fig. LX.—*Schizaea dichotoma*; 1. its spore-case. Fig. LXI.—Spore-case of *Todea Fraseri*.

ORDER XXV. DANÆACEÆ.—DANÆAWORTS.

Agyratæ, Swartz. *Synops.* (1806).—*Poropterides*, Willd. *l. c.* 66. (1810).—*Danæaceæ*, Agardh, *l. c.* 117. (1822).—*Marattiaceæ*, Kaulf. *l. c.* 31. (1824); *Bory*, *l. c.* (1824); *Mart. ic. pl. crypt.* 119. (1834); *Endl. gen.* xxxi.; *Link. filic. sp.* p. 31.

DIAGNOSIS.—*Filical Acrogens*, with ringless dorsal spore-cases, combined in masses, and splitting irregularly by a central cleft.

With all the habit of Dorsiferous Ferns, these plants are widely distinguished by the peculiar nature of their spore-cases, which are neither like those of Ferns nor

Adder's-tongues. To the latter they approach the nearest, but instead of being connected with, and perhaps fashioned out of, the margin of a contracted leaf, they appear sunk within, or more rarely seated upon, the back of the leaflets. The entire want of that elastic ring, which, in some state or other so strikingly characterises true ferns, gives them a far stronger title to be regarded as a distinct order, than the trifling differences which have in the eyes of some botanists elevated little groups of the latter to that dignity.

In addition to this, their spore-cases are always united more or less by their inner faces, as if in anticipation of the prevailing tendency among the carpels of flowering plants. For this reason they may be regarded as the highest form of the highest Alliance among Acrogens.

The few known species of the Order are all tropical in both hemispheres. Some form trees.

The bruised leaves of the fragrant *Angiopteris evecta*, an arborescent species, are said to be employed in the Sandwich Islands to perfume the cocoa-nut oil. The rhizome of *Marattia alata* is eaten by the Sandwich Islanders in time of scarcity, according to Mr. Hinds: this would appear to be the Nchai, and not the former plant.

GENERA.

<i>Kaulfussia</i> , Blum.	| <i>Clementea</i> , Cav.	| <i>Eupodium</i> , J. Sm.	| <i>Myriotheca</i> , Comm.
<i>Angiopteris</i> , Hoffman.	| <i>Danæa</i> , Smith.	| <i>Marattia</i> , Swartz.	| <i>Celanthera</i> , Thouin.

NUMBERS. GEN. 5. Sp. 15. (J. Smith.)

POSITION.—*Polypodiaceæ*.—*DANÆACEÆ*.—*Ophioglossaceæ*.

Fig. LXII.—*Danæa alata*. 1. Collection of spore-cases; 2. sections of the same and spores, 2 of which are highly magnified.



Fig. LXII.

CLASS III.—RHIZOGENS.

Rhizanthæ, Blum. *Fl. Javæ*, (1828); *Endlicher Meletemata*, p. 10. (1832); *Ed. prior*, p. 389; *Endl. Gen.* p. 72.

These are parasitical plants destitute of true leaves, in room of which they have cellular scales. Their stem is either an amorphous fungous mass, or a ramified mycelium, sometimes, perhaps always, appearing to be lost in the tissue of the plants on which it grows; and is very imperfectly supplied with spiral vessels, which in some instances seem to be wholly deficient. No instance of green colour is known among them; but they are brown, yellow, or purple. They are furnished with true flowers, having genuine stamens and carpels, and surrounded by a trimerous or pentamerous calyx, or absolutely naked. Their ovules appear to be constructed upon the same plan as in other flowering plants. The true nature of their seeds is in most species quite unknown; by some they are described as breaking up into a mass of spores, by others as consisting of a cellular nucleus abounding in grumous corpuscles (*Endl.*), and in general they may be regarded as too small for exact observation; but it is certain that in some instances they have a minute undivided embryo enclosed in mucilagino-granular albumen.

At this point of the Vegetable Kingdom we find a most curious assemblage, which, with many of the peculiarities of Endogens, seems to be an intermediate form of organisation between them and Thallogens. They have no relation to Acrogens, although they follow at this place, but they agree with Endogens in the presence of sexes, and sometimes in the ternary structure of their flower; they have, however, scarcely any spiral vessels, and their seeds appear, as far as they have been examined, either, as some say, to want the cotyledons and axis of other flowering plants, or to lose themselves in a mass of pulp, from which they are almost undistinguishable. In their amorphous succulent texture, in their colour, often in their putrid odour when decaying, in the formation of a mycelium or spawn, which is evident in *Helosis*, and is with good reason suspected to exist in others, and in their parasitical habits, these plants resemble Fungals, while in their flowers and sexes they accord with Arumworts, or similar Endogens.

Rhizogens all agree in being of a fungus-like consistence, and in their habits of living parasitically on the roots of other plants. They very generally stain water, or spirit, of a deep blood-red colour. Their forms are exceedingly diversified; some have the aspect of a Mushroom, or develop a head like that of a Bullrush (*Typha*): others push forth a thyrse of flowers, or an elegant panicle; while some have their bloom in a head like that of some Cynaraceous plant. In *Helosis* and *Langsdorfia* the rhizome, which is horizontal and branched, and which at intervals throws up perpendicular flowering stalks, is quite analogous to the spawn* of

* The existence of a mycelium has also been adverted to by Dr. Brown. (*Lin. Trans.* xiv. 232.) He suggests that in *Rafflesia* the earliest effort of the seed, after being deposited in its proper nidus, may consist in the formation of a cellular tissue extending laterally under the bark of the stock. He remarks that in *Pilostyles* and *Cytinus*, where the plants are closely approximated, their possible origin from a common base or thallus, is rendered the more probable by the parasites in the former genus, which is dioecious, being produced generally, perhaps always, in groups of the same sex, and by those groups, which are often very dense, not unfrequently surrounding the branch of the stock. He adds, however, that this view is not sustained by sufficient observation, but that there are circumstances in both genera favourable to the hypothesis, especially in *Pilostyles*.

Fungals. In *Cynomorium*, *Seybaliu*m and *Balanophora*, this part is wanting, and in its room the roots of those genera emit roundish deformed tubers collected in a circle upon the roots of other plants, and growing into them by some unknown process. Blume says, "that at the period of germination of *Balanophoreæ* there is produced from the roots of the Fig on which they grow an intermediate body, of a fleshy nature and intimately combined with its superficial woody layers, and that this intermediate body is penetrated by their spiral vessels, which render it woody." He moreover adds, that "several seeds of *Balanophoreæ* germinate on nearly the same points of the Fig-root; hence this woody body, or luxuriant product of the juices that are sucked out, has generally an irregular form, and the plants proceeding from such tubers grow out in different directions, much in the same manner as the tubers of a Potato generate their offsets: with this difference, however, that in a Potato the eyes of the plant are in the circumference, while in *Balanophora* they are placed in the centre, and on that account the intermediate body where the offsets break out, has necessarily a conical extension." Something of the same kind occurs in *Seybaliu*m, whose tubers are expanded in an irregular form about the root of some unknown tree, are fleshy, and composed even in the substance of the stalk of somewhat irregular cells and no spiral vessels. In the room of leaves these plants have scales, which differ from true leaves in the want of colour, a character common to all other plants parasitical on roots. A vertical stalk (stipes), sometimes terminated by a solitary head of flowers, sometimes bearing several heads variously arranged upon the stalk, is found in all the genera of *Balanophoraceæ*; which moreover agree in this that the flower-heads, which at first are sessile on the rhizome and concealed by many rows of imbricated scales, resemble the leafy rosette of a *Sempervivum* without colour, or rather the very small bud of a *Rafflesia*. The genuine species of *Helosis* show on their rhizome roundish conical buds seated on a very short stalk, or altogether sessile, enclosing the rudiments of the future head within a very thin involucre, as a fungus within the volva; this latter after a time splits into three or more segments, and emits the flower-head enlarged and furnished with a stalk, which is altogether naked except at the base, where it is surrounded by the scale-like segments of the withering involucre. This is the most simple form of involucre, which in the other genera becomes more and more complicated, and finally runs into numerous series of imbricated scales which clothe the stipes more or less completely. In those genera which grow upon the bark of the stems of trees, there are some diversities of structure in the organs of vegetation that are very remarkable. Blume tells us that *Rafflesia Patma* appears upon the creeping roots or stems of *Cissus scariosa* in the form of solitary or clustered hemispherical dilatations, which look like excrescences or expansions of the root. These excrescences are something of the nature of leaf-buds, consisting of layers of scales and a more solid centre. As the latter increase in size they burst through the wrapper by tearing it irregularly from the apex towards the base, and develop themselves in the form of numerous scales, at first flesh-coloured, then brownish, and finally deep purple, which surround the flowers. As soon as these parts are exposed, richly nourished as they are by the humid air that surrounds them, they grow with such rapidity that it is reported that *Rafflesia*, which, when full-blown, is a yard across, and when unexpanded, is as large as a middle-sized cabbage, only takes about three months for its complete formation. *Brugmansia* has a similar mode of development.

At one time it was believed that Rhizogens agreed with Fungals in the

total want of spiral vessels. That, however, was a mistake. Spiral vessels do exist among them. Brown says that he has discovered them in *Rafflesia*, in which he originally failed to perceive them, and in several other cases. Martius also found them in *Langsdorffia*, in the form of bundles lying in the rhizome, stem and branches, and Mohl in similar parts of *Helosis*, but in small quantity compared to the mass of the plants. Brown adds that "the vascular system of all these parasites is uniform and more simple than that of the far greater part of Phænogamous plants; that the spiral, or slight modifications of it, is the only form of vessel hitherto observed in any of them; and that the large tubes or vessels, with frequent contractions, corresponding imperfect diaphragms, and variously marked surface, which have received several names, as *vasa porosa*, *punctata*, *vasiform* cellular tissue, dotted ducts, &c., and which are so conspicuous in the majority of arborescent Phænogamous plants, have never been observed in any part strictly belonging to these parasites. (*Lin. Trans.* vol. xix. 231.) He, however, does not attach systematical importance to this curious fact.

The flowers are in general formed upon some symmetrical plan, the proportions varying from genus to genus. But in a singular deformed genus called *Sarcophyte* the flowers are not reducible to symmetry, as far as has yet been observed. It has not, however, been examined in a philosophical manner.

The seeds of most Rhizogens appear to have baffled the inquiries of those who have had the best opportunities of examining them. Even the seeds of the common *Cytinus Hypocistis* of the South of Europe are wholly unknown; to the disgrace of Mediterranean Botanists. Blume describes the seeds of *Brugmansia Zippelii* as containing, 1° a grumous substance which under a powerful microscope exhibits a lax cellular tissue, formed of roundish cells, which become angular by mutual pressure, and are filled with grumous matter; among these are dispersed, 2° threads or tubes, very numerous, very tender, long, entangled without order, usually forked, sometimes irregularly branched. Upon these threads Blume makes the following remarks:—"The tender tubes, principally visible in the ripe spores of Rhizogens, may be considered analogons to those lowest forms of vegetation which belong to the genus *Mycoderma*, *Pers.*, of the family *Hydronemateæ*. The parietes of the fruit of *Brugmansia* are seldom covered with spores when the pericarp is closed up, but they constantly are when the plant is decaying: a circumstance which is attributable to the facility with which the spores separate from their stalks, and to the cellulo-gelatinous matter in which the fruit abounds. It is worthy of remark, however, that the spores are attached in the same manner as the seeds of more perfect plants, although they are altogether different from them in structure. They are, indeed, to be compared only to the unfecundated ovules of Phænogamous plants, which in the latter are more completely evolved after impregnation, but in Rhizogens, as in other Cryptogamous plants, only after germination. That the ovules of Rhizogens, while inclosed in the pericarp of their mother, ever arrive at the development of an embryo, seems to be altogether untrue. For I have over and over again examined numerous specimens at different stages of formation; the observations have been repeated under the eyes of Reinwardt, and the brothers Nees von Esenbeck; as also by Meyen, so celebrated as an anatomist, upon specimens preserved in spirits of wine, so that I can deny the possibility of any error. How, indeed, can we suppose Rhizogens to be plants furnished with an embryo, when they exhibit only the simplest form of cellular organization in all their parts." (*Pl. Java, Rhizanther*,

p. 23.) Endlicher describes the seeds of *Scybalium fungiforme* as being a "nucleus compositus e telâ cellulôsâ, corpuseculis sporidiiformibus e cellulis angulatis conflatis et massulis grumosis inmixtis, filis tenuissimis earundem particulas connectentibus fartâ." But these are perhaps mistakes arising from inaccurate observation. At least I can positively confirm the statement of the elder Richard (*Mem. Mus.* viii. t. xxi.), who gives to *Cynomorium coccineum* an embryo. I find in that plant that the seed consists of a mucilaginous mass filled with angular particles, which are doubtless loosely cohering cells. They contain starch in a very minutely globular state, but are chiefly composed of gum. On one side of this seed is a globular embryo, looking like a speck, but found, when properly examined, to be a globose mass of cells, destitute of starch, enclosed within the albumen, and apparently undivided on any part of its surface. It is, however, difficult to speak positively upon this point, on account of its smallness, and I am not sure that it is not very slightly 2-lobed. Francis Bauer too ascertained the ovules of *Rafflesia Aruoldi* to have the ordinary structure, a strong indication that the seeds would not be so anomalous as has been represented, and he found an undivided embryo in the seed of the same plant, (*Linn. Trans.* xix. t. xxv.) a circumstance confirmed by the observations of Brown. Ferdinand Bauer, too, found in *Hydnora Africana* what seems to be a central embryo (*Ibid.* t. xxx.) of the same nature.

Such being the principal facts that have been ascertained with regard to these singular parasites, it only remains to notice some of the views entertained regarding them by systematic botanists. Dr. Robert Brown, who, aided by the microscopical drawings of the two Bauers, has had peculiar advantages for considering the question, appears to be opposed to the idea of regarding Rhizogens as a peculiar class. He considers the Patma worts (*Rafflesiaceæ*) as being unquestionably allied to Birthworts, and therefore as a form of Exogens. The reasons, however, which have led this botanist to form such an opinion, require to be stated with much more detail before they can claim serious attention. His objections to regarding Rhizogens as a peculiar class are more definite. He denies the absence of spiral vessels, which he himself and others once supposed to be a characteristic of some at least among them, and asserts that the vascular texture of Rhizogens is not essentially different from that of any perfectly developed Phænogamous plants. But, as was stated in the last edition of this work, the true question to be considered is, not as to the presence or absence of spiral vessels, but as to their abundance. In Exogens or Endogens *equally developed* they would be most copious, and would exist in all the foliaceous organs; and it is no argument against the importance of this circumstance, to say, that spiral vessels have no existence in certain Endogens, as Lemna, for instance; for in that and similar cases the small degree in which such plants are developed, may be considered to account for the absence of spiral vessels; just as in a common Exogen, the spiral system does not make its appearance until the general development of the individual has made some progress.

So, indeed, in Ferns and other Acrogens of high degree, we have no right to say that the vascular system is absent; on the contrary, in the centre of the stem of Clubmosses, and in the soft parts of that of Ferns, either spiral or scalariform vessels exist in abundance; but they do not make their appearance in the foliaceous organs as in more perfect plants.

Brown also attaches no importance to the supposed homogeneity of the embryo of Rhizogens, because the same structure, he says, exists in Oro-

banche and Orchisworts. But with regard to Orobanche, that plant has a slightly two-lobed embryo lying in a mass of albumen, so that I do not see how it can be brought into comparison with that of Rhizogens; and as to Orchisworts, we have no right to say that their embryo is essentially different from that of common Endogens, except in its smallness.

More recently, Mr. Griffith has adopted the views of Brown, and endeavoured, by new arguments, to show that Rhizogens cannot be regarded as a peculiar class in the Vegetable Kingdom. He is of opinion that "in the construction of the group, a remarkable diversity of characters has been sacrificed to an appearance resulting from parasitism on roots, and to an assumed absence of an ordinary form of vegetable embryo." He asserts, that these plants are not similar in their parasitism, and that in those which he has examined there would appear to be two remarkably different types of development of the embryo. He thinks, moreover, that such a class is opposed to the system of Nature, a chief point of the plan of which consists in an extensive interchange of characters, either positively by structure, or negatively by imitation of structure. The want of uniformity in opinion of the founders of the group regarding its rank or value, is incompatible with any group of the system of Nature. And he is persuaded that Rhizogens are an entirely artificial class, not even sanctioned by practical facility, which is the only merit of an artificial association, and "a retrograde step in the course of philosophical botany." This being the case, it was of course necessary to show where the genera of Rhizogens can be stationed, if they are not collected into one common class, as is here proposed. Accordingly, Mr. Griffith suggests, that the genus *Mystropetalon* may be "the homogeneous-embryo-form of that order, which he takes to include *Proteaceæ*, *Santalaceæ*, &c., and which nearly agrees with Professor Lindley's alliance *Tubiferæ*." The tendency of *Sarcophyte* is, he thinks, towards *Urticaceæ*, and he also considers *Balanophora* as the homogeneous-embryo-form of *Urticaceæ*, forming a direct passage in one, and usually the more perfect, structure to *Musci* and *Hepaticæ*." Finally, he stations his genus *Thismia* between *Taccaceæ* and *Burmanniaceæ*.—(*Proceedings of the Linnean Society, No. XXX., p. 220.*)

I think that this kind of argument affords strong evidence in favour of the propriety of constructing the class here again proposed. The forced resemblances which are sought after by both Dr. Brown and Mr. Griffith, in themselves indicate the weakness of the arguments by which it is proposed to do away with the class of Rhizogens. The fact is, that the species which constitute it have no real relation to any other parts of the system. It is true that the genera differ very much from each other in the details of their fructification; though not at all more than the genera of other classes; but the character of the order does not depend upon the fructification. It depends wholly upon the great peculiarity in the manner of growth, already pointed out; and the fructification is connected with questions of quite a subordinate degree. All the classes of plants depend equally upon such considerations; and, therefore, Rhizogens are a class. I am indeed surprised, that so acute a botanist as Mr. Griffith—one of the very few men who combine with minute accuracy of observation great general views—should not himself perceive how much his position is weakened by comparisons like the following, the justice of which, however, I am far from disputing. He particularly directs attention to the resemblance between the pistil of *Cynomorium* and that of Mosses, or more especially to that of some evaginate Liverworts, and to the effects produced by the

action of the pollen on their styles. "Indeed," he observes, "in the development of the female organ, in the continuous surface of the style before fecundation, and in its obvious perforation after, Balanophora presents a direct affinity to a group of plants with which otherwise it has not a single analogy." In another genus, called Phæocordylis, he finds that the hairs in which the fruits are imbedded present a remarkable analogy with the paraphyses of Drepanophyllum and certain Neckeræ, and also with the bodies which he suspects to be the male organs of Ferns. Surely this is a class of peculiarities which indicate a group of a much lower rank than that of Exogens or Endogens. It is easy, indeed, to get rid of many of these characteristics by a particular mode of reasoning; but, since the same mode of reasoning would equally destroy every class now recognised among plants, I do not think it necessary to examine it particularly.

There is an account of Rhizogens by Endlicher in his *Meletemata*, which contains a summary of all that was in 1832 known concerning them. For further information the reader is referred, to Blume's *Flora Javæ*; Martius' *Nova Genera*, &c., vol. 3; Brown's *Observations on Rafflesia*, in the 13th and 19th volumes of the *Linnean Society's Transactions*; Griffith, in the *Proceedings* of the same learned body, and the various works quoted at the head of the following natural orders:

NATURAL ORDERS OF RHIZOGENS.

- | | |
|--|---------------------|
| <i>Ovules solitary, pendulous; fruit one-seeded</i> | 26. BALANOPHORACEÆ. |
| <i>Ovules 00, parietal; fruit many-seeded; calyx, 3-4-6-parted; }
anthers opening by slits</i> | 27. CYTINACEÆ. |
| <i>Ovules 00, parietal; fruit many-seeded, calyx 5-parted, anthers }
opening by pores</i> | 28. RAFFLESIIACEÆ. |

ORDER XXVI. BALANOPHORACEÆ.—CYNOMORIUMS.

Balanophorea, Rich. in *Mém. Mus.* 8. 429. (1822); Endlicher *Meletemata*, p. 10. (1832); *gen.* xxxix. Meisner, p. 366; *Jungkuus* in *nov. act. xviii. suppl.*; Griffith, *Proceedings Linn. Soc.* No. xxii.

DIAGNOSIS.—Stems amorphous, fungoid; peduncles scaly; flowers in spikes; ovules solitary, pendulous; fruit one-seeded.

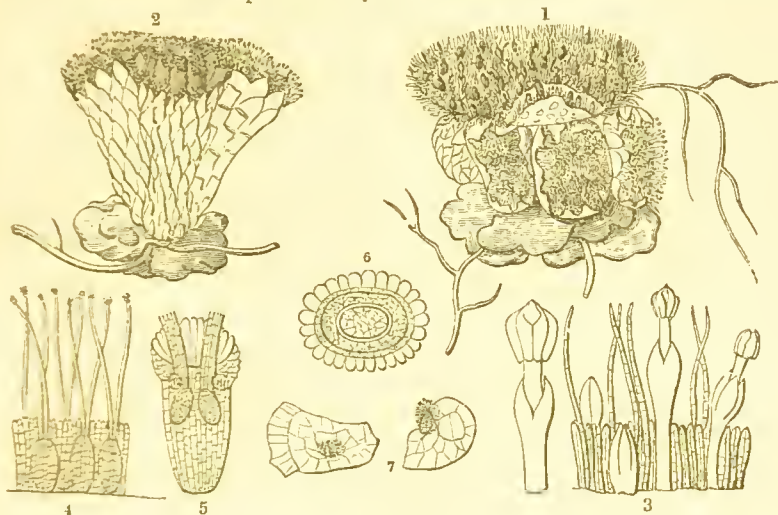


Fig. LXIII.

Fungus-like plants, parasitical upon roots, with fleshy, horizontal, branched stems, and peduncles covered by imbricated scales. Flowers monœcious, collected in dense heads, which are roundish or oblong, usually bearing both male and female flowers, but occasionally having the sexes distinct; the receptacle covered with scales or setae variable in form, here and there bearing also peltate thick scales; rarely naked. ♂ flowers pedicellate; calyx deeply 3-parted, equal, spreading, with somewhat concave segments; stamens 1-3 (seldom more), epigynous, with both united filaments and anthers; the latter 3. ♀ ovary inferior, 1-2-celled, 1-2-seeded, crowned by the limb of the calyx, which is either marginal and nearly inverted, or consists of from 2 to 4 unequal leaflets; ovule pendulous; style 1, seldom 2, filiform, tapering; stigma simple, terminal, rather convex. Fruit 1-celled. Seed, in *Cynomorium coccineum*, solitary, consisting of mucilaginous albumen, in which angular cells of gum and starch-granules are loosely arranged; embryo very minute in proportion to the albumen, roundish, whitish, enclosed beneath the skin, undivided.

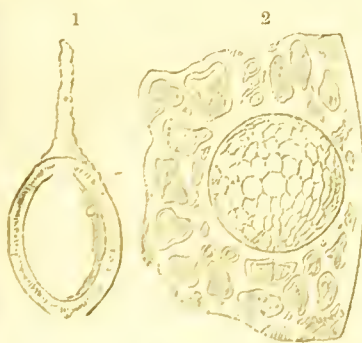


Fig. LXIV.

Fig. LXIII. *Scybalium fungiforme*. 1. A male plant; 2. a female; 3. male flowers with hairs between them; 4. females; 5. a vertical section of a female, with the two pendulous ovules; 6. a section across a ripe fruit. 7. seeds?

Fig. LXIV. *Cynomorium coccineum*. 1. A section of the ripe fruit, showing the embryo on the rest of the albumen. 2. a portion of the nucleus very highly magnified, showing the embryo and the albumen cells in which it lies. N.B. These cells are separated by the pressure of a compressium.

which the scaly peduncles start up. Junghuns assures us, that his *Rhopalocnemis* has altogether the appearance of *Phallus impudicus*, and that it would certainly be taken for a toadstool if it were not for its flowers. The species put on very extraordinary forms, one of which is represented here, and several of which have been given by Junghuns.

All are tropical in both worlds, with the exception of one found in Malta. About as many occur in Asia as in America, and several are known from the Cape of Good Hope.

They seem, as far as anything is known of them, to be styptics. The *Cynomorium coccineum*, or *Fungus melitensis* of the apothecaries, long had a great reputation in that way; and various kinds of *Helosis* have had a similar character. *Sarcophyte*, a Cape plant, is said to have an atrocious odour. Pöppig says, that *Ombrophytum*, which in Peru springs up suddenly after rain, in the manner of the toadstool, is called *Mays del Monte*, in consequence of its resemblance to a kind of Maize, and is quite insipid, on which account it is cooked and eaten like Fungi.

GENERA.

Tribe I.—Sarcophytidæ. <i>Sarcophyte</i> , Sparrm. <i>Ichthyosma</i> , Schlecht.	<i>Archimedeæ</i> , Leandr. <i>Ombrophytum</i> , Pöpp.	<i>Balanophora</i> , Forst. <i>Phæocordylis</i> , Griff.	<i>Helosis</i> , Rich. <i>Caldasia</i> , Mut. <i>Lathraophila</i> , Leandr.
Tribe II.—Lophophytidæ. <i>Lophophytum</i> , Schott et Endl.	Tribe III.—Cynomoridæ. <i>Cynomorium</i> , Michel. <i>Mystropetalum</i> , Harv.	Tribe IV.—Helosidæ. <i>Cynopsolæ</i> , Endl. <i>Scybalium</i> , Schott et Endl.	<i>Langsdorfia</i> , Mart. <i>? Thonningia</i> , Schmch. <i>? Hamatostrobos</i> , Scht. <i>Rhopalocnemis</i> , Jungh.

NUMBERS. GEN. 12. Sp. 30.

Fungales.

POSITION. ———, BALANOPHORACEÆ.—Cytinaceæ.
Muscales?

ORDER XXVII. CYTINACEÆ.—CISTUSRAPES.

Cytineæ, Adolph. Brongn. in *Ann. des. Sc. Nat.* 1. 29. (1824); Endlicher *Meletemata*, p. 13. *Gen. xl. Meisner*, p. 367. R. Brown in *Linn. Trans.* xix.—Pistiaceæ, Agardh. *Aphor. Bot.* p. 240. (1826).—Aristolochiæ, § Cytineæ, Link *Handb.* 1. 368. (1829).—Hydnoreæ, R. Br. *Linn. Trans.* 19. (1844).

DIAGNOSIS.—Flowers in spikes at the end of a scaly stem, with a 3-6-parted calyx, anthers opening by slits, and innumerable ovules growing over parietal placenta.

Flowers ♂, or ♂ ♀, solitary and stemless, or clustered at the top of a stalk covered with imbricated scales, the males uppermost, the females lowermost, in the axil of a bract, and supported on each side by a bractlet. Perianth tubular-campanulate, with a spreading 3-6-lobed limb, the segments imbricated, the exterior alternating with the bractlets or induplicate and valvate. Anthers sessile, 2-celled; their cells distinct, opening longitudinally; four dissepiment-like membranes in *Cytinus* alternate with the segments of the perianth, and join its tube with the column. ♀ Perianth as in the males, but epigynous. Ovary inferior, 1-celled, with vertical or parietal placenta, covered by innumerable ovules; style cylindrical, joined to the tube of the perianth by septiform processes, with a thick stigma, or free, and consisting of several styles, each having a free stigmatic apex. Fruit berried, leathery, one-celled, with innumerable seeds buried in pulp, and having a hard leathery skin firmly attached to the nucleus. Seed in *Hydnora*, with a small undivided embryo in the centre of cartilaginous albumen, and in *Cytinus* ex-albuminous according to Brown.



Fig. LXV.

In these we have a near approach to the common condition of Endogens, both in structure and habit, if we compare *Cytinus* with some Bromelworts. But the appearance of *Hydnora* is so peculiar that we know nothing to contrast it with, except some such Fungus as a Geaster, like which it grows half-buried in the soil. Its innumerable seeds distinguish it from Patmaworts, as well as its caulescent habit and slit anthers.

The history of this extraordinary plant has been fully given by Ferdinand Bauer and Dr. Brown, in the 19th vol. of the *Linnæan Transactions*, from which place the accompanying cuts are taken. The genus is regarded by Brown as the type of a peculiar Order: and perhaps with justice. But for reasons elsewhere given, I demur to the formation of all Orders that depend upon a single genus.

Cytinus is parasitical on the roots of *Cistus* in the South of Europe; the rest are from the Cape of Good Hope, where *Hydnora* is parasitical on the roots of succulent *Euphorbias*, and of *Cotyledon orbiculatum*.

Hydnora Africana (*Jackals Kost* or *Kauimp*), smells like decaying roast-beef, or some fungus (*Harvey*); when roasted it is eaten by the African savages. *Cytinus Hypocistis* (*Hyocistis*; *Diosc.*) contains gallic acid, and according to Pelletier, has the property of precipitating gelatine without containing tannin; its extract is still officinal in the South of Europe, under the name of *Succus Hypocistidis*; it is blackish, sub-acid, astringent, and is employed in hæmorrhages and dysentery.

Hydnora Africana (*Jackals Kost* or *Kauimp*), smells like decaying roast-beef, or some fungus (*Harvey*); when roasted it is eaten by the African savages. *Cytinus Hypocistis* (*Hyocistis*; *Diosc.*) contains gallic acid, and according to Pelletier, has the property of precipitating gelatine without containing tannin; its extract is still officinal in the South of Europe, under the name of *Succus Hypocistidis*; it is blackish, sub-acid, astringent, and is employed in hæmorrhages and dysentery.

Fig. LXV.—*Cytinus Hypocistis*. 1. A flower; 2. a head of anthers; 3. a transverse section of the ovary.

GENERA.

Cytinus, L.
Hypocistis, Tourn.
Hydnora, Thunb.

Aphyteia, L.
Hypolepis, Pers.
Phelypœa, Thunb.

Hyobanche, Sparrm.
Thyrsine, Gled.
 ? *Thismia*, Griff.

NUMBERS. GEN. 4. Sp. 7.

Fungales.

POSITION.—Rafflesiacœ.—CYTINACEÆ.—Balanophoracœ.
Bromeliacœ?

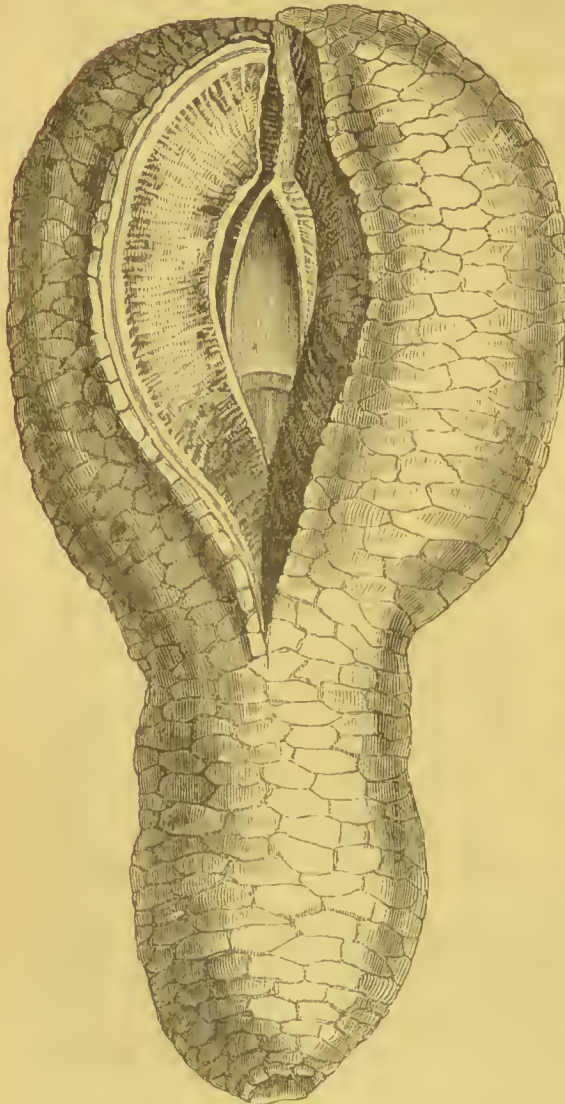


Fig. LXVI.



Fig. LXVII.

Fig. LXVI. - A plant of *Hydnora Africana*. Fig. LXVII.—A longitudinal section of it.—*Ferd. Bauer.*

ORDER XXVIII. RAFFLESIACEÆ.—PATMAWORTS.

Rafflesiaceæ, *Endlicher Meletemata*, p. 14. (1832); *Gen. ali. Meisner*, p. 367; *R. Brown in Linn. Trans.* 19. 241.

DIAGNOSIS.—*Stemless and stalkless; flowers 5-parted, sessile on the branches of trees, solitary, with anthers opening by pores, and innumerable ovules growing over parietal placentæ.*

Stemless plants, consisting merely of flowers growing immediately from the surface of branches, and immersed among scales; flowers hermaphrodite, or diœcious. Perianth superior, globose or campanulate; the limb 5-parted, with the segments imbricated or doubled inwards in æstivation; the throat surrounded by calli, which are either distinct or run together into an entire ring. Column (synema) hypocateriform or sub-globose, adhering to the tube of the perianth; anthers unnumerous, distinct, or somewhat connate, adhering by the base, in one row; 2-celled, with the cells opposite, and each opening by a vertical aperture, or concentrically many-celled with a common pore. Ovary inferior, 1-celled, with many-seeded parietal placentæ; styles conical, equal in number to the placentæ, run together within the column, but projecting beyond it, and then distinct. Fruit, an indehiscent pericarp, with an infinite multitude of seeds. [Embryo undivided, with or without albumen.—*R. Brown.*]

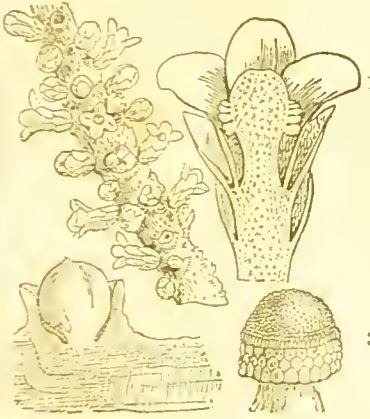


Fig. LXVIII.

These extraordinary plants have no stems whatever, but consist of flowers only, supported

by scales in room of leaves. Among them is the very remarkable species described by Brown in the 13th vol. of the *Linnean Society's Transactions*, under the name of *Rafflesia*, to which those may be referred who are desirous either of knowing what is the structure of one of the most anomalous of vegetables, or of finding a model of botanical investigation and sagacity, or of consulting one of the most beautiful specimens of botanical analysis which Francis Bauer ever made. They differ from the *Cistusrapes* in having no proper stem, in their anthers being porous, and in their flower, which constitutes the whole plant, being divided by 5, like *Exogens*, instead of 2 or 3, like *Endogens*. An affinity has been suggested with *Birchworths*, to which this Order seems to have no immediate relationship.

Natives of the East Indies, on the stems of *Cissis*; or of South America, on the branches of leguminous plants.

Rafflesia Patna is employed in Java as a powerful styptic, in relaxation or debility of the urino-genital apparatus, and *Brugmansia* seems to possess similar qualities.

GENERA.

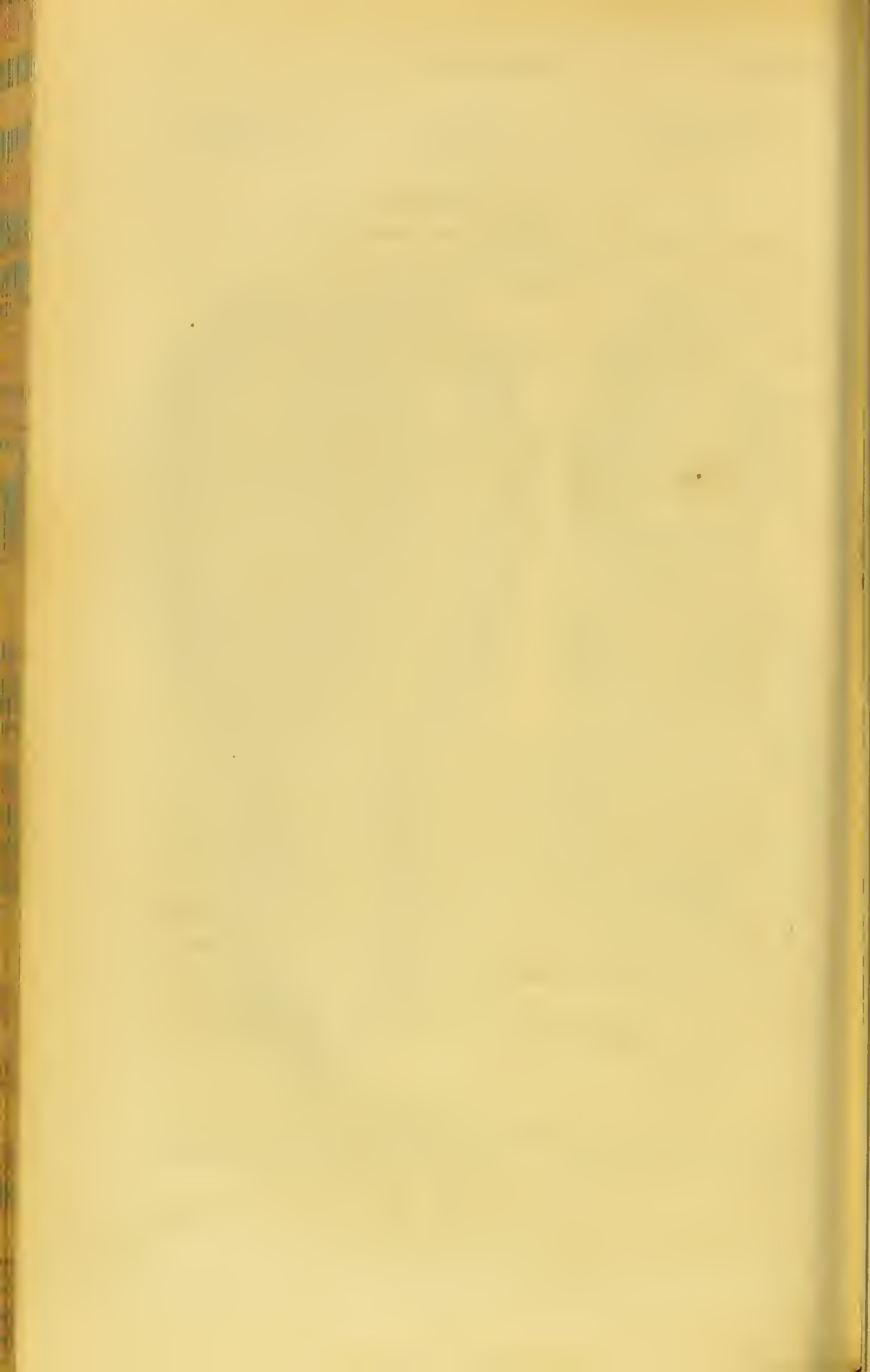
* <i>RAFFLESIA</i> , <i>R. Br.</i>	<i>Brugmansia</i> , <i>Blume.</i>	** <i>APODANTHEÆ</i> , <i>R. Br.</i>	<i>Pilostyles</i> , <i>Guittem.</i>
<i>Rafflesia</i> , <i>R. Br.</i>	<i>Zygella</i> , <i>Rehb.</i>	<i>Apodanthes</i> , <i>Poit.</i>	<i>Frostia</i> , <i>Bert.</i>
<i>Sapria</i> , <i>Griffith.</i>	<i>Myetanthe</i> , <i>Rehb.</i>		

NUMBERS. GEN. 5. Sp. 16.

Aristolochiaceæ ?

POSITION.—*Balanophoracæ*—*RAFFLESIACEÆ*.—*Cytinacæ*.

Fig. LXVIII.—*Pilostyles Berterii* ♂. 1. A vertical section of a flower; 2. a young flower bursting through the bark; 3. a head of stamens.



CLASS IV.—ENDOGENS.

Monocotyledones, *Juss. Gen.* 21. (1789); *Desf. Mém. Inst.* 1. 478. (1796). Endorhizæ, *Rich. Anal.* (1808). Monocotyledonæ or Endogenæ, *DC. Théorie*, 207. (1813). *Meisner*, p. 353. Cryptocotyledonæ or Granifera, *Agardh.* 73. (1821).—Amphibrya, *Endl. Gen.* p. 76.—Teleophyta, *Schleiden*.

Having now passed in review the absolutely sexless plants, called Thallo-gens, and all that class which, under the title of Acrogens, comprehends a numerous race among whom the existence of a double sex is conjectured to exist, and having, moreover, disposed of the curious Rhizogens, which, to a fungal mode of growth join a complete sexual apparatus, we pass to Endogens, or Monocotyledons.

Here we find a vast multitude of species, with extremely diversified habits, among whom occurs every attribute supposed to be connected with the most perfect structure. Leaves and stems are distinctly separated; spiral vessels, breathing-pores, and sexes, are in a condition that admits of no further complication; and we find in the great majority everything which constitutes as elaborate an arrangement of parts as we have any knowledge of in the vegetable kingdom.

This great class bears the name of Endogens, in consequence of its new woody matter being constantly developed in the first instance towards the interior of the trunk, only curving outwards in its course downwards. That palm-trees grow in this way was known so long since as the time of Theophrastus, who distinctly speaks of the differences between endogenous and exogenous wood.* But that this peculiarity is also extended to a considerable part of the vegetable kingdom is a modern fact, the discovery of which we owe to the French naturalists Daubenton and Desfontaines. The path being thus opened, the inquiry has subsequently, and more particularly of late years, been much extended, and the result is the conviction that all those numerous races to which Jussieu applied the name of Monocotyledonæ, agree essentially in this manner of growth. We may take the palm-tree as typical of the endogenous structure. In the beginning the embryo of a palm consists of a cellular mass of a cylindrical form, very small and not at all divided. As soon as germination commences a certain number of cords of ligneous fibre begin to appear in the radicle, deriving their origin from the plumule. Shortly afterwards, as soon as the rudimentary leaves of the plumule begin to lengthen, spiral and dotted vessels appear in the tissue in connection with the ligneous cords; the latter increase in quantity as the plant advances in growth, shooting through the cellular tissue, and keeping parallel with the outside of the root. At the same time the cellular tissue increases in diameter to make room for the ligneous cords (or woody bundles, as they are also called). At last a young leaf is developed with a considerable number of such cords in connection with its base, and, as its base passes all round the plumule, these cords are consequently connected equally with the centre which that base surrounds. Within this a second leaf gradually unfolds, the cellular tissue increasing horizontally at the same time; the ligneous cords, however, soon cease to maintain anything like a parallel

* Εξ ην δὲ τῶν μόνων, τὰ μὲν μετὰ τὴν καὶ γὰρ τῶν, ὡς Ἡρακλῆς, Δεῖς, καὶ τὰ ἄλλα τὰ πρῶτα μῆτρα τὰ δὲ ἀσυνταξίαν, ἴσως, Ἐδμῶν, Ἠβῶν, οὐ γὰρ ἴσως ἀπορριπτόμενον οὐτὸν ἀβρῖν, ἀλλὰ καὶ φασὶ τινὲς οὐ κατὰ τὸ μῆτρον, ἀλλὰ κατὰ τὸν ἴχθυον, ἵσως μὲν εἶναι τῶν ἀσυνταξίαν, ἴσως καὶ ἴσως οὐ δ' ἂν δόξουν ὅλος ἴχθυος ἴσως καὶ τοῦ βῆμα ἀδύνατον εἶναι διαζῶν κατ' ἐδμῶν. *Theophr. Hist.* 1. 8.

direction, but form arcs whose extremities pass upwards and downwards, losing their extremities in the leaf on the one hand, and on the other in the roots, or in the cellular integument on the outside of the first circle of cords ; at the same time the second leaf pushes the first leaf a little from the centre towards the circumference of the cone of growth. In this manner leaf after leaf is developed, the horizontal cellular system enlarging all the time, and every successive leaf, as it forms at the growing point, emitting more woody bundles curving downwards and outwards, and consequently intersecting the older arcs at some place or other ; the result of which is that the first formed leaf will have the upper end of the arcs which belong to it longest and much stretched outwardly, while the youngest will have the arcs the straightest ; and the appearance produced in the stem will be that of a confused entanglement of woody bundles in the midst of a quantity of cellular tissue. As the stem extends its cellular tissue longitudinally while this is going on, the woody arcs are consequently in proportion long, and in fact usually appear to the eye as if almost parallel, excepting here and there, where two arcs intersect each other. As in all cases the greater number of arcs curve outwards as they descend, and eventually break up their ends into a multitude of fine divisions next the circumference where they assist in forming a cortical integument, it will follow that the greater part of the woody matter of the stem will be collected near the circumference, while the centre, which is comparatively open, will consist chiefly of cellular tissue ; and when, as in many palms, the stem has a limited circumference, beyond which it is its specific nature not to distend, the density of the circumference must, it is obvious, be proportionably augmented. It is however a mistake to suppose that the great hardness of the circumference of old palm wood is owing merely to the presence of augmenting matter upon a fixed circumference ; this will account but little for the phenomenon. We find that the woody bundles next the circumference are larger and harder than they originally were, and consequently we must suppose that they have the power of



Fig. LXIX.

increasing their own diameter subsequent to their first formation, and that they also act as reservoirs of secretions of a hard and solid nature, after the manner of the heartwood of exogens.

When the growth of the stem of an endogen goes on in this regular manner, with no power of extending horizontally beyond a specifically limited diameter, a trunk is formed, the sections of which present the appearances shown in the accompanying cut. There is a number of curved spots crowded together in a confused way, most thick and numerous at the circumference, comparatively small and thinly placed at the centre ; and the only regular structure that is observable with the naked eye is that the curves always present their convexity to the



Fig. LXX.

circumference. When there is no limited circumference assigned by nature to an Endogen, then the curved spots, which are sections of the woody arcs, are much more equally arranged, and are less crowded at the circumference. Never is there any distinct column of pith, or medullary rays, or concentric arrangement of the woody arcs; nor does the cortical integument of the surface of endogenous stems assume the character of bark, separating from the wood below it; on the contrary, as the cortical integument consists very much of the finely divided extremities of the woody arcs, they necessarily hold it fast to the wood, of which they are themselves prolongations, and the cortical integument can only be stripped off by tearing it away from the whole surface of the wood, from which it does not separate without leaving myriads of little broken threads behind.

This is the apparent and general structure of the most perfect among Endogens. It is of course modified exceedingly according to the nature of particular individuals, and may even be reduced to nullity, as is the case in *Lemna*, *Tillandsia usneoides*, *Naiads*, and similar plants.

Schleiden, who treats this subject in a merely anatomical manner, thus describes the peculiarities of Endogens or Monocotyledons, and the manner in which they differ from Exogens or Dicotyledons.

In all plants, he says, the woody bundles, whose development always proceeds from the interior to the exterior, are either limited or unlimited in their growth. Commonly every woody bundle consists of three different physiological parts; firstly, of a tissue of extreme delicacy, capable of rapid development, in which new cells are continually generated and deposited in various ways, in two different directions, viz. next the circumference, in the shape of a peculiar kind of lengthened cellular tissue with very thick walls, the liber; and next the centre, in the form of annular, spiral, reticulate, and porous vessels: secondly, of woody cells, which are either uniform in appearance, or different, and form the wood, properly so called. Up to a certain period the development of the vascular system in Monocotyledons and Dicotyledons proceeds upon the same plan; but in Monocotyledons (Endogens) the active, thin, solid, delicate cellular tissue, suddenly changes; the partitions of its cells become thicker; their generating power ceases; and when all the surrounding cells are fully developed, they assume a peculiar form, ceasing to convey gum, mucilage, and other kinds of thick formative sap.

From this cause all further development of vascular bundles is rendered impossible, and therefore Schleiden calls the woody bundles of such plants "limited." In Dicotyledons (Exogens), on the contrary, this tissue retains, during the whole lifetime of the plant, its vital power of formation; continues to develop new cells; and so increases the mass, ceaselessly augmenting both the exterior (liber), and the interior faces (wood), for which reason Schleiden calls such woody bundles "unlimited." This, he continues, happens according to the climate and nature of the plant: either pretty continuously, as in *Cætaeæ*; or by abrupt periodical advances and cessations, as occurs in forest trees of Europe. In the latter, the stem forms an uninterrupted tissue, from the pith to the bark, during every period of life, and the bark is never organically separate from the stem; what is considered their natural separation in the spring, is only a rent produced by tearing the delicate tissue already spoken of, which is present, even during winter, and constitutes the foundation of new annual zones, although compressed, and filled with gum, starch, and other secretions. In the spring, being expanded and swollen by the new current of sap, it is deprived of its contents by their solution.

This difference between limited and unlimited woody bundles affords, in Schleiden's opinion, the only universal distinction between Endogens and Exogens. In the annual Exogens the unlimited woody bundle, checked in its further development by the death of the plant, has, it is true, in so far some similarity to the limited one of Endogens; yet, sufficient research shows the difference distinctly, for the formative layer in the former constantly retains to the last moment its generating power. (*See Annals of Natural History*, iv. 236.)

The distinction between Endogens and Exogens, whether it be as we have first described it, or such as Schleiden states, is so obvious and universally recognised, that one would have thought them beyond the reach of controversy. Nevertheless, M. de Mirbel has very recently (*Comptes Rendus*, Oct. 1844, p. 699) asserted, that, according to his theoretical views of their structure, a great number of Monocotyledons are Exogens, more especially *Draecæna*, *Phœnix*, *Chamærops*, and *Bromelia*. Meneghini, moreover, long since pointed out the fact that *Yucca gloriosa* arranges its woody bundles in concentric circles, (*Ricerche sulla Struttura del Caule nelle Pianta Monocotiledoni*, Padova 1836) and the same tendency is discoverable in some other Endogens allied to *Yucca*. But the mere gathering together the woody bundles into imperfect rings, does not in any degree invalidate the distinction between Endogens and Exogens, because their whole manner of growth is different. The fibrovascular tissue which forms the wood of *Yucca gloriosa* itself, is in fact present in the form of arcs, just as much as in a Palm-tree.

In many of the larger kinds of Endogens the stem increases principally by the development of a single terminal bud, a circumstance unknown in Exogens, properly so called. In many however, as all grasses, the ordinary growth takes place by the full development of axillary buds in abundance.

In general there is so great a uniformity in the structure of an endogenous stem, that the common cane or asparagus illustrates its peculiarities sufficiently. There are, however, anomalous states that require explanation.

Grasses are endogens with hollow stems strengthened by transverse plates at the nodes. This is seen in the bamboo, whose joints are used as cases to hold rolls, or in any of our indigenous species. In this case the deviation from habitual structure is owing to the circumference growing faster than the centre, the consequence of which is the tearing the latter into a fistular passage, except at the nodes, where the arcs of ligneous tissue, connected with the leaves, cross over from one side of the stem to the other, and by their entanglement and extensibility form a solid and impenetrable diaphragm. That this is so is proved by the fact, that the stems of all grasses are solid, or nearly so, as long as they grow slowly; and that it is when the rapidity of their development is much accelerated that they assume their habitual fistular character. In the sugar-cane grass the hollowness of the stem is indeed unknown. Independently of that circumstance, their organisation is sufficiently normal.

Xanthorrhæa hastilis has been shown by De Candolle to have an anomalous aspect. When cut through transversely, the section exhibits an appearance of medullary rays proceeding with considerable regularity from near the centre to the very circumference. (*Organographie Végétale*, t. vii.) But such horizontal rays are not constructed of muriform cellular tissue like real medullary processes, but are composed of ligneous cords lying across the other woody tissue; they are in fact the upper ends of the woody arcs pulled from a vertical into a horizontal direction by the growth of the stem

and the thrusting of the leaves to which they belong from the centre to the circumference. Such a case throws great light upon the real nature of the more regular forms of endogenous wood.

Other appearances are owing to imperfect development, as in some of the aquatic species of this class. *Lemna*, for example, has its stem and leaves fused together into a small lenticular cavernous body; and in *Zannichellia* and others, a few tubes of lengthened cellular tissue constitute almost all the axis.

By far the most striking kind of anomaly in the stem of Endogens is that which occurs in *Barbaenia*, and which was originally noticed in the first edition of this work, p. 334. In an unpublished species of *Barbaenia* from Rio Janeiro, allied to *B. purpurea*, the stems appear externally like those of any other rough-barked plant, only that their surface is unusually fibrous and ragged when old, and closely coated by the remains of sheathing leaves when young. Upon examining a transverse section of this stem it is found to consist of a small firm pale central circle having the ordinary endogenous organisation, and of a large number of smaller and very irregular oval spaces pressed closely together but having no organic connection; between these are traces of a chaffy ragged tissue which seems as if principally absorbed and destroyed. A vertical section of the thickest part of this stem exhibits, in addition to a pale central endogenous column, woody bundles crossing each other or lying parallel, after the manner of the ordinary lignous tissue of a palm stem, only the bundles do not adhere to each other, and are not embodied as usual in a cellular substance. These bundles may be readily traced to the central column, particularly in the younger branches, and are plainly the roots of the stem, of exactly the same nature as those aerial roots which serve to stay the stem of a screw pine (*Pandanus*). When they reach the earth the woody bundles become more apparently roots, dividing at their points into fine segments, and entirely resembling on a small scale the roots of a palm-tree. The central column is much smaller at the base of the stem than near the upper extremity. A figure of this structure will be found under the order *Hæmodoracææ*.

The age of endogenous trees has been little studied. When the circumference of their stem is limited specifically, it is obvious that their lives will be limited also; and hence we find the longevity of palms inconsiderable when compared with that of exogenous trees. Two or three hundred years are estimated to form the extreme extent of life in a date-palm and in many others. But where, as in the Dragon Trees, the degree to which the stem will grow in diameter is indefinite, the age seems, as in Exogens, to be indefinite also: thus a famous specimen of the *Dracæna Draco*, of Oratava in Teneriffe, was an object of great antiquity so long ago as A. D. 1402, and is still alive.

Important as the character furnished by the internal manner of growth of an Endogen obviously is, it is much enhanced in value by its being found very generally accompanied by peculiarities of organisation in other parts. The leaves have in almost all cases the veins placed in parallel lines, merely connected by transverse single or nearly single bars. Straight-veined foliage is therefore an external symptom of an endogenous mode of growth. When such an appearance is found in Exogens it is always fallacious, and is found to be owing to the excessive size and peculiar direction of a few of the larger veins, and not to be a general character of all the venous system; as is sufficiently obvious in Rib-grass, Gentian, and many more.

The flowers too of Endogens have in most cases their sepals, petals, and

stamens corresponding with the number three, or clearly referrible to that type; and the pistil usually participates in the same peculiarity. Where such a proportion exists in Exogens, it is usually confined to the sepals and petals by themselves, or to the pistil by itself, not extending to the other organs. In Endogens it is almost universal in all the whorls of the

flower, although sometimes obscured by the abortion, dislocation, or cohesion of particular parts, as happens in the whole of the extensive natural order of grasses.

The effect of the manner of growth in Endogens is to give them a very peculiar appearance. Their trunks frequently resemble columns rising majestically with a plume of leaves upon their summit; and the leaves, often very large—the fan-shaped leaves of some palms are from 20 to 30 feet wide—have most commonly a lengthened form, resembling a sword blade if stiff, or a strap if weak and broad. These peculiarities are connected with others belonging to endogenous vegetation in its most rudimentary condition. The embryo of an Endogen is, in its commonest state, a small undivided cylinder, which protrudes from within its substance a radicle from one end and a plumule from a little above the radicle; in other cases its embryo has a

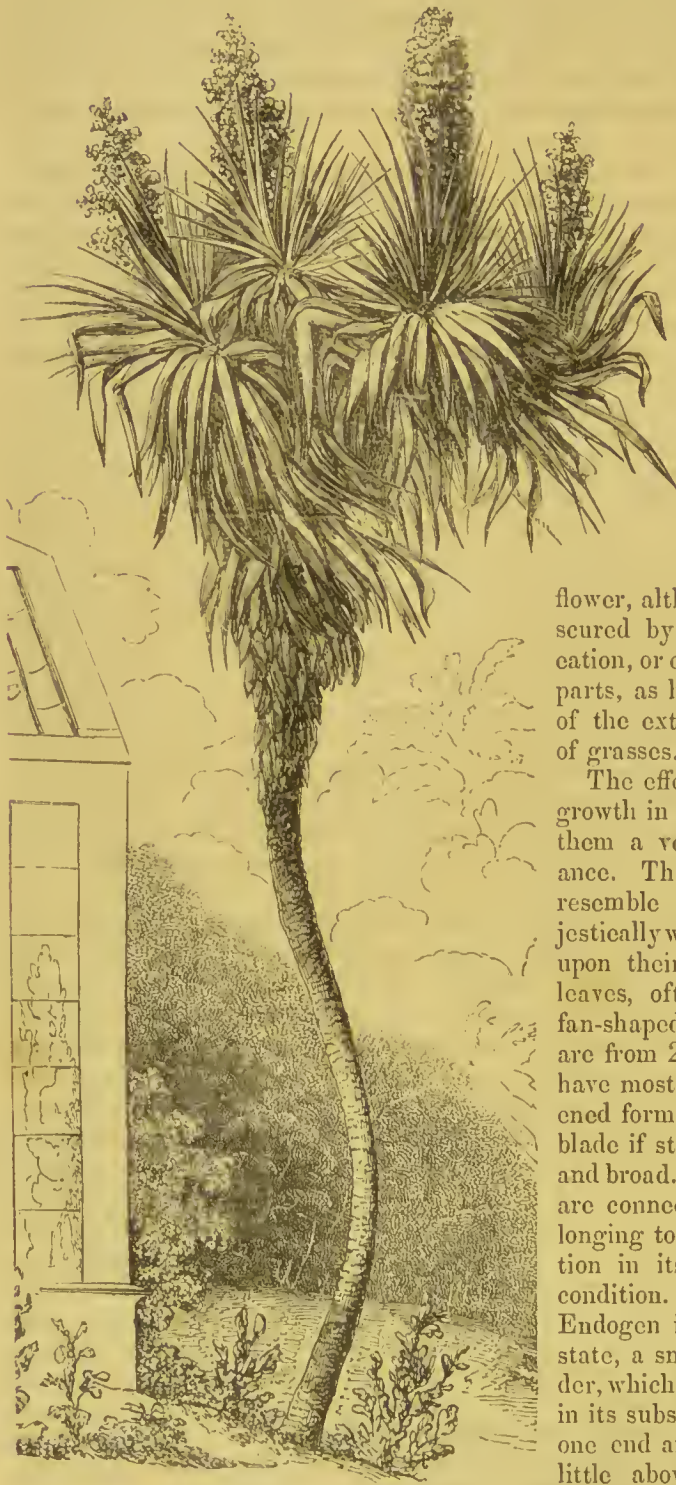


Fig. LXXI.—*Yucca aloifolia*.

slit on one side, in the cavity of which the plumule reposes; or, finally, the embryo is a flat plate as in grasses, with the plumule and radicle attached to its face near the base. In the latter case the flat plate is a solitary cotyledon, which, in the second instance, is folded together so as to give the embryo the appearance of being slit, and which in the first, or most habitual, condition is not only folded up, but united at its edges into a case entirely burying the plumule and cotyledon. Hence the embryo of an endogen is called monocotyledonous; a name that is really unexceptionable, notwithstanding the occasional appearance of a second rudimentary cotyledon, as occurs in common wheat. M. Adrien de Jussieu has endeavoured to show that the slit, which is generally supposed to be peculiar to the Arums and their allies, is of general occurrence in the endogenous embryo. (*Ann. Sc. N. Ser.* xi. p. 341.)

It has already been stated that the radicle is protruded in germination from within the substance of the embryo; the base of the radicle is consequently surrounded by a minute collar formed of the edges of the aperture produced by the radicle upon its egress. For this reason Endogens are called endorhizal.

Hence the great natural class of plants forming the subject of these remarks has five most important physiological peculiarities, by all which combined, or usually by each of which separately, the class may be characterised.

1. The wood is endogenous.
2. The leaves are straight-veined.
3. The organs of fructification are ternary.
4. The embryo is monocotyledonous.
5. The germination is endorhizal.

It may however be readily supposed that, viewed as a large class of plants, Endogens are essentially characterised only by the combination of these five peculiarities, and that occasional deviations may occur from every one of them. Thus in Naias, Caulinia, Zannichellia, and others, which constitute a part of what Professor Schultze names Homorganous floriferous plants, the whole organisation of the stem is so imperfect that the endogenous character is lost; but their true nature is nevertheless sufficiently indicated by their straight veins, monocotyledonous embryo, &c. The examples of a concentric arrangement of the woody bundles, above alluded to, may be regarded as instances of endogenous development tending towards the exogenous, and are usually looked upon as cases of transition from one form to the other—perhaps not very correctly. Of a similar nature are the resemblances between the columnar Cycadaceous Gymnosperms and Palms, between the livid, foetid, one-sided calyx of *Aristolochia* and the equally livid, foetid, one-sided spathe of Araceous Endogens, or, in another point of view, between such lenticular plants as *Lenna* in Endogens, with the leaves and stems fused, as it were, together, and similar forms of stem and leaf among Marchantiaceous Aerogens.

Really intermediate forms of vegetation connecting Endogens with other classes, are extremely uncommon. One of the most striking is that which occurs between Ranunculaceæ and Nymphaeaceæ on the part of Exogens, and Alismaceæ and Hydrocharaceæ on that of Endogens; if *Ranunculus lingua*, or better *R. parnassifolius*, is contrasted with *Alisma plantago*, or *Damasonium*, leaving out of consideration subordinate differences, it will be found that there is little of a positive nature to distinguish them except the albuminous dicotyledonous seeds of the former as compared with the exal-

buminous monocotyledonous seeds of the latter; and the resemblances between *Hydropeltis* and *Hydrocharis* in the other case are so very great, that Schultz and others actually refer them to the same class.

Endogens probably contain more plants contributing to the food of man, and fewer poisonous species in proportion to their whole number, than Exogens. Grasses, with their floury albumen, form a large portion of this class, to which have to be added Palms yielding fruit, wine, sugar, sago; Arums, Arrow-roots, Amaryllids, &c., producing arrow-root; the nutritious fruit of Plantains; the aromatic secretions of Gingers; and Orehisworts, forming salep. Among the deleterious species we have no inconsiderable number among Amaryllids, Arums, Melanths, and even Lilies.

In this, as in all other large groups, the extremes of development are so far apart, that one would be tempted to doubt the possibility of their being mere forms of each other, were it not certain that numerous traces exist in the vegetable kingdom of a frequent tendency to produce the typical structure of a natural association of whatever kind in both an exaggerated and degraded state, if such figurative terms may be employed in science. For instance, the genus *Ficus* contains some species creeping on the ground like diminutive herbaceous plants, and others rising into the air to the height of 150 feet, overspreading with the arms of their colossal trunks a sufficient space of ground to protect a multitude of men; the type of organisation in the willow is in like manner represented on the one hand by the tiny *Salix herbacea*, which can hardly raise its head above the dwarf moss and saxifrages that surround it; and on the other by *Salix alba*, a tree sixty feet high. Then among natural orders we have the Rosal structure exaggerated, on the one hand, into the arborescent Pomaceæ, and degraded, on the other, into the apetalous imperfect Sanguisorbeæ; the Myrtal type, highly developed in *Myrtus*, and almost obliterated in Streamworts (*Haloragææ*); the Urtical, in excess in *Artocarpus*, and quite imperfect in *Ceratophyllum*; Grasses, presenting the most striking differences of perfection between the moss-like *Knappia*, and Bamboos a hundred feet high; and the Lilial in equally different states of development, when *Asparagus* is compared with the Dragon-tree, or an autumnal squill with an arborescent *Yucca*. So, in like manner, we find at one extreme of the organisation of the class of Endogens, Palms, Plantains, and arborescent Liliaceous species, and at the other, such submersed plants as *Potamogeton*, *Zannichellia*, and Duckweed, the latter of which has not even the distinction of leaf and stem, and bears its flowers, reduced to one carpel and two stamens, without either calyx or corolla—and therefore at the minimum of reduction, if to remain flowers at all—in little clinks in its edges.

The classification of Endogens is not a subject upon which there is any very great diversity of opinion among botanists. If the natural orders are sometimes not distinctly limited, they are, upon the whole, grouped much better than those of Exogens; and although it may be expected that some changes have still to be introduced into this part of systematic botany, yet there seems no probability of the limits of the natural orders themselves being disturbed to any considerable extent.

The principles of classification here adopted are the following:—

In the first place, all those numerous species whose flowers are like grasses are stationed by themselves, and constitute the Glumal alliance. They are not perhaps so close upon flowerless plants as some hereafter to be mentioned, but they form, as a whole, the lowest condition of structure to which a great mass of Endogens is reduced. Their flowers may be

regarded as made up of scales, analogous to bracts, without any thing that can be strictly called either calyx or corolla being ever present. These have in many instances the sexes separated; but their glumaceous structure overrules this peculiarity.

Next to them seem to be stationed Bulrushes; plants with scales too for their floral envelopes, but arranged in rings, and so falling within the definition of at least a calyx. Their sexes are disunited, and that important circumstance associates them with Palms, Arums, and other arborescent tropical plants, together with a small group of water plants, or Hydrals. This separation of the sexes appears to be a mark of very great importance, when it is complete; and must not be confounded with another kind of separation, in which flowers of one sex have the other sex present in an imperfect condition, and often become actually hermaphrodite. All such cases, although set down in books as monœcious or diœcious, are by no means dichinous, and are excluded from the division containing the Aral Alliance, with the exception of Palms, in which flowers are occasionally altogether hermaphrodite, and which, therefore, form a real exception to the prevailing character of this part of the classification.

The remainder of Endogens are typically hermaphrodite, the number of exceptions to that character being very few. One division of them has the ovary adherent to the calyx and corolla, the other has that organ free, a portion of the Narcissal Alliance having both characteristics. The line of orders thus associated is closed by the Alismal Alliance, some of whose species are almost exogenous as has been already mentioned, while others, being truly dichinous, carry the circle of affinity back to the Hydral Alliance.

ALLIANCES OF ENDOGENS.

- I. GLUMALES.—*Flowers glumaceous; (that is to say, composed of bracts not collected in true whorls, but consisting of imbricated colourless or herbaceous scales).*
- II. *Flowers petaloid, or furnished with a true calyx or corolla, or with both, or absolutely naked; ♂ ♀ (that is, having sexes altogether in different flowers, without half-formed rudiments of the absent sexes being present).*
- ARALEA.—*Flowers naked or consisting of scales, 2 or 3 together, or numerous, and then sessile on a simple naked spadix; embryo axile; albumen mealy or fleshy. (Some have no albumen.)*
- PALMALES.—*Flowers perfect (with both calyx and corolla), sessile on a branched scaly spadix; embryo vague, solid; albumen horny or fleshy. Some Palms are ♂.*
- HYDRALES.—*Flowers perfect or imperfect, usually scattered; embryo axile, without albumen—aquatics. (Some are ♀.)*
- III.—*Flowers furnished with a true calyx, and corolla, adherent to the ovary; ♂.*
- NARCISSALES.—*Flowers symmetrical; stamens 3 or 6, or more, all perfect; seeds with albumen; flowers unsymmetrical. (Some Bromeliaceæ have a free calyx and corolla.)*

AMOMALES.—*Flowers unsymmetrical; stamens 1 to 5, some at least of which are petaloid; seeds with albumen.*

ORCHIDALES.—*Stamens 1 to 3; seeds without albumen.*

IV. *Flowers furnished with a true calyx and corolla, free from the ovary; ♂.*

XYRIDALES.—*Flowers half herbaceous, 2-3-petaloidous; albumen copious.*

JUNCALES.—*Flowers herbaceous, dry, and permanent, scarious if coloured; albumen copious. (Some Callas have no albumen.)*

LILIALES.—*Flowers hexapetaloidous, succulent, and withering; albumen copious.*

ALISMALES.—*Flowers 3-6-petaloidous, apocarpal; albumen none. (Some Alismaceæ are absolutely ♀ ♂.)*

ALLIANCE VII. *GLUMALES*.—THE GLUMAL ALLIANCE.

DIAGNOSIS.—*Glumaceous Endogens*.

The great mass of herbage known by the name of Sedges and Grasses, constitutes perhaps a twelfth part of the described species of flowering plants, and at least nine-tenths of the number of individuals composing the vegetation of the world ; for it is the chief source of that verdure which covers the earth of northern countries with a gay carpet during the months of winter. Such forms of vegetation are provided by nature with true flowers, that is to say, with stamens and pistils, the action of the former of which upon the latter is indispensable for the creation of a seed ; but there is little trace of the calyx and corolla, which are commonly characteristic of the more perfect races of plants ; not that floral envelopes are wanting, but they do not assume the whorled or ringed position of the parts which form a calyx and corolla ; they merely consist of minute green or brown bracts placed one over the other, and sometimes appearing to be united by their edges. There is also great simplicity in their pistil, but one ovule being formed in each cavity, whatever number of carpels (indicated by the stigmas) may be employed in the construction of it. Their foliage is as simple as it can be to have any considerable degree of development, consisting of fine thread-shaped veins running side by side from one end of the leaf to the other.

It is usual to restrict the term glumaceous to Grasses and Sedges ; but there seems no intelligible reason why the Cordleaves (*Restiaceæ*), Pipeworts (*Eriocaulaceæ*), and Bristleworts (*Desvauxiaceæ*), should be omitted, for they have precisely the same habit and the same substitution of imbricated scales for calyx and corolla. It is only among the Pipeworts that we have the beginning of a calyx, in the form of a membranous tube surrounding the ovary. They do not, however, indicate a more complex condition ; rather less so indeed than in Grasses and Sedges ; for their pistils are perfectly simple, while those of the latter are invariably formed by the coalition of at least 2 carpellary leaves for each cavity of the ovary.

Two divisions may be formed among the orders, viz. :—

1. Ovule erect or ascending ; pistil compound.—*Graminaceæ* and *Cyperaceæ*.
2. Ovules pendulous ; pistil simple.—*Desvauxiaceæ*, *Restiaceæ*, *Eriocaulaceæ*.

The first set touch Palms, the latter Rushes ; the whole, in consequence of their spiked-inflorescence, scaly floral envelopes, and great tendency to a separation of the sexes, pass naturally into Bulrush worts (*Typhaceæ*).

NATURAL ORDERS OF GLUMALS.

Ovar. 1-celled, with 2 or more distinct (or united) styles ; ovule ascending ; embryo lateral, naked	}	29. GRAMINACEÆ.
Ovar. 1-celled, with 2 or more (distinct or) united styles ; ovule erect, embryo basal		
Ovar. several (sometimes united) with 1 style to each ; ovule pendulous ; glumes only ; st. 1-2 ; anth. 1-celled ; embryo terminal	}	31. DESVAUXIACEÆ.
Ovar. 1-2-3-celled, with 2 or 3 styles always ; ovule pendulous ; glumes only ; st. 2-3 ; anth. 1-celled ; embryo terminal		
Ovar. 2-3-celled, with 1 style to each cell ; ovule pendulous ; a membranous 3-lobed cup within the glumes ; anthers 2-celled ; embryo terminal	}	33. ERIOCAULACEÆ.

ORDER XXIX. GRAMINACEÆ.—GRASSES.

Gramina, *Juss. Gen.* 28. (1789).—Gramineæ, *R. Brown Prodr.* 168. (1810); *Palisot de Beauv. Agrostol.*; *Kunth in Mem. Mus.* 2. 62; *Id. in N. G. et Sp. Humb. et Bonpl.* 1. 84; *Turpin in Mem. Mus.* 5. 426; *Trinius Fundam. Agrostol.*; *Dumortier Agrost. Belg.*; *Trinius Diss. de Gram. Unifl. et Sesquif.*; *De la Harpe in Ann. Sc.* 5. 335. 6. 21; *Raspail in Ann. des Sc.* 4. 271. 422. 5. 287. 433. 6. 224. 384. 7. 335; *Nees v. Esenbeck Agrostol. Brasil.*; *Kunth Enum. pl. vol. 1 et 2*; *Endl. Gen.* xlii. *Meisner*, p. 414.

DIAGNOSIS.—*Glumal Endogens, with split-sheathed leaves, a one-celled ovary, and a lateral naked embryo.*

Evergreen herbs, occasionally having stems of considerable size and living for many years. Rhizoma, fibrous or bulbous. Stem cylindrical, usually fistular and closed at



Fig. LXXII.



Fig. LXXIII.

Fig. LXXII.—1. Locusta of *Agrostis alba*; 2. paleæ and stamens, &c. of the same; 3. paleæ of *Leersia oryzoides*; 4. pistil, stamens, and hypogynous scales of the same; 5. locusta of *Polygonum monspeliensis*; 6. paleæ, &c. of the same; 7. locusta of *Stipa pennata*; 8. rachis, bractæ, and florets of *Cynosurus cristatus*; 9. locusta of *Cynodon dactylon*; 10. paleæ, and abortive floret of the same.

Fig. LXXIII.—1. Locusta of *Corynephorus canescens*; 2. paleæ, &c. of the same; 3. locusta of *Phalaris aquatica*; 4. locusta of *Alopecurus pratensis*; 5. locusta of *Aira caryophyllæa*; 6. floret of the same; 7. locusta of *Festuca duriuseula*; 8. locusta of *Glyceria fluitans*; 9. floret of the same; 10. locusta of *Eragrostis poæformis*.

the joints, covered with a coat of silex, sometimes solid. Leaves narrow and undivided, alternate, with a split sheath, and a membranous expansion (ligula) at the junction of stalk and blade. Flowers green in little spikes called locustæ, arranged in a spiked, racemed or paniced manner. Flowers usually ♂, sometimes mouceous or polygamous; consisting of imbricated bracts, of which the most exterior are called glumes, the interior immediately enclosing the stamens paleæ, and the innermost at the base of the ovary scales. Glumes usually 2, alternate; sometimes single, most commonly unequal. Paleæ 2, alternate; the lower or exterior simple, the upper or interior composed of 2 united by their contiguous margins, and usually with 2 keels, together forming a kind of dislocated calyx. Scales 2 or 3, sometimes wanting; if 2, collateral, alternate with the paleæ, and next the lower of them; either distinct or united. Stamens hypogynous, 1, 2, 3, 4, 6, or more, 1 of which alternates with the 2 hypogynous scales, and is therefore next the lower paleæ; anthers versatile. Ovary simple; styles 2 or 3, very rarely combined into one; stigmas feathery or hairy; ovule ascending by a broad base, anatropal. Pericarp usually undistinguishable from the seed, membranous. Albumen farinaceous; embryo lying on one side of the albumen at the base, lenticular, with a broad cotyledon and a developed plumula; and occasionally, but very rarely, with a second cotyledon on the outside of the plumula, and alternate with the usual cotyledon.

This most important Order offers great singularities in its organisation, although it is one in which, formerly, botanists the least suspected anomalies to exist. They found calyx and corolla and nectaries here with the same facility as they found them in a *Ranunculus*; and yet such organs exist in no one genus of Grasses. Their so-called flowers consist of green scales, not placed in whorls, but arranged one above the other, and are undoubtedly constructed of bracts alone. Not a trace is discoverable among them of calyx or corolla, properly so called, unless certain scales usually present, next the ovary, are to be so considered. Brown's account of their construction is still the best that has been published. He says,—

“The natural or most common structure of Gramineæ is to have their sexual organs surrounded by the floral envelopes, each of which usually consist of two distinct valves; but both of these envelopes are, in many genera of the order, subject to various degrees of imperfection or even suppression of their parts. The outer envelope, or gluma of Jussieu, in most cases containing several flowers with distinct and often distant insertions on a common receptacle, can only be considered as analogous to the bractæ or involucrem of other plants. The tendency to suppression in this envelope appears to be greater in the exterior or lower valve; so that a gluma consisting of one valve may, in all cases, be considered as deprived of its outer or inferior valve. In certain genera with a simple spike, as *Lolium* and *Lepturus*, this is clearly proved by the structure of the terminal flower or spicula, which retains the natural number of parts; and in other genera not admitting of this direct proof, the fact is established by a series of species showing its gradual obliteration, as in those species of *Panicum* which connect that genus with *Paspalum*. On the other hand, in the inner envelope, or calyx of Jussieu, obliteration first takes place in the inner or upper valve; but this valve having, instead of one central nerve, two nerves equidistant from its axis, I consider it as composed of two confluent valves, analogous to what takes place in the calyx and corolla of many irregular flowers of other classes; and this confluence may be regarded as the first step towards its obliteration, which is complete in many species of *Panicum*, in *Andropogon*, *Pappophorum*, *Alopecurus*, *Trichodium*, and several other genera. With respect to the nature of this inner or proper envelope of Grasses, it may be observed, that the view of its structure now given, in reducing its parts to the usual ternary division of Monocotyledons, affords an additional argument for considering it as the real perianthium. This argument, however, is not conclusive, for a similar confluence takes place between the two inner lateral bractæ of the greater part of *Iridæ*; and with these, in the relative insertion of its valves, the proper envelope of Grasses may be supposed much better to accord than with a genuine perianthium. If, therefore, this inner envelope of Grasses

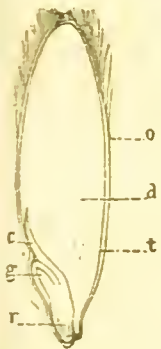


Fig. LXXV.

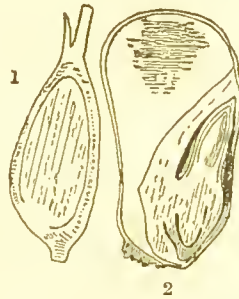


Fig. LXXIV.

Fig. LXXIV.—1. Section of ovary of *Penicillaria spicata*; 2. section of grain of rice, showing the lateral embryo.

Fig. LXXV.—Section of an Oat; o ovary, t testa, a albumen, r radicle, g plumule, c cotyledon.

be regarded as consisting merely of bractæ, the real perianthium of the order must be looked for in those minute scales, which, in the greater part of its genera, are found immediately surrounding the sexual organs. The scales are, in most cases, only two in number, and placed collaterally within the inferior valve of the proper envelope. In their real insertion, however, they alternate with the valves of this envelope, as is obviously the case in *Ehrharta* and certain other genera; and their collateral approximation may be considered as a tendency to that confluence which uniformly exists in the parts composing the upper valve of the proper envelope, and which takes place also between these two squamæ themselves, in some genera, as *Glyceria* and *Melica*. In certain other genera, as *Bambusa* and *Stipa*, a third squamula exists, which is placed opposite to the axis of the upper valve of the proper envelope, or, to speak in conformity with the view already taken of the structure of this valve, opposite to the conjunction of its two component parts. With these squamæ the stamina in triandrous Grasses alternate, and they are consequently opposite to the parts of the proper envelope; that is, one stamen is opposed to the axis of its lower or outer valve, and the two others are placed opposite to the two nerves of the upper valve. Hence, if the inner envelope be considered as consisting of bractæ, and the hypogynous squamæ as forming the perianthium, it seems to follow, from the relation these parts have to the axis of inflorescence, that the outer series of this perianthium is wanting, while its corresponding stamina exist, and that the whole or part of the inner series is produced while its corresponding stamina are generally wanting. This may, no doubt, actually be the case; but as it would be, at least, contrary to every analogy in Monocotyledonous plants, it becomes in a certain degree probable that the inner or proper envelope of Grasses, the calyx of *Jussieu*, notwithstanding the obliquity in the insertion of its valves, forms in reality the outer series of the true perianthium, whose inner series consists of the minute scales, never more than three in number, and in which an irregularity in some degree analogous to that of the outer series generally exists. It is necessary to be aware of the tendency to suppression existing, as it were, in opposite directions in the two floral envelopes of Grasses, to comprehend the real structure of many irregular genera of the order, and also to understand the limits of the two great tribes into which I have proposed to subdivide it. One of these tribes, which may be called *Panicæe*, comprehends *Ischæmum*, *Holeus*, *Andropogon*, *Anthistiria*, *Saccharum*, *Cenchrus*, *Isachne*, *Panicum*, *Paspalum*, *Reimaria*, *Anthenantia*, *Monachne*, *Lappago*, and several other nearly related genera; and its essential character consists in having always a locusta of two flowers, of which the lower or outer is uniformly imperfect, being either male or neuter, and then not unfrequently reduced to a single valve. *Ischæmum* and *Isachne* are examples of this tribe in its most perfect form, from which *Anthenantia*, *Paspalum*, and *Reimaria*, most remarkably deviate, in consequence of the suppression of certain parts: thus *Anthenantia* (which is not correctly described by *Palisot de Beauvois*) differs from those species of *Panicum* that have the lower flower neuter and bivalvular, in being deprived of the outer valve of its gluma; *Paspalum* differs from *Anthenantia* in the want of the inner valve of its neuter flower, and from those species of *Panicum* whose outer flower is univalvular, in the want of the outer valve of its gluma; and *Reimaria* differs from *Paspalum* in being entirely deprived of its gluma. That this is the real structure of these genera may be proved by a series of species connecting them with each other, and *Panicum* with *Paspalum*. The second tribe, which may be called *Poacæe*, is more numerous than *Panicæe*, and comprehends the greater part of the European genera, as well as certain less extensive genera peculiar to the equinoctial countries; it extends also to the highest latitudes in which *Phænogamous* plants have been found; but its maximum appears to be in the temperate climates, considerably beyond the tropics. The locusta in this tribe may consist of 1, 2, or of many flowers; and the 2-flowered genera are distinguished from *Panicæe* by the outer or lower flower being always perfect, the tendency to imperfection in the locusta existing in opposite directions in the two tribes. In conformity with this tendency in *Poacæe*, the outer valve of the perianthium in the single-flowered genera is placed within that of the gluma, and in the many-flowered locusta the upper flowers are frequently imperfect. There are, however, some exceptions to this order of suppression, especially in *Arundo Phragmites*, *Campulosus*, and some other genera, in which the outer flower is also imperfect: but as all of these have more than two flowers in their locusta, they are still readily distinguished from *Panicæe*." *Brown in Flinders*, 530.

According to this view, in a locusta of several florets, the scales at its base, or glumes, are bracts, and each floret consists of a calyx formed of one sepal remote from the rachis, and two cohering by their margins and next the rachis; the little hypogynous scales are the rudiments of two petals, and the stamens alternate with these in the normal manner. This may be rendered more clear by the following diagram, in which the triangle A B B represent the outer series, or paleæ, or calyx, A being the inferior valve, and B B the superior, formed of two sepals united by their col-

liguous margin at x . If the triangle $C D D$ be understood to represent the next series, the position of the parts will be at the three angles; and in reality the two scales that are usually developed to occupy the places $D D$; while the third, whenever it is superadded, is stationed at C . The triangle $E E F$ indicates by its angles the normal position of the first series of stamens, which are actually so situated, the stamen F which is opposite the sepal A alternating with the rudimentary petals $D D$. The objection to this is, that the parts of the supposed calyx or paleæ are not inserted upon the same plane, or truly verticillate, and consequently do not answer exactly to what is required in a floral envelope; and it is on this account that Turpin rejects Brown's opinion, giving the paleæ the name of spathele, and considering them bracts of a second order. Kunth entertains a somewhat different view of the nature of the floral envelopes, considering the hypogynous scales to be analogous to the ligula, and the normal state of Grasses to be hexandrous. See *Enumeratio*, vol. i. p. 3, 4.

Raspail, in a memoir upon the structure of Grasses, hazards a theory, that the midrib of the bracts of Grasses is an axis of development in cohesion with the bracts, and that when it separates, as in Phleum, Bromus, or Corynephorus, it is attempting to revert to the functions of ulterior development, for which it is more especially destined. Among other things, he states (*Ann. des Sc.* 4. 276. E) that he should not be surprised one day to find some Grass in which the midrib of the lower palca actually became a new axis bearing other florets. I mention this for the sake of remarking that such a case is known, without however admitting that it is any confirmation of Raspail's views, which are at variance with the laws of vegetable development, for reasons which are so obvious, as to render it altogether unnecessary to give them here. I have a monstrous Barley, the *Hordeum Ægiceras* of Royle, cultivated as Wheat in the Himalaych mountains, specimens of which I communicated in 1830 to M. Kunth and others, in which the midrib of the lower palea actually becomes saccate towards the apex, bearing an imperfect floret, with stamens, ovary, and hypogynous scales in its cavity. The well-known tendency to a special development of buds in the margins of certain leaves, in Ferns, and according to the observations of Turpin, in the whole substance of certain monocotyledonous leaves, leaves nothing in this fact to excite surprise or to give rise to new theories; but it is worth mentioning as the only instance upon record of a flower-bud with sexual apparatus being developed under such circumstances.

The embryo is here described in conformity with the views that are most commonly taken of its nature; that is to say, it is considered to consist of a dilated lenticular cotyledon applied to the albumen on one side, and bearing a naked plumule on the other side, next the testa. It is proper, however, to remark, that the opinion of the late L. C. Richard, that the part commonly called cotyledon is a peculiar process, and that the plumule is a body contained within the apparent plumule, has been adopted by Nees v. Esenbeck, in his *Agrostologia Brasiliensis*, but with some difference. Richard considered the cotyledon to be a part of the radicle, to which he gave the name of macropodal, in consequence of its great supposed enlargement in Grasses and some other families; Nees v. Esenbeck, on the contrary, seems to entertain the opinion that this cotyledon is a special organ, for which he retains Richard's name of hypoblastus, although he does not adopt the view that botanist took of its nature. But I think if we consider the improbability of any special organ being provided for Grasses, which is not found elsewhere, and if we consider how nearly alike are the embryos of Grasses and certain Arumworts, in which the plumule lies within a cleft of the cotyledon, it is impossible to doubt the identity of the hypoblastus of Richard and Nees v. Esenbeck, and the cotyledon of other Monocotyledons. Indeed, the latter himself appears, in one place, to hesitate about the accuracy of distinguishing them, when he says (p. 9), "Tum vero hypoblastus pars quedam habenda est cotyledoni analoga, mngisque ad interiora seminis quam ad externam corculi evolutionem spectans."

In some Grasses a portion of the inflorescence assumes a nearly bony texture. "This change takes place in Coix, in the involucre; in Chionachne and Sclerachne, in the outer valve of the glume of the female loensta; and in Tripsacum, in the rachis of the spike." *Bennet in Hookfield's Planta Javanica*, p. 19; where the systematic reader will find some

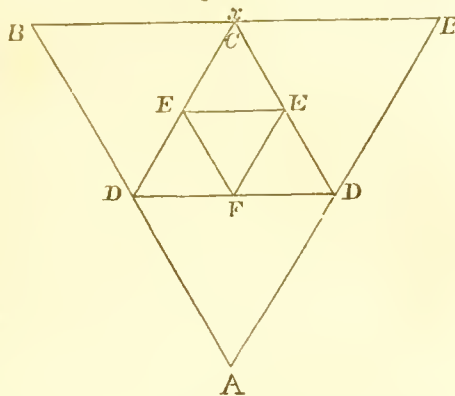


Fig. LXXVI.

curious and important details relating to the structure and affinities of the genera of Grasses.

The stem of Grasses seems to be so much at variance in structure with that of other Endogens, as to have led Agardh to remark, that it is the least monocotyledonous of all Monocotyledonous plants. It is probable, however, that its peculiarity does not depend so much upon any specific deviation from the ordinary laws of growth, as upon a separation of the parts at an early period of their growth. The stem of a Grass, it must be remembered, exists in two different states,—that of the rhizome, and of the straw: the rhizome, which is the true trunk; and the straw, which may be considered a ramification of it. The rhizome grows slowly, and differs in no respect from the stem of other Monocotyledons, as is evident in that of the Bamboo. The straw, on the contrary, which grows with great rapidity, is fistular, with a compact impervious diaphragm at each articulation; a fact which must be familiar to every one who has examined corn, or the joint of a Bamboo. In the beginning, when this straw was first developed, it was a solid body like the rhizome, only infinitely smaller; but in consequence of the great rapidity of its development, the cellular tissue formed more slowly than the woody vascular bundles which it connects, and in consequence a separation takes place between the latter and the former, except at the articulations, where, by the action of the leaves, and their axillary buds, is formed a plexus of vessels, which, growing as rapidly as the straw, distends, and therefore never separates in the centre. Something analogous to this occurs in the flowering stem of the common Onion among Monocotyledons, and in Umbellifere among Dicotyledons. The stem of Grasses is not, however, always hollow; in the Sugar Cane it is solid, as in common Endogens.

The relation that exists between Palms and Grasses will be adverted to in speaking of the former order: Nees v. Esenbeck considers Grasses to be a sort of Palms of a lower grade. In reality, the habit of the genera *Calamus* and *Bambusa* is nearly alike; the inflorescence of Grasses may be considered to be the same as that of Palms, the floral envelopes of the latter taken away, and only their bracts remaining; and, finally, the leaves are formed upon exactly the same plan, with this difference only, that those of Grasses are undivided. With Sedges, however, it is that Grasses are most properly to be compared. While a manifest tendency, at least to the degree of verticillation requisite to constitute a calyx, evidently takes place in the paleæ of Grasses, Sedges are destitute of all trace of such a tendency, unless the opposite connate glumes of the female flowers of *Carex*, or the hypogynous scales of certain *Schœui* and others, be considered an approach to the production of a perianth. For this reason, Grasses may be considered plants in a higher state of evolution than Sedges. Independently of this difference, the orders are usually known by the stems of Grasses being hollow, those of Sedges solid; the leaves of Grasses having a ligula at the apex of their sheath, which is split, while the sheath of Sedges is not split, and is destitute of this ligula; and, finally, the embryo of Grasses is external, lateral, and with a naked plumule, while that of Sedges is undivided and enclosed within the base of the albumen.

As nothing can be uninteresting which is connected with the habits of a tribe of such vast importance to man, I extract the following account of the geographical distribution of Grasses by Schouw, from Jamesou's *Philosophical Journal for April, 1825*:—"The family is very numerous: Persoon's *Synopsis* contains 812 species, 1-26th part of all the plants therein enumerated. In the system of Rœmer and Schultes there are 1800; and, since this work, were it brought to a conclusion, would probably contain 40,000 in all, it may be assumed that the Grasses form a 22d part. It is more than probable, however, that in future the Grasses will increase in a larger ratio than the other phanerogamic plants, and that perhaps the just proportion will be as 1 to 20, or as 1 to 16. Greater still will be their proportion to vegetation in general, when the number of individuals is taken into account; for, in this respect, the greater number, nay perhaps the whole of the other classes, are inferior. With regard to locality in such a large family, very little can be advanced. Among the Grasses there are both land and water, but no marine, plants. They occur in every soil, in society with others, and alone; the last to such a degree as entirely to occupy considerable districts. Sand appears to be less favourable to this class; but even this has species nearly peculiar to itself. The diffusion of this family has almost no other limits than those of the whole vegetable kingdom. Grasses occur under the equator; and *Agrostis algida* was one of the few plants which Phipps met with on Spitzbergen. On the mountains of the south of Europe, *Poa disticha* and other Grasses ascend almost to the snow-line; and, on the Andes, this is also the case with *Poa malulensis* and *daetyloides*, *Deyeuxia rigida* and *Festuca dasyantha*.

"The greatest differences between tropical and extra-tropical Grasses appear to be the following:—1. The tropical Grasses acquire a much greater height, and occasionally

assume the appearance of trees. Some species of *Bambusa* are from 50 to 60 feet high. 2. The leaves of the tropical Grasses are broader, and approach more in form to those of other families of plants. Of this the genus *Paspalus* affords many examples. 3. Separate sexes are more frequent in the tropical Grasses. *Zea*, *Sorghum*, *Andropogon*, *Olyra*, *Anthistiria*, *Ischemum*, *Ægilops*, and many other genera, which only occur in the torrid zone, and are there found in perfection, are monœcious, or polygamous. *Holcus* is perhaps the only extra-tropical genus with separate sexes. 4. The flowers are softer, more downy, and elegant. 5. The extra-tropical Grasses, on the contrary, far surpass the tropical in respect of the number of individuals. That compact grassy turf, which, especially in the colder parts of the temperate zones, in spring and summer, composes the green meadows and pastures, is almost entirely wanting in the torrid zone. The Grasses there do not grow crowded together, but, like other plants, more dispersed. Even in the southern parts of Europe, the assimilation to the warmer regions, in this respect, is by no means inconsiderable. *Arundo donax*, by its height, reminds us of the Bamboo; *Saccharum Ravennæ*, *S. Teneriffæ*, *Imperata arundinacea*, *Lagurus ovatus*, *Lygeum spartum*, and the species of *Andropogon*, *Ægilops*, &c. by separate sexes, exhibit tropical qualities. The Grasses are also less gregarious, and meadows seldomer occur, in the south than in the north of Europe. The generality are social plants.

“The distribution of cultivated Grasses is one of the most interesting of all subjects. It is determined, not merely by climate, but depends on the civilisation, industry, and traffic of the people, and often on historical events. Within the northern polar circle, agriculture is found only in a few places. In Siberia grain reaches at the utmost only to 60°, in the eastern parts scarcely above 55°, and in Kamtschatka there is no agriculture even in the most southern parts (51°). The polar limit of agriculture on the North-west coast of America appears to be somewhat higher; for, in the more southern Russian possessions (57° to 52°), barley and rye come to maturity. On the east coast of America it is scarcely above 50° to 52°. Only in Europe, namely, in Lapland, does the polar limit reach an unusually high latitude (70°). Beyond this, dried fish, and here and there potatoes, supply the place of grain. The grains which extend farthest to the north in Europe are barley and oats. These, which in the milder climates are not used for bread, afford to the inhabitants of the northern parts of Norway and Sweden, of a part of Siberia and Scotland, their chief vegetable nourishment. Rye is the next which becomes associated with these. This is the prevailing grain in a great part of the northern temperate zone, namely, in the south of Sweden and Norway, Denmark, and in all the lands bordering on the Baltic; the north of Germany, and part of Siberia. In the latter another very nutritious grain, buck-wheat, is very frequently cultivated. In the zone where rye prevails, wheat is generally to be found; barley being here chiefly cultivated for the manufacture of beer, and oats supplying food for the horses. To these there follows a zone in Europe and western Asia, where rye disappears, and wheat almost exclusively furnishes bread. The middle, or the south of France, England, part of Scotland, a part of Germany, Hungary, the Crimea and Caucasus, as also the lands of middle Asia, where agriculture is followed, belong to this zone. Here the vine is also found; wine supplants the use of beer; and barley is consequently less raised. Next comes a district where wheat still abounds, but no longer exclusively furnishes bread, rice and maize becoming frequent. To this zone belong Portugal, Spain, part of France on the Mediterranean, Italy, and Greece; further, the countries of the East, Persia, northern India, Arabia, Egypt, Nubia, Barbary, and the Canary Islands; in these latter countries, however, the culture of maize or rice towards the south, is always more considerable, and in some of them several kinds of sorghum (*doura*) and *Poa Abyssinica* come to be added. In both these regions of wheat, rye only occurs at a considerable elevation; oats, however, more seldom, and at last entirely disappear; barley affording food for horses and mules. In the eastern parts of the temperate zone of the Old Continent, in China and Japan, our northern kinds of grain are very unfrequent, and rice is found to predominate. The cause of this difference between the east and the west of the Old Continent appears to be in the manners and peculiarities of the people. In North America, wheat and rye grow as in Europe, but more sparingly. Maize is more reared in the Western than in the Old Continent, and rice predominates in the southern provinces of the United States. In the torrid zone, maize predominates in America, rice in Asia, and both these grains in nearly equal quantity in Africa. The cause of this distribution is, without doubt, historical; for Asia is the native country of rice, and America of maize. In some situations, especially in the neighbourhood of the tropics, wheat is also met with, but always subordinate to these other kinds of grain. Besides rice and maize, there are, in the torrid zone, several kinds of grain, as well as other plants, which supply the inhabitants with food, either used along with them, or entirely occupying their place. Such are, in the New Continent, yams (*Dioscorea alata*), the manihot (*Jatropha manihot*), and the batatas

(*Convolvulus batatas*), the root of which, and the fruit of the pisang (*Banana Musa*), furnish universal articles of food. In the same zone, in Africa, doura (sorghum), pisang, manihot, yams, and *Arachis hypogæa*. In the East Indies, and on the Indian Islands, *Eleusine coracana*, *E. stricta*, *Panicum frumentaceum*; several palms and Cycadææ, which produce the sago; pisang, yams, batatas, and the breadfruit (*Artocarpus incisa*). In the islands of the South Sea, grain of every kind disappears, its place being supplied by the bread-fruit tree, the pisang, and *tacca pinnatifida*. In the tropical parts of New Holland there is no agriculture, the inhabitants living on the produce of the sago, of various palms, and some species of *Arum*. In the high lands of South America there is a distribution similar to that of the degrees of latitude. Maize, indeed, grows to the height of 7200 feet above the level of the sea, but only predominates between 3000 and 6000 of elevation. Below 3000 feet it is associated with the pisang, and the above-mentioned vegetables; while, from 6000 to 9260 feet, the European grains abound: wheat in the lower regions, and rye and barley in the higher; along with which *Chenopodium Quinoa*, as a nutritious plant, must also be enumerated. Potatoes alone are cultivated from 9260 to 12,300 feet. To the south of the tropic of Capricorn, wherever agriculture is practised, considerable resemblance with the northern temperate zone may be observed. In the southern parts of Brazil, in Buenos Ayres, in Chile, at the Cape of Good Hope, and in the temperate zone of New Holland, wheat predominates; barley, however, and rye, make their appearance in the southernmost parts of these countries, and in Van Diemen's Land. In New Zealand the culture of wheat is said to have been tried with success; but the inhabitants avail themselves of the *Acrostichum fureatum* as the main article of sustenance. Hence it appears, that, in respect of the predominating kinds of grain, the earth may be divided into five grand divisions, or kingdoms. The kingdom of rice, of maize, of wheat, of rye, and lastly of barley and oats. The first three are the most extensive; the maize has the greatest range of temperature; but rice may be said to support the greatest number of the human race."

It is a very remarkable circumstance, that the native country of wheat, oats, barley, and rye, should be entirely unknown; for although oats and barley were found by Col. Chesney apparently wild on the banks of the Euphrates, it is doubtful whether they were not the remains of cultivation. This has led to an opinion, on the part of some persons, that all our cereal plants are artificial productions, obtained accidentally, but retaining their habits, which have become fixed in the course of ages. This curious subject has been discussed in the *Gardeners' Chronicle* for 1844, p. 555, 779, &c., whither the reader is referred for further information.



Fig. LXXVII.—*Setaria Germanica*.

The uses of this most important tribe of plants, for fodder, food, and clothing, require little illustration. The abundance of wholesome fecula contained in their seeds renders them peculiarly well adapted for the sustenance of man; and if the Cereal Grasses only, such as Wheat, Barley, Rye, Oats, Maize, Rice, and Guinea Corn, are the kinds commonly employed, it is because of the large size of their grain compared with that of other Grasses; for none are unwholesome in their natural state, with the exception of *Lolium temulentum*, a common weed in many parts of England, the effects of which are undoubtedly deleterious, although perhaps exaggerated; of *Bromus purgans* and *catharticus*, said to be emetic and purgative; of *Bromus mollis*, reported to be unwholesome, and of *Festuca quadridentata*, which is said to be poisonous in Quito, where it is called Pignonil. To these must be added *Molinia varia*, injurious to cattle, according to Endlicher; and a variety of *Paspalum serobiculatum*, called Hureck in India, (*Graham's Bombay Plants*, p. 234), which is perhaps the Ghohona Grass, a reputed Indian poisonous species, said to render the milk of cows that graze upon it narcotic and drastic. (*Madras Journal*, 1837, p. 107). It is however uncertain how far the injurious action of some of these may be owing to mechanical causes, which, in the case of the species of *Calamagrostis* and *Stipa* seem to be the cause of mischief in consequence of their roughness and bristles. In their qualities the poisonous species seem to approach the properties of putrid Wheat, which is known to be dangerous.

Among corn plants less generally known may be mentioned *Eleusine coracava*, called Natchnee, on the Coromandel coast, and Nagla Ragee, or Mand, elsewhere in India; *Phalaris canariensis*, which yields the canary seed; *Zizania aquatica* or Canada Rice; *Paspalum serobiculatum*, the Menya or Kodro of India, a cheap grain, regarded as unwholesome; *Setaria germanica*, yielding German millet; *Panicum frumentaceum*, called Shamoola, in the Deccan; *Setaria italica*, cultivated in India under the name of Kala kangnee or Kora kang; *Panicum miliaceum*, a grain called Warree in India; and *P. pilosum*, called Bhadlee. *Penicillaria spicata* or Bajree; *Andropogon Sorghum* or Durra, Doora, Jowaree or Jondla; and *Andropogon saccharatus* or Shaloo, are also grown in India for their grain. A kind of fine-grained corn, called, on the west of Africa, Fundi or Fundungi, is produced by *Paspalum exile*; and finally, both the Teff and Toccusso, Abyssinian corn plants, are species of this order; the former *Poa abyssinica*, the latter *Eleusine Toccusso*, (*Linnaea*, 1839). Even *Stipa pennata* is said to produce a flour much like that of Rice.

The value of Grasses as fodder for cattle is hardly second to that of their corn for human food. The best fodder Grasses of Europe are usually dwarf species, or at least such as do not rise more than 3 or 4 feet above the ground, and of these the larger kinds are apt to become hard and wiry; the most esteemed are *Lolium perenne*, *Phleum* and *Festuca pratensis*, *Cynosurus cristatus*, and various species of *Poa* and dwarf *Festuca*, to which should be added *Anthoxanthum odoratum* for its fragrance. But the fodder Grasses of Brazil are of a far more gigantic stature, and perfectly tender and delicate. We learn from Nees von Esenbeck, that the Caapim de Angola of Brazil, *Panicum spectabile*, grows 6 or 7 feet high: while other equally gigantic species constitute the field crops on the banks of the Amazons. In New Holland the favourite is the *Anthistiria australis* or Kangaroo Grass; in India the *A. ciliata* is also in request. But the most common Indian fodder Grass appears to be Doorba, Doorwa, or Hurryalee, *Cynodon Dactylon*. Gama Grass, *Tripsacum dactyloides*, has a great reputation as fodder in Mexico; and attention has lately been directed to the Tussac-grass of the Falklands, *Festuca flabellata*, a species forming tufts 5 or 6 feet high, and said to be unrivalled for its excellence as food for cattle and horses. (See *Gardener's Chronicle*, 1843, p. 131).

The fragrance of our sweet Vernal Grass (*Anthoxanthum*), is by no means confined to it. Other species are *Microchloa borealis*, *Ataxia Horsfieldii*, and some *Andropogons*; their odour is said to be owing to the presence of benzoic acid. The most famous species are *Andropogon Iwarancusa* and *Schœnanthus*, the latter the Lemon Grass of English gardens; *A. Calanus aromaticus*, which Dr. Royle considers the plant of that name described by *Dioscorides*, and the "sweet cane" and "rich aromatic reed from a far country" of Scripture; and the *Anatherum muricatum*, called Vetiver by the French, and *Khus* in India, where its fragrant roots are employed in making tatties, covers for palanquins, &c.

This fragrance is connected with aromatic secretions which have in part recommended Grasses to the notice of medical practitioners. The last mentioned plant (*Anatherum muricatum*), is said to be acrid, aromatic, stimulating, and diaphoretic; another species, *A. Nardus*, is called, because of its quality, Ginger Grass, or Koshel. The roasted leaves of *Andropogon Schœnanthus* are used in India, in infusion, as an excellent stomachic. An essential oil of a pleasant taste is extracted from the leaves in the Moluccas; and the Javanese esteem the plant much as a mild aromatic and

stimulant. (*Ainslie*, ii. p. 58.) The former is one of the Grass oils of Nemaar, called in India Ivarancusa, and described in *Brewster's Journal*, ix. p. 333. Many others partake of the same qualities. But it is not merely for their aroma that Grasses are used medicinally. A cooling drink is employed in India from the roots of *Cynodon Dactylon*. The hard stony fruits of *Coix Lachryma* (Job's-tears), have been supposed to be strengthening and diuretic; and the latter quality has been recognised in many others, especially the common Reeds, *Phragmites arundinacea* and *Calamagrostis* in Europe, *Perotis latifolia* in the West Indies, and the Brazilian species of *Gynerium*. A decoction of *Eleusine indica* is employed in Demerara, in the convulsions of infants, according to Schomburgk. *Donax arundinaceus* is astringent and subacid. The creeping roots of the Quitch or Quick Grass, *Triticum repens*, of Tr. glaucum and juncum and *Cynodon Dactylon* and linearis, have some reputation as a substitute for Sarsaparilla. A decoction of the root of *Gynerium parviflorum* is used in Brazil to strengthen the hair.

Sugar is a general product of Grasses. *Gynerium saccharoides*, a Brazilian Grass, derives its name from that circumstance. It exists in great quantity in the Sugar-cane (*Saccharum officinarum*); Maize so abounds in it that its cultivation has been proposed in lieu of the Sugar-cane; and it is probable that the value of other species for fodder depends upon the abundance of this secretion.

For economical purposes Grasses are often of much importance. The strong stems of the Bamboo are employed instead of timber and cordage. The *Arundo arenaria* and *Elymus arenarius* (Marrum Grasses) are invaluable species for keeping together the blowing sands of the sea-coast, by their creeping suckers and tough entangled roots. The first is employed in the Hebrides for many economical purposes, being made into ropes for various uses, mats for pack-saddles, bags, hats, &c. Some of the Reeds of Brazil, called Taquarussa, are living fountains: they grow from 30 to 40 feet high, with a diameter of six inches, form thorny impenetrable thickets, and are exceedingly grateful to hunters; for, on cutting off such a Reed below a joint, the stem of the younger shoots is found to be full of a cool liquid, which quenches the most burning thirst. Reeds and other coarse species furnish in Europe the materials for thatching. The reeds (sometimes 16 feet long), from which the Indians of Esmeralda form the tubes whence they blow the arrows poisoned with the deadly *Urari* or *Woorali*, are single internodes of the *Arundinaria Schomburgkii*. (*Linn. Trans.* xviii. p. 562.) A coarse but good sort of soft paper is manufactured in India from the tissue of the Bamboo, and the very young shoots of that plant are eaten like Asparagus.

Besides these things the inorganic products are remarkable. That the cuticle contains a large proportion of silex, is proved by its hardness, and by masses of vitrified matter being found whenever a hay-stack or heap of corn is accidentally consumed by fire. In the joints of some Grasses a perfect siliceous deposit is found, particularly in a kind of Jungle Grass mentioned in a letter from Dr. Moore to Dr. Kennedy of Edinburgh. It is also said that Wheat-straw may be melted into a colourless glass with the blow-pipe, without any addition. Barley-straw melts into a glass of a topaz yellow colour. The siliceous matter of the Bamboo is often secreted at the joints, where it forms a singular substance called tabasheer, of which see a very interesting account in *Brewster's Journal*, viii. p. 268. It was found by Turner that the tabasheer of India consisted of silica containing a minute quantity of lime and vegetable matter. Sulphur exists, in combination with different bases, in Wheat, Barley, Rye, Oats, Maize, Millet, and Rice.

For an account of the disease called Ergot, see p. 39, in the Fungal Alliance. It seems to be found in all Grasses, but most abundantly in Rye and Maize. When mixed with flour, in any quantity, it causes a mortification of the limbs, and the most horrible poisoning. Medical men have however found it to exercise a decidedly powerful stimulant effect upon the uterus, on which account it is now frequently and successfully employed by European practitioners in cases of difficult parturition.* The ergot

* Ergot is a disease which causes the grain of Rye to lengthen, harden, turn black, and form horns or spurs upon the ears. Where Rye is the food of man or of cattle, most dreadful consequences have followed the use of the spurred grains. Some curious observations have lately been made upon it by M. Bonjean. He says that the action on animals is extremely similar to that of morphia, although it in fact contains no trace of that substance. The first effect is to produce a loss of appetite and stupefaction; when it begins to act, dogs howl frightfully until they are completely under its influence, and then lie down and groan. In fowls the comb and crop become black. It appears that the Ergot which breaks with a white fracture is quite as dangerous as that which is violet; but until it is quite ripe it has no dangerous action; six or eight days are sufficient for its maturity, and even its being very old, hard, and dry seems in no way to impair its venomous qualities. M. Bonjean adds that Ergot contains two principles entirely different: one, of an oily nature, is venomous; the other, of a watery character, is harmless, but produces the extraordinary medical effects for which Ergot is employed—in particular in stopping the most frightful cases of hemorrhage. He asserts that the watery part, which he calls hæmostatic extract, may be prepared without difficulty, and that he has administered as much as 2 drachms of it, which is equal to 9 or 10 drachms of the Ergot, without any dangerous consequences.

The best Ergot is obtained from Rye which is grown on dry, airy, elevated regions, and where the

of Maize is, according to Roulin, very common in Colombia, and the use of it is attended with a shedding of the hair, and even the teeth, of both man and beast. Mules fed on it lose their hoofs, and fowls lay eggs without shell. Its action upon the uterus is as powerful as that of Rye ergot, or perhaps more so. The country name of the Maize thus affected is Mais pladéro. This statement however requires confirmation.

GENERA.

<p>I.—<i>Oryzæe</i>. <i>Leersia</i>, Sol. <i>Asprella</i>, Schreb. <i>Homatocenchrus</i>, Mieg. <i>Blepharochloa</i>, Endl. <i>Potamochoa</i>, Griseb. <i>Oryza</i>, Linn. <i>Maltebrunia</i>, Kunth. <i>Potamophila</i>, R. Br. <i>Hydrochloa</i>, P. Br. <i>Hydropyrum</i>, Lk. <i>Melinum</i>, Lk. <i>Zizania</i>, L. <i>Hyporiza</i>, Nees. <i>Caryochloa</i>, Trin. <i>Arrozia</i>, Schrad. <i>Luziola</i>, Juss. <i>Ehrharta</i>, Thunb. <i>Trochera</i>, Rich. <i>Tetrarhena</i>, R. Br. <i>Microstena</i>, R. Br. <i>Diglossa</i>, Sol. <i>Pharus</i>, P. Br. <i>Leptaspis</i>, P. Br.</p>	<p>III.—<i>Panicæe</i>. <i>Reimaria</i>, Flugg. <i>Paspalum</i>, L. <i>Axonopus</i>, Röm. et Sch. <i>Ceresia</i>, Pers. <i>Garnotia</i>, Brongn. <i>Milium</i>, L. <i>Miliarium</i>, Mnch. <i>Leptocoryphium</i>, Nees. <i>Amphicarpum</i>, Rafn. <i>Olyra</i>, L. <i>Lithachne</i>, Palis. <i>Raddia</i>, Bertol. <i>Strepnum</i>, Schrad. <i>Thrasya</i>, Kunth. <i>Eriochloa</i>, Kunth. <i>Cedipachne</i>, Lk. <i>Helopus</i>, Trin. <i>Urochloa</i>, Palis. <i>Axonopus</i>, Palis. <i>Cordoschloa</i>, Nees. <i>Rhynchelytrum</i>, Nees. <i>Panicum</i>, Linn. <i>Digitaria</i>, Scop. <i>Dactylon</i>, Vill. <i>Syntherisma</i>, Schrad. <i>Hymenachne</i>, Palis. <i>Streptostachys</i>, Palis. <i>Mouachne</i>, Palis. <i>Aulaxanthus</i>, Ell. <i>Aulaxia</i>, Nutt. <i>Thalassin</i>, Spr. <i>Trichachne</i>, Nees. <i>Olachyrium</i>, Nees. <i>Ichnanthus</i>, Palis. <i>Bluffia</i>, Nees. <i>Isachne</i>, R. Br. <i>Menertaria</i>, Herm. <i>Stenotaphrum</i>, Trin. <i>Rotboellia</i>, Sw. <i>Acraetherum</i>, Lk. <i>Bergansia</i>, Endl. <i>Miquelia</i>, Nees. <i>Melinis</i>, Palis. <i>Suardia</i>, Schrank. <i>Tristepis</i>, Nees. <i>Thysanotæna</i>, Nees. <i>Chætium</i>, Nees. <i>Oplismenus</i>, Palis. <i>Orthopogon</i>, R. Br. <i>Hypogrostis</i>, Rumph. <i>Echinocloa</i>, Palis. <i>Berchtoldia</i>, Presl. <i>Chamæraphis</i>, R. Br. <i>Pennisetum</i>, Rich. <i>Setaria</i>, Palis. <i>Gymnothrix</i>, Palis. <i>Culalophora</i>, Steudel. <i>Beckera</i>, Fres. <i>Penicillaria</i>, Sw. <i>Cenchrus</i>, Linn. <i>Panicastrella</i>, Michel. <i>Trachyozus</i>, Reichenb. <i>Trachyr</i>, Pers. <i>Trachylachys</i>, Dietr.</p>	<p><i>Anthephora</i>, Schreb. <i>Colladoa</i>, Pers. <i>Lappago</i>, Schreb. <i>Tragus</i>, Hall. <i>Lopholepis</i>, Decaisn. <i>Holboellia</i>, Wall. <i>Latipes</i>, Kunth. <i>Echinolæna</i>, Desv. <i>Navicularia</i>, Bertol. <i>Thouarea</i>, Pers. <i>Microthouarea</i>, Thonars. <i>Spinifex</i>, Linn. <i>Neurachne</i>, R. Br. IV.—<i>Stipæe</i>. <i>Oryzopsis</i>, Rich. <i>Dilopyrum</i>, Raf. <i>Greenia</i>, Nutt. <i>Piptatherum</i>, Palis. <i>Urachne</i>, Trin. <i>Lasiagrostis</i>, Lk. <i>Dichelachne</i>, Endl. <i>Orthoraphium</i>, Nees. <i>Macrochloa</i>, Kunth. <i>Stipa</i>, Linn. <i>Nosella</i>, Trin. <i>Piptochætium</i>, Presl. <i>Aristella</i>, Triu. <i>Jarava</i>, Ruiz et Pav. <i>Eriocoma</i>, Nutt. <i>Streptachne</i>, R. Br. <i>Aristida</i>, Linn. <i>Chætaria</i>, Palis. <i>Cortopogon</i>, Palis. <i>Pseudachne</i>, Endl. <i>Streptachne</i>, Kunth. <i>Arthratherum</i>, Palis. <i>Stipagrostis</i>, Nees. V.—<i>Agrostæe</i>. <i>Mühlenbergia</i>, Schreb. <i>Podosæmum</i>, Kunth. <i>Trichochloa</i>, Trin. <i>Dilopyrum</i>, Michx. <i>Brachyelytrum</i>, Palis. <i>Clomena</i>, Palis. <i>Lycurus</i>, H. B. K. <i>Coleanthus</i>, Scid. <i>Schmidtia</i>, Tratt. <i>Willibaldia</i>, Sternb. <i>Phippsia</i>, R. Br. <i>Colpodium</i>, Trin. <i>Cinna</i>, L. <i>Epilempes</i>, Presl. <i>Echinopogon</i>, Palis. <i>Sporobolus</i>, R. Br. <i>Helochloa</i>, Palis. <i>Agrosticuta</i>, Raddi. <i>Calotheca</i>, Steud. <i>Agrostis</i>, Linn. <i>Trichodium</i>, Auct. <i>Vilfa</i>, Auct. <i>Anemagrostis</i>. <i>Apera</i>, Palls. <i>Gastridium</i>, Palis. <i>Nowodworsky</i>, Presl.</p>	<p><i>Raspailia</i>, Presl. <i>Chætotropis</i>, Kunth. <i>Polypogon</i>, Desf. <i>Chæturus</i>, Lk. <i>Agopogon</i>, Willd. <i>Pereleusa</i>, Presl. VI.—<i>Arundinæe</i>. <i>Sericura</i>, Hassk. <i>Calamagrostis</i>, Adans. <i>Deyeuxia</i>, Clar. <i>Lachnagrostis</i>, Trin. <i>Pentapogon</i>, R. Br. <i>Ammophila</i>, Host. <i>Psonma</i>, Palis. <i>Amagris</i>, Rafin. <i>Arundo</i>, Linn. <i>Donax</i>, Palis. <i>Scolochloa</i>, Koch. <i>Trichoon</i>, Roth. <i>Ampeledemos</i>, Lk. <i>Graphophorum</i>, Desv. <i>Phragmites</i>, Trin. <i>Czeruya</i>, Presl. <i>Amphidonax</i>, Nees. <i>Gynerium</i>, H. B. K. VII.—<i>Pappophoræe</i>. <i>Amphipogon</i>, R. Br. <i>Diplogogon</i>, R. Br. <i>Dipogonia</i>, Palis. <i>Triphaphis</i>, R. Br. <i>Pappophorum</i>, Schreb. <i>Enneapogon</i>, Desv. <i>Polyrhaphis</i>, Trin. <i>Euraphis</i>, Trin. <i>Corthrum</i>, Vahl. <i>Cottæa</i>, Kunth. <i>Echinaria</i>, Desf. <i>Panicastrella</i>, Mönch. <i>Cathestecum</i>, Presl. VIII.—<i>Chloræe</i>. <i>Microchloa</i>, R. Br. <i>Schenefeldia</i>, Kunth. <i>Cynodon</i>, Rich. <i>Digitaria</i>, Juss. <i>Fibigia</i>, Kôhr. <i>Capriola</i>, Adans. <i>Caprera</i>, Lagasc. <i>Dactyloctenium</i>, Willd. <i>Eustachys</i>, Desv. <i>Schultesia</i>, Spr. <i>Chloris</i>, Sw. <i>Apogon</i>, Endl. <i>Euchloris</i>, Kunth. <i>Actinochloris</i>, Pauz. <i>Geopogon</i>, Endl. <i>Tetrapogon</i>, Desf. <i>Leptochloa</i>, Palis. <i>Leptostochus</i>, Meyer. <i>Oxytenia</i>, Nutt. <i>Diplachne</i>, Palis. <i>Elysiens</i>, Gayn. <i>Harpochloa</i>, Kunth. <i>Ctenium</i>, Panz.</p>
---	---	---	---

soil is sandy or chalky in character. When its form is somewhat long, and it is of a very dark colour, or if it has been gathered in plains or damp valleys, it is of inferior quality. On chemical analysis, according to the experiments of Vauquelin, Wiggers, and others, it yields nearly half its weight in oil, resin, wax, fatty matter and gum, all hydrogenous principles, and a little albumen, and nitrogenous extract. If the season has been a wet one, or if the Ergot has been gathered in moist places, these principles lose their relative proportions; and the spurred Rye, approaching nearer in quality to good grain, contains but few oleo-resinous principles. It is worthy of remark, that this parasitic grain is only met with on the finest plants of Rye in shady places, or towards the ends of fields recently cleared of wood, and where the carbonic principles and a rich soil abound.—*Chemical Gazette*.

Campuloa, Desv.
Campulosus, Palis.
Monocera, Elliot.
Monothera, Raf.
Melinoenchris, Nees.
Chondrosium, Desv.
Actinochloa, Willd.
Bouteloa, Lagasc.
Opiza, Presl.
Spartina, Schreb.
Limnetis, Rich.
Trachynotia, Michx.
Poncletia, Thouars.
Eutriann, Trin.
Atheropogon, Mühlenb.
Aristidium, Endl.
Heterostegn, Desv.
 ? *Enteropogon*, Nees.
Triplantha, Endl.
Triathera, Desv.
Gymnopogon, Palis.
Polyodon, H. B. K.
Pentalaphis, H. B. K.
Polyschistis, Presl.
Triana, H. B. K.
Triplasis, Palis.
Pleurnphis, Torrey.
Bromidium, Nees.

IX.—*Avenca*.

Hierochloa, Gmel.
Disarrhenum, Lab.
Dimeria, Raf.
Anthoxanthum, L.
Ataxia, R. Br.
Podopogon, Ehrenb.
Corynephorus, Palis.
Wingärtneria, Bernh.
Deschampsia, Palis.
Campella, Lk.
Dupontin, R. Br.
Aira, L.
 ? *Periballia*, Trin.
 ? *Poidium*, Nees.
Airopsis, Desv.
Trisetaria, Forsk.
Lagurus, L.
Trisetum, Kunth.
Colobanthus, Trin.
Rostraria, Trin.
Kateria, Lk.
Trichæta, Palis.
Acrospelon, Bess.
Ventenata, Kôl.
Avena, Linn.
 ? *Leptopyrum*, Rafin.
Gaudinia, Palis.
Arthrostachya, Lk.
Arrhenatherum, Palis.
Tristachya, Nees.
Monopogon, Presl.
Anisopogon, R. Br.
Trichopterya, Nees.
Eriachne, R. Br.
Achneria, Pnlis
Brandtin, Kunth.
Danthonia, DC.
Sieglingia, Beruh.
Triodia, Palis.
Tripogon, Rôm. et Sch.
Triathera, Roth.
Pentameris, Palis.
Chærobromus, Nees.
Uralapis, Null.
Diploca, Rafin.
Windsoria, Natt.
Tricuspis, Palis.
Tridens, Rom. et Sch.
Triodin, R. Br.
Pommereulla, Lin. fil.

X.—*Festucea*.

**Bromidæ*.
Sesleria, Ard.
Oreochloa, Lk.
Psilathera, Lk.
Poa, L.
Ælthropus, Trin.
Brizopyrum, Lk.
Distichis, Raf.
Eragrostis, Palis.
Megastachya, Palis.
Dissanthelium, Trin.
Tetrachne, Nees.
Phalaridium, Nees.
Centotheca, Desv.
Glyceria, R. Br.
Devauria, Palis.
Hydrochloa, Lk.
Erydra, Endl.
Lophochlæna, Nees.
Pleuropogon, R. Br.
Eatonia, Raf.
Reboulca, Kunth.
 ? *Chondrachyrum*, Nees
Catahrosa, Palis.
Cælachne, R. Br.
Brizn, L.
 ? *Neurolooma*, Rnf.
Chnscolytrum, Desv.
Calotheca, Kunth.
Anthochloa, Nees.
Melica, L.
Bulbilis, Rafin.
Molinia, Mönch.
Airochloa, Lk.
Kæleria, Lk.
Collinaria, Ehrh
Ægialitis, Trin.
Ægialina, Schult.
Lophochloa, Rehb
Schismus, Palis.
Hemisacris, Steud.
Wnngenhelmia, Monch
Ductylis, L.
Lasiochlon, Kunth.
Urochlæna, Nees.
Cynosurus, L.
Chrysurus, Palis.
Lamarckia, Monch.
Pterium, Desv.
Ectrosia, R. Br.
Lophantherum, Brongn.
Elytrophorus, Palis.
Echinalysium, Trin.
Plagioclytrum, Nees.
Festuca, Linn.
Sclerochloa, Palis.
Sphenopus, Trin.
Catapodium, Lk.
Brachypodium, Palis.
Vulpia, Gmel.
Mygalurus, Lk.
Schedonorus, Pnlis
Amphibromus, Nees.
Bromus, Linn.
Ceratochloa, Palis.
Libertia, Lej.
Michclaria, Dumort.
Orthochlæna, Palis.
Uniola, Linn.
Chasmanthium, Lk.
Trisiola, Raf.
Diarrhena, Palis.
Diarina, Raf.
Ræmeria, Zea
Corycarpus, Zen.

** *Bambusidæ*.

Arundinaria, Rich.

Miegia, Pers.
Ludolfia, Willd
Triglossum, Fisch.
Macrouax, Rafin.
Arthrostylidium, Ruppr.
Phyllostachys, Sieb.
Streptogyna, Palis.
Chusquea, Kunth.
Rettbergia, Raddi.
Platonja, Kunth.
Dendragrostis, Nees.
Merostachys, Spreng.
Gundua, Kunth.
Nastus, Juss.
Stemmatospermum, Pnl.
Schizostachyum, Nees.
Bambusa, Schreb.
Arundarbor, Bauh.
Dendrocalamus, Nees.
Beesha, Rheed.
Melocanna, Rop.
Streptochaeta, Nees.
Lepidiclenia, Trin.

XI.—*Hordeæ*.

Lolium, Linn.
Cræpalia, Schrank.
Triticum, Linn.
Spelta, Endl.
Agropyrum, Palis.
Trachynia, Lk.
Secale, Linn.
Elymus, Linn.
Psammochloa, Endl.
Cuviera, Kæl.
 ? *Sitanion*, Raf.
Gymnostichum, Schreb.
Asprella, Humb.
Hystrix, Mönch.
Hordeum, Linn.
Zoocriton, Palis.
Cristesum, Rafin.
Ægilops, L.
Polyntherix, Nees.
Parinnn, Aubl.

XII.—*Rottboellææ*.

Nrdus, Linn.
Psilurus, Trin.
Asprella, Host.
Monerma, Palis.
Lepturus, R. Br.
Myurus, Endl.
Micurus, Endl.
Moerma, Palis.
Syurus, Endl.
Pholurus, Trin.
Oropetium, Trin.
Ophiurus, Gærtn.
Hemarthria, R. Br.
Lodicularia, Palis.
Vossia, Wall. et Grif.
Mnesithen, Kunth.
Thyridostachyum, Nees.
Rottbellin, R. Br.
Hemipus, Endl.
Stegosia, Lour.
 ? *Cymbachne*, Retz.
Cælorhachis, Brongn.
Rntzehngia, Kunth.
Aikinia, Wall.
Xerochloa, R. Br.
Tripsneum, Linn.
Maulsurls, Linn.
Peltophorus, Desv.

XIII. *Andropogoneæ*.

Perotis, Ait.

Xystlidium, Trin.
Leptothrium, Kunth.
Zoysia, Willd.
Epiphyllis, Trin.
Matrella, Pers.
Osterdamia, Neck.
Dimeria, R. Br.
Haaplachne, Presl.
Arthraxon, Palis.
Pleuropilitis, Trin.
Luæca, Kunth.
Eriochrysis, Palis.
Plæzerum, Willd.
Saccbarum, Linn.
Phragmites, Adans.
Saccharophorum, Neck.
Trieholæna, Schrad.
Eriopogon, Endl.
Imperatin, Cyrill.
Pogonatherum, Palis.
Homeopilitis, Trin.
Erianthus, Rich.
Ripidium, Trin.
 ? *Microstegium*, Nees.
Eulalin, Kunth.
Leptatherum, Nees.
Apocaris, Nees.
Elionurus, Kunth.
Anthistirin, Linn.
Themeda, Forsk.
Perobachne, Presl.
Androscæpia, Brongn.
Dictomis, Kunth.
Apluda, Linn.
Dictomis, Palis.
Batratherum, Nees.
Hologamium, Nees.
Lepeocercis, Trin.
Anatherum, Palis.
Cymbopogon, Spr.
Hypogynium, Nees
Agentum, Nees.
Trnchypogon, Nees.
Schizachyrium, Nees
Pithecurus, Willd.
Sorghum, Pers.
Blumenbachia, Kol.
Andropogon, Linn.
Pollinia, Spr.
Chrysopogon, Trin.
 ? *Rhaphis*, Loureir.
Centrophorum, Trin.
Heteropogon, Pers.
Ischæmum, Linn.
Schima, Forsk.
Meoschium, Palis.
Colladoa, Cnv.
Spodtopogon, Trin.
Arundinella, Raddi.
Goldbachia, Trin.
Riedelia, Trin.
Thysanachne, Presl.
Pogonopsis, Presl.
Thelepogon, Roth.
Arthropogon, Nees.
Zengites, P. Br.
Alloteropsis, Presl.
Blyttia, Fries.

Doubtful Genera.
Pterium, Desv.
Rytachne, Desv.
Xenochloa, Liehtenst.
Chryochloa, Spr.
Heterelytron, Jungh.
Aristarin, Jungh.

NUMBERS. GEN. 29i. Sp. 3800 ?

Bryaceæ ?

POSITION.—*Restiaceæ*.—*GRAMINACEÆ*.—*Cyperaceæ*.

Palmaceæ.

ORDER XXX. CYPERACEÆ. SEDGES.

Cyperoideæ, *Juss. Gen.* 26. (1789).—Cyperaceæ, *R. Brown Prodr.* 212. (1810); *Lestiboudois, Essai*; *Nees von Esenbeck in Lianca*, 9. 273; *Endl. Gen.* xliii.; *Meisner*, p. 110; *Kunth. Enum.* vol. 2; *Nees ab Escnb. in Fl. Bras. fasc.* 4.

DIAGNOSIS.—*Glumal Endogens with whole leaf-sheaths, a one-celled ovary, and an embryo enclosed within the base of the albumen.*

Grass-like herbs, growing in tufts and never acquiring a shrubby condition. The stems are never hollow, and seldom have any partitions at their nodes; they are frequently angular, and are sometimes enlarged

at the base into corms or tubers. The leaves are narrow or taper, and, when they wrap round the stem in the form of a sheath, never have that sheath slit. Flowers ♂ or ♀, consisting of imbricated solitary bracts, of which the lowermost are often empty, very rarely enclosing other opposite bracts at right angles with the first, and called glumes. Calyx none. Stameus hypogynous, definite, 1, 2, 3, 4, 5, 6, 7, 10, 12; anthers fixed by their base, entire, 2-celled. Ovary 1-seeded, often surrounded by bristles called hypogynous setæ; ovule erect, anatropal; style single, trifid, or bifid; stigmas undivided, occasionally bifid. Nut crustaceous or bony. Albumen fleshy or mealy, of the same figure as the seed; embryo lenticular, undivided, enclosed within the base of the albumen; plumule inconspicuous.

Sedges so nearly resemble Grasses in appearance, that the one may be readily mistaken for the other by incurious persons; they are, however, essentially distinguished by many important points of structure. In the first place, their stems are usually angular, not round and fistular; there is no diaphragm at the articulations; their flowers are destitute of any other covering than that afford-



Fig. LXXVIII.

ed them by a single bract, in the axil of which they grow, with the exception of *Carex*, *Uncinia*, and *Diplacrum*, in which 2 opposite glumes are added; and, finally, the seed has its embryo lying in the base of the albumen, within which its cotyledonar extremity is enclosed, and not on the outside, as in Grasses; a very important fact, which it is the more necessary to point out, since *Brown* describes it (*Prodr.* 212) as lenticular and placed on the outside of the albumen. The additional glumes above adverted to form what *Linnean* botanists call the nectary or aril! *Brown* mentions a case where these glumes, which he calls a capsular perianth, included stamens instead of a pistil. According to *Turpin*, rudiments of the



Fig. LXXIX.

Fig. LXXVIII.—*Scirpus lacustris*. 1. A flower surrounded with hypogynous bristles; 2. a seed; 3. a section of it, showing the lenticular embryo.

Fig. LXXIX.—Tricle or additional glumes of *Carex rivularis*.

latter sometimes appear in different species of *Marsicus*. Sedges approach Cordleafs (*Restiaceæ*) in the peculiar state of the flowers and in general habit. They are, however, clearly distinguished from that order by their seeds being erect not pendulous, and by their more complicated ovary, which is always formed by 2 or 3 carpellary leaves, although enclosing only one ovule, while Cordleafs have but one carpellary leaf to each ovule. The sheaths of the leaves of Cordleafs are slit, like those of Grasses. Sedges stand then in the same relation to Cordleafs as Buckwheats to Chenopods. The species are extremely difficult to determine, and the distinctive characters of the genera were unsatisfactory, until Professor Nees v. Esenbeck rearranged the Order in the place above quoted.

Found in marshes, ditches, and running streams, in meadows and on heaths, in groves and forests, on the blowing sands of the sea shore, on the tops of mountains, from the arctic to the antarctic circle, wherever Phænogamous vegetation can exist. Humboldt remarks, that in Lapland Sedges are equal to Grasses; but that thence, from the temperate zone to the equator, in the northern hemisphere, the proportion of Sedges to Grasses very much diminishes. As we approach the Line, the character of the order also changes: *Carex*, *Scirpus*, *Schoenus*, and their allies, cease to form the principal mass, the room of which is usurped by multitudes of species of *Cyperus*, by *Kyllinga*, *Marsicus*, and the like, genera comparatively unknown in northern regions, or at least not forming any marked feature in the vegetation. A few species are common to very different parts of the world, as *Scirpus triquetus*, *Eleocharis capitata*, and *Fuirena umbellata*, to New Holland and South America, and several *Scirpi* to Europe and the southern hemisphere.

While Grasses are celebrated for their nutritive qualities, and for the abundance of fecula and sugar they contain, Sedges are little less remarkable for the frequent absence of those principles: hence they are scarcely sought for by cattle. The roots of *Carex arenaria*, *disticha*, and *hirta*, have diaphoretic and demulcent properties, on which account they are called German Sarsaparilla. Those of *Cyperus* are succulent, and filled with a nutritive and agreeable mucilage. In *Cyperus longus* (the *κυπειρος* of Hippocrates) a bitter principle is superadded, which gives its roots a tonic and stomachic quality. The tubers of *Cyperus hexastachyus* or *rotundus* are said by General Hardwicke to be administered successfully in cases of cholera by Hindoo practitioners, who call the plant Mootha. Those of *C. pertenuis*, or Nagur-Mootha, are, when dried and pulverised, used by Indian ladies for securing and perfuming their hair. The root of *Cyperus odoratus* has a warm aromatic taste, and is given in India, in infusion, as a stomachic. The root of *Scirpus lacustris* is astringent and diuretic, and was once official. *Remirea maritima*, a common plant in tropical America, is said to be powerfully diaphoretic and diuretic; and the same qualities are ascribed to *Kyllinga odorata* and *Hypoporum nutans*. The leaves of Cotton-grasses, *Eriophorum*, were once used in diarrhœa, and the spongy pith of the stem to destroy tape-worms. *Cyperus Iria* has a reputation in India as a useful medicine in suppression of the menses, and in colic. The root of *Kyllinga triepes* is employed in the East Indies in diabetes, and as a stomachic, for which its acidity combined with some aroma has recommended it. The root of *Scleria lithosperma* is supposed upon the Malabar coast to have antinephritic virtues. The tubers or corns of *Cyperus esculentus*, (the *μαλινοθαλλη* of Theophrastus), called by the French Souchet comestible or Amande de terre, are used as food in the south of Europe, and are employed in the preparation of orgeat; Dr. Royle adds, that when roasted they have been proposed as a substitute for coffee and cocoa. The Chinese cultivate several species for food, especially the Pi-tsi or *Scirpus tuberosus*, which Nees v. Esenbeck regards as a bulbous form of *Limnochloa plantaginea*. And Dr. Royle informs us (*Illustr.* p. 413), that the *Cyperus bulbosus* of Vahl (*C. jemenicus* L.), called Sheelandic-aresee in Madras, and Puri-drempa by the Telingas, has tubers which when roasted or boiled taste like potatoes, and would be valuable for food if they were not so small. *Scirpus dubius* of Roxburgh, (the Allikee of the Telingas) is given on the same authority as having tubers, which the natives say are as good as yams.

The Papyrus of the banks of the Nile, *Papyrus antiquorum*, of which boats, paper, and ropes are made, is a plant of this family; it is said to be called Babeer in Syria, and is described by the Arabians (*Avic.* c. 543), by the name Fafcer and Burdee: the former evidently of the same origin as the Greek and Syrian names. A species of the genus *Papyrus* (*P. corymbosus*, N. ab E., *P. Pangorei* Arnott) is hardly of less use in India, being extensively employed for making the mats so much used there for covering the floors of rooms, and which are also so much esteemed in Europe. Dr. Ainslie says that a species, called Rora and Toonghi, which he refers to *C. textilis* of Thunberg, is employed in the peninsula for the same purpose. Some of the species of *Scirpus*, especially *S. lacustris*, are sometimes substituted for rushes in making baskets and chair bottoms, &c.; *Cyperus textilis* is employed in making ropes, and as the Papyrus

of Egypt was by the ancients. The species of *Eriophorum*, called Cotton-grass in England, from having their fruit clothed at the base with a silky or cotton-like substance, of which paper and wicks of candles have been made, and pillows stuffed, has a species (*E. comosum*, Wall., *cannabium*, nob.), Bhabhur of the natives, of which the leaves, previous to the plant flowering, are in the Himalayas extensively employed for rope-making. *Cyperus mundatus* probably, with other species, helps much to bind and protect the banks of the Ganges from the rapidity of the stream and the force of the tides; as in Holland *Carex arenaria* is carefully planted on the dikes, where its far-extending roots, by mutually interlacing with each other, fix the sand and give strength to the embankment." (Royle, *Illustr.* p. 415.) *Cyperus Hydra*, called Nut-grass in the West Indies, is said to be a pest there, overrunning the Sugar-cane plantations, and rendering them barren.

GENERA.

- I.—Cariceæ.
Carex, Mich.
Vigna, Palis.
Schelhammeria, Münch.
Scuria, Rafin.
Triodia, Rafin.
Trasus, Gray.
Uncinia, Pers.
Hoppia, Nees.
Schoenoxiphium, Nees.
- II.—Elyneæ.
Trilepis, Nees.
Dilepis, Endl.
Fintelmannia, Kunth.
Elyna, Schrad.
Frölichia, Wulff.
Kobresia, Willd.
- III.—Sclereæ.
Diplacrum, R. Br.
Ptychocarya, R. Br.
Sciera, Berg.
Cylindropus, Nees.
Pteroscleria, Nees.
Schizolepis, Schr.
Ophryoscleria, Nees.
Macrolomia, Nees.
Osmoscleria, Nees.
Mastigoscleria, Nees.
Acrocarpus, Nees.
Cephalocarpus, Nees.
Cryptanguina, Schr.
Lazencarpus, Nees.
Chondrolomia, Nees.
Trachyloma, Nees.
Hymenolytrum, Schr.
Becquerela, Brongn.
Calyptrocarya, Nees.
Hypoporum, Nees.
Anogyna, Nees.
Aulaeorrhynchus, Nees.
- IV.—Rhynchosporææ.
 * *Rhynchosporida*.
Morisia, Nees.
Mitrospora, Nees.
Haplostylis, Nees.
Iperotheca, Presl.
Calyptrostylis, Nees.
Ephippiorhynchium, Nees.
- Cephaloschenus*, Nees.
Diplochæta, Nees.
Ceratoschenus, Nees.
Rhynchospora, Vahl.
Chaetospora, R. Br.
Carpus, Banks & Sol.
Strébidia, Lk.
Asterochæta, Nees.
Cyathocoma, Nees.
Eucyathocoma, Fenzl.
Idcleria, Kunth.
Trianoptiles, Fenzl.
Ecklonia, Steud.
Nemochloa, Nees.
Nomochloa, Palis.
Pleurostachys, Brongn.
Machærina, Vahl.
Buekia, Nees.
Lepidosperma, Labill.
Lepidosterna, Röm. et Sch.
Sclerochæcium, Nees.
Oreobolus, R. Br.
- ** *Schænidæ*.
Spermodon, Palis.
Triodon, Rich.
Psilocarya, Torr.
Astroschenus, Nees.
Ptilochæta, Nees.
Dichromena, Rich.
Zosterospermum, Palis.
Echinoschenus, Nees.
Haloschenus, Nees.
Elynanthus, Palis.
Vincenia, Gaud.
Chapelliera, Nees.
Baukea, Gaudich.
Schænus, Linn.
Torulinium, Desv.
 ? *Schanopsis*, Lestib.
Gussonea, Presl.
Gymnoschenus, Nees.
Isochenus, Nees.
Remirea, Aubl.
Mirigia, Schreb.
- V.—Cladææ.
Cladium, P. Br.
Lampyrocarya, R. Br.
Morcolota, Gaud.
Melachne, Schrad.
Didymonema, Presl.
- Epiandria*, Presl.
Gahnia, Forst.
Caustis, R. Br.
Evandra, R. Br.
- VI.—Chrysitricheæ.
Chrysitrix, Linn. fil.
Pandanophyllum, Hassk.
Lepironia, Rich.
Chondracine, R. Br.
Chorizandra, R. Br.
- VII.—Hypolytreæ.
Hemicarpha, Nees.
Lipocarpha, Nees.
Hypolytrum, R. Br.
Hypolytrum, Lk.
Platylepis, Kunth.
Hypolytrum, Rich.
Bessa, Palis.
Albikia, Presl.
Diplasia, Rich.
- VIII.—Fuireneæ.
 * *Melanocranidæ*.
Melanocranus, Vahl.
Hypolepis, Palis.
Sickmannia, Nees.
Anosporum, Nees.
 ** *Hemichlanidæ*.
Hemichlæna, Schrad.
Acrolepis, Schrad.
Hypophialium, Nees.
Pleurachne, Schrad.
 *** *Ficinidæ*.
Fuirena, Rottb.
Vaginaris, L. C. Rich.
Vauthiera, A. Rich.
Ficinia, Schrad.
Schænidium, Nees.
Oxycaryum, Nees.
Blepharolepis, Nees.
Oncostylis, Mart.
Fimbristylis, Vahl.
Trichelostylis, Lestib.
Dichelostylis, Palis.
Echinolytrum, Desv.
- IX.—Scirpææ.
Isolepis, R. Br.
Holoschenus, Lk.
Eleoilton, Lk.
Trichelostylis, Lestib.
Dichostylis, Palis.
Nemum, Palis.
Helothrix, Nees.
Scirpus, L.
Pterolepis, Schrad.
Malacochæta, Nees.
Hymenochæta, Palis.
Elytrospermum, C. A. Meyer.
Blysmus, Panz.
Bæothryon, Nees.
Eleocharis, R. Br.
Eleocharis, Nees.
Chælocyprus, Nees.
Scirpidium, Nees.
Androtrichum, Brongn.
Androcoma, Nees.
Eriophorum, L.
Linagrostis, Lam.
Trichophorum, Pers.
- X.—Cypereæ.
Dulichium, Rich.
Pleuranthus, Rich.
Comostemum, Nees.
Diclidium, Schr.
Cyperus, Linn.
Torreya, Rafin.
Papyrus, Willd.
Kyllingia, Linn.
Mariscus, Vahl.
Adulpa, Bosc.
Courtoisia, Nees.
Oputiola, Gærtn.
Tryocephalon, Forst.
Abilgaardia, Vahl.
Fria, Rich.
Leptoschenus, Nees.
 Uncertain Genera.
Mapania, Aubl.
Disphora, Lour.
Haplostemum, Rafin.
Diplarrhinus, Rafin.
Disticmus, Rafin.
Tetraria, Palis.
Catagyna, Palis.
Tricostularia, Nees.

NUMBERS.—GEN. 112. Sp. 2000.

POSITION.—Graminacææ.—CYPERACEÆ.—Restiacææ.
Acoracææ.
Typhaceææ.

ORDER XXXI. DESVAUXIACEÆ.—BRISTLEWORTS.

Desvauxiaceæ, *Nixus Plantarum*, p. 23. (1833), a § of Restiaceæ; *Bartl. Ord. Nat.* p. 36; *Martius Conceptus*, No. 38.—Centrolepideæ, *Desvaux in Ann. des Sc.* 13. 36. (1828); *Endl. Gen.* xlv.; *Meisner, Gen.* p. 409; *Kunth. Enum.* 3. 487.

DIAGNOSIS.—*Glumal Endogens*, with several ovaries (sometimes consolidated), a pendulous ovule, 1-2-stamens, 1-celled anthers, and terminal embryo.

Little tufted herbs, resembling small Scirpi. Leaves setaceous, sheathing at the base. Scapes filiform, undivided, naked. Flowers enclosed in a terminal spathe. Glumes one,

in front, or two somewhat opposite each other. Paleæ 0, or one or two tender scales parallel with the glumes. Stamen 1, very rarely 2; anther simple. Ovaries from 1 to 18 attached to a common axis, distinct or partially united, 1-celled, with a single stigma to each; ovules solitary, orthotropal. Fruit as many 1-seeded utricles, opening longitudinally; seed pendulous; embryo lenticular, placed within the extremity most remote from the hilum.

The main distinction of this Order consists in the ovaries, which are variable in number, and usually distinct from each other round a common axis, in the manner of a *Ranunculus*. Occasionally they are partially united; in all cases they change to little one-seeded utricles. The stamen, which is usually solitary, has a second added in the genus *Gaimardia*, which does not seem to be otherwise different. *Aphelia* has only one earpel, and this is regarded by *Eudlicher* as a near approach to Sedges; but it is really very different, for the single ovary of that order is evidently made up of from 2 to 3 carpels enclosing a single ovule; while in *Aphelia*, as in all the Order of Bristleworts, the ovary consists of but a single earpel.

All inhabit the South Sea Islands; and nearly all New Holland.

They are of no known use.



Fig. LXXX.

Aphelia, R. Br.
Alepyrum, R. Br.

GENERA.
Centrolepis, Labill.
Desvauxia, R. Br.

Gaimardia, Gaudich.

NUMBERS. GEN. 4. Sp. 15. (Kunth.)

POSITION. Restiaceæ.—DESVAUXIACEÆ.—Eriocaulaceæ.

Fig. LXXX.—*Centrolepis fascicularis*. 1. A head of flowers; 2. a single flower separated; 3. an ovary with the style cut off.—*Endlicher*.

ORDER XXXII. RESTIACEÆ.—CORDLEAFS.

Restiaceæ, *R. Brown, Prodr.* 243. (1810); *Kunth in Humb. N. G. et Sp.* 1. 251. (1815); *Agardh Aph.* 136. (1823) a § of Junceæ; *Nees v. Eсенbeck, in Linnæa*, 5. 627. (1830) et 7. 614. (1832); *Endl. Gen.* xl.; *Meisner, Gen.* p. 408; *Kunth Enum.* 3. 381.—Elegiæ, *Beauv. in cod. loc.* (1825).

DIAGNOSIS.—*Glumal Endogens, with a 1-3-celled ovary, a pendulous ovule, 2-3 stamens, 1-celled anthers, and terminal embryo.*

Herbaceous plants or under-shrubs. Leaves simple, narrow, or none. Culms naked, or more usually protected by sheaths, which are slit, and have equitant margins. Flowers generally aggregate, in spikes or heads, separated by bracts, and most frequently unisexual. Glumes 2-6, seldom wanting. Stamens 2 to 3, attached to 4 or 6 glumes and opposite the innermost; anthers usually usually unilocular and peltate. Ovary 1- or more-celled, cells monospermous; styles or stigmata never fewer than 2, although the ovary be 1-celled; and otherwise equal in number to the cells of the ovary; ovules pendulous. Fruit capsular, or nucamentaceous. Seeds inverted; albumen of the same figure as the seed; embryo lenticular, on the outside of the albumen, at that end of the seed which is most remote from the hilum.

According to Brown, the principal character distinguishing this order from Rushes and Sedges consists in its pendulous seed and lenticular embryo placed at the extremity of the seed opposite to the umbilicus. From Rushes it also differs in the order of suppression of its stamina, which, when reduced to 3, are opposite to the inner glumes; and most of its genera are distinguishable from both these Orders, as well as from Commelinaceæ, by their simple or unilocular anthers.—(*Flinders*, 579.) But in truth it is essentially distinguished from the order of Rushes by its glumaceous flowers, as well as by the characters already named. If the glumes are absent, it is then only to be known from Sedges by the pendulous ovules, terminal embryo, and by the sheaths of its leaves being slit. The tripetaloid flower and polyspermous fruit of *Xyris*, a genus formerly referred here, are characters indicating a far superior degree of evolution, and sufficient to separate it as the representative of a peculiar order; a measure which Brown anticipated when he remarked (*Prodr.* 244.), that the genus *Xyris*, although placed by him at the end of Restiaceæ, is certainly very different from the other genera, in the inner segments of the perianth being petaloid, with the stamens proceeding from the top of their ungues, and in its numerous seeds. Pipeworts are known by their having a membranous sheath between the glumes and ovary, and thus indicating an approach to the petaloid Orders, especially to Xyrids.

All are extra-European, and chiefly found in the woods and marshes of South America, New Holland, and southern Africa. They have not been found in America.

The tough wiry stems of some species are manufactured into baskets and brooms. *Willdenowia teres* is employed for the latter purpose, and *Restio tectorum* for thatching.

GENERA.

<i>Rhodocoma</i> , <i>Nees.</i>	<i>Willdenowia</i> , <i>Thunb.</i>	<i>Lepidanthus</i> , <i>Nees.</i>	<i>Chondropetalum</i> , <i>Rottb.</i>
<i>Leptocarpus</i> , <i>R. Br.</i>	<i>Nematanthus</i> , <i>Nees.</i>	<i>Anarthria</i> , <i>R. Br.</i>	<i>Restio</i> , <i>Lin.</i>
<i>Loxocarya</i> , <i>R. Br.</i>	<i>Hypodiscus</i> , <i>Nees.</i>	<i>Lyginia</i> , <i>R. Br.</i>	<i>Calorophus</i> , <i>Labill.</i>
<i>Chaetanthera</i> , <i>R. Br.</i>	<i>Leucoplocus</i> , <i>Nees.</i>	<i>Lepyrodia</i> , <i>R. Br.</i>	<i>Calopsis</i> , <i>Palis.</i>
<i>Hypoleuca</i> , <i>R. Br.</i>	<i>Mesanthus</i> , <i>Nees.</i>	<i>Thamnochortus</i> , <i>Berg.</i>	<i>Cannomois</i> , <i>Palis.</i>
<i>Curullifera</i> , <i>Nees.</i>	<i>Anthochortus</i> , <i>Nees.</i>	<i>Staberchia</i> , <i>Kunth.</i>	<i>Boecklinii</i> , <i>Kunth.</i>
<i>Dovea</i> , <i>Kth.</i>	<i>Ceratocaryum</i> , <i>Nees.</i>	<i>Elegia</i> , <i>Thunb.</i>	

NUMBERS. GEN. 23. Sp. 171 (*Kunth*.)

POSITION. Cyperaceæ.—RESTIACEÆ.—Eriocaulaceæ.

Fig. LXXXI.—*Lepyrodia hermaphrodita*. 1 A flower: 2. the same when the fruit is ripe; 3. the ovary; 4. the fruit in a state of dehiscence; 5. the seed, cut vertically, of *Restio dichotomus*.

ORDER XXXIII. ERIOCAULACEÆ.—PIPEWORTS.

Eriocauloneæ, L. C. Richard in H. B. K. Nov. Gen. et Sp. Pl. 1. 251. (1815); Desvoux in Ann. Sc. 13. 36.; Martius in Act. Acad. Cas. Nat. cur. 17.; Endl. Gen. xlv. ; Meisner. gen. p. 407; Eriocaulaceæ, Kunth. enum. 3. 493.; Act. Acad. Wissench. Berlin, Febr. 1841.

DIAGNOSIS.—*Glumal Endogens, with a 2-3-celled ovary, a pendulous ovule, 2-celled anthers, a terminal embryo, and a 3-lobed cup within the glumes.*

Perennial marsh-plants, with linear cellular spongy leaves sheathing at the base.



Flowers capitate, bracteate, very minute, ♂ ♀. Glumes two, unilateral, or 3. A membranous tube, with 2 or 3 teeth or lobes, surrounds the ovary. Ovary superior 3- or 2-celled; ovules solitary, orthotropal; style very short; stigmas as numerous as the cells of the ovary. Dehiscence of the capsule loculicidal. Seeds solitary, pendulous, coated with wings or rows of hairs. Embryo more or less lenticular, lying upon the albumen at the end of the seed most remote from the hilum.

This order is usually combined with Restiaceæ (or Cordleaves) from which, in a memoir in the 17th vol. of the Nova Acta, Von Martins separates it on the following grounds. Restiaceæ: Flowers in spikes. Calyx glumaceous ▽. Stamens in a single row, 1-3, opposite the petals; anthers generally 1-celled. Seeds with out rows of hairs. Eriocaulaceæ: Flowers in heads, unisexual. Calyx sepaloideous Δ. Stamens 3, 6, 2, 4; if in two rows, with the inner row most developed; anthers 2-celled. Seeds solitary, with rows of hairs. The most important distinctions seem to consist in the presence among the Pipeworts of a membranous tube, which may be regarded as the most distinct approach, in the Glumal Alliance, to the corolla of the petaloid series, and in the anthers being 2-celled, not 1-celled; a further indication of a higher order of development. Xyrids, with a perfect corolla, may be regarded as the link which connects these plants with some of the more perfect orders of Endogens.

Many remarkable species are figured by Bongard in *Memoirs of the Imperial Academy of St. Petersburg, 6th series, 1. p. 601., &c.*

A large number of species is collected under this head; all of which are amphibious or aquatic. According to Endlicher, two-thirds

are found in the tropics of America, and half the remainder in the north of New Holland. A few occur in North America, and one is found in Great Britain, in the isle of Skye.

Eriocaulon setaceum, boiled in oil, is said to be a popular remedy for the itch in the East Indies.

GENERA.

Lachnocaulon, Klh.
Eriocaulon, L.
Dupalya, Fl. sum.
Nasmythia, Huds.

Randalia, Petiv.
Sphacrochloa, Palis.
Leucocephala, Roxb.
Paepalanthus, Mart.

Tonina, Aubl.
Hyphydra, Schreb.
Philodice, Mart.

Cladocaulon, Gardn.
Stephanophyllum, Guill.
? Symphachne, Palisot.

NUMBERS. GEN. 9. Sp 200 (Kunth).

Juncaceæ.

POSITION.—Restiaceæ.—ERIOCAULACEÆ. ———
Xyridaceæ.

Fig. LXXXII.—Tonina fluviatilis. 1. ♂ flower; 2. centre of do.; 3. ♀ an ♂ flowers; 4. section of ripe fruit; 5. seed; 6. section of do.—Martius.

ALLIANCE VIII. *ARALES*.—THE ARAL ALLIANCE.

DIAGNOSIS.—*Unisexual petaloid or naked flowered endogens, with a simple naked spadix, and an embryo in the axis of mealy or fleshy albumen.*

It is here that we find the lowest structure known among flowering plants. Lemna, in the Lemnad order, has a lenticular frond, in a cleft of whose edge lurk a couple of flowers, one ♂ and the other ♀, enclosed in a membranous bag. In Pistia, of the same Lemnad order, the leaves are separated from the stem, the flowers are more separated, and the ♂ has the beginning of a calyx. In Ambrosinia, also associated with Lemna, a complete bearded spathe is formed, and the ♂ is of a more complicated structure. From these plants we pass into the Arads, with naked flowers growing in dense spikes or spadixes, and they lead, on the one hand to the palm-like Screw Pines, and on the other to the sedgy Typhads, by means of which, especially the former, a communication is effected with the princely Palms. By another transition, into the Orontiacæ of hermaphrodite hypogynous Endogens, a passago is formed into Lilyworts on the one hand and Peppers on the other. In fact, as I stated long since, the Aral alliance, and more especially the Araceous order, is the centre of a large system whose rays pierce very remote parts of the vegetable kingdom. Through Lemna this alliance passes into the Hydral by way of the Naiads. The *Spadicifloræ* of modern botanists, or *Spadicicarpa* of Blumè (Rumphia 2. 74) are nearly the same plants, except that Meisner includes Palms among them, to which there seems some objection.

NATURAL ORDERS OF ARALES.

<i>Flowers 2 or 3, of which one only is ♀. Spadix 0. Ovary one-celled.</i>	}	PISTIACEÆ.
<i>Ovules erect. Embryo slit</i>		
<i>Flowers 00, on a naked spadix. Calyx scaly or hairy. Anthers with long filaments. Ovule solitary, pendulous. Seed adherent to the pericarp. Embryo slit</i>	}	TYPHACEÆ.
<i>Flowers 00, naked, on a solitary spadix covered by a single hooded spathe. Anthers sessile. Seed loose. Embryo slit, axile</i>		
<i>Flowers 00, naked or scaly, on a spadix covered by many spathes. Anthers stalked. Seeds loose. Embryo solid, minute</i>	}	PANDANACEÆ.

ORDER XXXIV. PISTIACEÆ.—LEMNADS, OR DUCKWEEDS.

PISTIACEÆ, *Rich. in Humb. et Bonpl. N. G. et Sp.* 1. 81. (1815); *Lindl. in Hooker's Fl. Scot.* 2. 191. (1821); *Synops.* 251. (1829); *Endl. Gen.* p. 233; *Meisner, p.* 363; *Kunth. enum.* 3. 7; *Blume, Rumphia* 2. 76.—LEMNACEÆ, *DC. and Duby,* 532. (1828); *Endl. Gen.* p. 232; *Meisner, p.* 363; *Kunth. enum.* 3. 2. *Schleiden in Linnaea,* xiii. 384; *Hoffman in Tydschr. v. nat. Gesch. Leyden* (1838).

DIAGNOSIS.—*Aral Endogens with 2 or 3 flowers, of which one only is ♀, no spadix, a one-celled ovary, erect ovules, and a slit embryo.*

Floating or land plants, with very cellular, lenticular, or lobed fronds or leaves, some of them wholly destitute of spiral vessels, except perhaps in the pistil. Flowers appearing from the margin of the fronds, 2 or 3, naked, enclosed in a spathe, but without a spadix. ♂ Stamens definite, often monadelphous (pollen globose, muricated, with a single aperture in *Lemna Schleiden*): ♀ Ovary 1-celled, with one or more erect ovules; style short; stigma simple; ovules anatropal, hemianatropal, or atropal. Fruit membranous or capsular, not opening, 1- or more-seeded. Seeds with a fungous testa, and a thickened indurated foramen; embryo either in the axis of fleshy albumen, and having a lateral cleft for the emission of the plumule, or at the apex of the nucleus, covered in by a hardened endostome.

The common Duckweed (*Lemna*) may be regarded as being the most simple of all Phænogamous plants. Its stem and leaves are fused into a minute lenticular frond, which pullulates by openings in its sides; its roots are simple fibres, tipped by a calyptra, which *Schleiden* regards as a peculiar organ, and its flowers are two in number, one male and the other female, lying concealed in a slit of the frond; they have neither calyx nor corolla, but are enclosed in a delicate membranous bag. *Lemna* is indeed but one remove from a *Crystalwort* (*Riccia*, p. 57); species of which have even been mistaken for *Lemnias* by some authors, according to *Schleiden*.

All the true *Lemnias* are almost entirely destitute of spiral vessels, which the same author found abundantly in the old *L. polyrhiza*, now called *Spirodela*. A *Lemna* indeed may be said to consist of a small plate of cellular tissue, and a couple or three flowers. There is however in the fresh water of tropical countries a very common floating plant, called *Pistia*, which may be regarded as a *Lemna* with the leaves and stem separated, and the flowers more highly developed; there being a distinct spathe for the inflorescence, and a kind of cup-like calyx to the male flower. And then again the Mediterranean gives birth to *Ambrosinia*, a little land plant, with leaves of an ordinary kind, and a small spathe inclosing a couple of flowers, of which the uppermost has many monadelphous stamens, perfectly destitute of a calyx, and an ovary which is like that of *Pistia*. If we disregard the simplicity of this structure, and consider the organisation as if it belonged to plants of a more highly developed character, it will be found that these are really nothing but *Arads*, the spadix of which is reduced to two or three flowers of different sexes. But while the accuracy of this view of the nature of the Duckweed order is generally acknowledged, it must

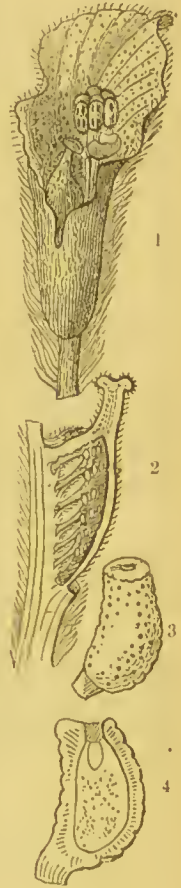


Fig. LXXXIII.

be borne in mind that this very reduction of parts is inconsistent with the notion of *Arads*, properly so called; and hence the necessity of constituting a particular order. I find from an examination of seeds of *Pistia*, most kindly procured from India for me by Dr. Wallich, that the embryo is a minute body lying within the apex of the albumen; in *Lemna* it occupies the axis; in both there is a fungous testa, with a remarkable induration of the foramen of the secundine. The embryo of *Pistia* is very minute, and, as far as I can see, solid; but *Horkel* says it is slit, and in *Lemna* there is certainly a cleft on one side for the emission of the plumule, just as in *Arads*. Most

Fig. LXXXIII.—*Pistia Stratiotes*. 1. A spathe with its 2 flowers; 2. a section of a seed-vessel; 3. a seed; 4. the same cut perpendicularly.

modern systematists regard Pistiaceæ and Lemnaceæ as distinct sub-orders of Arads, from which I separate them on account of their want of spadix, Ambrosinia connecting them with the curious genus *Cryptocoryne*. By some oversight, both Adrien de Jussieu and Endlicher regard Lemnaceæ as exalbuminous.

Lemna inhabits the ditches of the cooler parts of the world ; *Pistia* the tropics ; *Ambrosinia* the basin of the Mediterranean.

Pistia Stratiotes grows in water-tanks in Jamaica, where, according to Browne, it is acrid, and in hot dry weather impregnates the water with its particles to such a degree as to give rise to the bloody flux. A decoction of the same plant is considered by the Hindoostanees as cooling and demulcent, and they prescribe it in cases of dysuria. The leaves are also made into a poultice for hæmorrhoids. See also *Martius Mat. Med. Brus.* 97.

GENERA.

<i>Lemna</i> , L.	<i>Telmatophace</i> , <i>Schleid.</i>	<i>Pistia</i> , L.	<i>Ambrosinia</i> , L.
<i>Wolffia</i> , <i>Hork.</i>			
<i>Horkelia</i> , <i>Rehb.</i>			

NUMBERS. GEN. 6. Sp. 20.

Ricciaceæ.

POSITION.—PISTIACEÆ.—ARACEÆ.

Naiadaceæ.

ORDER XXXV. TYPHACEÆ.—TYPHADS OR BULRUSHES.

Typha, Juss. Gen. 25. (1789).—Aroidæ, § 3. R. Brown Prodr. 338. (1810).—Typhineæ, Agardh Aph. 139. (1823). Kunth. enum. 3. 88. (1841).—Typhaceæ, DC. and Duby, 482. (1823); Richard in Arch. de Bot. vol. 1. p. 193; Endlich. gen. lxxiii.; Meisn. p. 360.—Typhoidæ and Sparganioideæ, Link. Handb. 1. 132. 133. (1829), as sections of Cyperaceæ.

DIAGNOSIS.—Aral Endogens, with numerous flowers on a naked spadix, a scaly or hairy calyx, long filaments, a solitary pendulous ovule, a seed adherent to its pericarp, and slit embryo.

Herbaceous plants, growing in marshes or ditches. Stems without nodes. Leaves rigid, ensiform, with parallel veins. Flowers ♂ ♀, very closely arranged upon a spatheless spadix. Sepals = mere scales, 3 in number or more; sometimes a mere bundle of hairs. Petals wanting. ♂: Stamens 3 or 6; anthers wedge-shaped, attached by their base to long filaments, which are sometimes monadelphous. ♀: Ovary single, superior, 1-celled; ovule solitary, pendulous, anatropal; style short; stigmas simple, linear. Fruit dry, not opening, 1-celled, 1-seeded, made angular by mutual pressure. Seed pendulous, with a membranous skin adhering to the pericarp. Embryo in the centre of mealy albumen, straight, taper, with a cleft in one side, in which the plumule lies; radicle next the hilum.

Jussieu, following Adanson, distinguishes these from Arads, with which Brown re-unites them, retaining them, however, in a separate section. They are generally regarded as a distinct tribe by most writers, and seem sufficiently characterised by their calyx being 3-sepaled and half-glumaceous, or a mere bundle of long hairs, by their lax filaments, wedged anthers, solitary pendulous ovules, and peculiar habit. Agardh refers Bulrushes to glumaceous Monocotyledons, on account of the analogy between the calyx of *Typha* and the hypogynous hairs of *Eriophorum*, a genus of Sedges; and a similar view of their affinity has been taken by Link; and in fact they do appear to constitute a direct transition from the glumaceous to petaloid Endogens, for although their floral envelopes are mere scales, yet they are arranged in regular whorls. In habit they are hardly distinguishable from Sedges. In another point of view they may be looked upon as diminutive species of Screw-pines (Pandanaeæ), and Kunth so considered them formerly: but their simple fruit, solitary ovules, and the slit in the side of their embryo, offer sufficient marks of distinction.

Found commonly in the ditches and marshes of the northern parts of the world, but uncommon in tropical countries: one species occurs in St. Domingo, and another in New Holland. Two are described from equinoctial America.

They are of little known use. The powdered flowers have been used as an application to ulcers. The pollen of *Typha* is inflammable, like that of *Lycopodium*, and is used as a substitute for it. De Candolle remarks that it is probable the facility of collecting this pollen which is the real cause of its use, and that any other kind would do as well. The rhizomes of *Typha* abound in starch, are somewhat astringent and diuretic, and are employed in the east of Asia in dysentery, gonorrhœa, and the measles.

GENERA. *Typha*, L. | *Sparganium*, L.
| *Platanaria*, Gray.

NUMBERS. GEN. 2. Sp. 13. (Kunth.)

POSITION. ——— *Acoraceæ*.
————— TYPHACEÆ.—Pandanaeæ.
————— Cyperaceæ.

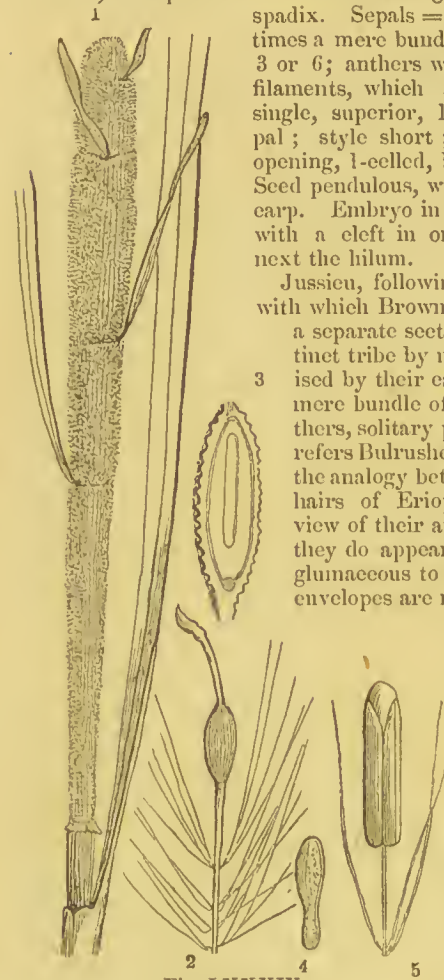


Fig. LXXXIV.

Fig. LXXXIV.—1. *Typha latifolia*; 2. its fruit; 3. a section of the seed; 4. the embryo; 5. a stamen.—Nees v. Esenbeck.

ORDER XXXVI. ARACEÆ.—ARADS.

AROIDÆE, Juss. Gen. 23. (1789); R. Brown Prodr. 333; Blume, Rumphia 1. 74; Endl. Gen. lxxii.; Meisner, p. 360; Kunth enum. 3. 1; Martius in Bot. Zeitung, 1831, p. 449. Richard in Arch. de Bot. t. 11.—ARACEÆ, Schott Meletemata, 16. (1832).

DIAGNOSIS.—*Aral Endogens*, with numerous naked flowers on a solitary spadix covered by a simple hooded spathe, sessile anthers, loose seeds, and a slit axile embryo.

Herbaceous plants, frequently with a fleshy corm; or shrubs; stemless or arborescent, or climbing by means of aerial roots. Leaves sheathing at the base, convolute in the

bud, usually with branching veins; sometimes compound! often cordate.

Spadix generally enclosed in a spathe.

Flowers ♂ ♀, naked, arranged upon

the surface of a spadix, within a

spathe. ♂: Stamens definite or indefinite, hypogynous, very short; anthers

1-2- or many-celled, ovate, turned

outwards. ♀, at the base of the spadix,

Ovary free, 1-celled, very seldom 3- or

more-celled, and many-seeded; ovules

erect or parietal, sessile, or attached to

long cords, orthotropal, campylotropal,

or occasionally anatropal; stigma sessile.

Fruit succulent. Seeds pulpy;

embryo in the axis of fleshy or mealy

albumen, straight, taper, with a cleft

in one side, in which the plumule lies;

(radicle obtuse, usually next the hilum,

occasionally at the opposite extremity.

R. Br.) Albumen sometimes wanting.

The hooded spathe of the order of Arads

affords a character not to be mistaken,

and, connected with their diclinous naked

flowers, gives them their most essential

diagnosis; Bulrushes are distinguished

by their long anthers and want of spathe;

Screw-Pines by their solid

embryo and compound fruit; and Duck-

weeds by their reduction to the simplest

state in which flowering plants can exist.

The whole of these Orders, taken together,

are known by their general tendency

to develop their flowers upon a

spadix, by their want of floral envelopes,

or by those parts not assuming the distinct

forms of calyx and corolla, but existing

only in the state of herbaceous scales.

With the exception of Screw-

Pines, they are all also known by their

plumule lying within a cleft of the

embryo; a structure found in few other

monocotyledonous plants, except Nai-

ads, in which the embryo is otherwise

widely different, and the hermaphrodite

Orontiaceæ, which are so much like

Arads in all but the combination of

their sexes.

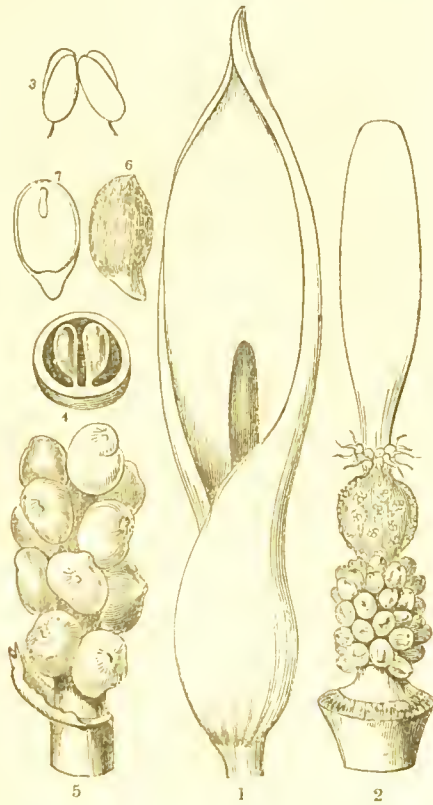


Fig. LXXXV.



Fig. LXXXVI.



Fig. LXXXVII.

Natives of all tropical countries abundantly, but of temperate climates rarely. In

Fig. LXXXV.—1. Spathe of *Arum maculatum*; 2. its spadix loaded with flowers; 3. an anther; 4. a transverse section of an ovary; 5. a cluster of ripe fruits; 6. a seed; 7. a section of the same, showing the embryo.

Fig. LXXXVI.—A single fruit divided vertically, so as to show the seeds *in situ*.

Fig. LXXXVII.—A perpendicular section of one of the seeds.

cold or temperate climates they are usually herbaceous, while in tropical countries they are often arborescent and of considerable size, clinging to trees by means of their aerial roots, which they protrude in abundance. In America, according to Humboldt (*Distr. Géogr.* 196), their principal station is on the submontane region, between 1200 and 3600 feet of elevation, where the climate is temperate and rains abundant.

An acrid principle generally pervades this Order, and exists in so high a degree in some of them as to render them dangerous poisons. The most remarkable is the Dumb Cane, or *Dieffenbachia Seguina*, a native of the West Indies and South America, growing to the height of a man: this plant has the property, when chewed, of swelling the tongue, and destroying the power of speech. Hooker relates an account of a gardener, who "incautiously bit a piece of the Dumb Cane, when his tongue swelled to such a degree that he could not move it; he became utterly incapable of speaking, and was confined to the house for some days in the most excruciating torments." The same excellent botanist adds, that it is said to impart an indelible stain to linen. P. Browne states, that its stalk is employed to bring sugar to a good grain when it is too viscid, and cannot be made to granulate properly by the application of lime alone; *Cryptocoryne ovata* is used for the same purpose. The leaves of *Colocasia esculenta* excite violent salivation and a burning sensation in the mouth, as I have myself experienced. Milk in which the acrid root of *Arum triphyllum* has been boiled has been known to cure consumption. DC. Notwithstanding this acidity, the flat under-ground corms, called roots, and the leaves of many *Arads*, are harmless, and even nutritive when roasted or boiled; as for instance, those of *Caladium bicolor*, *pæcile* and *violaceum*, *Colocasia esculenta*, *himalensis*, *antiquorum*, *mueronata*, and others, which, under the names of Cocoa root, Eddoes, and Yams, are common articles of food in hot countries. Nevertheless the juice of *Caladium bicolor* is cathartic and anthelmintic. Whole fields of *Colocasia macrorrhiza* are cultivated in the South Sea Islands, under the name of Tara or Kopeh roots. The corms of the *Arum maculatum* are commonly eaten by the country people in the Isle of Portland; they are macerated, steeped, and the powder obtained from them is sent to London for sale under the name of Portland Sago. They are universally cultivated in India, and known there under the names of Kuehoo and Gaglee. *Arum nymphæifolium*, which Dr. Roxburgh considers only a variety of *C. antiquorum*, is but rarely cultivated in Bengal. *Arum indicum*, *Man-kuehoo* and *Man-guri* of the Bengalese, is a species much cultivated about the huts of the natives for its esculent stems and small pendulous tubers. *Arum campanulatum*, now *Amorphophallus*, Ol of the Bengalese, and which deserves to be called the Telinga Potato, is also much cultivated, especially in the Northern Circars, according to Dr. Roxburgh, where it is highly esteemed for the wholesomeness and nourishing quality of its roots. In the Himalayas, the species which is called *Colocasia himalensis* forms the principal portion of the food of the hill-people. *Royle*. (Medicinally, the root in its recent state is stimulant, diaphoretic, and expectorant.) A similar starchy substance is yielded by *Xanthosoma sagittifolia* (*Chou carab*), *Peltandra virginica*, and the huge and hideous *Amorphophalli* of the Indian Archipelago. The spadixes of some species have a fetid putrid smell; others, such as *Arum cordifolium*, *Italicum*, and *maculatum*, are found to disengage a sensible quantity of heat at the time when they are about to expand. The emanations from *Arum Draucunculus* are extremely inconvenient; when in flower they produce dizziness, head-ache, and vomiting. A writer in the *Annals of Chemistry* says that he was attacked with violent head-ache and sickness after gathering about 40 of the spadixes. *Amorphophallus orixensis* having exceedingly acrid roots, is, when fresh, applied in India by the natives in cataplasm to excite, or bring forward tumours. Dr.



Fig. LXXXVIII.

Roxburgh pronounces it to be certainly a most powerful stimulant; other species are likewise employed, as *A. montanum*, Roxb., (*macrorhizon*, Ainslie). The plant called by the latter *Dracontium polyphyllum* is exhibited internally when its acrimony has been subdued; it is considered antispasmodic, and is also said to be useful in asthmatic cases. An emmenagogue is said to be prepared from it in the Society Islands. Agardh considers that the acrid principle, which, notwithstanding its great fugacity, has been obtained pure, is no doubt of great power as a stimulant. *Aph.* 133. The *Colocasias* are remarkable for being milky. Various species of *Philodendron* have a turbid acrid juice, and are found useful in cleansing foul ulcers; they are also employed for many other purposes in Brazil. See *Martius Mat. Med. Bras.* 96, who mentions *Dracontium polyphyllum*, *Arisæma Pythonium*, and *Monstera Adansonii*, as caustics.

GENERA.

<p>I.—<i>Cryptocoryneæ</i>. Stamens distinct from the pistils, which are several, whorled round the base of the spadix, and there combined into a many-celled ovary. <i>Cryptocoryne</i>, Fisch. <i>Stylochaeton</i>, Lepr.</p>	<p><i>Biarum</i>, Schott. <i>Homid</i>, Adans <i>Ischarum</i>, Blume. <i>Arum</i>, Linn. <i>Gigarum</i>, Caesalp. <i>Eminium</i>, Blun.e. <i>Typhonium</i>, Schott. <i>Stauronatum</i>, Schott. <i>Therophonum</i>, Blum. <i>Dracunculus</i>, Tournef. <i>Pythonium</i>, Schott. <i>Thomsonia</i>, Wall. <i>Amorphopallus</i> Blume. <i>Candarum</i>, Reichenb. <i>Pythion</i>, Mart.</p>	<p>dix usually naked at point. Cells of anthers with a very thick connective. <i>Remusatia</i>, Schott. <i>Gonatanthus</i>, Kl <i>Colocasia</i>, Ray. <i>Caladium</i>, Vent. <i>Peltandra</i>, Rafin. <i>Rensselaeria</i>, Beck. <i>Lecontia</i>, Torr. <i>Xanthosoma</i>, Schott. <i>Acontias</i>, Schott. <i>Syngonium</i>, Schott. <i>Culcasia</i>, Palis. <i>Denhamia</i>, Schott. <i>Philodendron</i>, Schott. <i>Calostigma</i>, Schott. <i>Meconostigma</i>, Schott. <i>Sphinctrostigma</i>, Scht.</p>	<p>IV.—<i>Anaporceæ</i>. Stamens and pistils numerous, contiguous, usually having the rudimentary bodies intermixed with the pistils. Point of spadix rarely naked. Cells of the anthers immersed in a very thick fleshy connective. <i>Spathicarpa</i>, Hook. <i>Diefenbachia</i>, Schott. <i>Pinellia</i>, Tenor. <i>Atherurus</i>, Blum. <i>Hemicarpurus</i>, Nees. <i>Aglaonema</i>, Schott. <i>Homalonema</i>, Schott. <i>Richardia</i>, Kunth. <i>Zantedeschia</i>, Spr.</p>
<p>II.—<i>Dracunculæ</i>. Stamens and pistils numerous, with rudimentary organs interposed. Spadix naked at the end. Cells of the anthers larger than the connective. <i>Arisarum</i>, Tournef. <i>Arisæma</i>, Mart.</p>	<p>III.—<i>Caladiææ</i>. Stamens and pistils numerous, contiguous or separated by the rudimentary bodies. Spa-</p>		

NUMBERS. GEN. 26. Sp. 170.

Orontiaceæ.

POSITION.—*Lemnaceæ*.—*ARACEÆ*.—*Typhaceæ*.

Palmaceæ.

ORDER XXXVII. PANDANACEÆ—SCREW PINES.

Pandaneæ, *R. Brown, Prodr.* 340. (1810); *De Cand. Propr. Méd.* 278. (1816); *Agardh Aph.* 133. (1822); *Gaudichaud in Ann. des Sc.* 3. 509. (1824); *Schott et Endlicher Meletemata*, p. 15. (1832). *Endl. gen.* lxxiv.; *Meisner*, p. 359; *Kunth Enum.* 3. 93; *Bennett in Horsfield, Pl. Jav.* 32; *Blume Rumphia*, 1. 155.—Cyclantheæ, *Poitau in Mem. Mus.* 9. 34. (1822); *Schott et Endlicher, Meletemata*, p. 15. (1832); *Martius Conspicua*, No. 22. (1835).—Cyclanthaceæ, *ed. pr.*—Freycinetieæ, *Ad. Brongn. tableau xv.* (1843).

DIAGNOSIS.—*Aral Endogens*, with numerous naked or scaly flowers, arranged on a spadix covered by many spathes, stalked anthers, loose seeds, and a solid minute embryo.

Trees or bushes, sometimes sending down aerial roots, sometimes weak and decumbent. Leaves lubricated, in three rows, long, linear-lanceolate, amplexicaul, with their margins almost always spiny; or pinnated, or fan-shaped; the latter being true leaves, the former, perhaps, mere leaf-stalks. Floral leaves smaller, often coloured, and spathaceous.

Flowers ♂ ♀ or polygamous, naked, or furnished with a few scales, arranged on a wholly covered spadix. ♂: Stamens numerous. Filaments with single anthers; anthers 2-4-celled. ♀: ovaries usually collected in parcels, 1-celled; stigmas as many as the ovaries, sessile; ovules solitary, attached to the suture, or very numerous, and springing from as many parietal placentæ as there are styles, anatropal. Fruit either fibrous drupes, usually collected in parcels, each 1-seeded; or many-celled berries, with polyspermous cells. Albumen fleshy, with a minute embryo at the base next the hilum, not slit on one side.

Although this Order is certainly very distinct from Arads, it is by no means easy to define its limits. Blume says it is principally known by its numerous spathes to each spadix, and its narrow, sessile, 3-rowed leaves, spiny at the back and edge, (*Rumphia* 2. 155); but this applies only to Pandaneæ proper, for the Cyclantheous division has the flabellate or pinnate foliage of Palms, and to all appearance establishes the connection between the Aral and Palmal Alliances.

The species of *Pandanus* and *Freycinetia* have the aspect of gigantic Bromeliads, bearing the flowers of a *Sparganium*. While there is no analogy with the former in structure beyond the general appearance of the foliage; the organisation of the fructification bears so near a resemblance to the latter as to have led to the combination of Screw-pines and Typhads by botanists of the first authority. But when we contrast the naked flowers, the compound highly-developed fruit, the spathaceous bracts, the entire embryo, and the arborescent habit of the for-



Fig. LXXXVIII.

Fig. LXXXVIII.—1. A *Pandanus*; 2. a stamen of *Freycinetia imbricata*; 3. an ovary of ditto; 4. the transverse section of the same; 5. a perpendicular section of its seed.—*Blume*

mer, with the half-glumaceous flowers, the simple fruit, the want of spathaceous bracts, the slit embryo, and the herbaceous sedgy habit of the latter, it is difficult to withhold our assent from the proposition to separate them. Brown remarks (*Prodr.* 341), that these have no affinity with Palms beyond their arborescent stems. But, on the contrary, Cyclantheæ, which, following Poiteau and others, I formerly adopted, have, with the structure of Pandaneæ proper, the foliage of Palms, and are in reality a connecting link between the two Orders. At least, *Carludovicia* evidently is so, as is shown by Hooker's figure in the *Botanical Magazine*, t. 2951, and *Cyclanthus* seems to have no peculiarity beyond a curious spiral arrangement of its ♂ and ♀ flowers in alternate rows.

Mr. Bennett has pointed out an error made by Gaudichaud, who places the embryo at the apex of semitransparent albumen. He states, that it is certainly at the base, as indeed Blume has shown in a beautiful figure of *Freycinetia imbricata*. Screw-pines are remarkable among arborescent monocotyledons for their constant tendency to branch, which is always effected in a dichotomous manner. Their leaves have also a uniform spiral arrangement round the axis, so as to give the stems a sort of corkscrew appearance before the traces of the leaves are worn away. The Chandelier Tree of Guinea and St. Thomas's derives its name (*Pandanus Candelabrum*) from this peculiar tendency to branching. According to *Fée* (l. 223), *Nipa* ought to be referred here, and not to

Palms, an opinion adopted by Kuuth, but not by Endlicher. A figure of it will be found at p. 133, in a sketch of the vegetation of Palms. The *Tagua* plant, or Vegetable ivory, referred hither by Endlicher and others, seems to be a true Palm. According to Mr. Bennett, the seeds of *Freycinetia* and *Pandanus* have such an abundance of raphides in their testa, that those crystals are conspicuous to the naked eye.

The Screw-pines are abundant in the Mascaren Islands, especially the Isle of France, where, under the name of *Vaquois*, they are found covering the sandy plains. There they have peculiar means given them by nature to subsist in such situations in the shape of strong aerial roots, which are protruded from the stem, and descend towards the earth, bearing on their tips a loose cup-like coating of cellular integument, which preserves their tender newly-formed absorbents from injury until they reach the soil, in which they quickly bury themselves, thus adding at the same time to the number of mouths by which food can be extracted from

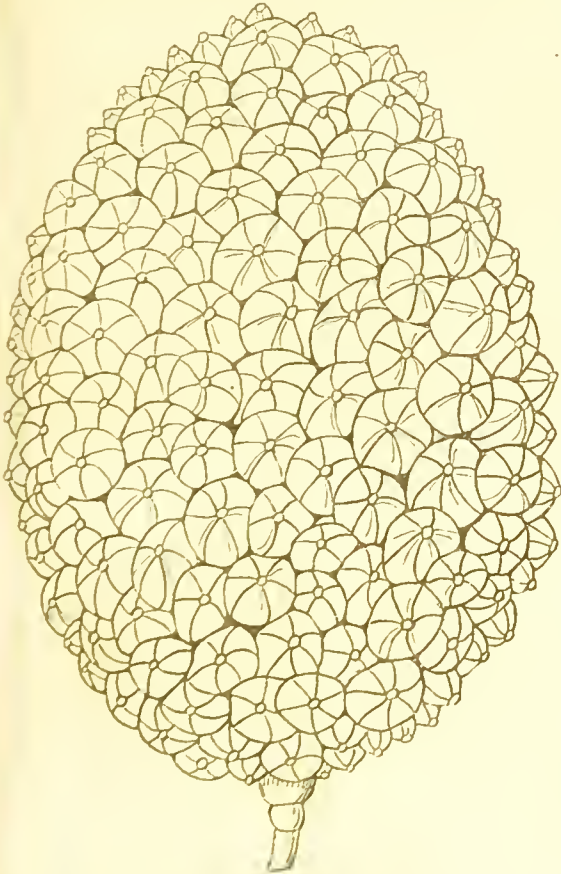


Fig. LXXXIX.

the unwilling earth, and acting as stays to prevent the stems from being blown about by the wind. They are common in the Indian Archipelago, and in most tropical islands of the Old World, but are rare in America. *Humb. de Distr. Geogr.* 198. The *Freycinetias* are scrambling plants, often of considerable stature, found in the Indian Archipelago and adjacent islands. The *Cyclantheæ* are exclusively American, from Peru and Brazil.

The seeds of Pandanus are eatable. The flowers of Pandanus odoratissimus are fragrant and eatable, and are reckoned in India aphrodisiac. The juice of Nipa, as it flows from the pounded spadices, furnishes one of the inferior kinds of Palm wine. Some plant of this Order is probably the "Palm" mentioned by Mr. Drummond as having a fruit which the natives of the Swan River find wholesome when fermented for some time, but which without preparation, produces violent vomiting and other dangerous symptoms. *Hook. Journ.* 356. The fruit of several is also an article of food. The leaves are used for thatching and cordage, and their juice is employed in diarrhœa and dysentery. The immature fruit is reputed emmenagogue.—*Humb.* l. c.

GENERA.

I.— <i>Pandaneæ</i> . Leaves simple. Flowers naked.	<i>Marquartia</i> , Hassk. <i>Freycinetia</i> , Gaudich.	Flowers usually furnished with a calyx.	<i>Nipa</i> , Rumph. <i>Cyclanthus</i> , Poit.
<i>Pandanus</i> , Linn <i>fil.</i> <i>Arthrodactylis</i> , Forst. <i>Keurva</i> , Forsk.	II. <i>Cyclantheæ</i> . Leaves flabellate or pinnate.	<i>Carludovica</i> , Ruiz et Par. <i>Ludovia</i> , Pers. <i>Salmia</i> , Willd.	<i>Cyclosanthes</i> , Pöpp. <i>Wettinia</i> , Pöpp.

NUMBERS. GEN. 7. Sp. 75.

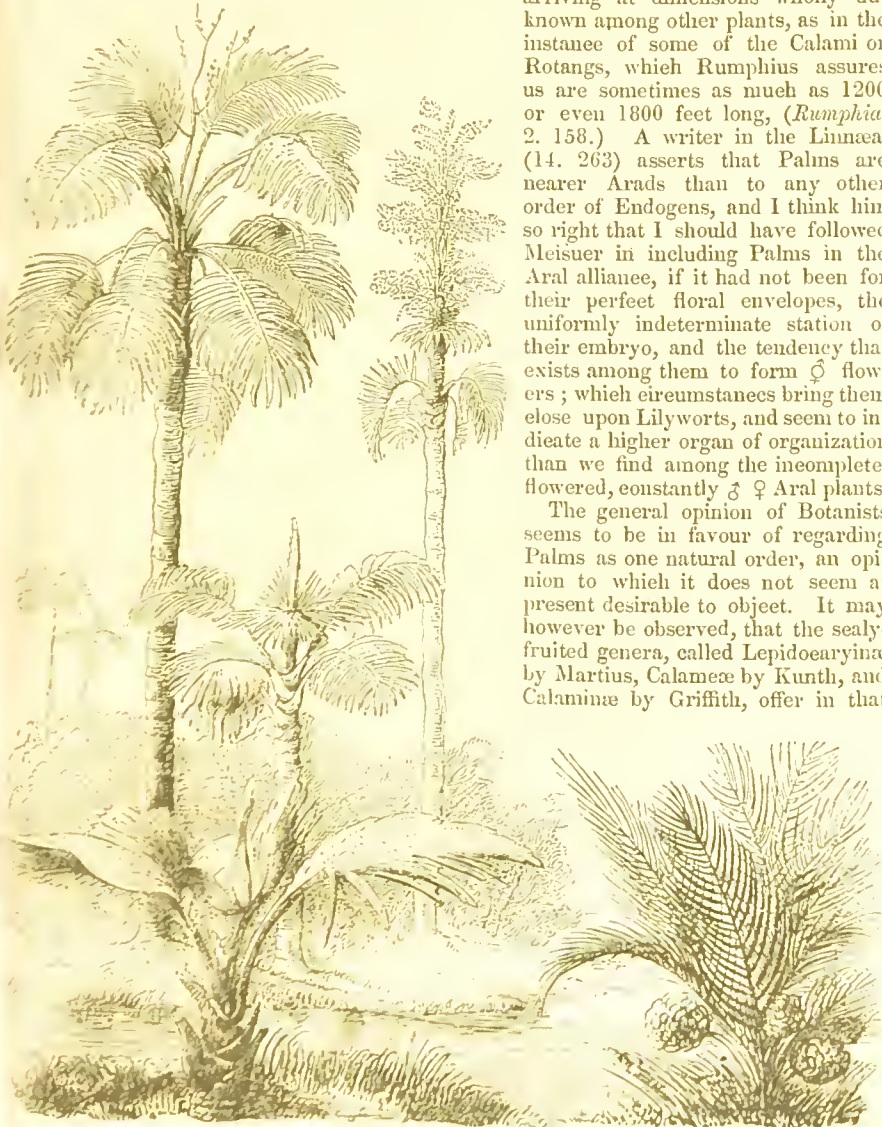
POSITION.—APACEÆ.—PANDANACEÆ.—TYPHACEÆ.
Palmarcææ.

ALLIANCE IX. PALMALES.—THE PALMAL ALLIANCE.

DIAGNOSIS.—Unisexual (or bisexual) Endogens, with perfect flowers, seated on a branched scaly spathe, and a minute embryo lodged below the surface of horny or fleshy albumen.

At this point the vegetative force of Endogens acquires its maximum power, resulting for the most part in trees of gigantic stature, always forming wood, and occasionally arriving at dimensions wholly unknown among other plants, as in the instance of some of the Calami or Rotangs, which Rumphius assures us are sometimes as much as 1200 or even 1800 feet long, (*Rumphia*, 2. 158.) A writer in the *Linnaea*, (14. 263) asserts that Palms are nearer Arads than to any other order of Endogens, and I think him so right that I should have followed Meisner in including Palms in the Aral alliance, if it had not been for their perfect floral envelopes, the uniformly indeterminate station of their embryo, and the tendency that exists among them to form ♂ flowers; which circumstances bring them close upon Lilyworts, and seem to indicate a higher organ of organization than we find among the incomplete-flowered, constantly ♂ ♀ Aral plants.

The general opinion of Botanists seems to be in favour of regarding Palms as one natural order, an opinion to which it does not seem at present desirable to object. It may however be observed, that the scaly-fruited genera, called Lepidoearynæ by Martius, Calameæ by Kunth, and Calaminæ by Griffith, offer in that



1

FIG. XC.

2

circumstances, and also in most instances in their habit, a very considerable deviation from the condition of the other genera, and seem to indicate the existence of at least one natural order to be struck off the true Palms.

FIG. XC.—Palm Trees. Blue.— 1. *Corypha Gebana*; 2. *Nipa fruticans* see *Pandanceæ*

ORDER XXXVIII. PALMACEÆ.—PALMS.

Palmæ, *Juss. Gen.* (1789); *R. Brown, Prodr.* 266. (1810); *Von Martius Palm. Bras.* (1824 to 1836); *Id. Programma* (1824); *Bartl. Ord. Nat.* 63. (1830); *Endl. gen.* lxxv.; *Royle Illustrations*, p. 399; *Blume Rumphia*, vol. 2. *passim*; *Kunth. enum.* 3. 168; *Meisner*, p. 354. *Griffith in Calcutta Journal of Natural History*, vol. ?.—*Phytelephantæ, Martius Conspectus*, No. 21. (1835).

DIAGNOSIS.—*Unisexual* (or *bisexual*) *Endogens*, with perfect flowers, seated on a branched scaly spathe, and a minute embryo lodged below the surface of horny or fleshy albumen.

Trunk arborescent, simple, occasionally shrubby, sometimes branched, rough with the dilated half-sheathing bases of the leaves or their scars; in the Rotangs flagelliform, and extremely long; occasionally armed with stiff spines. Leaves clustered, terminal, usually very large, pinnate or flabelliform, plaited, with parallel simple veins; in some cases eroded and wedge-shaped. Spathe scaly, terminal, often branched, enclosed in a 1- or many-valved spathe, which is often woody. Flowers small, supported by scaly bracts, ♂ ♀, or occasionally ♂. Sepals 3, colourless, fleshy or leathery, persistent. Petals 3, often larger, and sometimes deeply comate. Stamens inserted into the base of the perianth, usually definite in number, opposite the segments, to which they are equal in number, seldom 3; sometimes indefinite in number. Ovary free, usually composed of 3 carpels, completely united, or partially so; occasionally of 2 or 1 only. Ovules solitary, very rarely 2, erect, orthotropal, or anatropal in various degrees. Styles continuous with the carpels. Fruit drupaceous, or nut-like, or berried, often with a fibrous rind. Seed filling the cavity in which it grows, often reticulated. Albumen cartilaginous, often ruminant, frequently furnished with a central or ventral cavity; embryo lodged in a particular cavity of the albumen, usually at a distance from the hilum, dorsal and indicated by a little nipple, taper or pulley-shaped; plumule concealed, scarcely visible; the cotyledonar extremity becoming thickened in germination, and either filling up a pre-existing cavity, or one formed by the liquefaction of the albumen in the centre.



The race of plants to which the name of Palms has been assigned is, no doubt, the most interesting in the vegetable kingdom, if we consider the majestic aspect of their towering stems, crowned by a still more gigantic foliage; the character of grandeur which they impress upon the landscape of the countries they inhabit; their immense value to mankind, as affording food, and raiment, and numerous objects of economical importance; or, finally, the prodigious development of those organs by which their race is to be propagated. A single spathe of the Date contains about 12,000 male flowers; *Alfonsia amygdalina* has been computed to have 207,000 in a spathe, or 600,000 upon a

Fig. XCI.—1. Inflorescence of *Chamærops humilis*, in its spathe; 2. a portion of the same, with the fruit ripening; 3. a male flower; 4. a female flower; 5. a ripe fruit; 6. a section of another variety, showing the seed; 7. a seed with a portion of the surface cut away, to display the embryo.

single individual; while every bunch of the Seje Palm of the Oronoco bears 3000 fruits. They are very uniform in the botanical characters by which they are distinguished, especially in their fleshy colourless 6-parted flowers, enclosed in spathes, their minute embryo lying in the midst of albumen and remote from the hilum, and their arborescent stems with rigid, plaited or pinnated, inarticulated leaves, called fronds; but their aspect and habits are extremely various. To use the words of the most accomplished traveller of our own, or any age;—"While some (*Kunthia moutana*, *Aiphanes Praga*, *Oreodoxa frigida*) have trunks as slender as the graceful reed, or longer than the longest cable, (*Calamus Rudentum*, 500 feet), others (*Jubæa spectabilis* and *Cocos butyracea*) are 3 and even 5 feet thick: while some grow collected in groups (*Mauritia flexuosa*, *Chamæropis humilis*), others (*Oreodoxa regia*, *Martinezia caryotafolia*) singly dart their slender trunks into the air; while some have a low caudex (*Attalea amygdalina*), others exhibit a towering stem 160-180 feet high (*Ceroxylon andicola*); and while one part flourishes in the low valleys of the tropics, or on the declivities of the lower mountains, to the elevation of 900 feet, another part consists of mountaineers bordering upon the limits of perpetual snow." To which may be added, that while many have a cylindrical undivided stem, the Doom Palm of Upper Egypt, and an allied species, the *Hyphæne coriacea*, are remarkable for their dichotomous repeatedly-divided trunk. The Calami, or Rotangs, and the siliceous secretions of their leaves, indicate an affinity with Grasses, which would hardly be anticipated, if the grasses of our European meadows were compared with the Cocoa Nuts of the Indies, but which becomes more apparent when the Bamboo is placed by the side of the Cane. The Rattan Palms, called by Rumphius *Palmijunci*, are described as inhabitants of dense forests, where the rays of the sun can hardly penetrate, in which situations they form spiny bushes which obstruct all passage into those jungles, rising to the tops of the highest trees and falling again, so as to resemble a prodigious length of cable, adorned however with the most beautiful leaves, pinnated or terminating in graceful tendrils.

Von Martius, the great illustrator of this noble family, speaks thus of their habits and geographical arrangement:—"Palms, the splendid offspring of Tellus and Phœbus, chiefly acknowledge as their native land those happy regions seated within the tropics, where the beams of the latter forever shine. Inhabitants of either world, they hardly range beyond 35° in the southern, or 40° in the northern hemisphere. Particular species scarcely extend beyond their own contracted limits, on which account there are few countries favourable for their production in which some local and peculiar species are not found; the few that are dispersed through many lands are chiefly *Cocos nucifera*, *Arecocmia sclerocarpa*, and *Borussus flabelliformis*. It is probable that the number of species thus scattered over the face of nature will be found to amount to 1000 or more. Of these not a few love the humid banks of rivulets and streams, others occupy the shores of the ocean, and some ascend into alpine regions; some collect into dense forests, others spring up singly or in clusters over the plains." *Progr.* 6. The testimony of Von Martius is confirmed by Humboldt, who also asserts that there must be an incredible number still to discover in equinoctial regions; especially if we consider

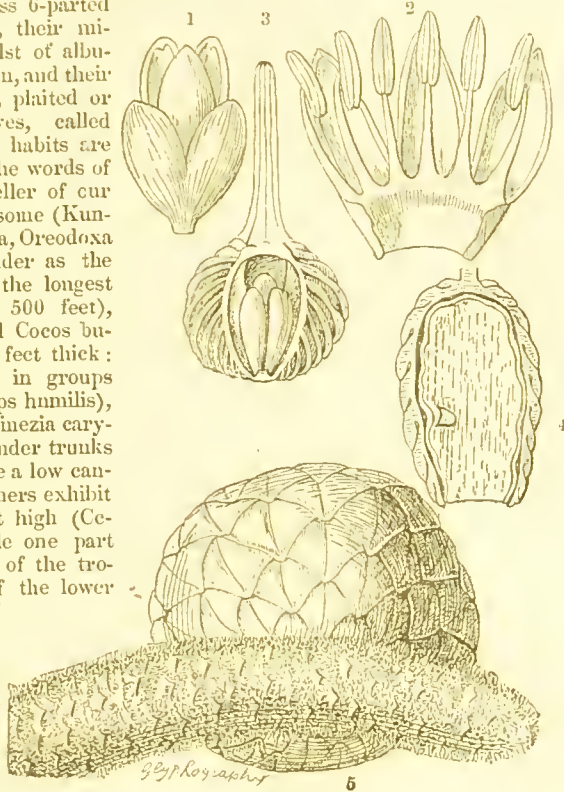


Fig. XCII.

Fig. XCII.—*Sagus Rumphii*. 1. a flower. 2. the same opened; 3. a section of an ovary; 4. a section of a seed of *Sagus filaris*; 5. fruit and remains of spathe.—*Blume*

how little is yet known of Africa, Asia, New Holland, and America. He and Bonpland discovered a new species in almost every 50 miles of travelling, so narrow are the limits within which their range is confined. A different opinion appears to be entertained by Schouw, a respectable Danish writer upon botanical geography, whose views deserve to be quoted, although he is far from having had such personal means of judging as Humboldt and Von Martius. He seems to consider that we are acquainted already with the greater part of the Palms; for he says, "it appears from the reports of travellers that such Palm woods as those of South America are less frequent in other parts of the world. Africa and New Holland seem to be less favourable to this tribe, for on the Congo, Smith found only from 3 to 4 Palms; in Guinea we know merely of the same number; and of the other African Palms, 6 belong to the Isles of Bourbon and France; New Holland has, in the torrid zone, three species, while Forster's *Prodromus* of the Flora of the South Sea Islands contains four." It is, however, not to be forgotten that Blume and Griffith have alone added 65. new species to the list of Indian Palms. Blume is of opinion that great numbers still remain to be discovered "in immensis illis et fertilissimis regionibus quarum pleræque primitivâ atque intactâ vegetatione continentur, neque unquam ab Europæis lustratæ sunt." The most northern limit of Palms is that of *Chamærops Palmetto* in N. America, in lat. 34°-36°, and of *Chamærops humilis* in Europe, near Nice, in 43°-44° N. lat. They are found in the southern hemisphere as low as 38° in New Zealand. "It is remarkable that no species of Palm has been found in South Africa, nor was any observed by M. Leschenault on the west coast of New Holland, even within the tropic." *Brown in Flinders, 577.*

Wine, oil, wax, flour, sugar, salt, says Humboldt, are the produce of this tribe; to which Von Martius adds, thread, utensils, weapons, food, and habitations. The most remarkable is the Cocoa Nut, of which an excellent account will be found in the *Trans. of the Wernerian Society*, vol. v. The root is sometimes masticated instead of the Arca Nut; of the small fibres baskets are made in Brazil. The hard case of the stem is converted into drums, and used in the construction of huts; the lower part is so hard as to take a beautiful polish, when it resembles agate; the reticulated substance at the base of the leaf is formed into cradles, and, as some say, into a coarse kind of cloth. The unexpanded terminal bud is a delicate article of food; the leaves furnish thatch for dwellings, and materials for fences, buckets, and baskets; they are used for writing on, and make excellent torches; potash in abundance is yielded by their ashes; the midrib of the leaf serves for oars; the juice of the flower and stems is replete with sugar, and is fermented into excellent wine, or distilled into a sort of spirit, called Arrack; or the sugar itself is separated, under the name of Jagery. The value of the fruit for food, and the delicious beverage which it contains, are well known to all Europeans. The fibrous and uncutable rind is not less useful: it is not only used to polish furniture and to scour the floors of rooms, but is manufactured into a kind of cordage, called Coir rope, which is nearly equal in strength to hemp; and which Roxburgh designates as the very best of all materials for cables, on account of its great elasticity and strength. Finally, an excellent oil is obtained from the kernel by expression. The juice which flows from the wounded spathes of *Borassus flabelliformis*, *Raphia vinifera*, *Mauritia vinifera*, the Cocoa Nut, and other Palms, is known in India by the name of Toddy. Independently of the grateful qualities of this fluid as a beverage, it is found to be the simplest and easiest remedy that can be employed for removing constipation in persons of delicate habit, especially European females. According to Roxburgh, *Caryota urens* is highly valuable to the natives of the countries where it grows in plenty. It yields them, during the hot season, an immense quantity of this toddy, or palm wine. The best trees will yield at the rate of 100 pints in the twenty-four hours. The pith, or farinaceous part of the trunk of old trees, is said to be equal to the best Sago; the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of the people whose country it inhabits, and during famines they suffer little while those trees last. Roxburgh found it highly nutritious. He ate the gruel, and thought it fully as palatable as that made of the Sago we get from the Malay countries (*Sagus levis*). *Fl. Ind. 3. 625.*

The finest Sago is prepared from *Sagus levis* and *genuina*, trees forming immense forests on nearly all the Moluccas, and so rich in starch that each individual is reckoned to furnish from 600 to 800 lb. of Sago (*Rumphia*, 2. 148); a similar substance is however yielded by *Caryota urens*, *Phoenix farinifera*, and many others.

The *Saguerus saccharifer* (or *Arenga saccharifera*) is one of the most important of the Order. Blume describes it (*Rumphia*, vol. 2. p. 126) as being from 20 to 25 feet high, and very common in the islands of the Indian Archipelago, the Moluccas and Philippines, where it is of the greatest value on account of its saccharine secretions. This juice is obtained continually from the spadixes in large quantities, by wounding and pounding them while on the trees; it yields by fermentation an intoxicating

beverage, and, when boiled, a kind of sugar, consumed for various purposes. When the trees are exhausted by the incessant draining of their fluids, Sago of good quality is obtained from the trunk,—as much as 150 to 200 lbs. weight from a single tree. The timber is extremely hard, and fit for building purposes; and the leaf-stalks yield annually from 4 to 7 lbs. of the strong black fibres, resembling horsehair, called *Gonutie*, which are extensively used in the manufacture of cables and various kinds of rope; they are also employed for stitching together thatch, for making brooms and for similar purposes. (Are these the vegetable bristles now so largely imported for making brooms?) The midribs of the side leaves are converted into pens called *Pausuri*, and the fine arrows which the Indians blow from their long tubes. Finally, there is at the base of the leaves a fine woolly material (*Baru*) much employed in caulking ships, as stuffing for cushions, and as tinder. Their “Cabbage” is moreover eatable, like that of the West Indian Cabbage Palm, *Areca oleracea*, whose huge terminal bud is known by this name. Egyptian *Bdellium*, a gum-resinous substance, formerly employed as a diuretic and diaphoretic, is obtained from *Hyphæne thebaica*. Besides the *Saguerus* already mentioned, very considerable quantities of sugar are procured from *Phoenix sylvestris*, a kind of wild date, which Dr. Roxburgh computed to furnish annually in Bengal 100,000 cwt. of date sugar.

The well known Betel Nut is the fruit of *Areca Catechu*, and remarkable for its narcotic or intoxicating power; from the same popular fruit is prepared a kind of spurious Catechu. It seems to me however doubtful whether the intoxicating effect of the Betel nut is not owing to the Piper leaf in which it is wrapped when eaten, rather than to any special property of its own.

Blume tells us that the Asiatic nations would rather forego meat and drink than their favourite *Areca* nuts; whole ship-loads of which are annually exported from Sumatra, Malacca, Siam, and CochinChina. They contain a large quantity of tauuin, which has caused them to be employed in some part of India for dyeing cotton cloths. The leafstalks, spathes, and timber are employed for many domestic purposes, and in Malabar an inebriating lozenge is prepared from the sap. (*Rumphia*, 2. 67.) In the opinion of this author, the practice of chewing the nuts, although offensive to Europeans, is really very conducive to health in the damp and pestilent regions of India, where the natives live upon a spare and miserable diet. As to the Brazilian Palms, Martius states that the kernel of various species of *Attalea*, when rubbed in water, form an emulsion used in medicine, both externally and internally. The juice of the unripe fruit of *Cocos schizophyllus* is employed in slight ophthalmic attacks.

The fruit of a few of them is eatable; as, for example, the Date Palm, *Phoenix dactylifera*, which furnishes the most important part of their food to the tribes of the desert; some other species of *Phoenix* eaten in India; the Cocoa Nut, too well known to require description; and the Doom Palm, *Hyphæne thebaica*, which is called in Egypt the Gingerbread Tree, because of the extreme resemblance of its brown mealy rind to that sort of cake; *Zalacca edulis*, a kind of Cane, with a juicy, pulpy covering to its seeds, much esteemed by the Burmese; and a few others of less importance. In some, however, the fruit is extremely acrid.

The fruit of *Saguerus saccharifer* is of that nature, exciting severe inflammation in the mouth of those who chew it; it was the basis of the “infernal water” which the Moluccans used in their wars, to pour over their enemies; nevertheless, the unripe albumen forms a beautiful kind of sweetmeat, which the Chinese and Indian nobles drink with their tea; it is prepared by soaking in lime-water and boiling in refined sugar. The same acidity occurs in the fruit of *Caryota urens* and some others.

Oil and wax are only of less common occurrence than farinaceous secretions. Palm oil, of which enormous quantities are employed in Europe as a sort of grease, and in soap and candle making, is chiefly obtained from *Elais guineensis* and *melanococca*, and these trees are also said to yield the best kind of Palm wine. *Cenocarpus Bacaba* and many *Cocoinæ* are other species whose fruit contains oil. The *Ceroxylon andicola*, or Wax Palm of Humboldt, has its trunk covered by a coating of wax, which exudes from the spaces between the insertion of the leaves. It is, according to Vauquelin, a concrete inflammable substance, consisting of 1-3d wax and 2-3ds resin. It is a very remarkable fact, first noticed by Brown (*Congo*, 456), that the plants of this order whose fruit affords oil belong to a tribe called by him *Cocoinæ*, which are particularly characterised by the originally trilobular putamen having its cells when fertile perforated opposite the seat of the embryo, and, when abortive, indicated by foramina even. A species called *Carnauba*, in Brazil, throws off waxy scales from its leaves.

Cocoa-nut oil is imported into England in considerable quantities, and it is surprising that it is not more generally used in England; for, instead of the detestable

smell of fish-oil, it has rather an agreeable odour; and it is readily consumed in open glass vessels, with floating or standing wicks, whatever the temperature of the air may be.

The natural secretion of the fruit of *Calamus Draco* constitutes the best D'jurnang or Dragon's Blood, a dark coloured inodorous insipid resin; a second and rather inferior kind is produced from the fruit from which the natural secretion has been removed by heat and bruising; the third and most inferior kind appears to be the refuse of the last process. It is doubtful whether this article is procured from the plant by incisions, as has been supposed.—*Griffith*.

The roots of the American Palmetto have been found to contain a large quantity of tannin.

There seems no end to the economical purposes to which the products of Palms are applied. Their huge and hard-skinned leaves are universally employed as thatch. All the hard-wooded sorts furnish excellent timber. The Brazilian Indians, especially the Puris, Patachos, and Botocudos, manufacture their best bows from the wood of a species of Cocoa-nut, called the Airi, or Brejeuba. Palmyra wood is produced by *Borassus flabelliformis*. Among those best known in Europe are the Rattans, belonging to various kinds of *Cauc*, and so much valued for their flexibility on the one hand, and flinty hardness on the other. Palm walking-sticks (under the name of Penang lawyers), are also very extensively used in England. Mention has already been made of the valuable horse-hair-like bristles obtained from *Saguerus saccharifer*. Fibrous matter is also procured from *Sagus filaris*, a Malay plant, whose bristles are dried and used for sewing linen garments. Ropes and strings are prepared in Afghanistan from the Maizurrie Palm, a species of *Chamerops*, according to Mr. Griffith.

Thousands of boys and girls are employed in Java in weaving into baskets and bags the young leaves of the Gebang Palm (*Corypha Gebanga*, *Bl.*), one of the most useful of all the species of India; its pith furnishes a sort of Sago; its leaves are used for thatch and broad-brimmed hats; fishing-nets and linen shirts are woven from its fibres; ropes from its twisted leaf-stalks; the root is both emollient and slightly astringent: sliced, it is used in slight diarrhoeas, and Waitz even says that it is a most valuable remedy for the periodical diarrhoeas which, in the East Indies, attack Europeans out of health.—*Rumphia*, 2. 60.

Finally, the hard albumen of some species is turned to use in manufactures. The Hyphaene furnishes materials for rosaries; and Date kernels have been used by the turner; but the most celebrated is the Vegetable Ivory. This is the produce of a tree found on the banks of the river Magdalena, resembling Palms in its leaves, which equal those of the Cocoa-nut in dimensions, in its torulose scaly stem, and, finally, in the remarkable structure and weight of its fruit.—*Humb.* The Spanish Botanists Ruiz and Pavon also met with it in the groves of Peru in the hotter parts of the Andes, and named it *Phytelphas macrocarpa*. The natives of Columbia call it Tagua, or Cabeza de Negro (Negro's head), in allusion, we presume, to the figure of the nut. Almost all we know about it is contained in the following memorandum, published by the Spanish writers above mentioned. "The Indians cover their cottages with the leaves of this most beautiful Palm. The fruit at first contains a clear insipid fluid, by which travellers allay their thirst; afterwards this same liquor becomes milky and sweet, and it changes its taste by degrees as it acquires solidity, till at last it is almost as hard as ivory. The liquor contained in the young fruits becomes acid if they are cut from the tree and kept some time. From the kernels the Indians fashion the knobs of walking-sticks, the reels of spindles, and little toys, which are whiter than ivory, and as hard, if they are not put under water—and if they are, they become white and hard again when dried. Bears devour the young fruit with avidity." The toys prepared from it by the turner are well known in the London shops, and are much admired for their beautiful texture.

For further details concerning the useful qualities of this interesting race, see *Dr. Royle's Work* in the place above quoted.

GENERA.

I. Arecææ.	<i>Euterpe</i> , <i>Mart.</i>	<i>Orania</i> , <i>Zippel</i> .	<i>Calyptrocalyx</i> , <i>Bl.</i>
<i>Chamaedorea</i> , <i>Willd.</i>	<i>Enocarpus</i> , <i>Mart.</i>	<i>Arausiaca</i> , <i>Bl.</i>	<i>Iguanura</i> , <i>Bl.</i>
<i>Nunnezharia</i> , <i>Ruiz et Pav.</i>	<i>Oreodoxa</i> , <i>Willd.</i>	<i>Ptychosperma</i> , <i>Lab.</i>	<i>Saguerus</i> , <i>Rumph.</i>
<i>Nunnezia</i> , <i>Willd.</i>	<i>Pinanga</i> , <i>Rumph.</i>	<i>Drymopalæus</i> , <i>Zipp.</i>	<i>Arenga</i> , <i>Lab.</i>
<i>Hyospathe</i> , <i>Mart.</i>	<i>Kentia</i> , <i>Blume.</i>	<i>Harina</i> , <i>Hamilt.</i>	<i>Gonitius</i> , <i>Rumph.</i>
<i>Morenia</i> , <i>Ruiz et Pav.</i>	<i>Oncosperma</i> , <i>Blume.</i>	<i>Orania</i> , <i>Bl.</i>	<i>Caryota</i> , <i>Limn.</i>
<i>Kunthia</i> , <i>H. et B.</i>	<i>Areca</i> , <i>Limn.</i>	<i>Wallichia</i> , <i>Roxb.</i>	II. Calameæ. — (Lepidocaryæ, <i>Martius</i> ; Calaminæ, <i>Griffith</i> .)
<i>Hyophorbe</i> , <i>Gærtn.</i>	<i>Euterpe</i> , <i>Gærtn.</i>	<i>Wrightia</i> , <i>Roxb.</i>	* <i>Pinnated.</i>
<i>Sublimia</i> , <i>Commers.</i>	<i>Dypsis</i> , <i>Noronh.</i>	<i>Iriartea</i> , <i>Ruiz et Pav.</i>	<i>Calamus</i> , <i>Limn.</i>
<i>Leopoldinia</i> , <i>Mart.</i>	<i>Noronha</i> , <i>Thours.</i>	<i>Ceroxylon</i> , <i>H. et B.</i>	
	<i>Seafortia</i> , <i>R. Br.</i>	<i>Cyrtostachys</i> , <i>Bl.</i>	

<i>Palmijuncus</i> , Rumph.	<i>Hyphæno</i> , Gærtn.	<i>Brahea</i> , Mart.	<i>Acrocomia</i> , Mart.
<i>Zalacca</i> , Reinw.	<i>Cacifera</i> , Delil.	<i>Copernicia</i> , Mart.	<i>Astrocaryum</i> , C. W. G.
<i>Plectocomia</i> , Mart.	<i>Douma</i> , Lau.	<i>Caranaiba</i> , Marc. Pise.	<i>Meyer</i> .
<i>Ceratolobus</i> , Blume.	*** <i>Pinnated</i> .	<i>Cryosophila</i> , Blume.	<i>Toxophanix</i> , Schott.
<i>Dæmourops</i> , Blume.	<i>Bentinckia</i> , Berry.	<i>Sabal</i> , Adans.	*** <i>Unarmed</i> .
<i>Calamosagus</i> , Griff.	<i>Keppleria</i> , Mart.	<i>Chamærops</i> , Linn.	<i>Attalea</i> , H. B. K.
<i>Eugeissona</i> , Griff.	<i>Geonoma</i> , Willd.	<i>Chamæriphes</i> , Pont.	<i>Elais</i> , Jacq.
<i>Raphia</i> , Palis.	<i>Gynestum</i> , Poiteau.	<i>Phœnix</i> , Cav.	<i>Afonsia</i> , Kunth.
<i>Sagus</i> , Gærtn.	<i>Vouay</i> , Aubl.	<i>Trithrinax</i> , Mart.	<i>Cocos</i> , Linn.
<i>Metroxylon</i> , Rottb.	<i>Manicaria</i> , Gærtn.	<i>Rhapis</i> , Linn. fil.	<i>Langsdorfia</i> , Raddi.
*** <i>Fan-leaved</i> .	<i>Pitophora</i> , Jacq.	<i>Thrinax</i> , Linn. fil.	<i>Syagrus</i> , Mart.
<i>Mauritia</i> , Linn. fil.	IV. <i>Corypheæ</i> .	§ 2. <i>Phœnicidæ</i> .	<i>Diplothemium</i> , Mart.
<i>Lepidocaryum</i> , Mart.	§ 1. <i>Sabalidæ</i> .	<i>Phœnix</i> , Linn.	<i>Maximiliana</i> , Mart.
III. <i>Borasseæ</i> .	<i>Corypha</i> , Linn.	<i>Elate</i> , Ait.	<i>Jubæa</i> , H. B. K.
* <i>Fan-leaved</i> .	<i>Taliera</i> , Mart.	V. <i>Cocœæ</i> .	<i>Molinæa</i> , Berter.
<i>Borassus</i> , Linn.	<i>Gembanga</i> , Blume.	* <i>Spiny</i> .	<i>Orbignya</i> , Mart.
<i>Lontarus</i> , Rumph.	<i>Livistoua</i> , R. Br.	<i>Desmoncus</i> , Mart.	? <i>Alagoptera</i> , Nees.
? <i>Pholidorpus</i> , Blume.	<i>Licuala</i> , Rumph.	<i>Aitilara</i> , Maregr.	<i>Phytelephas</i> , Ruiz et Pav.
<i>Lodoicea</i> , Labill.	<i>Saribus</i> , Rumph.	<i>Bactris</i> , Jacq.	<i>Elephantusia</i> , Willd.
<i>Latania</i> , Commers.	<i>Bissula</i> , Rumph.	<i>Guilielma</i> , Mart.	<i>Nipa</i> , Thunb.
<i>Cleophora</i> , Gærtn.	<i>Pericycla</i> , Blume.	<i>Martinezia</i> , Ruiz et Pav.	<i>Nypa</i> , Rumph.

NUMBERS. GEN. 73. Sp. 400.—(1000 Martius.)

Position	—————	<i>Pandanaçæ</i> .	—————
		PALMACEÆ.	
		<i>Juncacæ</i> .	

ALLIANCE X. *HYDRALES*.—THE HYDRAL ALLIANCE.

DIAGNOSIS—*Unisexual aquatic Endogens, with perfect or imperfect flowers, not arranged on a spadix, and without albumen.*

The essential character of the Hydral Alliance consists in its ♂ ♀ flowers and exalbuminous seeds ; it is therefore necessary to expel all those genera, which, like Potamogeton, have been placed among the Naiads although they are ♂ ; for in truth there is nothing except the diclinous character which can distinctly divide the Arrow-grasses from the Naiads. Among the Frogbits, however, a couple of genera occur which are described as being truly ♀ and yet cannot be referred to any other Order, and they therefore constitute real exceptions to the otherwise positive distinction. The Hydral are all, as their name indicates, strictly aquatic, no instance of a land-plant occurring among them. They divide into three well-marked Orders, namely :

- | | |
|--|----------------------|
| <i>Stamens epigynous ; ovary adherent</i> | 39. HYDROCHARIDACEÆ. |
| <i>Stamens hypogynous ; ovary free ; pollen globose</i> | 40. NAIADACEÆ. |
| <i>Stamens hypogynous ; ovary free ; pollen conservoid</i> | 41. ZOSTERACEÆ. |

The genera of these Orders demand, however, a much more careful examination than they have yet had, and considerable changes may be expected among them ; for it is uncommon to find in the same Order so much diversity of condition as occurs among the Naiads and Frogbits as at present constituted.

ORDER XXXIX. HYDROCHARIDACEÆ.—HYDROCHARADS.

Hydrocharides, *Juss. Gen.* 67. (1789).—Hydrocharideæ, *DC. Fl. Fr.* 3. 265. (1815); *R. Brown Prodr.* 344. (1810); *Richard in Mem. Mus.* vol. 1. 365. (1815); *Agardh Aph.* 127. (1822), *Endl. gen.* lix. *Meisner*, p. 365.—Vallisneriaceæ anâ Stratioteæ, *Link Handb.* 1. 281. (1829).—Anacharideæ, *Endl. gen.* p. 161.

DIAGNOSIS.—*Hydral Endogens with epigynous stamens and an adherent ovary.*

Floating or water-plants. Leaves with parallel veins, sometimes spiny. Flowers enclosed in a spathe, ♂ ♀ (or occasionally ♂). Sepals 3, herbaceous. Petals 3, petaloid, occasionally absent. Stamens definite or indefinite. Ovary adherent, composed of several carpels, and 1- 6- 8- 9-celled; stigmas 3-6; ovules indefinite, anatropal, often parietal. Fruit dry or succulent, indehiscent, with 1 or more cells. Seeds without albumen; embryo undivided, or throtropal, with a plumule more or less lateral and generally manifest.

Such appear to be the essential characteristics of this singular group of plants, whose inflorescence lives and passes through all the stages of its existence under water, except just at the time when fertilization is necessary, when the flowers rise above the surface for a few hours. Darwin has celebrated the so-called phenomena connected with this function in *Valisneria spiralis*, (see his *Loves of the Plants*); but they are greatly in need of more accurate investigation. Mr. Quekett, in an elaborate memoir on this plant, (*London Phys. Journ.* 1. 65,) considers that a part at least of the statements are fabulous.

It is not easy to determine what is the immediate affinity of Hydrocharads. Their exalbuminous seeds and declinuous flowers distinguish them from Bromeliaceæ, to which their adherent ovary, and the habit of the Water-soldier (*Stratiotes*) seems to approach them; from Naiads, their indefinite seeds and adherent ovary equally divide them. By their tripetaloidous flowers, with an inferior ovary, they are separated from Alismads, with which some agree in habit and want of albumen, but from which they differ in their carpellary leaves being definite, not indefinite. Commelynaceæ are at once recognised by their superior trilocular ovary. Agardh refers here *Trapa*! Linnaeus placed Hydrocharads along with Palms! in his natural arrangement. *Hydrocharis Morsus Ranæ* has been compared, and not unaptly, to a pigmy *Nymphaea*. Perhaps, taking into account their declinuous flowers, the universal presence of a spathe and their aquatic nature, they may be regarded as approaching to Arads through Lemnads.

Natives of fresh water in Europe, North America, and the East Indies. One species is found in Egypt (*Damasonium indicum*), and two *Vallisnerias* in New Holland. A few occur in estuaries of the sea.

Nothing is known of their uses, unless that the fruit of *Enhalus* is eatable, and its fibres capable of being woven, according to Agardh (*Aph.* 128). The *Jangi* of Hindostan, called *Vallisneria alternifolia* by Roxburgh, *Hydrilla* by Hamilton, is one of the plants used in India for supplying water mechanically to sugar in the process of refining it, "as clay is used in the West Indies to permit the slow percolation of water."—*Royle*. The herbage of *Hydrocharis Morsus Ranæ* is mucilaginous and slightly astringent. *Ottilia* and *Boottia* are eaten in India as potherbs.

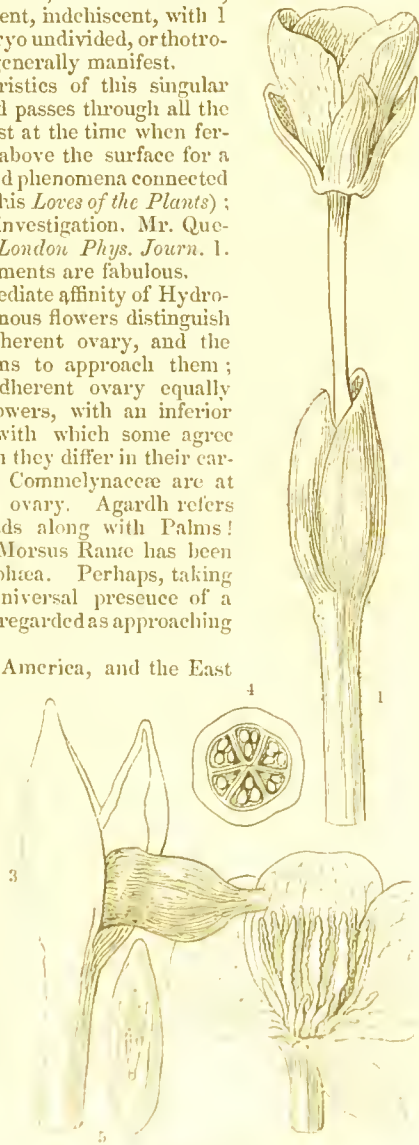


Fig. XCIII.

Fig. XCIII.—*Stratiotes aloides*. 1. a flower and spathe; 2. a flower split open; 3. a fruit in its spathe; 4. a section of the fruit; 5. an embryo.

GENERA.

Tribe I.—Valisneriæ

Ovary 1-celled.

Udora, Nutt.

Elodea, L. C. Rich.*Philotria*, Rafin.

Anacharis, Rich.

Hydrilla, Rich.

?Hydrospondylus, Hskl.*Lagarosiphon*, Harvey.*Vallisneria*, Michx.*Physkium*, Loureir.*Blyxa*, Thouars.*Saivala*, Wall

Tribe II.—Stratiotæ.

*Ovary 6-8-9-celled.**Stratiotes*, Linn.*Aloides*, Boerh.*Euhalus*, L. C. Rich.*Ottelia*, Pers.*Damasonium*, Schreb*Hymenotheca*, Salisb.*Bootia*, Wall.*Limnobium*, L. C. Rich.*Hydromystria*, F.G.W.

Meyer.

Jalambicca, Llav. et

Lex.

Hydrocharis, Linn.*Stratiotes*, Dillen.

NUMBERS. GEN. 12. Sp. 20?

Pistiaceæ.

POSITION. ————— HYDROCHARACEÆ.—Naiadaceæ.

Bromeliaceæ.

ORDER XL. NAIADACEÆ.—NAIADS.

Naiades, *Juss. Gen.* 18. (1789) in part.—Fluviales, *Vent. Tabl.* 2. 80. (1799); *Kunth Enum.* 3. 111.—Potamophite, *Rich. Anal. Fr.* (1808).—Potameæ, *Juss. Dict. Sc. Nat.* 43. 93. (1826).—Naiadeæ, *Agardh Aph.* 125. (1822); *Endl. gen. lxxi. Meisner*, p. 363.—Fluviales, *Rich. Mém. Mus.* 1. 364. (1815).—Hydrogetones, *Link. Handb.* 1. 282. (1829).

DIAGNOSIS.—*Hydral Endogens*, with hypogynous stamens, a free embryo, and globose pollen.

Water-plants, inhabiting both the ocean and fresh water. Leaves very cellular, with parallel veins, and membranous interpetiolar stipules. Flowers inconspicuous, often arranged in terminal spikes, ♂ ♀. Perianth of 2 or 4 pieces, often deciduous, rarely wanting. Stamens definite, hypogynous. Ovaries 1 or more, superior; stigma simple; ovule solitary, pendulous and orthotropal or campylotropal, or erect and anatropal. Fruit dry, very rarely opening by regular valves, 1-celled, 1-seeded. Seed erect or pendulous; albumen none; embryo with a greatly enlarged radicle, and a latent cleft for the emission of the plumule.

In this Order we have the nearest approach to the great class of Thallogens. Many of them live under water. The perianth is reduced to a few imperfect scales, and there is in some of the genera either a total absence of spiral vessels, or that form of tissue exists in a very rudimentary state. Pollini asserts, according to De Candolle, that spiral vessels do exist in them; but Amici, on the other hand, maintains that there is no trace of them, at least in *Caulinia*. The manifest affinity of Naiads to Arrow-grasses determines a relation on the part of the former to Arads, which is confirmed by the tendency to produce a rudimentary spathe in some of them, and by their undoubted resemblance to the Duckweeds. It is remarkable that Adanson was aware

of this relationship between Arads and Naiads, to which, however, Jussieu, whose Naiades are a very heterogeneous assemblage, did not assent. The species of the Order, as now circumscribed, are generally translucent cellular plants, destitute of stomates, having no epidermoidal layer, and perishing rapidly upon exposure to air. Amici has seen the sap circulate in the transparent joints of *Caulinia fragilis*, which he states is the unknown plant upon which Corti made observations relating to the same subject. See Amici in *Ann. des Sc.* 1. 42. Mr. Griffith has remarked that, although the difference between the development of the vegetable carpel leaf and vegetable ovulum is in general sufficiently apparent, an exception has appeared to him to be presented by Naias, in which the future pistil seems to be derived from an annular growth round a central body, which subsequently becomes the ovule!

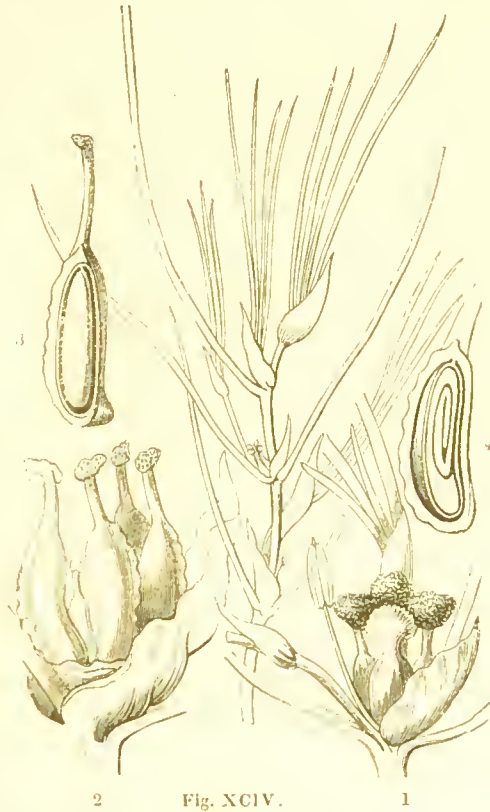


Fig. XCIV.

FIG. XCIV.—*Zannichellia palustris*. 1. A flower; 2. a cluster of ripe ovaries; 3. an ovary opened to exhibit the ovule; 4. a vertical section of a seed, showing the folded up embryo.

Common in extra-tropical countries, either inhabiting fresh water, or the shores of the ocean, but also found near the equator.

Their uses are unknown.

GENERA.

Caulinia, <i>Willd.</i>	Phyllospadix, <i>Hook.</i>	Tetroncium, <i>W.</i>	Athenia, <i>Petit.</i>
<i>Hetera</i> , <i>Gmel.</i>	Zannichellia, <i>Michel.</i>	<i>Cathantes</i> , <i>Rich.</i>	<i>Bellevalia</i> , <i>Delil.</i>
Najas, <i>Willd.</i>	Lilæa, <i>H.B.K.</i>	Halodule, <i>Endl.</i>	Epigynanthus, <i>Blume.</i>
<i>Fluvialis</i> , <i>Michel.</i>	<i>Heterostylus</i> , <i>Hook.</i>	<i>Diplanthera</i> , <i>Thouars.</i>	

NUMBERS. GEN. 9. Sp. 16.

Juncaginaceæ.

POSITION.—Hydrocharidaceæ.—NAIADACEÆ.—Zosteraceæ.

Thallogens.

ORDER XLI. ZOSTERACEÆ.—SEA WRACKS.

Zosterinæ.—*Nees ab Esenb. ex Kunth.*—Zostereæ.—*Kunth. enum. 3. 115. (1841).*—Posidonieæ.—*Id.*

DIAGNOSIS.—*Hydral Endogens with hypogynous stamens, a free ovary, and confervoid pollen.*

Marine plants resembling sea weeds and living among them. Leaves grassy, thin, sheathing at the base. Flowers very minute, absolutely naked, or surrounded by 3 scales, ♂ ♀, arranged within herbaceous spathes. ♂ Anthers definite in number, one or two-celled, sessile; pollen filamentous, resembling fine confervæ. ♀ Ovary free, one-celled; ovule solitary, pedulous, campylotropal; or parietal with the foramen downwards; stigmas 1 or 2, capillary. Fruit drupaceous, one-seeded. Seed pendulous; albumen 0; embryo antitropal or homotropal, with a very large radicle, and a highly developed plumule lying in its cavity.

If we are to find anywhere a positive intercalation of flowering with flowerless plants it is here, where with naked flowers, but distinct sexes, we have the pollen in a condition that may be well compared to the claters of *Marehantia* and its allies, and totally different from all that is known in other flowering plants. The habit too is quite that of sea weeds. It therefore seems expedient to separate these genera from the Naiads, which are an Order higher in organization, and in fact differ in nothing from the common types of flowering structure, except in their simplicity. The manner in which fertilization takes place among these plants is unknown. *Zostera marina*, whose flowers of both sexes are inclosed in a spathe filled with air, offers indeed no insuperable difficulty to the supposition that in such a situation, although the plants are under water, yet the flowers may be in a dry medium; but, as *Vaucher* has observed, this does not assist us to understand how fertilization is effected in *Zostera maritima* which is dioecious. Does the confervoid pollen float to the place where it is wanted?

The bottom of the ocean is the locality of these plants, which occur from the North Sea to the Mediterranean, the Indian Ocean and the coasts of Arabia. One species indeed, *Amphibolis zosterifolia*, is seen on the shores of New Holland, and another in the West Indies.

They can scarcely be said to form any part of the vegetation subdued by man, except in the case of the Sea wrack, *Zostera marina*, which is a common material for packing, and for stuffing cottagers' cushions, and has also been used for tumours, owing apparently to the iodine of the sea weeds that are gathered with it.

GENERA.

<i>Cymodocea</i> , König.	| <i>Thalassia</i> , Sol.	| <i>Posidonia</i> , Kbn.
<i>Amphibolis</i> , Agh.	| <i>Zostera</i> , L.	| <i>Kerneria</i> , W.
<i>Graunultera</i> , Rehb.		| <i>Caulinia</i> , DC.

NUMBERS. GEN. 5. Sp. 12 (Kunth).

POSITION. ———. — *Ceramiaceæ.*
— *ZOSTERACEÆ.* — *Naiadaceæ.*
— *Marchantiaceæ.*

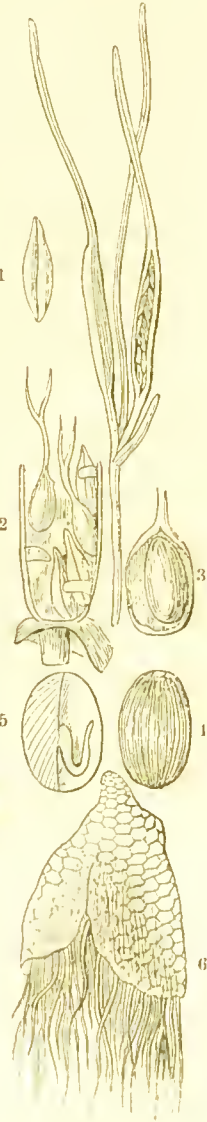


Fig. XCV.

Fig. XCV.—*Zostera Noltii*. 1. An anther; 2. a portion of a spathe opened, to show the ♀ and ♂ flowers; 3. a seed; 4. the same cut in half, to show the plumule; 5. an anther opened and discharging its confervoid pollen.—*Nees v. Farnbeck.*

ALLIANCE XI. *NARCISSALES*.—THE NARCISSAL ALLIANCE.

DIAGNOSIS.—*Epigynous petaloid Endogens, with symmetrical flowers, 3 or 6 stamens, and albuminous seeds.*

From the Hydral Alliance and its higher forms, such as the Water Soldiers (*Stratiotes*), we pass, by an easy transition, to the Narcissals, which may be regarded as hermaphrodite Hydrals growing on dry land, and having albumen in their seeds. This transition is effected by the Bromelworts (*Bromeliaceæ*), which have quite the same habit, and in addition a tripetaloid flower. This point being settled, the remainder of the Alliance consists of plants which might be regarded as Lilials, if their ovary were not adherent; for it is difficult to separate the Irids from *Melanths* or the *Amaryllids* from *Lilyworts*, by any other precise character.

The principal difficulty in limiting this Alliance arises out of the Bromelworts, some of whose genera have the ovary absolutely free: but such plants are not at all like any other part of the system, and if their calyx is free, it is so fleshy or permanent as to have all the external appearance of being adherent to the ovary.

While however there is, as has been stated, a gentle passage from Hydrals into Narcissals, we find, on the other hand, the Aral Alliance provided here with its representative in the form of the *Taccads*, which have much the habit of some *Arads*, and nevertheless an adherent ovary and almost tripetaloid flower. These plants have also a very evident resemblance to *Orontiaceæ*.

NATURAL ORDERS OF NARCISSALS.

<i>Flowers tripetaloidous, 6-leaved, imbricated. Albumen mealy</i>	. 42. BROMELIACEÆ.
<i>Flowers half tripetaloidous, tubular. Albumen fleshy</i>	. . . . 43. TACCACEÆ.
<i>Flowers hexapetaloidous, tubular, scarcely imbricated. Stamens 3,</i>	} 44. HÆMORACEÆ.
<i>opposite the petals, or 6; anthers turned inwards. Radicle</i>	
<i>remote from the hilum, which is naked</i> }
<i>Flowers hexapetaloidous, much imbricated. Stamens 6; anthers</i>	} 45. HYPOXIDACEÆ.
<i>turned inwards. Radicle remote from the hilum, which is often</i>	
<i>strophiolate</i> }
<i>Flowers hexapetaloidous, much imbricated. Stamens 6, or more;</i>	} 46. AMARYLLIDACEÆ.
<i>anthers turned inwards. Radicle next the hilum</i>	
<i>Flowers hexapetaloidous. Stamens 3, opposite the sepals; anthers</i>	} 47. IRIDACEÆ.
<i>turned outwards</i>	

ORDER XLII. BROMELIACEÆ.—BROMELWORTS.

Bromeliæ, Juss. Gen. 49. (1789); *Dict. Sc. Nat.* 5. 347. (1817).—*Bromeliaceæ*, Lindl. in *Bot. Reg.* fol. 1068. (1827); *Bartl. Ord. Nat.* 46. (1830); *Schult. f. in Röm. and Sch. Syst. Veg.* vol. 7. (1830); *Endl. Gen.* lxx.; *Meisn. p.* 395. *Tillandsiæ*, Adr. Juss. *Cours Élém.* tab. 3.

DIAGNOSIS.—*Narcissal Endogens* with tri-petaloidous six-leaved flowers having imbricated divisions, and mealy albumen.

Stemless or short-stemmed plants, with rigid channelled leaves often covered with cuticular scales, and spiny at the edge or point. Flowers with gay colours, in racemes or panicles. Calyx 3-parted or tubular, persistent, never withering, more or less cohering with the ovary, usually herbaceous, sometimes coloured. Petals 3, coloured, withering or deciduous, equal or unequal, rigidly imbricated. Stamens 6, inserted into the tube of the calyx and corolla; anthers opening inwards. Ovary 3-celled, many-seeded; ovules anatropal; style single; stigma 3-lobed, or entire, often twisted. Fruit capsular or succulent, 3-celled, many-seeded. Seeds innumerable in most cases, always numerous, with a leathery skin, or tapering into a slender thread; embryo taper, curved or straight, minute, lying in the base of mealy albumen, with the radicle next the hilum.



Fig. XCVI.

Stratiotes among the Hydrocharads has so much the foliage of this Order as to render it probable, taking the fructification also into account, that the nearest affinity of the Bromelwort Order is with the former. It is, however, essentially distinguished by its seeds having mealy albumen. This

circumstance also cuts it off from the Amaryllids and Hypoxids. The habit of Bromelworts is peculiar; they are hard dry-leaved plants, often with a scurfy surface; the species are frequently capable of sustaining long drought without inconvenience. There can be no doubt about the Order belonging to an epigynous series, and yet the whole race of Tillandsias has the ovary free; but it is never, I believe, wholly so, but has always so much union to the calyx at the base as will show its adherent tendency. Besides, the sepals are always as fleshy, to the last, as if they were absolutely incorporated with the ovary. Nevertheless, Adrien de Jussieu regards the free genera as a peculiar Order, which he calls Tillandsiæ.

All, without exception, are natives of the continent or islands of America, whence they have migrated eastwards in such numbers as to have established themselves as part of the present Flora of the west coast of Africa, and some parts of the East Indies. They are all capable of existing in a dry hot air without contact with the earth; on which account they are favourites in South American gardens, where they are suspended in the buildings, or hung to the balustrades of the balconies; situations in which they flower abundantly, filling the air with fragrance.

The most remarkable species is the Pine Apple, or Ananas, which is well known for the sweetness and fine aromatic flavour of its fruit; in its wild state, however, and unripe, its fruit is excessively acid, burning the gums. In the West Indies it is employed, along with Bromelia Pinguin and others, to destroy intestinal worms, and to promote the secretion of urine. Tillandsia usneoides hangs down from the trees in the woods of tropical America like long dry beards, and is used for stuffing birds, and in the

Fig. XCVI.—1. Flower of *Bromelia fastuosa*; 2. a flower of *Pitcairnia ringens*; 3. the stamens of the same; 4. its seed; 5. a cross section of the seed of *Bromelia Pinguin*; 6. a section of its seed; 7. a cross section of the ovary of *Bromelia fastuosa*.

preparation of an ointment used against hæmorrhoids. *Puya chilensis* yields an extract used in healing broken bones; a transparent gum flows from the spike of *Puya lanuginosa*. A yellow colour is extracted in Brazil from the root of *Billbergia tinctoria*. Ropes are made in Brazil from a species of *Bromelia*, called *Grawatha*; and very fine muslin has been manufactured from the fibres of the common Pine Apple.

GENERA.

<i>Ananassa</i> , Lindl.	<i>Aræococcus</i> , Brongn.	<i>Amalia</i> , Hort. hispan.	<i>Dyckia</i> , Schult. fil.
<i>Ananas</i> , Tournef.	<i>Cryptanthus</i> , Klotsch.	<i>Strepsia</i> , Nutt.	<i>Encholirium</i> , Mart.
<i>Bromelia</i> , Linn.	<i>Brocchinia</i> , Schull. fil.	<i>Caraguata</i> , Plum.	<i>Pouretia</i> , Ruiz et Pav.
<i>Karatas</i> , Plum.	<i>Pitcairnia</i> , Herit.	<i>Devilca</i> , Bert.	<i>Puya</i> , Molina.
<i>Ananas</i> , Gaertn.	<i>Hepetis</i> , Swartz.	<i>Guzmania</i> , Ruiz et Pav.	<i>Renealmia</i> , Feuille.
<i>Aechmea</i> , Ruiz et Pav.	<i>Spirastigma</i> , Herit.	<i>Bonapartea</i> , Ruiz et Pav.	<i>Achupalla</i> , Humb.
<i>Oechmea</i> , Juss.	<i>Vriesia</i> , Lindl.	<i>Acanthospora</i> , Spr.	<i>Hechtia</i> , Klotsch.
<i>Billbergia</i> , Thunb.	<i>Neumannia</i> , Brongn.	<i>Misandra</i> , Dietr.	<i>Dasyllirion</i> , Zucc.
<i>Hohenbergia</i> , Schult. fil.	<i>Tillandsia</i> , Linn.	<i>Navia</i> , Mart.	? <i>Roulinia</i> , Brongn.
<i>Acanthostachys</i> , Klotsch.	<i>Renealmia</i> , Plum.	<i>Cottendorria</i> , Schult. fil.	

NUMBERS. GEN. 23. Sp. 170.

Hydrocharidaceæ.

POSITION.—*Hæmodoraceæ.*—*BROMELIACEÆ.*—*Hypoxidaceæ.*



Fig. XCVI.*

Fig. XCVI.*—*Aechmea fulgens.*—*Paxton.*

ORDER XLIII. TACCACEÆ.—TACCADS.

Taccææ, *Presl. Reliq. Herk.* 1. 149. (1830; *Bartl. Ord. Nat.* 82. (1830).—Taccaceæ, *Key*, §c. 70. (1835); *Ed. prior.* ccxxxix.; *Endl. Gen.* lviii.—*Meisner*, p. 403.

DIAGNOSIS.—*Narcissal Endogens with tubular half-tripetaloidous flowers and fleshy albumen.*

Large perennial herbs, with a tuberous root. Leaves all radical, stalked, undivided or pedatifid, the segments pinnatifid and entire, with curved parallel veins. Stipules 0.

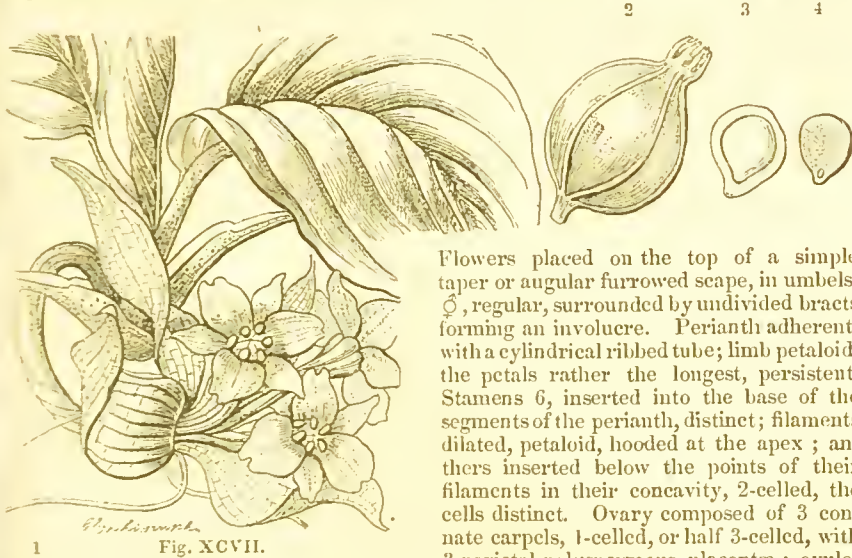


Fig. XCVII.

Flowers placed on the top of a simple taper or angular furrowed scape, in umbels, ♂, regular, surrounded by undivided bracts forming an involucre. Perianth adherent, with a cylindrical ribbed tube; limb petaloid, the petals rather the longest, persistent. Stamens 6, inserted into the base of the segments of the perianth, distinct; filaments dilated, petaloid, hooded at the apex; anthers inserted below the points of their filaments in their concavity, 2-celled, the cells distinct. Ovary composed of 3 connate carpels, 1-celled, or half 3-celled, with 3 parietal polysperous placentæ; ovules

ascending and anatropal, or horizontal and amphitropal; styles 3, connate; stigmas connate at the base, radiating, 2-lobed. Pericarp berried, indehiscent, 1-celled, or half 3-celled, many-seeded. Seeds lunate or somewhat ovate, striated. Albumen fleshy. Embryo placed inside the albumen in the region of the hilum, or remote from it.

Personally I have had no opportunity of examining critically the plants which compose this small Order. They are in some respects like Arads, in others like Birthworts (*Tacca levis*); but certainly have nothing to do with Dicotyledons. Blume has the following remarks upon *Tacca*. *Enum.* 1. 82. "The genus *Tacca* offers the type of a new family between Araceæ and Aristolochiaceæ. To the former it approaches closest in habit, especially in the leaves, but it is very different from them in the structure of the parts of fructification. For in no species of true Araceæ is a corolline perianth, properly so called, to be found; what we have the custom of calling so in *Dracontium* and others, is nothing but scales, and not even a calycine integument; the perianth is, moreover, superior in *Tacca*. By this superior perianth the affinity with Aristolochiaceæ is evident; but from those too *Tacca* differs in the situation of the stamens, which are not as in that Order adherent to the pistil with the anthers opening outwards, but are placed on the perianth itself with the anthers turned inwardly." In *Tacca* it is probable that there are several germinating points upon the embryo, analogous to the double or triple plumule of *Dracontium*; hence embryos of such a kind may be said to be tubers formed in the fruit itself. Brown long since stated (*Prodromus*, 1816) that a relation is established between Arads and Birthworts by means of *Tacca*. See also *Agerth's Aphorisma*, 245. For my own part, however, this resemblance to Birthworts seems so very slight as to be unworthy of notice. The true relation is with the Arads, or at least with those ♂ plants which are now separated under the name of *Cronticeæ*, of which these seem to be an epigynous form. Endlicher compares them with Yams, to which they appear to have even less resemblance than to the Birthworts.

Fig. XCVII.—1. *Tacca integrifolia*; 2. fruit of *T. pinnatifida*; 3. seed of do. with half the testa removed; 4. section of its albumen and embryo. *Gaertn.*

Found in damp maritime places and woods in the hotter parts of India, the South Sea Islands, and the tropical parts of Africa.

“The plants of this family are possessed of some degree of acridity, both in their tubers and in their herbaceous parts, as Rumphius informs us that the tubers of *T. pinnatifida*, *dubia*, and *montana* are rasped and macerated for four or five days in water, and a fecula is separated in the same manner that sago is, and like it employed as an article of diet by the inhabitants of the Malayan and Molucca Islands. In Otaheite and other Society Islands, they make cakes of the meal of the tubers of *T. pinnatifida*, which are the *Tacca youy* of some navigators; they form an article of diet in China and Cochin China, as also in Travancore, where Dr. Ainslie informs me they attain a large size, and that the natives eat them with some acid to subdue the acrimony.”—*Royle*.

	GENERA.			
<i>Tacca, Forst.</i>	|			<i>Ataccia, Presl.</i>
NUMBERS. GEN. 2. Sp. 8.				
POSITION	—————	<i>Orontiacæ.</i>		
		TACCACEÆ.—	Bromeliacæ.	
		<i>Arucææ.</i>		

ORDER XLIV. HÆMODORACEÆ.—Blood Roots.

Hæmodoraceæ, *R. Brown, Prodr.* 299. (1810); *Agardh, Aphor.* 170. (1823); *Endl. Gen.* lxi.; *Meisner, p.* 396.—*Vellozicæ, D. Don in Edinb. Ph. Journal.* (1830).

DIAGNOSIS.—*Narcissal Endogens with hexapetaloidous tubular flowers, 3 stamens opposite the petals or 6, anthers turned inwards, and radicle remote from the hilum which is naked.*

Herbaceous plants with fibrous perennial roots and permanent sword-shaped equitant leaves, which are mostly in two ranks. Flowers ♂. Perianth usually more or less woolly, adherent; the sepals and petals in many cases undistinguishable and united into a (cylindrical) tube. Stamens arising from the sepals and petals, either 3 and opposite the petals, or 6; anthers bursting inwardly. Ovary with the cells 1- 2- or many-seeded, adherent, usually 3-celled,



Fig. XCVIII.



Fig. XCIX.

occasionally 1-celled, with a placenta occupying only a point of the axis; style simple; stigma undivided; ovules amphitropal. Fruit covered by the withered perianth, capsular, valvular, seldom indehiscent, somewhat nucamentaceous, with the placenta easily separable from the dissepiments, if any. Seeds either definite or indefinite, fixed by the base or peltate, winged or wrinkled and angular. [Embryo lying in cartilaginous albumen, short, straight, with the radicle usually remote from the hilum. *Endl.*]

The distinction between these and Amaryllids consists in their perianth not having the regular equitant position of sepals and petals which is found in the latter, in their constantly equitant leaves, and in their flowers, which have frequently a woolly surface, and a small limb compared with the tube. From birds they are divided

Fig. XCVIII.—*Blancaea canescens*. 1. a flower and ovary of *Conostylis tenuis* opened.
Fig. XCIX. *Hæmodorum spicatum*. 1. A flower spread open; 2. a cross section of the ovary; 3. an anther.

by the number of their stamens, and by their anthers turning inwards, or, if their stamens are reduced to three, then, by those organs being opposite the petals; and by their simple stigma. Dr. Herbert includes all the hexandrous genera in Amaryllids; and limits the Order to those having 3 stamens and an adherent ovary; but, although it may be very difficult to express in satisfactory language the exact differences between the Blood-roots and Amaryllids, yet I think there can be no doubt of their real distinctness, and that the diagnosis now assigned to them does sufficiently characterize them.

In Brazil, Southern Guiana, and also in the Mascaren islands, there occurs a race of these plants which may be compared to the Conestyles of New Holland on a gigantic scale. Martins, who calls them Vellozias, describes them as perennial Lilies, with



Fig. C.

their trunks closely covered by the withered remains of leaves, branching by forks, and bearing at their points tufts of leaves in the manner of a Yucca or Draecena; some of them are from 2 to 10 feet high, with a trunk sometimes as thick as a man's body. I find the structure of that trunk most curious. It consists of a central slender subcylindrical column, which never increases in diameter after its first formation, and which has the ordinary monocotyledonous structure. Outside of the column are arranged great quantities of slender fibrous roots, which cohere firmly by their own cellular surface, and form a spurious kind of wood, which is extremely like that of some kinds of Palm wood, only it is developed by constant additions to the very outside of the stem. Something analogous occurs in Pandanus, but it is in some tree ferns only that this mode of growth is exactly repeated. Don proposed to make an Order of the Vellozias; but till their structure and that of the Bloodroots shall have been thoroughly investigated this step is premature.

As to Wachendorfia and its allies, with triandrous flowers, and free ovary, Mr. Herbert looks upon it as the type of an Order (Wachendorfiaceæ) quite unconnected with Hæmodorum and Conostylis, and he is possibly right; but in the meanwhile, as we

know very little of these genera, it seems most expedient to dismiss them from the Blood-roots and station them in reserve among the Lilies. Endlicher states that the genera of this Order have the cells of the ovary opposite the petals, and this, if so, would certainly be an important characteristic; but I cannot confirm the statement: it is in truth very difficult to determine such a point in the majority of the genera, whose sepals and petals are all apparently on the same plane. The true Hæmodoraceæ are smooth and dissimilar in habit to Conostylis and its allies; wherefore a couple of additional sub-Orders may be conveniently admitted here, for which better characters may be hereafter found.

The species occur in North America sparingly, and the Cape of Good Hope; several are described from the more temperate parts of New Holland, and a good many Vellozias and Barbacenias occur in Brazil and the Mascaren islands. A Barbacenia (Alexandrinæ) growing from 10 to 12 feet high has also been noticed by Sir R. Schomburgk in the Southern parts of British Guiana.

De Candolle remarks, that the red colour found in the roots of *Laelmanthes tinctoria* in North America, where it is used for dyeing, prevails in *Hæmodorum*, and deserves to be studied in the rest of the Order. The natives of the Swan River live on the roots of such plants, especially of *Hæmodorum paniculatum* and *spicatum*, and *Anigozanthus floridus*, which are mild and nutritious when roasted, but acrid when raw. *Hook. Journ.* 2. 355. One of the most intense bitters known is *Aletris farinosa*. It is used in infusion as a tonic and stomachic, but large doses produce nausea and tendency to vomit. It has also been employed in chronic rheumatism.

GENERA.

I.—*Hæmodoracæ*. Perianth smooth,
short.
Hæmodorum, Sm.
Phlebocarya, R. Br.

II.—*Conostylacæ*. Perianth woolly,
long.
Dilatris, Berg.
Lachnanthes, Elliot.
Heritiera, Gmel.
Gyrotheca, Salisb.

Lanaria, Thunb.
Argolisia, Juss.
Augca, Retz.
Anigosarthus, Labill.
Anigozia, Salisb.
Anagosanthus, Reich.
Schwegrichenia, Spr.
Androstemma, Lindl.
Conostylis, R. Br.
Blancoa, Lindl.

Aletris, Linn.
Tribonanthes, Endl.

III.—*Velloziacæ*.
Vellozia, Mart.
Xerophyta, Comm.
Campteria, A. Rich.
Radia, A. Rich.
Barbacenia, Vandelli.
Visca, Steud.

NUMBERS. GEN. 13. Sp. 50.

Liliacæ.

POSITION.—Iridacæ.—HEMODORACEÆ.—Amaryllidacæ.

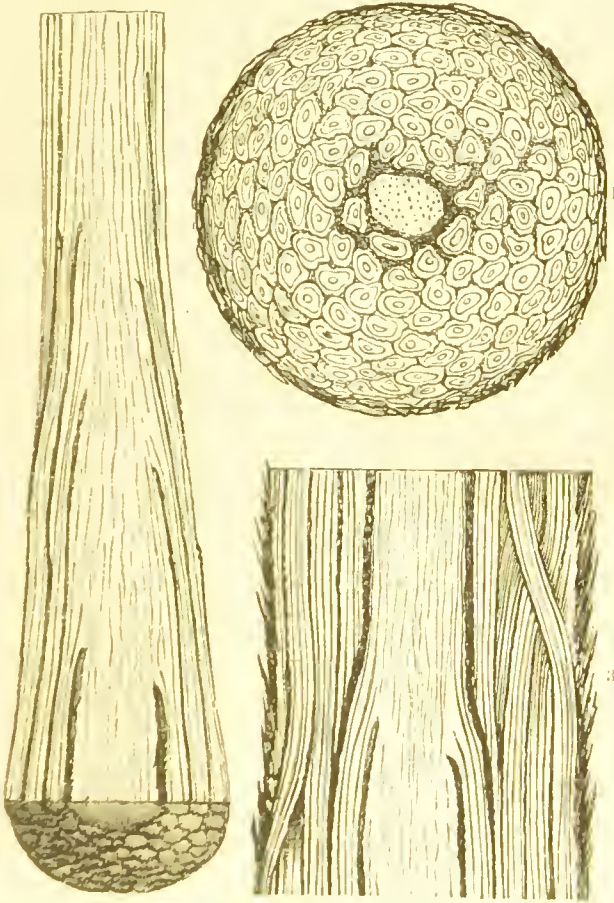


FIG. 11.

FIG. 11.—Sections of the stem of a Brazilian *Vellozia*; 1, transversely; 2, 3, longitudinally.

ORDER XLV. HYPOXIDACEÆ.—HYPOXIDS.

Hypoxidæ, *R. Br. in Flinders* (1814); *Agardh Aph.* 164 (1823); *Ed. prima. No. 235* (1830); *Endl. Gen. lxxiii. Meisner, p. 397.*

DIAGNOSIS.—*Narcissal Endogens with hexapetaloidous flowers which are much imbricated, 6 stamens with anthers turned inwards, and a radicle remote from the hilum, which is often strophiolate.*

Herbaceous plants with a tuberos or fibrous perennial root. Leaves always growing from the root and crown, nowhere else, linear, entire, plaited, of a dry texture. Scapes simple or branched, occasionally very short. Flowers complete, ♀. Perianth petaloid, adherent to the ovary, 6-parted, with the sepals coarser than the petals. Stamens 6, inserted into the base of the segments of the perianth; filaments distinct; anthers turned inwards, 2-celled, erect, opening lengthwise. Ovary adherent, 3-celled, with the cells opposite the sepals; style terminal, simple; stigmas distinct or combined, [crowned by an operculum formed by the base of the style.—*Herbert*]; ovules 00, axile, amphitropal. Fruit indelhiscent, dry or berried, 1- 2- 3-celled; seeds 00, roundish, with a lateral hilum, and a beaked strophiole. Embryo in the axis of fleshy albumen, straight, with the radicle remote from the hilum, and directed upwards.



Fig. CII.

1 As far as habit goes, these are very different from the Amaryllids, for their leaves are harsh and hairy, and although dwarf, they have no bulbs. But when we look to the fructification there is but little to connect with the difference in the vegetation. It is true that the sepals are much coarser in texture than the petals, but that is of small importance; and in truth it is the position of the embryo, remote from the hilum, and that alone, by which the Order is to be certainly known; for the beaked strophiole, which is often found near the hilum, is of small importance. As to the texture of the seed-skin, formerly relied upon in distinguishing some of the Orders of

Endogens, experience and reason equally reject it as an ordinal character.

The whole number of Hypoxids is inconsiderable. What are known inhabit the Cape of Good Hope, New Holland, the East Indies, the tropics of America, and the warmer parts of the United States.

The roots of *Curculigo orchioides* are somewhat bitter and aromatic, and are employed in the East Indies in gonorrhœa. The tubers of *Curculigo staus* are eaten in the Marianne islands; those of *Hypoxis erecta* are employed by the aborigines of North America in healing ulcers, and against intermittents.

GENERA.

Curculigo, *Gartn.*
Molineria, *Colla.*
Forbesia, *Eckl.*

Hypoxis, *L.*
Schnitzleinia, *Stued.*

Niobea, *W.*
Pauridia, *Harr.*

NUMBERS. GEN. 4. Sp. 60.

Orchidaceæ.

POSITION.—*Hemodoraceæ.*—HYPOXIDACEÆ.—*Amaryllidaceæ.*

Apostasiaceæ.

Fig. CII.—1. Seed of *Curculigo orchioides*; 2. a perpendicular section of it.—*Gartner.*

ORDER XLVI. AMARYLLIDACEÆ.—AMARYLLIDS.

Narcissi, the second section, *Juss. Gen.* 54. (1789).—Amaryllideæ, *R. Brown Prodr.* 296. (1810); *Herbert, Appendix to the Bot. Mag.* (1821); *Id. Amaryllid.* (1837); *Endl. Gen.* lxiv.; *Meisner, p.* 393. —Narcisseæ *Agardh. Aph.* 173. (1823).

DIAGNOSIS.—*Narcissal Endogens with hexapetaloidous much imbricated flowers, 6 or more stamens with the anthers turned inwards, and the radicle next the hilum.*

Generally bulbous plants, sometimes fibrous-rooted, occasionally with a tall, cylindrical, woody stem. Leaves ensiform, with parallel veins, rarely expanded at the sides



Fig. CIII. 1

Blood-roots and Hypoxids are known, the first by the nature of their albumen, and the latter by the lateral position of their embryo, &c. No one has ever thought of dismembering it, since Brown founded it upon Jussieu's 2d section of Narcissi; and it can scarcely be said to comprehend an anomalous genus, unless Clivia and Doryanthes be so considered, on account of their fasciated roots, Agave and Fourcroya, the stems of which are woody, and Gethyllis, because of its being polyandrous. The latter deviation from the ordinary character of the Order will probably be considered of less importance, if we bear in mind the polyandrous structure of some Blood-roots, and especially if, in the first place, the genuine Amaryllidaceous genus Phycella be attended to, which has a tendency to produce additional stamens; and if, secondly, the coronet of Narcissus itself be borne in mind, which is in fact an organ representing an extra number of stamens. I have elsewhere remarked (*Bot. Rey.* 1341.) that this is connected with a strong tendency in the whole Order to form another set of male organs between the perianth

into an oval lamina with a narrow stalk. Flowers usually with spathaceous bracts. Scape not spadicaceous. Calyx and corolla confounded, adherent, regular, coloured, the former overlapping the latter. Stameus 6, arising from the sepals and petals, sometimes

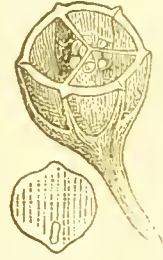


Fig. CIV.

cohering by their dilated bases into a kind of cup; sometimes an additional series of barren stamens is present, often forming a cup which surmounts the tube of the perianth; anthers bursting inwardly. Ovary 3-celled, the cells opposite the sepals, many-seeded, or sometimes 1- or 2-seeded; ovules anatropal; style 1; stigma 3-lobed. Fruit either a 3-celled, 3-valved capsule, with loculicidal dehiscence, or a 1-3-seeded berry. Seeds with either a thin and membranous, or a brittle and black or a thick and fleshy testa; albumen fleshy or corneous; embryo nearly straight, with its radicle turned towards the hilum.

The only Orders with which this need be compared are the Lilies, from which it is known by its inferior ovary: the Irids, which are distinguished by being triandrous, with the anthers turned outwards; and the

Fig. CIII.—*Pancreatum maritimum*. 1. a flower cut open, and showing that there is a bifid tooth, forming a coronet or cup, between each stamen; 2. a transverse section of the ovary.

Fig. CIV.—*Alstromeria Pelegrina*. 1. A section of its capsule; 2. a perpendicular section of its seed.

and those stamens that actually develop. Hence a curious instance is exhibited, to which several parallels may, however, be found in other families, of the force of development being generally confined to a series of organs originating within those which should be formed according to the ordinary laws of structure. Of course, in all such Orders a multiplication of the usual number of stamens is more to be expected than where this peculiar circumstance does not exist.

The learned investigator of the Order, the Honourable and very Rev. W. Herbert, Dean of Manchester, includes in it the whole Narcissal Alliance, to which he adds the Yams; for his reasons for which the reader is referred to the elaborate monograph above quoted. The remarkable difference in habit between the bulbous species, like *Narcissus*, and the arborescent kinds, such as *Agave* and *Littea*, is precisely analogous to what occurs among the Lilies, and does not appear to be connected with differences in the fructification. Dr. Joseph Hooker is of opinion that Brown is right in regarding *Campynema* as belonging to *Melanthis*; but its inferior ovary is against this view, notwithstanding its separate styles. It is probably an oesulant genus.

A very few only are found in the North of Europe and the same parallel; these are plants of the genera *Narcissus* and *Galanthus*. As we proceed south they increase. *Paneratium* appears on the shores of the Mediterranean; *Crinums* and *Paneratiums* abound in the West and East Indies; *Hæmanthus* is found for the first time with some of the latter on the Gold Coast; *Hippeastra* show themselves in countless numbers in Brazil, and across the whole continent of South America; and, finally, at the Cape of Good Hope the maximum of the Order is beheld in all the beauty of *Hæmanthus*, *Crinum*, *Clivia*, *Cyrtanthus*, and *Brunsvigia*. A few are found in New Holland, the most remarkable of which is *Doryanthes*.

This is one of the few monocotyledonous Orders in which poisonous properties occur. They are principally apparent in the viscid juice of the bulbs of *Hæmanthus toxicarius* and some neighbouring species, in which the Hottentots are said to dip their arrow-heads, and *Amaryllis Belladonna*, which is said to be employed for poisoning in the West Indies, (*Endl.*); but this is no doubt a mistake, and the statement applies to some other bulbs of the Order—for the *Belladonna* is a Cape plant; probably to *Hippeastra*, which Martius tells us have poisonous bulbs. The bulbs of *Leucoium vernum*, of the Snowdrop and Daffodil, have for ages been known as emetic; and it has recently been shown by Loiseleur Deslongchamps that a similar power exists in *Narcissus Tazetta*, *odorus* and *Poeticus*, and in *Paneratium maritimum*.



Fig. CV

Fig. CV.—*Littea geminiflora*.

The flowers of *Narcissus Pseudo-Narcissus* are not only emetic, but a dangerous poison, occasionally producing serious consequences in infants which are allowed to swallow them. De Candolle considers the principle found in Amaryllids analogous to that of the Squill (*Essai*, p. 290). *Oporanthus luteus* is purgative, *Alströmeria salsilla* diaphoretic and diuretic, *Amaryllis ornata* astringent. *Agardh Aph.* 178. A kind of arrow-root is prepared from the succulent roots of *Alströmeria pallida* and others, in Chile. *Bomarea Salsilla* is employed as a substitute for Sarsaparilla. *Agave Americana*, the American Aloe, which is said to flower once only in a hundred years, a gardener's fable, forms impenetrable hedges with its hard and spiny leaves; its fibre and that of some neighbouring species, especially the Pita plant, is extremely tough, and forms excellent cordage; its root is diuretic and antisyphilitic, and is even brought to Europe mixed with Sarsaparilla. "The species of *Agave* are not alone ornamental as plants and useful as hedges, but are important for their products. The roots, as well as the leaves, contain ligneous fibre (pita thread), useful for various purposes: this is separated by bruising and steeping in water, and afterwards beating.—The Mexicans also made their paper of the fibres of *Agave* leaves laid in layers. The expressed juice of the leaves evaporated, is stated by Long, in his *Hist. of Jamaica*, to be also useful as a substitute for soap.



Fig. CVI.

Fig. CVI.—*Agave Americana*.

But the most important product of Agave, and especially of *A. Americana*, the species now most common in the South of Europe, is the sap, which exudes upon the cutting out of the inner leaves, just before the flower-scape is ready to burst forth. Of this a very full account is given by Humboldt, in his Political History of New Spain, book iv. c. 9. The species is *A. Americana*, called metl by the Mexicans, and Maguay de Cocuza in Caraccas. Pittes and magney-metl are varieties of *A. Americana*, which is stated to be common everywhere in Æquinoctial America, from the plains even to elevations of between 9000 and 10,000 feet. *A. Mexicana* is also, by some authors, called maguei-metl, and also mangnai; and *A. Vivipara* is theometl or manguei divinum. In Cumana and Caraccas, *A. Cubensis* is called maguey de Cocay. Humboldt informs us, that the first (*A. Mexicana*) is extensively cultivated in the interior table-land of Mexico, and, indeed, extends as far as the Aztec language. The juice of the Agave is of a very agreeable sour taste. It easily ferments on account of the mucilage and sugar it contains, when it is called pulque by the Spaniards. This vinous beverage, which resembles cider, has an odour of putrid meat, extremely disagreeable; but the Europeans, who have been able to get over the aversion which this fetid odour inspires, prefer the pulque to every other liquor. A very intoxicating brandy is formed from the pulque, which is called mexical or aguadiente de maguey. The government drew from the Agave juice a net revenue of £166,497 in three cities."—*Royle*. *Agave saponaria* is a powerful detergent; its roots are employed in Mexico as a substitute for soap. A cold infusion of the leaves of *Chæradodia Chilensis* is purgative and diuretic; it is called Thekel, in Chile.—*Molina*.

GENERA.

Tribe I. — Amaryllæc.	<i>Amaryllis</i> , Sweet.	<i>Liperiza</i> , Herb.	<i>Ganymedes</i> , Haw.
<i>Bulbs, without a coronet in the flower.</i>	<i>Coburgia</i> , Herb.	<i>Calliphruia</i> , Herb.	<i>Phlogyne</i> , Haw.
	<i>Leopoldia</i> , Herb.	<i>Eurycles</i> , Salisb.	<i>Hermione</i> , Haw.
<i>Gulanthus</i> , Linn.	<i>Vallota</i> , Herb.	<i>Proiphys</i> , Herb.	<i>α. Jonquilla</i> , DC.
♀ <i>Erangebia</i> , Renealm.	<i>Lycoris</i> , Herb.	<i>Calostemma</i> , R. Br.	<i>β. Tazetta</i> , DC.
<i>Leucojum</i> , Linn.	<i>Strumaria</i> , Jacq.	<i>Vugaria</i> , Herb.	<i>Chloraster</i> , Haw.
<i>Nivaria</i> , Mönch.	<i>Hessea</i> , Herb.	<i>Tapeinanthus</i> , Herb.	<i>Corbularia</i> , Haw.
<i>Acis</i> , Salisb.	<i>Nerine</i> , Herb.	<i>Chlidanthus</i> , Herb.	
<i>Erinosma</i> , Herb.	<i>Galathea</i> , Herb.	<i>Clinanthus</i> , Herb.	
<i>Lapiedra</i> , Lagasc.	<i>Brunsvigia</i> , Heister.	<i>Urceolina</i> , Rchb.	Tribe III. — Alströmæicæ.
<i>Carpolyza</i> , Salisb.	<i>Imhofia</i> , Herb.	<i>Ureolaria</i> , Herb.	<i>Fibrous rooted. Sepals different in form from the petals.</i>
<i>Hessca</i> , Berg.	<i>Buphane</i> , Herb.	<i>Collania</i> , Schultz.	
<i>Gethylis</i> , L.	<i>Boophane</i> , Herb.	<i>Coburgia</i> , Sweet.	<i>Chæradodia</i> , Herb.
<i>Papiria</i> , Thunb.	<i>Amnocharis</i> , Herb.	<i>Phædranassa</i> , Herb.	<i>Alströmæria</i> , L.
<i>Ixiolirion</i> , Fisch.	<i>Griffinia</i> , Ker.	<i>Stenomesson</i> , Herb.	<i>Collania</i> , Herb.
<i>Bravoa</i> , Llav.	<i>Crinum</i> , Linn.	<i>Chrysiptule</i> , Ker.	<i>Sphærinæ</i> , Herb.
<i>Catocapnia</i> , Lk. et Otto.	<i>Hæmanthus</i> , Linn.	<i>Sphærotele</i> , Presl.	<i>Bomarea</i> , Mirb.
<i>Sternbergia</i> , Waldst. et Kit.	<i>Tristegia</i> , Rchb.	<i>Elisena</i> , Herb.	
	<i>Polystegia</i> , Rchb.	<i>Liriope</i> , Herb.	Tribe IV. — Agavæc.
<i>Oporanthus</i> , Herb.	<i>Cyrtanthus</i> , Ait.	<i>Liriope</i> , Rchb.	<i>Fibrous rooted. Sepals and petals alike.</i>
<i>Haylockia</i> , Herb.	<i>Timtia</i> , Gmel.	<i>Paucrathum</i> , Linn.	
<i>Cooperia</i> , Herb.	<i>Cyrtanthus</i> , Herb.	<i>Hymenocallis</i> , Salisb.	
<i>Scopranthus</i> , Grah.	<i>Monella</i> , Herb.	<i>Schizostephanium</i> , Rchb.	<i>Clivia</i> , Lindl.
<i>Amaryllis</i> , Linn.	<i>Gastronema</i> , Herb.	<i>Halmyra</i> , Salisb.	<i>Imatophyllum</i> , Hook.
<i>Lilio-Narcissus</i> , Tour.	<i>Colcophyllum</i> , Klotsch.	<i>Tiaranthus</i> , Herb.	<i>Himantophyllum</i> , Spr.
<i>Belladonna</i> , Sweet.		<i>Choretis</i> , Herb.	<i>Campynema</i> , Labill.
<i>Callirhoe</i> , Link.	Tribe II. — Narcissæc.	<i>Ismene</i> , Herb.	<i>Campylonema</i> , Poir.
<i>Zephyranthes</i> , Herb.	<i>Bulbs, with a coronet in the flower.</i>	<i>Callithæme</i> , Herb.	<i>Doryanthes</i> , Correa.
<i>Argyropsis</i> , Herb.		<i>Narcissus</i> , Linn.	<i>Agave</i> , L.
<i>Pyrolirion</i> , Herb.	<i>Phycella</i> , Lindl.	<i>Ajax</i> , Haw.	<i>Littrea</i> , Tagl.
<i>Habranthus</i> , Herb.	<i>Placena</i> , Miers.	<i>Diomedes</i> , Haw.	<i>Boupartea</i> , W.
<i>Sprekelia</i> , Heist.	<i>Encrosia</i> , Ker.	<i>Queltia</i> , Haw.	<i>Fourcroya</i> , Vent.
<i>Hippeastrum</i> , Herb.	<i>Carpodetes</i> , Herb.	<i>Schizanthus</i> , Haw.	

NUMBERS. GEN. 63. Sp. 400.

Melanthaceæ.

POSITION.—Iridacæe.—AMARYLLIDACEÆ.—Hypoxidacæe.

Liliacæe.

ORDER XLVII. IRIDACEÆ.—IRIDS.

Irides, *Juss. Gen.* 57. (1789).—*Ensate*, *Ker in Ann. of Botany*, 1. 219. (1805).—*Irideæ*, *R. Brown Prodr.* 302. (1810); *Ker. Gen. Irid.* (1827); *Bartl. Ord. Nat.* 44. (1830); *Meisner*, p. 391.—*Iridaceæ*, *Ed. pr.* cexl.; *Endl. Gen.* lxi.

DIAGNOSIS.—*Narcissal Endogens with 3 stamens opposite the sepals, and anthers turned outwards.*

Herbaceous plants, or very seldom under-shrubs, usually smooth; the hairs, if there are any, simple. Roots tuberous or fibrous. Leaves equitant and distichous in most genera. Inflorescence terminal, in spikes, corymbs, or panicles, or crowded, sometimes radical. Bracts spathaceous, the partial ones often scarios; the sepals occasionally rather herbaceous. Calyx and corolla adherent or coloured, their divisions either partially cohering, or entirely separate; sometimes irregular, the 3 petals being occasionally very short. Stamens 3, arising from the base of the sepals; filaments distinct or connate; anthers bursting externally lengthwise, fixed by their base, 2-celled. Ovary 3-celled, cells many-seeded; ovules anatropal; style 1; stigmas 3, often petaloid, some-



Fig. CVII.



Fig. CIX.



Fig. CVIII.



Fig. CX.

times 2-lipped. Capsule 3-celled, 3-valved, with a loculicidal dehiscence. Seeds attached to the inner angle of the cells, sometimes to a central column becoming loose,

Fig. CVII.—Diagram of an Iris.
Fig. CIX.—*Iris germanica*.

Fig. CVIII.—Ripe capsule of an Iris.
Fig. CX.—Vertical section of its seed.

spheroidal, angular, oblong, or winged; albumen horny, or densely fleshy; embryo inclosed within it, the radicle being uniformly next the hilum.

This Order differs from that of Amaryllids essentially, in being triandrous, with the anthers turned outwards; from Orchids, to which it approaches nearly in some respects, in not being gynandrous; in the nature of the seeds and placentæ, in all the anthers

being distinct; from Gingers and Arrowroots the three perfect stamens divide it, independently of the structure of the leaves, which are extremely different. Blood-roots, which are often triandrous with equitant leaves, have the anthers bursting inwardly, and when triandrous their stamens are opposite the petals. The Iris represents the general structure of the Order; but a departure from the form of perianth found in that genus takes place in Crocus, the flower of which is extremely like that of Gethyllis and Oporanthus among Amaryllids on the one hand, and of Colchicum among Melanths on the other; the latter is known by their superior triple ovary. The dilated stigma found in Iris is characteristic of only a part of the Order; in Crocus the stigma is rolled up instead of being spread open, and in many genera it is absolutely thread-shaped. Brown observes, that *Burmannia* appears at first sight to agree with Irids, especially in its equitant leaves, coloured superior triandrous perianth, and 3 dilated stigmas; it cannot, however, be united with them, on

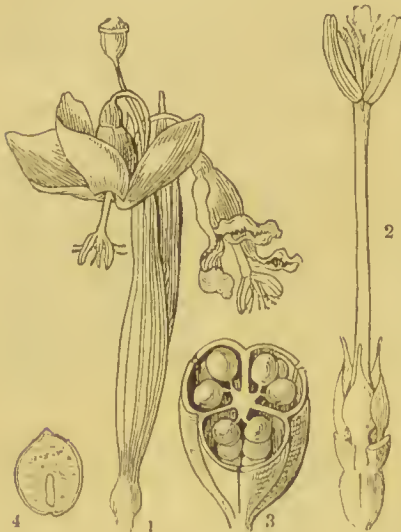


Fig. CXI.

account of its fertile stamens being opposite the inner segments of the perianth, and alternating with an equal number of sterile ones, because of the transverse dehiscence of the anthers, and also the structure of the seeds. In *Xyris* some resemblance with this Order is discoverable, especially in the disposition of the leaves, the triandrous flowers, and anthers turned outwards; but that genus is very distinct in its free perianth, the outer segments of which are glumaceous, and the inner distinctly petaloid, in the inngues bearing the stamens at their apex, in the sterile alternate stamens, and especially in the structure of the seed.—*Prodr.* 302. The whole Order is greatly in want of a good critical examination; but much caution is required in forming the genera, especially in deriving characters from the seeds, for they are both round, and fleshy, and thin, in the genus *Iris*.

The Irids are principally natives either of the Cape of Good Hope, or of the middle parts of North America and Europe. A few only are found within the tropics, and the Order is generally far from abundant in South America, if compared with the numbers that exist at the Cape. The genera *Marica* and *Morea* appear to occupy the same station in hot climates that *Iris*, a closely related genus, does in cooler latitudes. *Crocus*, among the most conspicuous of the Order, occurs only in Europe and Asia. None of the Cape or New Holland forms appear in America.

More remarkable for their beautiful fugitive flowers than for their utility. The rhizomo of some of them is slightly stimulating, as the violet-sected *Orris* root, the produce of *Iris Florentina*. Various species of *Sisyrinchium*, *Ferraria*, *Libertia*, and the *Irises* *pseud-acorus*, *tuberosa*, *versicolor*, and *verna*, are used as diuretics, purgatives, and emetics, but some of them are apt to produce distressing nausea like sea-sickness, with a prostration of strength. The substance called Saffron is the dried stigmas of *Crocus sativus*; its colouring ingredient is a peculiar principle, to which the name *Polychroite* has been given; it possesses the properties of being totally destroyed by the action of the solar rays, of colouring in small quantity a large body of water, and of forming blue and green tints when treated with sulphuric and nitric acid, or with sulphate of iron. In moderate doses this substance stimulates the stomach, and in large quantities excites the vascular system. Moreover it seems to have a specific influence on the cerebro-spinal system, as it affects, it is said, the mental faculties, a result which *De Candolle* considers analogous to that produced by the petals of certain odorous flowers. "In modern practice it is little used, except as a colouring ingredient; on the Continent it is employed

Fig. CXI.—1. Spathe and flowers of *Rigidella immaculata*; 2. the petals, stamens, &c. of it; 3. a cross section of the capsule of *Pardanthus Chinensis*; 4. a perpendicular section of its seeds.

as an agreeable stimulant in many culinary preparations and liqueurs. In a medicinal point of view it is frequently used to assist the eruption of exanthematous diseases; on the same principle that bird-fanciers give it to birds in the moult. It has been used as a carminative, antispasmodic and emmenagogue.—*Pereira*. Sicilian saffron is obtained from *Crocus odoratus*, according to Gussone. According to Gray, the roasted seeds of *Iris pseud-acorus* very nearly approach Coffee in quality.—*Suppl. Pharmac.* 237. *Iris sibirica* is regarded as an antisiphilitic; *Iris foetidissima*, the *ξυρίς* of Dioscorides, has some reputation as a cure for scrofula. *Gladiolus segetum* has been fancied an aphrodisiac, a reputation doubtless obtained from its acrid qualities, which seem to occur in the whole Order, as far as they have been examined. Nevertheless, we are told that the Hottentots eat the tubers or corns of various species, whose starch renders them nutritious. Those of *Trichoneima edule* are eaten by the natives of Socotra, as we learn from Westead. According to Endlicher, the purple flowers of *Iris germanica* and *sibirica*, treated with lime, furnish a green colour (Lilicngrün), "much used by artists." The stem of *Witsenia maura* is said to abound in rich saccharine juice.—*Bot. Reg.* 1. 5. Some Brazilian Irids are purgative, among which Martius particularly enumerates *Ferraria purgans* and *cathartica*, and *Sisyrinchium galaxioides*.

GENERA.

<i>Sisyrinchium</i> , L.	<i>Morea</i> , Linn.	<i>Tapinia</i> , Commers.	<i>? Neuberia</i> , Eckl.
<i>Bernudiana</i> , Tourn.	<i>Homeria</i> , Vent.	<i>Patersonia</i> , R. Br.	<i>Sparaxis</i> , Ker.
<i>Sperhynchium</i> , Hfmsg.	<i>? Diets</i> , Salisb.	<i>Genostiris</i> , Lahill.	<i>Montbretia</i> , DC.
<i>Orthrosanthus</i> , Sweet.	<i>Diplarrhena</i> , Labill.	<i>Galaxia</i> , Thunb.	<i>Hexaglottis</i> , Vent.
<i>Solenomelus</i> , Miers.	<i>Iris</i> , Linn.	<i>Ovieda</i> , Spreng.	<i>Tritonia</i> , Ker.
<i>Cruksbanksia</i> , Miers.	<i>Xiphion</i> , Tournef.	<i>Lapeyrousia</i> , Pourr.	<i>Waizia</i> , Rchh.
<i>Symphostemon</i> , Miers.	<i>Hermodactylus</i> , Tourn.	<i>Peyrousia</i> , Sweet.	<i>Houttuynia</i> , Houtt.
<i>Eleutherine</i> , Herb.	<i>Sisyrinchium</i> , Tournef.	<i>Meristostigma</i> , Dietr.	<i>Freesa</i> , Eckl.
<i>Psytirisma</i> , Herb.	<i>Isis</i> , Tratt.	<i>Anomatheca</i> , Ker.	<i>Blendenia</i> , Rafin.
<i>Echthronema</i> , Herb.	<i>Herbertia</i> , Sweet.	<i>Anomaza</i> , Lawson.	<i>Morphixia</i> , Ker.
<i>Eriphilema</i> , Herb.	<i>Cypella</i> , Herb.	<i>Bahiana</i> , Ker.	<i>Ixia</i> , Linn.
<i>Calydorea</i> , Herb.	<i>Phalocallis</i> , Herb.	<i>Acaste</i> , Salisb.	<i>Hyalis</i> , Salisb.
<i>Glamosia</i> , Herb.	<i>Alophia</i> , Herb.	<i>Acidanthera</i> , Hochst.	<i>Eurydice</i> , Pers.
<i>Tecophilæa</i> , Bert.	<i>Trifurcaria</i> , Herb.	<i>Gladiolus</i> , Tournef.	<i>Agrctta</i> , Eckl.
<i>Phyganthus</i> , Popp.	<i>Hydrotania</i> , Lindl.	<i>Hebea</i> , Pers.	<i>Diasia</i> , DC.
<i>Poppigia</i> , Kunze.	<i>Beatonia</i> , Herb.	<i>Lemonia</i> , Pers.	<i>Aglæa</i> , Pers.
<i>Liberia</i> , Spr.	<i>Tikridia</i> , Juss.	<i>Homoglossum</i> , Salisb.	<i>Melasphecula</i> , Ker.
<i>Renalmia</i> , R. Br.	<i>Rigidella</i> , Lindl.	<i>Synotia</i> , Sweet.	<i>Phalangium</i> , Burm.
<i>Nenatostigma</i> , Dietr.	<i>Ferraria</i> , Linn.	<i>Streptanthera</i> , Sweet.	<i>Hesperanthera</i> , Ker.
<i>Cipura</i> , Aubl.	<i>Pardanthus</i> , Ker.	<i>Bertera</i> , Sweet.	<i>Hesperanthus</i> , Salisb.
<i>Marica</i> , Schreb.	<i>Belencanda</i> , Rheede.	<i>Antholyza</i> , Linn.	<i>Geissorhiza</i> , Ker.
<i>? Trimeriza</i> , Salisb.	<i>Aristea</i> , Soland.	<i>Cuonia</i> , Buttn.	<i>? Weihea</i> , Eckl.
<i>? Hydrotylis</i> , Salisb.	<i>Cleanthe</i> , Salisb.	<i>Anisanthus</i> , Sweet.	<i>? Spatalanthus</i> , Sweet.
<i>? Galathea</i> , Salisb.	<i>? Bobartia</i> , Linn.	<i>Petamenes</i> , Salisb.	<i>Trichonema</i> , Ker.
<i>Hymenostigma</i> , Hochst.	<i>Wredowia</i> , Eckl.	<i>Watsonia</i> , Mill.	<i>Romulca</i> , Maratti.
<i>Vienuseuxia</i> , Roche.	<i>Witsenia</i> , Thunb.	<i>Micranthus</i> , Pers.	<i>Nemastylis</i> , Nutt.
<i>? Freuchenia</i> , Eckl.	<i>Nivenia</i> , Vent.	<i>Phalangium</i> , Houtt.	<i>Gelasine</i> , Herb.
<i>Plantia</i> , Herbert.	<i>Genlisia</i> , Rchb.	<i>Meriana</i> , Trev.	<i>Crocus</i> , Tournef.
<i>Trimezia</i> , Herbert.	<i>Sophronia</i> , Lichtenst.		

NUMBERS. GEN. 53. Sp. 550.

Orchidaceæ.

POSITION.—Hæmodoraceæ.—IRIDACEÆ.—Amaryllidaceæ.

ALLIANCE XII. *AMOMALES*.—THE AMOMAL ALLIANCE.

DIAGNOSIS.—*Epigynous petaloid Endogens, with unsymmetrical flowers, from 1 to 5 stamens, some of which are abortive, and albuminous seeds.*

In the Narcissal Alliance, the series was terminated by the Irids, many of whose genera have a singularly irregular corolla : as, for example, *Babiana* ; there was, however, even in these last, an exact symmetry in the number of parts of which the flowers consist. In this Alliance that symmetry is wholly lost, the number of perfect stamens, as represented by anthers, being reduced to one, or even half a one, and not exceeding five in any instance. At the same time the development of the foliage takes a new direction. In the majority of Narcissals the leaves are absolutely sword-shaped, and their veins consequently run in parallel lines ; and even when, as sometimes happens, their leaves become widened, the veins still converge at the point. But in the Amomal Alliance the veins always diverge ; the result of which is a foliage of quite another character, to which, among Endogens, some Lilyworts offer the only resemblance. When such leaves acquire a large size, they are frequently split into lateral ribands.

NATURAL ORDERS OF AMOMALS.

<i>Stamens more than 1 ; (anthers 2-celled, no vitellus)</i>	48. MUSACEÆ.
<i>Stamen but 1 ; anther 2-celled, embryo in a vitellus</i>	49. ZINGIBERACEÆ.
<i>Stamen but 1 ; anther 1-celled (halved), no vitellus</i>	50. MARANTACEÆ.

ORDER XLVIII. MUSACEÆ.—MUSADS.

Musæ, *Juss. Gen.* (1789).—Musaceæ, *Agardh Aph.* 180. (1823); *Ach. Rich. Nouv. Élém. ed.* 4. 436. 1828; *Endlicher Prodr. Fl. Norf.* 34. (1833); *Endl. Gen.* lxx.; *Lestiboudois in Ann. Sc. Nat.* 2. ser. 17. 257.; *Meisner, p.* 389.

DIAGNOSIS.—*Amomal Endogens with more stamens than one.*

Stemless or nearly stemless plants, with leaves sheathing at the base, and forming a kind of spurious stem, often very large, their limb separated from the taper petiole by a round tumour, and having fine parallel veins diverging regularly from the midrib towards the margin. Flowers spathaceous. Perianth 6-parted, adherent, petaloid, in 2 distinct rows, more or less irregular. Stamens 6, inserted upon the middle of the divisions, some always becoming abortive; anthers linear, turned inwards, 2-celled, often having a membranous petaloid crest. Ovary inferior, 3-celled, many-seeded, rarely 3-seeded; ovules anatropal; style simple; stigma usually 3-lobed. Fruit either a 3-celled capsule, with a loculicidal dehiscence, or succulent and indehiscent. Seeds sometimes surrounded by hairs, with an integument which is usually crustaceous; embryo orthotropal, oblong-linear, or mushroom-shaped, with the radicular end touching the hilum, having pierced through the mealy albumen.

The relationship of this Order will be pointed out under Gingerworts and Marants, with which the Musads are strictly related. The flower of *Musa* is well described in the Appendix to the *Congo Expedition*, 471., in a note; that of *Strelitzia* is pentandrous and exceedingly irregular, and is admirably illustrated in Bauer's drawings, published some years since by Ker, under the title of *Strelitzia Depicta*. The hilum of the seed gives rise to a tuft of long hairs in *Urania* and *Strelitzia*. For remarks upon the distinctive characters of some of the genera of Musads, see *Endl. Prodr.* p. 34, and *Lestiboudois* in the place above quoted. Musads are doubtless the most perfect of the Anomal Alliance, excelling the others both in the size at which they arrive, and the completeness of their parts of fructification.

Natives of the Cape of Good Hope, the islands of its south-east coast, and generally of the plains of the tropics, beyond which they do not naturally extend, unless in Japan, the climate of which seems to be much at variance with that of other countries in the same latitude.

They are most valuable plants, both for the abundance of nutritive food afforded by their fruit, called in the tropics Plantains and Bananas, and for the many domestic purposes to which the gigantic leaves of some species are applied. The latter are used for thatching Indian cottages, for a natural cloth from which the traveller may eat his food, as a material for basket making, and finally they yield a most valuable flax (*Musa textilis*), from which some of the finest muslins of India are prepared. The stems are formed of the united petioles of the leaves, which are remarkable for the vast quantity of spiral vessels they contain: these exist in such numbers as to be capable of being pulled out by handfuls, and are said to be collected in the West Indies and sold as a kind of tinder. *Dec. Org.* 33. The number of threads in each convolution of these spiral vessels varies from 7 to 22.—*Ibid.* 37. The young shoots of the Banana are eaten as a delicate vegetable. The root of *Heliconia Psittacorum*, the fruit of the *Bihai*, and the seed of *Urania speciosa* or *Ravenala*, a magnificent Palm-like plant, called by the French *Arbre du Voyageur*, are said to be eatable; its pulpy aril, of the

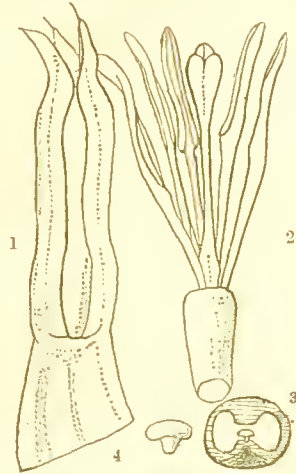


Fig. CXII.

FIG. CXII.—*Musa paradisiaca*. 1. A flower; 2. the stamens, style, and stigma; 3. a section of a seed; 4. the embryo.

most brilliant blue colour, yields an essential oil. The juice of the fruit and the lymph of the stem of *Musa* are slightly astringent and diaphoretic. The juice of the fruit of *Urania* is used for dyeing.—*Agdh.*

GENERA.

<p>I.—<i>Heliconææ.</i> Seeds solitary. Fruit a capsule bursting through the partitions.</p> <p><i>Heliconia</i>, Linn. <i>Bihai</i>, Plum.</p>	<p>II.—<i>Uranææ.</i> Seeds numerous in each cell. Fruit berried, or, if capsular, bursting through the cells.</p> <p><i>Musa</i>, <i>Tournef.</i></p>	<p><i>Strelitzia</i>, Banks. <i>? Heliconia</i>, Gærtn. <i>Ravenala</i>, Adans. <i>Urania</i>, Schreb.</p>
---	--	--

NUMBERS. GEN. 4. Sp. 20.

Liliacææ.

POSITION.—Zingiberacææ.—MUSACEÆ.—Marantacææ.
Palmacææ?

ORDER XLIX. ZINGIBERACEÆ.—GINGERWORTS.

Cannæ, *Juss. Gen.* 62. (1798), in part.—*Drymyrhizææ*, *Vent. Tabl.* (1799); *DC. Ess. Méd.* 281. (1816).—*Scitamineæ*, *R. Brown, Prodr.* 305 (1810); *Agardh Aph.* 182. (1823); *Rosc. Monogr.*; *Blume Enumeratio*, p. 39. (1827); *Lestiboudois in Ann Sc. 2. ser. 15.* 305.—Zingiberaceæ, *Rich. Anal. Fr.* (1808); *Ed. pr. ccxxxiii.—Endl. Gen.* lxxviii.; *Meisner, p.* 388.—Amomeæ, *Juss. in Mirbel's Elém.* 854. (1815); *Ach. Rich. Nouv. Elém. ed. 4.* 433. (1823).—Alpiniceæ, *Link Handb.* 1. 228. (1829), a sect. of Scitamineæ.

DIAGNOSIS.—*Amomal Endogens* with one stamen, a two-celled anther, and a vitellus round the embryo.

Aromatic tropical herbaceous plants. Rhizome creeping, often jointed. Stem formed of the cohering bases of the leaves, never branching. Leaves simple, sheathing, their



Fig. CXIII.

lamina often separated from the sheath by a taper neck, and having a single midrib, from which very numerous, simple, crowded veins diverge at an acute angle. Inflorescence either a dense spike, or a raceme, or a sort of panicle, terminal or radical. Flowers arising from among spathaceous membranous bracts, in which they usually lie in pairs. Calyx superior, tubular, 3-lobed, short. Corolla tubular, irregular, with 6 segments in 2 whorls; the outer 3-parted, nearly equal, or with the odd segment sometimes differently shaped; the inner (sterile stamens) 3-parted, with the intermediate segment (labellum) larger than the rest, and often 3-lobed, the lateral segments sometimes nearly abortive. Stamens 3, distinct, of which the 2 lateral are abortive, and the intermediate one fertile; this placed opposite the labellum, and arising from the base of the intermediate segment of the outer series of the corolla. Filament not petaloid, often extended beyond the anther in the shape of a lobed or entire appendage. Anther 2-celled, opening longitudinally, its lobes often embracing the upper part of the style. Pollen globose, smooth. Ovary 3-celled, sometimes imperfectly so; ovules several, anatropal, attached to a placenta in the axis; style filiform, stigma dilated, hollow. Fruit usually capsular, 3-celled, many-seeded, [sometimes by abortion 1-celled]; occasionally berried (the disseminents generally central, proceeding from the axis of the valves, at last usually separate from the latter, and of a different texture.—*R. Br.*) Seeds roundish, or angular, with or without an aril (albumen floury, its substance radiating, and deficient near the hilum, *R. Br.*); embryo inclosed within a peculiar membrane (vitellus,

Fig. CXIII.—1. Flowers of *Kamperin pandurata*; 2. the inner row of the corolla seen in profile; 3. the anther, inclosing the apex of the style between its lobes; 4. the style and stigma, with two abortive stamens at the base; 5. a transverse section of the ovary. 6. ripe fruit of Ceylon Cardamom, *Elettaria Cardamomum Zeylanicum* of Persira; 7. a seed, 8. the same cut through to show the embryo seated in vitellus.

R. Br. Prodr.; membrane of the amnios, *Ibid. in King's Voyage*, 21), with which it does not cohere.

Formerly the Gingerworts and Marants were united in one tribe called Cannæ: hence it is certain that they are at least more nearly related to each other than to anything else, and that whatever is the affinity of the one will be that of the other. Taking the vegetation into account, these two tribes are exceedingly nearly allied to Musads, in which is found the same kind of leaf, the veins of which are closely set, and diverge from the midrib to the margin, being connected by very weak and imperfect intermediate veins; the leaves have also the same distinct petiole, often with a thickened rounded space at the apex; Musads are, however, pent- or hexandrous, with a calyx and corolla of the same texture. Irids are the next Order with which Gingerworts may be compared, agreeing in their superior flowers, which have sometimes an approach to the irregularity of *Alpinia*, and also in the triple number of their stamens; but while these organs are all developed in Irids, two are abortive or deformed in Gingerworts and Marants. Bromelworts have been identified with them of old, but their resemblance consists chiefly in the distinction of calyx and corolla, and their inferior ovary. To Orchids, to which the flowers of *Mantisia* bear much resemblance, they are related in consequence of the reduction of their three stamens to one by the abortion of two: but the cohesion of the stamens and style in the latter, and the want of any distinction between calyx and corolla, sufficiently separate them, besides which the series which produces the stamens in Orchids answers to the sterile stamens or inner limb of the corolla in the Gingerworts. There is a volume consecrated to plants of this kind by Roscoe, who first remodelled the genera and reduced them within fixed limits. Between the embryo and the albumen is interposed a fleshy body enveloping the former: this has been called a process of the rostellum by Correa, a cotyledon by Smith, a vitellus by Gærtner and Brown, a central indurated portion of the albumen by Richard. It is now known to be the innermost integument of the ovule, unabsorbed during the advance of this body to maturity.

Independently of the presence of this vitellus, the most remarkable part of the structure of Gingerworts depends on the number of divisions of the floral envelopes, which consist of a tubular calyx, and of two more series instead of one. Brown, struck with this unusual deviation from the ordinary organization of Monocotyledons, was disposed to consider the calyx an accessory part (*Prodr.* 305); but Lestiboudois' explanation appears more satisfactory. According to this botanist Gingerworts are really hexandrous, like the nearly-related Musads; but of their stamens the outer series is petaloid, and forms the inner limb of the corolla, and of the inner series of stamens the central one only develops, the lateral ones appearing in the form of rudimentary scales. This notion of Lestiboudois is confirmed by Marants, in which the inner stamens (even that which is autheriferous) become petaloid like the outer: thus showing that in these plants there is a strong and general tendency in the filaments to assume the state of petals.

All are tropical, or nearly so. By far the greater number inhabit various parts of the East Indies; some are found in Africa, and a few in America. They form a part of the singular Flora of Japan.

They are generally objects of great beauty, either on account of the high development of the floral envelopes, as in *Hedychium coronarium* and *Alpinia nutans*; or because of the rich and glowing colours of the bracts, as in *Curcuma Roscoeana*. They are, however, principally valued for the sake of the aromatic stimulating properties of the root or rhizome, such as are found in Ginger (*Zingiber officinale*), Galangale (*Alpinia racemosa* and *Galanga*), Zedoary (*Curcuma Zedoaria* and *Zerumbet*), and some other species of the latter genus. Many more species are used in a similar manner. The warm and pungent roots of the greater and lesser Galangale are not only used by the Indian doctors in cases of dyspepsia, but are also considered useful in



Fig. CXIV.

Fig. CXIV.—A flower of *Mantisia saltatoria*; 1. style, stigma, and anther; 2. ovary, style, and abortive stamens.

coughs, given in infusion. A bad sort of Galangale is obtained from *Alpinia pyramidata*, *Bl.*, and *Allughas*, with which are often mixed *Alpinia mutans* and *Kæmpferia Galanga*. The seeds of many partake of the properties of the root. Cardamoms are the seeds of several plants of this Order. On the eastern frontiers of Bengal the fruit of *Amomum aromaticum* is used. Malabar Cardamoms are produced by *Elettaria Cardamoum*; Ceylon Cardamoms, an inferior sort, by *Elettaria major*. Grains of Paradise, a sort of hot acrid seed, used to give a pungent flavour to spirituous liquors, belong principally to *Amomum Grana Paradisi*, but *Amomum angustifolium*, *macrosperrum*, *maximum*, and *Clusii* are, according to Dr. Pereira, also the parents of an inferior description of this seed. Others are known for their dyeing properties, such as *Turmeric*. This substance, obtained from *Curcuma longa*, is cordial and stomachic; it is also considered by the native practitioners of India an excellent application in powder for cleaning foul ulcers. The fruit of *Globba uviformis* is said to be eatable. Generally, in consequence of the presence of the aromatic oil that is so prevalent in the Order, the roots or rhizomes, although abounding in fecæula, are not fit for the preparation of arrow-root; but an excellent kind is prepared in Travancore, in the East Indies, from *Curcuma angustifolia*.

A species of *Curcuma* is supposed by Von Martius to furnish the astringent Mexican drug called *Cascara de Pingue*, which abounds in tannin. What is called *Caseara de Lingue* is the bark of some tree.—*Chem. Gaz.* 1844. 263. The American *Renecalmias* are stated by Pöppig to have aromatic leaves which, when bruised, are employed in pains of the limbs. The roots of *Costi* are very bitter, and have had a great reputation as sweets, but they are out of use. The roots of *Alpinia aromatica* and *Paco sercea* are sweetly aromatic, and are employed in Brazil as carminatives and stomachics.—*Martius*. All the Brazilian *Costi* have a sub-acid mucilaginous juice, which is used in nephritic disorders and gonorrhœa.—*Id.* According to Roxburgh the pendulous tubers of *Curcuma rubescens* and several other species yield a very beautiful pure starch, like Arrow-root, which the natives of the countries where the plants grow prepare and eat. In Travancore this flour or starch forms a large part of the diet of the inhabitants. Such Arrow-root, obtained from *C. angustifolia*, is commonly sold in the markets of Benares. See *Flora Medica* for further information concerning these plants.

GENERA.—(Much in need of re-examination.)

<i>Globba</i> , Linn.	<i>Kæmpferia</i> , Linn.	<i>Donacodes</i> , Blume.	<i>Hellenia</i> , Willd.
<i>Catimbium</i> , Juss.	<i>Soncorus</i> , Rumph.	<i>Diracodes</i> , Blume.	<i>Albina</i> , Gieseke.
<i>Colebrookia</i> , Don.	<i>Trilophus</i> , Lestib.	<i>Hedychium</i> , König.	<i>Martensia</i> , Gieseke.
<i>Cerantha</i> , Horn.	<i>Roscœa</i> , Smith.	<i>Gandsulium</i> , Rumph.	<i>Heritiera</i> , Retz.
<i>Hura</i> , König.	<i>Amomum</i> , Linn.	<i>Gamochilus</i> , Lestib.	<i>Languas</i> , König.
<i>Sphaerocarpus</i> , Gawl.	<i>Cardamomum</i> , Rumph.	<i>Renecalmia</i> , Linn.	<i>Monolophus</i> , Wall.
<i>Manilia</i> , Gieseke.	<i>Marenga</i> , Salisb.	<i>Alpinia</i> , Plum.	<i>Canolophon</i> , Blume.
<i>Ceratanthera</i> , Hornem.	<i>Alexis</i> , Salisb.	<i>Gethya</i> , Salisb.	<i>Costus</i> , Linn.
<i>Mantisia</i> , Curt.	<i>Hornstedtia</i> , Retz.	<i>Pepcridium</i> , Lindl.	<i>Tsjava</i> , Gmel.
<i>Zingiber</i> , Gærtl.	<i>Meislera</i> , Gieseke.	<i>Alpinia</i> , Linn.	<i>Planera</i> , Gieseke.
<i>Jägera</i> , Gieseke.	<i>Wurfbainia</i> , Gieseke.	<i>Zerumbet</i> , Jacq.	<i>Banksia</i> , König.
<i>Dietrichia</i> , Gieseke.	<i>Greenwaya</i> , Gieseke.	<i>Costus</i> , Pers.	<i>Hellenia</i> , Retz.
<i>Canumunar</i> , Colla.	<i>Paludana</i> , Gieseke.	<i>Ethanium</i> , Salisb.	<i>Glossanthe</i> , Salisb.
<i>Lampjang</i> , Rumph.	<i>Ellingera</i> , Gieseke.	<i>Allughas</i> , Linn.	<i>Jacuanga</i> , Lestib.
<i>Curcuma</i> , Linn.	<i>Elettaria</i> , Thved.	<i>Buckia</i> , Gieseke.	<i>Monocystis</i> , Lindl.
<i>Zerumbet</i> , Rumph.	<i>Malonia</i> , Sm.	<i>Catimbium</i> , Lestib.	<i>Kolowratia</i> , Presl.
<i>Sisera</i> , Gieseke.	<i>Cardamomum</i> , Salisb.	<i>Leptosolema</i> , Presl.	<i>Nyctophylax</i> , Zippel.
<i>Ernalia</i> , Gieseke.	<i>Geanthus</i> , Reinw.	<i>Gastrochilus</i> , Wall.	<i>Hitchenia</i> , Wall.

NUMBERS. GEN. 29. Sp. 247.

POSITION.—MUSACEÆ.—ZINGIBERACEÆ.—MARANTACEÆ.
Orchidaceæ.

ORDER L. MARANTACEÆ.—MARANTS.

Canna, Juss. Gen. 62. (1789) in part.—*Canna*, R. Brown, Prodr. 1. 307. (1810).—*Cannæ* or *Marantæ*, Brown in Flinders, (1814).—*Cannaceæ*, Agardh Aph. 181. (1823); Link Handb. 1. 223. (1829), a sect. of *Scitamineæ*; Endl. Gen. lxi.; *Lestiboudois* in Ann. Sc. 2 ser. 17. 205.; Meisner, p. 389.

DIAGNOSIS.—*Aromal Endogens*, with one stamen, half an anther, and no vitellus.

Herbaceous tropical plants, destitute of aroma. Rhizome often tuberous, and abounding in starch. Stem often branching. Leaves, inflorescence, and flowers, as in Gingerworts. Calyx superior, of 3 sepals, short. Corolla tubular, irregular, with the segments in 2 whorls: the outer 3-parted, nearly equal; the inner very irregular; one of the lateral segments usually coloured, and formed differently from the rest; sometimes by abortion fewer than 3. Stamens 3, petaloid, distinct, of which one of the laterals and the intermediate one are either barren or abortive, and the other lateral one fertile. Filament petaloid, either entire or 2-lobed, one of the lobes bearing the anther on its edge. Anther 1-celled, opening longitudinally. Pollen round (papillose in *Canna coccinea*, smooth in *Calathea zebрина*.) Ovary 1-3-celled, and ovules solitary, erect, and campylotropal, or numerous, anatropal, and attached to the axis of each cell; style petaloid or swollen; stigma either the mere denuded apex of the style, or hollow, cucullate, and incurved. Fruit capsular, as in Gingerworts. Seeds round, without aril; albumen hard, somewhat floury; embryo straight, naked, its radicle, lying against the hilum.

Under Gingerworts, the relations of that Order and the present to other monocotyledonous groups has been noticed. In this place the distinction between the two Orders has to be explained. In true Gingers, as Brown has observed (*Prodr.* 305.), the stamen is always placed opposite the labellum or anterior division of the inner series of the corolla, and proceeds from the base of the posterior outer division; while the sterile stamens, when they exist, are stationed right and left of the labellum. But in Marants the fertile stamen is on one side of the labellum, occupying the place of one of the lateral sterile stamens of Gingerworts. This peculiarity of arrangement indicates a higher degree of irregularity in Marants than in Gingers, which also extends to the other parts of the flower. The suppression of organs takes place in the latter in a symmetrical manner; the two posterior divisions of the inner series of the perianth, which are occasionally absent, corresponding with the abortion of the two anterior stamens. In Marants, on the contrary, the suppression of organs takes place with so much irregularity, that the relation which the various parts bear to each other is not always apparent: instead of the central stamen being perfect while the two lateral ones are abortive, as in Gingerworts and most Orchids, or of the central stamen being abortive and the two lateral ones perfect, as in some Orchids, it is the central and one lateral one that are suppressed in Marants. In

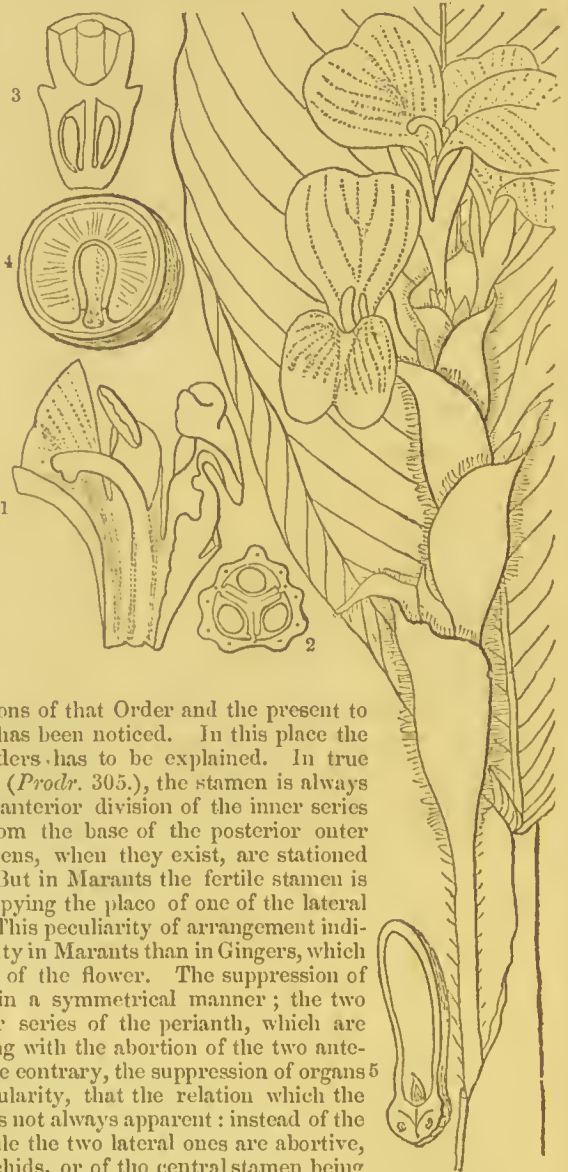


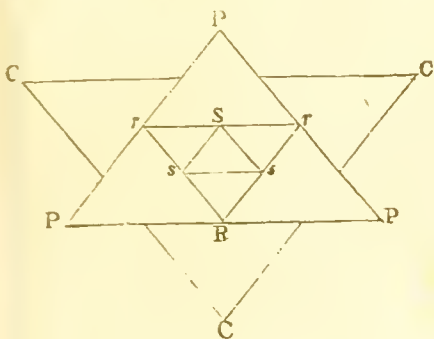
Fig. CXV.

Fig. CXV.—*Calathea villosa*; 1, a flower cut open; 2, a transverse section of the ovary; 3, a perpendicular section of it; 4, a section of the seed of *Canna*; 5, a section of its embryo.

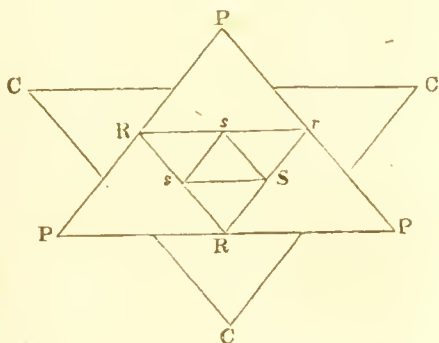
the perianth of *Canna* only the most external part within the calyx can properly be called corolla ; the remainder of the segments being attempts to produce barren petaloid stamens analogous to what is called the inner limb of the corolla in Gingerworts ; and the characters upon which botanists found their specific distinctions depend upon the degree to which this development of petaloid abortive stamens extends. When, for instance, they describe some as having an inner limb of 2 or of 3, or of 4 or of 5 segments, they should rather say 2, 3, 4, or 5 stamens are partially developed.

Perhaps it will be possible to put the relative structure of Gingerworts and Marants in a clearer light by the following diagrams, in which the triangle C, C, C represents the calyx, the angles corresponding with the position of the sepals ; the triangle P, P, P the corolla ; R, r, r an outer series of petaloid stamens, of which r, r are rudimentary only ; and S, s, s the inner series of stamens, of which S is the fertile and fully developed one.

GINGERWORTS.



MARANTS.



The greater part are found in tropical America and Africa ; several are natives of India ; none are known in a wild state beyond the tropics.

While Gingerworts are valued for their aromatic heating principle, the Marants are esteemed on account of the fecula, which abounds in the rhizome and root of both tribes, the Gingerworts being destitute of that principle : on this account it is collected as a delicate article of food, both from *Maranta arundinacea*, *Allonyia*, and *nobilis*, in the West Indies, and also from *Maranta ramosissima* in the East. The fleshy corms of some *Cannas* are reported to be eaten in Peru, and a sort of Arrow-root called *tous les mois* is extracted in the West Indies from some species supposed to be *C. Achiras*. The seeds of others, called Indian shot, have been used as a substitute for Coffee, and yield a purple dye. A tough fibre is obtained from *Phrynium dichotomum* ; and the leaves of the South American *Calatheas* are worked into baskets, whence their name. The juice of *Maranta arundinacea* is said to be efficacious in poisoned wounds ; it is acrid when fresh, reddening the skin, and exciting saliva when chewed. The tubers of *Maranta Allouyia*, cooked with pepper and salt, are eaten in the West Indies. Martius says that the tubers of *Canna aurantiaca*, *glauca*, and others, are diuretic and diaphoretic, and are not unlike *Orris-root* in action.

GENERA.

Thalia, Linn.
Perontia, DC.
Maranta, Plum.
Phrynium, Willd.

Phyllodes, Loureir.
Calathea, G. F. W. Meyer
Göppertia, Nees.
Myrosma, Linn. fil.

Canna, Linn.
Cannacorus, Tournef.

NUMBERS. GEN. 6. Sp. 160.

POSITION.—*Liliaceæ*.
—*Marantaceæ*.
—*Orchidaceæ*.

ALLIANCE XIII. *ORCHIDALES*.—THE ORCHIDAL ALLIANCE.

DIAGNOSIS.—*Epigynous Endogens, with 1 to 3 stamens, and seeds without albumen.*

At this point there is an abrupt break in the series of direct affinity. No gradual change can be traced from other natural Orders to that of the Orchidal Alliance, which is distinguished by the embryo not only having no albumen, but being a solid homogeneous body, equally destitute of any visible radicle or cotyledon. In the majority the structure is what Linnæus called Gynandrous; that is to say, the stamens, and style, and stigma, are blended together into one solid body, named a column; in two, however, of the natural Orders of which it consists, the stamens are perfectly free. If we neglect the condition of the seeds, we then may find a variety of approaches to other Orders, as, for example, to the Irids, in which *Gladiolus* seems to be an imitation of the structure of an *Orehis*; or to *Sisyrinchium*, to which *Thelymitra* or *Paxtonia* offer some analogy; or to the Hypoxids, of which *Apostasias* and *Tropidia* have much the aspect; or to Gingerworts, whose close heads of imbricated bracts are imitated in *Evelyna*. The *Burmanniads* are remarkable for their perfect symmetry, among hundreds of species whose prevailing character is want of symmetry.

NATURAL ORDERS OF ORCHIDALS.

<i>Flowers regular. Stamens free, perigynous</i>	51.	BURMANNIACEÆ.
<i>Flowers irregular, gynandrous. Placentæ parietal</i>	52.	ORCHIDACEÆ.
<i>Flowers regular, half-gynandrous. Placentæ axile</i>	53.	APOSTASIACEÆ.

ORDER LI. BURMANNIACEÆ.—BURMANNIADS.

Burmannieæ, *Spreng. Syst.* 1. 123. (1825); *Reichenb. Conspect.* 60. (1828), a sect. of Amaryllidææ.—
 Burmanniaceæ, *Blume Enum. Pl. Jav.* 27. (1827); *Bartl. Ord. Nat.* 41. (1830); *Schult. f. in Rom.*
et Sch. Syst. Veg. 7. lxxiii. (1830); *Endl. Gen.* lx.; *Meisner, p.* 390.; *Miers in Linn. Trans.* 18. 552.
 —Tripterelææ, *Nuttall in Act. Philadelph.* 7. 23.

DIAGNOSIS.—*Orchidal Endogens, with regular flowers and free perigynous stamens.*

Herbaceous plants, with tufted radical acute leaves, or none; or a slender naked stem; and terminal flowers, sessile upon a 2- or 3-branched rachis, or solitary. Flowers ♂.

Perianth coloured, tubular, adherent, membranous, with 6 teeth, the 3 inner of which (petals) are minute, the 3 outer larger, sometimes with a wing or keel at the back. Stamens 3, inserted in the tube opposite the petals; anthers sessile, 2-celled, opening transversely, with a fleshy, simple, or 2-lobed connective. Ovary adherent, 1- 3-celled, with 3 placenta, which are either simple and parietal, or double and axile; the cells of the 3-celled genera opposite the sepals; ovules innumerable; capsule surmounted by the persistent perianth, 1- 3-celled, bursting vertically, or horizontally, or not at all, or by one fissure, into a boat-shaped pericarp. Seeds innumerable, very minute, with the testa loose or fitting tight; apparently with a solid nucleus, and no albumen; style single; stigma 3-lobed. Capsule covered by the withered perianth, or 3-celled, bursting irregularly.

This is a most singular race, which has been well illustrated by Mr. Miers, who has been the first to point out its relationship to the Orchids. This he has shown to consist in the minute seeds, parietal placenta, in many cases peculiar condition of the capsule, and the nucleus loose in the middle of a net-like testa. To this I think may be added the organization of the kernel of the seed, which is, to all appearance, in Burmannia, Aperia, and Dietyostega, exactly like that of Orchids. Mr. Miers, however, describes the nucleus of the latter genus as being suspended by a thread in the middle of the testa; I find it, on the contrary, ascending. Two very different forms are pointed out by Mr. Miers, the Burmanniaceæ, with 3 cells in the ovary and an axile placentation, and the Aptericeæ, with 1 cell and 3 parietal placenta; this peculiarity is not however accompanied by any other, and may, for the present, be regarded as of secondary importance. The single genus upon which the Order was founded, was placed by Jussieu in Bromelworts; Brown stationed it as a doubtful genus at the end of Rushes, with the remark, that it is extremely distinct both in flower, fruit, and inflorescence, and not really allied to any other known plant, but more nearly related to Xyris and Philydrium than to either Bromelia or Hypoxis. Von Martius, who has beautifully illustrated the Brazilian species, refers them to Hydrocharads. Blume, who has added two new genera, merely remarks that "the Order is known from Juncaceæ by its tubular perianth, which is petaloid instead of glumaceous, and by the structure of the fruit; it is well distinguished from Irids by the station of the stamina, and the transverse dehiscence of the anthers." —*Enum.* p. 27.

In reality the Order must be considered to connect Orchids and Irids.

Natives of marshy grassy places in the tropics of Asia, Africa, and America. Burmannia is found as far to the north as Virginia in North America.

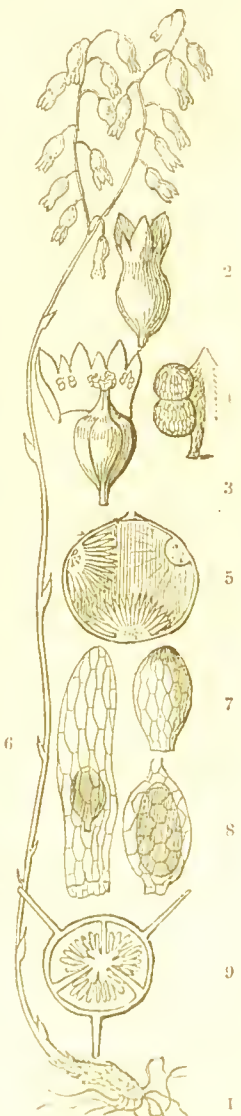


Fig. CXVI.

Fig. CXVI.—1. *Dietyostegia orobanchioides*; 2. a flower; 3. the same, with the perianth opened; 4. half an anther; 5. section of ovary; 6. seed; 7. seed of *Burmannia disticha*; 8. ditto of *Aperia stacea*; 9. transverse section of the ovary of a *Burmannia* from Ceylon.

Apteria setacea is slightly bitter and very astringent. A similar flavour, something like that of Green Tea, is discernible in *Burmannia cœrulea*.—*Nuttall*.

GENERA.

I.—*Apteriaceæ*. Miers. Ovary 1-celled.
Placentæ parietal.

Gymnosiphon, *Blume*.
Apteria, *Nutt*.
Dictyostegia, *Miers*.
Cymbocarpa, *Miers*.
Stenoptera, *Miers*.

II.—*Burmanniaceæ*. Miers. Ovary 3-celled.
Placentæ parietal.

Burmannia, *L*.
Tripterella, *Rich*.
Vogelia, *Gmel*.
Maburnia, *Thouars*.
Gonyanthes, *Blume*.

NUMBERS. GEN. 7. Sp. 30.

Iridaceæ.

POSITION.—*Apostasiaceæ*.—BURMANNIACEÆ.—*Orchidaceæ*.

ORDER LII. ORCHIDACEÆ.—ORCHIDS.

Orchides, *Juss. Gen.* 64. (1789).—Orchidææ, *R. Brown Prodr.* 309. (1810); *Rich. in Mém. Mus.* 4. 23. (1815); *Bauer, Francis, and Lindley, Illustrations of Orchidaceous Plants; Id. Genera and Species of Orch.* (1830); *R. Brown Observations on the Sexual Organs, &c. of Orchidicæ and Asclepiadææ* (1831); *Endl. Gen.* lxxvi.; *Meisner, Gen.* p. 367.—Vanillaceæ, *Ed. pr.* ccxlv.

DIAGNOSIS.—*Orchidal Endogens, with irregular gynandrous flowers and parietal placenta.*

Herbaceous plants or shrubs, always perennial, occurring all over the world, except in the very coldest regions, or those where everlasting dryness reigns; in temperate countries terrestrial, in warmer latitudes growing on trees (epiphytes), or fixing themselves to stones. Their roots are fibrous and fasciculated, fleshy or resembling tubers, and these filled with starch, or horny nodules of bassorin. Stem none, or long and annual, or perennial and woody, forming a rhizome, or jointed branches. Leaves flat, terete or equitant, generally sheathing, membranous, coriaceous, or hard, never lobed, occasionally bordered by cartilaginous teeth, their veins parallel, almost never slightly reticulated. Flowers ♂, irregular, extremely variable in form, solitary, clustered, spiked, racemose, or panicled, always supported by a solitary bract; very often most gratefully fragrant,



Fig. CXVII.



Fig. CXVIII.

sometimes fetid, and not unfrequently scentless. Perianth adherent, variable, herbaceous or coloured, membranous or fleshy, permanent and withering, or deciduous; its parts arranged in two rows, rarely in 3, free or adhering in various ways; very often resupinate in consequence of a twist in the ovary. Sepals (which, morphologically speaking, are petals) 3, equal at the base, or variously extended or expanded there; the two lateral standing in front when the ovary is twisted, and the third then dorsal, or

Fig. CXVII. — *Herminium monorchis*.

Fig. CXVIII. — Accidental manner of producing a jointed stem in *Aspidia ophioides*.

next the axis ; occasionally surrounded by a calyculus (or true calyx). Petals (which are to be regarded as sterile stamens) usually 3 ; very rarely one only, placed between the sepals : the lateral usually similar to the dorsal sepal ; the third, called the lip (*labellum*), usually larger than the petals, and quite unlike them in form ; horned or furnished with various appendages, free or adherent to some other body, occasionally moveable as if spontaneously ; now and then contracted so as to form two separate parts, of which the lowest is called the hypochil, the highest the epichil, and the middle one the mesochil ; sometimes furnished with a single or double appendage, derived from the stigma. Column consisting of the stamens and style consolidated into a central body, so that the latter stands next the lip and the former next the dorsal sepal, sometimes petaloid, and occasionally extended far beyond the perianth (*corymbis*). Stamens 3, opposite the sepals, the central only being perfect, except in *Cypripedium*, when the central is abortive and the two lateral perfect ; anthers occasionally one-celled ; usually two-celled, with the cells separated by 2 or 4 partitions ; standing erect at the end of the column, or turned down flat upon it, or altogether dorsal ; pollen powdery, or collected into grains, or adhering in wedges tied together by an elastic material, or consolidated into masses of a waxy texture and fixed number, the masses either free or adhering by a caudicle to a gland belonging to the apex (or rostellum) of the stigma. Ovary adherent, 1-celled, composed of 6 carpels, of which 3, opposite the petals, have didymous polysperous parietal placentæ without stigmas, and 3 opposite the sepals have as many stigmas but no placentæ ; style never distinct, except in *Cypripedium* and some *Neotticæ* ; stigmas usually confluent in a hollow (or prominent) mucous disk ; the dorsal stigma having on the upper edge one or two glands, which are separate in *Vandææ* and *Neottææ* ; often extended into a beak (rostellum), or hollowed out into pouches, or sometimes drawn out into 2 parallel or diverging arms ; the lateral stigmas usually obsolete, but sometimes united to the base of the lip in the form of an appendage or pair of plates. Capsule very rarely fleshy, indehiscient and pod-shaped, usually breaking up into 6 dry woody rigid valves with horizontal cells, of which 3 only bear seeds. Seeds innumerable, very minute, with a loose netted skin, very rarely with a hard crustaceous one, sometimes expanded into a circular wing ; embryo solid, fleshy, without albumen ; chalaza at the apex of the seed, and therefore the radicle next the hilum.

The general structure of Orchids, briefly embodied in the foregoing description, has been treated of at such length in the prefatory matter of the *Illustrations of Orchidaceous Plants*, that it is unnecessary to do more than refer the reader to that work. I must, however, take the opportunity of correcting one part of the theoretical view which was there taken of the structure of the column. While, in common with Dr. Brown, I regarded the stigma as really consisting of three parts, usually in a state of confluence, I also supposed the position of the stigmata to be opposite the petals ; being led to that conclusion by the constant position of the stigmatic arms of *Ophrydæ*. That opinion I afterwards retracted, in consequence of the position of the stigmas in *Cypripedium*, which *C. spectabile* shows most clearly to be opposite the sepals ; and therefore the stigmatic arms of *Ophrydæ* are to be understood as side lobes of that stigma which is opposite the dorsal sepal. This circumstance, however, only confirms the accuracy

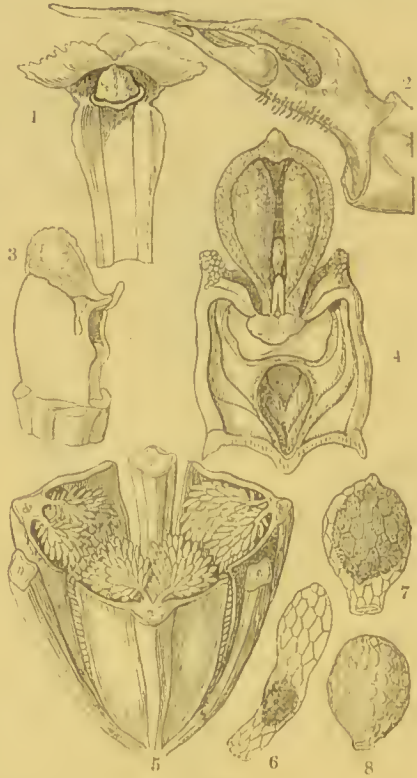


Fig. CXIX.

Fig. CXIX.—1. Column of *Arethusa* ; 2. of *Stenorhynchus* ; 3. of *Brassia maculata* ; 4. of *Orchis mascula* ; 5. section of capsule of *Ophrys apifera* ; 6. seed of *Ophrys* ; 7. of *Pterygodium atratum* ; 8. of *Vanilla aromatica*.

of my view of the true nature of the stamens, which are certainly all opposite the lobes of the stigma in *Cypripedium*. While, however, the untenableness of the first opinion concerning the relation borne by the stigmas to the other parts of the flower, is thus admitted, there remains a difficulty that opposes itself to the view I now take in common with Brown, and which must not be overlooked. It is that the placentiferous pieces of the ovary are not opposite the stigmas, but alternate with them, while the seedless pieces of the ovary are in a line with the stigmata! This seems to show that the ovary is composed of 6 carpellary leaves, of which three bear stigmas without ovules, and three bear ovules without stigmas. However paradoxical this may appear, it is by no means incompatible with the due performance of the functions of fertilisation; for the carpellary leaves do not adhere into a solid mass, either in the ovary or in the style. On the contrary they form a cavity open from the stigmatic apex down to the ovules, and the whole of that cavity is lined with a lax conducting tissue, which may nevertheless be exclusively furnished by 3 stigmas only, and may become so confluent with the placenta as to form a perfect channel of communication for the pollen tubes in their descent into the ovules.

The Order owes its chief peculiarities to the following circumstances: firstly, to the consolidation of stamens and pistil into one common mass, called the column; secondly, to the suppression of all the anthers, except one in the mass of the Order, or two in *Cypripedæe*; thirdly, to the peculiar condition of its pollen, and the anther which contains it; and fourthly, to the very general development of one of the inner leaves of the perianth or petals in an excessive degree, or in an unusual form. These peculiarities are in most cases so striking, and are all so strongly manifested in the same flower, that the inexperienced botanist may be unable to discover their real character. We find, however, that the true nature of each part is indicated by special cases of structure occurring in different parts of the Order. Thus in *Cypripedium* not only are two lateral stamens furnished with anthers, while the central stamen is antherless, but the stigma and style separate from the filaments nearly to the base, and the triple nature of the former is distinctly shown, together with the relation of its lobes to the other parts of the flower. The pollen, which has so anomalous an appearance in its waxy or setile state, presents the usual appearance of that substance in *Goodyera*, and many *Neottæe*. And the irregularity of the labellum disappears in such genera as *Thelymitra*, *Paxtonia*, *Maedonaldia*, *Hexisea*, and some others, whose flowers are almost as regular as those of a *Sisyrinchium*. It is indeed to the latter genus, more nearly than to any other, that Orchids seem to approach in structure, unless to *Gingerworts*; so that they may be supposed to pass into Irids through *Thelymitra* and *Sisyrinchium* on the one hand, and into *Gingerworts* through *Phrynium* and such a genus as *Evelyna* on the other. With regard to *Apostasiads*, their relation to that Order does not appear to be greater than to either of the two now mentioned; and in the absence of all evidence as to the connecting links which join Orchids and *Apostasiads* it seems unnecessary to advert further to the subject. It may, however, be observed that *Apostasia* has apparently as much claim to be regarded as a diandrous monadelphous *Hypoxid*, standing, perhaps, in the same relation to that Order as *Gilliesia* to *Lilyworts*, as it has to be regarded as a trilocular Orchid with the gynandrous organization lost.

It is not necessary to enter, in this place, into a history of the gradual alteration that has taken place in the views of botanists with regard to the structure of the sexual apparatus of these most curious plants, or to explain what degree of ignorance was shown by those who mistook masses of pollen for anthers, or a column of stamens for a style; such errors could only have occurred at a period when the laws of organization were unknown. They have been corrected, in a more or less perfect manner, by various writers; most completely by Brown in his *Prodromus*, published in 1810, and subsequently by the late most accurate and indefatigable Richard. But long before the publication of any rational explanation of the structure of Orchids, while botanists were in utter darkness upon the subject, it had been investigated by a man unrivalled in his day for the perfection of his microscopical analyses, the beauty of his drawings, and the admirable skill with which he followed Nature in her most secret workings; and let me add, which is a still rarer quality, the generous disinterestedness with which he communicated to his friends the result of his patient and silent labours. Sketches were executed by the late Francis Bauer, between 1794 and 1807, in which the most material part of what has been published since that period is distinctly shown; and it has been my good fortune to be the humble means of giving some of these remarkable productions of the pencil to the world, in the *Illustrations of the Genera and Species of Orchidaceous Plants*.

If the column of an Orchidaceous plant is examined, it will be found to consist of a fleshy body stationed opposite the lip, bearing a solitary anther at its apex, and having in front a viscid cavity, upon the upper edge of which there is often a slight callosity, called the *rostellum*. This cavity is the stigma, and the rostellum is the point by which

the pollen masses are secured when any adhesion between them and the stigma takes place. Hence such a plant would appear to be monandrous; it will be seen, however, in Giugerworts and Marants, the only other monandrous Orders of Endogens, that, while only one perfect stamen is developed, two others exist in a rudimentary state; so that the ternary number prevalent in Monocotyledons is not departed from. So it is in Orchids: the column does not consist of a single filament cohering with a style, but of three filaments firmly grown together, the central of which is antheriferous, and the lateral sterile. This is proved by the frequent presence of callosities, or processes in the place of the sterile stamens; by imperfectly-formed anthers occasionally appearing at the side of the perfect one; and, if any further evidence were wanted, by monsters, in which a regular structure is exchanged for the ordinary irregularity. Such an instance in *Orchis latifolia* is described by Achille Richard, in the *Mémoires de la Soc. d'Hist. Nat. of Paris*, in which the flowers were perfectly triandrous, with no trace of irregularity in any part of the floral envelopes; and other cases of a similar nature are by no means uncommon, and have been occasionally mentioned.

Orchids are remarkable for the unusual figure of their irregular flowers, which sometimes represent an insect, sometimes a helmet with the visor up, and are so various in form that there is scarcely a common reptile or insect to which some

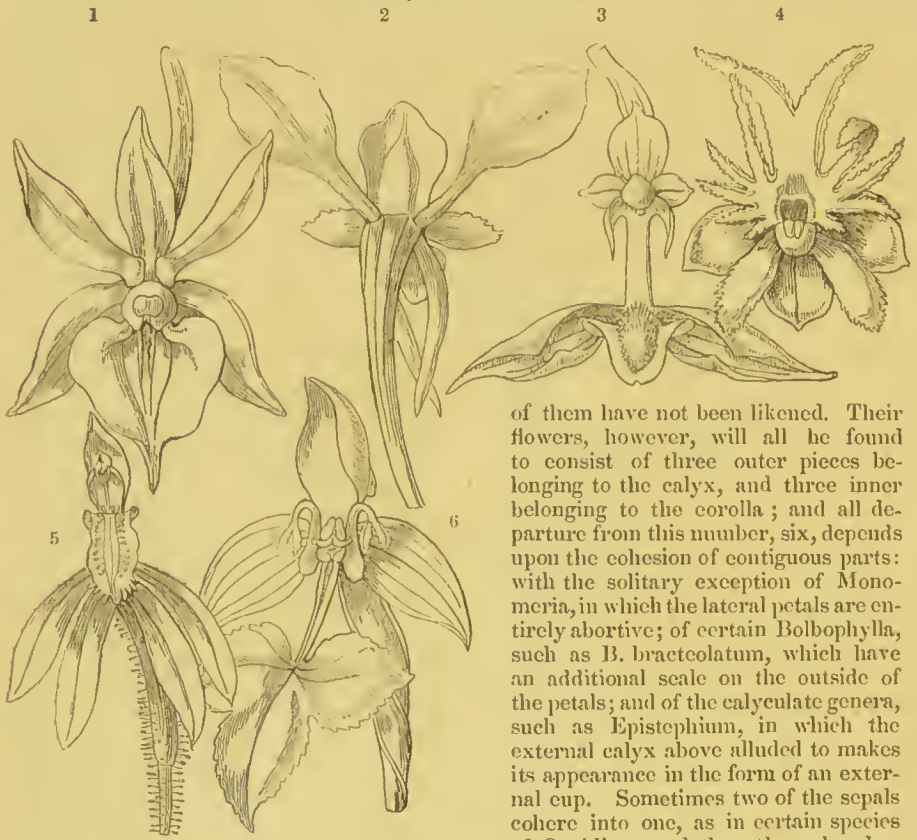
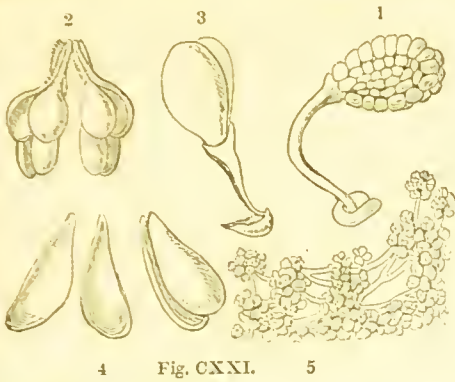


Fig. CXX.

of them have not been likened. Their flowers, however, will all be found to consist of three outer pieces belonging to the calyx, and three inner belonging to the corolla; and all departure from this number, six, depends upon the cohesion of contiguous parts: with the solitary exception of *Monomeria*, in which the lateral petals are entirely abortive; of certain *Bolbophylla*, such as *B. bracteolatum*, which have an additional scale on the outside of the petals; and of the calyculate genera, such as *Epistephium*, in which the external calyx above alluded to makes its appearance in the form of an external cup. Sometimes two of the sepals cohere into one, as in certain species of *Oncidium*, and then the calyx has the appearance of consisting of but two sepals; sometimes the lateral petals are connate with the column, as in *Gougora* and *Lepanthes*, and then the column appears furnished with two wings. In nearly the whole Order the odd petal, called the lip, arises from the base of the column, and is opposite it; but in the Cape genus *Pterygodium*, the lip sometimes grows from the apex of the column, and sometimes is stalked and turned completely over between the fork of the inverted anther, and thus seems to belong to the back of the column. Nor is the anther less subject to modification, although constant to its place: sometimes it stands erect, the line of dehiscence of its lobes being turned towards the lip; sometimes it is turned upside down, so that its back regards the lip; often it is prone upon the apex of the column, where a niche is excavated for its reception. The pollen is not

Fig. CXX. 1. *Angræcum eburneum*; 2. *Diuris*; 3. *Drymoda picta*; 4. *Oberonia Griffithiana*; 5. *Caladenia*; 6. *Disa spathulata*.



less curious: now we have it in separate grains, as in other plants, but cohering to a meshwork of cellular tissue, which is collected into a sort of central elastic strap; now the granules cohere in small angular indefinite masses, and the central elastic strap, becoming more apparent, is found attached to a glandular process of the stigma, which is often inclosed in a peculiar pouch especially destined for its protection; again, the pollen combines into larger masses, which are definite in number, and attached to another modification of the elastic strap;

and finally a complete union of the pollen takes place, in solid waxy masses, without any distinct trace of this central elastic tissue. Such is a part of the singularities of Orchidaceous plants, and upon these the distinctions of their tribes and genera are naturally founded. Whoever studies them must bear in mind that their fructification is always reducible to 3 sepals, 3 petals, a column consisting of 3 stamens grown firmly to one another, and to a single style and stigma; and, with this view, he will have no difficulty in understanding the organization of even the most anomalous Cape species. In the last edition of this work an Order called Vanillaceæ was proposed, about which I shall only say that its introduction would have been much better omitted.

Professor Link has shown that beyond all doubt the nucleus of the seed in this Order is a naked embryo, with an excessively enlarged radicula. See his beautiful figures in the *Ausgewählte Anatomisch-botanische Abbildungen fasc. 2. t. vii.* Here we again have a structure analogous to that of *Nymphæa* and *Nelumbium*.

Among the most singular circumstances connected with this Order is the manner in which, upon the same spike, flowers of extremely different structure are produced. This was first noticed in Demerara by Sir R. Schomburgk, who published in the *Linn. Transactions* (17. 551.) an



Fig. CXXII.

Fig. CXXI.—1. Pollen masses of *Ophrys apifera*; 2. of *Phajus Tankervillei*; 3. of *Brassia maculata*, 4. of *Malaxis paludosa*; 5. Pollen of *Stenorrhynchus speciosus*.
 Fig. CXXII.—2. *Cycnoches ventricosum*, 4 and 5 *C. Egertonianum*; the others intermediate forms.

account of the production of *Monachanthus viridis*, *Myanthus barbatus*, and a *Catasetum*, 3 supposed genera, upon the same spike; and he expressed his opinion that the *Catasetum* was the female of these, because he found it producing seeds abundantly, while *Monachanthus* was uniformly sterile. Afterwards a similar specimen made its appearance in the garden of his Grace the Duke of Devonshire at Chatsworth, and has been figured in the *Botanical Register*, fol. 1951. And still more lately two species of *Cyenochea*, *ventricosum* and *Egertonianum* have appeared in company, as represented in the accompanying figure (CXXII.)

Such cases shake to the foundation all our ideas of the stability of genera and species, and prepare the mind for more startling discoveries than could have been otherwise anticipated.

If the accompanying diagram be compared with those employed to illustrate the distinctions of Marants and Gingerworts, p. 169, the relation borne to those Orders by Orchids will be distinctly seen. In the diagram the parts are arranged as they are in nature before the ovary twists; that is, with the lip next the axis, or uppermost, and the stamen undermost. Let C, C, C represent the outer series of floral envelopes or calyx, and PP, P, P the inner, or corolla, of which PP is the labellum; then the position of the single fertile stamen will be at S, and the sterile ones at s, s; that is to say, in the situation of the supernumerary petaloid stamens of Gingerworts and Marants, while the second series of stamens, to which the fertile stamen of these Orders belongs, is not developed in Orchids.

But although this is the apparent structure of the Order, it is more probable that the parts called sepals are the true petals, because *Epistephium* and others have a calyculus exterior to the apparent calyx. In that

point of view the apparent petals will be sterile stamens, as among the Marants, and the nature of the parts will be shown by the above projection.

In classifying this Order the most important characters appear to reside in the pollen, which in many is consolidated into firm waxy masses of a definite number in each species, and in others is either in its usual loose powdery condition, or is collected in granules or small wedges, the number of which is far too great to be counted. Of those with waxy pollen masses some (*Malaxæe*) are destitute of any visible processes by which the masses are brought into contact with the stigma; others (*Epidendræe*) have strap-shaped cau-

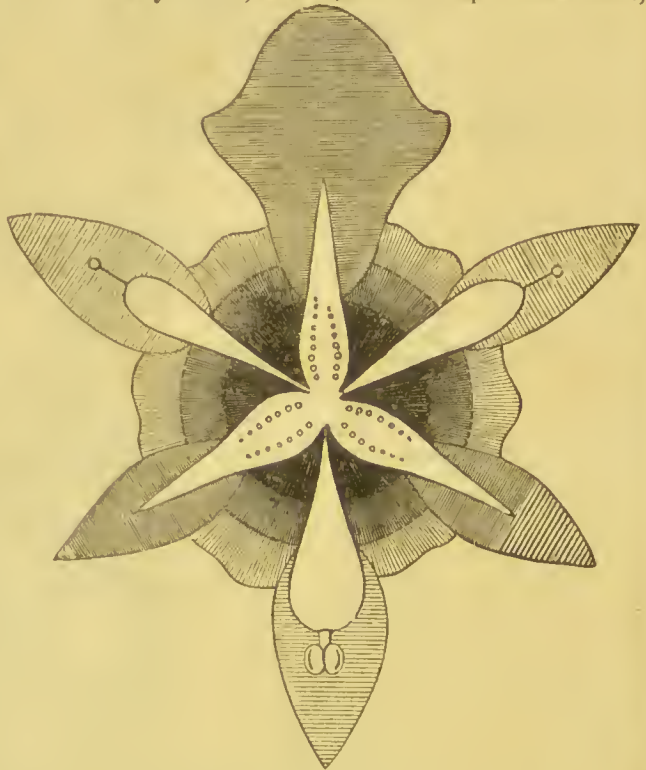
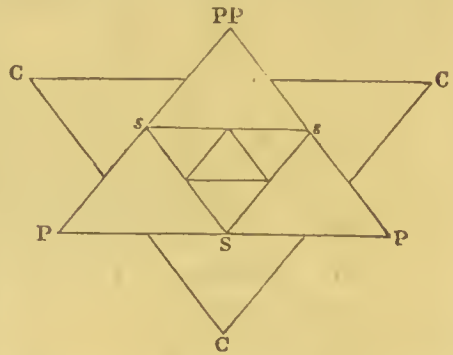


Fig. CXXII. bis.

Fig. CXXII. bis.—A theoretical projection of all the parts of an Orchid flower, showing what is supposed to be their true relative position.

dies, which are either bent down upon the masses themselves, or serve to hold them together, without, however, forming any organised union with the stigma; while the remainder (Vandee) have a caudicle, which adheres firmly to a gland found on the upper margin of the stigma, and separating freely from that organ. The genera with powdery, granular, or sectile pollen cannot be classified so conveniently by modifications of that part, but are readily divided into 3 natural tribes by peculiarities in the anther. In some (Ophreæ) the anther is erect, not hinged to the column but continuous with it, and stands above the stigma, the pollen masses having their points directed to the base of the lobes of the anther; in others (Arethusæ) the anther is hinged to the column, upon the end of which it is placed transversely like a lid; and in others (Neotteæ) it is also hinged to the column, but is stationed at its back so as to be nearly parallel with the stigmatic surface. If to this we add that Cypripideæ have two anthers, while all the others have one only, we find the Order divided into seven tribes, of which the following is a tabular view.

I. Anther one only.		B. Pollen powdery, granular, or sectile.	
A. Pollen masses waxy.		a. Anther terminal, erect	IV. Ophreæ.
a. No caudicle or separable stigmatic gland	I. Malaxæ.	b. Anther terminal, opercular	V. Arethusæ.
		c. Anther dorsal	VI. Neotteæ.
b. A distinct caudicle, but no separable stigmatic gland	II. Epidendræ.	II. Anthers two	
c. A distinct caudicle, united to a stigmatic gland	III. Vandæ.	VII. Cypripideæ.	

Among many other remarkable peculiarities the irritability of the labellum must not be passed over in silence. This is extremely striking in various species of Pterostylis, in the genus Megacalinium, and in many Bolbophylls, especially barbigerrum and Careyaum.

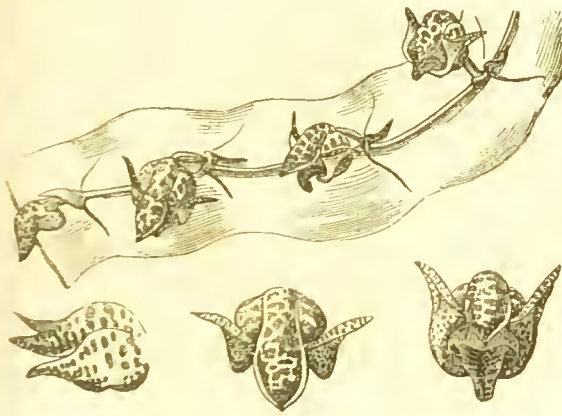


Fig. CXXIII.

But some of the Swan River species are still more singular. In *Caleana nigrita*, Mr. Drummond describes the structure to the following effect. The column is a boat-shaped box, resembling a lower lip; the labellum forms a lid that exactly fits it, and is hinged on a claw which reaches the middle of the column; when the flower opens, it (the labellum) turns round within the column, and falls back, so that, the flower being inverted, it stands fairly over the latter. The moment

a small insect touches its point, the labellum makes a sudden revolution, brings the point to the bottom of the column, passing the anther in its way, and thus makes prisoner any insect which the box will hold. When it catches an insect it remains shut while its prey continues to move about; but if no capture is made the lid soon recovers its position. Another plant, *Drakæa elastica*, has a single flower placed at the end of a slender smooth erect scape, from twelve to eighteen inches high, and its labellum, which is hammer-headed, and placed on a long arm with a moveable elbow-joint in the middle, is stated by Mr. Drummond to resemble an insect suspended in the air, and moving with every breeze. Another plant of this description is *Spicula ciliata*, whose rusty flowers when spread open may be compared to long-legged spiders, the lip with a long solid lamina looking like their body, while an appendage at its apex, which is apparently moveable, is not unlike the head of such a creature.

Orchids are found in almost all parts of the world, except upon the verge of the frozen



Fig. CXXIII. lit.

Fig. CXXIII.—*Megacalinium Bute*; 1. a portion of a spike magnified; 2. flowers in various positions, more magnified.

Fig. CXXIII. lit.—*Spicula ciliata*, its flower

zone, and in climates remarkable for dryness. In Europe, Asia, and North America, they are seen growing everywhere, in groves, in marshes, and in meadows; in the drier parts of Africa they are either rare or unknown; at the Cape of Good Hope they are abundant in similar situations as in Europe; but in the hot damp parts of the West and East Indies, in Madagascar, and the neighbouring islands, in the damp and humid forests of Brazil, in the warm mild parts of Central America, and Western Mexico, in the damp tropical parts of India, and on the lower mountains of Nipal, the Orchidaceous plants flourish in the greatest variety and profusion, no longer seeking their nutriment from the soil, but clinging to the trunks and limbs of trees, to stones and bare rocks, where they vegetate among ferns and other shade-loving plants, in countless thousands. Of the epiphytal class, one only is found so far north as South Carolina, growing upon the branches of the Magnolia, if we except the species from Japan, a country which has a climate peculiar to itself, among regions in the same parallel of latitude. The most southern stations are those of *Earina mucronata* in New Zealand, in lat. 35° S., and of *Gunnia australis* in Emu Bay, Van Diemen's Land, lat. 41° S. Ample details respecting their distribution in Australia are given by A. Cunningham in the *Botanical Register* for 1843 t. 37.

It often happens that those productions of nature which charm the eye with their beauty, and delight the senses with their perfume, have the least relation to the wants of mankind, while the most powerful virtues or most deadly poisons are hidden beneath a mean and insignificant exterior: thus Orchids, beyond their beauty, can scarcely be said to be of known utility, with a few exceptions. The nutritive substance called Salep has been prepared from the subterraneous succulent roots of *Orchis mascula* and many others of the Ophreous division; and in India from the tubers of a species of *Enliphia*; it consists almost entirely of a chemical principle called Bassorin. The root of *Bletia verecunda* is said to be stomachic. Some of the South American species, such as the *Catasetums*, *Cyrtopodiums*, &c., contain a viscid juice, which being inspissated by boiling, becomes a kind of vegetable glue used for economical purposes in Brazil. The viscidness of the tuber of *Aplectrum hyemale* is such that it is called Putty-root in the United States, and is used for cementing broken earthenware.

Other medical qualities have been assigned to other species, but they seem to be of no importance; thus, *Arethusa bulbosa* is employed in the United States in toothache and bringing tumours to a head, *Spiranthes diuretica* as a diuretic in Chile, where also *Chloræa disoides* is fancied to promote the flow of milk. *Cypripedium pubescens* is used in North America as a substitute for Valerian, *C. guttatum* in Siberia against epilepsy. Vanilla is one of the most delightful aromatics known; it is used in the manufacture of chocolate, of liqueurs, and of various articles of confectionery. The substance called by this name in the shops is the dried fruit of *Vauilla planifolia*, and other species; it contains a great quantity of essential oil, and a good deal of benzoic acid. Dr. Bird says that the effluvium of *Vanilla* intoxicates the labourer who gathers it.—*Peter Pilgrim*, 1. 234. See *Linnaea*. 4. 573, for some account of the cultivation of the plant in Mexico. *Vanilla claviculata* is bitter as well as fragrant, and its leaves are regarded in the West Indies, where it is called *Liane à blessures*, as a vulnerary, and antisyphilitic. In New Holland many species are eaten by the natives, who find their starchy roots a good article of diet. Mr. Backhouse describes the *Gastrodia sesamoides* as having a root like a series of kidney potatoes, terminating in a branched, thick mass of coral-like fibres. It is eaten by the aborigines of Tasmania, and is sometimes called native potato; but its tubers are watery and insipid.

P. Browne states that the corm of *Bletia verecunda* is "bitterish and attended by a clamminess that leaves a light prickly warmth behind it; but this wears off soon, leaving the palate free from every sensation but that of the bitter. When dried it may be used with great propriety as a stomachic." According to Sir R. Schomburgk the expressed juice of *Epidendrum bifidum* is a purgative, taken in doses of a table spoonful at a time; it is also reckoned in Tortola an anthelmintic, and diuretic, &c.—*Linnaea*, ix. 512.



Fig. CXXIV.

GENERA.

[In the following list, I have cast all the genera into natural subdivisions, preparatory to a further revision of them; but I have not attempted to settle very exactly their order of sequence. In fact, a great number demand a very careful revision, and others, to which an * is prefixed, I have never had the opportunity of examining.]

- I.—MALAXEÆ.
 PLUKROTALLIDÆ.
Lindl. in Bot. Rey. 1812. misc. p. 67.
Pleurothallis, R. Br.
Rhynchospora, Klotzch.
Myoxanthus, Popp. et Endl.
Specklinia, Lindl.
Centranthera, Scheidw.
Acianthera, Scheidw.
Dialissa, Lindl.
Stelis, Swz.
Humboldtia, Fl. Peruv.
Lepanthes, Swz.
Restrepia, Kth.
 * *Caletia, Gaudich.*
Physosiphon, Lindl.
Masdevallia, Fl. Per.
Stenoglossum, H. B. K.
Ocoteima, R. Br.
- LIPARIDÆ.
Liparis, Rich.
Sturnia, Rchb.
Alipsa, Hfmg.
Cestichia, Thouars.
Distichia, Thouars.
Dendrochilum, Bl.
 * *Osyricera, Bl.*
 * *ChrysoGLOSSUM, Bl.*
Oberonia, Lindl.
Ensiſera, Bl.
 * *Tiania, Endl.*
Empusa, Lindl.
Empusaria, Rchb.
 * *Platystylis, Bl.*
 * *Gastroglottis, Bl.*
Microstylis, Nutt.
Crepidium, Bl.
Monorchis, Mentz.
Achroanthes, Raf.
Pterochilus, Hook.
Dienia, Lindl.
Potilea, Lindl.
Malaxis, Swz.
 * *Nephelephyllum, Bl.*
Calypso, Salisb.
Cythera, Salisb.
Norma, Wall.
Orchidium, Swz.
- DENDROBIDÆ.
Dendrobium, Swz.
Graustidium, Bl.
Ceraia, Lour.
Keranthis, Lour.
Boottia, Petiv.
 ? *Sarcotoma, Bl.*
 § *Stachyobium, Lindl.*
 § *C. rubrum, Lindl.*
 § *Pedilonium, Bl.*
 § *Oxychilum, Bl.*
 § *Dematrichum, Bl.*
 § *Dendrocygne, Lindl.*
 * *Macrostromium, Bl.*
Aporium, Bl.
Schismoceras, Presl.
 * § *Diplocnemium, Schauer.*
Oxytrophium, Bl.
 * ? *Diglyphis, Bl.*
Dialyphos, Bl.
Monomeria, Lindl.
 * *Epicranthes, Bl.*
 ? *Drymoda, Lindl.*
Bolbophyllum, Thouars.
Diphyce, Bl.
- Tribrachia, Lindl.*
Odontostylis, Bl.
 (f. *Endl.*)
Gersinia, Neraud.
 (f. *Endl.*)
Macrolepis, A. Rich.
 § *Anisoptalum, Hooker.*
 ? *Sunipia, Lindl.*
Trias, Lindl.
 * *Thelyphiton, Endl.*
 * *Cochlia, Bl.*
 * *Lyraea, Lindl.*
Megachinium, Lindl.
Cirrhopetalum, Lindl.
Zygoglossum, Reinw.
Ephippium, Bl.
 ? *Sestochilus, Kuhl et Hass.*
Bryohium, Lindl.
Conchidium, Grtff.
Mycaranthes, Bl.
Phreatia, Lindl.
Eria, Lindl.
Dendrolirium, Bl.
Pinalia, Hamilt.
- CORALLORHIZIDÆ.
Corallorhiza, Haller.
Aplectrum, Nuttall.
 * *Aphyllorchis, Blume.*
- II.—EPIDENDREÆ.
 CÆLOGYNDIDÆ.
 * ? *Acanthoglossum, Bl.*
Cælogyne, Lindl.
Chelonanthera, Bl.
Panisea, Lindl.
Pleione, Don.
Gomphostylis, Wall.
Trichosma, Lindl.
Dilochia, Lindl.
Pholidota, Lindl.
Ptilocnema, Don.
Crinonia, Bl.
Otochilus, Lindl.
Earina, Lindl.
- ISOCHILIDÆ.
Isochilus, R. Br.
Hexisea, Lindl.
 ? *Elleanthus, Presl.*
Diothonea, Lindl.
Gastropodium, Lindl.
- LÆLIADÆ.
Epidendrum, L.
 § *Hormidium, Lindl.*
 § *Epicladium, Lindl.*
 § *Eneyctium, Hooker.*
 § *Diacrium, Lindl.*
 § *Aulzeum, Lindl.*
 § *Osmophyllum, Lindl.*
 § *Lanatum, Lindl.*
 § *Spathium, Lindl.*
 § *Amphiglottium, Salisb.*
 § *Epidendrum, Lindl.*
Scraphyla, Fisch.
Physinga, Lindl.
Ponera, Lindl.
Nemconia, Knowles.
 * ? *Aspergentia, Pöpp. et Endl.*
Hexadesmia, Brongn.
Herzogia, Bates.
Dinetna, Lindl.
Sophranitis, Lindl.
Alamania, Llave.
Hartwegia, Lindl.
- Arpopphyllum, Llave.*
Barkeria, Knowles.
Broughtonia, R. Br.
 ? *Chysis, Lindl.*
Lælia, Lindl.
Anabia, Rchb.
Cattleya, Lindl.
Schomburgkia, Lindl.
Tetramicra, Lindl.
Leptotes, Lindl.
Brasavola, Lindl.
- BLETIDÆ.
Phaius, Lour.
Pachyna, Salisb.
Tankervillea, Link.
Arundina, Bl.
Evelyna, Pöpp. et Endl.
Bletia, R. et Pav.
Gyas, Salisb.
Thiebandia, Colla.
 * *Mitopetalum, Bl.*
Tainia, Bl.
Spathoglottis, Bl.
Paxtonia, Lindl.
 * *Collahium, Bl.*
Cytheris, Lindl.
Pesomeria, Lindl.
Ipsea, Lindl.
 * ? *Pachystoma, Bl.*
Apaturia, Lindl.
 ? *Cremastra, Lindl.*
Ania, Lindl.
 * ? *Callostylis, Bl.*
Tylostylis, Bl.
 * ? *Ceratium, Bl.*
Cylindrolobus, Bl.
 * ? *Trichotisia, Bl.*
 * ? *Plocoglottis, Bl.*
 * ? *Pachychilus, Bl. (Endl.)*
- III.—VANDEÆ.
 SARCANTHIDÆ.—*Lindl.*
in Bot. Reg. 1843. misc. p. 12.
Eulophia, R. Br.
Galeandra, Lindl.
Corydandra, Rchb.
Cyrtopera, Lindl.
Lissochilus, R. Br.
Doritis, Lindl.
Luisia, Gaud.
Pseudoranda, Lindl.
Mesoclastes, Lindl.
Birchra, A. Rich.
Vanda, R. Br.
Fidelia, Gaud.
Renanthera, Lour.
Arachnis, Blume.
Nephranthera, Hassk.
Arachnanthes, Blume.
Phalenopsis, Bl.
Diplocentrum, Lindl.
 * *Microsaccus, Blume.*
Camarotis, Lindl.
Chiloschista, Lindl.
Gunnia, Lindl.
Miropera, Lindl.
Succolabium, Lindl.
Sarcophilus, Blume.
Gastrachiluz, Don.
Bobipactia, Gaudich.
Guzsonia, A. Rich.
Rhynchostylis, Blume.
Cactrota, A. Rich.
Sarcophilus, R. Br.
 ? *Tendrophyllum, Blume.*
Clojostoma, Blume.
- Polychilos, Kuhl et Hass.*
 * *Ceratostylis, Blume.*
 * *Ephippium, Blume.*
 * *Ceratochilus, Blume.*
Omwia, Blume.
 * *Echioglossum, Blume.*
Sarcanthus, Lindl.
 * *Pteroceras, Hass.*
Agrostophyllum, Blume.
 * *Adenoncos, Blume.*
Cleoclares, Lindl.
Trichoglottis, Bl.
Aërides, Louriev.
Dendrocolla, Blume.
Cuculla, Blume.
Tubera, Blume.
Fornicaria, Blume.
Pilearia, Lindl.
Ornithochilus, Wall.
 * *Schænorchis, Blume.*
Aëranthus, Lindl.
Cryptopus, Lindl.
Beclardia, A. Rich.
Cœonia, Lindl.
Angrecom, Thouars.
Aërobion, Spr.
Mystacidium, Lindl.
Microcalia, Lindl.
Appendicula, Bl.
Metachilum, Lindl.
Podochilus, Bl.
Platysma, Bl.
Placostigma, Bl.
Apista, Bl.
Headesmia, R. Br.
 ? *Blunnea, Meyer.*
 * *Cryptoglottis, Bl.*
 * *Glomera, Bl.*
 * *Thelasis, Bl.*
Tetrapeltis, Wall.
 * ? *Conchochilus, Hassk.*
 * ? *Todaroa, A. Rich.*
- CAYTUCHIDÆ.
Cyrtochilus, Wall.
Acanthophippium, Bl.
 * ? *Anthogonium, Wall.*
- BRASSIDÆ.
Cymbidium, Swz.
Bolbidium, Lindl.
Graummatophyllum, Bl.
Gabertia, Gaud.
 * *Stauroglottis, Schauer.*
Bromheadia, Lindl.
Ansellia, Lindl.
Agnisia, Lindl.
Epiphora, Lindl.
Aspasia, Lindl.
 ? *Acriopsis, Bl.*
Trichopilia, Lindl.
Helcia, Lindl.
Nanodes, Lindl.
Pilumna, Lindl.
Dipodium, R. Br. [Bl.
 ? *Armatorium, Kuhl et Blume.*
Dichea, Lindl.
Fernandezia R. et Pav.
Lackharia, Hooker.
Phymatidium, Lindl.
Leordilus, Knowles.
Oncidium, Swz.
Cyrtuchilum, H. B. K.
Odontoglossum, H. B. K.
 § *Trymenium, Lindl.*
Brassia, R. Br.

- Miltodia*, Lindl.
Macrochilus, Knowles.
- PACHYPHYLLIDÆ.
Nasodia, Lindl.
Centropetalum, Lindl.
Pachyphyllum, H. B. K.
- MAXILLARIDÆ. Lindl. in
Bot. Reg. 1843, misc. p.
 12.
Staphopen, Frost.
Ceratochilus, Lodd.
Houlletia, A. Brongn.
Perlsteria, Hooker.
Eckardia, Richb.
Acineta, Lindl.
Lacæna, Lindl.
 * ? *Cuitlauzina*, Llav.
Govenia, Lindl.
Eucemis, Lindl.
Augidium, Liadl.
Batemannia, Lindl.
Gongora, Fl. Peruv.
Acropera, Lindl.
Coryanthes, Hook.
Chrenanthe, Lindl.
Malachadenia, Lindl.
Cælia, Lindl.
Ornithidium, Salisb.
Trigoaidium, Lindl.
 * *Psittacoglossum*, Llav.
Stenia, Lindl.
Promœna, Lindl.
Grobya, Lindl.
Warrea, Lindl.
Huntleya, Lindl.
Zygopetalum, Hooker.
Bifrenaria, Lindl.
Stenocoryne, Lindl.
Maxillaria, Fl. Per.
 § ? ? *Nothium*, Lindl.
 § ? *Xylobium*, Liadl.
 § ? *Dicrypta*, Liadl.
Heterolaxis, Lindl.
Lycaste, Lindl.
Adguloa, Fl. Per.
Camaridium, Lindl.
 * *Sigouanthus*, Pöpp et
 Endl.
Scuticaria, Lindl.
Scaphyglottis, Pöpp et E.
Cladobium, Liadl.
Colax, Lindl.
Paphlala, Lindl.
Polystachya, Hooker.
 * ? *Orchidofunkia*, A. Rich.
Clynhymenia, A. Rich.
 * ? *Galeottia*, A. Rich.
- CATASETIDÆ. Lindl. in
Bot. Reg. 1842, p. 22.
Catasetum, Rich.
Monachanthus, Lindl.
 § *Myanthus*, Lindl.
Mormodes, Lindl.
Cyclosia, Klotzsch.
Clovesia, Lindl.
Cyenochea, Lindl.
Cyrtopodium, R. Br.
Tylochilus, Nees.
- NOTYLIDÆ.
Notylia, Lindl.
Cirrhaea, Lindl.
Zygostates, Lindl.
Ductylostylis, Scheidw.
Ornithocephalus, Hook.
 ? *Trophianthus*, Scheidw.
Cryptarrhena, R. Br.
Macradenia, R. Br.
Sutrina, Lindl.
Telipogon, H. B. K.
Trichoceros, H. B. K.
Trizeuxis, Lindl.
- Quekettia, Lindl.
- IONOPSIDÆ.
Rodriguezia, R. et Pav.
Gomezia, R. Br.
 * *Scelochilus*, Klotzsch.
Burlingtonia, Lindl.
Ionopsis, H. B. K.
Iantha, Hook.
Cybelion, Spreng.
 * *Diadenium*, Pöpp et En.
Comparettia, Pöpp et En.
Trichocentrum, Pöpp et E.
Acoidium, Lindl.
- CALANTHIDÆ.
Calanthe, R. Br.
Centrosia, A. Rich.
Atismorchis, Thouars.
Ambyglottis, Blume.
Styloglossum, Kuhl et
 Hass.
 * *Limatodes*, Bl.
 * *Ghiesbrectia*, A. Rich.
 * *Tipularia*, Nutt.
Anthericlis, Ref.
Geodorum, Jacks.
Otandra, Salisb.
Cistella, Bl.
- IV.—OPHREÆ.
 SERAPIADÆ.
Orchis, L.
 § *Herorchis*, Liadl.
 § *Andorchis*, Eudl.
Anacamptis, Rich.
Nigritella, Rich.
Aceras, R. Br.
Loroglossum, Rich.
Himantoglossum, Spr.
Serapias, L.
Helleborine, Pers.
Ophrys, Swartz.
Heulipilla, Lindl.
Glossaspis, Spreng.
Glossula, Lindl.
Perularia, Lindl.
Bartholina, R. Br.
Lathrisia, Swz.
- SATYRIADÆ.
Pachites, Lindl.
Satyrium, Swz.
Diplectrum, Rich.
Satyridium, Lindl.
Aviceps, Lindl.
- GYMNADENIDÆ.
Aopla, Lindl.
Herminium, R. Br.
Arachnites, Hoffm.
 § *Chamorchis*, Rich.
Chamærepes, Spr.
Gymnadenia, R. Br.
Siberia, Spr.
Platanthera, Rich.
Mecosa, Bl.
Peristylus, Blume.
Benthamia, A. Rich.
Habenaria, W.
Dissorhynchium,
 Schauer.
 ? *Centrochilus*, Schauer.
Ate, Lindl.
Bonatea, W.
Bilabrella, Lindl.
Steuoglottis, Lindl.
Diplomeris, Don.
Diplochilus, Lindl.
Paraguathis, Spreng.
Bicornella, Lindl.
Cynorchis, Thouars.
 ? *Amphorchis*, Thouars.
Cæloglossum, Lindl.
Omuatodium, Lindl.
- POLOTACHIDÆ.
Holothrix, Rich.
Saccidium, Lindl.
Monotris, Lindl.
Scopularia, Lindl.
Tryphia, Lindl.
Buccullan, Lindl.
- DISIDÆ.
Dlsa, Berg.
 § *Repandra*, Liudl.
 § *Phlebidia*, Lindl.
 § *Vagnarina*, Lindl.
 § *Parfoglossa*, Lindl.
 § *Coryphæa*, Lindl.
 § *Stenocarpa*, Lindl.
 § *Oregura*, Lindl.
 § *Trichochila*, Lindl.
 § *Dischla*, Lindl.
Mouadeala, Lindl.
Schizodium, Lindl.
Penthea, Lindl.
Forficaria, Lindl.
Hierschelia, Lindl.
Brachycorythis, Lindl.
Brownilea, Harv.
- COAYCIDÆ.
Pterygodium Swz.
Corycium, Swz.
Disperis, Swz.
Dijera, Spreng.
Dryopeia, Thouars.
Ceratandra, Lindl.
 § *Hippopodium*, Harv.
 § *Evola*, Lindl.
Calota, Harv.
Ariottia, A. Rich.
- V.—ARETIUSEÆ.
 LIMODORIDÆ.
Chloroa, Lindl.
Epipactis, Peuill.
Asarca, Lindl.
Gavica, Pöpp.
Asarca, Pöpp.
Bipinnula, Commers.
Limodorum, Tournef.
Cephalanthera, L. C. Rich.
Macdonaldia, R. Gunn.
Eriochilus, R. Br.
Diplodium, Swartz.
Caladenia, R. Br.
Calonema, Liadl.
Leptoceras, R. Br.
Glossodia, R. Br.
Elythrauche, Endl.
Lyperanthus, R. Br.
Microtis, R. Br.
- ACIANTHIDÆ.
Acianthus, R. Br.
Chiloglottis, R. Br.
Cyrtostylis, R. Br.
Corysanthes, R. Br.
Calcearia, Bl.
Corybas, Salisb.
Stelocorys, Endl.
Pterostylis, R. Br.
- CALEYIDÆ.
Caleyia, R. Br.
Culeana, R. Br.
Drakæa, Lindl.
Spulcaea, Lindl.
- POGONIDÆ.
Pogonia, Juss.
Triphora, Nutt.
Nervilia, Commers.
Odontoclis, Rafia.
Isotria, Rafin.
 * *Didymoplexis*, Griff.
Codonorellis, Lindl.
Arethusa, Gronov.
 * *Ilaplostellis*, A. Rich.
- Cleistis, Rich.
Calopogon, R. Br.
Cathea, Salisb.
Crybe, Lindl.
- GASTRODIDÆ.
Gastrodia, R. Br.
Epiphanes, Blume.
Ceratopsis, Lindl.
 * *Gamoplexis*, Falc.
Epipogium, Gmel.
- VANILLIDÆ.
 * *Cyathoglottis*, Pöpp et
 Endl.
Sobralia, Ruiz et Pav.
Epistephium, H. B. K.
Erythrorchis, Blume.
Cyrtosia, Blume.
Vanilla, Swartz.
 * *Pogochilus*, Falcon.
- VI. NEOTTEÆ.
 CRANICHIDÆ, Lindl.
Ponthieva, R. Br.
Schænicinia, Klot.
Pterichis, Lindl.
Acraea, Lindl.
Cryptostylis, R. Br.
 * *Zosterostylis*, Blum.
Gomphichis, Lindl.
Stenoptera, Lindl.
Altensteinia, H. B. K.
Cranichis, Swartz.
Tripleura, Lindl.
 * *Chlorosa*, Blum.
 * *Rophostemon*, Blum.
Cordyla, Blume.
 * *Galeoglossum*, A. Rich.
 * *Ocampona*, A. Rich.
Prescottia, Lindl.
Decaisnea, Brodgn.
- LISTEADÆ, Lindl.
Listera, R. Br.
Diphyllum, Raf.
Neottia, R. Br.
Neottidium, Lk.
Calochilus, R. Br.
Epipactis, Hall.
Scrapias, Pers.
- SPIRANTHIDÆ, Lindl.
Cœmidia, Lindl.
Decaisnea, Lindl.
Spiranthes, L. C. Rich.
Ibidium, Salisb.
Cyclopogon, Presl.
Gyrostachys, Pers.
Stenoptera, Presl.
Sarcoglottis, Presl.
Cordylestylis, Falc.
Stenorhynchus, Rich.
Sauroglossum, Lindl.
Pelexia, Poit.
Synassa, Lindl.
- PHYSURIDÆ, Lindl.
 * *Plexaura*, Endl.
Chloldia, Lindl.
Zeuxine, Lindl.
Acnostyles, Blume.
Gionisaccus, Kuhl.
 * *Charadroplectrod*, Schr.
Monochilus, Blume.
Haplochilus, Endl.
Cheirostylis, Blumc.
Myoda, Lindl.
Hæmaria, Lindl.
Hylophila, Lindl.
Ætheria, Blum.
Platylepis, A. Rich.
Goodyera, R. Br.
Leucostachys, Hoffg.
Gonogona, Lk.
Tussaca, Rafin.
 * *Eucosia*, Blume.

Georchis, *Lindl.*
 *Macodes, *Blum.*
 Tropidia, *Lindl.*
Psychochilus, *Schauer.*
 Ulantha, *Hook.*
 Anæctochilus, *Blume.*
 Anæctochilus, *Blume.*
 Chrysobaphus, *Wall.*
 Orchipedium, *Kubl.*
 *Galera, *Blume.*
 Physurus, *L. C. Rich.*

Microchilus, *Presl.*
Erythroides, *Blume.*
Psychechilos, *Kuhl.*
 Baskervilla, *Lindl.*
 Herpysma, *Lindl.*
 Diuridæ, *Lindl.*
 Diuris, *Smith.*
 Orthoceras, *R. Br.*
 Prasophyllum, *R. Br.*
 Burnettia, *Lindl.*
 Genoplesium, *R. Br.*

THELYMITIDÆ, *Lindl.*
 Thelymitra, *Forst.*
 Epiblema, *R. Br.*
 VII. CYPRIPEDEÆ.
 Cypripedium, *Linn.*
Criosanthus, *Rafin.*
Arietinum, *Beck.*
 GENERA about which no-
 thing certain is known.
 *Hysteria, *Reinw.*

Corymbis, *Thouars.*
 *Thrixspermum, *Lour.*
 *Scaredederis, *Thouars.*
 *Oxyanthera, *A. Brongn.*
 *Galeola, *Lour.*
 *Callista, *Lour.*
 *Acronia, *Presl.*
 *Scleropteris, *Scheidw.*
 *Macrostylis, *Kuhl et Hass.*
 *Amblostoma, *Scheidw.*

NUMBERS. GEN. 394. Sp. 3000 ?

Iridaceæ.

POSITION.—Apostasiaceæ.—ORCHIDACEÆ.—Burmanniaceæ.
Zingiberaceæ.



Fig. CXXIV. bis.

Fig. CXXIV. bis.—Manner of growth of *Odontoglossum grande*. . *Paxton.*

ORDER LIII. APOSTASIACEÆ.—APOSTASIADS.

Apostasiæ, *Lindl. Nixus Plantarum*, p. 22. (1833); *Blume in Ann. Sc. Nat. Ser. 2. 2. 91.* (1834); *Endl. Gen. lxxii.*; *Meisn. p. 387.*

DIAGNOSIS.—*Orchidal Endogens with regular half-gynandrous flowers, and axile placentæ.*

Perennial herbaceous plants. Stem simple or branched. Leaves firm, thin, sheathing at the base. Flowers in simple or compound terminal racemes. Calyx and corolla each consisting of 3 similar pieces. Anthers 2 or 3, sessile upon a short column, erect, 2-celled, opening longitudinally; pollen cohering in 3s or 4s according to Mr. Bauer (*Illust. Fruct. t. 15*),—in single oval grains with a longitudinal furrow according to Mr. Griffith (*Letter dated Merqui Dec. 28, 1834*) and Blume. Ovary 3-celled, with 3 polyspermous placentæ in the axis; ovules with their integuments very distinct and much shorter than the protruded nucleus (*Griffith*); style filiform, with a slightly 3-lobed stigma as long as the anthers, and adhering with their filaments into a short column. [Capsule 3-celled, 3-valved; the valves bearing the dissepiment in the middle, but cohering at the apex and base. Seeds very numerous, minute, ovate, and with a skin fitting the nucleus, or scobiform with a membranous testa loose at each end.—*Blume.*]

Very closely allied to Orchids, from which they differ essentially in having a 3-celled fruit, with loculicidal dehiscence, and in the style being altogether free from the stamina for the principal part of its length. At the same time the structure is gynandrous enough to afford a clear distinction from the Burmanniads. There are many admirable observations upon *Apostasia* itself in Brown's *Observations on the organs and mode of fecundation in Orchidæ and Aselepiadæ*, and some further information is given by Blume in the place above quoted. The Order seems as if connecting Orchids and Hypoxidæ. If *Rhyncanthera* is correctly represented by Blume, its 3-locular ovary will refer it here, while the structure of its column would keep it in Orchids. The essential character is, however, framed without reference to it.

Found in damp woods in the hotter parts of India.

No uses have been assigned to any of them.

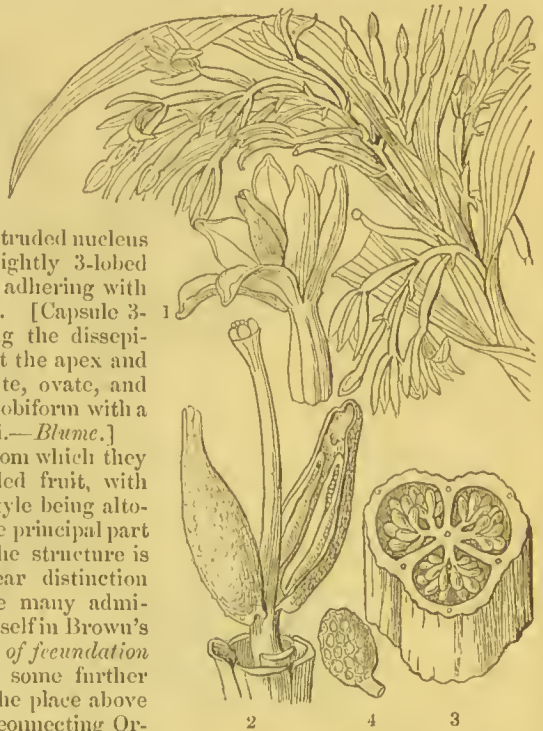


Fig. CXXV.

	GENERA	
<i>Apostasia</i> , <i>Bl.</i> <i>Mesodactylus</i> , <i>Wall.</i>	<i>Neuwiedia</i> , <i>Bl.</i>	<i>?Rhyncanthera</i> , <i>Bl.</i>

NUMBERS. GEN. 3. Sp. 5.

Hypoxidacæ.

POSITION.—*Orchidacæ.*—APOSTASIACEÆ.—

Fig. CXXV.—*Apostasia odorata*; 1. a flower; 2. the stamens and style; 3. a cross section of the ovary; 4. a seed.

ALLIANCE XIV. *XYRIDALES*.—THE XYRIDAL ALLIANCE.

DIAGNOSIS.—*Hypogynous bisexual tripetaloid Endogens, with copious albumen.*

It is in this Alliance that, among Endogens with a free ovary, the first distinct separation of a corolla from the calyx takes place, in the form of (2 or) 3 petals. Hence the essential character of the Alliance is its tripetaloid condition. In the absence of that circumstance it is not to be distinguished from Juncals on the one hand, or Liliacs on the other. The Waterworts (*Philydraceæ*) seem to have anticipated the tripetaloid organization by forming petals before sepals, and hence they present the anomaly of a flower with a very conspicuous corolla having no calyx, the office of which appears to be performed by spathaceous bracts. Xyrids resemble Sedges with a corolla, and are no doubt akin to Pipeworts (*Eriocaulaceæ*). Spiderworts are analogous to Parids among *Dictyogens*, and as for the *Mayacs* they may be compared to *Leptanthus* among *Pontederas*, or to *Potamogeton* among the *Arrow-grasses*.

NATURAL ORDERS OF XYRIDALS,

- | | | |
|---|---|-------------------|
| <p><i>Sepals</i> 0. <i>Petals</i> 2. <i>Stamens</i> 3, of which 2 are abortive. <i>Embryo</i> axile, in fleshy albumen</p> | } | 54. PHILYDRACEÆ. |
| <p><i>Sepals</i> 3. <i>Petals</i> 3. <i>Stamens</i> 3 fertile. <i>Carpels</i> opposite sepals. <i>Placentæ</i> parietal. <i>Embryo</i> minute, on the outside of fleshy albumen</p> | } | 55. XYRIDACEÆ. |
| <p><i>Sepals</i> 3. <i>Petals</i> 3. <i>Stamens</i> 6 (or 3). <i>Carpels</i> opposite sepals. <i>Placentæ</i> axile. <i>Embryo</i> trochlear, half immersed in fleshy albumen</p> | } | 56. COMMELYNACEÆ. |
| <p><i>Sepals</i> 3. <i>Petals</i> 3. <i>Stamens</i> 3; (anthers one-celled). <i>Carpels</i> opposite petals. <i>Placentæ</i> parietal. <i>Embryo</i> minute, on the outside of fleshy albumen</p> | } | 57. MATACEÆ. |

ORDER LIV. PHILYDRACEÆ.—WATERWORKS.

Philydræ, *R. Br.* (1832?); *Lindl. Nixus*, 22. (1833); *Endl. gen. lli.*; *Meisner*, p. 406; *Kunth Enum.* 3. 379.

DIAGNOSIS.—*Xyridal dipetalous Endogens without a calyx, with 3 stamens of which 2 are abortive, and an embryo in the axis of fleshy albumen.*

Root fascicled-fibrous. Stems erect, simple, leafy, often woolly. Leaves ensiform, somewhat cellular, equitant with their half-sheathing bases.



Fig. CXXVI. Other with distinct cells. Ovary superior; style simple; stigma

capitate; ovules numerous, on narrow, parietal or axile placentæ, horizontal, anatropal. Capsule 3-celled, 3-valved; the valves having the partition in their middle. Seeds numerous, minute, horizontal; their skin thick; with the embryo in the axis of fleshy albumen.

These are herbaceous plants, having the great spathaceous bracts of a plant of the Musads, combined with the habit of Sedges; and at the same time having a flower like that of a Spiderwort, minus its calyx and one petal. It is uncertain what the exact analogy of its petaloid divisions may be; but they appear to belong to the corolla. Brown regards the Waterworks as having some relation to Burmannia, and even to Orchids, on account we presume of the constant abortiou of 2 out of the 3 stamens. Their nearest relationship, however, is plainly with Xyrids and Spiderworts, from the former of which they differ in the want of a glumaceous calyx, and from both in the large embryo lying in the axis of the albumen.

The only plants of this Order yet discovered are found in New Holland, Cochinchina, and China.

Nothing is known of any use to which they may be applied.

GENERA.

Philydrum, *Banks.*Garciana, *Lour.*Hetæria, *Endl.*

NUMBERS. GEN. 2. Sp. 2.

Orchidacæ.

POSITION.—Commelynacæ.—PHILYDRACEÆ.—Xyridacæ.



Fig. CXXVII.

Fig. CXXVI.—A seed of *Philydrum lanuginosum*, divided perpendicularly so as to show the embryo.
Fig. CXXVII.—1. *Hetæria pygmaea*; 2. a flower; 3. the fertile stamen and two lateral sterile ones; 4. a cross section of the ovary.

ORDER LV. XYRIDACEÆ.—XYRIDS.

Xyridæ, Kunth in Humb. *N. G. et Sp.* 1. 255. (1815) a sect. of Restiaceæ; Agardh *Aphorism.* 158. (1823); Desvaux in *Ann. des Sc.* 13. 49. (1828); *Endl. Gen.* xvii.; Meisner, p. 407; Kunth *Enum.* 4. p. 1.—Rapateæ, *Endl. l. c.*

DIAGNOSIS.—Xyridal Endogens, with 3 sepals opposite the carpels, 3 petals, 3 fertile stamens, parietal placentæ, and a minute embryo on the outside of fleshy albumen.

Herbaceous sedgy plants with fibrous roots. Leaves radical, ensiform, or filiform, with enlarged scarious sheathing bases. Flowers in terminal, imbricated, scaly heads.

Sepals 3, glumaceous. Petals 3, thin, long, and coloured, united into a monopetalous corolla. Fertile stamens 3, inserted upon the claws of the petals; anthers turned outwards, 2-celled; sterile stamens alternate with the petals. Ovary single, 1-celled, with parietal placentæ; ovules numerous, orthotropal; style trifid; stigmas obtuse, multifid, or undivided. Capsule 1-celled, 3-valved, many-seeded, with parietal placentæ. Seed with the embryo on the outside of the fleshy albumen, and at the end most remote from the hilum.

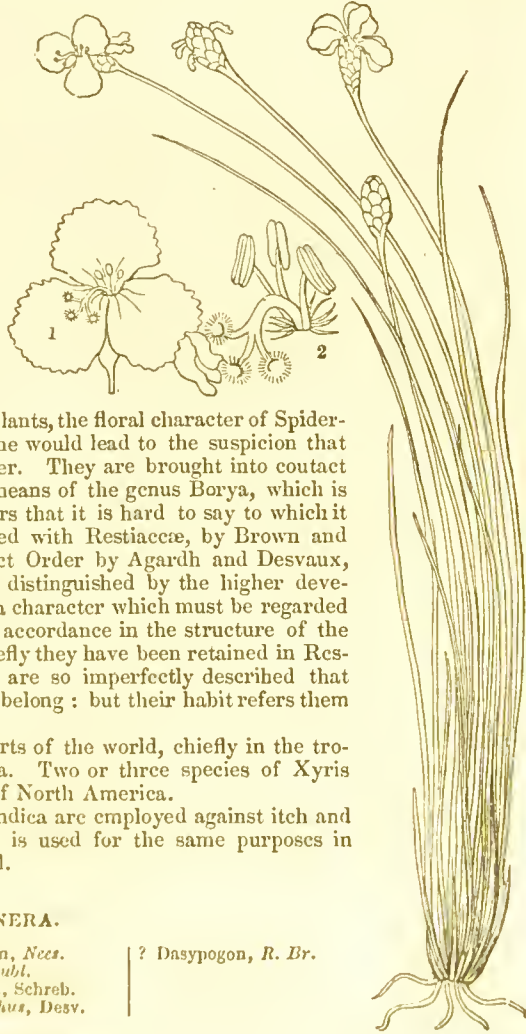


Fig. CXXVIII.

GENERA.

Xyris, Linn.
Abolboda, H. et B.
Chlorum, Willd.

? *Acoridium*, Nees.
Rapateæ, Aubl.
Mnarium, Schreb.
Spathanthus, Desv.

? *Dasypogon*, R. Br.

NUMBERS. GEN. 5. Sp. 70.

Cyperaceæ.

POSITION.—Mayaceæ.—XYRIDACEÆ.—Cormelynacæe.

Fig. CXXVIII.—*Xyris operculata*; 1. a flower seen in front; 2. a style, stigmas and stamens.

ORDER LVI. COMMELYNACEÆ.—SPIDERWORTS.

Ephemereæ, *Batsch. Tab. Affin.* 125. (1802) *in part.*—Commelyneæ, *R. Brown Prodr.* 268. (1810); *Richard in Humb. Bonpl. N. Gen.* 1. 258. (1815); *Agardh Aph.* 168. (1823); *Kunth. Enum.* 4. 34.
—Commelyneæ, *Ed. prior. Endl. Gen.* xlviii.; *Meisner, Generavp.* 406.—Flagellariæ, *Endl. Gen.* p. 131.

DIAGNOSIS.—*Xyridal Endogens, with 3 sepals opposite the carpels, 3 petals, 6 (or 3) stamens, axile placentæ, and a trochlear embryo half immersed in fleshy albumen.*

Herbaceous plants. Leaves flat, narrow, usually sheathing at the base. Sepals 3, distinct from the petals, herbaceous. Petals coloured, sometimes cohering at the base. Stamens 6, or a smaller number, hypogynous, some of them either deformed or abortive; anthers 2-celled, turned inwards. Ovary 3-celled, with few-seeded cells; style 1; stigma 1. Capsule 2- or 3-celled, 2- or 3-valved, the valves bearing the dissepiments in the middle. Seeds often twin, inserted by their whole side on the inner angle of the cell, whence the hilum is linear, with a papilla covering over the embryo; embryo pulley-shaped, antitropal, lying half-buried in a cavity of the albumen remote from the hilum; albumen densely fleshy.

The Spiderworts are plants which exhibit a transition from the first remove out of the regions of sedge-like plants to the true Lilies. In other words, while Xyrids are glumaceous herbs with their perfectly-formed petals, there are Xyrids with the glumaceous structure gone, and the Liliaceous peculiarities gained: all but the long axile embryo and the petaline condition of the calyx. Brown compares them with Rushes, observing that they are very different both in habit and structure; agreeing better with Restiaceæ in the situation of the embryo and the sheathing leaves, although otherwise quite distinct; they have scarcely any affinity with Palms, except in the trochlear embryo, remote from the hilum, and indicated in both Orders by an external papilla. The Spiderworts may also be compared with Alismads, which are equally tripetaloidous, and with Mayacs, which have 1-celled anthers, a wholly cellular structure, and, as they say, the carpels opposite the petals.

Chiefly found in the East and West Indies, New Holland, and Africa. A few occur in North America, but none in Northern Asia or Europe.

Concerning their uses there is little to relate. The fleshy rhizomes of *Commelyna cœlestis*, *tuberosa*, *angustifolia* and *striata*, contain a good deal of starch mixed with mucilage, and are therefore fit for food when cooked. The Chinese employ those of *C. medica* in cough, asthma, plenrisy, strangury, and dysury. *Tradescantia diuretica* has a similar application in Brazil. A decoction of *Cyautotis axillaris* is drunk in the East Indies in cases of tympanis, and *Tradescantia Malabarica* is administered in the same country, boiled in oil, as a remedy for itch and leprosy. *Murdannia scapiflora* is said by Dr. Royle "to have some repute in Hindoo Materia Medica." *Commelyna Rumphii* is held in India to be emmenagogue. The leaves of *Flagellaria indica* are said to be astringent and vulnerary.



Fig. CXXIX.

GENERA.

Commelyna, *Dillen.*
Hedwigia, *Medik.*
Lechea, *Lour.*
Ananthopus, *Raf.*
Anellema, *R. Br.*
Aphilax, *Salisb.*

Palisota, *Reichenb.*
Pollia, *Thunb.*
Aclisia, *E. Mey.*
Lamprocarpus, *Blum.*
Callisia, *Lisfl.*
Hapalanthus, *Jacq.*
Murdannia, *Royle.*

Tinnantia, *Scheidw.*
Tradescantia, *Linn.*
Ephemerum, *Tournef.*
Spirocnema, *Lindl.*
Cyanotis, *Don.*
Zygomenes, *Salisb.*
Lampra, *Benth.*

Campelia, *Rich.*
Zanonia, *Plum.*
Dichorisandra, *Mik.*
Cartonema, *R. Br.*
Forrestia, *A. Rich.*
Flagellaria, *L.*

NUMBERS .GEN. 16.—Sp. 260.

Liliaceæ.

POSITION.—.—COMMELYNACEÆ.—Xyridaceæ.

Bromeliaceæ.

Fig. CXXIX.—*Anellema crispatum*; 1. a flower; 2. the calyx and pistil; 3. the capsule; 4, 5. seeds; 6. a section of ditto showing the embryo; 7. the papilla; 8. the embryo. *Fred. Bauer.*

ORDER LVII. MAYACEÆ.—MAYACS.

Mayaceæ, Kunth. Enum. iv. 30 (1843).

DIAGNOSIS.—*Xyridal Endogens*, with 3 sepals alternate with the carpels, 3 petals, 3 stamens, 1-celled anthers, parietal placenta, and a minute embryo on the outside of fleshy albumen.

Moss-like plants, creeping over damp places, almost entirely destitute of spiral vessels. Leaves very narrow, pellucid, undivided. Flowers ♀, small, white, pink, or violet. Sepals valvate! herbaceous. Petals much longer, imbricated. Stamens 3, inserted into the base of the sepals; anthers 1-celled, adhering by the base to a thread-like filament, opening at the point only. Carpels 3, alternate with the sepals, combined into a 1-celled ovary; placenta 3, parietal; ovules sessile, horizontal, orthotropical; style thread-like; stigma simple. Capsule membranous, covered by the permanent sepals and petals, 1-celled, 3-valved; seeds attached to the middle of the valves, roundish, ribbed, terminated by a conical tubercle. Albumen shaped like the seed, composed of angular crystal-like cells, arranged in a radiant manner. Embryo very minute, antitropical, half plunged in the vertex of the albumen.

Such appears to be the structure, according to Kunth, and Schott, and Endlicher, of a few plants which are separated from the Spiderworts by the former of these botanists. They are very little known, and demand a fresh examination, but in the meanwhile appear to be distinguished from the Spiderworts by their peculiar habit, their 1-celled anthers, and their carpels being opposite the petals (according to Schott and Endlicher), while, on the other hand, the Xyrids are separated by their monopetalous glumaceous capitate flowers and 2-celled anthers. There is, however, but little other difference, unless the valvate calyx of the Mayacs and the position of their carpels should afford additional characteristics. This, however, is to be noted, that the figures given by the last mentioned botanists are at variance with their account of the position of the carpels. No spiral vessels were detected by Schleiden in the leaves and stems of *Mayaca fluviatilis*, except in the flower-stalks.—*Wiegman*. *Arch.* v. 231.

The few species that are described inhabit the marshes of America, from Brazil up to Virginia.

They are of no known use.

GENERA.

Mayaca, Aubl.
Blasita, Vand.
Syrens, Schreb.
Colletia, Flor. Flum.

NUMBERS. GEN. 1. Sp. 4.

POSITION.—*Commelynaceæ*.—*MAYACEÆ*.—*XYRIDACEÆ*.

Fig. CXXX.—*Mayaca Vandellii*: 1. a flower; 2. a cross section of its ovary; 3. a seed vessel; 4. two seeds, one of which is cut perpendicularly in order to show the embryo.



Fig. CXXX.

ALLIANCE XV. *JUNCALES*.—THE JUNCAL ALLIANCE.

DIAGNOSIS.—*Hypogynous, bisexual, scaly or scarious flowered Endogens, with abundant albumen.*

This and the Xyridal Alliance stand on the same line in the scale of organization. They both consist of Endogens, which are equally related to Orders of a very low and very high structure. The Juncals approach Grasses and their allies in the glumaceous character of their calyx and corolla, the Xyrids in that of their calyx and bracts. Some of them are absolutely without floral envelopes, the majority have those organs in the form of inconspicuous scales, and when colour or a petalino condition appears among them, the parts in which it occurs are dry and sapless, as if they were mere membranes or attempts at the organs they represent. The Rushes have a very minute embryo, wholly destitute of all appearance of a plumule; Orontiads have the cleft of an Arum, through which a plumule is easily found. The great exception to their character consists in the absence of albumen from the seeds of a few genera among the Orontiads; but such plants are readily known by their spadiceous inflorescence from the exalbuminous Alismal Alliance.

NATURAL ORDERS OF JUNCALS.

- Flowers scattered. Embryo minute, undivided* 58. JUNCACEÆ.
Flowers spadiceous. Embryo axile, with a conspicuous cleft on one side. 59. ORONTIACEÆ.

ORDER LVIII. JUNCACEÆ.—RUSHES.

Junci, *Juss. Gen.* (1789), *in part.*—*Juncaceæ*, *DC. Fl. Fr.* 3. 155. (1815) ; *R. Brown Prodr.* 257. (1810).—*Juncaceæ*, *Agardh Aphor.* 156. (1823), *in part.* ; *Endl. Gen. li.* ; *Meisner, Gen.* p. 405. *Kunth. Enum.* 3. p. 205. *Kingiaceæ*, *Calcectasiæ*, *Xerotidæ*, *Endl. l. c.*

DIAGNOSIS.—*Juncal Endogens*, with scattered flowers and a minute undivided embryo.

Herbaceous plants, with fascicled or fibrous roots. Leaves fistular, or flat and channelled with parallel veins. Inflorescence often more or less capitate. Flowers generally brown or green, in umbels, racemes, or long compact spikes, or even panicles. Calyx and corolla forming an inferior, 6-parted, more or less glumaceous or cartilaginous, perianth. Stamens 6, inserted into the base of the segments ; sometimes 3, and then opposite the calyx. Anthers 2-celled, turned inwards, opening longitudinally, or by pores at the points. Ovary 1- or 3-celled, 1- or many-seeded, or 1-celled and 3-seeded ; style 1 ; stigmas generally 3, sometimes only 1 ; ovules anatropal. Fruit capsular, with 3 valves, which have the dissepiment in their middle, sometimes destitute of valves, and 1-seeded by abortion. Seeds with a thin skin ; albumen firm, fleshy, or cartilaginous ; embryo very minute, included, near the hilum.

This Order, in its most genuine state, may be said to stand between petaloideous and glumaceous Endogens, agreeing with the former in the floral leaves having assumed the verticillate state necessary to constitute a perianth, and with the latter in their texture. But while a glumaceous confused calyx and corolla are the characteristic of one part of the Order, another part, approaching Lilyworts, assumes a petaloid state ; so that little is finally left to separate Rushes from the latter, except the difference in the embryo, which is extremely small in Rushes, and large and axile in Lilies. It is in fact by this last character, more than by any other, that the Order seems to be distinguished ; for otherwise, *Narthecium* would go to Lilies, and all the *Aphyllanthous* Lilies would come to Rushes. The genera are in great need of careful revision ; of several the embryo is unknown, and it may be found hereafter necessary to make considerable alteration among them ; but till the whole history of the obscure genera shall have been cleared up, it is at least premature to create more Orders for their reception. I do not discover a single feature in *Xerotes* which can divide it from Rushes proper, and as to *Flagellaria*, equally made the usurper of a throne that cannot be maintained, it seems a mere runaway from the Spiderworts, differing very little from *Ancilema*. Some of the species of this Order are remarkably unlike European Rushes. The *Pronium Palmita* of the Cape of Good Hope, has the look of an *Aloe*, or of the crown of a *Pine-apple*, mounted upon a thick black spongy stem. *Kingia* has an arborescent stem terminated by a tuft of leaves. *Calcectasias* are branched herbs, with dry, permanent, starchy flowers, of a bright violet, and anthers opening by pores, like a *Solanum*. According to *Brown (Hooker's London Journal*, 2. 494.), the genera *Kingia*, *Dasyopogon*, *Calcectasia*, *Xerotes*, and *Bacteria*, form a peculiar tribe of this Order ; but no character is assigned to such tribe. I cannot, however, include *Dasyopogon*. *Brown* remarks, that Rushes are intermediate between *Restiaceæ* and *Asphodeleæ*, differing from the former in having an included embryo, a radicle usually centripetal, and the stamens, when there are only 3, opposite the sepals. *Agardh* combines *Restiaceæ* and Rushes.—*Aph.* 157. From Palms they are distinguished, independently of their habit, by the texture of the perianth, by the constant tendency to produce more than 1 ovule in each cell, and by the embryo never

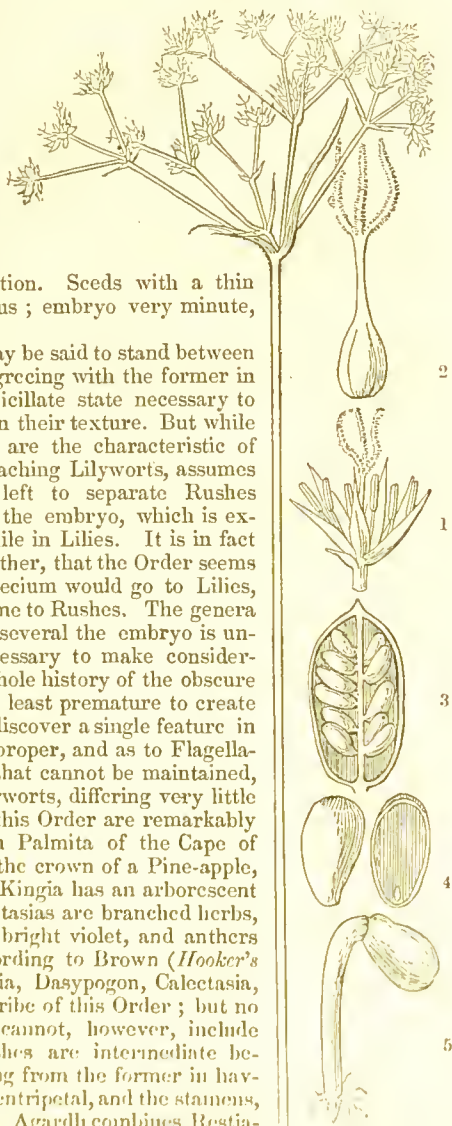


Fig. CXXXI.

Fig. CXXXI.—*Juncus acutiflorus* ; 1. a flower ; 2. the pistil ; 3. a perpendicular section of the ovary ; 4. seeds ; 5. a seed germinating

being remote from the hilum. *Juncus* is an instance of a monocotyledonous plant having distinct pith. "Xerotes, in the structure and appearance of its flowers, and in the texture of albumen, has a considerable resemblance to Palms, but it wants the peculiar characters of the seed, and also the habit of that remarkable Order."—*Brown in Flinders, 578.*

Chiefly found in the colder parts of the world, some even in the coldest, two existing in the nugenial climate of Melville Island. Several, however, are known in the tropics. Eight are mentioned as inhabiting the tropical parts of New Holland alone. According to Humboldt they constitute $\frac{1}{400}$ of the flowering plants in the equinoctial zone; in the temperate zone, $\frac{1}{90}$; in the frozen zone $\frac{1}{25}$; in North America, $\frac{1}{150}$; in France, $\frac{1}{30}$. In Sicily, according to Presl, they do not form more than $\frac{1}{300}$.

Only employed for mechanical purposes, as the Rush and others for making the bottoms of chairs, &c.; the pith of the same for the wick of common candles. One species is cultivated in Japan like Rice, entirely for making floor-mats.—*Thumb.* The blanched portion of the base of the inner leaves of some Rushes, and of *Astelia alpina*, a sedgy plant, which grows on the sand-hills of the coast of Tasmannia, and has the mature leaves an inch wide, and of a deep green, are eatable, and of a nutty flavour. The flowers resemble those of Rushes. They grow in clusters, on a stem as flat and broad as the leaves.—*Backhouse.* The roots of *Luzula campestris*, and several Rushes, have a popular reputation as diuretics, and are used as such in the north of Europe and China. The herbage of *Narthecium ossifragum* was once regarded as a vulnerary. *Susum*, a Java plant, supposed to be near *Xerotes*, has anthelmintic roots employed in veterinary practice. Dr. J. Hooker observes, that in some species of this Order the outer membrane of the seeds forms with water a transparent jelly similar to what is seen on the moistened grains of some Composite plants.

GENERA.

<i>Luzula, DC.</i>	<i>Rostkovia, Desv.</i>	<i>Cephaloxys, Desv.</i>	<i>Hamelinia, A. Rich.</i>
<i>Luciola, Smith.</i>	<i>Marsippospermum,</i>	<i>Susum, Bl.</i>	? <i>Funkia, W.</i>
<i>Prionium, E. Mey.</i>	Desv.	<i>Xerotes, R. Br.</i>	<i>Hanguana, Bl.</i>
<i>Juncus, DC.</i>	<i>Narthecium, Mochr.</i>	<i>Lomandra, Lab.</i>	<i>Kingia, R. Br.</i>
<i>Distichia, Nees.</i>	<i>Abama, Adans.</i>	<i>Astelia, Sol.</i>	<i>Baxteria, R. Br.</i>
			<i>Calcectasia R. Br.</i>

NUMBERS. GEN. 13. Sp. 200.

POSITION. ————— *Liliaceæ.*
 ————— JUNCACEÆ. ————— *Orontiaceæ.*
 ————— *Cyperaceæ.*

ORDER LIX. ORONTIACEÆ.—ORONTIADS.

Orontiaceæ, *R. Brown, Prodr.* 337. (1810); *Endl. Gen.* p. 239. *Adr. Juss. Cours. Élém.* p. 506.—*Caliceæ, Endl. Gen.* p. 239. (1836); *Meisner, p.* 360.—*Acoroideæ, Agh. Aph.* 133. (1822; *Schott. Meletem.* 22, (1832.—*Acorinæ, Link Handb.* i 144.—*Acoraceæ, ed. pr. eclxii.*

DIAGNOSIS.—*Juncal Endogens, with spadicous flowers, and an axile embryo with a lateral cleft.*

Herbaceous plants, with broad entire or deeply divided leaves, which however are occasionally sword-shaped and equitaut. Some of them are stemless, others scramble over trees, to which they adhere by creeping roots; a few are aquatics. Flowers ♂, on a simple spadix, furnished with a spathe, white, green, or purple. Calyx and corolla absent, or consisting of 4, 5, 6, 8 scales. Stamens of the same number, either hypogynous or perigynous; anthers 2-celled, opening longitudinally or transversely. Ovary free, with 1 or more cells; ovules erect, anatropal or campylotropal, or pendulous and orthotropal; stigma capitate, sessile, or furnished with a subulate style. Fruit a berry. Embryo slit on one side, in the axis of fleshy, or horny, or mealy albumen. (Albumen absent in *Scindapsus, Dracontium, Symplocarpus, Orontium.*—*Endl.*)

The greater part of these plants have the habit of Arads, with which they are usually associated, and from which in fact they differ only in having hermaphrodite flowers, which have usually a scaly perianth. For this reason other Botanists separate them, and it seems more especially desirable to do so, because there is no tendency among them to a separation of the sexes. Acoraceæ are indeed usually regarded as the type of a peculiar Order; and if this opinion is correct, the Orontiads must certainly accompany them, for they differ in nothing except the form of their leaves, which, in Acoraceæ, are sword-shaped and straight-veined. In fact, Acorus seems to bear the same relation to Orontiads as *Pandanus* and *Freydenetia* to *Cyclanths*. Blume considers these plants to be allied, on the one hand, by *Pothos* and *Saururaceæ*, and, on the other, to *Lilyworts*.—*Rumphia* 2. 74. in which he is probably right; for *Aspidistree* form a connecting link between Orontiads and Lilies. Brown has remarked that in *Dracontium polyphyllum* and *foetidum*, in which there is no albumen, the plumule consists of imbricated scales, and that it is sometimes double or even triple. In the former of these plants the external scales, in germination, quickly wither away, when other internal and larger ones appear, and remain for some time round the base of the primordial leaf, before the development of which no rootlets are emitted.—*Prodr.* 334. A similar economy has been noticed by Du Petit Thouars, in his genus *Ouvirandra* in *Alismads*.

The plants of this Order chiefly occupy woodland stations within the tropics of both hemispheres, but many are found in colder latitudes; for *Symplocarpus* is common in the swamps of the United States; *Calla palustris* inhabits the deep muddy frozen marshes of S. Lapland, in 64° N., and on the Andes, *Pothos pedatus* and *quinquenerius* rise to the height of 8400 feet above the sea.

The fresh leaves of *Monstera pertusa* are employed by the Indians of Demerara as vesicatories or rubefiants in cases of dropsy. The root and seeds of *Skunk Cabbage, Symplocarpus foetidus*, a most foetid species, are powerful antispasmodics and expectorants; they have considerable reputation in N. America, as palliatives in paroxysms of asthma. *Dracontium polyphyllum*, said to be the *Labaria* plant of Demerara, is reputed to possess similar properties. *Orontium aquaticum* is acrid when fresh, but its dried root can be eaten without inconvenience. The corn of the beautiful *Richardia africana*, with its snowy spathe and golden spadix, was formerly officinal under the name of *Radix Ari Æthiopii*. The rhizomes of *Calla palustris*, although acrid and caustic in the highest degree, are, according to *Linnaeus*, made into a kind of bread in

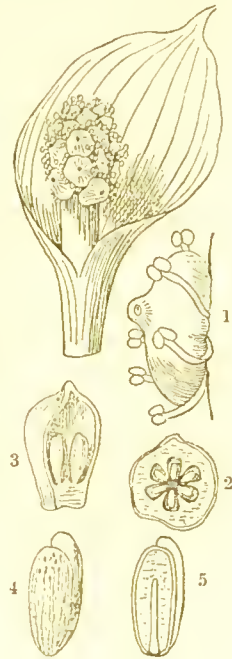


Fig. CXXXII.

Fig. CXXXII.—*Calla palustris*: 1. a flower; 2. a section of the ovary; 3. a perpendicular section of the ripe fruit; 4. a seed; 5. its longitudinal section.—*Nees.*

high estimation, called Missebroed, in Lapland. This is performed by drying and grinding the roots, afterwards boiling and macerating them till they are deprived of their acrimony, when they are baked like other farinaceous substances. The plant has the credit of being a very active diaphoretic. The fruit of *Scindapsus officinalis*, cut into transverse pieces and dried, is an article of some importance in Hindoo Materia Medica, is called Gnj-pippul, and sold by the druggists under that name.—*Roxb.* *Pothos scandens* is employed in India as a remedy for putrid fevers. The rhizome of *Acorus Calamus* contains an aromatic bitter principle, which has caused the plant to be regarded as medicinal. In cases of chronic catarrh and humid asthma benefit has been received from its exhibition. In Constantinople it is made into a confection, is considered a good stomachic, and eaten freely during the prevalence of epidemic diseases. It is in this country chiefly employed by perfumers, in the manufacture of hair powder, on account of the fragrance of the essential oil which is mixed with its farinaceous substance. Dr. Pereira says, that although it is rarely employed in medicine, it might frequently be substituted for other more costly aromatics; it is adapted to cases of dyspepsia, or as an adjunct to tonics or purgatives.

GENERA.

Tribe I.— <i>Callææ</i> . <i>Flowers naked. Ovules erect.</i>	Tribe II. — <i>Orontieæ</i> . <i>Flowers with a regular perianth. Leaves plane, entire, palmate or pinnated. Ovules pendulous.</i>	<i>Anthurium, Schott.</i> <i>Spathiphyllum, Schott.</i> <i>Dracontium, Linn.</i> <i>Symplocarpus, Salisb.</i> <i>Ictodes, Bigelow.</i> <i>Spathyema, Rafin.</i> <i>Orontium, Linn.</i>	Tribe III. — <i>Acoreæ</i> . <i>Flowers with a regular perianth. Leaves ensiform, equitant. Ovules pendulous.</i>
<i>Calla, Linn.</i> <i>Monstera, Adans.</i> <i>Heteropsis, Kth.</i> <i>Scindapsus, Schott.</i> * <i>Rhaphidophora, Hassk.</i>	<i>Pothos, Linn.</i> <i>Lasia, Loureir.</i>		<i>Gymnostachys, R. Br.</i> <i>Acorus, Linn.</i>

NUMBERS. GEN. 13. Sp. 70.

*Piperacææ.*POSITION.—*Juncacææ*.—ORONTIACEÆ.—*Liliacææ*.
Araccææ.

ALLIANCE XVI. LILIALES.—THE LILIAL ALLIANCE.

DIAGNOSIS.—*Hypogynous, bisexual, hexapetaloid Endogens, with copious albumen.*

These are the centre of the division of Endogens with complete flowers free from the ovary. They are known from the Xyrids by their sepals and petals being all equally coloured; from the Juncals by their tender highly developed flowers; and from the Alismals by their abundant albumen. To Palms they often approach in habit, and even in the separation of their sexes; but the genera described by botanists as monœcious or diœcious seem to be never truly diclinous, the distinct rudiments of one sex always accompanying the perfect state of another. By the Gilliesiads they seem to show a tendency to assume the glumaceous condition; Pontederads are evidently on the limits of Alismals, by their genus *Leptanthus*; Juncals are brought into the closest proximity by the *Aphyllanths* among Lilies, and so are *Amaryllids* by means of the *Conanthereæ* of the same great Order. Their undoubted accordance with *Dictyogens*, in many essential particulars, enables them to extend their frontier to that of the vast mass of *Exogens*; and their wood, which does certainly, in *Yucca* and *Dracæna*, arrange itself in circles, confirms the tendency of the Liliales towards a junction with the same class.

NATURAL ORDERS OF LILIALES.

- | | | |
|---|---|-------------------|
| <i>Perianth surrounded by a calycine involucre, the inner bracts of which are coloured and petaloid</i> | } | 60. GILLIESIACEÆ. |
| <i>Perianth naked, flat when withering. Anthers turned outwards; styles distinct; albumen fleshy</i> | | |
| <i>Perianth naked, flat when withering. Anthers turned inwards. Styles consolidated. Albumen fleshy</i> | } | 62. LILIACEÆ. |
| <i>Perianth naked, circinate when withering. Anthers turned inwards. Albumen mealy</i> | | |
| | } | 63. PONTEDERACEÆ. |
| | | |

ORDER LX. GILLIESIACEÆ.—GILLIESIADS.

Gilliesiæ, *Lindl. in Bot. Reg.* 992. (1826); *Hooker in Bot. Mag.* 2716. (1827).—Gilliesiaceæ, *Ed. pr.* ccxlix. *Endl. Gen.* p. 152; *Meisner, Gen.* p. 398.

DIAGNOSIS.—*Lilial Endogens with a calyx-like involucre, the inner bracts of which are coloured and petal-like.*

Small herbaceous plants, with tunicated bulbs. Leaves grasslike. Flowers umbellate, somewhat spathaceous, inconspicuous, hermaphrodite, surrounded by bracts the outer of which are petaloid and herbaceous, the inner starved and coloured. Perianth minute, either a single lip-like lobe, or an urecolate 6-toothed body. Stamens 6, either all fertile, or 3 sterile and nearly obliterated. Ovary superior, 3-celled; style 1; stigma simple. Capsule 3-celled, 3-valved, with a loculicidal dehiscence, many-seeded. Seeds attached to the axis, by means of a broad hollow neck; testa black and brittle; embryo curved in the midst of fleshy albumen.

To the following account of these plants, originally given in the *Botanical Register*, when speaking of Gilliesia, little has to be added.

“The whole structure of this plant is so peculiar, that I scarcely know whether the description of the parts of fructification above given will not be considered more paradoxical than just; and yet, if the analogies the various organs bear to those of other plants be carefully considered, their structure will scarcely admit of any other interpretation. With respect to the five petaloid leaves, which are here described as bracts, and which bear a considerable degree of resemblance to a perianth, it may be observed, that this appearance is more apparent than real; they neither correspond in insertion nor in number with the segments of a monocotyledonous perianth, nor do they bear the same relation to the parts contained as a perianth should bear. The three outer are not inserted on the same line, but are distinctly imbricated at the base; and the two inner do not complete the second series, as would be required in a regular monocotyledonous perianth. But if we were to admit, for a moment, the possibility of these bracts being segments of a perianth, what explanation could be given of the setiform processes proceeding from their base, or of the central fleshy slipperlike body from within which the stamens proceed? The former bear no determinate relation to the other parts of the flower in their insertion; they are subject to much diversity of form and number, being sometimes eight, consisting of two unequal subulate bodies proceeding from the edges of each lateral segment, the outermost of the two being wider than the innermost, and being, moreover, not infrequently a manifest process of the margin of the segment itself; sometimes having their number reduced to four by the suppression of the exterior processes of each lateral segment; and occasionally having the outer processes suppressed on one segment, and not suppressed on the other. In the many flowers which have been under examination, the processes, moreover, were always constituted of cellular tissue alone, without either spiral or tubular vessels. These circumstances being considered, it will scarcely be proposed, we presume, to identify them with abortive stamina. If they are, notwithstanding what has been advanced, determined to be the perianth itself, what

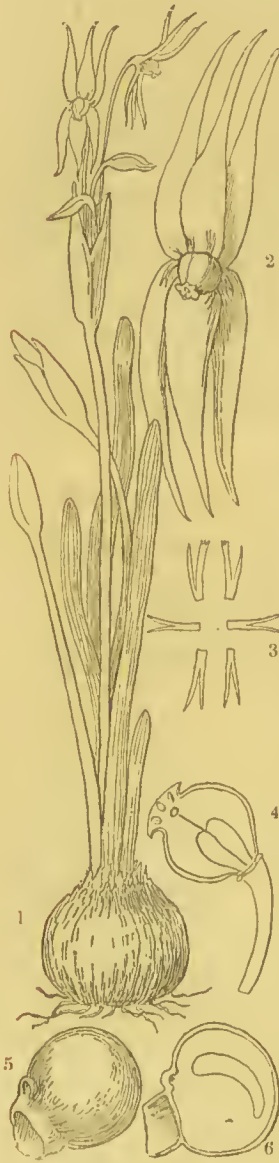


Fig. CXXXIII.

Fig. CXXXIII.—1. *Miersia chilensis*; 2. its flower; 3. the interior coloured petaloid bracts; 4. a perpendicular section of the perianth (from a sketch by Mr. Miers); 5. a seed of *Gilliesia graminea*; 6. a section of the same.

becomes of the outer segments, which had previously been referred to the perianth? for it would be difficult to trace any analogy between the structure of Gilliesia and of those genera in which a third series is added to the usual ternary division of Monocotyledons. But none of the peculiarities adverted to are opposed to those bodies being referred to depauperated or reduced bracts. With respect to the central body from which the stamens proceed, this body, which might be conveniently disposed of by referring it to what Linnean botanists call a nectarium, consists of a fleshy slipperlike lobe, with or without two auricles at the base, and within which the cup of stamens is inserted. The relation it bears, as regards insertion, to the parts which have been already noticed, is very obscure; it is always opposite the solitary external bracts; but whether it is anterior with respect to the common axis of inflorescence, or posterior, has not at present been ascertained. The reasons which have been offered for the view here taken of the parts surrounding this body, make it obvious that it must be considered the perianth. It manifestly bears an intimate relation to the stamens, being obliterated in the same direction and degree as they are. In this view, then, the petaloid segments are considered perfect bracts, the subulate interior processes abortive bracts, and the fleshy central labelloid body the perianth. However paradoxical this description of Gilliesia may appear, it will probably be found more deserving of attention if compared with Miersia. In Miersia the bracts are six in number, of which two are interior and four exterior, a still more valid reason against their being segments of a perianth. The subulate processes assume a more regular form, and a more constant mode of insertion, but still bear no very apparent relation to the bracts, and the fleshy labelloid central body is represented by an urceolate six-toothed cup, within the orifice of which six fertile stamens are included. In Miersia, therefore, the perianth, which was in Gilliesia subject to a certain degree of imperfection, in which the stamens also participated, is in the usual regular form of many Monocotyledous, no irregularity occurring in the stamens. As there can be no doubt of the affinity between Gilliesia and Miersia, and as there can also be little doubt that the central body of the latter genus is a perianth, it will follow, that as the supernumerary appendages of that genus are external with respect to the perianth, and are therefore neither perianth nor stamens, so also will the analogous appendages of Gilliesia not be perianth. And the central body having been ascertained to be perianth, all the parts which surround it will necessarily be bracts, or modifications of them.

"The natural affinity of these two genera is obscure. Their black, brittle seeds, large axile embryo, tunicated bulbs, spathaceous inflorescence, and general appearance, place them near Lilyworts, with some genera of which, especially Muscari and Puschkinia, Miersia at least agrees in the structure of perianth; but there is no genus among the Lilies to which the fructification of Gilliesiads can be otherwise compared. If the one-flowered species of Schoenus, in which a single naked flower is surrounded by several imbricated scales, be admitted as a form of inflorescence analogous to that under consideration, it may perhaps be allowable to carry this comparison yet further, and to suggest an identity of origin and function between the depauperated bracts of Gilliesia and the hypogynous setæ of Scirpus and other Sedges."

But although such plants may be analogous in structure to the Gilliesiads, as well as to Cordleaves, to which they were also compared in the work above quoted, yet no doubt can exist, that they form a most curious part of the Lillial Alliance.

Chilian bulbs, of no known size.

GENERA.

Gilliesia, *Lindl.*

Miersia, *Lindl.*

NUMBERS. GEN. 2. Sp. 5.

POSITION. ——— GILLIESIACEÆ.—Liliacæ.
Cyperacæ.

ORDER LXI. MELANTHACEÆ.—MELANTHS.

Melanthææ, *Batsch, Tab. Aff.* (1802).—Colchicææ, *Dec. Fl. Fr.* 3. 192. (1815); *Ess. Mld.* 298. (1816); *Bartl. Ord. Nat.* 51. (1830).—Melanthaceæ, *R. Brown, Prodr.* 272. (1810); *Endl. Gen.* liii. *Meisner, Gen.* p. 404. *Kunth, Enum.* 4. 136. *A. Gray, Lyceum, N. York, vol.* 4. (1837).—Veratrea, *Satisb. in Hort. Trans.* 1. 328. (1812); *Agardh Aphor.* 166. (1823).—Merenderæ, *Mirb. according to De Candolle.*—Anguillareæ, *Don. in Linn. Trans.* 18. 513.

DIAGNOSIS.—*Lilial Endogens with a naked perianth, flat when withering, anthers turned outwards, distinct styles, and fleshy albumen.*

Bulbous, tuberous, or fibrous-rooted plants, extremely variable in appearance; in the Colchicææ stemless, with the flowers half subterranean like a *Crocus*; in the Veratrea, with spiked, racemose, paniced, branching, or simple herbaceous stems. Flowers not unfrequently ♂ ♀, white, green, or purple. Calyx and corolla both alike, free, petaloid, in 6 pieces, or, in consequence of the cohesion of the claws, tubular; the pieces generally involute in æstivation. Stamens 6; anthers turned outwards. Ovary 3-celled, many-seeded; style 3-parted; stigmas undivided; [ovules orthotropal, semi-campylotropal, semi-anatropal or anatropal, *Endl.*] Capsule generally divisible into 3 pieces; sometimes with a loculicidal dehiscence. Seeds with a membranous testa; albumen dense, fleshy or cartilaginous; embryo very minute, inclosed, extremely uncertain in its position.

The plants of this Order have in some cases the appearance of *Crocuses*, in others that of small *Lilies*. *Brown* considers its station to be between *Lilyworts* and *Rushes*, from both which it is known by its tripartite fruit, and anthers turned outwards. The latter character gives the *Melanth*s their distinctive character, more than anything else, and, combined with their separable carpels, generally renders their identification free from difficulty. *Don* has well observed that "the genus *Colchicum* establishes an evident relationship, through *Sternbergia* and *Crocus*, between *Melanth*s, *Amaryllids*, and *Irid*s; *Disporum* joins them to *Smilacææ*, and *Tofieldia* to *Rushes*, while a comparison of the structure of *Uvularia* and *Erythronium* fully makes out their affinity with *Liliacææ*."

Frequent at the Cape of Good Hope, not uncommon in Europe, Asia, and North America, and existing within the tropics of India and New Holland, this Order appears to be confined within no geographical limits; it is, however, far more abundant in northern countries than elsewhere.

Few Orders of plants are more universally poisonous than this, whose qualities are conspicuously indicated by *Colehicium* and *Veratrum*. The corn and seeds of the

Fig. CXXXIV.—*Colchicum autumnale*. 1. A corn in flower; 2. The same stripped of its outer coats, and showing the ovaries after the floral envelopes are cut away; 3. a transverse section of the ovaries; 4. a ripe capsule; 5. a section of a seed; 6. the flower cut open, to show the stamens and the 3-parted style.

Fig. CXXXV.—Section of the centre of the flower of *Veratrum nigrum*.



former are well-known to be acrid, cathartic, narcotic, and diuretic; the latter is a nauseous, dangerous emetic. These properties are owing to a peculiar alkaline principle, called Veratria, which acts with singular energy on the membrane of the nose, exciting violent sneezing, though taken in very minute quantity. When received internally in very small doses, it produces excessive irritation of the mucous coat of the stomach and intestines; and a few grains are found fatal to the lower animals. *Veratrum viride* of North America is an acrid, emetic, and powerful stimulant, followed by sedative effects. Serious accidents have followed the incautious use of Meadow Saffron, *Colchicum autumnale*; it is only a few months since a woman was poisoned by the sprouts of *Colchicum* roots, which had been thrown away in Covent Garden market, and which she mistook for onions. White Hellebore, *Veratrum album*, the *ἵππομανη* of the ancients, is used by gardeners to destroy the Gooseberry Caterpillar, and similar noxious insects. *Asagrea officinalis*, an Alpine Mexican plant, yields most of the *Cevadilla*, *Cebadilla* or *Sabadilla* seeds of commerce, which were formerly used to destroy pediculi, and as anthelmintics, and have also been employed in chronic rheumatism and paralysis, and in neuralgic cases, but are now chiefly consumed in the manufacture of Veratria. *Helonias frigida*, called in Mexico *Savoaja*, is allied to this, and is a well-known poison, stupefying the horses that feed upon it. The root of *Helonias dioica* in infusion is anthelmintic, but its tincture is bitter and tonic; when chewed it excites the saliva and produces vomiting; the N. Americans call it Blazing Star and Devil's Bit. A decoction of *Helonias bullata* is given in obstructions of the bowels. *Amianthium muscætoxicum* is said to poison cattle which feed upon its foliage in the autumn, whence the United States Americans call it Fall Poison; they employ it to destroy flies. *Uvularias* are said to be simply astringent; the bruised leaves of *Uvularia grandiflora* are a popular remedy in the United States for the bite of the rattlesnake. The *Hermodactyls* of the Arabians, formerly so celebrated for soothing pains in the joints, were corms of the *Colchicum variegatum*, a species found in the Mediterranean. Dr. Royle found them in the bazaars of India, where they bear names traceable to the *χολχικον* and *εφεμερον* of the Greeks.

GENERA.

VERATRÆÆ. <i>Toieldia</i> , Huds. <i>Narthecium</i> , Ger. <i>Helonias</i> , Willd. <i>Heritiera</i> , Schrank. <i>Idrogalvia</i> , R. et P. <i>Hebelia</i> , Gmel. <i>Conradia</i> , Raf. <i>Lepillix</i> , Raf. <i>Triantha</i> , Nutt. <i>Pleea</i> , Rich. <i>Xerophyllum</i> , Rich. <i>Helonias</i> , Linn. <i>Abalon</i> , Adans. <i>Chamælitrium</i> , Willd. <i>Ophiostachys</i> , Del. <i>Diclinohrys</i> , Raf.	<i>Asagrea</i> , Lindl. <i>Sabadilla</i> , Brandt. <i>Schœnocaulon</i> , A. Gr. <i>Amianthium</i> , A. Gr. <i>Amiantanthus</i> , Kth. <i>Cyanotris</i> , Raf. <i>Chrosperma</i> , Raf. <i>Veratrum</i> , Tournef. <i>Stenanthium</i> , A. Gr. <i>Anticlea</i> , Kth. <i>Zygadenus</i> , Rich. <i>Leimanthium</i> , Willd. <i>Burchardia</i> , R. Br. <i>Erythrostictus</i> , Schlecht. <i>Ornithoglossum</i> , Salisb. <i>Lichtensteinia</i> , Willd. <i>Cymation</i> , Spr. <i>Anguillaria</i> , R. Br.	<i>Melanthium</i> , Linn. <i>Crioccephalus</i> , Schlecht. <i>Meliglossum</i> , Schlecht. <i>Dipidax</i> , Laws. <i>Androcymbium</i> , Willd. <i>Cymbanthes</i> , Salisb. <i>Wurmbea</i> , Thunb. <i>Bæometra</i> , Salisb. <i>Kolbea</i> , Schlecht. <i>Jania</i> , Schult. f. UVULARÆÆ, A. Gray. <i>Schelhammera</i> , R. Br. <i>Kreysigia</i> , Reichenb. <i>Tripladenia</i> , Don. <i>Uvularia</i> , Linn. <i>Tricyrtis</i> , Wall. <i>Compsanthus</i> , Spreng.	<i>Disporum</i> , Salisb. <i>Dracopis</i> , Blum. <i>Lethea</i> , Noronh. <i>Prosartes</i> , Don. <i>Hekorima</i> , Raf. <i>Streptopus</i> , Rich. COLCHICÆÆ, Nees. <i>Monocaryum</i> , R. Br. <i>Bulboeodium</i> , Linn. <i>Merendera</i> , Ram. <i>Geophila</i> , Berg. <i>Colchicum</i> , Tournef. <i>Hermodactylus</i> , R. Br. <i>? Leucoerinum</i> , Nutt. <i>? Geanthia</i> , Raf. <i>? Weldenia</i> , Schult. f. <i>Rugendasia</i> , Schiede.
---	---	---	--

NUMBERS. GEN. 30. Sp. 130.

Iridacææ.

POSITION. ————— MELANTHACEÆ. — Liliacææ.

Juncacææ.

ORDER LXII. LILIACEÆ.—LILYWORTS.

Lilia, Juss. Gen. 48. (1789).—Narcissi, the first sect. *Ibid.* 54. (1789).—Hemerocallideæ, R. Brown Prodr. 295. (1810).—Liliaceæ, DC. Theor. Elém. 1. 249. (1813); Endl. Gen. lv.; Meisner, p. 398; Kunth, Enum. 4. 215; Ann. sc. 2. ser. 18. 290.—Tulipaceæ, DC. Ess. Méd. 297. (1816); Bernh. in Bot. Zeit. Oct. 1835.—Coronarieæ, Agardh Aphor. 165. (1823).—Asparagi and Asphodeli, Juss. (1789).—Asphodeleæ, R. Brown Prodr. 275. (1810); Kunth, Enum. 4. 280.—Alliaceæ, Aloinæ, Hyacinthinæ, Dracænaceæ, Link Handb. vol. 1. (1829).—Asparaginæ, *ib.*—Asparagæ, DC. and Duby, 458. (1828).—Asparaginæ, Ach. Rich. Dict. Class 2. 20. (1822); Nouv. Elém. ed. 4. 430. (1828).—Convallariaceæ, Link Handb. 184. (1829.)

DIAGNOSIS.—*Lilial Endogens with a naked perianth, flat when withering, anthers turned inwards, consolidated styles, and fleshy albumen.*

Herbaceous plants, shrubs or trees, with bulbs, or tubers, or rhizomes, or fibrous roots. Leaves narrow, with parallel veins, only in a very small number expanded into a broad blade with diverging veins; never articulated with the stem. Flowers large and showy, or small and green, with all kinds of intermediate gradations; in nearly all cases ♂; never, perhaps, truly ♂ ♀. Calyx and corolla confounded, coloured alike, regular or nearly so, occasionally cohering in a tube. Stamens 6, inserted into the sepals and petals. Anthers opening inwards. Ovary free, 3-celled, many-seeded; style 1; stigma simple, or 3-lobed; ovules anatropal or amphitropal. Fruit succulent, or dry and capsular, 3-celled. Seeds packed one upon another in 1 or 2 rows; embryo with the same direction as the seed, in the axis of fleshy albumen, or uncertain in direction and position, occasionally very minute.

The beautiful creations which constitute the Order of Lilies would seem to be well known to all the world; for what have been so long admired and universally cultivated as they? Nevertheless, there are few great groups of plants which have been more neglected by the exact botanist, or which stand more in need of his patient attention. The best proof of the justice of this assertion is to be found in the unsteady and conflicting views of botanists as to its limits, or the subordinate groups which it contains. While

one writer breaks Lilyworts up into a number of distinct Orders, another refuses to recognise the limits assigned to them by his predecessor, and prefers a new arrangement, just as unsatisfactory as that which it succeeds. We have seen the classification of Jussieu and Brown break down beneath a rigorous scrutiny; it has been succeeded by schemes of Bartling, Endlicher, Kunth, Meisner, Bernhardt and others, all alike unsatisfactory; and I doubt whether we can be truly said to know more about the true characteristics and exact structure of a very large proportion of this Order, than we did twenty years ago. Genera in plenty have been added, but a good combination of



Fig. CXXXVII.

Fig. CXXXVI.—1. Section of seed of *Asphodelus ramosus*; 2. of *Tulipa hortensis*.

Fig. CXXXVII.—*Arthropodium paniculatum*, 1. A flower magnified; 2. a ripe capsule; 3. a transverse section of it; 4. a vertical section of a seed.

them is still wanted. Under these circumstances it seems to me better not to meddle with the supposed Orders or Suborders that have of late years been proposed, but to gather together, in tolerably natural groups, under the Order of Lilies, everything that does not belong to the other parts of the Liliac Alliance. It will be a task hereafter for some botanist, with ample materials and good general views, to study the details of the structure of these interesting plants, and out of those details to form an intelligible and solid classification. In the meanwhile, a few general remarks upon such groups as are here adopted are all that it will be useful to bring forward.

The favourite distinctions among the majority of systematic botanists are those by which the Liliaceæ, Asphodeleæ, and Asparageæ or Smilacæ of authors are said to be known. Brown thought to distinguish them by their seeds and fruit; ascribing to the first a spongy and dilated or winged seedcoat and a capsule, rarely a berry; to the second, a black brittle seedcoat; and, to the third, a membranous seedcoat and berry. With regard to the colour of the seedcoat or its texture, I must remark firstly, that one would be slow to recognise such a peculiarity as a valid distinction even of genera, and that as an ordinal characteristic, it is still less admissible; that exceptions to such a character appear, as might be expected, in all directions, and prove it to be wholly illusory. By the great botanist just mentioned, the distinction of Smilacæ was strengthened by adding to its character an embryo remote from the hilum, and it is probable that this circumstance deserves more attention than it has hitherto received; nevertheless, *Streptopus*, which is expressly named by Brown as one of his Smilacæ, has the embryo next the hilum; so that this character also is untenable. Bartling, who retains Smilacæ, adds to the distinction of the Order a minute embryo, but then he admits such genera as *Asparagus* and *Drymophila*, in which the embryo is the same as that of Asphodeleæ. Bernhardt assigns to his Tulipacæ anthers attached to the filament by a fine point lodged in a narrow canal, and an inflorescence without membranous spathes; or, as Jussieu expressed it, *Flores nudæ*, while he gives Asphodeleæ, anthers attached to the filament by a broad base, and membranous bracts, combining moreover under the name of Alliaceæ, the Asphodeleæ, Hypoxidæ, Rushes, Amaryllidæ and others, a proposition in which I think no judicious botanist would concur. But the character derived from the anther of Tulipacæ, if valid, which Kunth denies, is trifling; and as to the peculiarities asserted to exist in the inflorescence of these plants, such membranous bracts do not exist in *Eucomis* among Asphodeleæ more than in *Fritillaria persica* among Tulipacæ, while the *Gageas* have all the habit of the former group, and if it were otherwise it would be idle to propose such a character for the mark of a natural Order. M. Adrien de Jussieu has lately reduced these Orders to two, viz. Liliaceæ and Smilacæ, giving the former an undivided style and parallel veined leaves, while the latter have a triple style and reticulated leaves. In this respect he appears to adopt the views which are taken in the present work. That good and high grounds of distinction will one day be found for some at least of the groups here admitted is probable; but they have not yet been discovered, nor is it likely that they will be until the true nature of the ovules, the position of their foramen, the direction of the embryo, and similar circumstances shall have been inquired into with scrupulous accuracy. In the meanwhile the following may be taken as the chief peculiarities of the sections now admitted.

TULIPEÆ are the Lilia of Jussieu, a couple of his genera being excluded, and they may be justly regarded as the type of the Order of Lilies. Bulbs, annual stems little or not at all branched, flowers usually large and gaily coloured, without membranous spathes, but axillary to leaves but little changed, the calyx and corolla and their parts scarcely united, although often arranged in a tube, anthers swinging lightly by the fine drawn point of a stiff filament, and finally a dry seed vessel, separate the group from all that follow. They are among the gayest of our garden flowers, as Tulips, Fritillaries, and Dogs' Tooth Violets testify; one of them indeed, the *Lilium chalcedonicum*, a plant that covers the plains of Syria with its scarlet flowers, is most memorable from having been selected by our Saviour as the subject of allusion in his sermon on the Mount. The *Gloriosa*, a tuberous plant from India, hardly belongs to them.

The HEMEROCALLEÆ or DAY LILIES, differ from the last in nothing except their calyx and corolla being so joined to each other as to form a tube of conspicuous length, and in their want of a bulb in many instances. The *Agapanthus*, so commonly cultivated in vases for decorating architectural gardens, and the fragrant *Tuberose*, are the more remarkable among them; but *Funkia*, *Hemerocallis*, *Blandfordia*, and the *Veltheimia* and *Tritomas*, are also species of familiar occurrence. *Phormium*, which yields the celebrated flax of N. Zealand, with its hard perennial leaves and panicles of yellow flowers, must be considered to connect the present division with that of Aloes.

There is so little to separate ALONNEÆ, or ALOES, from the Day Lilies, that scarcely anything can be named except their succulent foliage; and even that disappears in

Yucca, which has the hard leaves of *Phormium*, with which however its distinct sepals and petals forbid its being associated.

With the *SCILLEÆ* or *SQUILLS*, we reach a division of the Order, abounding in beautiful species, all of which are bulbous, with annual stems. Their peculiarity resides in the anthers not being so lightly attached to the filaments as in *Tulipeæ*, and in the leaves from whose axils the flowers proceed, acquiring a membranous condition.

CONANTHEREÆ are Squills with the ovary partially adhering to the calyx and corolla, and springing from tubers, not bulbs. They offer a direct transition to *Amaryllids*.

ANTHERICEÆ or *ASPHODELS*, agree with the last in having tubers or fleshy fasciated roots and not bulbs, but their ovary is free; they are therefore tuberous or fibrous rooted Squills. *Chrysobactron*, a genus gathered by Dr. Joseph Hooker, in Auckland and Campbell's islands, is described as diœcious, but apparently is polygamous. The fruit in these three last Orders is a capsule.

APHYLLANTHÆ are plants with the habit of Rushes, and the bracts so membranous and closely imbricated, as to give the appearance of *Xyrids* when the flowers are past. They seem to form a connection between Lilies and some plants of the Juncal or *Xyridal* Alliances. The genera have been very insufficiently examined. *Xanthorrhæas*, called Grass Trees in New Holland, are very different in habit from the remainder; their shrubby stems, which emulate small Palm trees in appearance, bear tufts of long wiry foliage at their extremities, from the midst of which rise very long cylindrical spikes of densely compacted flowers, resembling Bullrushes (*Typha*). By this genus the *Aphyllanth*s completely join Rushes, for the genus *Kingia*, included in Rushes, because of its minute embryo, has entirely the aspect of a *Xanthorrhæa*.

The reason for referring *WACHENDORFÆ* hither, have been given in speaking of the Bloodroots (p. 152). They are plants with ensiform or plaited leaves of a hard texture, fibrous roots, with flowers usually in panicles and by no means remarkable for size or bright colouring. If it is really true that their carpels are opposite the petals, as is said, they will undoubtedly have to be removed from their present station.

ASPARAGÆ are Lilies with a succulent fruit. They consist of plants extremely dissimilar in appearance, the common Asparagus and the Lily of the Valley being associated under this title. In general their leaves are broad; in the genus *Cordylina* they even acquire the expanded form and diverging veins of the *Amonal* Alliance. Their stems, although among the dwarfest that the Lilies comprehend, are in the common Asparagus branched and of considerable size, and in the Dragon-trees they acquire the dimensions and age of large trees. A tendency to the separation of sexes occurs here on the part of the genus *Ruscus*; but it is not carried so far as to constitute a diœcious structure. According to Von Martius (*Choix*. p. 21.), the position of the sepals in Lilyworts (in which he includes *Asphodeleæ*) is ∇ with respect to the axis; while in *Asparagæ* it is \triangle . He also finds throughout the Liliaceous Order that the petaline stamens are larger and more perfect than the sepaline, it being the latter moreover which disappear when there is any deficiency in the usual number of stamens.

With respect to *ASPIDISTREÆ*, concerning whose structure we have very insufficient information, they are principally known by a large mushroom-shaped stigma. Their foliage is that of Gingerworts; their flowers are dingy purple or green, with a campanulate perianth, on whose sides the stamens are inserted. In many respects they are very like *Orontiad*s, to which, perhaps, they ought to be referred.

In like manner the *OPHIPOGONEÆ*, or *TEATWORTS*, have a foliage hardly belonging to Lilies, *Peliosauthes Teta* resembling a Ginger more than a plant of this Order. They are remarkable for their seeds bursting through the sides of the ovary at a very early period, growing freely though exposed to air, and finally acquiring the succulent appearance of a tuber. It is very uncertain whether they have any real claim to the rank of Lilies.

If we suppose that the doubtful members of this great Order are removed, we shall find that its most immediate relations are as follows. From the *Melanths* it chiefly differs in its anthers being turned inwards, and its carpels quite consolidated. To the *Amaryllids* it approaches so nearly that there is perhaps nothing to separate them except its free ovary; and the group *Conantheræ* exhibits a structure intermediate in this respect. With Rushes Lilyworts are brought into close contact by means of the *Aphyllanth*s as has been already stated. Towards *Arads* they extend in the direction of *Orontiad*s, through the intermediate group of *Aspidistreæ*. Finally, it is here that *Dietyogens* are reached by means of the *Asparagæ*, which, by most botanists, are actually made to comprehend the genus *Smilax* and the *Parids*. For the affinity of Lilies and Palms, the reader is referred to the observations under the latter Order.

The geographical limits of the Order are as wide as its differences of structure. Upon the whole, however, the species are much more abundant in temperate climates than in the tropics, where they chiefly exist in an arborescent state. Aloes are mostly found

in the southern parts of Africa; one species is a native of the West Indies, and two or three more of Arabia and the East. Dracæus, the most gigantic of the Order, attain their largest size in the Canaries; a *D. Draco* there is described as being between 70 and 75 feet high, 46½ feet in circumference at the base, and was known to have been a very ancient tree in the year 1406. The northern Flora comprehends for the most part plants of the genera *Scilla*, *Hyacinthus*, *Allium*, and *Ornithogalum*. In the East Indies Lilyworts are rare; in New Holland they form a distinctly marked feature of the vegetation, and in New Zealand they are represented by the Phormium or Flax-bush.

A very considerable number are employed for the purposes of mankind. Among the most extensively useful are those whose fibre is strong enough to furnish cordage. Such are *Phormium tenax*, the New Zealand Flax, whose toughness rivals that of Hemp, and the *Sansevieras*, a race of hard-leaved perennial plants, found all over the tropics of Africa and India, from which a yet stronger substance is obtained under the name of African Hemp, or Bowstring Hemp. The *Yuccas* too yield a tenacious fibre, but it is of comparative unimportance. Several species have been used as food from the most remote antiquity; those chiefly belong to *Allium*. The Onion, Garlic, and Leek, says Dr. Royle, called in Arabic Bush, Som, and Korras, seem to be alluded to in the earliest parts of the Bible (Numbers, ch. xi. v. 12), as the names there used are very similar to these. All are cultivated in gardens in India, as well as *Allium ascalonicum* and *A. tuberosum*. The bulbs of *Allium leptophyllum* are eaten by the hill-people, and the leaves are dried and preserved as a condiment. Chives, Shallots, and Rocambole are other species of the Alliaceous race. The bulbs of *Camassia esculenta* are eaten by the North American Indians under the name of Quamash, and those of *Lilium pomponium* are roasted and eaten in Kamtchatka, where it is as commonly cultivated as the Potato with us. *Erythronium Dens canis* is said to furnish a part of the diet of the Tartars. The Cordyline Ti (*Dracæna terminalis*), or Ti plant, affords an important part of the food of a Sandwich islander. Its great woody roots are baked, when they become sweet and nutritious. Bruised, mixed with water, and fermented, it forms an intoxicating beverage; distilled, an ardent spirit is readily obtained; boiled before fermentation, a rich syrup, capable of being a substitute for sugar, is the result. Cattle, sheep, and goats are fond of the leaves, which furnish thatch for houses, and are woven into a kind of cloth. Its trunk takes root when stuck in the ground, and form a valuable permanent hedge.—*Bot. Reg.* 1. 1749. Mr. Drummond says that the tops of different species of *Xanthorrhæa* furnish all kinds of cattle with valuable fodder, in the Swan River colony, *Hooker Journ.* 2. 328; and we learn from Mr. Backhouse that the base of the inner leaves of the Grass-tree of Tasmania is not to be despised by the hungry. The aborigines beat off the heads of these singular plants by striking them about the top of the trunk with a large stick; they then strip off the outer leaves and cut away the inner ones, leaving about an inch and a half of the white tender portion, joining the trunk: this portion they eat raw or roasted; and it is far from disagreeable in flavour, having a milky taste, slightly balsamic. There are some other species of Grass-tree in the colony, the base of the leaves of which may also be used as food: those of the dwarf Grass-tree, *Xanthorrhæa humilis*, which is abundant about York Town, may be obtained by twisting the inner leaves firmly together, and pulling them forcibly upwards; but care is required not to cut the fingers, by slipping the hand. Even in Europe the young shoots of *Polygonatum* (Solomon's Seal), and others, have been substituted for Asparagus, and the annual cultivation of the latter for kitchen purposes is known to every one.

Aloes and Squills indicate the value of some Lilies in medicine. The acrid matter which thus renders them valuable as purgatives or emetics, is found in a considerable number of species. The bulb of the *Urginea* or *Scilla maritima*, and *Panacratium*, (the *Σκιάλη* and *Πανκρατίον* of Dioscorides) is nauseous and acrid, acting either as an emetic, purgative, expectorant, or diuretic, in proportion to the dose in which it is given; its properties are said to be due to a peculiar principle, called by Vogel, Scillitin. It is curious

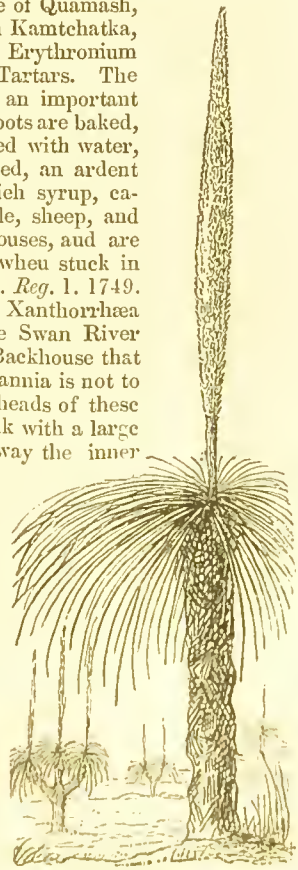


Fig. CXXXVIII.

that in India a species very closely allied to the Mediterranean plant, and called *Scilla indica* by Dr. Roxburgh, is substituted for the *Urginea maritima*, and *Iskeel* given as its Greek name; the bulb is also used by weavers in preparing their thread.—*Royle*. According to Theodore Martius the bulbs of *Ledebouria hyacinthoides* are also used as a substitute for Squills in the East Indies; Ainslie states that they are employed in cases of strangury and fever in horses. Both leaves and roots of *Erythronium americanum* are emetic; so are the bulbs of *Muscari moschatum*, various *Gageas*, *Hyacinths*, and *Ornithogalums*. As purgatives, the Aloes are in most extensive use; it is, however, exclusively from the arborescent species, especially *A. vulgare*, *socotrina*, *purpurascens*, and *spicata*, that the drug is collected. Similar qualities reside in *Bulbine planifolia*, the roots of common *Asparagus*, *Lily of the Valley*, the capsules of *Yuccas*, &c. As may be supposed, the peculiar secretions which produce actions like these will, when a little modified, become diuretic; and thus we have a long list of species to which this quality is attributed. Foremost are *Alliums*, whose bulbs abound in free phosphoric acid; then follows *Asparagus*, notorious for its singular effect upon the urine, many of the emetic species, and the roots of *Asphodelus ramosus*, *Asphodeline lutea*, *Antherium ramosum*, the berries of *Smilacina racemosa*, &c. According to Dr. Dieffenbach, the root of *Phoridium tenax* is an excellent substitute for Sarsaparilla, acting as a purgative, diuretic, sudorific, and expectorant.—*Chem. Gaz.* 1842, 150. Then, when these acrid principles become concentrated, we have virulent poisons. Such are *Gloriosa superba*, and the fetid bulb of the Crown Imperial, whose very honey is said to be emetic as it distils from the flowers.

Resinous matters are yielded in abundance by some species, whence they have been found useful in dysenteries. Of these the most celebrated is *Dragon's-blood*, a tonic astringent resin, sometimes employed in diarrhoea and passive hæmorrhages; it is yielded in part by *Dracæna Draco*, from the surface of the leaves, and from the cracks in its trunk; this is, however, scarcely known to modern druggists, who sell the astringent resin of *Pterocarpus*. A fragrant brownish yellow resin, called *Botany Bay gum*, when burnt smelling like *Benzoïn*, flows in abundance from *Xanthorrhæa arborea*. It is probable that some such secretion occurs in *Dianella odorata*, whose powdered roots are said by Blume to be made into fragrant pastiles. The roots of *Dracæna terminalis* and *ferrea* are said to be useful astringents, to which may be added *Streptopus amplexifolius* and *Ruscus hypoglossum*, both of which have been employed in gargles.

A few miscellaneous instances of useful Liliaceous plants still remain to be added. The roots of *Asparagus racemosus* and *ascendens* are both employed medicinally in North India; those of the latter, conical in form and semi-transparent, are considered a good substitute for *salep*.—*Royle*. *Polianthes tuberosa*, or the *Tuberose*, is well known for its delicious fragrance. This plant emits its scent most strongly after sunset, and has been observed in a sultry evening, after thunder, when the atmosphere was highly charged with electric fluid, to dart small sparks, or scintillations of lucid flame, in great abundance from such of its flowers as were fading. The roots of *Sansevieria* have been employed as remedies for gonorrhœa, pains of the joints, and coughs. The bulbs of *Erythronium Dens canis* have been regarded as aphrodisiac and anthelmintic. Oil of Lilies was prepared by infusing the flowers of *Lilium candidum* in oil. *Tubaghia*, a Cape genus, smelling like *Garlic*, is boiled in milk and prescribed in phthisical complaints. *Asparagus* owes its remarkable qualities to the presence of a peculiar principle called *Asparagin*, which is said to be more abundant in *Asparagus acutifolius* than in the species commonly cultivated. The flowers of *Cordylina reflexa* are said to be emmenagogue. A decoction of the root of *Dianella odorata* is administered in Java in gonorrhœa, dysury, and fluor albus, according to Blume. The *Butchers' Brooms* (*Rusci*) of Europe, were once celebrated as aperients and diuretics, on account of their bitter, subacid, mucilaginous roots, especially *Ruscus aculeatus*, the *ὄξυμυρσίνη* of Dioscorides. The Arabian writers called the fruit *Rhabâbath*, out of which, according to Eudlicher, the Latinobarbarous word *Cubeba* has been corrupted. *Ruscus hypophyllum* had considerable reputation as a stimulant of the uterus. The seeds of these *Rusci* are very horny, and when roasted are said to furnish a pleasant substitute for coffee. The bulbs of the common *Tulip* are sometimes substituted fraudulently for *Colehiccums*; large quantities have been thus imported from Naples; they are readily known by being true bulbs, while the *Colchicum* has a corm. It is not a little remarkable that the *Yuccas*, like some species of *Fourcroya*, have the property of producing tubers although they have arborescent stems.

GENERA.

I.—TULIPEÆ, DC.
Erythronium, Linn.
Dens Canis, Tournef.
Tulipa, Tournef.
Orithya, Don.

Gagea, Salisb.
Ornithoxanthum, Lk.
Bulbillaria, Zucc.
Iphigenia, Kth.
Plectostigma, Traut.

Hornungia, Bernh.
Lloydia, Salisb.
Rhabdocrinum, Rehb.
Nectarobothrium, Led.
Calochortus, Pursh.

Cyclobothra, Don.
Euerinum, Nutt.
Fritillaria, Linn.
Petilium, Linn.
Imperialis, Juss.

Rhinopetalum, Fisch.
Lilium, Linn.
Amblirion, Rafin.
Marlagon, Tournef.
Cardoerium, Endl.
Climostylis, Hochst.
? Gloriosa, L.
Methonica, Heru.

II. HEMEROCALLESÆ, K. Br.

Hemerocallis, L.
Funkia, Spr.
Hosta, Tratt.
Bryocles, Salisb.
Niobe, Salisb.
Stassurca, Salisb.
Libertia, Dumort.
Agapanthus, Herit.
Mauhaia, Thunb.
Abumon, Adans.
Polianthes, Linn.
Blandfordia, Sm.
Veltheimia, Gled.
Tritoma, Ker.
Tritomanthe, Hfsg.
Tritonium, Lk.
Radolpho-Romeria,
Steud.
Kniphofia, Mnch.
Phormium, Forst.
Chlamidia, Banks.
Sansevieria, Thunb.
Acyntia, Commel.
Salmia, Cav.

III. ALOINEÆ, Link.

Aloë, Tournef.
Apicra, Haw.
Catevala, Medik.
Haworthia, Duval.
Gasteria, Duval.
Ripidodendron, Willd.
Kamara, Medik.
Bowiea, Haw.
Pachydendron, Haw.
Agriodendron, Haw.
Lomatophyllum, Willd.
Phylloma, Ker.
Yucca, Linn.

IV. SCILLÆ, Bartl. Alliæ, Link.

Allium, Linn.
Moly, Mnch.
Monchua, Medik.
Saturnia, Maratti.
Ophiocordum, Wallr.
Colonyrasum, Rchb.

Gethioides, Columb.
Schanoprasum, Kuuth.
Porrum, Tournef.
Cepa, Tournef.
Scorodoprasum, Michel.
Neectaroscordum, Lindl.
Caloscordum, Herb.
Milla, Car.
Hesperoscordum, Lindl.
Pseudoscordum, Herbert.
Nothoscordum, Kth.
Ornithogalodeum,
G. Don.

Calliprora, Lindl.
Camassia, Lindl.
Cyanotris, Raf. ms.
Scilla, Linn.
Urginea, Steinh.
Stellaris, Mnch.
Squilla, Nees.
Ornithogalum, Lk.
Chlorogalum, Lindl.
Albuca, Linn.
Myogalum, Lk.
Albuca, Rchb.
Honorus, Gray.
Nolina, Rich.
Nolina, Pers.
Uropetalum, Ker.
Pollemannia, Berg.
Zuccagnia, Thunb.
Dipeadi, Mnch.
Litanthes, Harv.
Muscari, Toarnef.
Botryanthus, Kth.
Bellevia, Lap.
Hyacinthus, Linn.
Eratobotrys, Fenzl.
Puschkinia, Adams.
Adamsia, Willd.
Strangecia, Bertoni.

Barnardia, Lindl.
Ledebouria, Roth.
Bessera, Schult.
Pharium, Herbert.
Leucocoryne, Lindl.
Brodiaea, Sm.
Hookeria, Salisb.
Dichelostemma, Kth.
Triteleja, Hook.
Subertia, Kth.
Tristagma, Pöpp.
Agraphis, Link.
Lachenalia, Jacq.
Cælanthus, W.
Peribæa, Kth.
Polyena, Kth.
Drinia, Jacq.
Idothea, Kth.
Massonia, Linn.
Dnulenia, Lindl.
Eucomis, Herit.
Basilara, Juss.

V. CONANTHEREÆ, Don.
Zephyra, Don.
Cunningia, Don.
Conanthera, Ruiz et Pav.
Pasithea, Don.

VI. ANTHERICESÆ, Bartl.

Sowerbaea, Smith.
Anemarrhena, Bung.
Eremurus, Bieberst.
Hennlingia, Kar.
Ammolirion, Kar.
Asphodelus, Linn.
Asphodeloides, Mnch.
Bidwillia, Herb.
Asphodeline, Rchb.
Chrysobactron, Hook. f.
Cyanella, Linn.
Anthericum, Linn.
Phalangium, Juss.
Czaekia, Andr.
Allobrogia, Tratt.
Lillastrum, Lk.
Babine, Linn.
Anthericum, Juss.
Bulbinella, Kth.
Trachyandra, Kth.
Arthropodium, R. Br.
Dichopogon, Kth.
Chlorophytum, Ker.
Hartwegia, Nees.
Trichopetalum, Lindl.
Bottionæa, Colla.
Stypandra, R. Br.
Simethis, Kth.
Thysanotus, R. Br.
Chlamysporum, Salisb.
Cæsia, R. Br.
Chloopsis, Blume.
Tricoryue, R. Br.
Echeandia, Orteg.
Tulbaghia, Linn.
Herreria, R. et Pav.
Eriosperrum, Jacq.

VII. APHYLLANTHESÆ, Endl.

Alania, Endl.
Laxmannia, R. Br.
Borya, Labill.
Daviesia, Lam.
Baumgartenia, Spr.
Aphyllanthes, Tournef.
Johnsonia, R. Br.
Xanthorrhæa, Sm.

VIII. WACHENDORFESÆ, Herbert.

Hagenbachia, Nees.
Xiphidium, Aubl.

Wachendorfia, Burm.
Pedlonia, Presl.
Schiekia, Meisn.
Lophiola, Ker.

IX. ASPARAGÆÆ, Lindl.

Dianella, Lam.
Diana, Commers.
Eccremis, Willd.
? Duchekia, Kostel.
Rhuacophila, Blume.
Eustrephus, R. Br.
Geitonoplesium, A. Cunningham.
Luzuriaga, R. Br.
Asparagus, Linn.
Oncus, Lour.
Myrsiphyllum, Willd.
Cyanella, Commers.
Charwoodia, Sweet.
Dracæna, Vandell.
Storkia, Crantz.
Cedra, Crantz.
Tetsia, Medik.
Drymophila, R. Br.
Polygonatum, Tournef.
Axillaria, Rafin.
Convallaria, Desf.
Brachypetalum, Nutt.
Smilacina, Desf.
Majanthemum, Mnch.
Ujifolium, Hall.
Evallaria, Neck.
Bifolium, Fl. wett.
Clintonia, Rafin.
Sigillaria, Rafin.
Tovaria, Neck.
Luzuriaga, Ruiz et Pav.
Callixene, Commers.
Enargea, Sol.
Ruscus, Tournef.
Danaida, Link.
Danaë, Medik.

X. ASPIDISTRESÆ, Endl.

Rhodea, Roth.
Tupistra, Ker.
Aspidistra, Ker.
Macrogynæ, Lk. et Otto.

XI. OPHIOPOGONESÆ, Endl.

Ophiopogon, Ait.
Flugga, Rich.
Stateria, Desv.
Polygonastrum, Mnchl.
Liriope, Lour.
Saneviella, Rchb.
Bulbosperium, Blume.
Pelliosanthes, Andr.
Teta, Roxb.

NUMBERS, GEN. 133. Sp. 1200.

Dictyogens.

POSITION.—ORONTIACEÆ.—LILIACEÆ.—MELANTHACEÆ.

Juncaceæ.

ORDER LXIII. PONTEDERACEÆ.—PONTEDERADS.

Pontederææ, *Kunth in Humb. et Bonpl. N. G.* 1. 211. (1815); *Agardh Aph.* 169. (1823).—Pontederaceæ, *Ach. Rich. Nouv. Elém. ed.* 4. 427. (1828); *Endl. Gen. liv. Meisn. Gen.* p. 398. *Kunth Enum.* 4. 119.

DIAGNOSIS.—*Lilial Endogens with a naked perianth, circinate when withering, anthers turned inwards, and mealy albumen.*

Aquatic or marsh-plants. Leaves sheathing at the base, with parallel veins, in the larger species arrow-headed, cordate or dilated. Flowers either solitary or in spikes or umbels, spathaceous, frequently blue, sometimes yellow. Perianth tubular, coloured, 6-parted, more or less irregular, with a circinate revivification. Stamens arising from the calyx, 6, or 3 opposite the petals; anthers turned inwards, opening lengthwise. Ovary free, more or less completely 3-celled, many-seeded; style 1; stigma simple; ovules anatropal. Capsule 3-celled, occasionally acquiring an adhesion to the perianth, 3-valved, with loculicidal dehiscence. Seeds indefinite, attached to a central axis, ascending; hilum small; embryo with its radicle rather enlarged, orthotrope, in the axis of somewhat mealy albumen.

The aquatic plants comprehended under this name are essentially distinguished by the divisions of their flowers being rolled inwards after flowering, to which may be added mealy albumen, and an indefinite number of seeds. For this reason a plant called *Reussia*, which seems to want the first and last characters, appears to have no business among them. They were referred to Spiderworts by Salisbury, and are considered nearly related to that Order by Achille Richard, who, however, separates them, suggesting their being referable to Lilyworts. There can be no doubt of their close relation to the latter Order, from which they are principally known by their irregular flowers, mealy albumen, and perianth rolling inwards after expansion. *Leptanthus*, however, if it is really one of the Order, has all the habit of a *Potamogeton*, and establishes a connection with the Arrow-grasses. Hooker, who has given an excellent figure of *Eichhornia speciosa* (*B. M. t.* 2932), states that each fibre of the roots has a calyptrate covering at the extremity, similar to that found on the roots of the Duck-weed.

Water-plants found exclusively in North and South America, the East Indies, and tropical Africa.

Very little is known of their uses. *Monochoria vaginalis* is employed in Indian pharmacy in liver-complaints and disorders of the stomach. Rubbed down in butter and drank, it is thought to remove redness of the eyes; powdered and mixed with sugar it is administered in asthma; and when chewed, is said to relieve toothache; brayed with milk it is given in fever; and, finally, when young, is eaten as a pot herb.—*Endlicher.*



Fig. CXXXIX.

GENERA.

Heteranthera, Ruiz et Pav.
Buchozia, Flor. Flum.
Heterandra, Palis.

Leptanthus, L. C. Rich.
Scholtzia, Willd.
Eichhornia, Kth.

Pontederia, Linn.
Unisema, Rafin.
Monochoria, Presl.

NUMBERS. GEN. 6. Sp. 30.

Juncaginaceæ.

POSITION.—PONTEDERACEÆ.—Liliaceæ.

Mayacæ?

ALLIANCE XVII. *ALISMALES*.—THE ALISMAL ALLIANCE.

DIAGNOSIS.—*Hypogynous, (bisexual), tri-hexapetaloidous Endogens, with separate carpels and no albumen.*

These stand in the same relation to hermaphrodite hypogynous Endogens as Orchidals and Hydrals to the Alliances with which they are respectively associated. The want of albumen is their great feature. They are however known, in addition, by their carpels not having any tendency to combine; so that they are to Endogens almost what the Crowfoots are to Exogens. And it is to be observed that if it were not for their monocotyledonous embryo there would be no distinguishing such plants as *Alisma* from certain *Ranunculi*, represented by *Ranunculus parnassifolius*. A very few are ♂ ♀; such however occur only among the Alismads, and are not liable to be mistaken for any other plants than Hydrals, with none of the Orders in which can they be properly associated. Arrow-grasses offer the lowest organization in the Order, and may be regarded as an Alismal form of Naiads.

This Alliance seems to close the class of Endogens, and to stand on the limits of Exogens, in consequence of the intimate and unquestionable relation between Alismads and Crowfoots.

NATURAL ORDERS OF ALISMALS.

<i>Flowers 3-petaloidous. Placentæ many-seeded, netted and parietal</i>	} 64. BUTOMACEÆ.
<i>Flowers 3-petaloidous. Placentæ few-seeded, simple, and axile, or basal. Embryo solid</i>	} 65. ALISMACEÆ.
<i>Flowers scaly. Placentæ few-seeded, simple and axile, or basal, slit on one side, with a very large plumula</i>	} 66. JUNCAGINACEÆ.

ORDER LXIV. BUTOMACEÆ.—BUTOMADS.

Butomææ, *Richard in Mem. Mus.* 1. 364. (1815); *Endl. Gen.* 1. *Meisner, Gen.* p. 365. *Kunth. Enum.* iii. 162.

DIAGNOSIS.—*Alismal Endogens with 3-petaloidous flowers, and many-seeded netted and parietal placenta.*

Aquatic plants. Leaves very cellular, with parallel veins, often yielding a milky juice. Flowers in umbels or solitary, conspicuous, purple, or yellow, or white. Sepals 3, usually herbaceous. Petals 3, petaloid. Stamens definite or indefinite, hypogynous, some of them occasionally abortive. Ovaries free, 3, 6, or more, either distinct or united into a single mass; stigmas the same number as the ovaries, simple; ovules 00, anatropal or campylotropal, attached to a parietal network. Achenia or follicles many-seeded, either distinct and rostrate, or united in a single mass. Seeds minute, very numerous, attached to the whole of the inner surface of the fruit; albumen none; embryo with the same direction as the seed.

These water plants are readily known by their placenta extending over the whole lining of the fruit, which is formed either of separate or concrete carpels. In this respect there is an evident analogy with Water lilies, which *Limnocharis* resembles in the structure of its fruit. De Candolle says that no Endogens are lactescent; but some of these yield milk in abundance. *Limnocharis* offers a singular example of a large conspicuous open hole in the apex of its leaf, apparently destined by nature as an outlet for superfluous moisture, which is constantly draining from it.

The species are natives of the marshes of Europe and Siberia, the North Western provinces of India, and equinoctial America.

Butomus umbellatus is acrid and bitter; its rhizome and seeds have been regarded emollient, refrigerant and solvent, and were once officinal under



Fig. CXL.

the name of *Radix et Semina Junci floridi*. The roasted rhizome is eaten in the North of Asia.

GENERA.

Butomopsis, *Kth.*
Tenagocharis, *Hochst.*

Butomus, *Tourn.*
Hydrocleis, *Rich.*

Limnocharis, *H. et B.*

NUMBERS. GEN. 4. Sp. 7.

Nymphæacæ.

POSITION. ———— BUTOMACEÆ.—Alismacææ.

Fig. CXL.—1. *Hydrocleis Commersoni*; 2. one of the carpels; 3 the same opened to show the placenta; 4. seed of *Limnocharis Plumieri*; 5. a section of the same.

ORDER LXV. ALISMACEÆ.—ALISMADS.

Alismaceæ, *R. Brown Prodr.* 342. in part (1810); *Rich* in *Mém. Mus.* 1. 365. (1815); *Juss. Dict. Sc. Nat.* 1. 217. (1822); *Endl. Gen.* xlix.; *Meisner, Gen.* p. 364. *Kunth Enum.* 3. 147.—Alismoideæ, *DC. Fl. Fr.* 3. 188. (1805).

DIAGNOSIS.—*Alismal Endogens with 3-petaloideous flowers, few-seeded simple and axile or basal placenta, and a solid embryo.*

Floating or swamp plants, very rarely annual, usually having a creeping fleshy perennial rhizome. Flowers in umbels, racemes or panicles, ♀, very rarely truly ♂ ♀. Leaves either narrow and strap-shaped, or expanded into a broad blade, always however with the veins parallel. Sepals 3, herbaceous. Petals 3, petaloid. Stamens definite or indefinite; anthers turned inwards. Ovaries superior, several, 1-celled; ovules erect or ascending, solitary, or 2 attached to the suture at a distance from each other, anatropal or campylotropal. Styles and stigmas the same number as the ovaries. Fruit dry, 1- or 2-seeded. Seeds without albumen, hooked; embryo shaped like a horse-shoe, undivided, with the same direction as the seed.

This Order is to Endogens what Crowfoots are to Polypetalous Exogens, and is in like manner recognised by its disunited carpels and hypogynous stamens. Such plants as *Ranunculus parnassifolius* are hardly distinguishable from Alismads by external characters. Arrow-grasses are known by their imperfect floral envelopes, and straight embryo having a lateral slit for the emission of the plumule. The plants belonging to Alismads, Hydrocharads, Naiads, Arrow-grasses, and Butomads, have all a disproportionately large radicle, whence their embryos were called by the late L. C. Richard, macropodal. The truly diclinous flowers of *Sagittaria* constitute a great and unusual exception to the otherwise hermaphrodite structure of this Order.

Chiefly natives of the northern parts of the world. Several *Sagittarias* and *Damasoniums* inhabit the tropics, the former those of both hemispheres.

Many have a fleshy rhizome, which is eatable; such are *Alisma* and *Sagittaria*: a species of the latter, *S. sinensis*, is cultivated for food in China; its herbage is acrid. *Alisma Plantago* and *Sagittaria sagittifolia* are among the plants foolishly recommended in hydrophobia; the rhizome of the former, deprived of acridity by drying, is eaten by the Kalnucks. Various Brazilian *Sagittarias* are very astringent; and their expressed juice is even employed in the preparation of ink.—*Martius, mat. m. br.* 47.

GENERA.

Alisma, *Juss.*
Echinodorus, *Rich.*
Sagittaria, *Linn.*
 † *Lophocarpus*, *Kth.*
Damasonium, *Juss.*
Actinocarpus, *R. Br.*

NUMBERS. GEN. 3. Sp. 50.

Commelynacæ.

POSITION.——————ALISMACEÆ.—Butomaceæ.

Ranunculacæ.

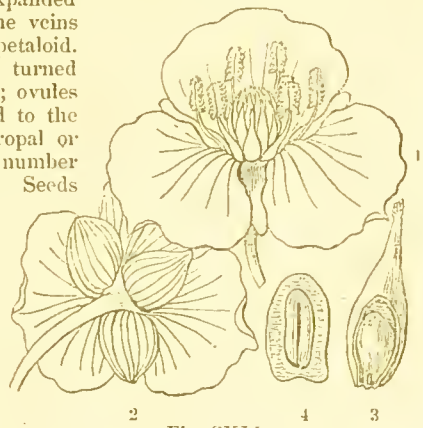


Fig CXLl.

Fig. CXLl.—1. Flower of *Alisma ranunculoides* seen in front; 2. the same from the rear; 3. a section of the ovary; 4. a section of a seed.

ORDER LXVI. JUNCAGINACEÆ.—ARROW-GRASSES.

Juncagineæ, *Rich. Anal. Fr.* (1808); *Mém. Mus.* 1. 364. (1815); *Endl. Gen.* p. 127; *Meisner*, p. 364; *Kunth Enum.* 3. 141.—Potamogetonææ, *Rehb. Fl. Excurs.* 1. 6. (1830).

DIAGNOSIS.—*Alismal Endogens with scaly flowers, few-seeded simple axile or basal placentæ, and an embryo slit on one side, with a very large plumule.*

Herbaceous aquatic or marsh plants, whose leaves have in all cases parallel veins, whether they are narrow and grassy, or broad and quite different from the leaf-stalk.

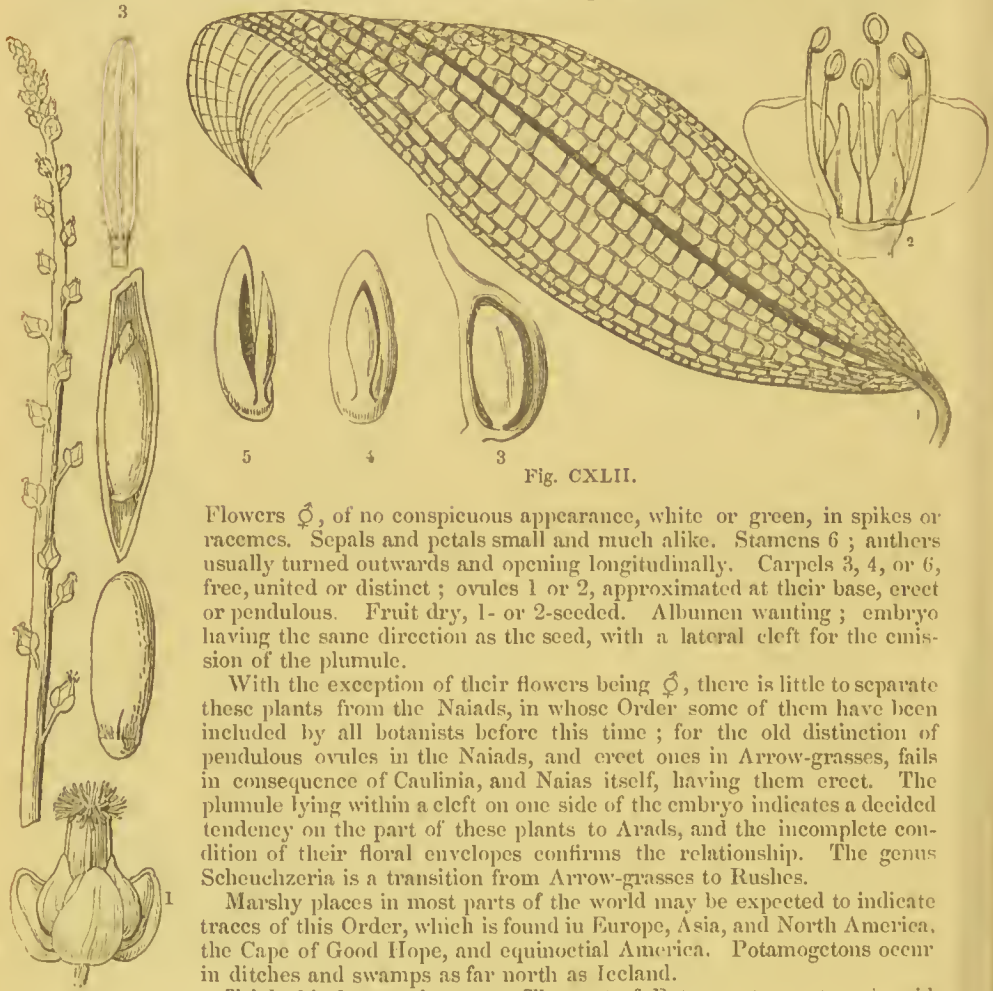


Fig. CXLIII.

Fig. CXLII.

Flowers ♀, of no conspicuous appearance, white or green, in spikes or racemes. Sepals and petals small and much alike. Stamens 6; anthers usually turned outwards and opening longitudinally. Carpels 3, 4, or 6, free, united or distinct; ovules 1 or 2, approximated at their base, erect or pendulous. Fruit dry, 1- or 2-seeded. Albumen wanting; embryo having the same direction as the seed, with a lateral cleft for the emission of the plumule.

With the exception of their flowers being ♀, there is little to separate these plants from the Naiads, in whose Order some of them have been included by all botanists before this time; for the old distinction of pendulous ovules in the Naiads, and erect ones in Arrow-grasses, fails in consequence of *Caulinia*, and *Naias* itself, having them erect. The plumule lying within a cleft on one side of the embryo indicates a decided tendency on the part of these plants to Arads, and the incomplete condition of their floral envelopes confirms the relationship. The genus *Scheuchzeria* is a transition from Arrow-grasses to Rushes.

Marshy places in most parts of the world may be expected to indicate traces of this Order, which is found in Europe, Asia, and North America, the Cape of Good Hope, and equinoctial America. *Potamogetons* occur in ditches and swamps as far north as Iceland.

Triglochin has a salt taste. The root of *Potamogeton natans* is said to be eaten in Siberia; the foliage of others is regarded as styptic.

GENERA.

Triglochin, Linn.
Juncago, Tournef.
Tristemon, Raf.

Scheuchzeria, Linn.
Ruppia, L.
Potamogeton, L.

Pellopsis, Raf.
Aponogeton, L.
Spathium, Lour.

Cyanogeton, Endl.
Ouvirandra, Thours.
Hydrogeton, Pers.

NUMBERS. GEN. 7. Sp. 44.

Naiadaeæ.

POSITION.————, — JUNCAGINACEÆ.—Alismacere.

Juncacææ.

Fig. CXLII.—1. Leaf of *Ovirandra fenestralis*; 2. a flower cut open; 3. section of a ripe carpel of *O. Bernieriana*; 4, 5. embryo in different positions: the thicker part is the cotyledon, the smaller the plumule.

Fig. CXLIII.—*Triglochin palustre*. 1. A flower; 3. a ripe fruit; 4. one ripe carpel opened, and exhibiting a seed; 5. embryo.

CLASS V.—DICTYOGENS.

Retosæ, *Ed. pr. p.* 358. (1836).—*Dictyogens, Bot. Reg.* 1839. *Misc. p.* 76.

There is among the plants referred by Jussieu to his Monocotyledons, and consequently by later Botanists to Endogens, a small number of species whose foliage and habit of growth are so very peculiar, that the reference of them to Endogens is wholly dependent upon their conformity in the structure of the embryo. They have a broad net-veined foliage, which usually disarticulates with the stem, and in some cases the small green flowers are very nearly the same as those of such plants as *Menispermum*, among Exogens. For these reasons I have endeavoured to show that they ought to be regarded as a transition class partaking somewhat of the nature of Endogens and also of that of Exogens. And if we regard merely the foliage, the distinction seems admissible, for no Endogens possess such a character except a few Arads, otherwise widely different. The nearest approach to this structure, with which I am acquainted, occurs in *Lilium giganteum*, but the leaves of that plant have a flat foliaceous petiole and do not disarticulate. The broad-leaved Amaryllids like *Griffinia*, *Euryeles*, &c., are totally different; their leaves not only having no articulation with the stem, but having no reticulations between the ribs, further than what arises from the anastomosing of the fine parallel secondary veins which connect them.

It is not, however, in the leaves alone that a distinction is found between Endogens and Dictyogens. If the annual branches of a *Smilax* are examined, there is nothing indeed in their internal structure at variance with that of a stem of *Asparagus*; they are exactly Endogenous; but in the rhizome of the whole genus (take the *Sarsaparilla* of the shops for instance) the wood is disposed in a compact circle, below a cortical integument, and surrounding a true pith; in that of *Smilax aspera* the woody matter is disposed in the form of a cylinder, inclosing a centre of soft cellular matter; and the vessels of the cylinder have an evident tendency to arrange themselves in lines forming rays from the centre. In *Dioscorea alata* the stem itself is formed of eight fibrovascular wedges placed in pairs, with their backs touching the bark, surrounding a central pith and having wide medullary plates between them; in fact, when the stems of this plant are in a state of decay, the eight fibrovascular wedges may be pulled asunder, like those of a Birthwort or a *Menisperm*. In the curious *Testudinaria* elephantipes the structure of the stem is of nearly the same kind; several bundles of fibrovascular tissue form a circle surrounding a pith, and pierced with broad medullary processes. *Lapageria* and *Philesia* have each a zone of wood below their bark, and a central pith in which the common fibrovascular bundles of Endogens are disposed; a tendency to which is also observable in *Smilax*. It therefore seems that the peculiarities in the foliage of these plants are accompanied by others equally remarkable in the structure of the stem; indeed I do not see why the stem of a common *Yam* has not as good a title to be regarded Exogenous as Endogenous. Schleiden indeed has remarked that he believes it to be the regular structure of the roots of Endogens to have a simple circle of fibrovascular closed bundles; and this seems to be sometimes the case. But I do not find it

in *Strelitzia*, or even in the arborescent *Aloes*, and when it does become evident it is unaccompanied by any peculiarity of the foliage. But, in the perennial stem of *Dictyogens* the bundles are what this Anatomist calls unlimited, that is to say, they go on growing for years together as in *Exogens*.

The principal difficulty about admitting the class of *Dictyogens* seems to me to consist in the small number of genera and species which it comprehends, and in the absence of any evidence as to the stem of *Triurids* or even *Parids* having the anatomical structure here assigned to it. These objections are undoubtedly deserving of serious consideration; but on the other hand it must be borne in mind that the plants collected under *Dictyogens* agree well with each other, and ill with any alliances of *Endogens*.

The Natural Orders of *Dictyogens* are poor in species, and can hardly be considered as established on recognised characters. The following are the distinctions, as far as they can be at present pointed out.

NATURAL ORDERS OF DICTYOGENS.

<i>Flowers</i> ♂ ♀. <i>Perianth</i> free. <i>Carpels</i> 00, one-seeded . . .	67. TRIURIDACEÆ.
<i>Flowers</i> ♂ ♀. <i>Perianth</i> adherent. <i>Carpels</i> consolidated, several-seeded	} 68. DIOSCOREACEÆ.
<i>Flowers</i> ♂ ♀. <i>Carpels</i> several, quite consolidated. <i>Placentæ</i> axile. <i>Flowers</i> hexapetaloidous	
<i>Flowers</i> ♂. <i>Carpels</i> several, quite consolidated. <i>Placentæ</i> parietal. <i>Flowers</i> 3-6-petaloidous	} 70. PHILESIACEÆ.
<i>Flowers</i> ♂. <i>Carpels</i> several, half consolidated. <i>Placentæ</i> axile. <i>Flowers</i> 3-petaloidous	
<i>Flowers</i> ♂. <i>Carpels</i> solitary, simple, many-seeded, with long-stalked anatropal seeds and a basal placenta	72. ROXBURGHICEÆ.

ORDER LXVII. TRIURIDACEÆ.—TAILWORTS.

Triuraceæ, Gardner in Linn. Trans. 19. 160. (1843).

DIAGNOSIS.—*Dictyogens* with unisexual flowers, a free perianth, and numerous 1-seeded carpels.

Little perennial herbs with a creeping rhizome. Leaves solitary, distant from the flowering scape, on long stalks, reticulated, entire, with sheathing scales at their base. Scape a little branched, scaly at the base. Flowers regular ♂ ♀, with 1-flowered bracteatate stalks. Perianth corolline, 3- 6-parted, spreading, permanent, with the segments extended into long tails, at the base valvate in æstivation, the tails curled inwards before expansion. ♂ Stamens 3- 6?—; anthers turned outwards, with disunited cells inserted on a large central fleshy receptacle. ♀ Ovaries 00, sessile on the receptacle, packed close together, disunited; ovules solitary?; styles rather on one side, awl-shaped, or thickened at the apex and obliquely truncate. Fruit unknown.

It is in these words that Mr. Gardner describes the present Order, which appears to have escaped the attention of everybody except himself and Mr. Miers. He considers it to be allied to Menisperms in some degree, but in reality to belong to the present class, and he distinguishes the Order thus: "From Smilacææ by the ovaries being free and numerous, not 3 and cohering; from Dioscoreacææ by the same characters, and by their being superior, not inferior; from Roxburghiacææ by their habit, diœcious flowers, and very numerous ovaries; while from all of them they are still further distinguished by their extrorse anthers." Till the structure is more exactly determined, it would be unprofitable to speculate further on the affinities of these curious little things.

The species inhabit the woods of Brazil, in moist shady places. Their uses, if any, are unknown.

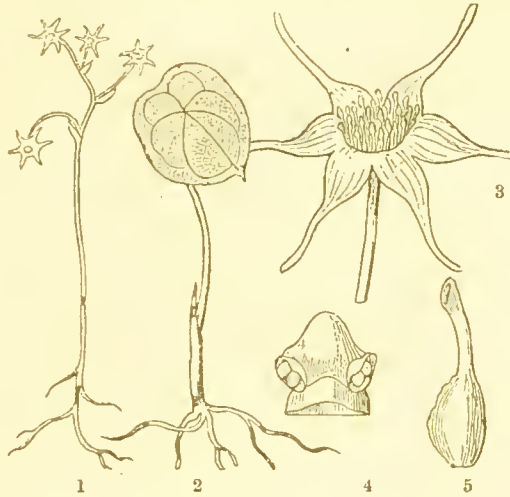


Fig. CXLIV.

GENERA.

Triuris, Miers. | Peltophyllum, Gardner.

NUMBERS. GEN. 2. Sp. 2.

POSITION. ——— TRIURIDACEÆ.—Trilliaceæ.
Menispermacæ?

Fig. CXLIV.—1. *Peltophyllum luteum*; 2. its leaf; 3. its flower; 5. its carpel; 4. anther of *Triuris hyalina*.—Miers.

ORDER LXVIII. DIOSCOREACEÆ.—YAMS.

Dioscoreæ, *R. Brown Prodr.* 294. (1810); *Agardh Aphor.* 169. (1823); *Ach. Rich. Nouv. Elem.* 434 (1828); *Endl. Gen. lvi.*—Dioscoreaceæ, *Ed. Pr. cclvii.*; *Meisner, p.* 404.

DIAGNOSIS.—*Dictyogens* with unisexual flowers, an adherent perianth, and consolidated several-seeded carpels.

Twining shrubs, with large tubers either above or below ground. Leaves alternate, occasionally opposite, with reticulated veins. Flowers small, spiked, with from 1 to 3 bracts each, ♂ ♀. Calyx and corolla confounded, herbaceous, adherent. ♂ Stameus

6, inserted into the base of the sepals and petals; anthers turned inwards, bursting longitudinally. ♀ Ovary adherent, 3-celled, with 1- or 2-seeded cells; style deeply trifid; stigmas undivided; ovules suspended, anatropal. Fruit leafy, compressed, with two of its cells sometimes abortive; occasionally succulent. Seeds two in each cell, or by abortion solitary, compressed, winged or wingless, or in the succulent species roundish; embryo small, near the hilum, lying in a large cavity of cartilaginous albumen.

According to Brown this Order is separable from Sarsaparillas by the threefold character of inferior ovary, capsular fruit, and albumen having a large cavity. *Tamus* is, however, between the two Orders, agreeing with Sarsaparillas in its baccate, with Yams in its inferior fruit.—*Prodr.* 294. Endlicher says it has no obscure resemblance to Birthworts, and it is probably in this place that that singular Order finds one of its nearest relationships; in fact, the woody tissue of the common Yam arranges itself in the stem very much in the same manner as the wedges of *Aristolochia*.

Although the genera are few in number the species are numerous, and are found exclusively in tropical countries of either hemisphere, if *Tamus* be excluded, which is a native of Europe and the temperate parts of Asia.

An acrid principle exists in the plants of this Order, and when concentrated renders them dangerous. *Tamus communis*, for example, has a large fleshy root, so acrid as to have been formerly employed for stimulating plaisters, while the tubers of *Dioscorea triphylla* and *dæmona* have dreadfully nauseous qualities even after being carefully cooked. Nevertheless, this principle is more generally so much diffused as to be of no importance: hence the principal part of the species belonging to the genus *Dioscorea* produce what are called Yams, large, fleshy, farinaceous tubers, which form an important

article of food in tropical countries as the Potato in Europe. The young suckers of *Tamus communis* (the *αμπελος μελαινα* of Dioscorides, and *οβρυά* of the modern Greeks,) and also of *T. erecta*, are eaten in Greece like Asparagus, as we learn from Sibthorp; but Endlicher says, that unless they are well boiled (*diligentius coquantur*) they are powerfully purgative, and even emetic.

GENERA.

Tamus, L.
Tamus, Juss.
Testudinaria, Salisb.

Rajania, L.
Janraja, Plum.

Dioscorea, L.
Ubiom, Rumph.

Oncus, Lour.
Podianthus, Schmitzi.

NUMBERS. GEN. 6. Sp. 110.

POSITION. ——— DIOSCOREACEÆ.—Smilacææ.
Aristolochiacceæ.



Fig CXLV.

Fig. CXLV.—*Dioscorea adenoearpa*; 1. a section of its male flower; 2. a seed vesicle open; 3. a seed

ORDER LXIX. SMILACEÆ.—SARSAPARILLAS.

Smilacæ, Ed. prior. cclvi. (1836).

DIAGNOSIS.—*Dictyogens* with bisexual or polygamous hexapetaloidous flowers, several consolidated carpels, and axile placentæ.



Fig. CXLVI.

Herbaceous plants or under-shrubs, with a tendency to climb, and sometimes having fleshy tubers. Stems scarcely woody. Leaves reticulated. Flowers ♂ or ♀ ♂ ♂. Calyx and corolla both alike, free, 6-parted. Stamens 6, inserted into the perianth near the base; seldom hypogynous. Ovary 3-celled, the cells 1- or many-seeded; style usually trifid; stigmas 3; ovules orthotropical. Fruit a roundish berry. Albumen between fleshy and cartilaginous; embryo very small, usually distant from the hilum.

From what has been already said in a previous page, it is obvious that the Order of Sarsaparillas, as

I understand it, is very different from that of other botanists. Its nearest affinities are with Lilies on the one hand, from which its reticulated leaves and quasi-exogenous rhizomes distinguish it, and on the other with Parids, whose tripetaloidous flowers afford a clear mark of distinction.

The species are found in small quantities in most parts of the world, especially in the temperate and tropical parts of Asia and America.

The diuretic demulcent powers of Sarsaparilla are well known. This drug is the produce of many species of Smilax; as *S. Purhampuy*, a Peruvian species highly extolled by Ruiz; *Smilax medica*, which furnishes the Sarsaparilla of Vera Cruz; *S. siphilitica*, which, according to Dr. Pereira, yields the Lisbon or Brazilian sort; and *S. officinalis*, which the same acute pharmacologist suspects to be the Jamaica Sarsaparilla, the best in the English market. Dr. Hancock maintains that the only Sarsaparilla to be relied upon for medical use, is that of the Rio Negro. Martius says (*Flora Bras*) that *S. papyracea* (*officinalis*, Pöpp.) yields Brazilian or Lisbon Sarsaparilla, and that many others are of medical value. It also appears that a considerable quantity of *Smilax glycyphylla*, of excellent quality, has been imported from New Holland; the leaves of

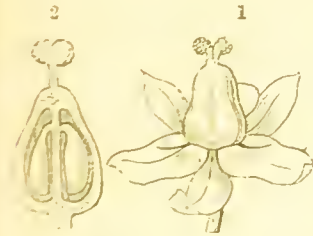


Fig. CXLVII.

FIG. CXLVI.—*Smilax glycyphylla*; 1. a male flower seen from above; 2. a female flower; 3. a transverse section of an ovary; 4. a seed, 5. a section of a seed, showing the embryo.

FIG. CXLVII.—1. Flower of *Smilax brasiliensis*; 2. perpendicular section of its ovary.

this plant are known under the name of Sweet Tea. Various Asiatic species, such as *S. zeylanica*, *glabra*, *perfoliata*, and *leucophylla*, are reputed to be little different in their qualities from the American species. *Smilax excelsa* and *aspera* are common substitutes in the south of Europe; according to Dr. Walsh (*Hort. Trans.* vi. 41), the root of both *S. aspera* and *S. excelsa*, which abound on the hills and in the woods on both sides of the Bosphorus, is used in decoction, like Sarsaparilla, for which it is sometimes substituted. Nees and Ebermaier say that it sometimes comes into the market under the name of Italian Sarsaparilla, but that it has little resemblance to the genuine drug. *Smilax China* has a large fleshy root, the decoction of which is supposed to have virtues equal to that of Sarsaparilla, in improving the health after the use of mercury. According to the Abbé Rochon, the Chinese often eat it instead of Rice, and it contributes to make them lusty.—*Ainslie*, 1. 70.

Roxburgh informs us that the large tuberous rhizomes of *S. lanceifolia* are much used by the natives of India, and are not to be distinguished from China root. The juice of the fresh tuber is taken inwardly for the cure of rheumatic affections, and the refuse, after extracting the juice, is laid over the parts most painful. American China root is reported to belong to this plant; but several species seem to be mixed together by botanists under this name. Elliot says that he believes *Smilax Pseudo-China* to be the one generally preferred in medicine as an alterative, and that it forms the basis of many diet drinks among the unlicensed faculty of the United States. From the tubers, with maize, sassafras and molasses, the negroes of Carolina manufacture a very pleasant beer.

GENERA.

Smilax, L.
Ripogonum, Forst.

NUMBERS. GEN. 2. Sp. 120.

Menispermaceæ.

POSITION.—*Dioscoreaceæ*.—SMILACEÆ.—*Trilliaceæ*.

Liliacæ.

ORDER LXX. PHILESIACEÆ.—PHILESIADS.

Philesiæ, *Ed. pr. under cclviii.* (1836); *Endl. Gen. p. 157.*—Philesiaceæ, *Endl. Ench. p. 91.* (1841).

DIAGNOSIS.—*Dictyogens* with bisexual trihexapetaloidous flowers, consolidated carpels and parietal placentæ.

Twining or upright shrubs, with ribbed or 1-nerved coriaceous, deeiduous, reticulated, leaves. Flowers large, showy, ♀, solitary, scaly at the base; either tripetaloidous with the calyx coloured, membranous and short, or hexapetaloidous, with the sepals and petals equal and similar. Stamens 6, inserted into the base of the perianth; anthers linear, opening longitudinally. Ovary 1-celled, free, with 3 parietal placentæ; style long, club-shaped; stigmas 3; ovules 00, orthotropical, enveloped in mucilage. Fruit succulent. Nothing more known with certainty, except that the seeds of *Lapageria* are obovate, horny, and buried in pulp, according to the *Flora Peruviana*.

In the last edition of this work I regarded these plants as forming a part of the Roxburgh-worts; but the discovery by Mr. Griffith, that the carpel of these plants is quite simple, and a further consideration of the parietal placentæ, orthotropical ovules, and hexamerous flowers of the Philesiads, has decided me to separate them, in the belief that recruits may be hereafter found for them. Very little is known about them at present; no one has analysed their seeds, and it is even doubtful whether the two genera here brought together are so closely allied as is supposed. For my part, I only know the ovules of *Philesia*. *Lapageria* looks like a *Smilax* bearing the flowers of a *Bomarea*.

Chili, especially its southern provinces, produces all we as yet know of the species of these plants.

Lapageria rosea, a most beautiful twiner, is said to have sweet eatable berries, and a root like *Sarsaparilla* in quality.

GENERA.

Philesia, *Comers.*
Cumplia, *Domb.*
Lapageria, *Rütz et Pav.*

NUMBERS. GEN. 2. Sp. 2.

POSITION.—*Smilacæe*. PHILESIACEÆ.—*Roxburghiaceæ*.
Amaryllidacæe.



Fig. CXLVIII.

Fig. CXLVIII.—1. *Philesia buxifolia*; 2. stigma of *Lapageria rosea*; 3. its ovary cut across; 4. its ovule.

ORDER LXXI. TRILLIACEÆ.—PARIDS.

Trilliaceæ, *DC. Propr. Med.* 294. (1816); *A. Gray, Ann. Lyc. N. York*, 4. 106.—Parideæ, *Link Handb.* 1. 277. (1829); *Endl. Gen.* p. 153; *Meisn. Gen.* p. 403.

DIAGNOSIS.—*Dictyogens* with bisexual tripetaloidous flowers, half consolidated carpels and axile placentæ.

Simple-stemmed herbaceous plants with tubers or rhizomes, and verticillate membranous netted leaves. Flowers large, terminal, solitary, ♂. Sepals 3, herbaceous. Petals 3, much larger, coloured, or herbaceous. Sometimes one-fourth is added to their parts. Stamens 6-10; filaments subulate; anthers linear, with cells on their edges, and the connective extended beyond them. Ovary free, 3-5-celled; styles as many, distinct; stigmas inconspicuous; ovules 00, in 2 rows, anatropal, ascending. Fruit succulent, 3-5-celled. Seeds 00, with a leathery brownish skin; embryo minute, in fleshy albumen.

These plants have been generally included in Sarsaparillas, from which they differ somewhat as Spiderworts from Lilies.

They are found in thickets in the temperate parts of Europe, Asia, and North America.

Paris quadrifolia is reckoned a narcotic acrid poison. The root of *Medeola virginica* is emetic and diuretic. *Trillium cernuum* and *sessile* have rhizomes that are violently emetic, and their fruit is suspicious; the juice of the berries mixed with alum gives a blue colouring matter.

GENERA.

Paris, *Linn.*
Demidovia, *Hoffm.*
Trillium, *Mill.*
Phyllantherum, *Rafin.*
Delostylys, *Rafin.*
 ? *Medeola*, *Gronov.*
Gyromia, *Nutt.*

NUMBERS. GEN. 4. Sp. 30.

Melanthaceæ.

POSITION.—*Smilacææ.*—TRILLIACEÆ.—*Roxburghiaceæ.*

Commelynaceæ.



Fig. CXLIX.

Fig. CXLIX.—*Paris quadrifolia*. 1. A transverse section of an ovary; 2. perpendicular section of the ripe fruit; 3. longitudinal section of a seed; 4. an anther.

ORDER LXXII. ROXBURGHACEÆ.—ROXBURGHWORTS.

Roxburghiaceæ, *Wall. Plant. As. Rar.* 3. 50. (1832); *Lindl. Nixus*, 23. (1833); *Endl. Gen.* p. 157.
Meisner, Gen. p. 402.; *Griffith in Calc. Journ. Nat. Hist.* p. 143.

DIAGNOSIS.—*Dictyogens* with bisexual flowers, solitary simple many-seeded carpels, with long stalked anatropal seeds, and a basal placenta.

Twining shrubs with tuberous roots? Leaves reticulated and coriaceous, with parallel secondary veins connecting several primary ribs. Flowers large and showy, solitary, fœtid. Perianth of 4 large petaloid divisions. Stamens 4, hypogynous; anthers adnate, opening inwards, pointed, with connectives projecting far beyond the cells, which separate from the latter as far as their bases. Ovary superior, 1-celled, with 2 polypermous placentæ arising from the very base of the pericarp; style none; stigma somewhat pencil-shaped; ovules 00, anatropal. Pericarp 1-celled, 2-valved, with 2 clusters of seeds at the base. Seeds attached to long cords covered with loose hairs just below the seeds; embryo taper, in the axis of fleshy albumen, with the plumule lying within a slit.

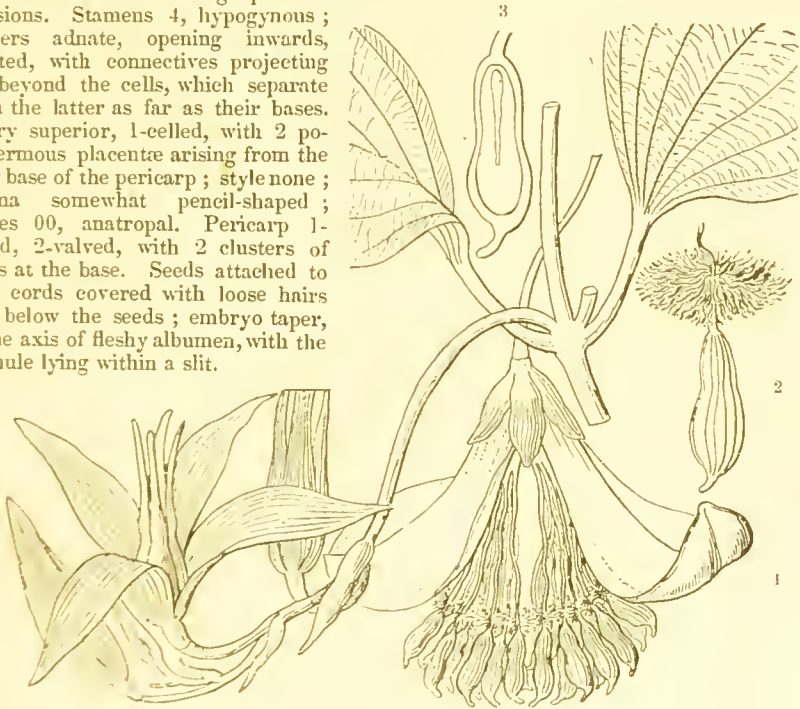


Fig. CL.

The affinity of this singular genus is not sufficiently marked to enable botanists to refer it to any known Natural Order: by Endlicher it is placed at the end of Sarsaparillas, and there can in fact be no doubt about its relation to the Parids, which that botanist includes in the Smilacæous Order. I, however, formerly regarded it as more nearly allied to Arads than to anything else, and Mr. Griffith has so far agreed with that opinion as to consider it certainly one of the class of which Arads are the type: in which he has apparently been influenced by the discovery of a slit on one side of the embryo. But this character has lost its value ever since the discovery by Adr. de Jussieu that a slit embryo is found very generally in Endogens; and a delinuous spadiceous inflorescence is indispensable to Arads; so that this view of the affinity of Roxburghia can hardly be maintained. It would rather appear to be the type of an Order for recruits to which we have still to look. In the meanwhile it may be looked upon as a tendency towards Arals on the part of Dictyogens. Roxburghia is said to have stems 100 fathoms long. Mr. Griffith regards the pistil as consisting, beyond all doubt, of one carpel only, as "is indicated by the obliquity of the ovary." Its double nature, as above

described, is the result of its maturation, and has no existence in the young state of the organ.

The plants of this small Order are natives of the hotter parts of India.

The roots of *Roxburghia*, previously prepared with limewater, are candied with sugar and taken with tea. Their flavour is insipid.—*Roxb.*

GENERA.

Roxburghia, *Dryand.*

Stemona, *Lour.*

Ubiun, *Rumph.*

NUMBERS. GEN. 1. Sp. 4.

POSITION.—*Smilacææ*.—*ROXBURGHACEÆ*.—*Trilliaceæ*.
Arucææ.

CLASS VI.—GYMNOGENS.

Synrhizæ, *Rich. Anal. du Fr. Eng. ed.* (1819).—Phanerogames Gymnospermes, *Ad. Brongniart Veget. Foss.* 88. (1828).—Gymnospermæ, *Nixus Plantarum.* 21. (1833); *Ed. pr.* p. 310.

The plants comprehended in this class have nearly an equal relation to flowering and flowerless plants. With the former they agree in habit, in the presence of sexes, and in their vascular tissue being complete; with Ferns and Clubmosses, among the latter, some also accord in habit, in the peculiar gyrate veneration of the leaves of some Cycads, in their spiral vessels being imperfectly formed, and in the sexes being less complete than in other flowering plants; the females wanting a pericarpial covering, and receiving fertilisation directly through the forameu of the ovule, without the intervention of style or stigma, and the males sometimes consisting of leaves imperfectly contracted into an anther bearing a number of pollen-cases upon their surface. So great is the resemblance between Clubmosses and certain Conifers, that I know of no obvious external character, except size, by which they can be distinguished. Gymnogens are known from most other Vasculares by the vessels of their wood having large apparent perforations or disks. It is not, however, on this account to be understood that they differ in growth from other Exogens; on the contrary, they are essentially the same, deviating in no respect from the plan upon which Exogenous plants increase, but having a kind of tissue peculiar to themselves.

At this point of the vegetable kingdom there is a plain transition from the highest form of organization to the lowest. Gymnogens are essentially Exogens in all that appertains to their organs of vegetation; they have concentric zones in their wood, a vascular system in which spiral vessels are found, and a central pith; but they are analogous to reptiles in the animal kingdom, inasmuch as their ova are fertilized by direct contact with the male principle. The two most remarkable of the Orders are Conifers and Cycads. Of these, the former is connected with Clubmosses among Acrogens by means of the extinct genus *Lepidodendron* (see *Fossil Flora*, vol. 2. t. 98), and their branches are sometimes so similar to those of certain Lycopods themselves, as to leave no doubt of their relation. Compare, for instance, *Lycopodium Phlegmaria*, and *Cunninghamia sinensis*. Some Cycads have the gyrate veneration of the leaves of true Ferns, along with the inflorescence of Conifers; and their mode of forming their trunk, although essentially the same as that of Exogens, yet resembles the growth of Acrogens in lengthening by a terminal bud only. While, however, the class of Gymnogens is thus distinctly marked by the most important physiological peculiarities, it approaches the highest forms of vegetation by that portion of it which bears the name of Joint-firs, plants, with all the structure of their class, but with the manner of growth of Chloranthus and Beefwoods, which will be found in a future part of this classification.

THE NATURAL ORDERS OF GYMNOGENS.

<i>Stem simple, continuous. Leaves parallel-veined, pinnate. Scales of the cone antheriferous</i>	}	73. CYCADEACEÆ.
<i>Stem repeatedly branched, continuous. Leaves simple, accrose. Females in cones</i>		
<i>Stem repeatedly branched, continuous. Leaves simple, often fork-veined. Females solitary. Membrane next the nucleus inclosed. Anthers 2-celled, opening longitudinally</i>	}	75. TAXACEÆ.
<i>Stem repeatedly branched, jointed. Leaves simple, net-veined. Membrane next the nucleus tubular, protruded. Anthers 1-celled, opening by pores</i>		
	}	76. GNETACEÆ.

ORDER LXXIII. CYCADEACEÆ.—CYCADS.

Cycadæ, Rich. in *Pers. Synops.* 2. 630. (1807); *Brown Prodr.* 346. (1810); *Kunth in Humb. et Bonpl. Nov. Gen. et Sp.* 2. 1. (1817); *R. Brown in King's Voyage*, (1825); *Rich Mémoire*, 195. (1826); *Ad. Brongniart in Ann. des Sc.* 16. 589. (1829); *Meisner, Gen.* p. 353; *Miquel in Linnæa*, 17. 675. —*Cycadeaceæ*, Ed. prior, (1836); *Endl. Gen.* xxxviii.

DIAGNOSIS.—*Gymnogens* with a simple continuous stem, parallel-veined pinnate leaves, and antheriferous cone-scales.

Small trees or shrubs, sometimes resembling Palm trees in their aspect. The stems are either simple and cylindrical, or spheroidal, or dichotomously branched, and in all cases strongly marked with the lozenge-shaped scars of broad woody leaf-stalks. Internally the stem consists of a mass of pith, traversed by woody bundles, and rings of woody matter, sometimes irregularly disposed, sometimes collected into regular



Fig. CLII.

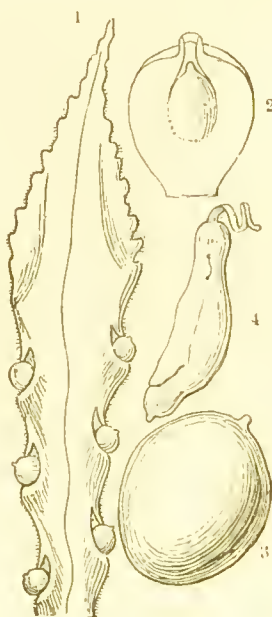


Fig. CLI.

and numerous concentric circles, always pierced by medullary plates. The wood consists of glandular woody tissue and spiral vessels. The leaves are pinnate, hard and woody, perennial, generally circinate when young, but in some instances flat; the leaflets have fine

simple veins, and are placed somewhat obliquely on their petiole, from which they finally disarticulate. (Miquel regards these leaves as a sort of branch, "rami scissi."—*Linnaea*, l.c.) Flowers ♂ ♀, perfectly destitute of all trace of calyx and corolla. ♂ collected in terminal cones, consisting of scales covered over their lower side with anthers which are one-celled, often collected in twos and threes, and split longitudinally. Pollen hyaline,

Fig. CLI.—*Cycas circinalis*; 1. a portion of a female frond; 2. section of the naked ovule; 3. ripe fruit; 4. embryo.

Fig. CLII.—Leaves of *Zamia*

angular, collected in masses. ♀ consisting of naked ovules, placed beneath peltate scales, or at the base of flat ones, or on the margins of contracted leaves. Seeds hard or spongy-coated nuts, with one or more embryos suspended by a long funiculus in a central cavity of large white fleshy or mealy albumen; the cotyledons unequal, more or less connate; radicle superior.

One of the botanists who originally noticed the plants that constitute this Order referred them to Ferns; an opinion to which Linnæus, having first adopted the idea of Adanson that they were related to Palms, finally acceded. He was followed by others, until, after some suggestions by Ventenat that the genera *Cycas* and *Zamia* ought to form a particular tribe, the present Order was finally characterised by the late L. C. Richard in Persoon's *Synopsis*, in 1807, with the observation that it was intermediate between Ferns and Palms. The opinion of the affinity to Ferns seems to have been thus generally adopted in consequence of the striking resemblance on the part of most species in the mode of developing their leaves; but the supposed relation to Palms was suggested rather by a vague notion of some general similarity, as, for instance, in their cylindrical trunks, than by any precise knowledge of the structure of Cycads. It is only within a few years that more accurate inquiries have determined the real nature of their affinities. In 1825, the publication of Brown's remarks upon the ovule, in which he demonstrated the similarity of conformation between the flowers of Cycads and Conifers, suggested new ideas of the affinities of both Orders; and the determination, in 1829, by Adolphe Brongniart, of the resemblance between them in the structure of the vessels of their wood, while it decided the near relation of Conifers and Cycads, confirmed the proximity of the latter to Ferns, and showed the inaccuracy of the ideas formerly held of a close resemblance between the latter and Palms. With regard to the nature of the evidence by which their strict relation to Conifers is established, it may be observed, that they both are dicotyledonous in seed, both have naked ovules constructed in a similar remarkable manner, and borne in both cases not upon an ordinary axis of growth, but upon the margin or face of metamorphosed leaves; that they have the same peculiar form of inflorescence, the same kind of male flowers, the same constant separation of sexes; that there is a like imperfect formation of spiral vessels; and that they both agree in having the vessels of their wood marked with circular disks; a character which, if not confined to them, is uncommon elsewhere. The difference between the cylindrical simple stem of Cycads and the branched conical one of Conifers arises from the terminal bud only of the former developing, its axillary ones all being uniformly latent, unless called into life by some accidental circumstance, as in the case recorded in the *Horticultural Transactions*, 6. 501; while in Conifers a constant tendency to a rapid evolution of leaf-buds takes place in every axil. With regard to their foliage, on which the difference of aspect chiefly depends, the leaves of Firs are minute and undivided, while those of Cycads are very large and pinnated; in Conifers there is a tendency to a higher development in the scales of the cones, while in Cycads there is a corresponding contraction, firstly in *Cycas* itself, and especially in *Zamia*, in which it takes place to exactly the same point as the evolution of Conifers. To this it may be added that the cones of *Araucaria*, among Firs, and of *Dion* among Cycads, are almost undistinguishable.

Natives of the tropics and temperate parts of America and Asia; but not found in equinoctial Africa, although they exist at the Cape of Good Hope and in Madagascar.—*Brown Congo*, 464. *Dion* edule occurs in Mexico, where it seems to be common in some places. According to Mr. Bunbury, *Zamias* are among the forms of vegetation that characterise the eastern part of the colony of the Cape of Good Hope, especially the great tract of thicket extending along the Caffèr frontier.—*Lond. Journ. Bot.* 2. 40. Upon the west coast of New Holland a *Zamia*, supposed to be *Macrozamia spiralis*, grows to the height of 30 feet. The undoubted remains of Cycads attest their having once formed a considerable portion of the vegetation of Great Britain!

All the species abound in a mucilaginous nauseous juice. With this, however, is mixed, in many instances, a very considerable quantity of starch, whence they are common articles of food in the countries where they grow. At the Cape of Good Hope various species of *Eucephalartos* are called Caffèrbread. The great seeds of *Dion* edule furnish a kind of Arrowroot in Mexico. A similar material of excellent quality is extracted in the Bahamas and other West India islands from *Zamia pumila* and other dwarf species. In Japan a kind of sago is procured from the cellular substance occupying the interior of the stem of *Cycas revoluta*. This is said by Thunberg to be held in the highest esteem; soldiers are able to exist for a long time upon a very small quantity of it, and it is contrary to the laws of Japan to take the trees out of the country. The nuts are also eatable. So also is a sort of sago extracted from *Cycas circinalis*, whose fruit is eaten in the Moluccas, and a kind of flour of bad quality is procured from

the kernels pounded in a mortar. It is supposed that the account given by Rheede of true sago being the produce of the plant is a mistake. This species also yields a clear transparent gum something like tragacanth, which when dried in the air, coagulates into a gummy mass which is applied to malignant ulcers, in which it excites suppuration in an incredibly short space of time.—*Blume*.

GENERA.

Cycas, *L.*
Dion, *Lindl.*

} <i>Zamia</i> , <i>L.</i>	} <i>Encephalartos</i> , <i>Lehm.</i>	} <i>Dipsacozamia</i> , <i>Lehm.</i>

NUMBERS. GEN. 6. Sp. 45.

Filicales.

POSITION.—*Pinaceæ.*—*CYCADEACEÆ.*—

Palmaceæ.



Fig. CLIII.

Fig. CLIII.—Male plant of *Cycas revoluta*; *a* one of the scales viewed from above; the same presenting the lower face, where the anthers grow.

ORDER LXXIV. PINACEÆ.—CONIFERS.

Coniferæ, *Juss. Gen.* 411. (1789); *Brown in King's Voyage, Appendix*, (1825); *Rich. Monogr.* (1826).—*Abietinæ et Cupressinæ*, *Rich. l. c.* (1826); *Bartl. Ord. Nat.* 94 et 95. (1830); *Endl. Gen.* lxxvi. and lxxvii.; *Meisner*, p. 352.—*Cunninghamiaceæ*, *Siebold, Fl. Jap. tt.* 101, 102.—*Conacææ*, *Lindl. Key*, No. 232. (1835).

DIAGNOSIS.—*Gymnogens with a repeatedly branched continuous stem, simple accrose leaves, and females in cones.*

These are noble trees or evergreen shrubs, with a branched trunk abounding in resin. Wood with the ligneous tissue marked with circular disks. Leaves linear, accrose or lanceolate, entire at the margins; sometimes fasciated in consequence of the non-development of the branch to which they belong; when fasciated, the primordial leaf to which they are then axillary is membranous, and enwraps them like a sheath. Flowers ♂ ♀, naked. ♂ monandrous or monadelphous; each floret consisting of a single stamen, or of a few united, collected in a deciduous amentum, about a common rachis; anthers 2-lobed or many-lobed, bursting longitudinally; often terminated by a crest, which is an unconverted portion of the scale out of which each stamen is formed; ♀ in cones. Ovary spread open, and having the appearance of a flat scale destitute of style or stigma, and arising from the axil of a membranous bract. Ovule naked; in pairs or several, on the face of the ovary, inverted, and consisting of 1 or 2 membranes open at the apex, together with a nucleus. Fruit consisting of a cone



Fig. CLIV

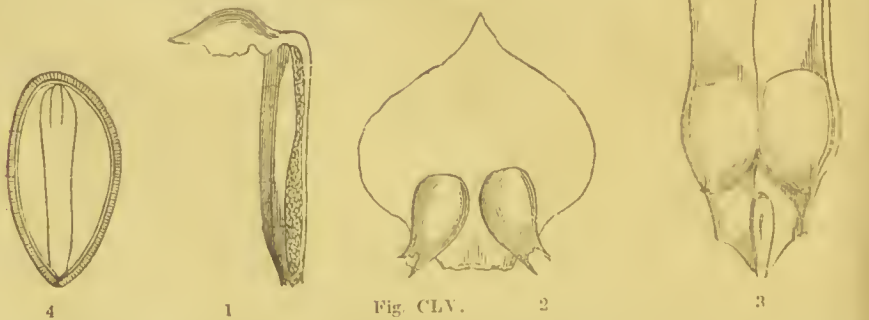


Fig. CLV.

Fig. CLIV.—*Pinus sylvestris*.

Fig. CLV.—1. side view of an anther; 2. carpellary scale and pair of inverted ovules; 3. inside of ripe scale and seeds; 4. section of the seed, minus the wing at its base.

formed of the scales-shaped ovaries, become enlarged and hardened, and occasionally of the bracts also, which are sometimes obliterated, and sometimes extend beyond the scales in the form of a lobed appendage. Seed with a hard crustaceous integument. Embryo in the midst of fleshy oily albumen, with 2 or many opposite cotyledons; the radicle next the apex of the seed, and having an organic connection with the albumen.

With the exception of Orchids, there is perhaps no Natural Order the structure of which remained so long and universally misunderstood as that of Conifers. This has arisen from the anomalous nature of their organisation, and from the investigations of botanists not having been conducted with that attention to logical precision which is now found to be indispensable. It is not expedient to enter upon an inquiry into the ideas that botanists have successively entertained upon the subject. Those who are desirous of informing themselves upon that point will find all they can desire in the Appendix to Captain King's *Voyage to New Holland*, and in Richard's *Mémoires sur les Conifères et les Cycadées*. It may, however, be useful to advert briefly to the principal theories which have met with advocates. These are, firstly, that the female flowers consist of a bilocular ovary having a style in the form of an external scale, an opinion held by Jussieu, Smith, and Lambert; secondly, that they have a minute cohering perianth, and an external additional envelope called the eupule: this view was taken by Schubert, Mirbel, and others; thirdly, that they have a monosepalous calyx cohering more or less with the ovary, contracted and often tubular at the apex, with a lobed, or glandular, or minute entire limb, an erect ovary, a single pendulous ovule, no style, and a minute sessile stigma: this explanation is that of Richard, published in his Memoir upon the subject in 1826. It appears, however, from the observations of Brown, that the female organ of Conifers is a naked ovule, the integuments of which have been mistaken for floral envelopes, and the apex of whose nucleus has been considered a stigma. About the accuracy of this view there is at this time no difference of opinion. These female organs, or naked ovules, originate from the larger scales of the cone towards their base, and occupy the same relative place in Conifers and in *Zamia*, a genus of Cycads. Now, as there cannot be any doubt of the perfect analogy that exists between the scales of the cone of *Zamia* and the fruit-bearing leaves of *Cycas*, the former differing from the latter only in each being reduced to 2 ovules, and to an undivided state; so there can be no doubt of the equally exact analogy between the scales of Conifers and *Zamia*, and therefore, the former would be called reduced leaves if the general character of the tribe was to produce a highly developed foliage; but as the foliage of Conifers is in a much more contracted state than the scales of their cones, the latter must be understood to be the leaves of Conifers in a more developed state than usual. That the scales of the cone really are metamorphosed leaves, is apparent not only from this reasoning, but from the following facts. They occupy the same position with respect to the bracts as the leaves do to their membranous sheaths; they surround the axis of growth as leaves do, and usually terminate it; but in some cases, as in the Larch, the axis sometimes elongates beyond them, and leaves them collected round it in the middle. In *Araucaria* they have absolutely the same structure as the ordinary leaves; and finally, they sometimes assume the common appearance of leaves, as is represented in Richard's Memoir, tab. 12., in the case of a monstrous *Abies*. The scales of the cones of Conifers and cone-bearing Cycads are therefore to these Orders, what carpellary leaves are to other plants. Schleiden does not, however, admit the scales of the cone of *Abietes* to be expanded carpellary leaves. He regards them as no other than the axillary buds of carpellary leaves; they, he says, cannot be the latter, because *folium in axilla folii* is without example in the whole vegetable world.—*Ann. Sc. N. S.* xii. 374. We would ask this ingenious anatomist what the fruit of *Salix* is but *folium in axilla folii*?

With regard to the male flowers, it is obvious that in the Larch, the Cedar of Lebanon, the Spruce, and the like, each anther is formed of a partially converted scale, analogous to the indurated carpellary scale of the females; and therefore, each antherium consists of a number of monandrous naked male flowers, collected about a common axis. Some botanists, however, consider each male catkin as a single monadelphous male flower, which is impossible. But in *Araucaria*, these cavities occupy one side only of an ordinary flat scale. In this genus, and such others as agree with it in structure, the anthers may be considered to consist of an uncertain number of lobes, and in this respect to recede from the usual structure of the male organs of plants: in Conifers, the anthers of which are normal, we have 2; in *Juniperus*, the like number; in *Cunninghamia*, but 3; in *Agathis*, 14; and in *Araucaria*, from 12 to 20. Brown remarks, what is certainly very remarkable, that in *Cunninghamia* the lobes of the anther agree in number, as well as insertion and direction, with the ovules.—*King's Appendix*, 32. The same author has noticed a very general tendency in some species of *Pinus* and *Abies* to produce several embryos in a seed, (*Wh Report of Brit. Assoc.* 1835, p. 596;) where also are some curious remarks upon the origin of the embryo in such plants.

Conifers are broken up by many modern botanists into 2 Orders, Abietæ and Cupressæ, the distinctive characters of which are given below. But I regard the cones as the true mark of Conifers, and consequently, such groups as mere divisions of the same Natural Order. Recently, Mr. Bennett has given the weight of his authority in favour of the separation of the two groups, relying upon the pollen of Abietæ having a curved

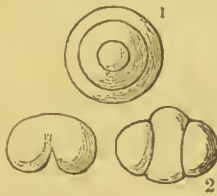


Fig. CLVI.

oval form, dark granular extremities, and an intermediate band; while Cupressæ have spheroidal grains whose outer coats are ruptured and thrown off, in consequence of the great capacity for absorbing moisture

possessed by the mucous matter surrounding the inner coat. But however beautiful this distinction may be in theory, it is by no means clear that it is of value in practice. Indeed, Mr. Bennett admits, that "it is not always a safe criterion in systematic arrangement;" and a comparison of his own statements with those of Mohl and others does not increase confidence in its importance. I, however, admit two well-defined groups, one of which has the ovules inverted and the others erect.

Natives of various parts of the world, from the perpetual snows and inclement climate of arctic America, to the hottest regions of the Indian Archipelago. The principal part of the Order is found in temperate countries; in Europe, Siberia, China, and the temperate parts of North America, the species are exceedingly abundant, and have an aspect very different from that of the southern hemisphere. In the former we have various species of Pines, the Larch, the Cedar, Spruce, and Juniper; the place of which is supplied in the latter by Araucarias, Podocarps, Dammars, Eutassas and Daeryds. A *Callitris* (*quadrivalvis*) is found on Atlas, and a true *Araucaria* (*Bidwillii*) in New Holland. In New Zealand the Daeryds are sometimes no bigger than Mosses.

No Order can be named of more universal importance to mankind than this, whether we view it with reference to its timber or its secretions. Gigantic in size, rapid in growth, noble in aspect, robust in constitution, these trees form a considerable proportion of woods or plantations in cultivated countries, and of forests where nature remains in temperate countries in a savage state. Their timber, in commerce, is known under the names of Deal, Fir, Pine, and Cedar, and is principally the wood of the Spruce, the Larch, the Scotch Fir, the Weymouth Pine, and the Virginia Cedar: but others are of at least equal, if not greater value. *Pinus palustris* is the Virginia Pine, so largely employed in the navy for masts. The Stone Pine, and *Pinus halepensis* (*πενικη*, *Diosc.*) are extensively used by the Greeks in ship-building. The gates of Constantinople, famous for having stood from the time of Constantine to that of Pope Eugene IV., a period of 1100 years, were of Cypress. The wood of *Juniperus oxycedrus* is supposed to have been that from which the images of their gods were carved by the Greeks; and finally, the Deodar wood of India is all but imperishable. The Norfolk Island Pine is an immense tree, known to botanists as *Eutassa* (*Araucaria*) *excelsa*; the Huon Pine of Tasmania is *Microcarphus tetragona*; the Kawrie Tree of New Zealand, or *Dammara australis*, attains the height of 200 feet, and yields an invaluable light compact wood, free from knots, from which the finest masts in the navy are now prepared. But they are both surpassed by the stupendous Pines of north-west America, one of which, *P. Lambertiana*, is reported to attain the height of 230 feet, and the other, *Abies Douglasii*, to equal or even to exceed it. The latter is probably the most valuable of the whole for its timber. Their secretions consist of various kinds of resinous matter. Oil of turpentine, common and Burgundy pitch, are obtained from *Pinus sylvestris*; Hungarian balsam from *Pinus*

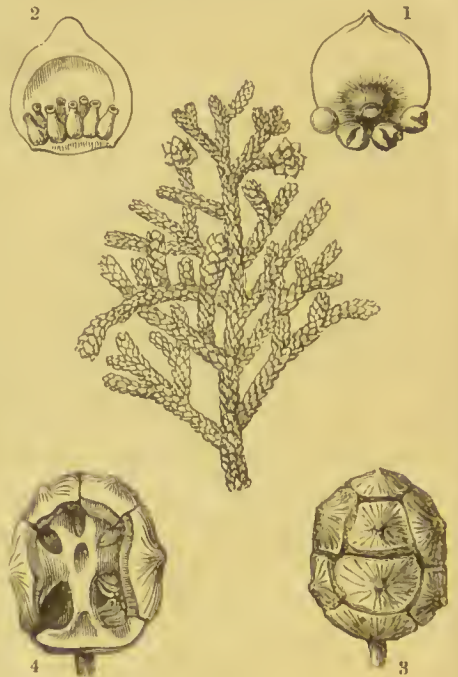


Fig. CLVII.

Fig. CLVI.—Pollen of, 1. *Juniperus virginiana*; 2. *Pinus sylvestris*.

Fig. CLVII.—*Cupressus sempervirens*; 1. a scale of a male cone with pollen; 2. a scale of a female cone with naked ovules; 3. a ripe cone; 4. the same with one of the scales removed.

Pumilio; a most fragrant resin from *Araucaria brasiliensis*; a hard brittle resin like copal from *Dammara australis*; Bourdeaux turpentine from *P. Pinaster*; Carpathian balsam from *P. Pinea*; Strasburg turpentine from *Abies peetinata* (*P. Picca L.*), our Silver Fir; Canadian balsam from *Abies balsamea*, or the Balm of Gilead Fir. The common Larch yields Venetian turpentine; a saccharine matter called Manna of Brignon exudes from the branches, and when the Larch forests in Russia take fire a gum issues from the trees during their combustion, which is termed Gummi Orenbergense; and which is wholly soluble in water like gum-arabic. Liquid storax is thought to be yielded by the Dammar Pine. Sandarach, a whitish yellow, brittle, inflammable, resinous substance, with an arid aromatic taste, is said by Thomson to exude from *Juniperus communis*; but upon the authority of Brongniart and Sehousboe, it is the tears of *Callitris quadrivalvis*. I have seen a plank two feet wide of this Sandarach tree, which is called the Arar Tree in Barbary. The wood is considered by the Turks indestructible, and they use it for the ceilings and floors of their mosques. The substance from which spruce beer is made is an extract of the branches of the *Abies canadensis*, or Hemlock Spruce, and of *Abies nigra*. Great tanning powers exist in the bark of the Larch; as great, it is said, as in the Oak. The stimulating diuretic powers of the Savin, *Juniperus Sabina*, are well known, and are partaken of in some degree by the common Juniper, the diuretic berries of which are an ingredient in flavouring gin; and by the *Thuja occidentalis*, and *Taxodium distichum*. Cypress was even once regarded febrifugal, and its oil as anthelmintic. The fetid oil of *Juniperus oxycedrus* is employed in veterinary practice. The large seeds of many are eatable. Those of the Stone Pine of Europe, *Pinus Pinea* (the *πινος, Diosc.*), *Pinus Cembra*, *Pinus Lambertiana* and *Gerardiana*, and *Araucaria Dombeyi*, are all eatable when fresh; and Mr. Bidwill found the natives of Moreton Bay feeding on the seeds of the *Araucaria Bidwillii*.

GENERA.

Suborder I. ABIETEÆ.
—*Ovules inverted; pollen oval, curved.*
Pinus, Linn.
Abies, Tournef.
Picea, Link.
Larix, Tournef.
Cedrus, Mill.
Cunninghamia, R. Br.
Betula, Salisb.

Arthrotaxis, Don.
Microcachrys, Hook, fil.
Sciadopitys, Zucc.
Araucaria, Juss.
Dombeya, Lam.
Colymbea, Salisb.
Eutassa, Salisb.
Altingia, Loud.
Dammara, Rumph.
Agathis, Salisb.

Suborder II. CUPRES-
SÆÆ.—*Ovules erect; pollen spheroidal.*
Juniperus, Linn.
Thuæcarpus, Trautv.
Thuja, Tournef.
Biota, Don.
Platycladus, Spach.
Cyparissa, Don.
Cryptomeria, Don.
Thujopsis, Zucc.

Cupressus, Tournef.
Chamæcyparis, Spach.
Retinispora, Zucc.
Callitris, Vent.
Parolinia, Endl.
Pachylepis, Brongn.
Taxodium, L. C. Rich.
Schubertia, Mirb.
Condylocarpus, Salisb.
Chamæpeuce, Zucc.

NUMBERS. GEN. 20. Sp. 100.

POSITION.—Cycadeaceæ.—PINACEÆ.—Taxaceæ.

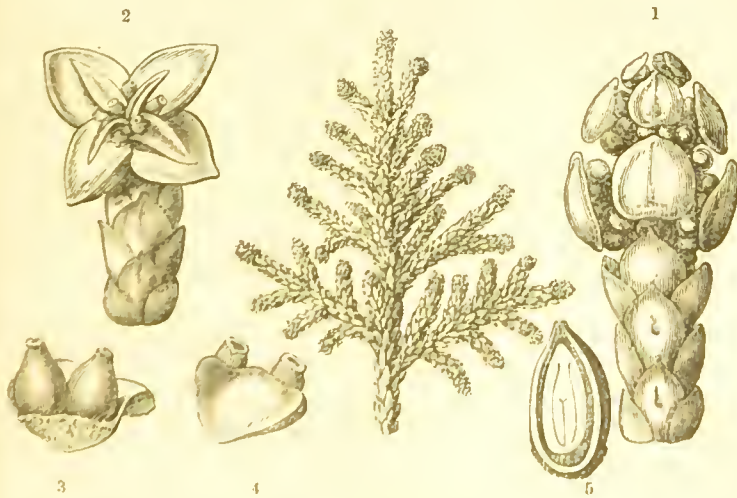


Fig. CLVIII.

Fig. CLVIII. *Thuja orientalis*; 1, a magnified fragment of a branch bearing a cone of male flowers; 2, a portion of a female branch; 3, 4, scales with naked ovules; 5, a vertical section of a ripe seed.

ORDER LXXV. TAXACEÆ.—TAXADS.

Taxineæ, *Rich. Conif.* 124. (1826); *Bartl. Ord. Nat.* 95. (1830); *Martius Conspectus*, No. 58. (1835); *Endl. Gen.* lxxviii.; *Meisner*, p. 353.—Taxaceæ, *Ed. pr.* (1836).

DIAGNOSIS.—*Gymnogens with repeatedly branched continuous stems, simple leaves often fork-veined, solitary females, 2-celled anthers opening longitudinally, and the membrane next the nucleus inclosed.*



Fig. CLIX.

Trees or shrubs with continuous, unarticulated branches. Wood having the ligneous tissue marked with circular disks. Leaves usually narrow, rigid, entire and veinless, evergreen, alternate or distichous; sometimes dilated and lobed, and in those cases having forked veins of equal thickness. Flowers ♂ ♀, naked, but surrounded by imbricated bracts. ♂ Stamens several; filaments usually monadelphous; anthers combined or distinct, opening longitudinally. ♀ solitary. Ovules naked, the foramen at their apex, their outer skin becoming finally hard. Seed usually supported or surrounded by a succulent imperfect cup-shaped pericarp. Albumen fleshy. Embryo straight, dicotyledonous, either antitropal or orthotropal.

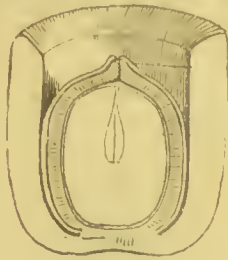


Fig. CLIX.

Yews are separated from Conifers by their fruits not being collected in cones, each ovule growing singly, unprotected by hardened scales; so that this is a degree of organization yet lower than that of Conifers themselves. It is also to be observed, that in this Order the leaves do not always preserve the veinless needle-shaped state of Conifers, but expand and form veins, which are then forked and of uniform thickness, just as in Ferns. To me it appears that this deviation on the part of many genera from the Coniferous form of fruit, is a good practical distinction. Mr. Bennett, however, is of opinion that Taxads should not form a distinct Natural Order, but ought to be associated with Conifers; at least such I presume to be the bearing of his observations in Horsfield's *Plantæ Javanicæ*, p. 37. In the opinion of this excellent botanist, *Taxus* belongs to Cupressaceæ, while *Podocarpus* and *Dacrydium* should be associated with Abietaceæ, an opinion to which he seems to be led, in part at least, by considerations connected with the pollen of those plants. What these peculiarities of the pollen are, is explained at p. 223. But I see no reason why two kinds of pollen should not be comprehended under the Order of Taxads as well as under Conifers; and the importance of distinctions in the pollen of plants appears to me to be at least very doubtful.

Fig. CLIX.—*Taxus baccata* loaded with male flowers; 1. a male flower; 2. an anther; 3. a female flower; 4. a vertical section of an ovule; 5. of a ripe fruit; 6. of a ripe seed, showing the embryo.—N.B. 4. and 6. are the same part in youth and age; 5. is the ripe ovule, with an accessory cup.

Fig. CLIX.—Perpendicular section of the ripe fruit of *Taxus*, together with the cup-shaped pericarp, which rises round it after the pollen has taken effect upon the ovule.

These plants occur in the milder climates of a great part of the world, and hence they are found in elevated situations within the tropics. The common Yew is the only species known in Europe; and it is common in the North of Asia. The majority belong to Asia or its dependencies. *Dacrydium* and *Phyllocladus* are abundant in New Zealand. Of *Podocarp*, the richest of any in species, three are found at the Cape of Good Hope.

Yews and their allies are resinous like Conifers, and often valuable for their timber, as evinced by the common Yew, which is unsurpassed for durability and elasticity. *Podocarpus cupressina* (Chomoro) is one of the best timber trees of Java. The *Dacrydium taxifolium*, or Kakaterro of New Zealand, acquires a height of 200 feet.—*Et. Ph. Journ.* 13. 378; its branches may be manufactured into a beverage resembling in antiscorbutic qualities the well-known spruce beer. *Podocarpus Totarra* furnishes the most valuable timber in New Zealand; and it is said that the possession of the trees has been the cause of wars among the savage natives.

The leaves of the common Yew are fetid, very poisonous, especially to horses and cows. (*Rex Cativolus Taxo, cujus magna in Gallia Germaniaque eopia est, se exanimavit. Cæsar.*) The berries are not dangerous. The seeds are said to be unwholesome. On the authority of an Italian physician it is stated that Yew-leaves, when administered in small doses to man, have a power similar to that of *Digitalis* over the action of the heart and arteries, reducing the circulation, and if persisted in too long, or given in too large doses, as certainly fatal. Yew is, however, reported to have one decided advantage over *Digitalis*, by its effects not accumulating in the system; so that it is a much more manageable and more efficient remedy.—*Burnett.* The bark of *Phyllocladus trichomanoides* yields a red dye. The fruits of *Salisburia*, a tree of great beauty, now common in Europe, are about as large as Damsons, and both resinous and astringent; their kernels are thought by the Japanese to promote digestion. The nuts of *Caryotaxus* are very astringent, and are employed by the Japanese interpreters, “ad coercendam urinam,” when they are likely to be detained for a long time in the Imperial Council Chamber.



1 Fig. CLXI.

GENERA.

<i>Taxus</i> , L.	<i>Caryotaxus</i> , Zucc.	<i>Thalamia</i> , Spreng.	<i>Cephalotaxus</i> , Zucc.
<i>Podocarpus</i> , L'Her.	<i>Nageia</i> , Gärtn.	<i>Robertia</i> , L. C. Rich.	<i>Salisburia</i> , Smith.
<i>Dacrydium</i> , Sol.	<i>Phyllocladus</i> , L. C. Rich.	<i>Brownckera</i> , L. C. Rich.	<i>Ginko</i> , Kämpf
<i>Forreya</i> , Arnott.			

NUMBERS. GEN. 9. Sp. 50.

Polypodiaceæ.

POSITION.—Gnetaceæ.—TAXACEÆ.—Pinaceæ.

Fig. CLXI.—*Phyllocladus rhomboidalis*; 1. a spike of ♂; 2. an anther, 3. the inflorescence of the ♀, with a pair of flowers.

ORDER LXXVI. GNETACEÆ.—JOINT FIRS.

Gnetææ, Blume, in *Ann. Sc. 2. Ser. 2. 105.* (1834).—Gnetaceæ, Lindl. in *Bot. Reg.* 1686. (July, 1834); *Endl. Gen. lxxix*; *Meisner, p. 352.*

DIAGNOSIS.—*Gymnogens with repeatedly branched jointed stems, simple net-veined leaves, 1-celled anthers opening by pores, and the membrane next the nucleus protruded.*

Small trees very much branched, or sarmentose shrubs, secreting watery, not resinous



Fig. CLXII.

1-leaved, transversely slit at the end, projecting from its bottom a monadelphous filament bearing 1-celled anthers, bursting longitudinally and centrally, so as to form a pore. Pollen (in *Gnetum*, simple, smooth, oblong, *Griffith*), in *Ephedra* ellipsoid, with 6 longitudinal furrows. ♀ altogether naked, or sheltered by a false calyx consisting of two scales, more or less combined, each of which surrounds one or two flowers. Ovary 0. Ovule pointed by a style-like process formed from a third membrane surrounding the nucleus. Seed drupaceous, before maturity pierced at the point and terminated by a style-shaped protruded process; finally pointless. Seed-coat thickish, either altogether leathery, or shelly, or fibrous internally, and succulent externally; in *Gnetum* lined by acicular woody tissue. Embryo dicotyledonous, in the middle of fleshy albumen; radicle superior.

Couifers and Cycads present features so peculiar that their separation from all other Orders is a point concerning which there can be no difference of opinion. It is indeed difficult to trace a plain transition from them to the other parts of the Vegetable Kingdom in which perfect sexes are present. There exist, however, a few plants, not very similar to each other in appearance, bearing the names *Gnetum* and *Ephedra*, in which we find precisely the structure and habit that would be wished for by a theorist searching for evidence to bring *Gymnogens* into communication with true *Exogens*; for one of them has all the appearance of a *Chloranth*, and the other of a *Casuarina*; and yet both retain the true peculiarities of *Gymnogens*. These are called *Gnetaceæ*, and may in English be termed *Joint Firs*, for they are closely allied to *Couifers*, but are distinctly known by their stems being jointed at every node. In these plants there is little tendency to form cones, and in the genus *Gnetum* the development of the ovule is so peculiar that botanists at one time, myself included, supposed that the real ovule was in truth an ovary pierced at the summit, for it consists of an exterior shell of considerable thickness and of a green colour; within which is a thinner envelope through which passes a tubular projection fringed at the point, and within these lies a nucleus, as is represented in the accompanying figure of the young ovule of *Gnetum Brunonianum*, copied from an unpublished drawing by Mr. Griffith. So that this sort of ovule has 3 distinct integuments, clear of the nucleus. It is to Mr. Griffith that I owe the knowledge of the true nature of these plants. In a most elaborate unpublished Memoir

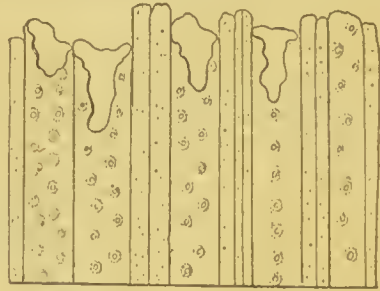


Fig. CLXIII.

matter, with opposite or clustered branches, and thickened separable articulations. Leaves opposite, entire, with anastomosing, reticulated veins; sometimes very minute and scale-shaped. Wood with the ligucous tissue marked with circular disks. Flowers ♂ ♀, arranged in catkins or heads, surrounded by opposite decussating scales which are connate at the base, or altogether consolidated into a horizontal ring. ♂ Calyx

Fig. CLXII.—*Gnetum Gnemon*: 1. a section of an ovule showing the three membranes, of which the innermost protrudes in the form of a stigma.

Fig. CLXIII.—A thin section of the wood of *Gnetum Gnemon*, highly magnified, after A. Brongniart.

on the structure of *Gnetum*, he shows that in reality the whole of the apparatus belongs to the ovulum. In that Memoir (dated Aug. 4, 1835), which unfortunately did not reach me till after the publication of the last edition of this work, there is the following description of the development of the parts of this extraordinary structure.

"At a period long before the exertion of the anthers, the ovules, which lie upon the male flowers, are generally of an oblong form, and consist of a central cellular solid body, inclosed in two envelopes. The outermost of these is fibro-cellular and divided longitudinally on the upper face, or that nearest the axis; the fissure extending nearly to the base of the ovule.* The inner or second envelope is cellular, and is divided irregularly towards its apex.

"This envelope does not at this period entirely inclose the nucleus: the points of some of the lacinie or divisions project occasionally beyond the apex of the outer envelope.

The nucleus is an oval or oblong cellular body, rounded off at its apex, which is composed of lax cellular tissue.

"The next change consists in the commencement of the obliteration of the longitudinal fissure, existing along the posterior face of each outer envelope, and of an extension of the inner coat over the nucleus, the apex of which becomes more or less depressed: the centre of the depression, however, projecting in the form of a cone of a very slight elevation. At the time of flowering, or of the exertion and dehiscence of the anthers, the fissure originally existing along the upper face of the outer coat has disappeared; with the exception of a small portion at the apex of the ovule, which remains unclosed throughout. The ovules are at this period in some species oblique. The inner envelope is generally entirely inclosed within the outer; the points of its lacinie reach, however, to the opening existing in the apex of this latter, and occasionally, but by no means universally, project beyond it to a short distance.

This coat has undergone scarcely any change, and corresponds in shape to the cavity of the outer envelope. The nucleus is completely covered by both integuments, and its apex, which continues of the same form, is occasionally tinged with brown. Within its substance, which is entirely cellular, and towards its centre, there exists a small cavity, lined with a membranous sac, attached apparently to the apex of the cavity, and containing a number of minute grumous-looking brown masses arranged without any obvious regularity. This sac I consider to be the amnios, with which it agrees in its development and subsequent disappearance; it exists at a rather early period, and is developed within a cavity formed by some excavating process.

"A short time after the fall of the male flowers an extraordinary change will be found to have occurred, consisting of the very rapid and apparently sudden development of a new membrano-cellular envelope between the second coat and the nucleus. This new formation, which I may term the additional coat, envelopes the nucleus pretty closely, and is continued upwards beyond the apex of the nucleus into a cylindrical tubular process; the mouth of the tube being lacinate or fimbriated. At the period now referred to, its apex barely projects beyond the outer envelope. During its development no particular change has taken place either in the original integuments or nucleus. At a somewhat later period, the ovules, except in the instance quoted in the note, hitherto concealed by the involucre, will be found exposed, and the outer coat to have become of a green colour.†

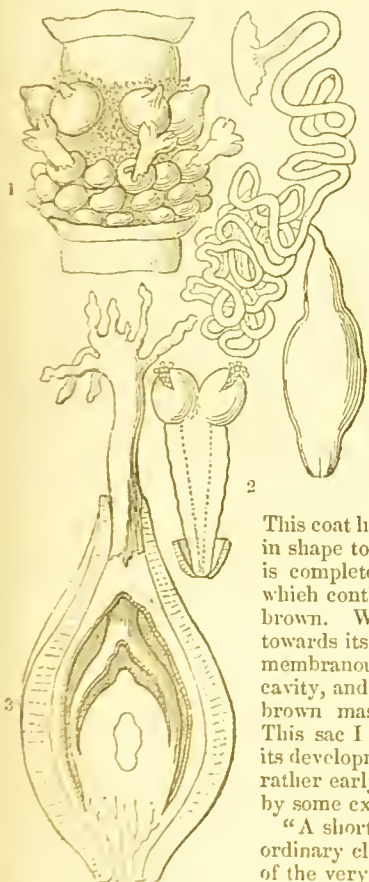


Fig. CLXIV.

the additional coat, envelopes the nucleus pretty closely, and is continued upwards beyond the apex of the nucleus into a cylindrical tubular process; the mouth of the tube being lacinate or fimbriated. At the period now referred to, its apex barely projects beyond the outer envelope. During its development no particular change has taken place either in the original integuments or nucleus. At a somewhat later period, the ovules, except in the instance quoted in the note, hitherto concealed by the involucre, will be found exposed, and the outer coat to have become of a green colour.†

* * This division is perhaps similar to that which Brown states to take place in *Daerydium*."

† In one species, *G. Brunonianum*, the ovules are at an early period exposed, owing to the obsolescence of the annulate involucre."

Fig. CLXIV.—Analysis of *Gnetum*, from sketches by Mr. Griffith; 1. a ring of ♂ and ♀ flowers; 2. a ♂; 3. a perpendicular section of a ♀, showing the 3 membranes overlying the nucleus; 4. an embryo extracted, with its long funicle.

The opening through its apex is distinct, and its direction vertical. The second envelope continues unchanged. The tubular prolongation of the additional or third envelope now projects through the openings in the original coats to a considerable distance. The mouth of the tube is also rather dilated, and the fringes of its margin spread out irregularly and to various extents. The whole of the tubular prolongation has become tinged with brown, in some cases approaching to black. It is to this stage or period that the descriptions of those authors who attribute a style and stigma to this genus apparently refer. Both Dr. Brown and Professor Lindley must likewise advert to this period when they state the nucleus to be surrounded with three envelopes."

There can be no doubt, then, that in reality Gnetum is as truly naked-seeded as Conifers themselves.

Independently of the singular organisation of its ovule, the genus Gnetum is remarkable for some other peculiarities. Its seed, which resembles a drupe, has within the outer fleshy integument, a layer of needle-like woody tissue of a very remarkable nature, freely separating when disturbed, and looking much like the hairs of Cowhage. The embryo, according to Mr. Griffith, is attached to an "enormously long tortuous and spirally but irregularly twisted cellular funiculus, the cells of which are much elongated and twisted. Its length varies, when moderately pulled out, from $3\frac{1}{2}$ to 5 inches, the whole length of the seed being about an inch. This funicle, as well as the extremely similar one of Cycas, has the property of contracting when immersed in water."—*MSS.* p. 15. Although belonging to the same category as Conifers and Taxads, the Joint Firs are very distinctly separated from them; for they have a calyx for the male flowers, and their anthers burst by pores, not longitudinally, to say nothing of the peculiarities of the ovule.

Natives of the temperate parts of Europe, Asia, and South America, and in the case of Gnetum, of the hottest parts of India and Guiana.

The interior of the pericarp of Gnetum urens is lined with stinging hairs; the seeds are eaten; the stem exudes a transparent gum, and when cut across yields an abundance of clear transparent tasteless water, which may be drunk.—*Aubl.* In Amboyna the seeds of Gnetum Gnemon are eaten roasted, boiled, or fried, and the green leaves form a favourite vegetable in lieu of Spinach; they are, however, very tasteless.—*Rumph.* The branches and flowers (*Amenta Uvæ maritimæ, Off.*) of the Asiatic Ephedras were formerly kept in the shops as styptics. The fruit is said to be mucilaginous, eatable, sub-acid, and slightly pungent.

GENERA.

Ephedra, Linn.
Gnetum, Linn.
Thoa, Aubl.
Gnemon, Rumph.
Uta, Rheede.

NUMBERS, GEN. 2. Sp. 15.

Chloranthac

POSITION.—Pinacete.—GNETACEÆ.—Taxaceæ
Casuarinacæ.

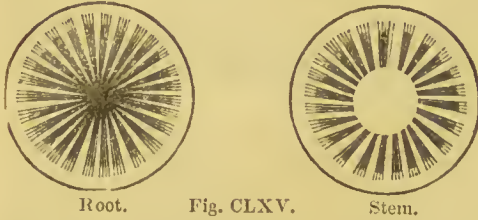
CLASS VII. EXOGENS.

Dicotyledones, *Juss. Gen.* 70. (1789); *Desf. Mem. Inst.* 1. 478. (1796).—Exorhizæ and Synorhizæ, *Rich Anal.* (1808).—Dicotyledoneæ or Exogeneæ, *DC. Theor.* p. 209. (1813).—Phanerocotyledoneæ or Seminifera, *Agardh. Aph.* 74. (1821).—Anthophytæ and Carpophytæ, *Oken.*—Dichorgana, *Schultz.*—Phylloblastæ, *Reichenbach.*—Homogens, *Lindl. in Bot. Reg.* 1839.—Acramphibrya, *Endl. Gen.* p. 258. (1837).—Synecophyta, *Schleiden.*

By common consent the plants to which botanists formerly gave the name of Dicotyledons, and which now bear that of Exogens, are recognised as the most completely formed of all the Vegetable Kingdom. In the more highly organised species they possess a degree of vitality unknown except among Gymnogens. A century or two terminates the life of an Endogenous tree, unless in a few rare cases; while many Exogens may have been the monarchs of their forests even at the commencement of the Christian era. This arises from their peculiar manner of growth, which insures a renovation of their vigour with each succeeding year; and it is in allusion to this circumstance that their name has been contrived.

Exogens, or outward growers, are so called because, as long as they continue to grow they add new wood to the outside of that formed in the previous year; in which respect they differ essentially from Endogens, whose wood is constructed by successive augmentations from the inside. All the trees of cold climates, and the principal part of those in hot latitudes, are exogenous. In an Exogen of ordinary structure the embryo consists of a cellular mass, in which there is usually no trace of woody or vascular tissue; but as soon as germination commences fine ligneous cords are seen proceeding from the cotyledons towards the radicle meeting in the centre of the embryo, and forming a thread-like axis for the root. As the parts grow the ligneous cords are increased in thickness and number, and having been introduced among the cellular mass of the embryo, are separated from each other by a portion of the cellular substance, which continues to augment both in length and breadth as the woody cords extend. By degrees the plumule or rudimentary stem becomes organised, and having lengthened a little, forms upon its surface one, two, or more true leaves, which gradually expand into thin plates of cellular substance traversed by ligneous cords or veins converging at the point of origin of the leaves. If at that time the interior of the young plant is again examined, it will be found that more ligneous cords have been added from the base of the new leaves down to the cotyledons, where they have formed a junction with the first wood, and have served to thicken the woody matter developed upon the first growth. Those ligneous cords which proceed from the base of the leaves do not unite in the centre of the new stem, there forming a solid axis, but pass down parallel with the outside, and leave a small space of cellular tissue in the middle; they themselves being collected into a hollow cylinder, and not uniting in the middle until they reach that point where the woody cords of the cotyledons meet in order to form the solid centre of the root. Subsequently the stem goes on lengthening and forming new leaves: from each leaf may again be traced a formation of woody matter disposed concentrically as before, and uniting with that previously formed: a cylinder of cellular substance being always left in the middle. The solid woody centre of the root proceeds in its growth in a corresponding ratio, lengthening as the stem lengthens, and increasing in diameter as the leaves unfold and new woody matter is produced. The result of this is, that when the young Exogen has arrived at the end of its first year's growth it has a root with a solid woody axis,

and a stem with a hollow woody axis surrounding cellular tissue, the whole being covered in by a cellular integument. But as the woody cords are merely plunged into a cellular basis, the latter passes between them in a radiating manner, connecting the centre with the circumference by straight passages, often imperceptible to the naked eye, but always present. The annexed diagram illustrates this.



Here we have the origin of pith in the central cellular tissue of the stem, of wood in the woody axis, of bark in the cellular integument, and of medullary processes in the radiating passages of cellular tissue connecting the centre with the circumference.

The woody axis is not, however, quite homogeneous at this time. That part which is near the centre contains vessels of different kinds, particularly dotted vessels (bothrenchyma); the part next the circumference is usually destitute of vessels, and consists of woody tissue exclusively: of these two parts that with the vessels belongs to the wood, properly so called, and serves as a mould on which future wood is added; the other belongs to the bark, separates under the form of liber, and in like manner serves as a mould within which future liber is disposed.

At the commencement of a second year's growth the liber separates spontaneously from the true wood; a viscid substance called cambium is secreted between them; and the stem again lengthens, forming new leaves over its surface. The ligneous cords in the leaves are prolonged into the stem, passing down among the cambium, and adhering in part to the wood and in part to the liber of the previous year, the former again having vessels intermingled with them, the latter having none. The cellular tissue that connected the wood and liber is softened by the cambium, and grows between them horizontally while they grow perpendicularly, extending to make room for them, and consequently interposed between the woody cords of which they each consist, forming in fact a new set of medullary processes terminating on the one hand in those of the first year's wood, and on the other in those of the first year's liber. This addition of new matter takes place equally in the stem and in the root, the latter extending and dividing at its points, and receiving the ends of the woody cords as they diverge from the main body. The following figure illustrates this, and shows, when compared with the last, what difference there is in the appearance of the stem of an Exogen one and several years old.

And thus, year after year, the Exogen goes on, forming zone upon zone of wood, which is permanent, and zone within zone of bark which perishes at the outside, but is renovated at the inside, as the stem increases in diameter.

If this account is compared with what has already been stated concerning Endogens, it must be obvious that the stem of these two great classes is formed from the very beginning in an essentially different manner. Endogens have no cylindrical column of pith; their woody arcs are never collected into a cylinder, through the sides of which the cellular tissue passes



Fig. CLXVI.

Fig. CLXV.—Ideal section of the root and stem of an Exogen one year old.
Fig. CLXVI.—Real section of the stem of an Exogen six years old.

in the form of medullary processes; and the woody matter of their bark, so to call their cortical integument, is not parallel with that of the wood and spontaneously separable from it. The only way in which the growth of the stem of Exogens corresponds with that of Endogens is that in both classes the woody matter is connected with the leaves; and in both a cellular substance is the foundation of the whole structure. Nevertheless, attempts have been made by some modern physiologists to identify the two, and to show that the one is very little different from the other.

It is not, however, to be supposed that the manner of growth in Exogens, is in all cases exactly what has been thus described as its normal condition. On the contrary, a great variety of modifications has been found to exist, dependent in part upon an excessive development of cellular matter, and in part upon the formation of angles, lobes, or sinuosities, upon the loss of concentric rings of wood for which a great homogeneity of structure is substituted, and upon the production of irregular zones of cellular matter resembling bark, between the zones of wood. Cases of this kind have attracted the attention of most modern botanists. Several have been noticed in my Introduction to Botany, in the *Penny Cyclopædia*, art. Exogens, and by Decaisne, Adrien de Jussieu, Schultz, Gaudichaud and Schleiden; but they have not been applied successfully to systematical purposes. In a sketch of a possible plan of extending the classes of plants at the expense of Exogens (*Bot. Reg.* 1839. *Misc.* p. 76), I have suggested the formation of a group to be called Homogens, to which it has been proposed to unite Birthworts, Nepenths, Lardizabalads, Menisperms, Peppers, and several other Orders. The character upon which reliance was placed was the remarkable nature of the wood of these plants, which never have more than one zone of woody matter, to whatever age they may have arrived. M. Decaisne has however shown (*Mémoire sur les Lardizabalées*), that although this peculiarity is extremely striking in some cases, as for example, in *Aristolochia labiosa*, yet that it is not constant in even the same Order, *A. Clematitis* having annual zones; and that in Menispermads, while there is a great departure from the ordinary structure of Exogens, except *Aristolochia* so far as regards the liber, the wood is regularly zoned in many instances, although the dotted vessels are wanting.

Nevertheless, although from the very imperfect state of information concerning the true structure of the stems of plants, I am unable to offer, for retaining this division, such reasons as would be satisfactory, yet I think it will be recognised hereafter, either wholly or in part; at least I am persuaded that the time will come when the internal structure of the stem will be far more extensively consulted than it now is, and be made the basis of good and important systematic divisions. Schultz preceded me in this attempt, in preparing his *Synorgano dichorganoidea* (*Natürliches System des Pflanzenreichs*, p. 319, 1832), to which he referred Piperaceæ, Saururaceæ, Chloranthaceæ, Nyctaginaceæ, Callitricaceæ, Hippuridaceæ, Myriophyllaceæ, Amaranthaceæ, Cycadeaceæ, Nymphaeaceæ, Nelumbiaceæ, and Diphylleaceæ, and his proposition, like mine, has fallen to the ground. But although the genera he collects under Diphylleaceæ, namely, *Diphylleia*, *Podophyllum*, and others, are in no wise different from the ordinary state of herbaceous Exogens, yet it must be admitted that Hippurids and several of the others offer less resemblance to that plan of organisation. It is difficult to say whether Schleiden contemplates the possibility of any similar division; but it is worthy of notice that he, in his paper *On the Anatomico-physiological Differences in the Structure of Stems*, translated in the *Annals of Botany* (iv. 240)

collects Peppers, Nyctaginaceæ, Amaranths, and Chenopods, by the common character of their stems having several sets of fibrovascular bundles, as in Endogens. It is however evident, as is stated in the proper places of this work, that the character proposed by Schleiden is no more universal than that which has been mentioned by myself; and therefore I think it more prudent to defer for the present an attempt at maintaining the Class of Homogens, and to leave it to be determined by future and very extended inquiries, whether such a group really exists in nature, what are its limits, and how they are to be defined. It seems probable that some such a group does exist, or at least that in the stems of Dicotyledonous plants there are modifications of structure of the very highest importance, to which attention has been hitherto insufficiently directed.

If Exogens are distinctly known from Endogens by their peculiar manner of growth and by the arrangement of their woody matter, they are not less clearly defined by external marks.

Their leaves have the veins ramifying from the midrib, or ribs if there are several, in so intricate a manner as to give the appearance of irregular network. Their veins never run parallel with each other without ramifications; for if, as sometimes happens, they appear to do so, it will be found that the appearance is confined to the principal veins or ribs, and that the secondary veins between them ramify in the usual way. The leaves are moreover in most cases articulated with the stem, leaving behind them a clean scar when they die, not rotting away and hanging upon the stem in the form of a ragged sheath, as is common in Endogens. Moreover, they are frequently furnished with stipules, an unusual circumstance in Endogens.

The flowers of Exogens are usually constructed upon a quinary type, that is to say, have five sepals, five petals, and five stamens, or some power of that number; now and then they vary to a type of four, or they exceed the number five; but we rarely find the ternary structure of Endogens present in them. If, as in Crowfoots, Berberids, Anonads, and other Orders, the sepals and petals follow a ternary type, the number three is lost in the stamens or the ovary. The Natural Order of Menispermads is the only one among Exogens in which the ternary type regularly pervades all the parts of the flower.

In their manner of growth they rarely resemble Endogens. The consequence of the ramification of the veins is to give their leaves a broad and rounded figure, the effect of which upon their general appearance is to produce the round-headed aspect that we recognise in all the trees naturally inhabiting this country. In no known instance does the stem grow by the development of a single terminal bud; so that we never find in this class the columnar aspect of Palm-trees, unless the genus *Theophrasta* be considered an exception.

The differences between Exogens and Endogens, thus strongly marked in the stem, leaves, and flowers, are connected with others in the embryo. In Exogens of the common kind this organ has two lobes, held together by a minute central body, the upper end of which, between the lobes, is the plumule or rudimentary stem, the lower the radicle or rudimentary root: the lobes themselves, or cotyledons, are rudimentary leaves. This structure is readily seen in a hazel-nut or a garden-bean; the deviations from it are few and unimportant as compared with those of Endogens. Three or a greater number of cotyledons may be present in a whorl, instead of two opposite to each other. Or one of the two cotyledons may be much smaller than the other, as in *Trapa*; or they may be deeply lobed, as in the garden-

eress. But in all these cases the deviations are obviously reconcilable with the typical character of being dicotyledonous.

When the embryo of an Exogen germinates, the radicle simply lengthens at its point, without having to break through the coat of the embryo; on this account Exogens have been named exorhizal.

Hence the class of Exogens has five important, and, in some measure, independent characters, by which its limits are settled.

1. The wood is exogenous.
2. The veins of the leaves are netted.
3. The fructification is formed upon a quinary or quaternary type.
4. The embryo is dicotyledonous.
5. The germination is exorhizal.

Exogens have received other appellations in allusion to such characters; they are commonly called Dicotyledones, and Exorhizæ is another but less common appellation; moreover, they are the Phanerocotyledonæ of Agardh, the Anthophytæ and Carpophytæ of Oken's school, the Dichoragana of Schultz, the Phylloblastæ of Reichenbach; not to mention names still more obscure.

In consequence of imperfect development, and the abortion or multiplication of parts, many deviations occur from the above characters. But, as in Endogens, so in these, such anomalies do not cause any real difficulty in distinguishing Exogens from other plants. Suppose the stem to be so slightly formed, as in Mossweeds (*Podostemaceæ*), or the aquatic Hippurids, as not to arrive at a state in which the exogenous arrangement is perceptible, we have the dicotyledonous embryo, and the typical number of the floral organs to guide us. Let the leaves appear as scales, as in *Lathræa*, *Orobanche*, and the like; still there is the embryo or again the floral proportions. If the fructification is absolutely ternary as in *Menispermads*, the organisation of the stem, leaves, and embryo reveals the true nature of such plants. Or if the embryo is undivided, as in *Cuscuta*, and at the same time the veins of the leaves deficient, and all this with an incomplete formation of woody matter, then the number of parts in the flower remains to prevent our falling into error. It is therefore always to be remembered, that the limits of this great class are not exclusively determined by one single character, but by a combination of five; a part of which may be occasionally exceptional or undiscoverable.

But while the class of Exogens is thus distinctly circumscribed, it is found to approach the limits of other classes at various points. It evidently touches *Gymnogens* by means of *Beefwoods* (*Casuarinaceæ*); *Endogens* are represented by *Crowfoots*, some of the species of *Ranunculus* having a striking resemblance to *Alismads*, and perhaps by *Peppers*, which seem to have a tendency to *Arads*. *Menispermads* may almost be mistaken for *Sarsaparillas* (*Similacæ*), and thus a connection is established with *Dicotyogens*; *Mossweeds* (*Podostemaceæ*) may be regarded as analogous to *Liverworts* among *Thallogens*; it is not unreasonable to regard *Hippurids* as an exogenous form of *Arrowgrasses*, or *Callitriche* as the analogue of *Lemna*, and the whole *Nymphal Alliance* certainly comes very near to *Hydrocharads*.

The different methods of classifying Exogens have been considered in the introductory part of this work. That which is here adopted is founded on the following considerations.

The office of reproduction is, after that of sustaining life, the most essential in the economy of both plants and animals, and therefore the

modifications which are found in the organs of reproduction may be expected to furnish the best characters for classification, after those of nutrition. The latter have been already employed as the foundations of the classes, as far as they appear susceptible of being so applied; the former, consisting of the stamens and pistil, have been little used for the classes, and appear to present as many modifications as are required for secondary divisions. That was the opinion of Linnæus, who adopted them in the construction of the Classes and Orders of his sexual system; but he mainly relied upon their number, which is a circumstance of little or no importance, and where that was done his classification proved useless; but in those parts of the system in which he made use of other circumstances, as in his Monadelphia, Diadelphia, Tetradynamia, Didynamia, Syngenesia, &c., his divisions ceased wholly or in part to be artificial, and although in some instances modified, still correspond essentially with the Natural Orders of modern botanists.

Nor did the importance of the stamens and pistil escape the keen eye of Jussieu, who relied upon them very much in the construction of his ingenious system. In the first place, he separated from all other Exogens those which have the stamens in one flower and the pistil in another, and he called them Diclinous, and by this process he brought together a collection of Natural Orders, corresponding with the Monœcious and Dioecious plants of Linnæus. No one can doubt that this was a judicious step, and upon the whole the plants collected in the diclinous division resemble each other more than they resemble anything else; but he excluded a large number of truly diclinous plants, which are scattered over other parts of his classification, and this has led to the idea that the distinction itself was a bad one, an opinion in which I formerly concurred; but a more careful examination of it since, and an extended acquaintance with the Vegetable Kingdom, has entirely convinced me that we have no available characters for breaking up Exogens into primary groups or sub-classes superior to those of separated and united sexes, that is, to diclinism and hermaphroditism. Not that they are without exceptions; to employ the forcible language of Jussieu himself: "*Ut in præcedenti serie nonnullas diclinis hermaphroditis commixtas plantis admittit exceptio, sic in diclinium ordines quædam irrepunt hermaphroditæ, consentiente aut jubente naturâ quæ stabiliores interdum eludit regulas, nonnunquam instabilis ipsa aut abstrusis legibus obtemperans.*"—*Gen. Pl.* 384. But if what are called polygamous plants, that is to say, such as have a rudimentary pistil in the male flowers, and rudimentary stamens in the female flowers, are regarded as being hermaphrodite, as they surely are, and the idea of a diclinous structure is limited to cases of a total separation of the stamens and pistil, these exceptions are reduced to a small and unimportant number, of no moment in a classification. For this reason, then, the diclinous subclass of Jussieu is still preserved; increased by modern discoveries and improved by the expulsion of such plants as Piper, Gnetum, Ulmus, and others which belong to hermaphrodite Orders, or have other affinities than those suggested by Jussieu.

In this way Exogens are broken up into 2 groups, the one Diclinous and the other Hermaphrodite. The latter is divided by almost everybody into Polypetalous, Monopetalous, and Apetalous sub-classes; following the old systematists, who knew of little beyond external characters, and had small acquaintance with any plants except those of Europe. But all experience shows, what reason seems to indicate, that no great natural

combinations can be effected by such distinctions. Exceptions to the constancy of such characters are endless ; there is probably not one polypetalous Order that is not also apetalous, and many of them are even monopetalous, of which Rueworts, Houseleeks, Anonads, Leguminous plants, Milkworts, and many more, afford familiar examples. The apetalous Orders are occasionally polypetalous, as in many genera of Buck wheats and Daphnads. The monopetalous structure becomes polypetalous in all but a very few cases, even indeed in such natural Orders as the Primworts ; and it even disappears altogether, as in Oliveworts and Primworts. Nor is it probable that characters derived from the calyx and corolla should be of the very highest value ; for, in the first place, those organs are physiologically identical, their distinction having no real existence except in certain special instances ; and, in the next place, the importance of them to the act of reproduction can hardly be considerable, when we find that plants are multiplied quite as well in their absence as in their presence, and even that, as in the Violet, some Leguminous plants, the common Apple, &c., which habitually produce them, seeds are matured as freely when they are partially away as when in a state of high development. For this reason, the calyx and corolla are here rejected as organs suited for distinguishing the primary groups, or the Sub-classes, of Exogens.

We are not, however, justified in assuming that the calyx and corolla are never of any high importance in plants ; and, therefore, while they are objectionable as forming the basis of a classification *per se*, they are recognised as having a real value in connection with the stamens. If the stamens have no adhesion to either calyx or corolla, then it may be assumed that the latter organs may be dispensed with ; and for this reason the first Sub-class of hermaphrodite Exogens is characterised by the stamens standing entirely clear of the floral envelopes, or being, in the language of Jussieu, Hypogynous. But if there is any adhesion between the stamens and either the calyx or corolla, it may equally be assumed that the one organ is in some way necessary to the other ; for this reason the Perigynous character is admitted as a valid mark of a Sub-class ; not, however, a slight and inappreciable adhesion, but a real and manifest union of the parts ; and it is considered immaterial whether the stamens grow on the petals or the calyx, provided they grow on one of them.

Beyond this we have that further degree of adhesion, to which Jussieu gave the name of Epigynous : consisting of a union not only of the calyx or corolla to the stamens, but of all those organs to the sides of the ovary. This, in which it may be supposed that a higher degree of necessity for the incorporation of the floral organs exists than in the former case, is taken as the distinctive mark of a third Sub-class of hermaphrodite Exogens. So that the Sub-classes are established on the following grounds :—

<i>Flowers absolutely unisexual.</i>	I. DICLINOUS.
<i>Flowers hermaphrodite.</i>	
<i>Stamens not adhering to either calyx or corolla</i>	II. HYPOGYNOUS.
<i>Stamens adhering to either calyx or corolla</i>	III. PERIGYNOUS.
<i>Stamens, calyx, and corolla all adhering to the side of the ovary</i>	IV. EPIGYNOUS.

This, it may be said, is essentially the old plan of Jussieu ; but there is this material difference between the method now proposed and that of the great chief of the French school : that what he treated as a secondary character is made primary ; while his primary distinction, of polypetalous,

monopetalous, and apetalous structure, is treated quite as a subordinate consideration, as it surely deserves to be.

If the classification thus obtained be attentively studied, it will be found to offer many entirely new combinations, while others of universally recognised truth are not disturbed by it. Of these new combinations there are few to which any serious objection seems to apply, and it is believed that the larger part of them are more opposed to our prejudices than to truth. Not that I have the presumption to suppose that they will meet the universal approval of Botanists. What method of classification ever has or ever can? So long as there are many points of view from which a survey may be taken of the Vegetable Kingdom, so long will there be conflicting opinions as to the way in which the objects that meet the eye can best be grouped.

In former attempts at redistributing the natural Orders of Exogens, I had proposed to throw into one Sub-class all those in which the embryo is very small as compared with the albumen in which it is imbedded; and I still think that this peculiarity is of as much importance among plants as the being oviparous or viviparous among animals. But, although I do not at present see a reason for retracting my former opinion upon that subject, yet I do see that the time is hardly come for carrying out such a principle satisfactorily. And, therefore, instead of employing it for the character of a Sub-class, it has only been used as a means of limiting Alliances.

Although, from the complicated nature of the affinities of plants, no hope can be reasonably entertained of securing an unbroken line of transition from one end to the other of the series in which the various groups must necessarily be treated of, yet it will be found that the method here proposed offers very few considerable gaps in the chain of relationship. Commencing with the Amental Alliance, which seems to stand in near relation to the Joint-firs (*Gnetaceæ*) among Gymnosperms, the passage to the Urtical and Euphorbial is too plain to require explanation: of the latter the Quernal and Garryal may be regarded as epigynous forms,—the first without albumen, the second with an abundance of it. Nutmegs, in the Menispermal Alliance, then fit in; and the twining Menispermads may be taken as an anticipation of Cucurbitals, of which the Papayal Alliance is an offset, a little out of the direct line of succession.—Even to the latter, however, an analogue is found among Violals, in the form of Bixads and Samyds; thence Turnerads conduct us directly into the Cistal Alliance. At this point we quit the debateable ground of affinities, and, passing successively through Malvals, Sapindals, Guttiferals, we reach the Nymphal Alliance through Tutsaus. Here, however, the chain is evidently broken, and probably the sequence is wrong. The Water-shields (*Cabombaceæ*), among Nymphals, pass directly into the Ranal Alliance by way of the Crowfoots, whence Poppyworts join Fumeworts in the Berberal Alliance. At this place Cyrrilads appear to form a connecting link with Humiriads among Ericals, and the latter pass directly into the Rutal Alliance by the intervention of such plants as *Correa*. From Rutals the passage is easy to the Gerarial, Silenal, and Chenopodal Alliances, which suddenly stop with the Peppers; this is, however, a doubtful case of affinity, although such a plant as *Batis* may seem to justify the approximation. At the point now reached the Perigynous Sub-class is penetrated by way of the Ficoidal Alliance, which might be almost united with the Chenopodal. Selcranths, among Ficoidals, seem to present a transition to Salvadorads in the Daphnal Alliance, of which again a part of the Rosal Alliance is almost a polypetalous form. From

Rosals to Saxifragals, and then by way of Brexia to Rhamnads, is but a step. At this point the Gentianal Alliance is entered by way of Hollyworts, and we quit it by moving from Gentianworts into the Solanal Alliance. The Cortusal, Eelial, and Bignonial Alliances may be passed without an obstacle; and thus we reach the end of the Perigynous Sub-class.—Gesnerworts, in the Bignonial Alliance, fit on to Goodeniads among the Campanals of the Epigynous Sub-class; these join Myrtals, through Myrobalans on the one hand, and Napoleonworts on the other. From Myrtals we pass to the Caetal Alliance, which may be theoretically considered a parietal condition of the former, so near do the Onagrads of the former approach the Loasads of the latter group. This brings us to Barringtoniads and other Orders collected in the Grossal Alliance. The Cinchonals are entered by way of Bilberryworts, and quitted through the Stellate plants, which evidently touch Umbellifers in the Umbellal Alliance. At this point a passage is effected into the last Alliance, that of Asarals, by way of Witch Hazels and Sandalworts, till the whole line is finally closed by the Birthworts. These singular plants, with their ternary flowers, appear to have an incontestable relationship to Yams among Dietyogens, and thus the circle of affinities eventually returns into itself.

Each of the Sub-classes consists of Alliances which have also in many instances a strong lateral relation; so that in order to obtain a clear idea of their mutual correspondence it is necessary to place them side by side as well as in succession. This is very obvious in the following instances:—

<i>Diclinous.</i>	<i>Hypogynous.</i>	<i>Perigynous.</i>	<i>Epigynous.</i>
Urticales, . . .	Chenopodales, . . .	Ficoidales, . . .	—————
Euphorbiales, . . .	Malvales,	Daphnales, . . .	—————
Menispermals, . . .	Ranales,	Saxifragales, . . .	Myrtales.
Cucurbitales, . . .	Violales,	Bignoniales, . . .	Campanales.
		(<i>Crescentia.</i>)	

This abundantly shows how hopeless it is to express the real affinities of plants by any other means than a map, or some such contrivance; and that all sequences will of necessity be inadequate to explain in any considerable degree the position in which natural Orders really stand with relation to each other.

ALLIANCES OF EXOGENS.

Sub-Class I. DICLINOUS EXOGENS.

Flowers ♂ ♀, without any customary tendency to ♂.

- AMENTALES. — *Flowers in catkins, achnamydeous or monochlamydeous; carpels superior; embryo small, with little or no albumen.*
- URTICALES. — *Flowers scattered, monochlamydeous; carpel single, superior; embryo large, lying in a small quantity of albumen.*
- EUPHORBIALES. — *Flowers scattered, monodichlamydeous; carpels consolidated, superior; placenta axile; embryo surrounded by abundant albumen. (Albumen occasionally absent.)*
- QUEBNALES. — *Flowers in catkins, monochlamydeous; carpels inferior; embryo amygdaloid, without albumen.*
- MARTYALES. — *Flowers monochlamydeous, sometimes amentaceous; carpels inferior; embryo minute, in a large quantity of albumen.*

- MENISPERMALES. — *Flowers monodichlamydeous ; carpels superior, disunited ; embryo surrounded by abundant albumen.*
- CUCURBITALES. — *Flowers monodichlamydeous ; carpels inferior ; placenta parietal ; embryo without albumen.*
- PAPAYALES. — *Flowers dichlamydeous ; carpels superior, consolidated ; placenta parietal ; embryo surrounded by abundant albumen.*

SUB-CLASS II. HYPOGYNOUS EXOGENS.

Flowers ♂, or ♂ ♀ ♀ ; stamens entirely free from the calyx and corolla.

- VIOLALES. — *Flowers monodichlamydeous ; placenta parietal or sutural ; embryo straight, with little or no albumen.*
- CISTALES. — *Flowers monodichlamydeous ; placenta parietal or sutural ; embryo curved or spiral, with little or no albumen.*
- MALVALES. — *Flowers monodichlamydeous ; placenta axile ; calyx valvate in æstivation ; corolla imbricated or twisted ; stamens definite or 00 ; embryo with little or no albumen.*
- SAPINDALES. — *Flowers monodichlamydeous, unsymmetrical ; placenta axile ; calyx and corolla imbricated ; stamens definite ; embryo with little or no albumen. (Stamens rarely 00.)*
- GUTTIFERALES. — *Flowers monodichlamydeous ; placenta axile ; calyx imbricated ; corolla imbricated or twisted ; stamens 00 ; embryo with little or no albumen. (Stamens sometimes definite in number.)*
- NYMPHALES. — *Flowers dichlamydeous ; placenta axile or sutural ; stamens 00 ; embryo on the outside of a very large quantity of mealy albumen. (A part have no albumen.)*
- RANALES. — *Flowers monodichlamydeous ; placenta sutural or axile ; stamens 00 ; embryo minute, inclosed in a large quantity of fleshy or horny albumen.*
- BERBERALES. — *Flowers monodichlamydeous, unsymmetrical in the ovary ; placenta sutural, parietal, or axile ; stamens definite ; embryo inclosed in a large quantity of fleshy albumen.*
- ERICALES. — *Flowers dichlamydeous, symmetrical in the ovary ; placenta axile ; stamens definite ; embryo inclosed in a large quantity of fleshy albumen. (Stamens occasionally adherent to the corolla.)*
- RUTALES. — *Flowers monodichlamydeous, symmetrical ; placenta axile ; calyx and corolla imbricated, if present ; stamens definite ; embryo with little or no albumen. (Occasionally ♂ ♀.)*
- GERANIALES. — *Flowers monodichlamydeous, symmetrical ; placenta axile ; calyx imbricated ; corolla twisted ; stamens definite ; embryo with little or no albumen.*
- SILENALES. — *Flowers monodichlamydeous ; placenta free, central ; embryo external, curved round a little mealy albumen ; carpels more than one, completely combined into a compound fruit. (Some slightly perigynous, others ♂ ♀.)*

- CHENOPODALES. — *Flowers monochlamydeous ; placenta free, central ; embryo external, either curved round or applied to the surface of a little mealy or horny albumen ; carpels solitary, or, if more than one, distinct. (Some slightly perigynous, others ♂ ♀.)*
- PIPERALES. — *Flowers achlamydeous ; embryo minute, on the outside of a large quantity of mealy albumen. (Occasionally ♂ ♀.)*

SUB-CLASS III. PERIGYNOUS EXOGENS.

- Flowers ♂, or ♂ ♀ ♀ ; stamens growing to the side of either the calyx or corolla ; ovary superior, or nearly so.
- FICOIDALES. — *Flowers monodichlamydeous ; placenta central or axile ; corolla, if present, polypetalous ; embryo external, and curved round a small quantity of mealy albumen.*
- DAPHNALES. — *Flowers monochlamydeous ; carpel solitary ; embryo amygdaloid, without albumen.*
- ROSALES. — *Flowers monodichlamydeous ; carpels more or less distinct ; placenta sutural ; seeds definite ; corolla, if present, polypetalous ; embryo amygdaloid, with little or no albumen.*
- SAXIFRAGALES. — *Flowers monodichlamydeous ; carpels consolidated ; placenta sutural or axile ; seeds 00 ; corolla, if present, polypetalous ; embryo taper, with a long radicle, and a little or no albumen.*
- RHAMNALES. — *Flowers monodichlamydeous ; carpels consolidated ; placenta axile ; fruit capsular, berried, or drupaceous ; seeds definite ; embryo amygdaloid, with little or no albumen.*
- GENTIANALES. — *Flowers dichlamydeous, monopetalous ; placenta axile or parietal ; embryo minute, or with the cotyledons much smaller than the radicle, lying in a large quantity of albumen.*
- SOLANALES. — *Flowers dichlamydeous, monopetalous, symmetrical ; placenta axile ; fruit 2-3-celled ; embryo large, lying in a small quantity of albumen. (Occasionally achlamydeous or polypetalous.)*
- CORTUSALES. — *Flowers dichlamydeous, monopetalous, symmetrical ; placenta free, central ; embryo lying among a large quantity of albumen. (Occasionally monochlamydeous, or polypetalous.)*
- ECHIALES. — *Flowers dichlamydeous, monopetalous, symmetrical, or unsymmetrical ; fruit nucamentaceous, consisting of several one-seeded nuts, or of clusters of them separate or separable ; embryo large, with little or no albumen. (Very rarely hypogynous !)*
- BIGNONIALES. — *Flowers dichlamydeous, monopetalous, unsymmetrical ; fruit capsular or berried, with its carpels quite consolidated ; placenta axile, or parietal, or free central ; embryo with little or no albumen.*

SUB-CLASS IV. EPIGYNOUS EXOGENS.

Flowers ♂ or ♂ ♀ ♀ ; stamens growing to the side of either the calyx or corolla ; ovary inferior or nearly so.

CAMPANALES. — *Flowers dichlamydeous, monopetalous ; embryo with little or no albumen.*

MYRTALES. — *Flowers dichlamydeous, polypetalous ; placentæ axile ; embryo with little or no albumen. (Occasionally monochlamydeous.)*

CACTALES. — *Flowers dichlamydeous, polypetalous ; placentæ parietal ; embryo with little or no albumen.*

GROSSALES. — *Flowers dichlamydeous, polypetalous ; seeds numerous, minute ; embryo small, lying in a large quantity of albumen.*

CINCHONALES. — *Flowers dichlamydeous, monopetalous ; embryo minute, lying in a large quantity of albumen.*

UMBELLALES. — *Flowers dichlamydeous, polypetalous ; seeds solitary, large ; embryo small, lying in a large quantity of albumen.*

ASARALES. — *Flowers monochlamydeous ; embryo small, lying in a large quantity of albumen.*

°.° The following artificial arrangement of the Alliances of Exogens will render it more easy to compare their characters.

Sub-class I.—DICLINOUS EXOGENS.

a. Albumen abundant.

Ovary inferior . . . GARRYALES.
Ovary superior.
Carpels several, disunited. MENISPERMALES.
Carpels consolidated.

Placentæ axile . . . EUPHORBIALES.

Placentæ parietal . . . PAPAYALES.

b. Albumen wanting, or in moderate quantity.

Ovary inferior.

Placentæ axile . . . QUERNALES.

Placentæ parietal . . . CUCURBITALES.

Ovary superior.

Flowers amentaceous . . . AMENTALES.

Flowers not amentaceous . . . URTICALES.

Sub-class II.—HYPOGYNOUS EXOGENS.

a. Albumen abundant.

Flowers achlamydeous . . . PIPERALES.

Flowers monodichlamydeous.

Embryo external . . . NYMPHALES.

Embryo internal. RANALES.

Stamens definite.

Flowers unsymmetrical in the ovary } BERBERALES.

Flowers symmetrical in the ovary } ERICALES.

b. Albumen wanting, or in small quantity.

Embryo external.

Carpels solitary, or distinct . . . CHENOPODALES.

Carpels consolidated . . . SILENALES.

Embryo internal.

Placentæ axile or central.

Flowers unsymmetrical. SAPINDALES.

Flowers symmetrical.

Calyx valvate . . . MALVALES.

Calyx imbricated.

Stamens 00 . . . GUTTIFERALES.

Stamens definite.

Corolla twisted . . . GERANIALES.

Corolla imbricated . . . RUTALES.

Placentæ parietal or sutural.

Embryo curved or spiral . . . CISTALES.

Embryo straight . . . VIOLALES.

Sub-class III.—PERIGYNOUS EXOGENS.

a. Albumen abundant.

Placentæ free, central . . . CORTUSALES.

Placentæ axile or parietal . . . GENTIANALES.

b. Albumen wanting, or in small quantity.

Embryo external . . . FICOIDALES.

Embryo internal.

Flowers unsymmetrical.

Fruit capsular or baccate . . . BIGNONIALES.

Fruit nucamentaceous. . . ECHIALES.

Flowers symmetrical.

Monochlamydeous.

Carpels solitary . . . DAPHNALES.

Carpels consolidated. . . RHAMNALES.

Dichlamydeous.

Polypetalous.

Carpels consoldated. Seeds definite . . . RHAMNALES.

Carpels apocarpous. . . ROSALES.

Carpels consoldated. Seeds 00 . . . SAXIFRAGALES.

Monopetalous.

Capsular or baccate . . . SOLANALES.

Nucamentaceous . . . ECHIALES.

Tricocccous . . . RHAMNALES.

Sub-class IV.—EPIGYNOUS EXOGENS.

a. Albumen abundant.

Monochlamydeous . . . ASARALES.

Dichlamydeous, monopetalous . . . CORNALES.

Dichlamydeous, polypetalous.

Seeds solitary . . . UMBELLALES.

Seeds 00 . . . GROSSALES.

b. Albumen wanting, or in small quantity.

Placentæ axile.

Monopetalous . . . CAMPANALES.

Polypetalous . . . MYRTALES.

Placentæ parietal . . . CACTALES.

SUB-CLASS I. DICLINOUS EXOGENS.

The plants thus named never, or at least very rarely, have bisexual flowers, but consist of species in which the stamens constantly appear in one kind of flower, and the pistil in another. They appear to constitute the nearest approach that can be found to Gymnosperms, to which the whole Amental Alliance might in fact be referred, if the carpels would open and present the ovules naked to the action of the pollen. It is indeed impossible to overlook, on the one hand, the close resemblance which exists between the cones of an *Abies* among Conifers, and the female catkins of a *Betula* in the Order of Birchworts; or, on the other, the vegetation of a Coniferous *Ephedra*, and an Amental *Casuarina*.

These and similar Orders must be regarded as the simplest forms of structure which Diclinous Exogens present, their condition reaching its lowest state in Hornworts (*Ceratophyllaceæ*). At this part of the Sub-class we have so entire a transition to the Chenopodal Alliance by means of certain Diclinous Chenopods, which form an exception to the general condition of their Order, as to make it clear that the Hypogynous Sub-class stands parallel with the unisexual Orders.

If we advance along the line of Diclinous Alliances, towards those forms whose organisation is the highest, such as Menispermads, Cucurbits, and Papayals, we shall find that all the others have also lateral affinities of a not less manifest description. Thus Spurges, Juglands, and Papayals pass into the Perigynous Rhamnads, Anacards, and Passion-flowers; Spurges and Nutmegs stand on the limits of the Hypogynous Byttneriads and Anonads; while the Epigynous Sandalworts and Loasads are closely approached by the Diclinous Helwingiads and Cucurbits.

These facts show, that, although in one direction such a series of affinities may be perceived, as that of which use has here been made, yet that it must be considered to be a very imperfect expression of the relationship borne by the Diclinous to the bisexual Alliances and Orders.

It would be possible to break up the Diclinous Alliances into Hypogynous, Perigynous, and Epigynous clusters; and to some it may appear that such a distribution would have been more logical than what is now proposed; and perhaps that view is correct. But, upon the whole, it is doubtful whether the advantages of that plan would have been equal to some of its disadvantages.

ALLIANCE XVIII. *AMENTALES*.—THE AMENTAL ALLIANCE.

DIAGNOSIS.—*Flowers diclinous, in catkins, achlamydeous or monochlamydeous; carpels superior; embryo small, with little or no albumen.*

About the near alliance of the mass of genera here collected, no reasonable doubt can be entertained; and, in fact, they are associated in almost all systems of classification. Their strictly unisexual flowers, amentaceous inflorescence, and incomplete calyx, afford the most obvious marks of identification. To this, however, the Order of Oleasters offers an exception; those plants are almost universally referred to the vicinity of Daphnads (Thymelacæ), among Perigynous Exogens, because the *Elæagnus* is taken as the type of their structure. I confess, however, that the latter genus seems to be far from offering a correct idea of this peculiar Order, which is much better represented by *Hippophaë* and *Shepherdia*. Indeed, it is open to question whether the genus *Elæagnus* itself would not fall more properly into the ranks of Daphnads. Upon that supposition, no doubt could be entertained of Oleasters finding their most natural station here.

Independently of the relations borne by Beefwoods (*Casuarinacæ*) to the Joint-firs among Gymnogens, it is evident that other strong lateral affinities present themselves. These are more especially manifest between Liquidambers and the Planes of the Urtical Alliance, and between Galeworts and the Crowberries of the Euphorbial Alliance.

If we attempt to trace a passage from Order to Order in the Alliance itself, it will be observed that the winged fruit of Beefwoods is of the same nature as that of their successors the Birchworts; that the latter are imitated by the Liquidambers, which may be almost regarded as polyspermous Alders. If we suppose the two carpels of Liquidambers to lose their partition, and the seeds to be covered with hairs, Willowworts would be the result of the change. At this point the series is interrupted, for there is nothing at present known to connect either Galeworts or Oleasters with Willows; these Orders are rather to be regarded as a modification of Beefwoods and Birchworts, by the substitution of a fleshy for a membranous pericarp. Their true relation will be best expressed thus:

Joint-firs.
Beefwoods—Birchworts—Liquidambers—Willowworts.
Galeworts.
Oleasters.

NATURAL ORDERS OF AMENTALS.

<i>Ovary 1-celled.</i>	<i>Ovule 1 or 2, ascending. Radicle superior . . .</i>	77. CASUARINACÆ.
<i>Ovary 2-celled.</i>	<i>Ovule 1, pendulous. Radicle superior . . .</i>	78. BETULACÆ.
<i>Ovary 2-celled.</i>	<i>Ovules 00. Seeds winged . . .</i>	79. ALTINGIACÆ.
<i>Ovary 1-celled.</i>	<i>Ovules 00. Seeds cottony . . .</i>	80. SALICACÆ.
<i>Ovary 1-celled.</i>	<i>Ovule 1, erect. Radicle superior. . .</i>	81. MYRICACÆ.
<i>Ovary 1-celled.</i>	<i>Ovule 1, ascending. Radicle inferior . . .</i>	82. ELÆAGNACÆ.

ORDER LXXVII. CASUARINACEÆ.—BEEFWOODS.

Casuarinææ, *Mirb. in Ann. Mus.* 16. 451. (1810); *R. Brown in Flinders*, 2. 571. *Endlich. Gen.* lxxxvi.; *Meisner*, p. 35'.

DIAGNOSIS.—*Amental Exogens, with a 1-celled ovary, 1 or 2 ascending ovules, and a superior radicle.*

Branching weeping trees, with jointed shoots, the internodes of which are striated;

Leaves 0; in their room short, toothed, ribbed sheaths. Flowers in spikes, ♂ ♀, each with a single bract. ♂ in spikes. Flowers whorled about the articulations of the jointed rachis. Bracts 2, membranous, right and left of a two-leaved calyx, the sepals of which stand fore and aft, and adhere at their points, and at the time of flowering are separated from their bases and carried up by the stamen in the form of a calypra to the anther. Stamen 1; filament subulate; anther erect, two-celled, with parallel contiguous cells opening by a longitudinal fissure. ♀: In dense heads. Rachis not jointed. Calyx 0. Ovary one-celled, with one obliquely ascending orthotropal ovule, or two standing side by side. Styles 2, united at base. Caryopsides winged, collected in a cone, hidden in thickened bracts, sessile. Seed erect, coated densely with spiral vessels, without albumen; radicle superior.

These are jointed, leafless, tropical, or sub-tropical trees, with all the appearance of an *Equisetum*. Blume remarks, that "Casuarina is undoubtedly related to *Myrica* in its ovaries, its single erect ovule, and its exalbuminous inverted embryo; but it differs so much in its habit, that it is better, with *Mirbel*, to consider it a distinct family, which differs from *Galeworts* in its fructification, especially in its achenia with membranous wings included between two lateral scales, which, as they grow up, are collected into a compact cone. *Myrica*, on the contrary, has distinct drupes, each somewhat immersed in a somewhat fleshy involucre (or calyx), which, although at first hypogynous, is eventually, after fecundation, extended beyond the ovary, with which it is conglutinated. Of such an involucre there is no trace in *Casuarina*, since the lateral scales, surrounding each achenium like a 2-valved capsule, by no means answer to the calycine involucre of *Galeworts*, but rather to those inferior bractlets which we observe at the base of the drupes in that Order."

The peculiar jointed leafless stems of these plants necessarily suggest a relationship to *Ephedra* among *Gymnosperms*; and it is indeed probable, that *Casuarina* offers more distinctly than any other *Exogen* the passage from *Angiosperms* to *Gymnospermous Orders*. *Endlicher* describes the ovule as pendulous; *Blume*, as erect. Neither are right. At least, the half-grown ovule is obliquely ascending

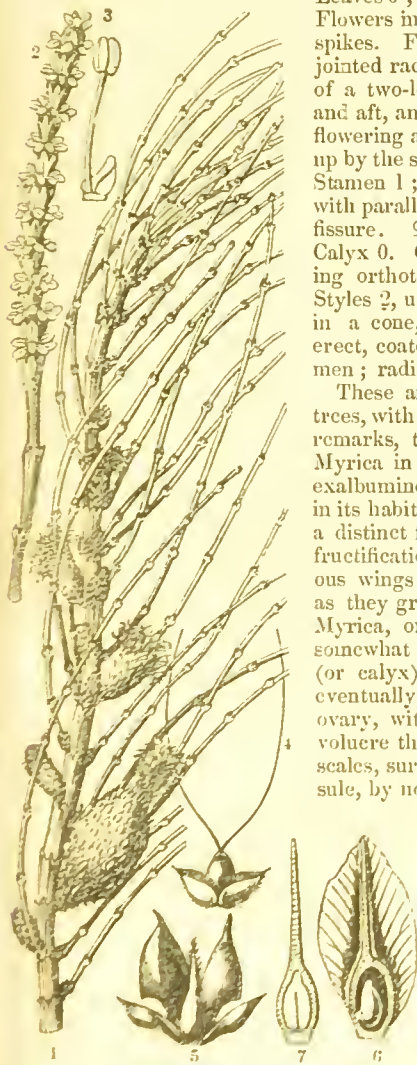


Fig. CLXVII.

from a little way up the side of the ovarian cavity, with a large foramen at the apex.

Fig. CLXVII.—1. *Casuarina* ♀; 2. ♂; 3. ♂ flower; 4. ♀ flower; 5. the ripe valves of the calyx, from which the fruit has been taken; 6. a section of the half-ripe ovary; 7. a section of the fruit showing the seed and embryo.

Gœppert has examined the timber anatomically, (*Ann. Sc. N.*, 2 ser., 18. 1.) He finds it to consist of woody bundles separated by medullary rays in the usual way, and divided by interrupted concentric bands of cellular substance. There is no trace of any tendency to form annual growth; for the appearance of it, caused by the concentric bands above mentioned, is illusory.

Brown, in the Appendix to *Flinders's Voyage*, has the following observations on the structure of this remarkable genus:—"In the male flowers of all the species of *Casuarina*, I find an envelope of four valves, as Labillardière has already observed in one species, which he has therefore named *C. quadrivalvis*. But as the two lateral valves of this envelope cover the others in the unexpanded state, and appear to belong to a distinct series, I am inclined to consider them as bractææ. On this supposition, which, however, I do not advance with much confidence, the perianthum would consist merely of the anterior and posterior valves; and these, firmly cohering at their apices, are carried up by the anthera, as soon as the filament begins to be produced, while the lateral valves or bractææ are persistent; it follows from it, also, that there is no visible perianthum in the female flower; and the remarkable economy of its lateral bractææ may, perhaps, be considered as not only affording an additional argument in support of the view now taken of the nature of the parts, but also as in some degree again approximating *Casuarina* to *Coniferæ*, with which it was formerly associated. The outer coat of the seed or caryopsis of *Casuarina* consists of a very fine membrane, of which the terminal wing is entirely composed; between this membrane and the crustaceous integument of the seed, there exists a stratum of spiral vessels, which Labillardière, not having distinctly seen, has described as an 'integumentum arachnoideum;' and within the crustaceous integument there is a thin proper membrane, closely applied to the embryo, which the same author has entirely overlooked. The existence of spiral vessels, particularly in such quantity, and, as far as can be determined in the dried specimens, unaccompanied by other vessels, is a structure at least very unusual in the integuments of a seed or caryopsis, in which they are very seldom at all visible; and have never, I believe, been observed in such abundance as in this genus, in all whose species they are equally obvious."

These are for the most part Australasian trees or scrubby bushes, chiefly confined to the more temperate latitudes of that vast island. One species only, *C. equisetifolia*, is recorded as inhabiting the tropics of the Indian Archipelago; and another, *C. uodiflora*, is met with in New Caledonia.

Notwithstanding their want of leaves, these plants are remarkable for the excellence of their timber, which is hard, heavy, and resembling the colour of raw beef, whence their Colonial name. The heavy war clubs of the New Hollanders are said to have been fashioned out of it. The bark of *C. equisetifolia* is slightly astringent; that of *C. muricata* is said to be employed in India, in infusion, as a tonic. According to Baekhouse, (*Visit to Australia*, App. xxxvii.), the young branches and young cones of *C. quadrivalvis*, or she-oak, when chewed, yield a pleasant acid, extremely useful to persons in want of water. Cattle are also exceedingly fond of them.

GENUS.

Casuarina, L.NUMBERS. GEN. 1. Sp. 20. (*Endl.*)*Coniaceæ*.POSITION.—*Myricaceæ*.—CASUARINACEÆ.—*Betulaceæ*.

ORDER LXXVIII. BETULACEÆ.—BIRCHWORTS.

Amentaceæ, *Juss. Gen.* 407. (1789) in part.—Betulineæ, *L. C. Richard in A. Richard, Elém. Bot.*, ed. 4., 562. (1828.)—Betulaceæ, *Bartl. Ord. Nat.* 99. (1830); *Endl. Gen.* lxxxviii.; *Meisner*, p. 351.

DIAGNOSIS.—*Amental Exogens*, with a 2-celled ovary, a solitary pendulous ovule, and a superior radicle.

Trees or shrubs. Leaves alternate, simple, with the primary veins often running straight from the midrib to the margin; stipules deciduous. Flowers ♂ ♀, amentaceous, with small scales for their calyx, which are sometimes arranged in a whorl so as to simulate a real calyx (*Alnus*). ♂ Stamens distinct, opposite the calycine scales; anthers 2-celled. ♀ Ovary free, 2-celled; ovules solitary, pendulous, anatropal; style single, or none; stigmas 2. Fruit thin, indehiscent, by abortion 1-celled, combined with the scales into a sort of cone. Seeds pendulous; albumen none; embryo straight; cotyledons flat; radicle superior.



Fig. CLXVIII.

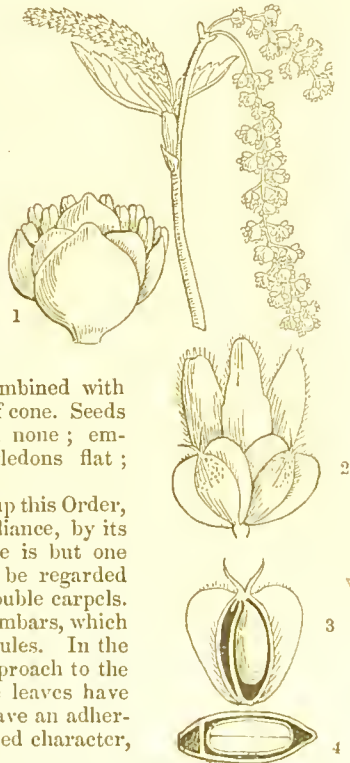


Fig. CLXIX.

The various kinds of Birch and Alder alone make up this Order, which is distinctly defined, among the Amental Alliance, by its fruit consisting of two carpels, in each of which there is but one pendulous ovule. If they had albumen, they might be regarded as Urticaceous plants with pendulous seeds and double carpels. Their nearest approach to other Orders is to Liquidambar, which have a little albumen, and numerous amphitropal ovules. In the male flowers of several species there is a distinct approach to the formation of a four-leaved membranous calyx. The leaves have the same venation as Mastworts, which, however, have an adherent calyx, and thus are distinguished by a well-marked character, independently of their cupule or involucre.

Inhabitants of the woods of Europe, Northern Asia, the Himalayas, and North America, and even making their appearance on the mountains of Peru and Columbia, and in the antarctic regions. They appear capable of existing up to the last limits between land and eternal snow.

The species are usually timber trees, with deciduous leaves; their bark is astringent, and sometimes employed as a febrifuge; but they are chiefly valued for their importance as ornaments of a landscape. Their wood is often light, and of inferior quality, but that of the Black Birch of North America is one of the hardest and most valuable we know. The bark of this species has a singular acrid taste; it contains a balsamic oil, and a peculiar resinous substance called Betuline, or Birch Camphor. The oil extracted from the Common Birch is employed in dressing Russia leather, and gives it its well known smell. From *Betula papyracea* the North American Indians strip off the thick tough bark, and manufacture it into boats, shoe-soles, and various domestic utensils. The sap of the Common Birch (*B. alba*) is obtained in the spring by tapping the trees, and, on account of

Fig. CLXVIII.—♂ and ♀ catkins of *Betula alba*.

Fig. CLXIX.—*Betula lenta*. 1. ♂ flowers; 2. ♀ flowers; 3. perpendicular section of a ripe fruit; 4. transverse section of it.

the quantity of sugar it contains, ferments, and is converted into an agreeable sparkling wine, much valued in the North of Europe; it has been found to contain free acetic acid and some saline matters; Birch wine has a popular reputation as a remedy for stone and gravel. *Betula nigra* and *lenta* furnish the North Americans with sugar of as good quality as that extracted from the Sugar Maple. The bark of the Common Alder is bitter and astringent, and has been employed for gargles, and with success in cases of ague. The leaves and female catkins are employed by dyers and tanners in some countries.

GENERA.

Betula, L.
Pterocaryon, Spach.
Apterocaryon, Spach.
Betulaster, Spach.
Alnus, L.
Alnaster, Spach.
Clethropsis, Spach.

NUMBERS. Gen. 2. Sp. 65.

POSITION.—Myricaceæ.—BETULACEÆ.—Altingiaceæ.
 " Pinaceæ.

ORDER LXXIX. ALTINGIACEÆ.—LIQUIDAMBAR.

Balsamaceæ, ed. pr.—Balsamifluæ, *Blume Fl. Javæ*; *Endl. Gen.* xcviij.; *Meisner*, p. 347.

DIAGNOSIS.—*Amental Exogens*, with a 2-celled ovary and numerous winged seeds.

Tall trees, yielding balsam. Leaves alternate, simple or lobed, with glandular serratures at the edges. Stipules deciduous. Female catkins on longer stalks than the males,

and below them, the males surrounded by a deciduous 4-leaved involucre. Flowers ♂ ♀. Catkins unisexual, roundish. ♂: Anthers numerous, oblong, nearly sessile; with no calyx, but mixed with a few minute scales, and covering the common receptacle. ♀: Ovaries 2-celled, collected into a globe, each surrounded by a few scales: styles 2, long; ovules indefinite, attached to the dissepiment, amphitropal. Fruit a cone composed of hard connected scales, in the cavities of which lie obconical, 2-lobed, 2-celled capsules. Seeds numerous, or solitary by abortion, compressed, membranous, winged, peltate, attached to the middle of the dissepiments; embryo inverted, in the midst of fleshy albumen; cotyledons leafy; radicle short, superior.

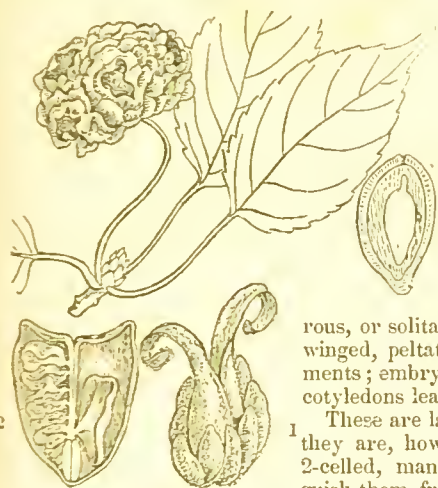


Fig. CLXX.

These are large trees with the appearance of Planes; they are, however, known from that Order by their 2-celled, many-seeded capsules, which equally distinguish them from all the Amental Alliauce, in which it seems necessary to retain them, notwithstanding the presence of a small quantity of albumen in their seeds.

They may be regarded as a connecting group, touching Planes on the one hand and Willowworts on the other, and standing intermediate between the latter Order and Birchworts. Their balsamic products have no parallel among similar plants, except in a slight degree in Willowworts.

The tropics of India, and the warmer parts of North America and the Levant, are the countries of this order.

A fragrant resin called Storax is yielded by several species of Liquidambar. That from North America, the produce of *Liquidambar styraciflua*, abounds in Benzoic acid.—(*Endl.*) The principal part, however, of what liquid Storax is used in this country is obtained from Trieste, and is probably collected from *L. orientale*, the Xylon Effendi, or Lord Wood, of the Cypriots. The bark of these plants is hot, bitter, and stomachic. What liquid Storax comes from the Malayan Archipelago is no doubt derived from *Liquidambar Altingia*, a lofty tree, 150 to 200 feet high, with a reddish brown, compact heavy wood, of very close grain, and extremely fragrant.

GENERA.

- Liquidambar*, *L.*
- Altingia*, *Nor.*

NUMBERS. GEN. 1. Sp. 3.

POSITION.—Salicaceæ.—ALTINGIACEÆ.—Betulaceæ.
Platanaceæ.

Fig. CLXX.—*Liquidambar Altingia*. 1. ♀ flower; 2. a section of the ripe fruit; 3. a section of a seed.—*Blume.*

ORDER LXXX. SALICACEÆ.—WILLOWWORTS.

Amentaceæ, *Juss. Gen.* 407. (1789) *in part.*—Salicinæ, *L. C. Richard in Ach. Richard. Elém. de la Bot.*, ed. 4., 560; *Endl. Gen.* xcix.; *Meisner*, p. 348.

DIAGNOSIS.—*Amental Exogens, with a 1-celled ovary, and numerous cottony seeds.*

Trees or shrubs. Leaves alternate, simple, with deliquescent primary veins, and frequently with glands on the edge or stalks; stipules deciduous or persistent. Flowers

♂ ♀, naked or with a membranous cup-like calyx, amentaceous. ♂: Stamens distinct or monadelphous; anthers 2-celled. ♀: Ovary superior, 1-celled; ovules numerous, erect, anatropal, at the base of the cell, or adhering to the lower part of the sides; style 1 or 0; stigmas 2 or 4. Fruit leathery, 1-celled, 2-valved, many-seeded. Seeds either adhering to the lower part of the axis of each valve or to the base of the cell, very small, covered over with long silky hairs springing from their base; albumen 0; embryo erect; radicle inferior.

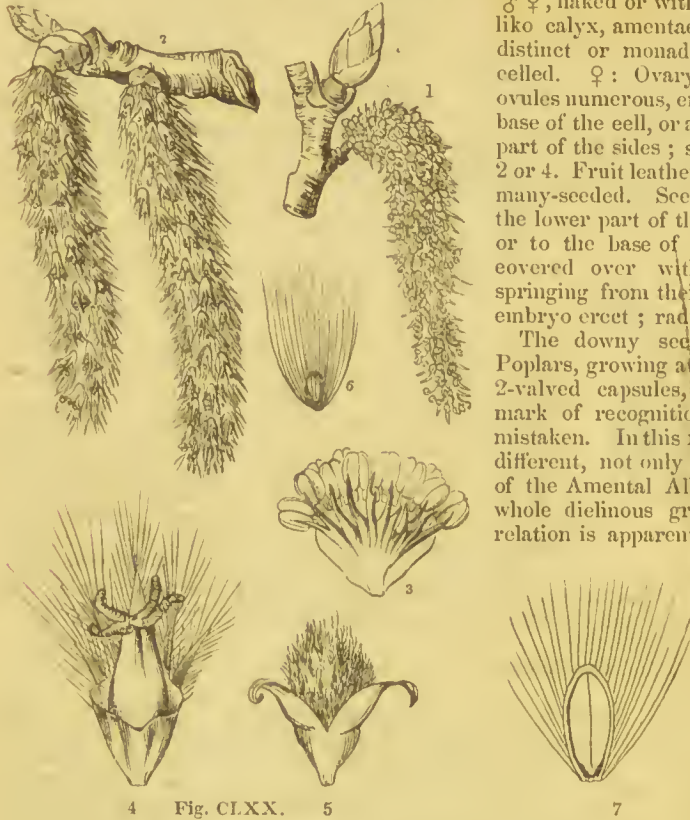
The downy seeds of Willows and Poplars, growing at the base of leathery 2-valved capsules, give such plants a mark of recognition which cannot be mistaken. In this respect they are quite different, not only from the remainder of the Amental Alliance, but from the whole diclinous group. Their nearest relation is apparently, on the one hand,

with Liquidambar, which, like them, have a many-seeded double fruit, and on the other with the Birchworts, with which they agree in their naked male flowers and double fruit. Tamarisks have been

regarded as somewhat allied, because their fruit has a similar structure; but the plants are otherwise totally different.

Natives, generally, of the same localities as Birchworts, but extending even further to the north than those plants. The most northern woody plants that are known are the Willows, *Salix arctica* and *polaris*. The Order is found sparingly in Barbary, and there is a species of Willow even in Senegal.

They are valuable trees, either for their timber or for economical purposes, the Willow, the Sallow, and the Poplar being the representatives of the Order. The bark is usually astringent, tonic, and stomachic; that of *Populus tremuloides* is known as a febrifuge in the United States; of *P. tremula* and *alba*, in Europe. A crystallisable principle, called Salicine, has been obtained from *Salix helix*, which, according to Majendie, arrests the progress of a fever with the same power as sulphate of quinia. The best species to prepare it from are said to be *S. fragilis*, *pentandra*, *Russelliana*, *vitellina*, and *purpurea* (the bitterest of all) in Europe, and *ericeophala*, *nigra*, and *conifera*, in the United States. Populine, a substance resembling Mannite, has been obtained from the leaves and bark of some poplars. Poplar buds, especially those of *P. nigra*, *balsamifera*, and



4 Fig. CLXX. 5

7

Fig. CLXX. — *Populus*. 1. *nigra* ♂; 2. *tremula* ♀; 3. a male flower; 4. a female flower; 5. a ripe capsule; 6. a seed; 7. the same more magnified, and split to show the embryo.

candicans, are besmeared in winter with a resinous, balsamic, bitter, aromatic exudation, which, under the name of Tacamahac, is said to be diuretic and antiscorbutic; they are also formed into an ointment for tumours, wounds, and burns, and are the basis of a balsam and tincture used for colic, &c. The sweet-scented male catkins of *Salix ægyptiaca* are employed in the preparation of a medicated water called Kalaf, which has a celebrity in the East for its cardiac and sudorific qualities. The same reputation once attached to our *Salix alba* and *rosmarinifolia*.

The use of Osiers for wicker-work, of Sallows for charcoal making, is well known. Excellent cricket-bats are made from the light wood of *Salix alba*; arrows from the Aspen (*Populus tremula*); and various turneryware, and other even-grained, soft implements from the Poplars, which are white-wooded. They have also been used for coarse flooring, but have no strength or durability.

GENERA.

Salix, L.*Populus*, L.

NUMBERS. GEN. 2. Sp. 220.

POSITION.—Betulaceæ.—SALICACEÆ.—Altingiaceæ.

ORDER LXXXI. MYRICACEÆ.—GALEWORTS.

Myricæ, *Rich. Anal. du Fr.* (1808); *Blume Fl. Javae*; *Bartl. Ord. Nat.* 98. (1830); *Endlich. Gen.* lxxxvii; *Metsner, p.* 351.

DIAGNOSIS.—*Amental Exogens, with a 1-celled ovary and a single erect seed, with a superior radicle.*

Leafy shrubs, or small trees, covered with resinous glands and dots; leaves alternate, simple, with or without stipules. Flowers ♂ ♀, amentaceous, naked. ♂ Stamens 2 to 8, generally in the axil of a scale-like bract; anthers 2- or 4-celled, opening lengthwise. ♀ Ovary 1-celled, surrounded by several hypogynous scales; ovule solitary, erect, orthotropical; stigmas 2, subulate, or dilated and petaloid. Fruit drupaceous, often covered with waxy secretions, and, with the hypogynous scales of the ovary, become fleshy and adherent. Seed solitary, erect; embryo without albumen; cotyledons 2, plano-convex; radicle short, superior.



Fig. CLXXII.

The fragrant Gale are just half way between the Urtical and Amental Alliances. With Nettleworts they exactly agree, except in wanting albumen and having catkins; with the Amental Alliances they correspond in all essential particulars, but stand distinctly marked by the perfect simplicity of their fruit, in which they agree with Beefwoods only. In their solitary erect ovule, superior radicle, often dilated stigmas, and aromatic secretions, so uncommon among plants in this neighbourhood, they nearly approach Juglands, but are distinguished by their free ovary. Looking at plants not belonging to the Diclinous group, they may be compared with Peppers, because of their erect ovules, 1-celled ovary, and naked flowers; but the resemblance is distant.

Found in the temperate parts of North America, the tropics of South America, the Cape of Good Hope, and India. One species only inhabits the swamps of Europe.

Aromatic shrubs, or trees of considerable size. *Comptonia asplenifolia* possesses astringent and tonic properties, and is much used in the domestic medicine of the United States, in cases of diarrhœa. Benzoic and tannic acids, with a resinous matter, occur in its aromatic bark. Wax is obtained in great abundance from the berries of *Myrica cerifera*, and other species. The fruit of *Myrica sapida* is about as large as a cherry, and, according to Buchanan, is pleasantly acid and eatable in Nepal. *Myrica Gale* yields an ethereal oil of a yellow colour, feeble odour, and mild taste, which after a while becomes slightly warm. Its leaves were formerly used against the itch, and in Sweden as a substitute for hops in brewing. The root of *Myrica cerifera* is said to be emetic, or drastic in large doses.

GENERA.

Myrica, L.

| *Gale, Tourn.*

| *Comptonia, Banks.*

| *Clarisia, R. et P.*

NUMBERS. GEN. 3. Sp. 20 ?

Empetracæ.

Juglandacæ.

POSITION.—*Betulacæ.*—MYRICACEÆ.—*Casuarinacæ.*

Urticacæ.

Fig. CLXXII.—*Comptonia asplenifolia*; 1. ♀ of *Myrica cerifera* guarded by its scale; 2 and 3. the same divested of the scale and cut perpendicularly; 4. ♂ of ditto; 5. Fruit of *Myrica Gale*; 6. a perpendicular section; 7. a section of the seed.

ORDER LXXXII. ELÆAGNACEÆ.—OLEASTERS.

Elæagni, *Juss. Gen.* 75. (1789).—Elæagneæ, *Ach. Rich. Monogr.* (1823); *Bartl. Ord. Nat.* 113; *Endl. Gen. exi.*; *Meisner, p.* 329.

DIAGNOSIS—*Amental Exogens, with a 1-celled ovary, a single ascending ovule, an inferior radicle, and flowers occasionally ♂, or scattered.*

Trees or shrubs, usually covered with leprous scurf. Leaves alternate, or opposite, entire, without stipules. Flowers axillary, often fragrant, in catkins or even panicles. Flowers ♂ ♀, rarely ♂. ♂ Flowers amentaceous, each in the axil of a scale-like bract. Sepals 2-4, sometimes united in a cup; stamens 3, 4, or 8, sessile; anthers 2-celled.—♀ and ♂ Calyx free, tubular, with a fleshy disk, which often closes it up, persistent; the limb entire, or 2-5-toothed. Ovary free, simple, 1-celled; ovule solitary, ascending, stalked, anatropal; stigma simple, subulate, glandular. Fruit crustaceous, inclosed within the calyx become succulent. Seed erect; embryo straight, surrounded by very thin fleshy albumen; radicle short, inferior; cotyledons fleshy.

These plants are regarded by most botanists as being typically hermaphrodite, and hence they are referred to the vicinity of Daphnads; Jussieu himself excluded them from his Diclinoous division. But when we consider that out of the genera constituting them, all except Elæagnus are ♂ ♀ it seems better to station them here, as one of the connecting links between the ♂ ♀ and ♂ races. Indeed, the Diclinoous genera seem to approach closely to Galeworts, for the quantity of albumen that surrounds their embryo is too inconsiderable to be of importance. Supposing that the Order of Oleasters were not regarded as unisexual, it would then, no doubt, stand in the Perigynous Sub-class, where it would be known from Daphnads by the position of its ovule; and from Proteads, by the valvate irregular calyx, and dehiscent fruit of that Order.

The whole of the northern hemisphere, down to the equator, is occupied more or less by this family, from Canada and Japan to Guiana and Java; they are comparatively rare south of the line.

The fruit of *Hippophaë rhamnoides* is occasionally eaten as a sauce with fish. Professor Santagala has, however, found that it contains a fatty matter of a narcotic nature. Twelve grains given to a moderate-sized dog, in a few hours prostrated the strength of the animal in a most remarkable manner.—*Chem. Gaz.* 1844, 121. That of *Elæagnus orientalis* is almost as large as a Jujube, and is known in Persia as an article of the dessert, under the name of Zinzeyd; the drupes of *E. arborea*, conferta, and others, are eaten in Nepal. The flowers of *Elæagnus orientalis* and *angustifolia* are highly fragrant, and abound in honey which is esteemed as a remedy for malignant fevers in some parts of Europe.

GENERA.

<i>Shepherdia</i> , Nutt.	| <i>Hippophaë</i> , Linn.	| <i>Elæagnus</i> , Linn.
<i>Lejargyrea</i> , Nutt.			| Conuleum, L. C. Rich.

NUMBERS. GEN. 1. Sp. 30.

Thymelæaceæ.

POSITION.—*Myricaceæ.*—ELÆAGNACEÆ.—

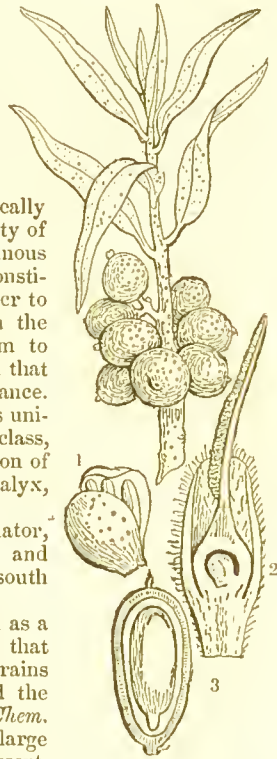


Fig. CLXXIII.

Fig. CLXXIII.—*Hippophaë rhamnoides*. 1. a ♂ flower; 2. a perpendicular section of a ♀; 3. a section of a ripe fruit.—Richard.

ALLIANCE XIX. *URTICALES*.—THE URTICAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens, with scattered monochlamydeous flowers, single superior carpels, and a large embryo lying in a small quantity of albumen.*

The main distinction between this and the Amental Alliance consists in the presence of albumen, and the flowers not being arranged in catkins. The former character, however, fails in several instances, especially in some Artocarpads and Hempworts; so that in reality the amentaceous inflorescence is the only difference that can be at present pointed out to separate two Alliances, which nevertheless appear to be really distinct if regarded as wholes. They touch most closely among the Planes and Artocarpads, which may be referred indifferently to the one Alliance or the other, for both have a quasi-amentaceous inflorescence, and Liquidambars agree with Planes in having albumen, while Artocarpus itself is said to differ from the mass of its order in the want of it. Artocarpus cannot however be separated from Ficus, nor Platanus from Artocarpus, and this seems to justify the place assigned to Artocarpads and Planes in this arrangement.

The Orders themselves do not always rest upon such distinctions as a botanist would wish to discover; this is most especially the case with Hempworts and Morads, which might very well be united. But they may be allowed to remain for the present, because we really know so little about the plants of the Urtical Alliance, that any final distribution of the genera must be premature. It is much to be wished that some one would seriously examine the heaps of undescribed obscure plants related to this part of the vegetable kingdom, to be found in all large herbaria; it would be hardly possible to render a more welcome service to systematical botany.

So many plants of the Chenopodal and Silenal Alliances are ♂ ♀, especially of the former, where *Atriplex* alone forms a large mass of exceptions to the usually ♀ structure, that we must suppose this to be one of the most remarkable instances of contact between the hypogynous and diclinous sub-classes.

NATURAL ORDERS OF URTICALS.

<i>Radicls superior. Ovules twin, suspended. Embryo straight, albuminous. Anthers 2-lobed, with vertical fissures . . .</i>	} 83. STILAGINACEÆ.
<i>Radicls superior. Ovule solitary, erect. Embryo straight, albuminous. Juice limpid. Stipules small, flat . . .</i>	} 84. URTICACEÆ.
<i>Radicls inferior. Embryo exalbuminous. Plumule many-leaved, large</i>	} 85. CERATOPHYLLACEÆ.
<i>Radicls superior. Ovule solitary, suspended. Embryo hooked, exalbuminous</i>	} 86. CANNABINACEÆ.
<i>Radicls superior. Ovules solitary, suspended. Embryo hooked, albuminous</i>	} 87. MORACEÆ.
<i>Radicls superior. Ovule solitary, erect or suspended. Embryo straight, exalbuminous. Juice milky. Stipules large, convolute</i>	} 88. ARTOCARPACEÆ.
<i>Radicls inferior. Embryo albuminous. Plumule minute. Juice limpid. Stipules large, deciduous</i>	} 89. PLATANACEÆ.

ORDER LXXXIII. STILAGINACEÆ.—ANTIDESMADS.

Stilagineæ, *Agardh's Classes*, 199. (1824); *Von Martius Hort. Reg. Monac.* (1829).—*Antidesmeæ*, *Sweet Hort. Brit. ed. 2.* 460. (1830); *Endl. xcvi.*; *Meisner*, p. 347.

DIAGNOSIS.—*Urtical Exogens*, with 2-lobed anthers splitting vertically, twin suspended ovules, a straight albuminous embryo, and superior radicle.

Trees or shrubs. Leaves alternate, simple, coriaceous, undivided or toothed. Stipules twin, deciduous. Flowers minute, in axillary scaly spikes. Flowers ♂ ♀. Calyx 2-3- or 5-parted. Corolla 0. ♂ Stamens 2, or more, arising from a tumid receptacle; filaments capillary; anthers innate, usually 2-lobed, with a fleshy connective and vertical cells opening transversely. ♀ Ovary free, 1-2-celled, often with a conspicuous disk; ovules anatropal, suspended in pairs; stigma sessile, 3-4-toothed. Fruit drupaceous. Seed suspended, sometimes perforated by processes of the putamen; embryo green, with foliaceous cotyledons, lying in the midst of copious fleshy albumen; radicle short, superior.

An obscure Order, whose limits are not ascertained. Judging from the genera *Stilago* and *Antidesma*, it is very near Nettleworts, from which it is chiefly distinguished by a great cushion-shaped disk, unelastic filaments, and anthers split into 2 lobes, which burst transversely at the apex. But *Falconeria* is said to have a 2-celled fruit, and therefore would approach very nearly to the Euphorbial Alliance. On the other hand, *Pyrenacantha*, referred hither by Endlicher, because of its two collateral pendulous ovules, is a milking plant, and wants the peculiar anthers of Antidesmads; but its pierced albumen and embryo are so similar to those of *Phytocene* (or *Gynoccephalum*), that it had better perhaps be referred to the *Artocarpads*. The male *Antidesmas* have much the inflorescence of East Indian Mastworts.

Natives of the East Indies and Madagascar.

These plants appear to be destitute of noxious qualities. Their succulent currant-like drupes are eaten by the natives of the countries where they grow; those of *Antidesma pubescens* are mentioned by Roxburgh, who also states that the shining deep red fruit of *Stilago Bunius* is sub-acid and palatable. The leaves of that plant are acid and diaphoretic; and, when young, are boiled with potherbs and given in India in cases of syphilis. The leaves of *Antidesma alexiteria* are among the imaginary remedies for serpent bites.

GENERA.

Antidesma, L.
Stilago, L.
Falconeria, Royle.

NUMBERS. GEN. 3. Sp. 20?

POSITION.—Urticacæ.—STILAGINACEÆ.—Artocarpacæ.
Coryluca.

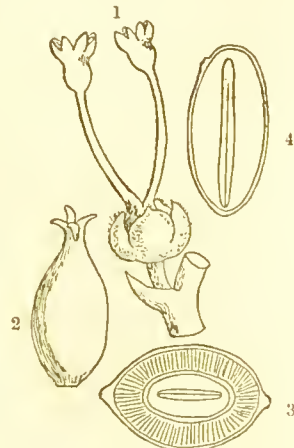


Fig. CLXXIV.

Fig. CLXXIV.—*Stilago lanceolata*. 1. ♂ flower; 2. half ripe fruit; 3. a transverse section of the fruit and seed; 4. a perpendicular section of a seed.

ORDER LXXXIV. URTICACEÆ.—NETTLEWORTS.

Urticæ, *Juss. Gen.* 400. (1789); *Gaudichaud in Freyc. Voyage*, p. 503. (1826); *Bartl. Ord. Nat.* 105. Urticaceæ, *Endlich. Prodr. Norf.* 37; *Gen.* xciv.; *Meisner*, p. 348.

DIAGNOSIS.—*Urtical Exogens*, with small flat stipules, limpid juice, a solid erect ovule, a straight albuminous embryo, and superior radicle.

Trees, shrubs, or herbs; never milky. Leaves alternate, usually covered either with asperities or stinging hairs, with membranous stipules, which are deciduous or convolute in veneration. Flowers herbaceous, inconspicuous, ♂ ♀, (occasionally ♀



Fig. CLXXV.

intermixed) scattered, or clustered, or in catkins, or close heads. Calyx membranous, lobed, persistent. ♂ Stamens definite, distinct, inserted into the base of the calyx, and opposite its lobes; anthers often curved inwards in æstivation, and turned backwards with elasticity when bursting. ♀ Ovary superior, simple; ovule solitary, erect; stigma simple, fringed. Fruit a simple indehiscent nut, surrounded either by the membranous or fleshy calyx. Embryo straight, with fleshy albumen; cotyledons flat; radicle superior.

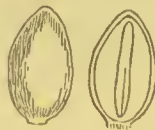


Fig. CLXXVI.

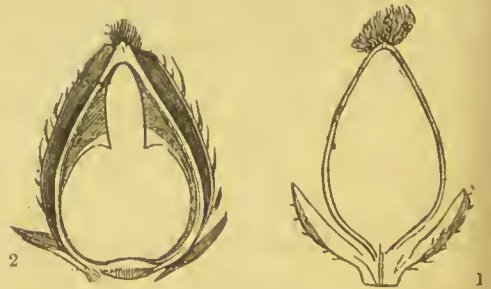


Fig. CLXXVII.

Nettleworts, as now circumscribed, consist almost entirely of rough-leaved plants, which, although they occasionally acquire the stature of trees, have nevertheless little more than a herbaceous texture, their wood being remarkable for its lightness, sponginess, and profusion of cellular tissue. Their great distinction consists in their having a

Fig. CLXXV.—1. Branch of *Procris splendens*; 2. cluster of male and female flowers; 3. a male flower about to expand; 4. the same expanded.

Fig. CLXXVI.—*Parietaria officinalis*; one of the lenticular fruits both whole and divided perpendicularly to show the embryo.

Fig. CLXXVII.—1. A section of the ovary of *Urtica dioica*; 2. the same when ripe, after the embryo is developed.

single erect ovule in a simple carpel, the foramen of which is at the apex, so that when the seed is ripe the embryo is necessarily inverted, its radicle pointing upwards. (In the second edition of this work the position of the radicle was misstated, owing to some accident.) Nettleworts will then be easily known from Morads and Hempworts, which have a hooked embryo, and from Antidesmads, which have pendulous ovules. What differences exist between them and the Artocarps are mentioned under that Order. The flowers are occasionally, in part, hermaphrodite, although the greater number are absolutely unisexual, and, on this account, they must be regarded as entirely continous with Chenopods in the hypogynous sub-class. They will, however, be found to differ not only in their habitually declinous flowers, but also in their embryo being enclosed in albumen and not external to it as in Chenopods.

Independently of the resemblances borne by Nettleworts to Chenopods as well as to other Orders in the Urtical Alliance, we must not lose sight of their very close affinity to the hypogynous Buckwheats, some of which are ♂ ♀. This has been already alluded to at p. 258, and will be further noticed hereafter.

The species are widely dispersed over every part of the world; appearing in the most northern regions, and in the hottest climates of the tropics; growing now upon dry walls, where there is scarcely nutriment for a Moss or a Lichen, and inhabiting the dampest recesses of the forest. Many follow the steps of man, flourishing on rubbish heaps and waste places around his dwellings.

All the more important of the old Urticeous Order having been removed from this place, the qualities of the few that remain are of little interest. Excessive causticity in the limpid juice is their chief characteristic, as is exemplified in the common stinging Nettles, *Urtica dioica*, *urens*, and *pilulifera*, which are, however, not to be compared for an instant with some of the E. Indian species. Leschenault de la Tour thus describes the effect of gathering *Urtica crenulata* in the Botanic Garden at Calcutta:—"One of the leaves slightly touched the first three fingers of my left hand: at the time I only perceived a slight pricking, to which I paid no attention. This was at seven in the morning. The pain continued to increase; in an hour it had become intolerable; it seemed as if some one was rubbing my fingers with a hot iron. Nevertheless, there was no remarkable appearance; neither swelling, nor pustule, nor inflammation. The pain rapidly spread along the arm, as far as the armpit. I was then seized with frequent sneezing, and with a copious running at the nose, as if I had caught a violent cold in the head. About noon I experienced a painful contraction of the back of the jaws, which made me fear an attack of tetanus. I then went to bed, hoping that repose would alleviate my suffering; but it did not abate; on the contrary, it continued nearly the whole of the following night; but I lost the contraction of the jaws about seven in the evening. The next morning the pain began to leave me, and I fell asleep. I continued to suffer for two days; and the pain returned in full force when I put my hand into water. I did not finally lose it for nine days." A similar circumstance occurred, with precisely the same symptoms, to a workman in the Calcutta Garden. This man described the sensation, when water was applied to the stung part, to be as if boiling oil was poured over him. Another dangerous species was found by the same botanist in Java (*U. stimulans*), but its effects were less violent. Both these seem to be surpassed in virulence by a Nettle called Daoum Setan, *U. mentissima*, or devil's leaf, in Timor; the effects of which are said, by the natives, to last for a year, or even to cause death. In some species the acrid fluid is so abundant that it is spontaneously discharged from the whole surface of the leaf. According to Endlicher the causticity of Nettle juice is owing to the presence of bicarbonate of ammonia. The foliage of *Boehmeria candata* is used advantageously in Brazil in baths, as a relief for hæmorrhoidal complaints, and in the same country an extract of *Pilea muscosa* is regarded as a remedy for dysuria. The tenacity of the fibres of some species is such that cordage has been successfully manufactured from them; the stalks of *Urtica cannabina* were even expected, at one time, to be equal in strength to Hemp itself. *Urtica tenuissima*, called Calose in Sumatra, yields an extremely tough cordage in that island.—*Roxb.* Flogging with nettles has been employed in cases of arthritis, paralysis, &c. Nettles when very young and tender are commonly used as an ingredient in broth by the English peasantry, who consider that they purify the blood. The tubers of *Urtica tuberosa* are esculent and nutritious; the natives eat them raw, boiled, or roasted.—*Roxb.* The herbage and seeds of *Urtica membranacea*, an Egyptian plant, are regarded as emmenagogue and aphrodisiac. Several *Parietarias*, especially *P. erecta* and *diffusa*, have had some reputation as refrigerants and diuretics. The leaves when dried have been used in polishing mirrors. A decoction of *Urtica dioica* strongly salted, will coagulate milk without giving it any unpleasant flavour; the whole plant is esteemed astringent and diuretic.—*Burnett.*

GENERA.

<i>Urtica</i> , <i>Tournef.</i>	<i>Van'era</i> , <i>Loureir.</i>	<i>Böhmeria</i> , <i>Jacq.</i>	<i>Pouzolzia</i> , <i>Gaudich.</i>
<i>Urera</i> , <i>Gaudich.</i>	<i>Malaisia</i> , <i>Blanco.</i>	<i>Duretia</i> , <i>Gaudich.</i>	<i>Memoralis</i> , <i>Hamilt.</i>
<i>Laportea</i> , <i>Gaudich.</i>	<i>Schychowskya</i> , <i>Endl.</i>	<i>Procris</i> , <i>Commers.</i>	<i>Rousselia</i> , <i>Gaudich.</i>
<i>Fleurya</i> , <i>Gaudich.</i>	<i>Pilea</i> , <i>Lindl.</i>	<i>Neraudia</i> , <i>Gaudich.</i>	<i>Soleirolia</i> , <i>Gaudich.</i>
<i>Girardinia</i> , <i>Gaudich.</i>	<i>Dubrucilia</i> , <i>Gaudich.</i>	<i>Parietaria</i> , <i>Tournef.</i>	<i>Helxine</i> , <i>Requ.</i>
<i>Elatostema</i> , <i>Forst.</i>	<i>Haynea</i> , <i>Schum.</i>	<i>Freirea</i> , <i>Gaudich.</i>	<i>Forskolea</i> , <i>Linn.</i>
<i>Langweldia</i> , <i>Gaudich.</i>	<i>Pellionia</i> , <i>Gaudich.</i>	<i>Thaumuria</i> , <i>Gaudich.</i>	<i>Cuidbcja</i> , <i>Forsk.</i>
<i>Sciophila</i> , <i>Gaud.</i>	<i>Splitgerbera</i> , <i>Miq.</i>	<i>Gesnouiina</i> , <i>Gaudich.</i>	? <i>Australina</i> , <i>Gaudich.</i>
<i>Sciobia</i> , <i>Rehb.</i>			

NUMBERS. GEN. 23. Sp. 300. There having been no recent enumeration of the species this is merely a rough estimate. As I find 216 actually described, the number now estimated is probably much too low both for genera and species.

Chenopodiaceæ.

POSITION.—*Moraceæ.*—URTICACEÆ.—*Cannabinaceæ.*

Polygonaceæ.

ORDER LXXXV. CERATOPHYLLACEÆ.—HORNWORTS.

Ceratophyllææ, *Gray's Arrangement of Brit. Fl.* 2. 554.; *DC. Prodr.* 3. 73. (1828); *Asa Gray, Ann. Lyc. N. York*, 4. 48. (1837); *Schleiden in Linnaea*, 11. 540. (1837); *Endl. Gen.* lxxxiii.

DIAGNOSIS.—*Urtical* submersed *Exogens*, with an inferior radicle, an exalbuminous embryo, and a large many-leaved plumule.

Submersed herbs, with dichotomous, cellular, verticillate leaves. Flowers monoecious. Calyx inferior, many-parted. ♂ Stamens from 12 to 20; filaments wanting; anthers 2-celled. ♀ Ovary superior, 1-celled; ovule solitary, pendulous, orthotropal; style pervious; stigma filiform, oblique. Nut 1-seeded, indchiscent, terminated by the hardened stigma. Seed pendulous, solitary; albumen 0; embryo with 2 cotyledous; plumule many-leaved; radicle inferior.

It would be difficult to name a plant concerning whose affinity more different opinions have been entertained. Possessed of the most simple organisation, it scarcely presents a single salient point for consideration, with the exception of its plumule being very highly developed. The number of cotyledons, although only two, as Schleiden has shown, appears to be four; and, in consequence of this, Richard placed it near Conifers, with which it seems to me to have no kind of affinity. Nevertheless, Schleiden leans towards Richard's view; in order to support which, he calls the male flower an amentum. De Candolle urges its relation to Hippuris and Myriophyllum, among Hippurids, from which it differs in its superior ovary; and he inquires whether Naias, which, according to some, is dicotyledonous, does not belong to the same Order. Agardh actually places it among Naiads.

I formerly suggested the possibility of its being a degeneration of Nettleworts, and as bearing the same relation to them as Mossweeds and Starworts to some unknown Order, or as Lemnads to Arads. This opinion Schleiden has criticised with incivility, forgetting that it was formed upon the assumption that the radicle of Ceratophyllum is superior, an error of De Candolle's, of which I was not then aware. And even now, I do not see where it can be better placed, unless near Chenopods. It agrees with the Urtical Alliance in having incomplete, unisexual flowers, a free ovary consisting of a single carpel and a solitary ovule; but it differs in having the radicle inferior, and no albumen. The high development of the plumule may however, in this instance,

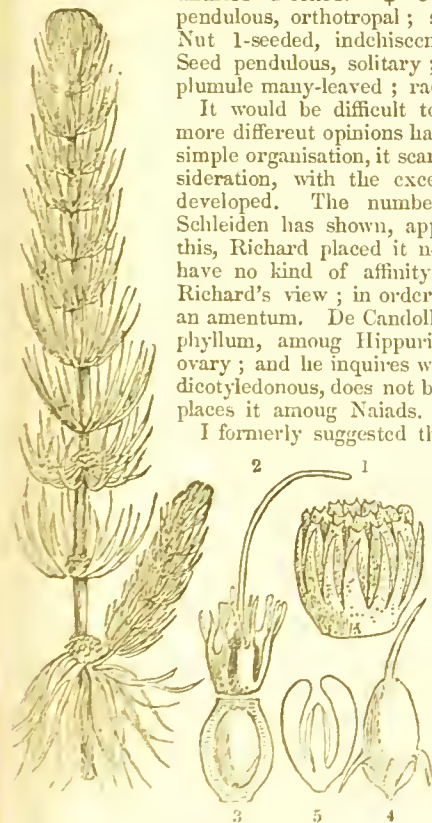


FIG. CLXXXVIII.

as in Waterbeans, (*Nelumbiaceæ*), be a compensation for the want of albumen, enabling the embryo to germinate without assistance, as soon as it is exposed to the fitting conditions.

Hornworts may also be compared with Chenopods, on account of their incomplete flowers, inferior radicle, simple free carpel, and single ovule; and the unisexual flowers and want of albumen would not be opposed to such a comparison. But the unisexuality of Chenopods is the exception, not the rule, and the straightness of the embryo of Ceratophyllum is as much at variance with the characteristic mark of that Order, as its

FIG. CLXXXVIII.—*Ceratophyllum submersum*.—1. ♂ flower; 2. ♀ ditto; 3. perpendicular section of ovary, the style being cut off; 4. fruit; 5. embryo.

inferior radicle is with most of the Urtical Alliance. Such being the case, it seems to me that until some better suggestion shall have been offered than that of stationing Hornworts near the Gymnospermous Conifers, they may be regarded as anomalous plants of the Urtical Alliance.

A singular view is that of Dr. Asa Gray, who would place *Ceratophyllum* near *Nelumbium*, because of its highly developed plumule, for it would be difficult to point out any other resemblance; to this opinion he has been led by the account of the development of the embryo given by M. Adolphe Brongniart *Ann. Sc.* 12. 253, which is only in part correct.

Found in ditches in Europe, North America, Northern Asia, Senegal, Barbary, and India.

These plants have no known use: they have sometimes the heavy smell of *Chara*.

GENUS.

Ceratophyllum, L.

NUMBERS. GEN. 1. Sp. 1. according to Schleiden; 6 according to Chamisso.

Chenopodiaceæ.

POSITION.—*Urticaceæ.*—CERATOPHYLLACEÆ.—

Haloragaceæ.

ORDER LXXXVI. CANNABINACEÆ.—HEMPWORTS.

Cannabinete, *Endl. Gen. xcv.* (Oct. 1837); *Meisner, p. 343.*DIAGNOSIS.—*Urtical Exogens, with a solitary suspended ovule, and a hooked exalbuminous embryo, with a superior radicle.*

Herbaceous, rough-stemmed, watery plants, with alternate lobed stipulate leaves, and small inconspicuous flowers. Flowers ♀ ♂. ♂ in racemes or panicles. Calyx herbaceous, scaly, imbricated. Stamens few, opposite the sepals; filaments filiform; anthers terminal, 2-celled, opening longitudinally. ♀ in spikes or cones. Sepal single, cunwrapping the ovary. Ovary free, 1-celled; ovule solitary, pendulous, campylotropal; stigmas 2, subulate, sessile. Fruit indehiscent, with a single suspended seed. Embryo without albumen, hooked or spirally coiled; radicle superior, lying against the back of the cotyledons.

These plants, formerly regarded as a division of Nettleworts, differ from that Order in having their seeds suspended, their embryo coiled up, and in wanting albumen. To the Artocarpads they approach in technical characters, differing chiefly in their embryo; but they have no milky juice, and are widely different in appearance. From Morads they are hardly distinguishable except by the absence of albumen.

Hempworts are found wild in the temperate parts of the Old World, in the northern hemisphere. The Hemp inhabits the cooler parts of India, whence it has been transported to Europe; the Hop occurs wild in the South Eastern provinces of Europe.

The valuable fibre called Hemp, is produced by *Cannabis sativa*, which is hardly less celebrated for its narcotic qualities. In the elegant language of Endlicher, "Emollitum exhilarat animum, impotentibus desiderii tristem stultam lætitiæ provocat et jucundissima somniorum conciliat phantasmata." The Turks employ it under the names of Hadschy and Malach. Linnæus speaks of its vis narcotica, phantastica, dementens, anodyna, et repellens. Even the Hottentots use it to get drunk with, and call it Dacha. The Arabians name it Hashish. The Brazilian savages delight in its use. It appears to owe its narcotic properties to the presence of a resin which is not formed in Europe. This resin exudes in India from the leaves, slender branches, and flowers; when collected into masses it is the churras or cherris of Nepal. Its odour is fragrant and narcotic, its taste slightly warm, bitterish, and acrid.—*Pharm. Journ.* 1. 489. The imbricated heads of the common Hop, *Humulus Lupulus*, participate in this quality, and in like manner are used for the purpose of producing intoxication, in the preparation of beer. Their scales are scattered over with resinous spherical glands, which are easily rubbed off, and have a powerful agreeable odour, and bitter taste; they appear to consist of an acrid, ethereal oil, an aromatic resin, wax, extractive, and a bitter principle called Lupuline. By pressure Hopheads yield a green, light, acrid oil, called Oil of Hops. Its young shoots are eaten as Asparagus, and the roots have been employed as a substitute for Sarsaparilla.

Cannabis, Tournef.

GENERA.
Humulus, Linn.

Lupulus, Tournef.

NUMBERS. GEN. 2. Sp. 2.

POSITION.—Urticaceæ. CANNABINACEÆ.—Moraceæ.



Fig. CLXXIX.

Fig. CLXXIX.—*Humulus Lupulus*. 1 ♂ flower; 2 ♀; 3 section of ovary; 4 ripe fruit; 5 section of it, showing the embryo; 6 a grain of lupuline.

ORDER LXXXVII. MORACEÆ.—MORADS.

Moracæ, *Endl. Prodr.* 40, (1833); *Gaudich. in Freycinet*, 509; *Meisner*, p. 350; *Endl.* xcii.—Phloosantheæ, *Blume Bijdr.* 436, (1825).—Sycoidæ, *Link Handb.* 1. 292. (1829).

DIAGNOSIS.—*Urtical Exogens, with solitary suspended ovules, and a hooked albuminous embryo with a superior radicle.*

Trees or shrubs, with a milky juice, sometimes climbing. Leaves of various forms and texture, very commonly lobed and rough, with large stipules often rolled up, inclosing the younger leaves, and leaving a ringed scar when they drop off. Flowers



Fig. CLXXX.

very inconspicuous, ♂ ♀, collected in heads, or spikes, or catkins. ♂ calyx 0, or 3-4-parted, imbricated. Stamens 3-4, inserted into the base of the calyx and opposite its segments; filaments generally shrivelled on the inner face; anthers 2-celled, opening lengthwise. ♀ sepals 3-4-5, sometimes in two rows. Ovary 1-celled, occasionally (by accident?) 2-celled. Ovules solitary, pendulous, or amphitropal, with the foramen uppermost; style terminal, bifid, with the lobes often unequal. Fruit, small nuts or utracles, 1-seeded, inclosed within a succulent receptacle, or collected in a fleshy head formed by the consolidated succulent calyx. Seed solitary, with a thin brittle integument. Embryo lying in fleshy albumen, hooked, with the radicle long, superior, folded down towards the cotyledons.

The whole of the genera of this Order have either a remarkably enlarged receptacle, upon or within which the flowers are arranged, as is seen in *Ficus*, and even more strikingly in *Dorstenia*, or a tendency towards its formation is indicated, when the flowers are gathered into heads of a spheroidal form, as in the Mulberry and Osage Orange (*Maclura*). In this manner the Order of Morads passes into that of the Artocarpads, from which indeed it hardly differs except in having an abundance of albumen, and a hooked slender embryo. Strictly speaking, however, albumen occurs in the Artocarpads in *Phytocera*, which certainly must belong to them, and in *Pyrenacantha*, which must, I think, be also referred thither, notwithstanding its somewhat different habit. In the last edition of this work, *Batis* was referred to the present Order; but I now see, that while the species so named by Roxburgh certainly stand next to *Morus*, the West Indian plant to which the designation properly applies must be stationed elsewhere.

The tenacity of life in some plants of this family is remarkable. A specimen of *Ficus anstralis* lived and grew suspended in the air, without earth, in one of the hothouses in the Botanic Garden, Edinburgh, for eight months, without experiencing any apparent inconvenience.

None of the Morads are European, for the Mulberries and common Fig have been brought from the East. The species inhabit the temperate and tropical latitudes of both

Fig. CLXXX.—*Morus alba*. 1. A male flower; 2. clusters of females; 3. a female flower separate; 4. the same with a part of the calyx cut away; 5. a vertical section of a ripe achæmium; 6. a cluster of fruit consisting of succulent calyxes enclosing achæmia.

hemispheres, often constituting vast forests, in the case of the various species of Fig, which in all hot countries have generally very thick trunks, with extremely strong boughs, and a prodigious crown. Travellers say, that the colossal wild Fig-trees are among the most grateful presents of Nature to hot countries : the shade of their magnificent head refreshing the traveller when he reposes under their incredibly wide-spreading branches and dark green shining foliage. In India, two of the species have historical celebrity. Of these the Banyan-tree, so remarkable for its vast rooting branches, is *Ficus indica* : the Pippal or sacred Fig of the same country, readily known by its rootless branches, and its heart-shaped leaves with long attenuated points, is *Ficus religiosa*. Blume also relates, that a *Ficus microcarpa*, which he planted before the door of his house in Java, had in seven years covered a space of above 60 (square ?) feet with its dense shade. And he describes a sacred specimen of enormous stature, growing in the same island, at a place called Batu-Tulies, from whose huge branches he gathered as many as 34 species of parasites and epiphytes, which were not, however, half what might have been collected. The genus *Ficus*, indeed, is one of those which travellers describe as most conducing to the peculiarities of a tropical scene. Mr. Hinds (*Ann. N. H.* xv. 100) points out the complex appearance of the main stem of many species ; their immense horizontal branches, their proportionate lowness, and the vast number of smaller stems in every stage of development, some just protruding from the horizontal limbs, others hanging midway between the leafy canopy and earth, displaying on each thick rounded extremity an enormous spongiolæ, while many reach the soil, and having attained strength and size act as columns to sustain the whole structure. "The tropical forest abounds with these in every variety of growth and apparent distortion."

Caoutchouc is furnished by many of this Order in great abundance ; all the India Rubber of continental India is obtained from *Ficus elastica* ; in Java, other species yield this substance of excellent quality, as do *F. Radula*, elliptica, and prinoides in America. Their milky fluid is in some instances bland, and actually employed as a beverage ; for of the different plants which have been occasionally brought to Europe under the name of Cow-trees, most are Figs. One of these has been figured by M. De Candolle, under the name of *Ficus Saussureana*, (*Mém. de la Soc. Phys. de Genève*) ; and others have been described by M. Desvieux, *Ann. Sc.* 18. 309. The juice is, however, in many cases excessively acrid ; that of *Ficus septica* is emetic, and of *F. toxicaria* and *Dæmona*, a virulent poison ; indeed the milky juice of the cultivated Fig itself possesses considerable acridity, causing a burning sensation in the throat when chewed. In some species the juice assumes a resinous character, when discharged from parts attacked

by Cocci, as is the case with *F. indica*, benghalensis, and *Tsjela*, which form a sort of gum-lac in the East Indies. Notwithstanding the prevalence of an acrid secretion, the fruit of many species appears to decompose it and convert it into sugar, or some other substance ; hence we have the eatable Fig of the shops from the acrid *Ficus Carica*, and a fruit of inferior quality, but still eatable, from *F. religiosa*, *Benamina*, *pumila*, *auriculata*, *Rumphii*, *benghalensis*, *aspera*, *Granatum*, and the Egyptian *Sycomorus*, whose imperishable wood is said to have been used in the

construction of the cases in which the mummies are inclosed. On the other hand the common Mulberry, *Morus nigra*, has an agreeable sub-acid succulent fruit, for the sake of which it was long since introduced from Persia ; and that of the White Mulberry, and other species, both Asiatic and American, is eatable though not esteemed ; but these fruits are not entirely harmless, causing diarrhœa if indulged in too freely, and their roots are both cathartic and anthelmintic, thus indicating the presence in their system of the acrid secretions of the Order. There is also a Brazilian *Ficus anthelmintica*. The Mulberries contain mannite and succinic acid, according to the chemists. Among other uses of less extensive application are the following :—*Dorstenia contrayerva*, *brasiliensis*, *opifera*, and others, have bitterish roots, and a remarkable overpowering odour, with a little pungency. They are supposed to be antidotes to the bites of venomous animals, and certainly possess stimulant, sudorific, and tonic qualities ; but they lose them by keeping, and soon become inert ; they are also emetic, and are

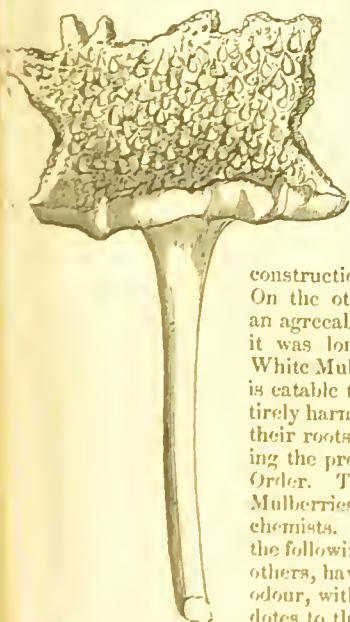


Fig. CLXXXI.

Fig. CLXXXI. — *Dorstenia contrayerva*.

employed for the same purposes as *Aristolochia Serpentaria*. A kind of paper is manufactured from *Broussonetia papyrifera*, whose fruit is succulent and insipid. The fruit of *Maclura aurantiaca*, (the Osage Orange), is as large as the fist, orange-coloured, and filled with a yellow fetid slime, with which the native tribes smear their faces when going to war. The wood of *Maclura tinctoria* is the dyewood called Fustick; it contains morine, a peculiar colouring matter; its fruit is pleasant, and used in North American medicine, for the same purposes as the black Mulberry in Europe. According to Martius, both it and other species of the same genus yield fustick in Brazil. It is to be observed, that the latter name is also given to the wood of *Rhus Cotinus*. The seeds of *Ficus religiosa* are supposed by the doctors of India to be cooling and alterative. The bark of *Ficus racemosa* is slightly astringent, and has particular virtues in hæmaturia and menorrhagia; the juice of its root is considered a powerful tonic. The white glutinous juice of *Ficus indica* is applied to the teeth and gums, to ease the tooth-ache; it is also considered a valuable application to the soles of the feet when cracked and inflamed; the bark is supposed to be a powerful tonic, and is administered by the Hindoos in diabetes. Is it not possible that the Indian poison with which the Nagas tip their arrows, of the tree that produces which nothing is known, may belong to this tribe? See, for an account of its effects, *Brewster's Journal*, 9. 219.

GENERA.

<i>Epicarpurus</i> , Blume.	<i>Batis</i> , Roxb.	<i>Maclura</i> , Nutt.	<i>Dorstenia</i> , Plum.
<i>Albrandia</i> , Gaudich.	? <i>Fatona</i> , Gaudich.	<i>Sycomorphe</i> , Miq.	<i>Sychnium</i> , Desv.
<i>Morus</i> , Tournef.	<i>Broussonetia</i> , Vent.	<i>Ficus</i> , Tournef.	? <i>Kosaria</i> , Forsk.
<i>Ampalus</i> , Boj.	<i>Papyrius</i> , Lam.	<i>Erosma</i> , Both.	

NUMBERS, GEN. 8. Sp. 184.

POSITION.—*Cannabinaceæ*.—*MORACEÆ*.—*Artocarpaceæ*.



Fig. CLXXXII.

Fig. CLXXXII.—Perpendicular section of the succulent hollow receptacle of *Ficus Carica*.

ORDER LXXXVIII. ARTOCARPACEÆ.—ARTOCARPADS.

Artocarpæ, *R. Brown in Congo*, (1818); *Blume By. Dr.* 479; *Ed. prim. No. 80*, (1830); *Bartl. Ord. Nat.* 104; *Endl. xciii.*; *Meisner*, p. 349; *Bennet in Horsfield*, p. 48.

DIAGNOSIS.—*Urtical Exogens*, with milky juice, large convolute stipules, solitary erect or suspended ovules, a straight exalbuminous embryo, and superior radicle.

Trees or shrubs, abounding in milky juice. Leaves alternate, simple, often lobed, with large deciduous stipules. Flowers ♂ ♀, always collected into dense heads of some kind.

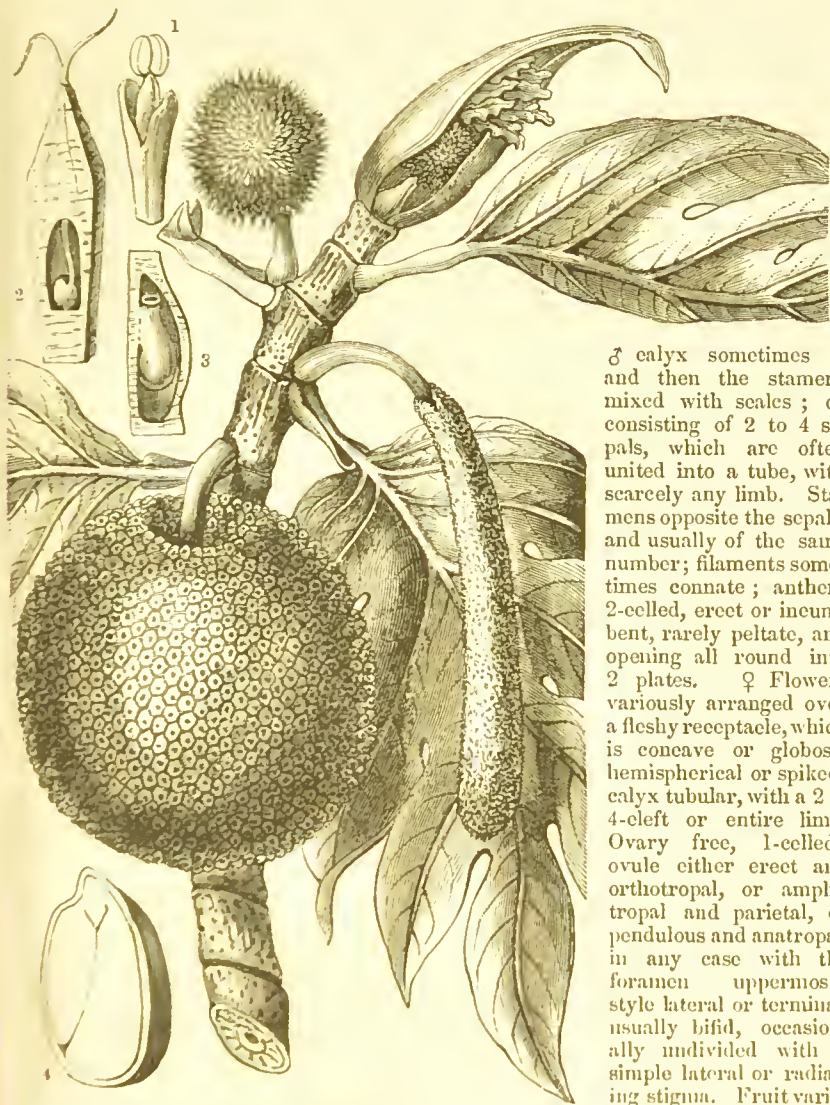


Fig. CLXXXIII.

♂ calyx sometimes 0, and then the stamens mixed with scales; or consisting of 2 to 4 sepals, which are often united into a tube, with scarcely any limb. Stamens opposite the sepals, and usually of the same number; filaments sometimes connate; anthers 2-celled, erect or incumbent, rarely peltate, and opening all round into 2 plates. ♀ Flowers variously arranged over a fleshy receptacle, which is concave or globose, hemispherical or spiked; calyx tubular, with a 2 to 4-cleft or entire limb. Ovary free, 1-celled; ovule either erect and orthotropal, or amphitropal and parietal, or pendulous and anatropal, in any case with the foramen uppermost; style lateral or terminal, usually bifid, occasionally undivided with a simple lateral or radiating stigma. Fruit variable, surrounded by a fleshy involucre, or com-

posed of consolidated fleshy calyxes, within which lies a multitude of nuts. Seed erect, parietal, or pendulous. Embryo with much or very little albumen, straight, with the axis directed towards the vertex of the ovary; cotyledons thick and fleshy, when the albumen is deficient, thin when it is abundant, often very unequal.

Fig. CLXXXIII.—*Artocarpus incisa*, with a ripe fruit, a head of ♀, and a pendulous club-shaped head of ♂ flowers. 1. A ♂ flower; 2. a ♀ cut out of the globular head; 3. a section of the ovary, showing the position of the ovule; 4. a section of a seed; partly after Hooker.

The massive heads into which the fruits of the Breadfruit tree are collected represent the typical condition of the genera of this Order, whose milky juice has long since suggested its separation from Nettleworts; an opinion, however, in which it was difficult to agree, so long as the Fig and its allies were associated with it by that character. Now, however, that such plants have been more carefully studied, it appears that the old Urticaceous Order should rather be regarded as an Alliance, of which the Artocarpaceae form one of the Orders. In that point of view the Artocarpaceae will be distinguished from Hempworts and Morads by their straight embryo with large cotyledons, and from Antidesmads by their anthers and solitary ovules. From Nettleworts the difference is rather one of habit than of real structure, as far as our information at present goes. Brown, indeed, who first proposed the Order, stated that the ovule was erect, which, however, is not the case in either *Artocarpus* or *Maclura*, both which have a suspended ovule. Endlicher, on the other hand, relies upon the absence of albumen; but a trace of it occurs in *Artocarpus*, and in *Phytoecene* it is extremely abundant, to say nothing of *Pyrenacantha*. Perhaps the large convolute stipules may form a further characteristic of Artocarpaceae.

With respect to *Phytoecene*, which is considered by M. Decaisne identical with *Gynoccephalum*, I find that it is remarkable for a very large quantity of granular albumen, which Blume says is altogether wanting in *Gynoccephalum*; I therefore retain it as a distinct genus.

The Order is not without anomalies. *Phytoecene* and *Pyrenacantha* have copious albumen. In *Antiaris* the ovary adheres to the involucre. It is doubtful whether all yield milk.

The tropics, and the tropics only, of both worlds, are the stations of these plants.

The most important plant of the Order is the Breadfruit, *Artocarpus incisa*, the most virulent the *Upas* tree, *Antiaris toxicaria*. Like Morads the species afford caoutchouc and an eatable fruit.

The edible quality of the Breadfruit appears to be owing to the presence of a large quantity of starch in its succulent heads. The Jack, *Artocarpus integrifolia*, has a similar quality, but is inferior. The venom of the Antjar poison, *Antiaris toxicaria*, is due to the presence of that most deadly substance strychnia; notwithstanding the exaggerated statements that have been made regarding this tree, the *Upas* of the Javanese, there remains no doubt that it is a plant of extreme virulence, even linen fabricated from its tough fibre being so acrid as to verify the story of the shirt of Nessus; for it excites the most distressing itching if insufficiently prepared.

However, the seeds are always wholesome; those of a plant nearly allied to *Cecropia*, called *Musanga* by the Africans of the Gold Coast, as well as of *Artocarpus*, are eatable as nuts. The famous Cow Tree, or *Palo de Vaca*, of South America, which yields a copious supply of a rich and wholesome milk, as good as that of the cow, is a species of *Brosimum*. It has been analysed by various chemists, especially Mr. Edward Solly, who found in it as much as 30.57 per cent. of galactin.—See *Phil. Mag.*, Nov. 1837. *Brosimum alicastrum* abounds in a tenacious gummy milk; its leaves and young shoots are much eaten by cattle, but when they become old they cease to be innocuous. The roasted nuts are used instead of bread, and have much



Fig. CLXXXIV.



Fig. CLXXXV.

Fig. CLXXXIV.—1. Nut of *Phytoecene*; 2. the same, showing the seed in its interior; 3. a cross section of the seed, showing the cotyledons and granular albumen; 4. the club-shaped radicle.

Fig. CLXXXV.—*Artocarpus integrifolia*.

the taste of Hazel-nuts. The milkiness of the sap is in itself an evidence of the presence of caoutchouc, and accordingly the tree *Uc* of Papantla, from which caoutchouc is obtained in that country, is supposed to be *Castilloa elastica*, a plant of this Order. A similar substance is obtained from *Cecropia peltata*, a very common tropical tree. The bark of this plant, remarkable for its stems being hollow between the nodes, is astringent, and used in diarrhoea and gonorrhoea. The light porous wood is employed by the American savages to give them light by friction.

From a species of *Antirris* (called by Mr. Nimmo *Lepurandra saccidora*), sacks are made in Western India by the following singular process. "A branch is cut corresponding to the length and diameter of the sack wanted. It is soaked a little, and then beaten with clubs till the fibre separates from the wood. This done, the sack formed of the bark is turned inside out, and pulled down till the wood is sawed off, with the exception of a small piece left to form the bottom of the sack." These sacks are in general use. A specimen of them was exhibited to the Linnean Society some years ago. Here there is no trace of the virulence of the *Epas* tree, and notwithstanding the fatal character of that species, others appear to be also inert. In the province of Martaban, Dr. Wallich found his Water Vine (*Phytocrene*), whose singular soft and porous wood discharges when wounded a very large quantity of pure and tasteless fluid, which is quite wholesome, and is drunk by the natives. This is an extraordinary exception to the usual character of the Order, and if the plant be really destitute of milk, it will break down very much the limit between *Artocarpads* and *Nettleworts*, unless, indeed, *Phytocrene* is out of its place, which its copious albumen (?) leads one to suspect. Martius says that the fruit of *Pourouma bicolor* is sub-acid, and worth cultivation, although mucilaginous. Snake-wood, or *Bois de Lettres*, so called because of the markings which it presents, is obtained from the *Brosimum*, called by Aublet *Piratinera guianensis*, a tree 60 or 70 feet high, whose beautiful timber is so hard that it can only be felled by the American axe.

—Schomb.

GENERA.

<i>Brosimum</i> , Swartz.	<i>Pourouma</i> , Aubl.	<i>Polyphema</i> , Lourèr.	<i>Pyrenacantha</i> , Hooker.
<i>Piratinera</i> , Aubl.	<i>Cecropia</i> , Linn.	<i>Tridapa</i> , Commers.	" " "
<i>Gabrielandrum</i> , Huin.	<i>Mussaenda</i> , Chr. Sm.	<i>Conocephalus</i> , Blume.	<i>Brusa</i> , Gaudich.
<i>Antiaris</i> , Leschen.	<i>Coussapoa</i> , Aubl.	<i>Gynoecephalum</i> , Blume.	<i>Perebea</i> , Aubl.
<i>Lepurandra</i> , Nimmo.	<i>Myrianthus</i> , Palla.	<i>Phytocrene</i> , Wall.	<i>Bazassa</i> , Aubl.
<i>Olmedia</i> , Rulz et Pav.	<i>Artocarpus</i> , Linn.	? <i>Natalatum</i> , Handl.	<i>Castilloa</i> , Cav.
<i>Macquira</i> , Aubl.	<i>Sitellum</i> , Banks.	<i>Trophis</i> , P. Br.	<i>Aporosa</i> , Blume.
<i>Trypanococcus</i> , Pöpp.	<i>Rudernachia</i> , Thunb.	<i>Etrebitus</i> , Lourèr.	<i>Sciaphila</i> , Blume.
<i>Borocera</i> , Et. Hill.	<i>Soccor</i> , Rumph.	<i>Achynax</i> , Soland.	

NUMBERS. GEN. 23. Sp. 54 †

POSITION.—MORACEÆ.—ARTOCARPACEÆ.—PLATANACEÆ.

ORDER LXXXIX. PLATANACEÆ.—PLANES.

Platanæ, *Lestiboudois*, according to *Von Martius, Hort. Reg. Monacensis*, p. 46. (1829.); *Endl. Gen.* xvii.; *Meisner*, p. 347.

DIAGNOSIS.—*Urtical Exogens*, with deciduous sheathing stipules, capitate flowers, limpid juice, an inferior radicle, albuminous embryo, and minute plumule.

Deciduous trees or shrubs. Leaves alternate, palmate, or toothed, with scarios sheathing stipules. Catkins round, pendulous. Flowers ♂ ♀, amentaceous, naked; the sexes in distinct catkins. ♂ Stamens single, without any floral envelope, but with several small scales and appendages mixed among them; anthers linear, 2-celled. ♀ Ovary 1-celled, terminated by a thick awl-shaped style, having the stigmatic surface on one side; ovules solitary, or two, one above the other, suspended, orthotropical. Nuts, in consequence of mutual compression, clavate, with a persistent recurved style. Seeds solitary, or rarely in pairs, pendulous, elongated; testa thin; embryo long, antitropical, taper, lying in the axis of very thin albumen; radicle inferior.

This group of trees or large shrubs, formerly comprehended in the Order once called Amentacæ, is particularly known by its round heads of flowers, its 1-celled ovary, containing 1 or 2 pendulous ovules, and its embryo lying with the radicle downward, by which it is distinguishable from both Birchworts, Galeworts, and Artocarpads, with all which, especially the latter, it has a close affinity. From the latter, indeed, it is chiefly known by the want of calyx, the inferior radicle, the presence of albumen, and the absence of milk; the habit of the two Orders is much the same. Bartling even combines *Platanus* with that Order, and it must be confessed that the grounds of separating the two are not strong. The simple carpel of the *Planes* refers it rather to the *Urtical* than the *Amental Alliance*: they may be regarded as the connecting link between *Artocarpads* and *Liquidambars*, agreeing most with the former on account of the simplicity of their fruit.

Noble timber-trees, natives of Barbary, the Levant, and North America, and extending even into Cashmere.

They are chiefly cultivated for the sake of their noble appearance; their broad, shady, palmated leaves being equalled in this country by those of no hardy trees except the Sycamore and its fellow species. The timber is firm and close grained, but brittle, perishable, and only fit for indoor work. That of *P. orientalis* is said, however, to be in request in the East for cabinet work, and even to have been used in ship-building. The timber of *P. occidentalis* is redder, but warps, and will not bear exposure to weather. No use is made of any other part of these plants.

GENUS
Platanus, L.

NUMBERS. GEN. 1. Sp. 6?

POSITION.—Artocarpacæ.—PLATANACEÆ.—
Altingiaceæ.

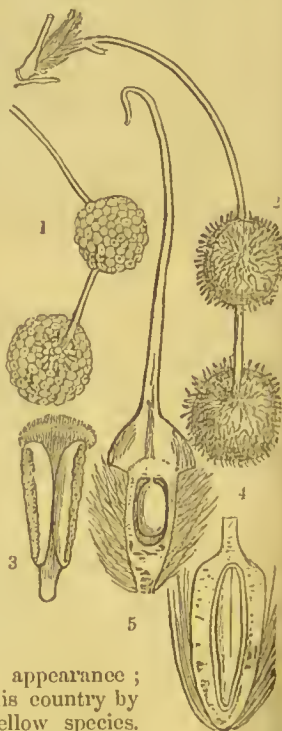


Fig. CLXXXVI.

Fig. CLXXXVI.—*Platanus orientalis*. 1. The ♂ inflorescence; 2. the ♀; 3. an anther; 4. a perpendicular section of an ovary; 5. a perpendicular section of a ripe fruit.

ALLIANCE XX. EUPHORBIALES.—THE EUPHORBIAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens, with scattered monodichlamydeous flowers, superior consolidated carpels, axile placenta, and a large embryo surrounded by abundant albumen.*

The main difference between the Euphorbial and Urtical Alliances consists in the compound consolidated pistil of the former and the simple one of the latter. In other respects they are much the same. Euphorbials may be regarded then as a higher form of Urticals, and accordingly we find their lateral affinities also pointing to groups with a more complicated structure; as for example to Rhamnads in the perigynous, and Malvads in the hypogynous Sub-class. They touch Urticals by such a genus as Eremocarpus among Spurgeworts; and Scepads also bring them to the borders of the Amental Alliance. Starworts are to Euphorbials what Hornworts are to Urticals. Into Garryals they pass by way of the Helwingiads, which, if their embryo was not so small, would be almost an inferior fruited form of Spurgeworts. The only doubtful part of the Alliance is the Batids, whose structure is ill ascertained, and the Nepenths, whose indefinite scobiform seeds are very unlike anything else in the Alliance. But it seems difficult to find any better place for the last Order.

NATURAL ORDERS OF EUPHORBIALS.

- Ovules definite, suspended, anatropal. Radicle superior.* 90. EUPHORBIACEÆ.
- Ovules definite, suspended, campylotropal. Radicle inferior. Albumen mealy* *GYROSTEMONEÆ.
- Ovules definite, suspended, anatropal. Radicle superior. ♂ amnitateous* } 91. SCEPACEÆ.
- Ovules definite, suspended, amphitropal. Radicle superior.* 92. CALLITRICHACEÆ.
- Ovules definite, ascending, anatropal. Radicle inferior.* 93. EMPETRACEÆ.
- Ovules solitary, ascending. ♀ naked, combined into a succulent cone* °BATIDÆ.
- Ovules 00, ascending. Radicle inferior. Seeds scobiform* 94. ? NEPENTHACEÆ.

ORDER XC. EUPHORBIACEÆ.—SPURGEWORTS.

Euphorbiæ, *Juss. Gen.* 385. (1789).—Euphorbiacæ, *Ad. de Juss. Monogr.* (1824); *Endl.* cxxliii.; *Meisner*, p. 336; *Klotzsch in Erichs. Archiv.* 7. 175. (1841).—Trewiaceæ, *Ed. prior.* p. 174.—Pseudanthææ, *Endl.* p. 328.—Anthoboleæ, *Endl.* p. 323?—Putranjivæ, *Endl.* p. 287.

DIAGNOSIS.—*Euphorbial Exogens*, with definite suspended anatropal ovules, scattered flowers, and tricoecous fruit.

Trees, shrubs, or herbaceous plants, often abounding in acrid milk. Leaves opposite or alternate, simple, rarely compound, often with stipules. Flowers axillary or terminal,



Fig. CLXXXVII.

arranged in various ways, sometimes inclosed within an involucre resembling a calyx. Flowers ♂ ♀. Calyx inferior, with various glandular or scaly internal appendages; (sometimes wanting.) Corolla either consisting of petals or scales equal in number to the sepals, or absent, or sometimes more numerous than the sepals; sometimes monopetalous. ♂ Stamens definite or indefinite, distinct or monadelphous; anthers 2-celled, sometimes opening by pores. ♀ Ovary free, sessile, or stalked, 1-2-3- or more celled; ovules solitary or twin, suspended from the inner angle of the cell; styles equal in number to the cells, sometimes distinct, sometimes combined, sometimes none; stigma compound, or single with several lobes. Fruit generally tricoecous, consisting of 3 carpels splitting and separating with elasticity from their common axis, occasionally fleshy and indehiscent. Seeds solitary or twin, suspended, often with an aril; embryo inclosed in fleshy albumen; cotyledons flat; radicle superior.

No group of plants can illustrate better than this the entangled nature of botanical affinities; for it claims kindred in an almost equal degree with Nettleworts, because of its unisexuality, and with Rhamnads and Mallowworts when that circumstance is left out of consideration. By the school of Jussieu it is considered an apetalous Order, with a tendency to form a corolla; by myself and others it is regarded as a polypetalous Order, losing its petals in a part of the species.

The reason for considering Spurgeworts as an apetalous Order is because of the want of a corolla in the genera with which European Botanists are most familiar. But if, instead of considering the imperfectly developed genera of Europe as typical of the true structure of the Order, we look to those of tropical countries, we find that the apetalous character by no means holds good with them. In Aleurites, for example, the petals are as much developed as in a Malvaceous plant; the same thing occurs in *Jatropha*, *Eleo-coeca*, and others; and, in fact, upon looking through the genera described by Adrien de Jussieu in his Monograph, it appears that out of 61 genera no fewer than 32 have petals. The tendency of the Order is, therefore, at least as great to form petals as to want them. Now if this be so, and the separation of sexes be disregarded, it will be found that it is with Mallowworts, on the one hand, and Rhamnads, on the other, that they

Fig. CLXXXVII.—*Andrachne telephioides*. 1. A male flower; 2. a female flower; 3. a pistil with the scales at its base; 4. a transverse section of an ovary; 5. a ripe seed; 6. a vertical section of it.

most agree, and especially with the former. Their habit, indeed, and general appearance, are in certain instances so much alike that one might easily mistake some *Crotons*, *Aleurites*, &c., for Mallowworts; the starry structure of their hairs, their monadelphous stamens, the definite number of ovules in a definite number of united carpels, are all further points of resemblance. As to the relationship of Spurgeworts to Rhamnads it was long ago perceived by Jussieu, and has been since adverted to by Adolphe Brongniart (*Monogr. des Rhamn. p. 35.*) Brown, too, in omitting Spurgeworts from the apetalous Orders, in his *Prodromus*, may be conjectured to have entertained a similar opinion; and Auguste de St. Hilaire inquires whether they are not intermediate between Mallowworts and Menispermads. A writer in the *Linnæa* (14. 250.), would place this Order next Bytneriads, and it is no doubt to that form of the Malval Alliance that it approaches nearest.

But if, with Jussieu, we consider the separation of sexes a great physiological character, the Order of Spurges will join that of Nettles, through *Eremocarpus*, a curious Californian plant lately discovered by Mr. Bentham, which indeed might be referred indifferently to Spurgeworts or Artocarpads. And so again with Antidesmads, their character is very little different from that of such drupaceous Spurgeworts as *Sarcococca*. Nor can their close connection with the Garryal Alliance be overlooked; for Helwingiads are scarcely more than Spurgeworts with an adherent ovary and minute embryo.

Misled by imperfect information, I formerly proposed a group called *Trewiaceæ*; but it has been shown by Klotzsch, who has had the opportunity of examining authentic materials concerning *Trewia*, that it is really a tetracocceous genus of the present Order, nearly allied to *Rotlera*, (*Wieg. vii. 257.*) Although there does not appear to be any considerable affinity between this tribe and Cucurbits, yet it is to be noted that several genera have a scrambling habit, that the number 3 prevails in the ovary of both Orders, and that the genus *Peripterygium* has, according to Hasskarl, the habit of a *Momordica*. There seems to be nothing in *Putranjiva* to distinguish it from a drupaceous Spurgewort.

In general the structure of Spurgeworts is very uniform, and upon the whole there are few extensive Orders in which it is less liable to exceptions. Some, however, of a very striking kind do occur. Foremost among the instances of anomalous structure is the common Spurge, (*Euphorbia*), in which the involucre is so much like a calyx, and sometimes seems to be even augmented with petals, that a student finds it difficult to believe that it is

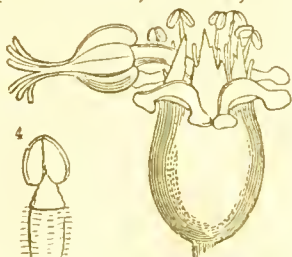


Fig. CLXXXIX.

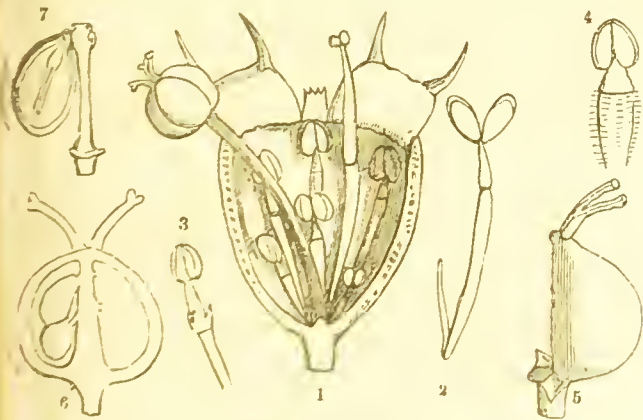


Fig. CLXXXVIII.

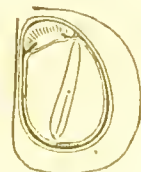


Fig. CXC.

really composed of numerous naked ♂ flowers surrounding a ♀ equally destitute of styx and corolla. The real history of the structure is however proved in many ways, and especially by such plants as *Monotaxis*, in which there is also a number of ♂ flowers surrounding one ♀, but each is furnished with a calyx, and the cup-like involucre which disguises *Euphorbia* is reduced to a few scales. Besides these instances of anomalous structure, we find the carpels reduced to 2 in *Mercurialis*, &c., or even 1 in *Eremocarpus* and *Peripterygium*, or increased to as many as 9 in *Anisoneema*, or 15 in *Hura*. The

Fig. CLXXXVIII.—1. The involucre of a *Euphorbia*, containing monandrous male florets, surrounding long-stalked female; 2, 3, 4. male florets of different species, with the articulation that separates them from the pedicel; 5. a carpel separate; 6. a vertical section of an ovary; 7. a vertical section of the seed, showing the central column and an embryo in the midst of albumen.

Fig. CLXXXIX.—The involucre of *Euphorbia lathyris*.
Fig. CXC.—Perpendicular section of the seed of *Euphorbia lathyris*.

fruit, moreover, which generally splits with elasticity, becomes a drupe in *Sarcococca* and others. Finally, in a few rare instances the albumen is said to be missing.

This extensive Order, which probably does not contain fewer than 2500 species, either described or undescribed, exists in the greatest abundance in equinoctial America, where about 3-8ths of the whole number have been found; sometimes in the form of large trees, frequently of bushes, still more usually of diminutive weeds, and occasionally of deformed, leafless succulent plants, resembling Indian Figs in aspect, but differing from them in every other particular. In the Western world they gradually diminish as they recede from the equator, so that not above 50 species are known in North America, of which a very small number reaches as far as Canada. In the Old World the known tropical proportion is much smaller, arising probably from the species of India and equinoctial Africa not having been described with the same care as those of America; not above an eighth having been found in tropical Africa, including the islands; a sixth is perhaps about the proportion in India. A good many species inhabit the Cape, where, and in the North of Africa, they often assume a succulent habit; and there are almost 120 species from Europe, including the basin of the Mediterranean: of which 16 only are found in Great Britain, and 7 in Sweden.



Fig. CXCI.

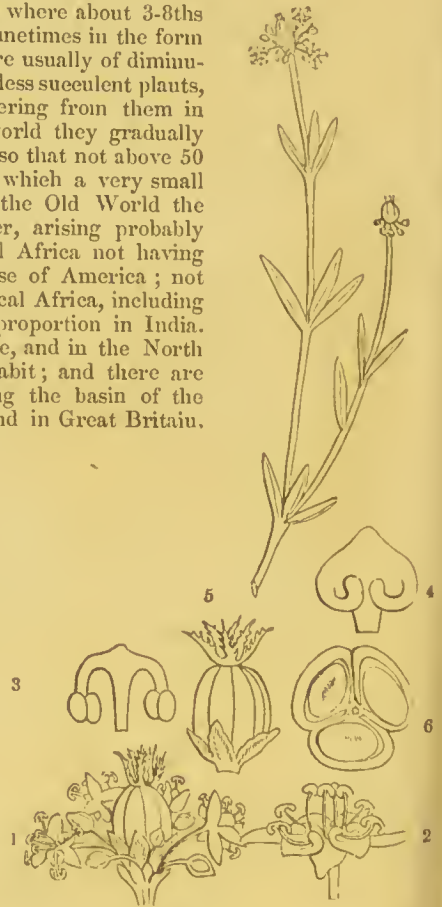


Fig. CXCH.

A very large proportion of these plants is venomous. The poisonous principle resides chiefly in their milky secretion, and is most powerful in proportion as that secretion is abundant. The hairs of some species are stinging. The bark of various species of *Croton* is aromatic, as *Cascarilla*; and the flowers of some, such as *Caturus spiciflorus*, give a tone to the stomach. Many of them act upon the kidneys, as several species of *Phyllanthus*, the leaves of *Mercurialis annua*, and the root of *Ricinus communis*. Several are asserted by authors to be useful in cases of dropsy; some *Phyllanthuses* are emmenagogue. The bark of several *Crotons*, the wood of *Croton Tiglium* and common *Box*, the leaves of the latter, of *Cicea disticha*, and of several *Euphorbias*, are sudorific, and used against syphilis: the root of various *Euphorbias*, the juice of *Commia*, *Anda*, *Mercurialis perennis*, and others, are emetic; the leaves of *Box* and *Mercurialis*, the juice of *Euphorbia*, *Commia*, and *Hura*, the seeds of *Ricinus*, *Croton Tiglium*, &c. &c., are purgative. Many are dangerous, even in small doses, and so fatal in some cases, that no practitioner would dare to prescribe them; as, for example, *Manchineel*. In fact, there is a gradual and insensible transition, in this Order, from mere stimulants to the most dangerous poisons. The latter have usually an acrid character, but some of them are also narcotic, as those *Phyllanthus* the leaves of which are thrown into water to intoxicate fish. Whatever the stimulating principle of *Spurgeworts* may be, it seems to be volatile, because application of heat is sufficient to dissipate it. Thus the

Fig. CXCI.—*Eremocarpus setigerus*—*Bentham*. 1. a young pistil; 2. a ripe fruit after dehiscing.
Fig. CXCH.—*Monotaxis tridentata*. 1. a ♀ flower surrounded by several ♂ s; 2. a ♂ apart; 3. a stamen; 4. a sepal; 5. a ♀ apart; 6. a transverse section of the ovary.—*Endlicher*.

starchy root of the Manihot or Cassava, which when raw is a violent poison, becomes wholesome nutritious food when roasted. In the seeds of some the albumen is harmless and eatable, but the embryo itself is acrid and dangerous. Many of the species furnish Caoutchouc, that most innocuous of all substances, produced by the most poisonous of all families, which may be almost said to have given a new arm to surgery, and which has become an indispensable necessary of life; it exists in Artocarpads and elsewhere, but is also the produce of species of Spurgeworts.

The properties of this Order are so important, that the object of this work would be unfulfilled if I did not, in addition to the foregoing general view, add a detailed list of the qualities of the most remarkable species named by writers.

Among milking species, the first to be noticed are the Cactus-shaped kinds, inhabiting

Africa chiefly, but also found in India. It is said that King Juba discovered Euphorbia in Barbary, and named it after his physician, who was brother to Musa. The plant of King Juba is referred to *Euphorbia officinarum*, Linn.; a many-angled succulent species growing in tufts armed with double spines, and now found in the North of Africa; others, however, believe it to have been *E. antiquorum*, a triangular branching species whose angles are sinuous and spiny, and which appears to be widely dispersed through Africa. The gum resin Euphorbium, now found in our shops, an acrid poison, is partly gathered in Africa from those two species, and partly in the Canaries, from *E. canariensis*; it



Fig. CXVIII.

flows from the wounded stems, and is collected in leather bags. It is an extremely acrid inflammable substance, producing severe inflammation of the nostrils, if those who powder it do not guard themselves from its dust; according to chemists, it consists of wax, myricine, phyteumacolla, and various salts. In India it is mixed with the oil expressed from the seeds of *Sesamum orientale*, and used externally in rheumatic affections, internally in cases of obstinate constipation. Orfila regards it as a poison. It is little used in Europe. The Arabs make up violent diuretic pills, by rubbing over the juice of *E. antiquorum* with flour; yet their camels will eat the branches of the plant when cooked. The juice of *E. heptagona*, *virosa*, and *cereiformis*, African species, furnishes the Ethiopians, and *E. cotinifolia*, the wild Brazilians, with a mortal poison for their arrows. That of the leaves of *Euphorbia nereifolia* is prescribed by the native practitioners of India, internally as a purge and deobstruent, and externally, mixed with *Margosa* oil, in such cases of contracted limb as are induced by ill-treated rheumatic affections. The leaves have, no doubt, a diuretic quality. *E. tribuloides*, one of the least of the Cactus-shaped species, is regarded as a diaphoretic in the Canaries, where it grows wild. Of the leafy Euphorbias great numbers have been found to possess a milk with purgative or emetic qualities. Endlicher mentions *E. Esula* (Wolfsmilch of the Germans), *Cyparissias*, *amygdaloides*, whose roots have been the basis of some celebrated quack fever mixtures, *Helioscopia*, our commonest weed, (*τιθύμαλος* and *ἡλιοςκόπιος*), *Peplus*, *Peplodes* (the *πέπλος* of Hippocrates), *palustris*, *pilosa*, *Chamaesyce*, *Peplis*, (the *πέπλιον* of Hippocrates, and *πεπλῖς* of Dioscorides), *spinosa* (*ἵπποφαές*), *dendroides* (*τιθύμαλος μέγας*, Hippoc.), *Aleppica*, and *Apios*; all plants having more or less reputation as purgatives. In America there are also employed for the same purpose, *E. buxifolia* in the West Indies; *capillosa* in Brazil, a species apt to produce dangerous superpurgations, and called *Leiteira* or *Lechetrea*; *laurifolia* in Peru; *portulacoides* in Chili; and *Tirucalli* in India; the fresh acrid juice of the latter is used as a vesicatory; it is common in the Madras Presidency, and makes an excellent hedge, which may be formed with very little trouble. A trench must be dug where it is intended to be, at the beginning of the rainy season; in this, cuttings being placed, and the earth pressed about them, they establish themselves without further trouble. No cattle will touch the leaves, and in one year it becomes a tolerable fence.

Among syphilitic remedies are *Euphorbia parviflora* and *hirta* in India, and *E. linearis* in America. *E. hiberna* also, before the introduction of mercury, was frequently administered in England against venereal affections; the Spaniards use *E. canescens* for such purposes to this day.

Fig. CXVIII.—*Euphorbia Caput Medusæ*.

The roots of some are emetic. According to Deslongchamps, the powdered root of *E. Gerardiana* vomits easily in doses of 18 or 20 grains. The root of *Euphorbia Ipeecacuanha* is said, by Barton, to be equal to the true *Ipeecacuanha*, in some respects superior; and not unpleasant either in taste or smell. *E. Pithyusa* in the Mediterranean is also esteemed. *Euphorbia thymifolia* is somewhat aromatic and astringent, and is prescribed in India in the diarrhoea of children, and as a vermifuge. In the same way is employed *E. hypericifolia*, a plant of tropical America, which is astringent and somewhat narcotic. Nevertheless *E. balsamifera* has no such qualities, and is eaten when cooked. *E. mauritanica* is also employed as a condiment, but its acidity is by no means inconsiderable; they say it is used to adulterate Scammony. The sap of *E. phosphorica* shines with a phosphorescent light in a warm night in the ancient forests of Brazil.

The genus *Pedilanthus* stands nearest to *Euphorbia*, and is not less potent in its quality; *P. tithymaloides* has an acrid bitter milk; a decoction of the dried shrub of it and *P. padifolius* (called Jewbush) is employed in syphilitic cases, and in amenorrhœa; the root is emetic. Some of the trees again are among the most poisonous of all that tropical countries produce. The juice of *Excœcaria Agallocha*, and even its smoke when burnt, affects the eyes with intolerable pain, as has been experienced occasionally by sailors sent ashore to cut fuel, who, according to Rumphius, having accidentally rubbed their eyes with the juice, became blinded, and ran about like distracted men, and some of them finally lost their sight. This juice is described as being thick, nauseous, and a violent purgative. The smoke of the burning branches is said to injure the eyesight. *Agallochum* or *Aloes wood*, an inflammable, fragrant, resinous substance, has been supposed to belong to this plant, but is really produced by quite a different race. See *AQUILARIACEÆ*. The famous *Manchineel tree*, *Hippomane Mancinella*, is said to be so poisonous that persons have died from merely sleeping beneath its shade. This is doubted, indeed, by Jacquin, who, however, admits its extremely venomous qualities; but it is by no means improbable that the story has some foundation in truth, particularly if, as Ad. de Jussieu truly remarks, the volatile nature of the poisonous principle of these plants is considered, and the various degrees of susceptibility of such influences in the human constitution. The juice of *Manchineel* is pure white, and a single drop of it falling on the skin burns like fire, forming an ulcer often difficult to heal. The fruit, which is beautiful, and looks like an apple, is turgid with a similar fluid, but in a milder form; the burning it causes in the lips of those who bite it guards the careless from the danger of eating it. The juice of *Hura crepitans* is stated to be of the same fatal nature as that of *Excœcaria*; its seeds are said to have been administered to negro slaves as purgatives, in number not exceeding 1 or 2, with fatal consequences. The juice of *Sapium aucuparium* is reputed poisonous. A case is mentioned by Tussac of a gardener whose nostrils became swollen and seized with erysipelatous phlegmasia, in consequence of the fumes only of this plant. The sap of *Commia cochinchinensis* is white, tenacious, emetic, purgative, and deobstruent. Cautiously administered, it is said to be a good medicine in obstinate dropsy and obstructions.



Fig. CXCIV.

The juice of this Order is not, however, always as dangerous as in the instances just given. That of *Siphonia clastica*, a tree inhabiting Guayana and Brazil, yields the bottle India Rubber, which is known in Europe; in preparing it the natives smear clay moulds with repeated layers of the juice, at the same time drying it in smoke. *Alcornoques triloba*, whose seeds will be mentioned presently, exudes a gummy substance which the natives of Tahiti chew; *A. laccifera* furnishes gum lac in Ceylon; and the secretions of certain *Crotons*, viz. *Draco* and *sanguiferum*, become a similar red substance in the tropical parts of America.

Among the crowd of emetic and purgative plants having more or less reputation

in the countries where they grow, many are found in the Euphorbiaceous Order. The root of *Stillingia sylvatica* is regarded in Carolina and Florida as a specific in syphilitic maladies; the same reputation attaches to *Cnemidostachys Chamælea* in India, and *Jatropha officinalis* (Raiz de Tihu) in Brazil. The *Tragias volubilis* of America, and *involverata*, *cannabina*, and *Mereurialis* of Asia, are noted for their solvent, diaphoretic and diuretic qualities. More especially the root of *Tragia involucrata* is reckoned, by the Hindoo doctors, among those medicines which they conceive to possess virtues in altering and correcting the habit in cases of cachexia, and in old venereal complaints attended with anomalous symptoms. The *Mereurialis* or Dog Mercury of Europe is another active genus. *M. annua* has a nauseous taste and is slightly purgative; *M. perennis* is much more active, sometimes producing violent vomiting, diarrhœa, a burning heat in the head, convulsions, and death; *M. tomentosa*, a Mediterranean shrub, is used in hydrophobia; it is vulgarly believed to this day that if women eat the male individuals of this plant, which is diceicious, they will conceive boys, and if the female girls; when boiled with other vegetables it acts as a mild purgative (English Mercury must not be confounded with these plants. See CHENOPODS). *Omphalea triandra*, a Guayana plant, has a white juice which turns black in drying, and is used in place of ink. In *Cicca disticha*, an India bush, the root is violently purgative, a decoction of the leaves diaphoretic. A decoction of *Croton perdicipes*, called *Pe de Perdis*, *Alcambora*, and *Cocallera*, in different provinces of Brazil, is much esteemed as a cure for syphilis, and as a useful diuretic. The root of another species, called *Velame do Campo*, *C. campestris*, has a purgative root, also employed against similar disorders. It is, however, more common to find balsamic juices in the American *Crotous*, among which balsamifer is employed in Martinique in the preparation of the liqueur called *Eau de Mantes*; frankincense is extracted from *C. thurifer* and *adipatus* on the banks of the Amazons; *C. humilis* is used for its aromatic qualities in medicating baths in the West Indies; at the Cape of Good Hope the fragrant *C. gratissimus* is used by the Koras as a perfume; the balsam of *C. organifolius* is mentioned among the substitutes for *copaiva*; its leaves and bark are considered diaphoretic and antispastic; finally, *C. niveus* is a vulnerary.

The most important, however, among the aromatic Spurge-worts are the plants that yield *Cascarilla*, a valuable bitter, tonic, aromatic, stimulant bark, imported from the West Indies. This drug has been at one time referred to *C. Eleuteria*, a Bahama shrub, at another to *C. Cascarilla*, a Jamaica bush, called, from its appearance, *Wild Rosemary*. As a good deal of controversy has been raised respecting this matter, it is as well to state that the question is now set at rest in consequence of the Hon. J. C. Lees, Chief Judge in the Bahamas, having sent home specimens of the *Cascarilla* tree, with the bark itself and the leaves adhering to it. It proves to be this species, concerning which Mr. Lees has favoured me with the following note: "The plant is scarcely known here by the name of *Cascarilla*, but is commonly called *Sweet Wood Bark*, and often *Eleuthera Bark*, because it is chiefly gathered on the island of *Eleuthera*. It is the only bark receiving the name of *Cascarilla* exported from the Bahamas, where the tree grows in great abundance." It is, however, certain that the *C. pseudo-China* furnishes *Cascarilla* in Mexico, where it is called *Quina blanca*, and *Copache Bark*; and *C. nitens*, *cascarilloides*, *micans* and *suberosus*, seem to be little inferior to the *C. Eleuteria* itself.

The bark of the Asiatic *Bridelias* is astringent; so is that of *Stylodiscus trifolius*, whose wood is of a red colour, as is the bark; the former is employed for masts and spars of small vessels in Java.—*Horsfield*. The common Box tree, *Buxus sempervirens*, has a bark with qualities similar to those of *Guaiaecums*, for which it has been substituted; the leaves are bitter, and very purgative; nevertheless, it is alleged that they have been used as a substitute for Hops.—*Endl.* They say that in some parts of Persia where Box trees abound, camels cannot be employed because it is found impracticable to prevent their browsing on the leaves, which kill them. The root and bark of *Colegium variegatum* are acrid, and excite a burning sensation in the mouth if chewed: but the leaves are sweet and cooling. The root, leaves, and young shoots of *Phyllanthus Niruri* are considered, in India, deobstruent, diuretic, and healing; the leaves are very bitter, and a good stomachic. Some other species, particularly *P. urinaria*, are powerful diuretics. The bruised leaves of *P. Commi* are used for inebriating fishes. The boiled leaves of *Plukenetia corniculata* are said to be an excellent potherb, for which purpose the plant is cultivated in Amboyna. *Acalypha Cupani*, an Indian herb, has a root which, bruised in hot water, is cathartic; a decoction of its leaves is also reported to be laxative. The flowers of *Caturus spiciflorus* are spoken of as a specific in diarrhœa, either taken in decoction or in conserve.

The oil of the seeds is perhaps the most important part of the useful products of this Order. It is often among the most valuable of known diuretics and purgatives. *Croton*

Tiglium, and Pavaua, two East Indian trees, whose seeds were formerly called Grana molucca, stand at the head of this class of medicines; their oil is so acrid as to blister the skin, and it will even act when externally applied to the abdomen. Next to these comes Ricinus communis, the castor oil plant, an annual in Europe, a tree in Africa, conspicuous with its broad palmate leaves, which have given it the name of Palma Christi, and spiny capsules, whose use is traceable into remote antiquity, under the name of Semina cataputiæ majoris; it is found that the albumen of this plant has little activity, but that the virulence resides mainly in the embryo and seed-coats; so that the activity of the oil will depend upon the amount of pressure, &c. to which the seeds may have been subjected; when long boiled their oil is found poisonous. In like manner the seeds of Omphalea are said to be eatable if the embryo is extracted, but if this is not done, to be too cathartic for food. Mr. W. Macleay calls this nut "most delicious and wholesome," and speaks of it as the Cobnut or Hognut of Jamaica. Similar qualities reside in the seeds of Hura crepitans, the Sand Box tree, and Curcas purgans (*Jatropha purgans*, L.); the latter plant is remarkable for the fierce acidity of its seeds, which are commonly called Purging-nuts. An expressed oil is obtained from them, which is reckoned a valuable external application in itch and herpes; it is also used, a little diluted, in chronic rheumatism. The varnish used by the Chinese for covering boxes is made by boiling this oil with oxide of iron. The leaves are considered as rubefacient and discutient; the milky juice is supposed to have a detergent and healing quality, and dyes linen black. In like manner *Curcas multifidus* produces a purgative oil called Pinhoen, under which name it reaches Europe from South America. From the seeds of *Jatropha glauca* the Hindoos prepare, by careful expression, an oil which, from its stimulating quality, they recommend as an external application in cases of chronic rheumatism and paralytic affections. *Euphorbia Lathyris*, called in English gardens the Caper-bush, to which it has no resemblance, was one of the plants which Charlemagne in his Capitularies commanded to be cultivated in all monastic gardens, for the sake of its purgative seeds, which were called Semina Cataputiæ minoris; they are acrid like Tiglium, and not mild like those of Ricinus. The capsules of this plant are reported to intoxicate fish. *Euphorbia hibernica* is extensively used by the peasantry of Kerry for poisoning, or rather stupefying fish, in the same manner as the exotic *E. piscatoria*. So powerful are its qualities that a small creel or basket, filled with the bruised plant, suffices to poison the fish for several miles down a river.—*Hooker, Brit. Fl. ed. 4. p. 326.* The Anda of Brazil is famous for the purgative qualities of its seeds, which are called Purga da Paulistas, and are fully as powerful as those of the Palma Christi. The Brazilians make use of them in cases of indigestion, in liver complaints, the jaundice, and dropsy. The bark, roasted on the fire, passes as a certain remedy for diarrhoea brought on by cold. According to Marcgraaf, the fresh bark steeped in water communicates to it a narcotic property which is sufficient to stupefy fish. The seeds are either eaten raw, or are prepared as an electuary; they yield an oil, which is said by M. Anguste de St. Hilaire to be drying and excellent for painting; in short, much better than nut oil. The Cape colonists collect the fruit of *Hyænanche globosa*, an anomalous plant of this Order, and kill hyænas with mutton rubbed with the powder. The seeds of *Stillingia sebifera*, a Chinese tree, common in most tropical countries, are enveloped in a fatty matter, from which candles are prepared; a mild oil is also furnished by them. Two species of *Elæococca*, the one *E. verrucosa* from Japan, the other *E. veruicia* from China, furnish oil by pressure of their seeds; the former for burning, the latter for painters' work; both too acrid to be used as food.

Nevertheless, some have an eatable fruit; that of Anda and Omphalea has been already mentioned. *Aleurites triloba*, a Molucca tree, has much reputation for its nuts, which are reported to be aphrodisiac; and the seeds of *Conceveiba guianensis* are said to be delicious. The succulent fruit of *Cicca disticha* and *racemosa* is sub-acid, cooling, and wholesome; its leaves are sudorific, and its seeds cathartic. The capsules of *Cluytia collina* are poisonous, according to Roxburgh. *Emblia officinalis* also, has an acrid fruit, which in India is made into a pickle; when ripe and dry it is astringent, and has been employed, under the name of Myrobalani Emblici, against diarrhoea, dysentery, and cholera.

It is not a little remarkable, that here, as in so many other cases, we should find in a very dangerous Natural Order such an abundant secretion of starch as renders certain species useful for food when the acrid matter is removed. This is most especially the case with the Mandioc plant, *Manihot utilisima*, *Pohl*, (*Jatropha manihot*, L.), a shrub about 8 feet high, extensively cultivated for food all over the tropical parts of the world. Of this plant the large root, weighing as much as 30lbs., is full of venomous juice, which if taken internally produces death. The roots are rasped, the pulp well bruised, and then thoroughly washed, after which the mark is placed on iron plates to be heated. In this way the venom is washed out or driven off, and the residue becomes Cassava.

The powder which floats off in the water is a very pure starch, which, when it settles down, becomes Tapioca. Manihot Aipi, Pohl assures us, has a harmless root.

Cnidoscopus quinquelobus (Jatropha urens, L.) is covered with hairs which sting severely, as indeed occurs elsewhere in this Order. The juice of its branches and seeds is diuretic. The root of another species, C. herbaceus, is used in the same way as Mandioc in Mexico and Carolina.

A few yield dyes. Turnsole, a well known purple drug, which becomes blue upon the application of ammonia, is the inspissated juice of Crozophora tinctoria (ἡλιοτρόπιον μικρόν) found in the southern parts of Europe. Its juice is acrid, and its seeds cathartic, as in others of this Order. Similar colours are found in other species of Crozophora, in some Crotous, Argythamnia, Ditassa and Claoxylou. The seed-vessels of Rottlera tinctoria are covered with a mealy powder which gives a scarlet colour, as also does its root. Maprounea brasiliensis, or the Marmeleiro do Campo of Brazil, yields a black dye, which is, however, fugitive; a decoction of its root is also administered in derangement of the stomach; according to Auguste de St. Hilaire, it is destitute of milky juice.

The timber of Buxus sempervirens is remarkable for its hardness and compactness, whence its value to wood engravers. There is reason to believe that the timber imported from the coast of Africa, under the name of African Teak, belongs to some tree of this Order. For further information as to the uses of Spurge-worts, see *Martius Materia Medica Brasiliensium*.

GENERA.

- | | | | |
|--|---|---|--|
| <p>I. — PROSOPIDOCLINEÆ. <i>Klotzsch</i>. Ovale solitary. Seeds with an arillus, and no albumen(?). Involucre globose, bladder-like, opening on one side, finally dropping off, containing from 3 to 6 flowers. Flowers diocious, apetalous.</p> <p><i>Chismatopera</i>, Kl.
<i>pinia</i>, <i>Leandr.</i>
<i>era</i>, <i>Mutis.</i>
<i>eridium</i>, <i>Schott.</i></p> | <p>Gymnanthes, <i>Swartz.</i>
Gussonia, <i>Spren.</i>
Sebastiania, <i>Spren.</i>
Adenogyne, Kl.
Sennefeldera, Kl.
Actinostema, <i>Marl.</i>
Sarthrostachys, Kl.
Styloceras, <i>Adr. Juss.</i>
Commia, <i>Lour.</i>
Synaspisma, <i>Endl.</i>
Hura, <i>Linn.</i>
Psilostachys, <i>Turcz.</i>
Hippomane, <i>Linn.</i>
<i>Mançanilla</i>, Plum.
Pachystemon, <i>Blum.</i>
Omalanthus, <i>Adr. Juss.</i></p> | <p>Macaranga, <i>Thouars.</i>
Panopia, <i>Noronh.</i>
Monospora, Kl.
Ctenomeria, <i>Hav.</i>
Claoxylon, <i>Adr. Juss.</i>
<i>Erythrochilus</i>, <i>Reinw.</i>
Conceveiba, <i>Aubl.</i>
Cladogynos, <i>Zippel.</i>
Platygyne, <i>Mercier.</i>
Simmondsia, <i>Nutt.</i>
Aparisthmium, <i>Endl.</i>
<i>Conceveibum</i>, L. C. Rich.
Omphalea, <i>Linn.</i>
<i>Omphalandria</i>, P. Br.
<i>Duchola</i>, <i>Adans.</i>
<i>Hecatea</i>, <i>Thouars.</i>
Cleidion, <i>Blum.</i>
Alchornea, <i>Soland.</i></p> | <p>Manibot, <i>Plum.</i>
<i>Janipha</i>, <i>Kunth.</i>
<i>Mandiocca</i>, <i>Link.</i>
<i>Api</i>, <i>Bauh.</i>
<i>Camagnoe</i>, <i>Aubl.</i>
Ricinus, <i>Tournef.</i>
Spathiostemon, <i>Blum.</i>
Baloghia, <i>Endl.</i>
Ricinocarpus, <i>Desf.</i>
<i>Echinosphæra</i>, <i>Sieb.</i>
<i>Rüperia</i>, <i>Spren.</i>
Moperea, <i>Adr. Juss.</i>
Mozinna, <i>Orteg.</i>
<i>Loureira</i>, <i>Cav.</i>
<i>Hemicyclia</i>, <i>W. et Arn.</i>
Gelonium, <i>Roxb.</i>
<i>Erythrocarpus</i>, <i>Blum</i>
<i>Codiaeum</i>, <i>Rumph.</i>
<i>Phyllaurea</i>, <i>Lour.</i>
Tetrochidium, <i>Pöpp.</i>
Rottlera, <i>Roxb.</i>
<i>Mallotus</i>, <i>Lour.</i>
<i>Adisca</i>, <i>Blum.</i>
<i>Trewia</i>, <i>L.</i>
<i>Touragastria</i>, <i>Gærtin.</i>
<i>Adriana</i>, <i>Gaudich.</i>
<i>Cheliosa</i>, <i>Blum.</i>
<i>Acidoton</i>, <i>Swartz.</i>
<i>Baliospermum</i>, <i>Blum.</i>
<i>Beyeria</i>, <i>Miq.</i>
<i>Hæmatospermum</i>, <i>Wall.</i>
<i>Hendecandra</i>, <i>Eschsch.</i>
<i>Asterogyne</i>, <i>Benth.</i>
<i>Adella</i>, <i>Linn.</i>
<i>Bernardia</i>, <i>Houst.</i>
<i>Crotonopsis</i>, L. C. Rich.
<i>Leptemon</i>, <i>Raf.</i>
<i>Friesia</i>, <i>Spren.</i>
<i>Peripterygium</i>, <i>Hassk.</i>
<i>Heterochlamys</i>, <i>Turcz.</i>
<i>Serophyton</i>, <i>G. B.</i>
<i>Fremocarpus</i>, <i>G. B.</i>
<i>Engelmannia</i>, <i>Kl.</i>
<i>Geissleria</i>, <i>Kl.</i>
<i>Philophytum</i>, <i>Kl.</i>
<i>Croton</i>, <i>Linn.</i>
<i>Ricinoides</i>, <i>Tournef.</i>
<i>Cascarilla</i>, <i>Adans.</i>
<i>Tridennus</i>, <i>Lour.</i>
<i>Arcton</i>, <i>Neck.</i>
<i>Lunlia</i>, <i>Neck.</i>
<i>Cinopsium</i>, <i>Neck.</i>
<i>Brunsvia</i>, <i>Neck.</i>
<i>Ricinocarpus</i>, <i>Benth</i>
<i>Jalocroton</i>, <i>Mart.</i></p> |
| <p>II. — EUPHORBIEÆ. Ovale solitary. Seeds albuminous. Flowers monocious, apetalous; ♂ and ♀, mixed, in a cup-shaped involucre.</p> <p><i>Edilanthus</i>, <i>Neck.</i>
<i>Croptaria</i>, <i>Haw.</i>
<i>Tithymaloides</i>, <i>Tournf.</i>
<i>uphorbia</i>, <i>Linn.</i>
<i>Tithymalus</i>, <i>Tournef.</i>
<i>Euphorbium</i>, <i>Isn.</i>
<i>Keruelima</i>, <i>Neck.</i>
<i>Athymalus</i>, <i>Neck.</i>
<i>Treisia</i>, <i>Haw.</i>
<i>Dactylanthus</i>, <i>Haw.</i>
<i>Medusa</i>, <i>Haw.</i>
<i>Gaborhorus</i>, <i>Haw.</i>
<i>Erula</i>, <i>Haw.</i>
<i>Anisophyllum</i>, <i>Haw.</i>
<i>opadocalyx</i>, <i>Kl.</i>
<i>sinetia</i>, <i>Graham.</i>
<i>anthostema</i>, <i>Adr. Juss.</i>
<i>lechampia</i>, <i>Plum.</i></p> | <p>Carumbium, <i>Reinw.</i>
Stillinga, <i>Gard.</i>
<i>Stillingia</i>, <i>Boj.</i>
Sapium, <i>Jacq.</i>
<i>Triadica</i>, <i>Lour.</i>
Cœlehogyne, <i>J. Sm.</i>
Microstachys, <i>Adr. Juss.</i>
<i>Cnemidostachys</i>, <i>Adr. Juss.</i></p> | <p>IV. — ACALYPHEÆ. Ovale solitary. Flowers apetalous, in clustered spikes or racemes.</p> <p><i>Tragia</i>, <i>Plum.</i>
<i>Schorioperam</i>, <i>Adans.</i>
Tragantus, <i>Kl.</i>
Leucandra, <i>Kl.</i>
Cnesmone, <i>Blum.</i>
Leptorhachis, <i>Kl.</i>
Bia, <i>Kl.</i>
Plukenetia, <i>Plum.</i>
<i>Sajor</i>, <i>Rumph.</i>
<i>Botryanthus</i>, <i>Kl.</i>
<i>Hedraostylus</i>, <i>Hassk.</i>
<i>Pterococcus</i>, <i>Hassk.</i>
<i>Ceratococcus</i>, <i>Melsn.</i>
<i>Anabrena</i>, <i>Adr. Juss.</i>
<i>Mercurialia</i>, <i>Linn.</i>
<i>Linozasia</i>, <i>Endl.</i>
<i>Triamegiata</i>, <i>Endl.</i>
<i>Acalypha</i>, <i>Linn.</i>
<i>Cupamenia</i>, <i>Adans.</i>
<i>Ceteria</i>, <i>Donnst.</i>
<i>y Ciburua</i>, <i>Linn.</i>
<i>Guburus</i>, <i>Spren.</i>
<i>Adenocline</i>, <i>Turcz.</i>
<i>Mappa</i>, <i>Adr. Juss.</i></p> | <p>V. — CROTONEÆ. Ovale solitary. Flowers usually having petals, in clusters, spikes, racemes or panicles.</p> <p>Cephalocroton, <i>Kl.</i>
Trachycaryon, <i>Kl.</i>
Calyptrostigma, <i>Kl.</i>
<i>Garcia</i>, <i>Rohr.</i>
<i>Mabea</i>, <i>Aubl.</i>
Siphonia, <i>Rich.</i>
<i>Hevea</i>, <i>Aubl.</i>
<i>Elateriospermum</i>, <i>Blum.</i>
<i>Anda</i>, <i>Maregr.</i>
<i>Johannesia</i>, <i>Velloz.</i>
<i>Andiscus</i>, Fl. Fl.
<i>Aleurites</i>, <i>Forsk.</i>
<i>Ambinuz</i>, <i>Commers.</i>
<i>Telopea</i>, <i>Soland.</i>
<i>Cambrium</i>, <i>Rumph.</i>
<i>Givolia</i>, <i>Griff.</i>
<i>Ostodes</i>, <i>Blum.</i>
<i>Elivococca</i>, <i>Commers.</i>
<i>Dryandra</i>, <i>Thunb</i>
<i>Vernicia</i>, <i>Lour.</i>
<i>Abazin</i>, <i>Kämpf.</i>
<i>Jatropha</i>, <i>Kunth.</i>
<i>Adenorhupium</i>, <i>Pohl.</i>
<i>Curcas</i>, <i>Adans.</i>
<i>Bromfolia</i>, <i>Neck.</i>
<i>Castiglioniia</i>, R. et Pav.
<i>Cnidoscopus</i>, <i>Pohl.</i>
<i>Bivanea</i>, <i>Ital.</i>
<i>Jussievia</i>, <i>Houst</i></p> |

- Podostachys, Kl.
Astræa, Kl.
Ocalia, Kl.
Eutropia, Kl.
Cleodora, Kl.
Timandra, Kl.
Medea, Kl.
Crotophora, Neck.
Tournefortia, Scop.
Chiropetalum, Adr. Juss.
Caperonia, St. Hil.
Cavanilla, Fl. Flum.
? Schinza, Dennst.
Ditaxis, Vahl.
Monotaxis, Brongn.
Argythamala, P. Br.
Ateramnus, P. Br.
Phylara, Kl.
Trigonostemon, Blum.
Trigostemon, Blum.
Ryparia, Blum.
Ryparosa, Blum.
- VI. — PHYLLANTHÆÆ.
Ovules in pairs. Stamens in the centre of the flower.
Cyclostemon, Blum.
Enchidium, Jack.
Briedelia, Willd.
Heydia, Deanst.
- Cluytia, Ait.
Clutia, Boerh.
Allora, Adans.
Cratocowila, Neck.
Andrachne, Linn.
Eratissa, Forsk.
Lineum, Forsk.
Arachne, Neck.
Sauropus, Blum.
Agynæia, Linn.
Leiocarpus, Blum.
Micranthea, Desf.
Pseudanthus, Sieb.
Menarda, Commers.
Xylophylla, Linn.
? Genesiphylla, Herit.
Phyllanthus, Linn.
Niruri, Adans.
Nymphanthus, Lour.
? Cathetus, Lour.
? Breymia, Forst.
Melanthesa, Blum.
Asterandra, Kl.
Kirganella, Juss.
Ardenghelia, Commers.
Emblica, Garln.
Cicca, Linn.
Chramela, Rumph.
? Tricaryum, Lour.
Leptouema, Adr. Juss.
Anisonema, Adr. Juss.
- Glochidonopsis, Adr. Juss.
Glochidiou, Forst.
Bradicia, Banks.
Gynoon, Adr. Juss.
Scepasma, Blum.
Epistylum, Swartz.
Eriococcus, Hassk.
Stylodiscus, Benn.
Poranthera, Rudg.
- VII. — БУХЕÆ, Ovules in pairs. Stamens inserted beneath the sessile rudiment of an ovary.
Flüggea, Willd.
Richeria, Vahl.
Amanoa, Aubl.
Lithoxylon, Endl.
Securinea, Commers.
Discocarpus, Kl.
Geblera, Fisch. et Mey.
Colmeiron, Reuter.
Savin, Willd.
Actephila, Blum.
Tricera, Swartz.
Crantzia, Swartz.
Buxus, Tournef.
Pachysandra, Michx.
Thecncoris, Adr. Juss.
Microelus, Wight et Arn.
- Adeacorepis, Blum.
Drypetes, Vahl.
Sarcococca, Lindl.
Putranjiva, Wall.
Nageia, Garln.
Hyenache, Lamb.
Toxicodendron, Thunb.
Doubtful Geuera.
Podocalyx, Kl.
? Anthobolus, R. Br.
Meborea, Aubl.
Tephrranthus, Neck.
Ægotoxicum, Ruiz et Pav.
Ætotoxicum, Id.
Margaritaria, Linn f.
Suregada, Roxb.
Hexadica, Lour.
Homonoia, Lour.
Cladodes, Lour.
Echinus, Lour.
? Ulassium, Rumph.
Lascadium, Ruf.
Rhytis, Lour.
Baccaurea, Lour.
Lumanaja, Blanc.
Lunasia, Blanc.
Doyyalls, E. Mey.
Desfontanea, Fl. Fl.
Mainea, Fl. Fl.
Pagiapteron.

NUMBERS. GEN. 191. Sp. 2500 ?

Rhamnaceæ.

Byttneriaceæ.

POSITION.—Empetraceæ.—EUPHORBIACEÆ.—Seepaceæ.

Helwingiaceæ.

GYROSTEMONÆÆ. (Endl. Gen. p. 978; Meisner, Gen. p. 322). Trees or shrubs inhabiting New Holland. Leaves alternate, entire, feather-veined, without stipules. ♂ Calyx 6-7-lobed. Corolla 0. Stamens indefinite, distinct, with anthers bursting longitudinally. ♀ Calyx cup-shaped, 6-7-lobed. Corolla 0. Carpels 00, collected round a flat central torus, 2-seeded, with suspended campylotropal ovules. Fruit composed of several membranous cases, arranged in a ring. Seed with a strophiolate hilum. Embryo hooked round mealy albumen, with linear incumbent cotyledons and a slender inferior radicle.—Two genera and three species at present constitute this group, about whose relationship we have at present no certain evidence. Because of their unisexual imperfect flowers, numerous consolidated carpels, and suspended ovules, they are related to Spurge-worts, and especially to the genus Hura; but they cannot be referred to them if Endlicher's statement is correct, that the albumen is unequal and the radicle inferior. Hooker and others station it in the Urtical Alliance, but its composite fruit, mealy albumen, and inferior radicle, do not justify that opinion. Desfontaines and Endlicher regard it as a form of the Mallow-worts, but the separated sexes, free stamens, peculiar albumen, and apetalous flowers are unfavourable to that supposition. Finally, Meisner after referring it to Lindenblossoms, has come to the conclusion that it ought to be associated with Phytolaccads; and if the flowers were not unisexual this opinion would have great weight: for it must be admitted that the plants under consideration have much the structure of that Natural Order. Nevertheless it seems for the present most advisable to associate Gyrostemonads with unisexual Orders, among which they may be looked upon as a passage to the Phytolaccads in the Chenopodal Alliance.

GENERA.

Gyrostemon, Desf.
Codonocarpus, Cunningham.

NUMBERS. GEN. 2. Sp. 3.

ORDER XCI. SCEPACEÆ.—SCEPADS.

Scepaceæ, *Ed. pr.* p. 171. (1836); *Endl. Gen.* p. 288; *Meisner*, p. 347.—*Forestiera*, *Endl.* p. 288; *Meisner*, p. 257.

DIAGNOSIS.—*Euphorbial Exogens*, with ♂ amentaceous flowers, definite suspended anatropal ovules, and a superior radicle.

Trees. Leaves coriaceous, alternate, with membranous stipules which form the scales of the buds. Flowers ♂ ♀—♂ amentaceous. Calyx 4-5-leaved, imbricated, very minute and membranous. Stamens 2-5; filaments short, straight, not clastic; anthers 2-celled, opening by longitudinal parallel sutures; connective inconspicuous. ♀ in short axillary racemes. Calyx of six sepals in two whorls, free; the inner ones in one species at least 3-lobed. Ovary 2-celled; style 0; stigma with two short emarginate lobes, or with 4 equal fringed ones; ovules in pairs, collateral, pendulous, anatropal, with a broad scale projecting from the placenta and covering over the foramen; their ends often buried in hairs projecting from the base of the cell. [In *Lepidostachys Roxburghii* the capsule is round, two-celled, 4-valved; the endocarp thin, tough, and separable from the friable sarcocarp. Seeds single or two, enveloped in a succulent aril; embryo green in the axis of albumen, with obovate cotyledons and a radicle next the hilum.—*Roxb.*]



Fig. CXC.V.

he foramen (I believe not till after impregnation) is exceedingly curious; these are no doubt what ultimately become the aril. In the genus *Scepa* the ends of the ovules are buried in a thick mass of hairs proceeding from the placental suture near the base of the cell. *Forestiera* does not appear to differ from *Scepad*s more than the genera of *Spurgeworts* from each other. It has no aril, and its fruit is indehiscent; but it is amentaceous. *Piptolepis* of Bentham, placed next it by Endlicher, seems to me very different, on account of its hermaphrodite flowers.

Natives of the tropical forests of India.

The wood of the *Kokra*, *Lepidostachys Roxburghii*, is very hard, and is used for various economical purposes.

GENERA.

Scepa, Lindl.
Lepidostachys, Wall.
Hymenocardia, Wall.
Forestiera, Poir.
Piptolepis, Smith.
Borya, Willd.
Adelia, L. C. Rich.

NUMBERS. GEN. 3. Sp. 6.

Betulaceæ.

POSITION.—*Euphorbiaceæ*—*SCEPACEÆ*—

Fig. CXC.V.—*Scepa villosa*. 1. a cluster of ♂ catkins; 2. a ♀ branch; 3. a ♂ flower; 4. its calyx; 5. an ovary; 6. a cross section of it; 7. the ovules in situ, 8. one of them forced downwards.

ORDER XCII. CALLITRICHACEÆ.—STARWORTS.

Callitrichinæ, *Link. Enum.* 1. 7. (1821); *Laville in Ann. Soc. Linn. Par.* p. 229; *DC. Prodr.* 3. 71; *Ed. pr.* (1836); *Endl.* lxxxiv.; *Meisn.* p. 336.

DIAGNOSIS.—*Euphorbial aquatic Exogens, with definite suspended anatropal ovules, and a superior radicle.*

Small aquatic herbaceous plants, with opposite, simple, entire leaves. Flowers axillary, solitary, very minute. Flowers unisexual, monœcious, naked, with 2 fistular coloured bracts. ♂ Stamen hypogynous, single, rarely 2; filament filiform, furrowed along the middle; anther reniform, 1-celled, 2-valved; the valves opening fore and aft. ♀ Ovary solitary, 4-cornered, 4-celled; ovules solitary, attached to the axis, suspended, amphitropal; styles 2, right and left, subulato; stigmas simple points. Fruit 4-celled, 4-seeded, indehiscent. Seeds peltate; embryo inverted in the axis of fleshy albumen; radicle very long, curved, superior; cotyledons very short.

I have formerly remarked, that "the affinity of this Order to other dicotyledons appears to be of the same nature as that borne by Lemna to Monocotyledons: they each exhibit the lowest degree of organisation known in their respective classes." Brown considers the Order allied to Hippurids: an opinion in which Botanists seem disposed to concur. The great objection to it is this; Hippurids are a reduced form of the exalbuminous Onagrads, with the petals often absent, and the calyx sometimes diminished to what seems a mere rim; but in reality, in consequence of the ovary being adherent, the whole of the tube of the calyx as well as its rim remains adhering to the ovary, so that the calyx is not in fact materially diminished; but Starworts are absolutely destitute of a calyx and are albuminous. These circumstances, and the unisexual flowers of the Order, seem to point to a widely different station, and accordingly, in the last edition of this work, it was arranged among the Incomplete Orders—in the neighbourhood of Mossweeds. It must, however, be confessed that its relation to these plants is one of analogy rather than of affinity. Nevertheless, Endlicher places it in the same situation, remarking, however, that it is perhaps an aquatic form of Spurgeiworts. And in this he seems to be right; at all events it differs so little from that Order, except in its indehiscent fruit and amphitropal ovules, that unless we should hereafter be able to employ internal structure for high systematical divisions, it is in the Euphorbial Alliance that this plant will remain. It is doubtful indeed whether it ought, in the present state of our knowledge, to be regarded as an independent Order.

Natives of still waters in Europe and North America.

The uses are unknown.

GENUS.

Callitriche, *L.*

NUMBERS. GEN. 1. Sp. 6.

Ceratophyllacæ ?

POSITION.—Euphorbiacæ.—CALLITRICHACEÆ.—

Haloragacæ.

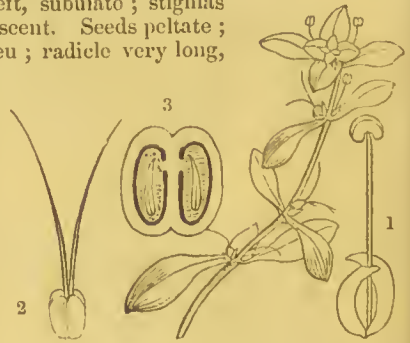


Fig. CXCVI.

Fig. CXCVI.—*Callitriche verna*. 1. a ♂ flower; 2. a ♀; 3. a perpendicular section of the ripe fruit.

ORDER XCIII. EMPETRACEÆ.—CROWBERRIES.

Empetræ.—Nutt. Gen. 2. 233; Don. in Edinb. New Phil. Journ. (1826); Hooker in Bot. Mag. t. 2758. (1827); Endl. ccxli.; Meisner, p. 336.

DIAGNOSIS.—*Euphorbial Exogens, with definite ascending anatropal ovules, and an inferior radicle.*

Small arid shrubs with heathlike evergreen leaves without stipules, and minute flowers in their axils. Flowers ♀ ♂. Sepals, hypogynous persistent imbricated scales, the innermost of which are sometimes petaloid, or even combined into a monopetalous corolla (as in *Oakesia*). ♂ Stamens equal in number to the inner sepals, and alternate with them; anthers roundish, 2-celled, the cells distinct, bursting longitudinally. ♀ Ovary free, seated in a fleshy disk, 3-6- or 9-celled; ovules solitary, anatropal, ascending; style 1; stigma radiating, the number of its rays corresponding with the cells of the ovary. Fruit fleshy, seated in the persistent calyx, 3-6- or 9-celled; the coating of the cells bony. Seeds solitary, ascending; embryo taper, in the axis of fleshy watery albumen; radicle inferior.

This little group can in no wise be separated from Spurgevents, from which indeed it is scarcely distinguishable by any positive character except the ascending seeds and inferior radicle. In habit too it quite corresponds with such heath-like genera of Spurgevents as *Micranthea* and *Pseudanthus*, which do not seem to differ from that Order.

A very small group, comprising a few species from the North of Europe, North America, the South of Europe, and the Straits of Magellan.

The leaves and fruit are slightly acid. The black berries of the Crowberry, *Empetrum nigrum*, sub-acid and unpleasant to the taste, are eaten in the arctic parts of Europe, and are regarded there as scorbutic and diuretic; the Greenlanders prepare a fermented liquor from them. The white berries of the *Camainheira* (*Corema*) are employed by the Portuguese in preparing an acidulous beverage, which the domestic physicians esteem in fevers.—*Enll.*



Fig. CXCVII.

GENERA.

Empetrum, L.
Corema, Don.
Ceratiola, Michx.
Oakesia, Tuckerm.
Tuckermannia, Klotzsch.

NUMBERS. GEN. 4. Sp. 4.

Myricaceæ.

POSITION.—*Euphorbiaceæ.*—EMPETRACEÆ.—

Fig. CXCVII.—*Ceratiola ericoides*. 1. a ♂ flower; 2. a ♀; 3. a view of the ovary, with its style removed to show the ovules; 4. ripe fruit; 5. section across a seed.—*Hooker.*

BATIDÆÆ.—(*Martius Conspectus*, No. 70, p. 13; *Meisner, Gen. p.* 349.) Shrubs inhabiting salt marshes, with opposite succulent leaves, having no stipules. Flowers ♂ ♀ in spikes. ♂ Scales of cone 1-flowered, closely imbricated. Calyx a scale rolled up with its back next the axis, and the edges united, so as to form an oblique membranous cup. Stamens 4, longer than the calyx, 2-celled, opening lengthwise; with flattened filaments. ♀ Flowers absolutely naked? or composed of succulent scales arranged in a short 4-rowed cone, and completely united to the back of the ovaries. Calyx 0. Ovary 5-6-celled, buried in the substance of the axis; stigma sessile, roundish; ovules solitary, erect. Fruit succulent; otherwise unknown.

Such appears to be the structure of a small West Indian plant, which has but little attracted the notice of systematical writers, and whose fruit is still unknown. The only point which I am doubtful about is the presence or absence of scales to the female flowers; there is an external appearance of them; but I am not able to separate them from the ovary within their axil. It would be premature to offer any observations upon the affinity of the plant until the structure of the ovules and seeds shall have been ascertained. For the present it must be sufficient to remark, that what writers call the seeds of *Batis*, are certainly the separable cells of a succulent ovary, the ovules of which are abortive; and it seems probable that this abortion is so common as to render the real seeds difficult to discover. *Martius* places the plant between *Podostemacæ* and *Salicacæ*; *Meisner* following *Urticacæ*; *Endlicher* among his unsettled genera, without a remark. In the last edition of the present work this genus was absolutely placed among the Order of Nettleworts, with the remark that "*Batis* has a common urticaceous fruit, and it agrees with many genera of the Order in its embryo having the radicle turned down upon the cotyledons." This remark applied to the *Batis aurantiaca* of *Wallich*, which I had inadvertently assumed to belong to the genus in which that learned Botanist had placed it. I now find, however, that the shrubs called *Batis* by *Roxburgh* and *Wallich* belong to a totally different genus, allied to *Morus*, and therefore the remark now quoted falls to the ground. For the present, until we know something more of this plant it may be stationed in the *Euphorbial Alliance*, with which its diclinous flowers and compound free ovary seem to associate it. It may even belong to the Order of *Crowberries*.

The salt marshes of the West Indies abound in this plant, which is sometimes gathered for the purpose of mixing with West Indian pickles. Its ashes yield barilla in abundance.

GENUS.

Batis, *P. Br.*

NUMBERS. GEN. 1. Sp. 2? (There is in Sir W. Hooker's Herbarium, a Texan plant in too young a state for examination, but which may be a second species of *Batis*).

Fig. CXC VIII.—*Batis maritima*. 1. a ♀ cone; 2. an ideal section of it through *a b*; 3. a ♂ with its bract and stamens; 4. the same without either.

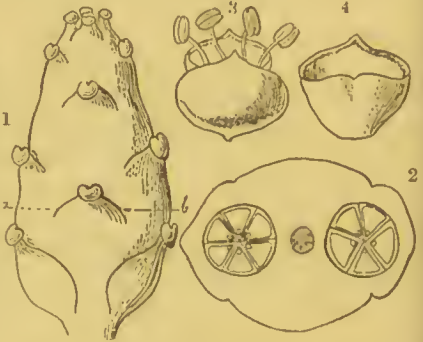


Fig. CXC VIII.

ORDER XCIV. NEPENTHACEÆ.—NEPENTHIS.

Aristolochiæ, § Nepenthinæ, *Link. Handb.* 1. 369. (1829).—Nepenthaceæ, *Ed. Pr.* (1836).—Nepentheæ, *Meisn.* p. 334; *Endl.* cxv.

DIAGNOSIS.—*Euphorbial Exogens?* with an infinite multitude of scobiform seeds, having an inferior radicle.

Herbaceous or half-shrubby caulescent plants. Leaves alternate, slightly sheathing at the base, with a dilated foliaceous petiole, pitcher-shaped at the end, which is articulated with a lid-like lamina. Stem without concentric zones, with an abundance of spiral vessels in the wood, pith, and bark, and also with a dense layer of the same between the wood and the bark. Racemes terminal, dense, many-flowered. Flowers dioecious. Calyx 4-leaved, inferior, oppositely imbricated in æstivation. ♂ Stamens cohering in a solid column, bearing at the apex about 16 anthers, collected in various directions in one head; anthers 2-celled, opening longitudinally and externally. ♀ Ovary free, four-cornered, 4-celled, with an indefinite number of ascending ovules attached to the sides of the dissepiments; stigma sessile, simple. Fruit capsular, 4-celled, 4-valved, with the seeds sticking to the sides of the dissepiments, which proceed from the middle of the valves. Seeds indefinite, ascending, very minute, fusiform, with a wax outer integument; nucleus oblong, much less than the seed, lying about the middle of the outer integument, suspended by the chalaza; embryo in the midst of fleshy albumen, with 2 cotyledons placed face to face; radicle turned towards the hilum.

The relation that is borne by the highly curious plants which this Order contains was not even guessed at until Adolphe Brongniart pointed out a resemblance between them and *Cissampelos*, which had not before been suspected, but which he considered so important as to justify him in placing the two Orders together. But it is impossible to agree in this conclusion. To say nothing of the extreme dissimilarity in habit between these plants, the structure of their fruit appears to be essentially different; and as the seeds of *Cytinus* being unknown, the resemblance between it

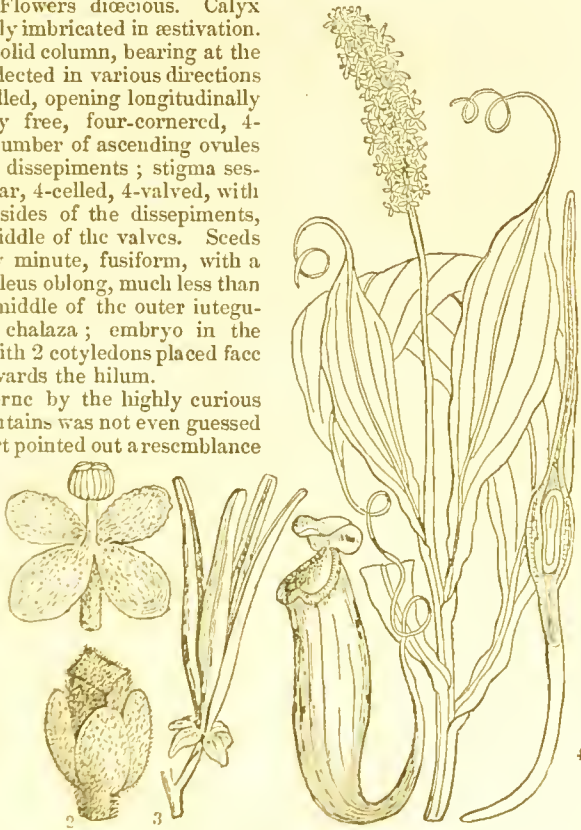


Fig. CXCIX.

and *Nepenthes* is reduced to a similarity in the arrangement of the anthers, which cannot in the present case be considered of much importance, as it in some degree depends upon the unisexuality of the flowers of both genera. A better approximation of the order has been made by Brown, who points out a relation to Birthworts; as to which the structure of the wood in some respects confirms his views. Like many in that Order, it is zoneless, although plainly exogenous; but it has this in particular to characterize it, that the system of spiral vessels is developed in a degree unknown in any other plants. Endlicher adopts the same view as does A. Brongniart; and I

Fig. CXCIX.—*Nepenthes distillatoria*. 1. ♂; 2. ♀; 3. ripe fruit; 4. a section of a seed very highly magnified.

have formerly coincided with those Botanists. But the adherent ovary of Birthworts, their highly developed calyx, axile placentation, and hermaphrodite flowers, are serious difficulties in the way of a close contact between them and Nepenths, unless the peculiar structure of the wood, the consideration of which I for the present abandon, should lead to the final establishment of the Class of Homogens, in which case Nepenths and Birthworts will be brought into contact, or at least a near neighbourhood. For the present, the true position of this Order must be regarded as an undetermined point. In the meanwhile it may be observed, that to station it in the Euphorbial Alliance will be to violate as few affinities as by taking any other course. Its points of agreements are its unisexual flowers, albuminous seeds, incomplete floral envelopes, and climbing habit. Its great disagreement consists in its indefinite seeds, and peculiar woody structure, which is, however, in some respects without example.

There is a good account of the germination of *Nepenthes*, in Jameson's Journal for April 1830, from which it may be concluded that the long loose tunie of the seed is intended to act at first as a buoy, to float the seed upon the surface of the water, and afterwards as an anchor, to keep it fast upon the mud until it can have struck root.

Natives of swamps in the East Indies and China.

Properties unknown. The water contained in the unopened pitcher of a plant which flowered in the Botanic Garden of Edinburgh, was found by Dr. Turner "to emit, while boiling, an odour like baked apples, from containing a trace of vegetable matter, and to yield minute crystals of superoxalate of potash on being slowly evaporated to dryness."

GENUS.

Nepenthes, L.

Phyllamphora, Lour.

NUMBERS. GEN. 1. Sp. 6 ?

POSITION.—*Sarraceniaceæ*?
 —*Nepenthaceæ*.
Aristolochiaceæ?
Menispermaceæ?

ALLIANCE XXI. QUERNALES.—THE QUERNAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens, with amentaceous monochlamydeous ♂ flowers, an inferior fruit, and an amygdaloid embryo without albumen.*

The Alliance, which comprehends the common Oak and the Beech tree of Europe, is one whose limits are in no degree invaded. The truly diclinous epigynous flowers, the ♂ of which are uniformly arranged in catkins, and the exalbuminous seeds with a large amygdaloid embryo, offer marks of recognition not to be mistaken. That the Walnut is nearly allied to the Oak seems incontestable, although it is often placed in a very different part of the system. Its diclinous epigynous amentaceous flowers, and superior radicle, are entirely those of the Mastworts, and the crumpled cotyledons of *Quercus Skinneri* are an imitation of those of the Walnut itself. Indeed if the Walnut had a many-celled fruit and a cupule, there would be no very good reason for separating it from Mastworts, except its resinous juices.

At this point the Diclinous Sub-class touches the Perigynous, where the Terebints, having in some instances diclinous flowers, as is the case with *Pistacia*, come up to the very limits of Juglands. On the other hand, the Myrobalans in the Myrtal Alliance are not very different from hermaphrodite Mastworts, and establish a less close, but well-marked, approach on the part of the Epigynous Sub-class.

The transition from the Quernal Alliance seems to be formed by *Garrya* itself, whose flowers are so much like those of Juglands, although the habit is different, that if it were not for the minute embryo and large mass of albumen in *Garrya* it might take its place in the Quernal Alliance.

NATURAL ORDERS OF QUERNALS.

- | | |
|---|------------------|
| <i>Ovary 2- or more celled. Ovules pendulous or peltate</i> | 95. CORYLACEÆ. |
| <i>Ovary 1-celled. Ovule solitary, erect</i> | 96. JUGLANDACEÆ. |

ORDER XCV. CORYLACEÆ.—MASTWORTS.

Castaneæ, *Adans. fam.* 366. (1763).—Cupuliferæ, *Rich. Anal. du Fr.* (1808); *Blume Flora Javae, Endlich. lxxxix.*; *Meisner, p. 346.*—Corylaceæ, *Mirb. Elem.* 906. (1815).—Quercineæ, *Juss. in Dict. Sc. Nat. vol. 2. Suppl.* (1816).

DIAGNOSIS.—*Quernal Exogens, with 2 or more cells in the ovary, and pendulous or peltate ovules.*

Trees or shrubs. Leaves with stipules, alternate, simple, often with veins proceeding straight from the midrib to the margin. Flowers ♂ ♀; ♂ amentaceous, ♀ aggregate or amentaceous. ♂ Stamens 5 to 20, inserted into the base of scales or of a membranous valvate calyx, generally distinct. ♀ Ovary crowned

2 2

by the rudiments of an adherent calyx, seated within a coriaceous involucre (cupule) of various figure, with several cells and several ovules, the greater part of which are abortive; ovules twin or solitary, pendulous or peltate; stigmas several, sub-sessile, distinct. Fruit a bony or coriaceous 1-celled nut, more or less inclosed in the involucre. Seeds solitary, 1, 2, or 3; embryo large, with plano-convex fleshy cotyledons and a minute superior radicle.

The trees or bushes which constitute this Order are among the most important that are known in the Flora of Europe. They are readily recognised by their amentaceous flowers and peculiarly veined leaves; from all other plants they are distinguished by their apetalous superior rudimentary calyx, fruit inclosed in a peculiar

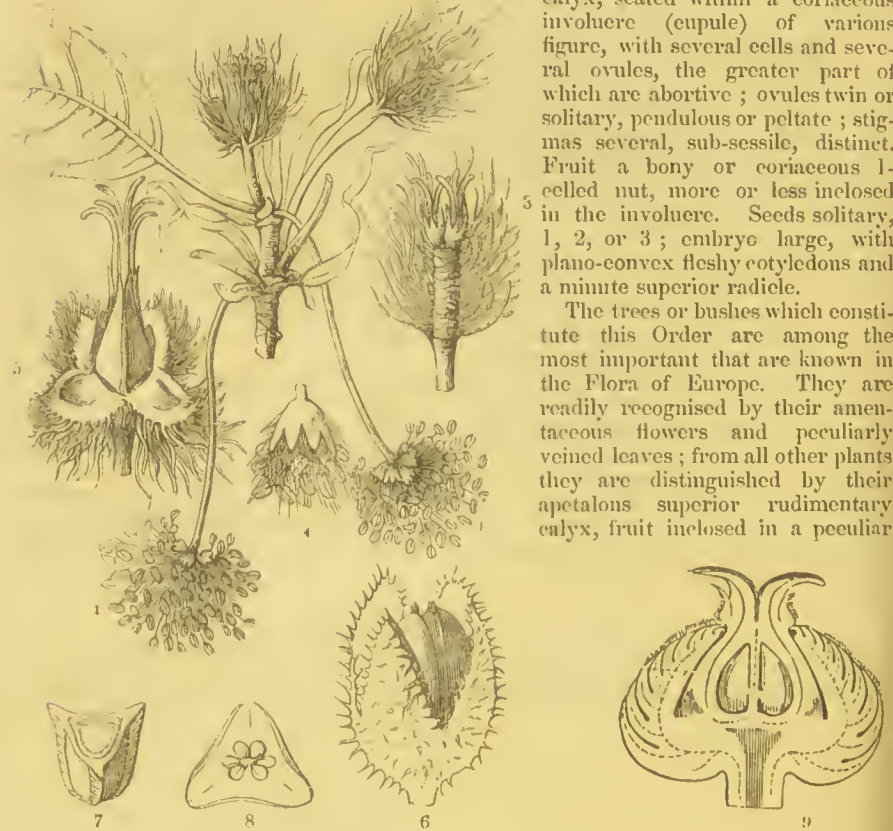


Fig. CC.

husk or eup, and nuts containing but 1 cell and 1 or 2 seeds, in consequence of the abortion of the remainder. They are akin to Willowworts and Birchworts, from which the superior calyx and, in the former case, very often the veining of their leaves, distinguish them. To Nettleworts they are nearly allied, but differ in their many-celled ovary, pendulous ovules, and superior calyx. At first sight, in consequence of their leaves never being pinnate, their relationship to Juglands escapes notice; but the discovery that some at least have the same kind of wrinkled and 4-lobed cotyledons, as for instance certain Oaks and *Synædryx*, has called attention to the fact. *Quercus Skinneri*, a kind of Oak from Guatemala, shows this in a striking manner; and upon considering all their points of structure, no doubt seems to remain about the Oak and Walnut really belonging to the same Natural Alliance.

Fig. CC.—*Fagus sylvatica*; 1. ♂ catkins; 2. ♀ do.; 3. the latter, with the scales of the involucre stripped off to show the ovaries at the apex; 4. a ♂ flower; 5. a half-grown ♀ with the involucre, now consisting of consolidated scales, forced back; 6. a ripe involucre opening and exposing the nuts; 7. a transverse section of a ripe nut; 8. the same of a young ovary (from *Nees*); 9. a vertical section of the ♀ flower of *Quercus pedunculata*.

Inhabitants of the forests of all the temperate parts of the continent both of the Old and New World ; extremely common in Europe, Asia, and North America ; more rare in Barbary and Chile, and the southern parts of South America ; and wanting at the Cape. The species which are found within the tropics of either hemisphere are chiefly Oaks and Chestnuts, which abound in the high lands, but are unknown in the valleys of equatorial regions. The most southern genus is the Beech, of which many species occur in the lower parts of South America, and in Van Diemens Land, and New Zealand. Of the former, *Fagus procera* is said to be a larger tree than the *Araucaria* itself, in whose country it grows wild.

An Order which comprehends the Oak, the Hazel Nut, the Beech, and the Spanish Chestnut, can scarcely require much to be said to a European reader of its properties, which are of too common a use to be unknown even to the most ignorant. Whatever excellence may be found in the timber of the European species is not at all inferior in that of hotter countries. Blume tells us that his *Lithocarpus javensis* is called *Passan-Batu*, or *Stone-oak*, because of its hardness. The leaves of *Quercus falcata* are employed, on account of their astringency, externally in cases of gangrene ; and the same astringent principle, which pervades all the Order, has caused them to be employed even as febrifuges, tonics, and stomachics. Cork is the bark of *Quercus Suber* ; it contains a peculiar principle called *Suberin*, and an acid called the *Suberic*. The galls that writing ink is prepared from are the produce of the *Quercus infectoria*, from which they derive their astringency. The acorns of a species known

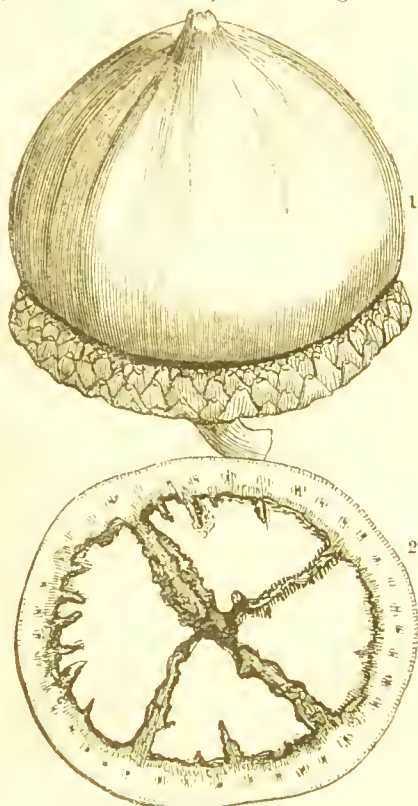


Fig. CCI.

in the Levant under the name of *Velonia* (*Quercus Ægilops*) are imported for the use of dyers. The fixed acids, called *Quercitanic* and *Gallic*, which have the power of guarding animal and vegetable fibre from decay, are abundant in many of the Oaks, whose bark is therefore invaluable for tanning. The yellow dyeing bark, called *Quercitron*, belongs to *Q. tinctoria*. The husks of the common Beech-tree yield a narcotic extractive, called *Fagine*. The sweetness of Spanish Chestnuts and Filberts is not confined to the nuts of those trees ; the other species of *Castanea* and *Corylus* resemble them in that respect, as do the Beech and many sorts of Oak, especially *Q. granuntia*, whose acorns are the *Belotes* of Spain, and a variety of *Q. sessiliflora*, which is believed to be the *Æsculus* of Virgil. The bark of the Oak has been employed as a coarse kind of bricage. In hot weather a large quantity of saccharine matter is secreted by the leaves of *Q. mannifera*, in Koordistan, where it is made into sweetmeats. Oil is obtained from the seeds of some species, such as the Beech and Hazel-nut.

GENERA.

<i>Prinos</i> , L.	<i>Fagus</i> , L.	<i>Castanea</i> , Gartn.	<i>Suber</i> , Tourn.
<i>Trya</i> , Scop.	<i>Caloccephalus</i> , H. & J.	<i>Quercus</i> , L.	<i>Lithocarpus</i> , Bl.
<i>rylus</i> , L.	<i>Calocarpus</i> , H. & J.	<i>Ilex</i> , Tourn.	<i>Synedrys</i> , Lindl.

NUMBERS. GEN. 8. Sp. 265.

Betulaceæ.

POSITION.—*Juglandaceæ.* *CORYLACEÆ.* — — —

Urticaceæ.

Fig. CCI—1. Acorn and cupule of *Quercus Skinneri*, natural size ; 2. cross section of the acorn, showing the lobed embryo

ORDER XCVI. JUGLANDACEÆ.—JUGLANDS.

Juglandæ, *D.C. Theoric*, 215. (1813); *Kunth. in Ann. Sc. Nat.* 2. 343; *Blume, Fl. Jav.*; *Bartl. Ord. Nat.* 397.; *Endlich. cexliv.*

DIAGNOSIS.—*Quernal Exogens, with 1 cell in the ovary, and 1 solitary erect ovule.*

Trees, with a watery or resinous juice. Leaves alternate, pinnated, usually undotted. Stipules none. Flowers herbaceous, inconspicuous. Flowers imperfect, ♂ ♀; the ♂ in catkins, the ♀ in terminal clusters; occasionally both mingled in 1 panicle. ♂ Calyx adherent to a scale-like bract, 2-3-6-parted, with membranous unequal segments. Stamens 3, or a considerable number, with short free filaments and erect 2-celled anthers. ♀ either terminal, clustered, and surrounded with a few small bracts of the bud, or in loose racemes inclosed in a 1-flowered involucre, which is cup-shaped at the base, united with the base of the calyx, growing with its growth, and finally acquiring unequal wing-like expansions. Calyx adherent to the ovary, with a minute limb, in from 3 to 5 deciduous or shrivelling divisions. Corolla usually 0, occasionally minute petals. Ovary adherent, 2- or 4-celled at the base, 1-celled at the apex, with a short column on which the ovule is seated. Ovule solitary, erect, on the point of the central column, orthotropal. Styles 1 or 2, very short; stigmas 2-4, seldom more, and unequal, fringed; sometimes sessile, discoid, 4-lobed. Drupe 1-stoned, naked, or in an adherent involucre; with the sarcocarp usually separating from a 2-valved or valveless stone, which is 2-4-celled at the base and 1-celled at the apex. Seed erect, without albumen, smooth or wrinkled, 2- or 4-lobed at the base, and partly divided by partial dissepiments which ent into it. Cotyledons fleshy, oily, sinuous. Radicle very short, superior.

Almost everybody refers these fine trees to the neighbourhood of the plants called Terebints by Jussieu; to which, however, their affinity is obscure. On the contrary, with the single exception of their terebinthinous leaves, all the points of their structure seem to point to Mastworts, with which they accord in their unisexual flowers, adherent calyx, and large exalbuminous embryo, which in *Synædry*s and some Oaks is also 4-lobed and wrinkled. This too seems to be the opinion of M. Adrien de Jussieu (*Cours élémentaire*, p. 510). Endlicher, however, still regards them as related to the Terebints through *Pistacia*, and there is no doubt that they are so, although, as has been already stated (p. 289), they seem to have a nearer resemblance to Mastworts.

Chiefly found in North America; a few are East Indian; one species, the common Walnut, is a native of Persia and Cashmere; another, of Caucasus; and a third, of the West India Islands.

The bark is aërid and purgative: so is the rind of the fruit of the common Walnut, notwithstanding its astringency. This quality is not confined to *J. regia*, but gives its name to the *J. cathartica* of the United States. The seed of the Walnut is esteemed for its sweetness and wholesome qualities. It abounds in oil, of a very drying nature, and valuable for domestic purposes. Mr. Vigne says that above 12,000 ass loads of Walnut kernels are annually appropriated to the oil press in Cashmere, where Walnut oil is preferred to Linseed oil, and is chiefly employed in cookery and for burning in lamps. This oil possesses such qualities as fairly entitle it to introduction into Europe, and if divested of its mucilage, it might, perhaps, compete with oil of Olives, at least for medi-



Fig. CCII.

Fig. CCII.—*Juglans regia*. 1. a ♂ catkin; 2. a pair of ♀ flowers; 3. perpendicular section of a ♀ flower; 4. perpendicular section of a ripe Walnut.

cial purposes. The fruit of several kinds of Hickory is eaten in America. The timber of all is valuable ; that of *J. regia* and *nigra* for its rich deep brown colour when polished, and that of *Carya alba*, the common Hickory, for its elasticity and toughness. The seeds of *Carya amara* are too bitter to be eaten, but, combined with oil of Chamomile, are found useful in colic. The *Engelhardtias* are very resinous ; *E. spicata*, a large Java tree, as much as 200 feet high, has a pale brown wood, hard and heavy, and used in Java for cart wheels, which are cut out of a single horizontal slab.

GENERA.

<i>Juglans</i> , L.	<i>Engelhardtia</i> , Lesch.
<i>Carya</i> , Nutt.	<i>Pterilema</i> , Rudwt.
<i>Hicorius</i> , Rafin.	<i>Dammara</i> , Rumph.
<i>Pterocarya</i> , Nutt.	

NUMBERS. GEN. 4. Sp. 27.

POSITION.——————*Caryaceæ*.
 —————JUGLANDACEÆ.—Corylaceæ.
Anacardiaceæ.

ALLIANCE XXII. *GARRYALES*.—THE GARRYAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens, with monochlamydeous, sometimes amentaceous, flowers, an inferior fruit, and a minute embryo lying in a large quantity of albumen.*

If we consider this Alliance conterminous with the Quernal on the one hand, because of the approach by *Garrya* to *Juglans*, so on the other must it stand in near relation to the Euphorbial, in consequence of including *Helwingia*, which may be considered as being almost a Spurgewort with an inferior ovary. It appears however to be sufficiently limited by its minute embryo, copious albumen, inferior ovary, and diclinous flowers. The former of these circumstances brings it near the Menispermal Alliance, in which alone among Diclinous Orders does this peculiar embryo occur.

Helwingia has a lateral relation to Sautalworts (*Sautalaceæ*), in the Epigynous Subclass

NATURAL ORDERS OF GARRYALS.

<i>Flowers amentaceous. Leaves opposite, exstipulate.</i>	. . . . . 97.	GARRYACEÆ.
<i>Flowers fascicled. Leaves alternate, stipulate.</i>	. . . . . 98.	HELWINGIACEÆ.

ORDER XCVII. GARRYACEÆ.—GARRYADS.

Garryaceæ, Lindl. in *Bot. Regist.* 20. t. 1686. (July 1834); *Endl.* p. 288; *Meisn.* p. 346.

DIAGNOSIS.—*Garryal Exogens*, with amentaceous flowers, and opposite leaves, without stipules.

Shrubs. Leaves opposite, without stipules. Flowers arranged in pendulous amentaceous racemes, within eouate bracts. Wood without distinct concentric zones, or dotted ducts. Flowers unisexual, amentaceous. ♂ Sepals 4. Stamens 4, alternate with the sepals, not elastic. ♀ Calyx superior, two-toothed. Ovary one-celled; styles 2, setaceous; ovules 2, pendulous, with funiculi as long as themselves. Pericarp berried, indelhiscent, two-seeded. Embryo very minute, in the base of fleshy albumen.

In its amentaceous inflorescence, imperfect flowers, superior calyx, and mode of germination, this Order is similar to Mastworts, from which it differs most essentially in its wood without concentric circles or vasiform tissue (dotted vessels), its opposite exstipulate leaves, simple fruit, and minute embryo lying in a great mass of albumen. The latter characters bring it near Peppers and their allies, especially Chloranthus, with which its zoneless wood (for Chloranthus has no annual zones), simple fruit, and opposite leaves, also agree; but the stipules of Chloranthus, together with their naked bisexual flowers, and articulated stems, distinctly separate that Order. Nettleworts and Antidesmads may also be compared with Garrya on account of their imperfect unisexual flowers, somewhat amentaceous inflorescence, and simple fruit; but their superior fruit, alternate leaves, and more perfectly formed wood, are important points of difference. Gnetum again may be taken into comparison on account of its opposite exstipulate leaves, amentaceous unisexual flowers appearing from the axils of connate bracts, minute embryo lying in a great mass of albumen, and imperfect zoneless wood, which in both cases is chiefly constituted of woody fibre (the sides of which are marked with numerous brownish granules), and of annular and reticulated vessels lying scattered sparingly among the tubes of woody fibre. On the other hand, these plants have entirely the appearance of Viburnums or Dogwoods. I formerly referred Garrya to the Urtical Alliance, in which Endlicher follows, placing it among his

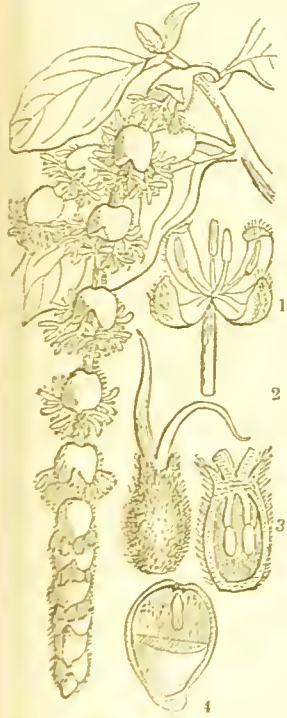


Fig. CCIII.

Julifloræ. Its adherent calyx, however, and more complicated fruit, afford an opportunity of associating it with Helwingiads, which agree in having a minute embryo in the base of solid albumen, and bring the whole into immediate contact with the Euphorbial Alliance.

These shrubs are all found in North America, in temperate latitudes, or in the West Indies.

Their uses are unknown.

GENERA.

Garrya, Douglas,
Fadgenia, Endl.

NUMBERS. GEN. 2, Sp. 6.

POSITION. — *Juglandaceæ*.
— GARRYACEÆ.—*Helwingiaceæ*,
Cuprifoliaceæ.

Fig. CCIII.—*Garrya elliptica*. 1. a ♂ flower; 2 a ♀; 3. a perpendicular section of the ovary; 4. a section of the seed.

ORDER XCVIII. HELWINGIACEÆ.—HELWINGIADS.

Helwingiaceæ, *Decaisne, Ann. Sc. Nat.* 2. ser. 6. 69. (1836); *Endl.* p. 328.

DIAGNOSIS.—*Garryal Exogens, with fascicled flowers, and alternate leaves with stipules.*

A shrub. Leaves alternate, serrate, without deciduous stipules. Flowers fascicled on the midrib of the leaves. Flowers unisexual. Calyx simple, 3-4-parted, with ovate spreading segments, which are deciduous in the females; aestivation valvate. ♂ Stamens 3-4, alternate with the sepals. Anthers continuous, roundish, turned inwards, 2-celled. Pollen smooth. ♀ Ovary adherent to the calyx, crowned by an epigynous disk, 3-4-celled, with one ovule in each cell. Ovules pendulous from the inner angles, anatropal. Style very short. Stigmas 3-4, short, awl-shaped, diverging. Drupe surmounted by the remains of the styles and disk, 3- or 4-celled, scarcely dehiscent (at last loculicidal, *Sieb.*); the cocci one-seeded. Seeds suspended by a short cord. Embryo minute, in the end of solid fleshy albumen; radicle superior.

Although this Order appears to be composed at present of only a single genus, yet it is one of those obscure apetalous unisexual plants, of which few have yet engaged the attention of Botanists, and it is almost sure to find companions hereafter; and even in the absence of this probability, its characters are so well marked as to justify its establishment. M. Decaisne seems inclined to refer it to the neighbourhood of Witch-hazels, rather than to that of Spurge-worts, with which he, however, compares it. But on the one hand, the minute embryo and unisexual flowers remove it far from the former Order; and again, its inferior fruit, unisexuality, and seeds, bring it near to Garryads, with which it seems more fit to be associated. With the Santalaceous Order, to which it has been referred, it has an indirect affinity, as is shown by its inferior fruit, small embryo, valvate calyx, and definite stamens.

The only known species inhabits Japan.

The mountaineers of Japan employ the young leaves of *Helwingia ruscifolia* as an esculent vegetable.—*Siebold.*

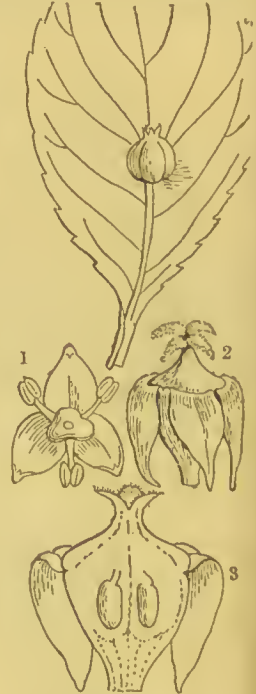


Fig. CCIV.

GENUS.

Helwingia, Willd.

NUMBERS. GEN. 1. Sp. 1.

Euphorbiaceæ.

POSITION. — HELWINGIACEÆ.—*Garryaceæ.*
Santalaceæ.

Fig. CCIV.—*Helwingia ruscifolia*.—*Siebold.* 1. a ♂ flower; 2. a ♀; 3. a perpendicular section of the latter.

ALLIANCE XXIII. *MENISPERMALES*.—THE MENISPERMAL ALLIANCE.

DIAGNOSIS.—*Diclinous Erogens, with monodichlamydeous flowers, superior disunited carpels, and an embryo surrounded by abundant albumen.*

This Alliance stands in the same relation to others in the Diclinous series as Ranals to the Hypogynous, or Rosals to the Perigynous Sub-classes. Its combining character resides in the disunited carpels, abundant albumen, and diclinous flowers. In the Alliances just mentioued, the carpels are sometimes reduced to uuity, and the same circumstance occurs in the present iustauce, where most of the Nutuegs are absolutely simple in their carpellary structure; but as such instaues are regarded as exceptional in Ranals and Rosals, being unaccompanied by other points of difference, so among Nutmegs the same conclusion must be adopted, the more especially since Hyalostemma, which I regard as a genuine genus of the Order, possesses more carpels than one, as its habitual character.

The relation of the Orders now collected in the same Alliance will hardly be disputed. Their combining characters are apparently solid, and their passage from oue to the other sufficiently well marked. Plumbe Nutmegs and Monimiads are by some Botanists regarded as the same Order; Monimiads pass into true Nutmegs by means of Tetra- some, and the remarkable peculiarity observable in the thin divergent cotyledons of the embryo is common to both Orders. Nutmegs are hrought into contact with Menispermads by their trimerous flowers, and by the ruminated albumen of Anonospermum; finally, the strict relation of Menispermads, Kadsurads, and Lardizabalads is unquestionable.

In its external relations this Alliance is very remarkable. Its twining or scrambling habit and unisexual flowers so nearly approach those of Cucurhlits in some instances, that even so acute a Botanist as Dr. Blume has referred the genus Gynostemma, a true Cucurbit, to the Order of Menispermads. To the Ranal Alliance it passes directly by means of the genus Hyalostemma, which will be regarded as a Nutmeg or an Anonad, according to the different points of view in which the question of affinities is regarded. And even to Dictyogens it cannot but be regarded as a near approach, if we compare the trimerous Menispermads with Smilax.

NATURAL ORDERS OF MENISPERMALS.

- | | |
|--|-----------------------|
| <i>Umen copious, solid. Seeds pendulous; embryo small, }
external. Stamens perigynous</i> | 99. MONIMIACEÆ. |
| <i>Umen copious, solid. Seeds erect. Anthers opening by }
recurved valves</i> | 100. ATHEROSPERMACEÆ. |
| <i>Umen copious, ruminated. Sepals united into a valvate cup.</i> | 101. MYRISTICACEÆ. |
| <i>Umen copious, solid. Seeds parietal; embryo minute.</i> | 102. LARDIZABALACEÆ. |
| <i>Umen copious, solid. Seeds pendulous; embryo minute, }
internal. Stamens hypogynous</i> | 103. SCHIZANDRACEÆ. |
| <i>Umen sparing, solid. Seeds amphitropal; embryo large.</i> | 104. MENISPERMACEÆ. |

ORDER XCIX. MONIMIACEÆ.—MONIMIADS.

Monimiæ, *Juss. in Ann. Mus.* 14. 130. (1809); *Bartl. Ord. Nat.* 103.; *Endl. Gen. cv.*

DIAGNOSIS.—*Menispermal Exogens, with perigynous stamens, pendulous seeds, and a minute embryo on the outside of copious fleshy albumen.*

Aromatic trees or shrubs. Leaves opposite, without stipules. Flowers axillary, ♂ ♀. Calyx somewhat globose, divided at the border, sometimes into more rows than one, in which case the segments of the latter are petaloid and imbricated. ♂ Stamens indefinite, covering all the inside of the tube of the calyx; filaments often with a pair of scales at the base; anthers 2-celled, bursting longitudinally. ♀ Ovaries several, superior, 1-celled, distinct, inclosed within the tube of the calyx, each with its own style and stigma; ovule solitary, anatropal, pendulous. Fruit consisting of several 1-seeded nuts, inclosed within the enlarged calyx. Seed pendulous; embryo [small, at the end of an abundant fleshy albumen, to which it is wholly external, its thin diverging cotyledons being applied to the surface of the albumen; testa very fleshy; radicle superior in *Ruizia fragrans* or *Boldoa*].

The plants which constitute this Natural Order have been stationed by different Botanists in various parts of their Natural arrangements. Being shrubs with apetalous flowers and an aromatic quality, they have been placed near Laurels (*Lauraceæ*), with which they also correspond in their ovaries containing but one ovule. Their flowers being apetalous and the sexes disunited, others have referred them to the vicinity of Nettleworts (*Urticaceæ*), with which, moreover, some species of *Citrosma* correspond in habit. The true station, however, is evidently among unisexual Orders, with a very large quantity of albumen, where they may be very naturally associated with Nutmegs and their allies. In fact, Mr. Gardner's *Tetratome elliptica* has so much the appearance of a Nutmeg, that it has been laid into herbaria as such. The extremely aromatic quality of these Monimiads is a strong confirmation of the propriety of this view. Their numerous carpels bring them also into contact with *Kadsurads*, another aromatic Order. The structure of the calyx of *Boldoa*, the gradual transition of its segments into petaloid leaves, and the disunited carpels, indicate some analogy to *Calycanthus*, but the minute embryo and disunited sexes forbid us to regard the connection between these plants and Monimiads as being of an intimate kind.

Brown says (*Flinders*, 553.) that what is here called, with Jussieu, a calyx, is more properly an involucre; a view that I formerly adopted, not having had the opportunity of examining specimens for myself. Now, however, that good materials have been acquired by me, I no longer concur with him in that opinion.

In most books the embryo is said to be in the axis of fleshy albumen. How far this may be true in other genera I am unable to ascertain, but it is certainly not so in *Boldoa fragrans*; which, as was partly stated long ago by Correa de Serra, has the very enrious structure above described. Is it possible that the thick fleshy radicle has been taken for an embryo, and that the thin diverging cotyledons have been overlooked?



2 Fig. CCV.

Fig. CCV.—*Boldoa fragrans*. 1. a section of the ripe fruit; 2. the embryo shown separately.

Most of these Monimiads are found in the forests of South America ; a few only occur in the Mauritius, Madagascar, Java, New Zealand, and New Holland.

All the parts of the bark and leaves exhale an aromatic odour, which is compared by travellers to that of Laurels or Myrtles. Boldoa, the Boldu of Chili, produces an aromatic succulent fruit, which is eaten by the natives ; both the wood and leaves are very fragrant ; the former makes a kind of charcoal, which is preferred beyond all other kinds by the smiths of Chili ; the bark is used by tanners.

GENERA.

Ambora, <i>Juss.</i>	Kibara, <i>Endl.</i>	Tetratome, <i>Pöpp.</i>	<i>Ruizia</i> , <i>Pav.</i>
Tambourissa, <i>Sonner.</i>	Brongniartia, <i>Blume.</i>	Hedycarya, <i>Forst.</i>	<i>Peumus</i> , <i>Pers.</i>
Mithridatea, <i>Commers.</i>	Citrosma, <i>Ruiz et Pav.</i>	Boldoa, <i>Juss.</i>	Mollinedia, <i>Ruiz et Pav.</i>
Monimia, <i>Thouars.</i>			

NUMBERS. GEN. 8. Sp. 40 †

Urticales.

POSITION.—Myristicaceæ.—MONIMIACEÆ.—Atherospermaceæ.
Piperaceæ.

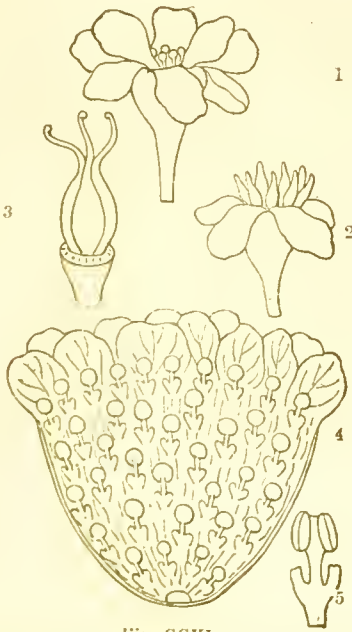


Fig. CCVI.

Fig. CCVI.—The details of the flowers of *Boldoa fragrans* after Endlicher. 1. a ♂ ; 2. a ♀ ; 3. the tepals ; 4. a section of a ♂ ; 5. a stamen.

ORDER C. ATHEROSPERMACEÆ.—PLUME NUTMEGS.

Atherospermeæ, R. Brown in *Flinders*, 553. (1814); *Arnott in Edinb. Encycl.* 130.

DIAGNOSIS.—*Menispermal Exogens*, with anthers opening by recurved valves.

Trees. Leaves opposite, without stipules. Flowers axillary in short racemes, with large deciduous bracts, ♂ ♀ (or ♂). Calyx tubular, divided at the top into several segments, usually placed in two rows, the inner of which is partly petaloid; to these are superadded in the ♀ flowers some abortive stamens in the form of scales. Stamens in the ♂ very numerous in the bottom of the calyx; in the ♀ fewer, and arising from the orifice of the calyx; anthers adnate, 2-celled, bursting with a valve which separates from the base to the apex; filaments with a pair of scales at their base. Ovaries several, usually indefinite, each with a single erect ovule; styles simple, arising either from the side or the base; stigmas simple. Nuts inclosed in the tube of the calyx, with the adherent styles converted into feathery awns. Seed solitary, erect; embryo minute, erect, at the base of soft fleshy albumen, with divaricating cotyledons; radicle inferior.



Fig. CCVII.



Fig. CCVIII.

Although the anthers of this Order are the same as those of Laurels and Herberries, and notwithstanding that it agrees with the former in its aromatic odour, yet it seems to stand in the nearest relationship to Monimiads, with which it is even combined by Jussieu, Bartling, and Endlicher. It differs, however, in the position of the ovule, and the structure of the anthers, and is probably a nucleus around which other genera will be hereafter collected.

The Australian continent produces two of the genera; *Laurelia* belongs to Chile.

All the species seem to be fragrant. The wood of *Doryphora Sassafras*, called *Sassafras* in New Holland, is said to smell like Fennel. The nuts of *Laurelia* are described as possessing the fragrance of the Nutmeg. Mr. Baekhouse gives the following account of *Atherosperma moschata*. "This forms a very beautiful tree in many parts of the colony, attaining to a height of 150 feet, and is from 6 to 7 feet in circumference. Its mode of growth resembles many Coniferæ, in being conical, and in having all its branches of the same year's growth, radiating from one point on the trunk. A decoction of the bark, either when in its green state or after having been dried, is used in many remote parts of the colony as a substitute for tea, and, when taken with plenty of milk, has a pleasant taste. Its effects are, however, slightly aperient."

GENERA.

Atherosperma, Labill.
Laurelia, Juss.
Pavonia, Ruiz.

Thiga, Molina.
Doryphora, Endl.

NUMBERS. GEN. 3. Sp. 4.

Lauruceæ.

POSITION.—Monimiaceæ.—ATHEROSPERMACEÆ.—Myristicaceæ.
Calycanthaceæ.

Fig. CCVII.—*Atherosperma moschata*.

Fig. CCVIII.—1. carpel; 2. stamen of *Doryphora Sassafras*.—*Endlicher*.

ORDER CI. MYRISTICACEÆ.—NUTMEGS.

Myristicæ, R. Brown, *Prodr.* 399. (1810); *Bartling, Ord. Nat.* 244; *Martius Conspectus*, No. 78; *Endl. clxxiii*; *Meisner*, p. 329.

DIAGNOSIS.—*Menispermal Exogens*, with ruminated albumen, and a valvate cup-shaped calyx.

Tropical trees, often yielding a red juice. Leaves alternate, without stipules, not dotted, quite entire, stalked, coriaceous. Inflorescence axillary or terminal, in racemes,

glomerules, or panicles; the flowers very small, often each with one short cucullate bract. Calyx coriaceous, mostly downy outside. Flowers completely unisexual. Calyx trifid, rarely quadrifid, with valvular aestivation.

♂. Filaments either separate or completely united in a cylinder. Anthers

3-12 or more, 2-celled, turned outwards, and bursting longitudinally; either connate or distinct. ♀ Calyx deciduous. Carpels solitary, or many, with a single erect anatropal ovule; style very short; stigma somewhat lobed. Fruit baccate. Albumen ruminated, between fatty and fleshy; embryo small, orthotropal; cotyledons diverging; radicle inferior.

The Order of Nutmegs is usually placed, on account of their apetalous flowers, in the vicinity of Laurels, from which they are distinguished by the structure of their calyx, anthers, and fruit. Brown places them between Proteads and Laurels, remarking, that they are not closely akin to any other Order. They may also be regarded as an apetalous form of Anonads, with which their trimorous flowers, arillate seed, ruminated albumen, minute embryo, and sensible properties, closely ally them. Boeagea, which is usually considered as a connecting link between the latter and Berberids, must also be looked upon as one of the cases of transition from Anonads to Virola among Nutmegs. Another and much more interesting instance is afforded by Wallich's genus *Hyalostemma*, which would be almost that plant, which has unisexual apetalous flowers, and a trifid calyx surrounded by an involucre of six subulate bracts, was regarded as a *Uvaria* by Roxburgh, and may be indifferently regarded as Anonaceous if its numerous carpels are considered, or Myristicaceous if its unisexual flowers and simple trifid calyx are allowed to have weight.

While, however, all these relationships may be allowed their due importance, it seems possible to disjoin Nutmegs from the Menispermal Alliance, because of their strictly bisexual flowers. The diverging cotyledons of their embryos bring them up to Monimiads, while the ruminated albumen finds its parallel in the genus *Anomospermum* in Menispermada. See p. 303.

Fig. CCIX. *Myristica fraxans*.—Blume. 1, a flower; 2, a column of stamens; 3, a section of a ♀ flower showing the ovary and ovule; 4, a section of a nutmeg, with the embryo at the base of the albumen.

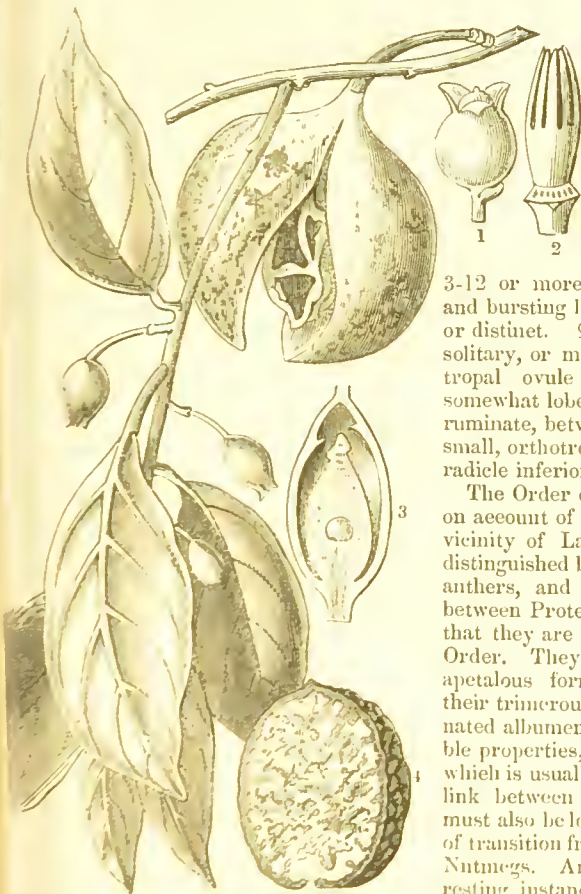


FIG. CCIX

Natives exclusively of the tropics of India and America, and most common in the former.

Their bark abounds in an acrid juice, which is viscid and stains red; the rind of the fruit is caustic. The aril and albumen of *Myristica moschata*, the former known under the name of Mace, and the latter of Nutmeg, are important aromatics. An aromatic fruit is also borne by other species. The coarse, strong-smelling Nutmegs of Santa Fé are from the *Myristica Otoba*. Another species is the *M. tomentosa*, and a third the *M. officinalis*, which is reckoned in Brazil an energetic tonic. In the Indian Archipelago *Myristica spuria* is employed as a substitute, and also a species in the Philippines called Dooghan, Dungan, or Gonogono; in Madagascar, *M. acuminata* and *madagascariensis*, and in Brazil *M. Bieuiba* (*Bieuiba* or *Vicuibia*) or *officinalis*. The seeds also abound in oil. *Virola sebifera* yields a fatty oil upon simple immersion in hot water; the common Nutmeg furnishes a similar secretion, and also a fluid oil. From the white Mace of *M. Otoba* is prepared an ointment used against the itch in Colombia. The red Mace of *Pyrrhosa tiugens*, an Amboyna plant, when rubbed between the fingers is mucilaginous, and stains them fiery red; by the addition of lime it yields a red pigment, with which the natives stain their teeth.—*Blume*. The aromatic quality, although so common in this Order, sometimes deserts their fruit. In *Myristica fatua* the fragrance is very slight and soon disappears, and in others it is scarcely perceptible. It must, however, not be supposed that the insipid Nutmegs are inert. Mr. Hinds states that in New Guinea, where the latter are common, persons who ate as many as two were soon after surprised by a violent evacuation of the bowels, and disturbance of the stomach. A single one produced nausea, sensation of fullness, and flatus.—*Lond. Journ. Bot.* 1. 675. This corresponds with the qualities of the common Nutmeg, which can only be used safely in very small quantities; in excess it produces oppression of the chest, intense thirst, headache, and even delirium and fatal apoplexy.—*Endl.* The Duugan of the Philippines, already mentioned, yields a crimson juice which is collected from incisions in the trunk, and used as a substitute for Dragou's Blood.—*Endl.* See *Blume's Rumphia*, 1. p. 179.

GENERA.

Myristica, Linn.
Virola, Aubl.
Schophora, Neck.
Knema, Lour.
Pyrrhosa, Blum.
Horsfeldia, Willd.
Hyalostemma, Wall.

NUMBERS. GEN. 5. Sp. 35?

Anonaceæ.

POSITION.—Schizandraceæ.—MYRISTICACEÆ.—Menispermaceæ.

Euphorbiaceæ.

ORDER CII. LARDIZABALACEÆ.—LARDIZABALADS.

§ of Menispermaceæ, DC. Prodr. 1. 95. (1824); Barll. Ord. Nat. 343 (1830); Endl. p. 828. (1830).—Lardizabaleæ, Decaisne, Mémoire (1837); Endl. Ench. clxxiv.

DIAGNOSIS.—*Menispermal Exogens, with parietal seeds and a minute embryo in abundant solid albumen.*

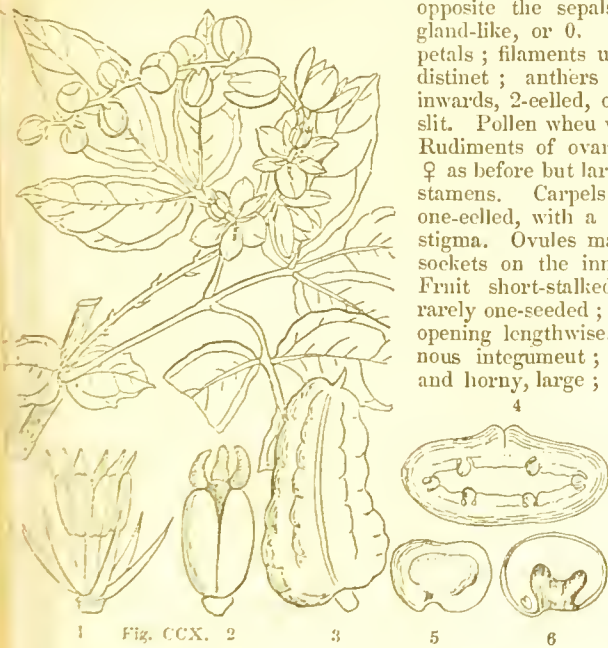
Twining smooth shrubs. Leaves alternate, compound, without stipules. Racemes^s solitary or clustered. Flowers coloured white, lilac, deep purple, or pale yellow; sometimes fragrant. ♂ Sepals 3 or 6, in 2 rows, deciduous. Petals 6, in 2 rows, opposite the sepals, the inner smaller, or gland-like, or 0. Stamens 6, opposite the petals; filaments united into a tube, or even distinct; anthers turned outwards, rarely inwards, 2-celled, opening by a longitudinal slit. Pollen when wet spherical, 3-furrowed. Rudiments of ovaries 2 or 3 in the centre; ♀ as before but larger, with 6 very imperfect stamens. Carpels distinct, 3, rarely 6-9, one-celled, with a short style and a simple stigma. Ovules many, rarely single, sunk in sockets on the inner surface of the ovary. Fruit short-stalked, berried, many-seeded, rarely one-seeded; sometimes follicular and opening lengthwise. Seeds with a cartilaginous integument; albumen between fleshy and horny, large; embryo minute, with its inferior radicle turned towards the hilum; very rarely almost as large as the seed, with flat cotyledons.

This small Order has been admirably illustrated by M. Decaisne. It consists of twining plants, with much the appearance of Menispermads, from which

they are readily known by their leaves being compound, and their ovules sunk in niches on the inside of the ovary, with the single exception of a Madagascar plant called *Burasaia*, which probably, as M. Decaisne suggests, hardly belongs to the Order. This Botanist regards them as otherwise allied on the one hand to *Kadsurads*, which have simple leaves and a great many carpels, whose ovules are not parietal, on the other to *Cherids*, whose foliage and flowers issuing from scaly buds are very similar; and finally to *Anonads* through *Bocagea*. No doubt they entirely participate in the relationship of Menispermads, whatever that may be. *Stauntonia* has the placentation *Flaccourtia*, according to Griffith.

Two of the genera inhabit the cooler parts of South America; the remainder are in the temperate parts of China. *Burasaia* is the only tropical form.

These plants appear to be harmless. The fruits of *Holboëllia* are eaten in the hills of India, according to Royle. Those of *Stauntonia hexaphylla* have a sweetish watery taste, and are eaten by the country people of Japan, who also employ their juice as a domestic remedy for ophthalmia. *Siebold*. In like manner *Akebia quinata* produces



g. CCX.—*Lardizabala triseriata*—*Decaisne*. 1. petals and stamens of ♂ flower; 2. carpel; fruit of a *Lardizabala*; 4. a cross section of it; 5. a seed; 6. a section of it, showing the embryo.

fruits used by the same people as an emollient medicine.—*lb.* The branches of Lardizabala are extremely tough, and are employed as cordage in Chile, by merely passing them through fire and then leaving them for some hours in water.—*Decaisne.* According to Thouars, the fruit of the doubtful genus *Burasia* abounds in mucilage.

GENERA.

§ 1. MADAGASCAR.
Burasia, *Thouars.*

§ 2. ASIATIC.
Akebia, *DC.*
Holboellia, *Wall.*
Stauntonia, *DC.*
Parvatia, *DC.*

§ 3. AMERICAN.

Lardizabala, *Ruiz et Pav.*
Boissiera, *Domb.*
Thouinia, *Domb.*
Boquila, *DC.*

NUMBERS. GEN. 7. Sp. 15.

Anonaceæ.

POSITION.—*Schizandraceæ.*—LARDIZABALACEÆ.—*Menispermaceæ.*

Berberidaceæ.

ORDER CIII. SCHIZANDRACEÆ.—KADSURADS.

Schizandraceæ.—*Blume Bijdr.* 21. (1825); *Endl.* clxxv.; *Meisner*, p. 5.

DIAGNOSIS.—*Menispermal Exogens, with hypogynous stamens, pendulous seeds, and a minute embryo, inclosed in copious solid albumen.*

Scrambling shrubs. Leaves alternate, simple, entire or toothed, without stipules, often with pellucid dots. Wood (in *Sphaerostema propinquum*) without annual rings, composed of glandular-sided woody tubes, arranged in rays, and separated by fine

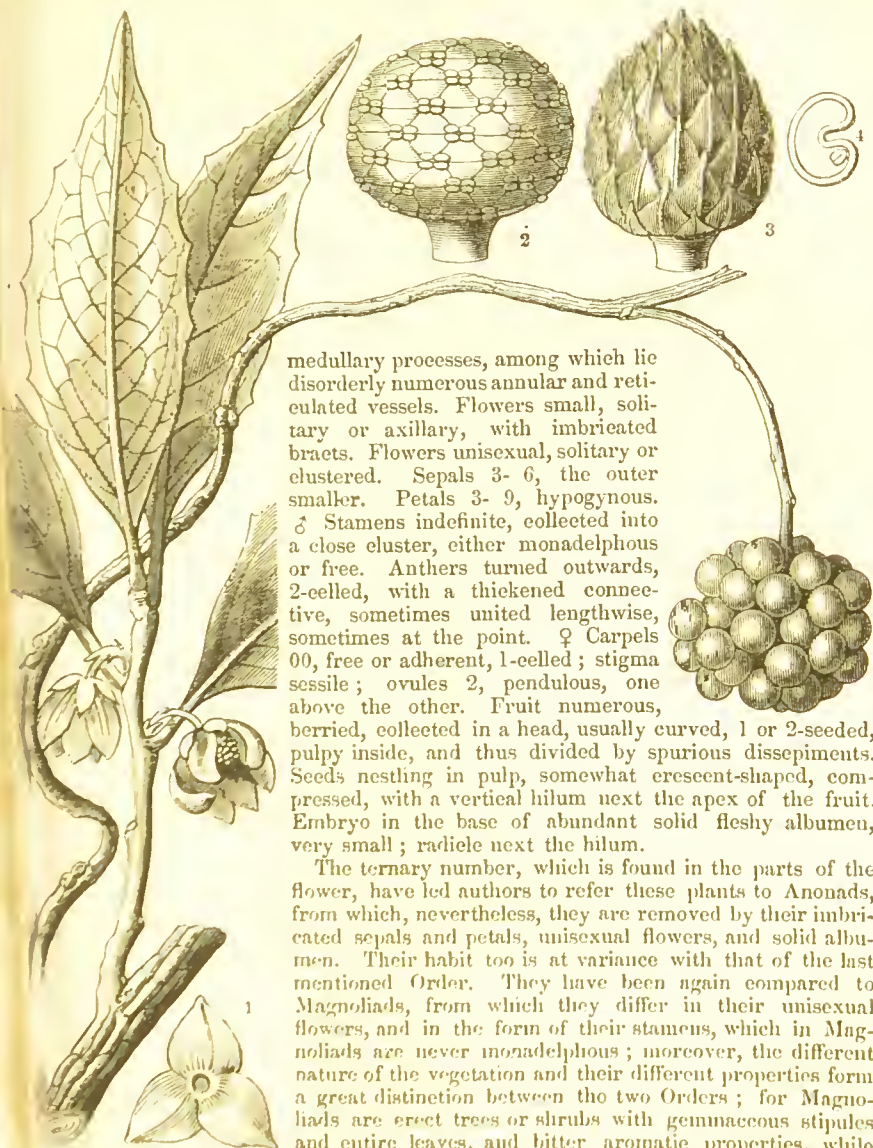


Fig. CXXI.

medullary processes, among which lie disorderly numerous annular and reticulated vessels. Flowers small, solitary or axillary, with imbricated bracts. Flowers unisexual, solitary or clustered. Sepals 3-6, the outer smaller. Petals 3-9, hypogynous. ♂ Stamens indefinite, collected into a close cluster, either monadelphous or free. Anthers turned outwards, 2-celled, with a thickened connective, sometimes united lengthwise, sometimes at the point. ♀ Carpels 00, free or adherent, 1-celled; stigma sessile; ovules 2, pendulous, one above the other. Fruit numerous, berried, collected in a head, usually curved, 1 or 2-seeded, pulpy inside, and thus divided by spurious dissepiments. Seeds nestling in pulp, somewhat crescent-shaped, compressed, with a vertical hilum next the apex of the fruit. Embryo in the base of abundant solid fleshy albumen, very small; radicle next the hilum.

The ternary number, which is found in the parts of the flower, have led authors to refer these plants to Anonads, from which, nevertheless, they are removed by their imbricated sepals and petals, unisexual flowers, and solid albumen. Their habit too is at variance with that of the last mentioned Order. They have been again compared to Magnoliads, from which they differ in their unisexual flowers, and in the form of their stamens, which in Magnoliads are never monadelphous; moreover, the different nature of the vegetation and their different properties form a great distinction between the two Orders; for Magnoliads are erect trees or shrubs with gemmaceous stipules and entire leaves, and bitter aromatic properties, while on the other hand Kadsurads are trailing shrubs, destitute

Fig. CXXI.—*Kadura japonica*. 1. a calyx; 2. a head of stamens; 3. a pistil; 4. a section of a stem.—*Siebold*

of stipules, constantly having toothed leaves, but having no aromatic or bitter properties; on the contrary, they abound in vegetable mucus. It is near Menispermads that they seem most to demand a place, notwithstanding the very different views that have formerly been held upon the subject. The unisexual flowers, with the parts on a ternary plan, scrambling habit, disunited carpels, and copious albumen, now appear of more importance than the hypogynous insertion of their stamens and the polypetalous flowers.

The few species hitherto discovered belong to the continents and islands of India, Japan, and the hotter provinces of North America.

The species abound in mucus, and appear to be quite insipid. The fruit of some are eaten. Siebold describes that of *Kadsura japonica* as being viscid, tasteless, and uneatable; he adds, that by boiling a sort of mucilage is obtained from its branches and applied to the fabrication of *Broussonetia* paper; it is also employed by the Japanese women to cleanse their hair of the pomatum they so largely employ.

GENERA.

Kadsura, *Juss.*
Sarcocarpum, *Blum.*
Sphærostema, *Blum.*
Schizandra, *L. C. Rich.*
Hortonia, *Wight.*
 ? *Mayna*, *Aubl.*

NUMBERS. GEN. 5. Sp. 12.

POSITION.—*Myristicaceæ*.—*SCHIZANDRACEÆ*.—*Lardizabalaceæ*.
Anonaceæ.

ORDER CIV. MENISPERMACEÆ.—MENISPERMACEÆ.

Menispermaceæ. Juss. Gen. 284. 1790; DC. Hyg. 1. 606.—*Menispermaceæ*. DC. Prodr. 1. 35. (1823); Wright and Arnott. Prodr. 1. 11; Endl. class. ; Metzer, p. 5; Wight. Rostk. 1. 19.

DIAGNOSIS.—*Menispermaceæ* *Exogens*, with amphitropal seeds, and a large embryo in a moderate quantity of solid albumen.

Shrubs, with a flexible tough tissue, and sarmentaceous habit; their wood often without zones. Leaves alternate, entire. Flowers small, usually racemose, and dioecious.

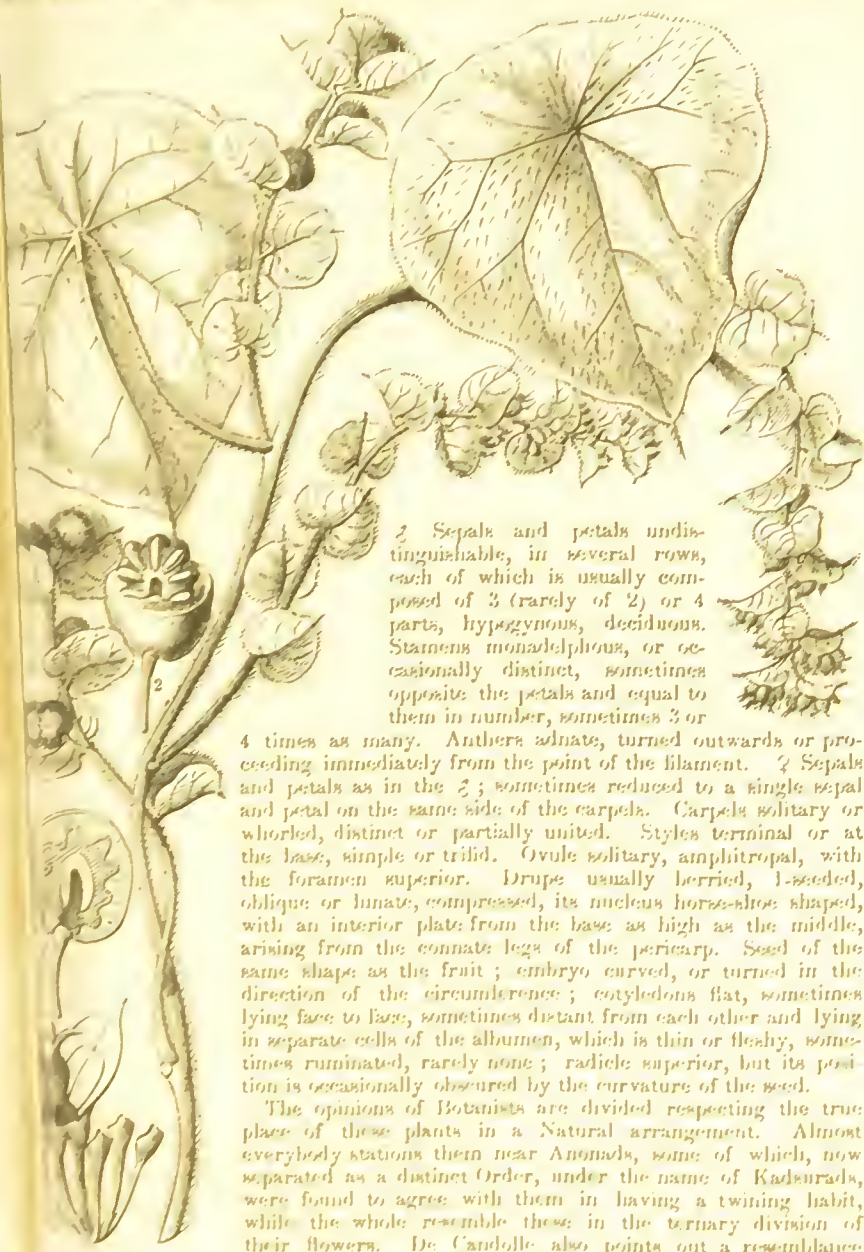


Fig. CCXII.

♂ Sepals and petals undistinguishable, in several rows, each of which is usually composed of 3 (rarely of 2) or 4 parts, hypogynous, deciduous. Stamens monadelphous, or occasionally distinct, sometimes opposite the petals and equal to them in number, sometimes 3 or

4 times as many. Anthers adnate, turned outwards or proceeding immediately from the point of the filament. ♀ Sepals and petals as in the ♂; sometimes reduced to a single sepal and petal on the same side of the carpels. Carpels solitary or whorled, distinct or partially united. Styles terminal or at the base, simple or triloc. Ovule solitary, amphitropal, with the foramen superior. Drupe usually berried, 1-seeded, oblique or lunate, compressed, its nucleus horse-shoe shaped, with an interior plate from the base as high as the middle, arising from the connate legs of the pericarp. Seed of the same shape as the fruit; embryo curved, or turned in the direction of the circumference; cotyledons flat, sometimes lying face to face, sometimes distant from each other and lying in separate cells of the albumen, which is thin or fleshy, sometimes ruminated, rarely none; radicle superior, but its position is occasionally obscured by the curvature of the seed.

The opinions of Botanists are divided respecting the true place of these plants in a Natural arrangement. Almost everybody stations them near Anonaceæ, some of which, now separated as a distinct Order, under the name of Kadsurads, were found to agree with them in having a twining habit, while the whole resemble these in the ternary division of their flowers. De Candolle also points out a resemblance with Sterculiada, consisting in the monadelphous stamens, and

CCXII.—*Cassipouira tropicalifolia*. 1. a ♂ flower. 2. a portion of a fruit, with the seed laid. 3. a perpendicular section of a fruit.

peltate leaves. According to Aug. de St. Hilaire, the Order is related to Spurge-worts through Phyllanthus, the male flowers of which are in certain species absolutely the same as those of Cissampelos. It is also thought to approach Mallowworts by those genera which, like *Caperouia*, have stipulate leaves, and distinct caducous petals separated from the calyx by the torus. But, on the other hand, the small flowers having no distinct separation of calyx and corolla, the disunited sexes, the large embryo, and the peculiar habit, are quite at variance with a series so high in the scale as the Anonal Alliance; and the resemblance of the species to *Smilax* is such as to persuade a Botanist that the two Orders cannot but have some more intimate affinity than would be suspected from their widely different embryo. To me it seems clear that whatever lateral affinity there may be between Menispermads and the great hermaphrodite Orders with hypogynous stamens and disunited carpels, yet that their direct relationship is with Spurges and similar Orders. At the same time, the separation of Kadsurads from the Anonal, and its insertion among the unisexual Alliances, tends to show the justice of the views of Botanists so long as that change was not effected. I once relied upon the zoneless wood of several species to remove the position of Menispermads altogether from among Exogens; but M. Decaisne has shown (*Mém. Lardizab.*) that this peculiarity is not constant, such plants as *Cocculus lancifolius* and *Cissampelos Pareira* having wood with numerous concentric zones. As I do not propose to insist, for the present, upon the value of the woody structure for systematical purposes, the reader is referred to M. Decaisne's Treatise and Gaudichaud's *Organogr.* xxviii. f. 12 and 13, for information upon this point. It may be as well, however, to add that, according to Endlicher, the root of *Cissampelos Caapeba* can hardly be distinguished from the Pepper of that name. A very curious and unexpected approach to Nutmegs is furnished by Mr. Miers' genus *Anomospermum*, which has ruminated albumen.

One of the most singular facts connected with the Menispermaceous Order, consists in the position of the seed, which is altered materially from that of the ovule in the progress of the growth of the fruit. According to Aug. de St. Hilaire, the ovule of *Cissampelos* is attached to the middle of the side of a straight ovary, which after fecundation gradually incurves its apex until the style touches the base of the pericarp, when the two surfaces being thus brought into contact unite, and a drupe is formed, the seed of which is curved like a horse-shoe, and the cavity of which is divided by a spurious incomplete dissepiment, consisting of two plates: the attachment of the seed is at the top of the false dissepiment, on each side of which it extends equally. Several of the species of *Cocculus* are so remarkably tenacious of life, that if even a large branch be broken at a considerable distance from the ground, the upper portion immediately throws out a slender filiform root, which speedily re-establishes the connection with the soil, and preserves the plant. Such a root has been seen 8 feet long, and not thicker than a common packthread.—*Wight*. The hermaphrodite genera *Spirospermum* and *Agdestis* cannot be regarded as belonging here; their true position is unsettled. *Phytocrene* or *Gynoccephalum* too, must have another station; see the URTICAL ALLIANCE.

This Order is common in the tropics of Asia and America, but uncommon out of those latitudes: all Africa contains but 5, North America 6, and Siberia 1. The species are universally found in woods, twining round other plants. Cocculi are most common in the Old World, *Cissampeli* in the New.

Active narcotic and bitter qualities prevail among the species; the former in excess, rendering them poisonous; the latter, causing them to be regarded as valuable tonics. A few are mucilaginous.

The roots of *Cocculus palmatus*, a herbaceous plant, with the air of a Bryony, found on the coast of Eastern Africa, is largely in use as a tonic, under the name of *Kalumba* or *Calumba* root. In this plant, the bitterness is mixed with mucilage, and contains a somewhat narcotic principle called *Calumbine*. The roots of *Cocculus peltatus* in Malabar, and of *C. flavescens* in the Moluccas, are found to be substitutes for *Calumba*; it is also said that a root called *Radix Lopeziana* belongs to some plant of this Order.—*Endl.* In fact, medical men in all the countries where the Order is found believe in the powerful action of the roots. In Brazil those of *Cocculus platyphyllus*, and *cinerascens* (called *Butua*), *Cissampelos ovalifolia* (or *Orelha de Onça*), in the West Indies of *Cissampelos Pareira* (*Pareira brava*) and *Caapeba*, in Madagascar of *Cissampelos mauritianus*, in Ceylon of *Coscinium fenestratum* (*Woniwol* or *Venivel*), in Senegal of *Cocculus Bakis* are employed as tonics or diuretics. The Brazilians also use the roots of *Cissampelos glaberrimus*, and *ebracteatus*, against serpent bites. An intoxicating spirit is distilled from the root of *Cissampelos obtecta*.—*Royle*. That of *Cissampelos glabra* is said to be extremely acrid.—*Roxb.*

The bark, wood, and leaves, are also employed for the same purposes. The stalks and leaves of *Cocculus cordifolius* are employed in an infusion called in Bengal *Páchana*, much in use as a tonic; while an extract of the stem, called *Pálo*, is regarded as a

diuretic. The bark of *Chondrodendron convolvulaceum* (Uva del Monte) is employed as a febrifuge in Peru. Endlicher states, that the bark of some species is used for dyeing yellow. Wight says, that extract of Guluncha, so much recommended in India as a febrifuge, may be prepared from the bruised stems of both *Cocculus verrucosus* and *cordifolius*. The young shoots of the latter are a powerful emetic. The wood and bark of *Coccoloba indicum* are regarded as furnishing, in infusion, an excellent stomachic.

It is, however, the fruit of this Order to which most importance attaches. That of *Anamirta* *Cocculus* furnishes the dangerous *Cocculus indicus* seed, in which resides picrotoxin, a most venomous principle; and in the pericarp is found the not less formidable alkaloid menispermine. From those seeds a fatty oil is expressed. Forskahl states, that from the acrid berries of *Cocculus Cebatha*, a spirit is distilled in Arabia called *Khumr-ool-majnoon*.

GENERA.

<i>Menispermum</i> , Tournef.	<i>Tiliacora</i> , Colebr.	<i>Odontocarya</i> , Miers.	<i>Coccinium</i> , Colebr.
<i>Triolophus</i> , Fisch.	<i>Epibaterium</i> , Forst.	<i>Auomospermum</i> , Miers.	<i>Pereira</i> , Lindl.
<i>Psidium</i> , Lour.	<i>Limacia</i> , Lour.	<i>Chondrodendrum</i> , Ruiz	<i>Anamirta</i> , Colebr.
<i>Cocculus</i> , DC.	<i>Fibraurea</i> , Lour.	et Pav.	<i>Stephania</i> , Lour.
<i>Abuta</i> , Aubl.	<i>Nephroia</i> , Lour.	<i>Meniscosta</i> , Blum.	<i>Clypea</i> , Blum.
<i>Baumgartia</i> , Mönch.	<i>Cebatha</i> , Forsk.	<i>Jüdes</i> , Blum.	<i>Cissampelos</i> , Linn.
<i>Androphylax</i> , Wendl.	<i>Leaba</i> , Forsk.	<i>Trichoa</i> , Pers.	<i>Caapeba</i> , Plum.
<i>Wendlandia</i> , Willd.	<i>Columba</i> , Commers.	<i>Batschia</i> , Thunb.	<i>Chasmanthera</i> , Hochst.
<i>Braunea</i> , Willd.	<i>Bagalatta</i> , Roxb.	<i>Abuta</i> , Pöpp.	<i>Cyclea</i> , Arnott et Wight.

NUMBERS. GEN. 11. Sp. 175.

Smilacæe.

POSITION.—*Schizandraceæ.*—*MENISPERMACEÆ.*—*Lardizabalacæe.*

Cucurbitacæe.



Fig. CCXIII.

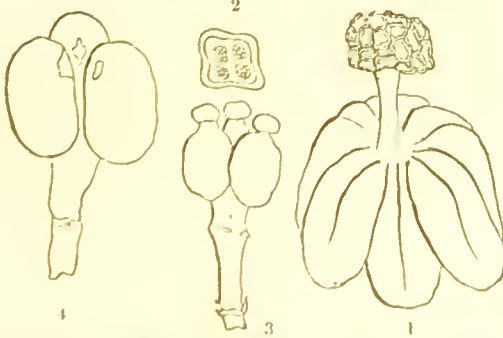


Fig. CCXIV.

g. CCXIII.—*Cissampelos Pereira*; 1. a ♂ flower; 2. a ♀ flower; 3. horseshoe formed drupe; 4. a cal section of a drupe, showing the embryo and albumen; a is the true apex of the fruit, brought to base as above described.

g. CCXIV.—*Anamirta Baueraana*; 1. ♂; 2. anther; 3. ♀ without the calyx; 4. fruit

ALLIANCE XXIV. *CUCURBITALES*.—THE CUCURBITAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens, with monodichlamydeous flowers, inferior fruit, parietal placentæ and embryo without a trace of albumen.*

The plants of this Alliance differ from all others in their diclinous flowers, combined with an inferior ovary, whose placentæ are more or less manifestly parietal. They approach Menispermads in their scrambling habit, and Passionworts in their placentation. In the greater part the stigmas are horseshoe-shaped. They differ from Papayals in their inferior ovary and exalbuminous seeds, and from the scrambling genera of Euphorbials in the same circumstances.

NATURAL ORDERS OF CUCURBITALS.

<i>Fruit pulpy. Placentæ strictly parietal. Monopetalous</i>	105. CUCURBITACEÆ.
<i>Fruit dry. Placentæ strictly parietal. Apetalous</i>	106. DATISACEÆ.
<i>Fruit dry. Placentæ projecting and meeting in the axis. Mono-</i>	} 107. BEGONIACEÆ.
<i>dichlamydeous</i>	

ORDER CV. CUCURBITACEÆ.—CUCURBITS.

Cucurbitaceæ, *Juss. Gen.* 393. (1789) ; *Aug. St. Hil. in Mem. Mus.* 9. 190-221. ; *DC. Prodr.* 3. 297.—*Schrad. in Linnaea*, 12. 401. ; *Endl. Gen. cci.* ; *Meisner*, p. 126. ; *Wight's Illustr.* 2. p. 24 ; *Arnott in Hooker's Journal*, 3. 271.—*Nandhirobee, Aug. de St. Hil.* l. c. (1823) ; *Turpin Dict. des Sc. Atlas.* ; *Endl. Gen. cci.*

DIAGNOSIS.—*Cucurbital Exogens*, with monopetalous flowers, strictly parietal placenta, and pulpy fruit.

Roots annual or perennial, fibrous or tuberous. Stem brittle, climbing by means of tendrils formed by abortive stipules? Leaves usually palmated, or with palmate ribs, very succulent, covered with numerous asperities, sometimes ternate. Flowers white, red or yellow; occasionally small and herbaceous. Flowers ♂ ♀. Calyx 5-toothed, sometimes obsolete. Corolla 5-parted, scarcely distinguishable from the calyx, very cellular, with strongly marked reticulated veins, sometimes fringed. ♂ Stamens 5, inserted on the corolla, and alternate with its segments, rarely 3 or 2, either distinct, or monadelphous, or so combined that 4 join in pairs and the fifth remains free; anthers 2-celled, very long and sinuous. ♀ Ovary adherent, 4-celled, with 3 parietal placenta, which often project into the cavity, and unite there into a solid central column, while the ovules remain attached to the free edges; ovules occasionally only one and pendulous, usually horizontal, anatropal; style short; stigmas very thick, velvety, lobed or fringed. Fruit more or less succulent, crowned by the scar of the calyx. Seeds flat, ovate, enveloped in a skin, which is either fleshy, or dry and membranous; testa coriaceous, often thick at the margin, sometimes fringed; embryo flat, with no albumen; cotyledons foliaceous, veined; radicle next the hilum.

Cucurbits are placed by Auguste de St. Hilaire and DeCandolle between Myrtles, to which they appear to have the affinity, and Passifloras, to which they are so closely allied, that they scarcely differ, except in their sinuous stamens, adherent ovary, bisexual flowers, and exalbuminous seeds, the habit of both being much the same. By



Fig. CCXV.

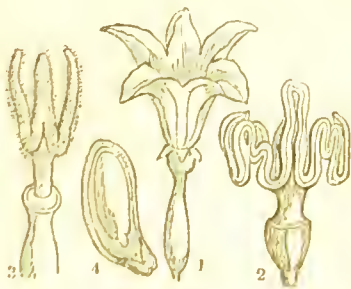


Fig. CCXVI

Fig. CCXV.—*Bryonia dioica*.

Fig. CCXVI.—*Coccoloba indica*. 1. a flower; 2. stamens; 3. stigmas; 4. section of seed. — *Wight*.

the former of these two writers a very particular account of the structure of the Order has been given in the *Mémoires du Muséum*. He adopts the opinion of Jussieu, that the apparent corolla of these plants is really a calyx, considering the apparent calyx to be merely certain external appendages. In discussing the affinities of the Order, which he does much at length, he remarks, that *Carica* (now the type of the Order *Papayads*) should



Fig. CCXVII.

be excluded; that the tendrils of *Cucurbits* are transformed stipules, but scarcely analogous to the stipules of *Passionflowers*; that there is an affinity between the Order and *Bellworts*, manifested in the perigynous insertion of the stamens, the inferior ovary, the single style with several stigmas, the quinary division of the flower connected with the ternary division of the fruit, and, finally, some analogy in the nature of the floral envelopes. He, however, chiefly insists upon their affinity with *Onagrads*, with which, including *Myrobalans*, they agree in their definite perigynous stamens, single style, exalbuminous seeds, fleshy fruit, and occasionally in the unisexual flowers and climbing stem, being connected in the latter point of view with *Onagrads* through *Gronovia*, a climbing genus then referred to that Order. He also points out the further connection that exists between *Cucurbits* and *Onagrads* through *Loasads*, which, with an undoubted affinity to the latter, have the habit of the former, especially in the genus *Gronovia* which has just been named. With regard to the supposed affinity of *Cucurbits* to *Myrtles*, this is founded upon the characters of a small group, called *Nandhirobeæ*, consisting of plants having the habit of *Cucurbits*, but some resemblance in the form of the fruit to that of *Lecythids*, which border closely upon *Myrtles*.

The true affinity of *Cucurbits* seems, however, to be with *diclinous Orders*. Into *Lardizabalads* they run through *Zanonia*; the relation to *Spurgeworts* is indicated by the climbing habit and the ternary plan of structure observable in the ovary of both Orders, coupled with their disunited sexes; and then to *Papayads* they belong in everything except their adherent ovary and exalbuminous seeds.

The plants called *Nhandirobeæ* by Auguste de St. Hilaire, whom Endlicher follows, do not appear to differ essentially from other *Cucurbits*. *Zanonia* indeed, with its panicles of small flowers and capsules opening at the point with 3 valves, has a peculiar habit approaching *Tetrameles*, and so connecting this Order with *Datiseads*; but it is associated with the genus *Feuillea*, which seems to be a *Gourd* and nothing else, notwithstanding its axillary tendrils. The characters relied upon to distinguish *Nhandirobeæ* as an Order are, 1. a 3-celled ovary; 2. the position of the ovules; 3. the distinct styles; 4. the oblong anthers and axillary not lateral tendrils. But there does not appear to be any difference between the placentation of *Zanonia* and common *Cucurbitaceous* plants; its 3 cells are formed by the adhesion of 3 projecting parietal placentæ; 2. if the ovules of *Feuillea* are ascending, those of *Zanonia* are horizontal; 3. the styles of *Luffa* are hardly united, and if it were otherwise, such a character would not be entitled to much attention; 4. the anthers of *Zanonia* and *Feuillea* are not alike, and those of the latter genus do not seem to be essentially different from those of *Telfairia*, *Zehneria*, and *Mukia*. As to the supposed axillary stipules of *Nhandirobeæ* I can only say that they are represented to be lateral in M. Turpin's figure of *Feuillea hederacea*, drawn expressly to illustrate this supposed Order, and that they are certainly so in *Z. cissoides* and *clavigera*.

According to M. Payer, the tendrils of *Cucurbits* are the two lateral fibrovascular bundles out of the 3 which each leaf forms in its axil.—*Ann. Sc. 3 ser. III. 164.*

Fig. CCXVII.—*Cucumis Melo*. 1. ♀ flower and leaf; 2. a section of a ♂ flower; 3. the stamens.

The anther lobes of the Order are occasionally not sinuous, and in a few cases the ripe fruit opens by valves at the point.

The placentation of this Order has needlessly perplexed many Botanists, who have supposed that it is essentially different from that which prevails in other plants. The notion of De Caudolle and others has been that in Cucurbits the carpellary leaves are not curved inwards, but outwards, their midrib being in the axis, not circumference, of the fruit. This view has lately been advocated by Dr. Wight in his *Illustrations of Indian Botany* and elsewhere; and seems to have been taken from the peculiar appearance of such fruits as the Cucumber when cut transversely; in which case the placentæ do certainly appear as if they were out of their ordinary position; but if the fruit of these plants is examined early enough it is evident that the illusion arises from 3 parietal placentæ, with revolute seed-bearing edges projecting forward into the cavity, where they adhere. In the garden Cucumber, for example, when half an inch long, the placentæ are exactly as in this cut, (CCXVIII. fig. 1) and have no adhesiou. There is, therefore, no ground for regarding the Cucurbitaceous structure at variance with general rules. There is, however, a great peculiarity in the fruit of some of them, such as *Luffa tetida*, which, when ripe, appears to consist of horizontal fibres forming a singular entangled mass; these are visible in the young ovary in the form of semi-transparent concentrical lines which take a somewhat perpendicular direction in the placentæ; thus apparently proving that part to be a portion of the carpellary leaves and not an independent part of the axis, as Schleiden's theory would suggest.

Natives of hot countries in both hemispheres, chiefly within the tropics; a few are found to the north in Europe and North America, and several are natives of the Cape of Good Hope. India appears to be their favourite station; a good many occur in Peru and Brazil, but are little known; one is found in Norfolk Island, and they are met with in Australia.

Those which are annuals readily submit to the climate of northern latitudes during the summer, and hence, although mostly of tropical origin, they are common in European gardens.

I borrow the following account of the properties of these plants, with some alterations and additions, from Dr. Wight's very useful *Illustrations of Indian Botany*. Although we best know the Cucurbits by their use as eatable fruits, the Melon, Cucumber, Vegetable Marrow, and similar plants being the common species, yet acrimony and a drastic tendency pervade many species, the fruits of some of which afford cathartics of remarkable power, acting, in even small doses, with great energy on nearly the whole line of the alimentary canal. Generally speaking, however, this intensity of power is of rare occurrence, though the property is found more or less active in every part of the plant; mildly in the roots of some and the leaves and young shoots of others, but in greatest intensity in the pulp surrounding the seed. The seeds themselves do not partake of the property, being, in nearly all, mild and oily. There is reason to believe that some at least, if not all the edible sorts, owe their freedom from poisonous properties to cultivation, for some in the wild state are found to possess them in much activity. The *Lagenaria vulgaris*, or Bottle Gourd, may be cited as an example of this, it being recorded that some sailors were poisoned by drinking beer that had been standing in a flask made of one of those Gourds; and Dr. Royle mentions a somewhat

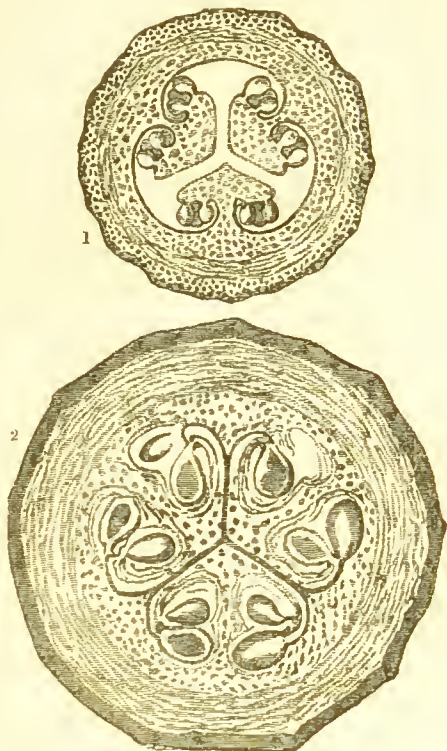


Fig. CCXVIII.

Fig.—CCXVIII. 1 a section of a very young Cucumber, long before the expansion of the flower; 2. the same at a period subsequent to the setting of the fruit.

similar case, where symptoms of cholera were induced by eating the bitter pulp. The fruit of many of the species of Cucumis, the genus to which the Melon and Cucumber belong, are powerfully cathartic; among these *C. Hardwickii* and *C. pseudocolocynthis* may be enumerated as the chief; but even the Cucumbers, especially the less highly cultivated varieties of India, are sometimes known to prove strongly aperient in susceptible constitutions. *C. Colocynthis* (now *Citrullus*), the source of the drug Colocynth, affords one of the most valuable medicinal agents derived from the Order. The Melon, *C. Melo*, and *C. utilissimus*, so far as I have been able to learn, is free from it. The fruit of some species of *Luffa* is violently cathartic, such as *L. amara* and *L. Bindaal* of Roxburgh, and the Brazilian *Luffas purgans* and *drastica* mentioned by Martius; yet, those of *L. acutangula* (*Cucumis acutangulus*, *Ainslie*) are a favourite potherb of the natives of India, and are esteemed very wholesome. Some of the species of *Bryonia*, especially *B. alba* and *B. dioica*, partake of the cathartic properties of the family in great intensity. Curiously enough, the juice of their root is strongly cathartic, and is often employed as such, while the young shoots are so free from the property, that they are used as potherbs, and are reported to resemble *Asparagus* in flavour. The purgative properties of *Bryonia* root have been long known, and in the opinion of some modern writers have fallen into unmerited neglect, they being fully equal in power, even when dried and powdered, to *Jalap*, and when recent much more so. *Bryonia americana* and *africana* are said to have similar properties. Yet the root of *B. abyssinica*, when cooked, is said to be eaten without danger. The root of *Bryonia epigæa* was once supposed to be the famous *Calumba*; (see *MENISPERMACEÆ*). Nearly allied to these plants appear to be various species of little known genera, *Trianosperma*, *Wilbrandia*, and *Cayaponia*, Brazilian drastics of great energy. *Trianosperma ficifolia*, indeed (*Bryonia ficifolia*, *Lam.*) is a species of great reputation for its activity as a purgative and purifier of the blood. But of all those yet mentioned, none approach the spicing Cucumber, *Ecbalium agreste* (*Momordica Elaterium*, *L.*, *σίκυς ἄγριος*), in the concentrated virulence of this quality. It is a native of the hotter parts of Europe, and remarkable for the force with which its poisonous pulp is suddenly expelled from the interior of the fruit, when it is quite ripe and the stalk is loosened. An ingenious explanation of this curious phenomenon has been given by Dutrochet in his *Nouvelles Recherches sur l'Endosmose*. A few grains of *Elaterium*, a drug prepared from the pulp of this plant, have been known occasionally to bring on symptoms of poisoning; a case is recorded by Dr. Christison, where a person, after carrying a specimen in his hat, was attacked with headache, succeeded by colic pains and frequent bilious vomiting and purging. Such being the predominant quality of the family, it is well to be cautious in the use of even the best known species.

Many, however, are in use as potherbs, among which may be mentioned with just encomiums the red Gourd, *Cucurbita maxima*, the flesh of which, when boiled, somewhat resembles in taste a tender Carrot; the Water Melon, *Cucurbita citrullus*, so highly esteemed for the cool refreshing juice of its large fruit; the white Gourd (*Benincasa cerifera*, or *Cucurbita pepo*), which *Ainslie* informs us is presented at every native marriage feast, being supposed to insure prosperity to the wedded pair; the Vegetable Marrow (*Cucurbita ovifera*), justly esteemed one of our finest culinary vegetables, and a few others. All the numerous cultivated varieties of the Melon and Cucumber are known to be wholesome. Some, if not all the Indian species of *Momordica*, seem equally safe. *M. Balsamina*, a species with a singular warted fruit, and *M. Charantia*, when steeped in oil, have some reputation as vulneraries. In a green state they form an agreeable pickle. It should be observed, however, that the fruit of a plant called *Neurosperma cuspidata* by *Rafinesque*, which is generally supposed to be *Momordica Balsamina*, is, according to that author, a dangerous poison, or in small doses a hydragogue. *Momordica operculata*, a plant common in the southern provinces of Brazil, quite answers to the character given of this *Neurosperma*, so far as its drastic qualities go.

A waxy substance is secreted by the surface of the fruit of *Benincasa cerifera*. The fruit of several species of *Trichosanthes*, especially that of *T. anguina*, are in daily use in India, even among Europeans, dressed in curries; but those of *T. palmata* are not employed, and are considered poisonous by the natives. Those of *Coccinia indica* (*Momordica monadelpha*, *Roxb.*), so common in every Indian hedge, are eaten by the natives in their curries, and when fully ripe (quite red and pulpy) seem to afford a favourite repast to many birds.

The seeds of all the species are oily, and capable of forming very readily an emulsion; those of *Telfairia pedata* (*Joliffia africana*, *D.C.*), an African plant, are as large as Chestnuts, and said to be as excellent as Almonds, having a very agreeable flavour; when pressed they yield an abundance of oil, equal to that of the finest Olives. The pulp is excessively bitter, and produced a violent headache when only applied to the tongue. *De Candolle* remarks, that the seeds of this family never participate in the

property of the pulp that surrounds them. But this is a mistake, for the oily seeds of *Feuillaea cordifolia*, a West Indian shrub, are intensely bitter, and act violently both as emetics and purgatives. The seeds of *Feuillaea trilobata* yield a fatty oil, used instead of ointment, in pains of the joints. The Americans employ the oil of both species for lamps. The Bandolier fruit (so called, no doubt, from the form of its seed-vessels), or *Zanonia indica*, has the taste and smell of Cucumber. The bruised leaves are infused in bathis, and, mixed with butter, serve for the preparation of an antispastic liniment. The seed of some Cucurbitaceous plants, called Giramont seeds, are said to destroy tape-worm.—*Endl.*

The seeds of *Anisosperma Passiflora* (Fava de S. Ignacio, Castanha do Jobotã) contain a bitter oil, mixed with a bland sebaceous matter and resin, and are regarded in Brazil as valuable stomachics; in large doses they purge. Those of *Hypanthera Guaieva*, another Brazilian climber, have similar qualities.

GENERA.

<p>I.—NHANDIROBÆÆ. Anthers not sinuous. Placenta adhering in the axis of the fruit. Seeds numerous.</p> <p><i>Telfairia</i>, <i>Hook.</i> <i>Joffia</i>, <i>Rojer.</i> <i>Ampelocycos</i>, <i>Thouars.</i> <i>Feuillaea</i>, <i>L.</i> <i>Nhandiroba</i>, <i>Plum.</i> <i>Zanonia</i>, <i>L.</i> <i>Alsomitra</i>, <i>Bl.</i> <i>Actinostemma</i>, <i>Griff.</i> <i>Anisosperma</i>, <i>S. Mans.</i> <i>Hypanthera</i>, <i>S. Mans.</i></p>	<p><i>Bryonopsis</i>, <i>Arn.</i> <i>Æchmandra</i>, <i>Arn.</i> <i>Zehneria</i>, <i>Endl.</i> <i>Pilogyne</i>, <i>Schrad.</i> <i>Anguria</i>, <i>Linn.</i> <i>Paiguria</i>, <i>Neck.</i> <i>Ithynchocarpa</i>, <i>Schrad.</i> <i>Bryonia</i>, <i>Linn.</i> <i>♀ Solena</i>, <i>Lour.</i> <i>♀ Cucumeroides</i>, <i>Gärtn.</i> <i>Karivia</i>, <i>Arn.</i> <i>Mukla</i>, <i>Arn.</i> <i>Dielllostigma</i>, <i>Kze.</i> <i>Schizostigma</i>, <i>Arn.</i> <i>Trianosperma</i>, <i>Torr et Gr.</i> <i>Alternanthera</i>, <i>Manso.</i> <i>Wilbrandia</i>, <i>Manso.</i> <i>Cayaponia</i>, <i>Manso.</i> <i>Citrullus</i>, <i>Neck.</i> <i>Colocynthis</i>, <i>Tournef.</i> <i>Rigocarpus</i>, <i>Neck.</i> <i>Echalinum</i>, <i>L. C. Rich.</i> <i>Momordica</i>, <i>Linn.</i> <i>Elaterium</i>, <i>Tournef.</i> <i>Amoridica</i>, <i>Neck.</i> <i>Poppya</i>, <i>Neck.</i></p>	<p><i>Muricia</i>, <i>Lour.</i> <i>Neurosperma</i>, <i>Raf.</i> <i>Luffa</i>, <i>Tournef.</i> <i>Toria</i>, <i>Forsk.</i> <i>Trevouzia</i>, <i>Scop.</i> <i>Benincasa</i>, <i>Savt.</i> <i>Lagenaria</i>, <i>Ser.</i> <i>Cucumis</i>, <i>Linn.</i> <i>Melo</i>, <i>Tournef.</i> <i>Cucurbita</i>, <i>Linn.</i> <i>Pepo</i>, <i>Tournef.</i> <i>Melopepo</i>, <i>Tournef.</i> <i>Cocclia</i>, <i>Wight et Arn.</i> <i>Trichosanthes</i>, <i>Linn.</i> <i>Angutua</i>, <i>Mich.</i> <i>Ceratocanthus</i>, <i>Juss.</i> <i>Involucrarina</i>, <i>Ser.</i> <i>Gymnopetalum</i>, <i>Arn.</i> <i>Apodanthera</i>, <i>Arn.</i> <i>Elaterium</i>, <i>Jacq.</i> <i>Echinocystis</i>, <i>Torr. et A. Gr.</i> <i>Cephalandra</i>, <i>Schrad.</i> <i>Cyclanthera</i>, <i>Schrad.</i> <i>Discanthera</i>, <i>Torr. et A. Gr.</i></p>	<p>Little known.</p> <p><i>Schizocarpum</i>, <i>Schrad.</i> <i>Rtytidostylis</i>, <i>Hook et Arn.</i></p> <p>III.—SICÆÆ. Placenta not projecting into the cavity. Seed solitary from the top of the cell.</p> <p><i>Sicyos</i>, <i>Linn.</i> <i>Sicyoides</i>, <i>Tournef.</i> <i>Badarua</i>, <i>Berter.</i> <i>Sechium</i>, <i>P. Br.</i> <i>Chayota</i>, <i>Jacq.</i> <i>Gynostemma</i>, <i>Blum.</i></p> <p>Genera quite doubtful.</p> <p>? <i>Erythropalum</i>, <i>Blum.</i> <i>Zucca</i>, <i>Commers.</i> <i>Thladiantha</i>, <i>Bong.</i> <i>Pentacthara</i>, <i>Berol.</i> <i>Perialanthopodus</i>, <i>Silv. M.</i> <i>Dromophylla</i>, <i>Silv. M.</i> <i>Druparia</i>, <i>Silv. M.</i></p>
---	---	---	--

NUMBERS. GEN. 56. Sp. 270. But this number is too low, in consequence of the South American species having been little investigated.

Passifloraceæ.

POSITION.—*Datisacacæ.*—*CUCURBITACEÆ.*—*Begoniacæ.*

Louracacæ.

ORDER CVI. DATISCACEÆ.—DATISCADS.

Datisceæ, R. Brown in Denham, 25. (1826); Barth. Ord. Nat. 419. (1830); Endl. Gen. clxxxiv.; Meisner, p. 346.

DIAGNOSIS.—*Cucurbital Exogens with apetalous flowers, strictly parietal placenta, and dry fruit.*

Herbaceous branched plants; or trees of considerable size. Leaves alternate, cut, simple, or compound, without stipules. Flowers in axillary racemes or terminal panicles, ♂ ♀. Calyx of the ♂ divided into 3-4 pieces; of the ♀ adherent 3-4-toothed. ♂ Stamens 3-7; anthers 2-celled, membranous, linear, bursting longitudinally. ♀ Ovary 1-celled, with 3-4 polysperous parietal placenta; ovules anatropal; stigmas equal in number to the placenta, and opposite the lobes of the calyx. Fruit capsular, opening at the vertex, 1-celled, with polysperous parietal placenta. Seeds enveloped in a membranous finely reticulated integument, with a cupulate membranaceous strophiole; embryo straight, without albumen, its radicle very long, turned towards the hilum. Cotyledons very short.

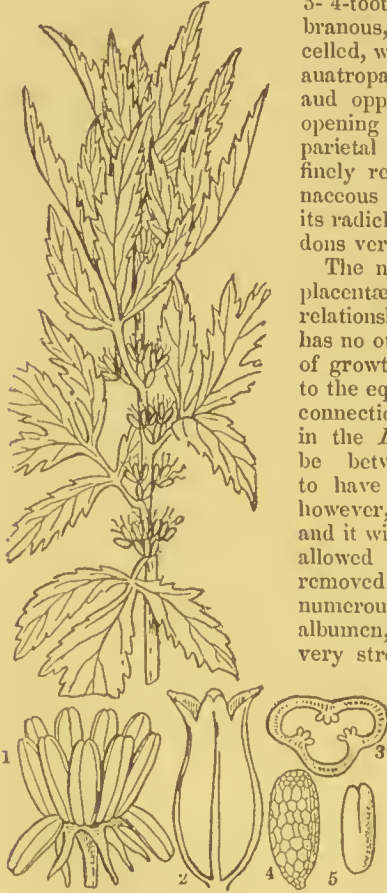


Fig. CCXIX.

Fresenius asserts (*Linnaea*, 1839) that female plants of *Datisca cannabina* are capable of bearing seed, although entirely cut off from the males. He regards this property to depend upon a mere act of vegetable increment, which, upon the supposition that an embryo is a bud, is not inconceivable. *Tetrameles*, the Weenoug of Java, and Jungle Bandy of Bombay, is remarkable as being a large tree in this very small Order, consisting otherwise of annual stemmed herbaceous plants.

The very few species of which the Order consists are scattered over North America, Siberia, Northern India, the Indian Archipelago, and the south-eastern corner of Europe.

Fig. CCXIX.—*Tricerastes glomerata*.—Presl. 1. ♂ of *Datisca cannabina*; 2. its fruit; 3. a cross section of it; 4. a seed; 5. its embryo.

Datisca is bitter and purgative ; it is occasionally used in Italy in fevers, as well as gastric and scrofulous complaints. Chemists have found in its roots a kind of starch analogous to Inuline. They call it *Datisceine*.

GENERA.

Datisca, *L.*
Tetrameles, *R. Br.*
Aniclolea, *Nimmo.*
Tricerastes, *Prest.*

NUMBERS. GEN. 3. Sp. 4. excluding *Datisca hirta*, which Mr. Bennett has ascertained to be *Rhus Typhinum*.

POSITION.—*Cucurbitaceæ*.—*DATISCACEÆ*.—*Begoniaceæ*.
Loasacæ?

ORDER CVII. BEGONIACEÆ.—BEGONIADS.

Begoniaceæ, *R. Brown in Congo*, 464. (1818); *Endl. Gen. ccliii.*; *Meisner*, p. 336.

DIAGNOSIS.—*Cucurbital Exogens with dry fruit and placentæ projecting and meeting in the axis.*

Herbaceous plants or succulent under-shrubs, with an acid juice. Leaves alternate, toothed, rarely entire, oblique at the base. Stipules large, scarious. Flowers pink, in cymes. Flowers ♂ ♀. Calyx adherent. Sepals coloured; in the ♂ 4, 2 within the others and smaller; in the ♀ 5, imbricated, two smaller than the rest, or 8, of which 4 are petaloid. ♂ Stamens indefinite, distinct, or combined into a solid column; anthers collected in a head, 2-celled, continuous with the filaments, clavate, the connective very thick, the cells minute, bursting longitudinally. ♀ Ovary adherent, winged, 3-celled, with 3 large placentæ meeting in the axis; ovules anatropal; stigmas 3, 2-lobed, sessile, somewhat spiral. Fruit membranous, capsular, winged, 3-celled, with an indefinite number of

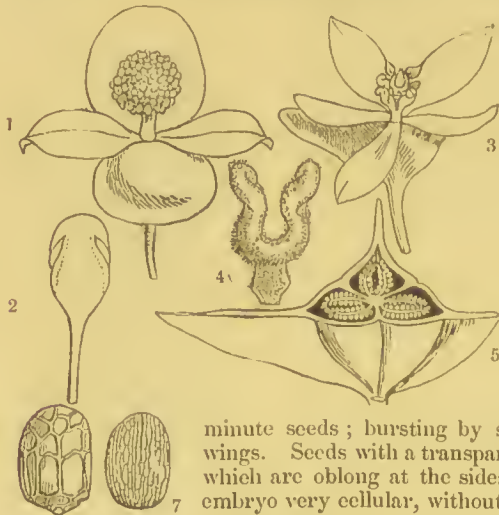


Fig. CCXX.

minute seeds; bursting by slits at the base on each side of the wings. Seeds with a transparent thin testa marked by reticulations, which are oblong at the sides and contracted at either extremity; embryo very cellular, without albumen, with a blunt round radicle next the hilum.

It is not a little curious that the opinions of Botanists concerning the affinity of these well-known plants should remain so undecided up to the present day. I formerly supposed the Order related to Hydrangea from some resemblances in its seeds, &c.; others have approximated it to Buckwheats on account of the stipules, 3-cornered fruit, and coloured calyx. Link places it near Umbellifers; Von Martius next Scævolaecæ; Meisner with Spurgeworts; and the tendency to the production of 4 in the sepals and petals, as evinced by Eupetalum, has led to the opinion that it may be related to the epigynous Myrtal Alliance, its seeds being indefinite and destitute of albumen. And that some near relation does exist between such plants and Begonia, is rendered more probable by Bertolonia maculata, which has the winged fruit and much the habit of that genus. Nevertheless, these are but distant points of approach; and the real affinities seem to be with Cucurbits, with which Begoniads accord in the unisexual flowers, peculiar stigmas, and even ternary number of the carpels. The discovery by Mr. Hartweg of Begoniads scrambling up trees and shrubs to the height of 25 feet, renders the resemblance almost complete. To Datisca the relationship seems to be well made out.

The main objection to the association of Begoniads and Cucurbits in the same Alliance arises from the great apparent difference in their placentation; that of Begoniads being axile, and of Cucurbits parietal. But a careful examination of the ovary of Diploclinium Evansianum, acuminatum, incarnatum, &c., shows that distinction to be one of words rather than of essential structure. The ovary of such Begoniads consists of 3 carpels, whose dorsal suture is winged, and whose margins turn inwards for a considerable distance, each margin forming a plate or placenta, over which the ovules are arranged. This, with the exception of the wing proceeding from the dorsal suture, is the structure of Cucumis, as figured at p. 313, fig. 1, with this difference, however, that the inflexed edges of the carpellary leaves adhere in Diploclinium at a very much more early period than in Cucumis. In Diploclinium acuminatum, when the flower-buds hardly project beyond their fringed bracts, these inflexed edges are easily separable from each other and from

Fig. CCXX.—*Diploclinium Evansianum*. 1. a ♂ flower; 2. an anther; 3. a ♀ flower; 4. a stigma; 5. a cross section of the ovary; 6. a seed; 7. an embryo

the soft torus which rises up between them and holds them together. I cannot however add that I have ever succeeded in finding the placenta absolutely separate, as is the case in a young Cucumber. If the true Begonias, which like *B. Meyenii*, *coccinea*, &c., have a solid, not 2-lobed placenta, are boiled for an instant in caustic potash, it becomes evident that the real structure is the same, and that there also the placentation is exactly the same as in *Cneumis*, except that the inflexed edges adhere into a solid wedge, and that the matter of the torus which rises between them and holds them together is more copious. The ovary of *Begonia Meyenii* may even be taken as an excellent illustration of the true nature of that of a Cucumber.

Common in the West Indies, South America, and the East Indies. Brown remarks, that no species has been found on the continent of Africa, though several have occurred in Madagascar and the Isles of France and Bourbon, and one in the island of Johanna.

The roots are astringent and slightly bitter. Those of two species are employed in Peru with success in cases of a flux of blood, or in other visceral diseases in which astringents are employed. They are also said to be useful in cases of senury, and in certain fevers. *B. malabarica*, and *tuberosa*, and several more, are used as pot-herbs. The root of *B. grandiflora* and *tomentosa* is bitter and very astringent. Some are said to be drastic purgatives in Mexico (*Endl.*); and if so, this is an additional point of resemblance between them and Cucurbits.

GENERA.

Begonia, *L.*

Eupetalum, *Lindl.*

Diploclinium, *Lindl.**

NUMBERS. GEN. 2. Sp. 159. (*Walpers*).

Melastomaceæ?

POSITION.—Cucurbitaceæ.—BEGONIACEÆ.—Datisceceæ.

* This genus includes those Begonias which have a double placenta.

ALLIANCE XXV. *PAPAYALES*.—THE PAPAYAL ALLIANCE.

DIAGNOSIS.—*Diclinous Exogens with dichlamydeous flowers, superior consolidated carpels, parietal placenta, and embryo surrounded by abundant albumen.*

If the plants referred to this Alliance had no albumen and an inferior ovary, they would be Cucurbitalis ; if their flowers were bisexual and coronetted they would do for Passionworts ; if their fruit were simple and their ovules orthotropal, or at least with the foramen uppermost, they would fall into the Order of Nettleworts. They seem evidently to join the Violal Alliance, the whole of which, if the flowers were diclinous, might have been brought into the closest contact with Papayals, as will be sufficiently evident if Pangiads are compared with Bixads.

NATURAL ORDERS OF PAPAYALS.

- Corolla monopetalous ; ♀ without scales* 108. PAPAYACEÆ.
Corolla polypetalous ; ♀ with scales in the throat 109. PANGIACEÆ.

ORDER CVIII. PAPAYACEÆ.—PAPAYADS.

Papayæ, *Agardh Classes*. (1824).—Cariceæ, *Turpin in All. du Dict. des Sc. Nat.* (?)—Papayaceæ, *Von Martius Conspectus*, No. 169. (1835); *Endl. cc.*; *Meisner*, p. 123; *Wight. Illustr.* 2. 33.—*Modèceæ*, *Endl.* p. 927.

DIAGNOSIS.—*Papaya Evogens*, with monopetalous flowers, having no scales in the throat of the females.

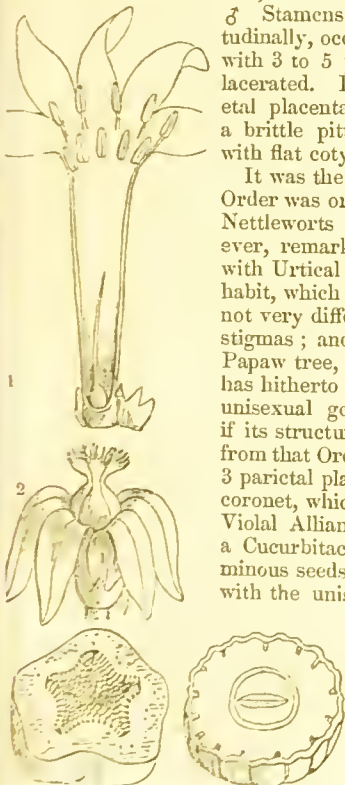
Trees or shrubs, sometimes yielding an acrid milky juice. Leaves alternate, lobed, on long taper petioles. Flowers in axillary racemes or solitary, unisexual. Calyx inferior, minute, 5-toothed. Corolla monopetalous, with 5 lobes. ♂ Stamens definite, epipetalous; anthers erect, splitting longitudinally, occasionally partly imperfect. ♀ Ovary free, 1-celled, with 3 to 5 parietal polyspermous placentæ; stigma 3-5-lobed, lacerated. Fruit succulent, or deliscent, 1-celled, with parietal placentæ. Seeds enveloped in a loose mucous coat, with a brittle pitted testa; embryo in the axis of fleshy albumen, with flat cotyledons and a taper radicle turned towards the hilum.

It was the opinion of Jussieu that the genus upon which this Order was originally founded held a sort of middle station between Nettleworts and Cucurbits. Auguste de St. Hilaire has, however, remarked upon this subject, that the only relation it has with Urtical plants consists in the separation of sexes, milky juice, habit, which is like that of some species of *Ficus*, foliage, which is not very different from that of *Cecropia*, and the position of its stigmas; and to these he attached little importance. But the Papaw tree, instead of standing in the system almost alone, as it has hitherto done, appears to be in reality the associate of all the unisexual genera hitherto referred to the Passionworts; for if its structure be scrutinised carefully it will be found to differ from that Order in nothing except having a fruit with 5 instead of 3 parietal placentæ, in its separate sexes, and the absence of the coronet, which in some form or other is so characteristic of the Viol Alliance. On the other hand, it may be regarded as a Cucurbitaceous plant with a free ovary, 5 placentæ, and albuminous seeds; and in that point of view it equally claims kindred with the unisexual Passionworts. The opinion of Jussieu then seems to have been right, as it has so often proved to be in difficult cases.

The species of *Carica* are natives of South America, and unknown, except as objects of cultivation, beyond that continent; the other genera belong to the temperate parts and tropics of the Old World.

The fruit of the Papaw (*Carica Papaya*) is eaten, when cooked, and is esteemed by some persons; but it appears to have little to recommend it. Its great peculiarities are, that the juice of the unripe fruit is

a most powerful and efficient vernifuge (the powder of the seed answers the same purpose), and that a constituent of this juice is fibrine, a principle formerly supposed peculiar to the animal kingdom and to Fungals. The tree has, moreover, the singular property of rendering the toughest animal substances tender, by causing a separation of the muscular fibre; its very vapour even does this; newly-killed meat suspended among the leaves, and even old hogs and old poultry, when fed on the leaves and fruit, become tender in a few hours. See an excellent account of the Papaw by Hooker in the *Bot. Mag.* 2898. Dr. Wight observes that the seeds, when chewed, yield, in a very marked degree, the pungency and flavour of *Tropæolum majus*. The excessive acidity which renders the Papaw an active vernifuge, is indicated by the disgusting and overpowering odour of its roots, which smell like decaying Radishes. The leaves are used by negroes



3 Fig. CCXXI. 4

to wash liuen, instead of soap. The *Carica digitata*, (Chamburu), a Brazilian plant, is regarded by the natives of Mayna as a deadly poison, and with as much awe as the U_pas tree by the Javanese. Pöppig says that the juice which spirited over his skin when he cut the tree, caused itching on the face, and drew a few blisters on his hands; the male flowers of this plant have the disgusting smell of human excrement. It is worthy of remark that the fruits of the plant, although handsome, scentless, and insipid, are untouched by birds or other animals except an ant belonging to the genus *Atta*. The root of *Modecca palmata*, a native of tropical Asia, rubbed down with oil, is regarded as a corroborant; mixed with Cocoa-nut milk it is used for pain in the chest. The leaves of *M. integrifolia*, boiled with butter, are used for piles; its juice is thought to assist labour.—*Endl.*

Vauquelin, who analysed the juice of the Papaw, says that no doubt can be entertained of its being a highly animalised substance; although it is not exactly like any animal matter known to him. It most resembles animal albumen, dissolving, like it, in water. Its solution is coagulated by heat, by acids, alkalies, the metallic salts, and infusion of nut-galls; and by distillation it yields the same products as animal substances.

GENERA.

<p>* <i>Fruit succulent, indhiscent.</i> <i>Carica</i>, Linn. <i>Papaya</i>, Tournef.</p>	<p><i>Vasconcella</i>, St. Hil. <i>Tetropathen</i>, Raoul. ** <i>Fruit capsular.</i> <i>Modecca</i>, Linn.</p>	<p><i>Microblepharis</i>, Wight et Arn. <i>Blepharanthus</i>, Smith. <i>Paschanthus</i>, Burch.</p>	<p><i>Kolbia</i>, Patis. <i>Ceratosicyos</i>, Nees. <i>Acharia</i>, Thunb.</p>
---	--	---	--

NUMBERS. GEN. 8. Sp. 25.

POSITION.—*Cucurbitaceæ.*
PAPAYACEÆ.—*Pangiaceæ.*
Passifloraceæ.



Fig. CCXXII.

Fig. CCXXII.—Fruit of *Carica Papaya*.

ORDER CIX. PANGIACEÆ.—PANGIADS.

Pangiaceæ, *Blume in Ann. Sc. N. ser. 2. 88. (1834)*; *Bennett in Horsfield, pl. Javan. p. 208*; *Endl. Gen. p. 922.*

DIAGNOSIS.—*Papaya Exogens, with polypetalous flowers, which have scales in the throat, of the females.*

Trees. Leaves alternate, stalked, entire, or somewhat lobed. Flowers axillary, solitary or fascicled, or in few-flowered racemes, ♂ ♀. Sepals 5, rarely 2, 3, or 4. Petals 5, rarely 6. Scales as many, opposite the petals. ♂ Stameus 5 or 00; not a rudiment of ♀. ♀ Sterile stamens equal in number to the petals, rarely more. Ovary free, 1-celled; ovules 00, attached to 2-6 parietal placenta. Capsules succulent, indehiscent, 1-celled. Seeds 00, large; albumen abundant, oily; embryo nearly as large as the albumen; radicle protruded; cotyledons generally leafy and veined.

—*Bennett.*

What the distinction is between these plants and Papayads, except that the last are monopetalous, and have no faucial scales in the ♀ flowers, it is hard to say. Mr. Bennett throws no light upon the matter, and I am unable to supply any.

The species are found in the hotter parts of India. All are poisonous plants. The seeds of *Gynocardia odorata* are employed extensively by the natives of India in the cure of cutaneous disorders. When freed from the integuments they are beaten up with clarified butter, into a soft mass, and in this state applied thrice a day to the parts affected. *Chaulmoogra* and *Petarkura* are the native names. *Hydnocarpus venenatus*, a Cingalese plant related to this Order, bears a poisonous fruit, which when eaten occasions giddiness and dangerous intoxication. It is used in Ceylon for

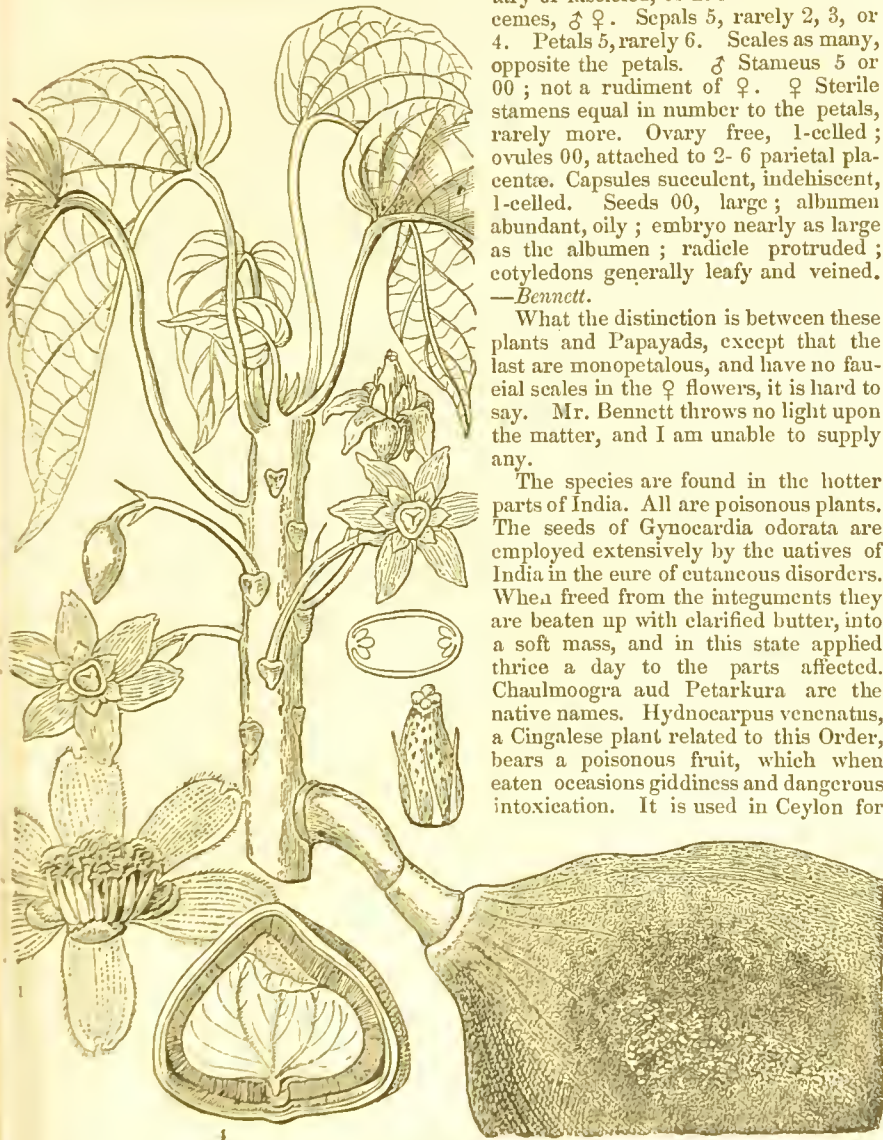


Fig CCXXIII.

poisoning fish, which afterwards become so unwholesome as to be unfit for food. According to Rumphius, the plant Pangi has a hard, solid wood, and its kernels are boiled, then cut to pieces and macerated in cold water to remove the noxious narcotic qualities;

Fig. CCXXIII.—*Pangium edule*.—*Horsfield.* 1. a ♂ flower; 2. an ovary with its sterile stamens; 3. a cross section of an ovary; 4. a perpendicular section of a seed.

after which they are dried to be used as a condiment. The bark thrown into water poisons fish; the juice of the leaves is used for destroying vermin, and in cutaneous diseases, and cows die from feeding on them. The oil of the seeds is however employed for frying. Dr. Horsfield adds that these seeds are rarely used, and curry containing them operates as a cathartic on persons unaccustomed to them.

GENERA.

Pangium, *Reino.*
Gynocardia, *R. Br.*

| *Chaulmoogra*, *Roxb.*
| *Chilmoria*, *Hamil.*

| *Hydnocarpus*, *Gartn.*
| *Munnicksia*, *Dennst.*

NUMBERS. GEN. 3. Sp. 4.

POSITION. ——— PANGIACEÆ.—Papayaceæ.
Bixaceæ.

SUB-CLASS II. HYPOGYNOUS EXOGENS.

The hypogynous insertion of the stamens has been regarded by the French school of Botanists as one of very great systematical importance; and it does seem to collect together a large mass of plants the genera of which have a great resemblance to each other. If we assume that the entire separation of the calyx and corolla from the stamens is an indication of those organs being in hypogynous plants of less importance than usual, then the character acquires a physiological value not previously assigned to it. And such appears to be the case; for it is only among hypogynous Exogens that we find a total absence of floral envelopes, as in the Piperid and Chenopodid Alliances; it is among them that the presence of petals seems to be of least moment, as the character of a Natural Order; for in 12 Alliances out of 14, petals are either constantly or frequently absent, and in one only are they often combined into a tube; in all other cases such a circumstance is exceptional.

It is, however, found that in some cases plants with a perigynous insertion of the stamens will nevertheless combine with hypogynous Alliances; as happens in the case of Samyds among Violals, and here and there in the Ericid, Sileual, and Chenopodid Alliances; but these again seem to be mere exceptional instances not affecting the general value of the hypogynous character, even where it is certain that the Orders in which such exceptions occur are rightly placed. Experience shows too that all natural groups of plants come in contact here and there; and in such instances exceptions to habitual structure make their appearance. It will be found, moreover, that the perigynous Orders or genera here and there introduced among the hypogynous series refuse to associate with any part of the perigynous Sub-class. Thus Samyds, a perigynous form of Violals, have no *locus standi* in any perigynous Alliance, while their affinity to the hypogynous Violals is of an obvious nature.

The sequence observed in the arrangement of the Alliances is chiefly objectionable on account of the presence of Berberals in contact with Ericals; but if we regard Cyrillads and Pittosporads as Berberals, then the Ericid Humiriads join them perfectly; but these approximations have not yet received the sanction of Botanists, and depend for their justification upon giving a higher value than customary to the presence of a small embryo in copious albumen.

There can be no doubt about the closeness of the relationship borne by the declinous Papayals to the hypogynous Violals, and therefore it is with the latter that the hypogynous series is made to begin. The transition from Violals to Cistals, thence to Malvals, to Sapindals, and to Guttiferals is so much in conformity to the views generally entertained by Botanists, that no objection to it is anticipated. The next step to Nymphals is more open to criticism; but if Tutsans are taken as an extreme form of Guttiferals, there is no difficulty in admitting the justice of bringing Nymphals into contact with them. The next relationship, that of Ranals, is obvious; their Poppyworts possess a genus, *Hypecoum*, which stands on the limits of Fumeworts among Berberals; thence either Cyrillads or Olacads will join the chain to Humiriads among Ericals. In the latter Alliance Heathworts themselves come distinctly in contact with such monopetalous Rueworts as *Correa*. Geranials join Rutals by means of Oxalids, and Silenals through Flaxworts; and, finally, the Chenopodid and Piperid Alliances are apparently degraded forms of the Silenal Alliance. Piperals ought, however, to be regarded as a lateral offset from Chenopodals rather than as an Order in the direct line of succession to the perigynous Sub-class.

ALLIANCE XXVI. VIOLALES.—THE VIOLAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, parietal or sutural placenta, and straight embryo with little or no albumen.*

If we except Moringads, Tamarisks and Houseleeks, which are doubtful members of this Alliance, the present group seems quite natural; and those Orders themselves appear to find no better station, as will be shown when speaking of their respective affinities. The parietal placentation is without example among Hypogynous Alliances, except in Cistals, whose curved or spiral embryo seems to distinguish them perfectly.

NATURAL ORDERS OF VIOLALS.

- | | |
|--|------------------------|
| <i>Flowers scattered, apetalous or polypetalous. Petals and stamens both hypogynous. Leaves doiless, or with round dots only.</i> | } 110. FLACOURTIACEÆ. |
| <i>Flowers in catkins, apetalous, scaly, polygamous. Stamens unilateral</i> | } 111. LACISTEMACEÆ. |
| <i>Flowers scattered, apetalous, tubular, hermaphrodite. Leaves marked with both round and linear transparent dots. (Stamens perigynous)</i> | } 112. SAMYDACEÆ. |
| <i>Flowers polypetalous or apetalous, coronetted. Petals perigynous, imbricated. Stamens on the stalk of the ovary. Styles simple, terminal. Seeds arillate. Leaves stipulate</i> | } 113. PASSIFLORACEÆ. |
| <i>Flowers polypetalous, coronetted. Petals perigynous, imbricated. Stamens on the stalk of the ovary. Styles simple, dorsal. Seeds without aril. Leaves without stipules</i> | } 114. MALESHERBIACEÆ. |
| <i>Flowers polypetalous. Calyx many-leaved. Petals perigynous. Anthers 1-celled. Fruit stipitate, consolidated, siliquose. Seeds without albumen (Stamens perigynous)</i> | } 115. MORINGACEÆ. |
| <i>Flowers polypetalous. Calyx many-leaved. Petals hypogynous. Stamens all perfect; anthers crested, and turned inwards. Fruit consolidated. Seeds albuminous</i> | } 116. VIOLACEÆ. |
| <i>Flowers polypetalous. Calyx tubular, furrowed. Petals hypogynous, unguiculate</i> | } 117. FRANKENIACEÆ. |
| <i>Flowers polypetalous. Calyx many-leaved. Petals hypogynous. Styles distinct. Fruit consolidated. Seeds 00, basal, comose, without albumen.</i> | } 118. TAMARICACEÆ. |
| <i>Flowers polypetalous. Calyx many-leaved. Petals hypogynous. Stamens partly sterile and petaloid; anthers opposite the petals, naked, turned outwards. Fruit consolidated. Seeds albuminous.</i> | } 119. SAUVAGESIACEÆ. |
| <i>Flowers polypetalous or monopetalous. Calyx many-leaved. Petals hypogynous. Fruit follicular, apocarpous</i> | } 120. CRASSULACEÆ. |
| <i>Flowers polypetalous. Petals perigynous, contorted. Styles forked. Leaves exstipulate</i> | } 121. TURNERACEÆ. |

ORDER CX. FLACOURTIACEÆ.—BIXADS.

Flacourtiaceæ, *Richard in Mém. Mus.* 1. 366. (1815); *DC. Prodr.* 1. 255; *Wight Illustr.* 1. 36; *Bennett in Horsfield's pl. Jav.* p. 187.—Flacourtiaceæ, *Ed. pr.* 1.—Bixineæ, *Kunth. Diss. Malv.* p. 17. (1822); *DC. Prodr.* 1. 259; *Wight Illustr.* 1. 38.—Bixaceæ, *Ed. pr.* liv. (1836); *Endl. Gen.* cxcv.

DIAGNOSIS.—*Violal Exogens, with scattered apetalous or polypetalous flowers, hypogynous petals and stamens, and dotless or round-dotted leaves.*

Shrubs or small trees. Leaves alternate, simple, on short stalks, without stipules, usually entire, and leathery, very often marked with transparent dots. Peduncles axillary, many-flowered. Sepals from 4-7, cohering slightly at the base. Petals equal to the latter in number and alternate with them, or wanting. Stamens hypogynous, of the same number as the petals, or twice as many, or some multiple of them. Ovary roundish, sessile, or slightly stalked, free, 1 or more celled, with 2 or more parietal placentæ, which are either simple or branched; style either none or filiform; stigmas several, more or less distinct; ovules attached to the surface or sides of the placentæ, and never to the axis in those genera whose ovary has several cells. Fruit 1-celled, either fleshy and indehiscent, or capsular, with 4 or 5 valves, the centre filled with a thin pulp. Seeds 00, usually enveloped in a pellicle formed by the withered pulp; albumen fleshy, somewhat oily; embryo straight, in the axis, with the radicle turned to the hilum, and therefore usually superior; cotyledons flat, foliaceous.

The two supposed Natural Orders now brought together, as suggested by several writers, and especially by Mr. Bennett and Professor Endlicher, have never possessed any valid claim to be distinguished. The differences between them were derived from the mode of placentation, which in *Bixa* and its allies is parietal in lines, while in *Flacourtia* it spreads like a net all over the inner surface of the fruit. But intermediate structures annul this characteristic. It was also supposed that the presence among the allies of *Flacourtia* of certain barren stamens or scales, would assist in dividing the latter from *Bixa*,—in fact, establishing a direct affinity between the first and Passionworts; but those scales belonged to genera now referred to *Pangiads*. Taken as a Natural Order, Bixads form a group readily known from *Samyds* by their hypogynous stamens and dotless leaves, or at least by all their dots being round if they are present; from *Passionworts* by the petals if present being hypogynous, and the total absence of all sign of a coronet. Because of their indefinite stamens, and the valvate calyx of some genera, they have been compared to *Lindenblooms*; but there



Fig. CCXXIV.

Fig. CCXXIV.—*Bixa Orellana*.—*Wight.* 1. a pistil and two stamens; 2. a cross section of the ovary; 3. a ripe fruit, 4. a cross section of a seed.

seems to be only a remote analogy with that Order. The frequent tendency to a polygamous structure shows their affinity to Lacistemads.

Almost all these plants are natives of the hottest parts of the East or West Indies, and Africa. Two or three species are found at the Cape of Good Hope, and one or perhaps two in New Zealand.

The pulp of *Oucoba* is sweet, and eaten in Nubia. The fruits of some of the *Flacourtiæ* are eatable and wholesome. Those of *F. Ramontehi*, a Madagascarese species, are much like black plums; of *F. sapida* and *sepiaria* have a pleasant refreshing subacid taste; and the berries of a species of *Roumea*, found in the jungles of Ceylon, are much prized at Colombo. The young shoots and leaves of *Flacourtia cataphracta*, which have the taste, but not the bitterness, of Rhubarb, are considered astringent and stomachic, and are prescribed, in the Circars, in cases of diarrhœa and general debility; in Bahar, a cold infusion is used in hoarseness. The infusion of *F. sepiaria* is considered useful in bites of snakes; the bark rubbed with oil, and made into a liniment, is employed against gout on the Malabar coast.—*Wight*. *Aphloia theiformis*, a shrub inhabiting the Isle of Frauce, has an emetic bark. *Laetia apetalæ* secretes in tropical America a balsamic resin, becoming white in contact with air, like Soudarach.

The seeds of *Bixa Orellana* are angular, and covered with an orange-red waxen pulp or pellicle. The latter substance is the Arnotto of the shops; it is separated from the seeds by washing. It is chiefly used in the preparation of chocolate; but was reckoned an antidote to the poison of the manioc or *Jamipha* Manihot. Farmers employ it to stain their cheeses, and dyers for a reddish colour. Martius says that the seeds are cordial, astringent, and febrifugal.

GENERA.

I.— <i>Bixetæ</i> . <i>Style simple</i> . <i>Fruit splitting</i> .	<i>Rhinanthera</i> , Blum. <i>Limonia</i> , Gärtn. <i>Scotopia</i> , Schreb. <i>Eriudaphus</i> , Nees. <i>Dasyanthera</i> , Presl.	<i>Bosca</i> , Fl. Flum. ? <i>Xyladenus</i> , Desv. <i>Azara</i> , Ruiz et Pav. <i>Kuhlia</i> , H. B. K. <i>Lilœnia</i> , Bert. <i>Almeja</i> , Endl. <i>Pineda</i> , Ruiz et Pav. <i>Christiania</i> , Presl. ? <i>Leonia</i> , Ruiz et Pav. <i>Stendelia</i> , Mart.	<i>Crepaloprumnon</i> , Endl. <i>Roumea</i> , Poil. <i>Koelera</i> , Willd. <i>Bessera</i> , Spreng. <i>Limacia</i> , Dietr. <i>Hisiugera</i> , Hellen. <i>Xylosma</i> , G. Forst. <i>Myroxylon</i> , J.R. Forst. <i>Lunania</i> , Hook. <i>Mellectus</i> , Forst.
<i>Bixa</i> , Linn. <i>Echinocarpus</i> , Blum. <i>Trichospermum</i> , Blum. <i>Lindackertia</i> , Blum. <i>Xylothea</i> , Hochst. <i>Deuhania</i> , Meisn. <i>Leucocarpon</i> , A. Rich.	<i>Ludia</i> , Lam. <i>Laetia</i> , Lüfl. <i>Thammia</i> , P. Br. <i>Hellwingia</i> , Adans. <i>Prockia</i> , P. Br. <i>Thiodia</i> , Benn. <i>Lightfootia</i> , Swartz. <i>Aphloia</i> , Benn. <i>Neumannia</i> , A. Rich. <i>Xylothea</i> , Hochst. <i>Asera</i> , Schott. <i>Trilix</i> , L. <i>Zuelania</i> , A. R. <i>Banara</i> , Aubl.	III.— <i>Flacourtetæ</i> . <i>Styles</i> <i>or stigmas several</i> , <i>Fruit succulent</i> . <i>Flacourtia</i> , Commers. <i>Stigmatota</i> , Lour. <i>Rhamnopsis</i> , Reichenb.	IV.— <i>Erythrospermeræ</i> . <i>Styles several</i> . <i>Fruit</i> <i>splitting</i> . <i>Kiggellaria</i> , Linn. <i>Erythrospermum</i> , Lam. ? <i>Tachibota</i> , Aubl. <i>Salmasia</i> , Schreb.
II.— <i>Procketæ</i> . <i>Style simple</i> . <i>Fruit not splitting</i> . <i>Carpotroche</i> , Endl. <i>Mayna</i> , Radd. <i>Oncoba</i> , Forsk. <i>Lundia</i> , Thoun. <i>Phoberos</i> , Lour.			

NUMBERS. GEN. 31. Sp. 85.

Pangiaceæ.

POSITION.—*Samydaceæ*.—FLACOURTIACEÆ.—Lacistemaceæ.

Tiliaceæ??

ORDER CXI. LACISTEMACEÆ.—LACISTEMADS.

Lacistemææ, *Martius, N. G. et Sp. Pl. 1. 154. (1824); Endl. Gen. c.; Meisn. p. 347.*

DIAGNOSIS.—*Violæ Exogens, with amentaceous scaly apetalous polygamous flowers, and unilateral stamens.*

Small trees or shrubs. Leaves simple, alternate, with stipules. Flowers disposed in clustered axillary catkins, ♀, or ♂ ♀ by abortion. Calyx in several narrow divisions, free, covered over by a dilated bract. Corolla wanting. Disk somewhat fleshy, surrounding the stamens, or in front of them, sometimes hardly visible. Stamen 1, hypogynous, standing on one side of the ovary, with a thick 2-lobed connective, at the apex of each of whose lobes is placed a single cell of an anther, bursting transversely. Ovary superior, seated in a fleshy disk, 1-celled, with several anatropal ovules attached to 2-3-parietal placentæ; stigmas 2 or 3, sessile or on a style. Fruit capsular, 1-celled, splitting into 2 or 3 valves, each of which bears a placenta in its middle. Seed usually, by abortion, one to each valve, suspended, with a fleshy aril; integument crustaceous; albumen fleshy; embryo inverted, with plane cotyledons and a superior straight cylindrical radicle.

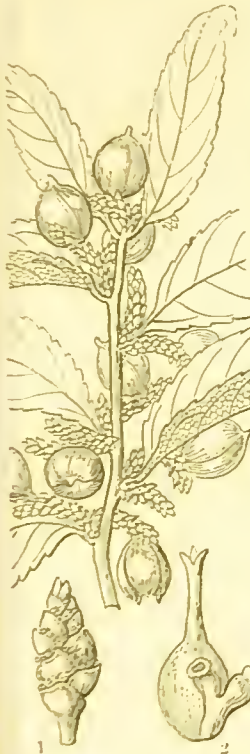
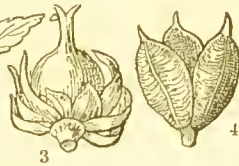


Fig. CCXXV.



Von Martius, the founder of this Order, which he divides from Nettleworts, speaks of it thus: "The peculiar character consists in the presence of a distinct perianth, while the amentaceous inflorescence is an indication of an affinity with apetalous Orders of a lower grade."

The same Botanist indicates its relation to Chloranthus in the structure of the filament, and to Samyds in that of the fruit, "the monadelphous stamens of both which may be perhaps considered a higher kind of evolution of the fleshy disk in the bottom of the flower of Lacistema." In habit the species are said to be something like Peppers, but more arborescent. To me, however, they look much more like Cascarias with an amentaceous inflorescence, and they might easily be mistaken for them, when not in flower. They differ, however, from Samyds in their leaves not being dotted, in their scaly, not perfect tubular and half-coloured, calyx, and their curious unilateral stamens. No doubt they are a transition form from the more perfect to the diclinous Orders, as is sufficiently indicated by their polygamous flowers.

Natives of low places in woods in equinoctial America. Their properties are unknown.

GENERA.

- | | | |
|------------------------------------|--|-----------------------------------|
| <i>Synzyganthera, Ruiz et Pav.</i> | \| | <i>Lacistema, Swartz.</i> |
| <i>Didymandra, Willd.</i> | \| | <i>Nematosperrum, L. C. Rich.</i> |

NUMBERS. GEN. 2. Sp. 6.

Piperaceæ.

POSITION. ———, LACISTEMACEÆ.—Samydaceæ.

Betulaceæ.

Fig. CCXXV.—*Lacistema serrulatum*.—*Martius*. 1. amentum in flower; 2. pistil and stamen; 3. pistil and calyx; 4. fruit in its state of dehiscence.

ORDER CXII. SAMYDACEÆ.—SAMYDS.

Samydæ, *Vent. Mem. Inst.* 2. 142. (1807); *Gærtn. fl. Carp.* 3. 238. 242. (1805); *Kunth. Nov. Gen.* 5, 360. (1821); *DC. Prodr.* 2. 47. (1825); *Endl. Gen.* cxciv.; *Meisn. p.* 72.

DIAGNOSIS.—*Violal Exogens*, with scattered apetalous tubular hermaphrodite flowers, perigynous stamens, and both round and linear transparent dots in the leaves.

Trees or shrubs. Leaves alternate, often somewhat distichous, simple, entire or toothed, evergreen, with stipules, usually with pellucid markings, which are both linear and oblong. Peduncles axillary, solitary, or numerous. Sepals 4-5, more or less cohering at the base, usually coloured inside; æstivation somewhat imbricated, very seldom completely valvate. Petals 0. Stamens arising from the tube of the calyx, 2, 3, or 4 times as many as the sepals; filaments monadelphous, either all bearing anthers, or alternately shorter, villous or eiliated, and alternately bearing ovate 2-celled erect anthers. Ovary superior, 1-celled; style 1, filiform; stigma capitate, or slightly lobed; ovules 00, attached to parietal placentæ, ascending, half anatropal. Capsule coriaceous, with 1 cell and from 3 to 5 valves, many-seeded, the valves dehiscing imperfectly, often somewhat pulpy inside, and coloured. Seeds fixed to the valves, without order, on the papillose or pulpy part, with a fleshy aril and excavated hilum; albumen oily or fleshy; embryo large, in the middle of it; cotyledons ovate; radicle pointing to the extremity remote from the hilum.



Fig. CCXXVI.

regarded as of the usual importance, it is certain that Samyds have no title to a place among the *Violal Allianec*. If, however, we regard it as exceptional in the present instance, we then find the Order very naturally associated, by the force of all its other characters, with those among which it is now placed. Its composite fruit, with distinct parietal placentation, is much the same as that of many *Bixads* on the one hand, and of *Lacistemads* on the other; and its sterile stamens appear to offer a plain indication of a tendency to acquire the coronetted structure of *Passionworts*. Brown observes, that *Samyds* are especially distinguished by their leaves having a mixture of round and

Fig. CCXXVI.—*Casaria grandiflora*.—A. *St. Hilaire*. 1. part of a calyx split open; 2. the pistil half grown; 3. section across the ovary; 4. section of seed; 5. seed; 6. aril, removed from the seed.

linear pellucid dots, which distinguish them from all the other families with which they are likely to be confounded.

Samyds are all tropical and principally American. Little is known of the African or Asiatic species.

The bark and leaves are said to be slightly astringent. In Brazil the leaves of *Casearia ulmifolia* are applied to wounds, and their juice is drunk by the sick ; it is said to be a most certain remedy against the bite of the most noxious serpents, and is called *Marmaleiro do Mato*. A decoction of the leaves of *Casearia lingua*, called by the Brazilians *Cha de Frade* and *Lingua de Fin*, is also used internally in inflammatory disorders and malignant fevers. *Casearia astringens* bark is mucilaginous and somewhat acrid ; it is used in Brazil as a poultice or lotion for badly healed ulcers, and is said by Martius to be wonderfully efficacious as a cleanser and stimulant of the raw flesh. *Casearia Anavinga*, an Indian species, is bitter in all its parts ; the leaves are used in medicated baths ; the pulp of the fruit is very diuretic. The root of *Casearia esculenta* is bitter and purgative ; but its foliage is eatable.

GENERA.

<p><i>Samyda</i>, Linn. <i>Guidonia</i>, Plum. <i>Mongezia</i>, Fl. Flum. <i>Casearia</i>, Jacq. <i>Antigona</i>, Fl. Flum. <i>Hexanthera</i>, Endl.</p>	<p><i>Anavinga</i>, Rheed. <i>Iroucana</i>, Aubl. <i>Langletia</i>, Scop. <i>Athenæa</i>, Schreb. <i>Bedousia</i>, Dennst.</p>	<p><i>Pitumba</i>, Aubl. <i>Melistaureum</i>, Forst. <i>Piparea</i>, Aubl. <i>Chælocrater</i>, Ruiz et Pav.</p>	<p><i>Crateria</i>, Pers. <i>Lindleya</i>, Kunth. <i>Eucereæa</i>, Mart. <i>Caudelabria</i>, Hochst. <i>? Periclistia</i>, Benth.</p>
---	--	--	---

NUMBERS. GEN. 5. Sp. 80.

Homaliaceæ.

POSITION.—*Passifloraceæ.*—*SAMYDACEÆ.*—*Flacourtiaceæ.*

ORDER CXIII. PASSIFLORACEÆ.—PASSIONWORTS.

Passifloræ, *Juss. Ann. Mus.* 6. 102. (1805); *Id. Dict. des Sciences Nat.* 38. 48.; *DC. Prodr.* 3. 321; *Achille Richard Dict. Class* 13. 95. (1828); *Endl. Gen.* cxcvii.; *Meisner, Gen.* p. 124.

DIAGNOSIS.—*Violæ Exogens*, with polypetalous or apetalous coronetted flowers, perigynous imbricated petals, stamens on the stalk of the ovary, simple terminal styles, arillated seeds, and stipulate leaves.

Herbaceous plants or shrubs, usually climbing, very seldom erect. Leaves alternate, with foliaceous stipules, often glandular. Flowers axillary or terminal, often with a 3-leaved involucre. Sepals 5, sometimes irregular, combined

in a tube of variable length, the sides and throat of which are lined by filamentous or annular processes, apparently metamorphosed petals. Petals 5, arising from the throat of the calyx, on the outside of the filamentous processes, occasionally wanting, sometimes irregular, imbricated in aestivation. Stamens 5, monadelphous, rarely indefinite, surrounding the stalk of the

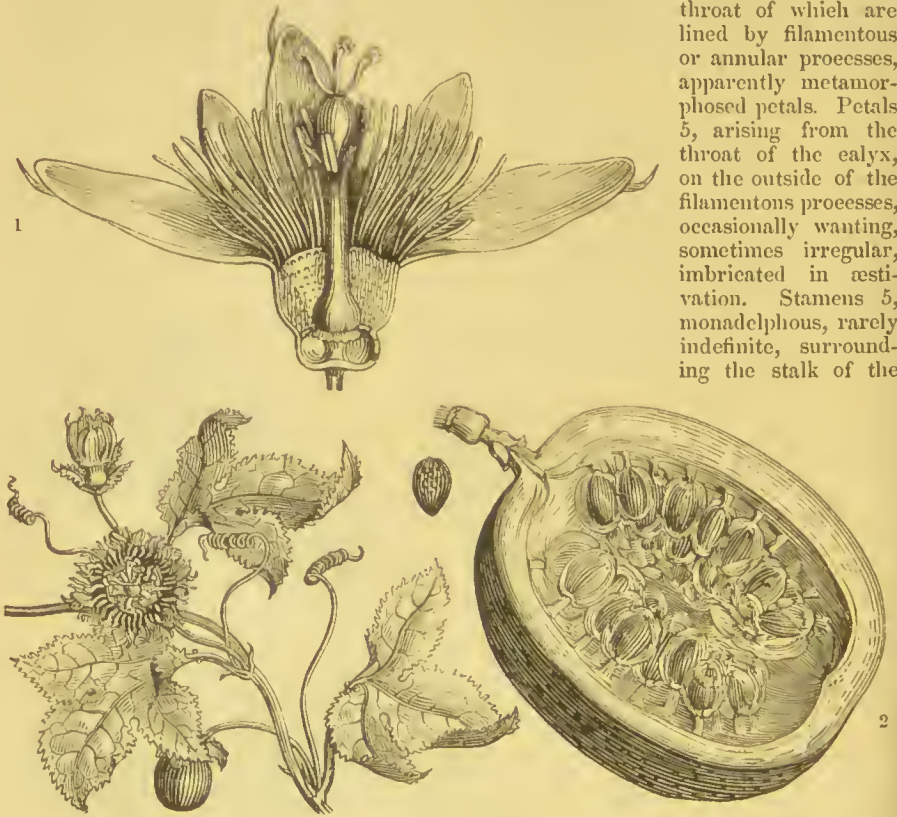


Fig. CCXXVII.

ovary; anthers turned outwards, linear, 2-celled, bursting longitudinally. Ovary seated on a long stalk, superior, 1-celled; styles 3, arising from the same point, clavate; stigmas dilated; ovules 00, anatropal, parietal, often inserted on long stalks. Fruit stalked, 1-celled, with 3 parietal polyspermous placenta, sometimes 3-valved. Seeds attached in several rows to the placenta, with a brittle sculptured testa surrounded by a pulpy aril; embryo straight, in the midst of fleshy thin albumen; radicle turned towards the hilum; cotyledons flat, leafy.

The real nature of the floral envelopes of this remarkable Order is a question upon which Botanists entertain different opinions, and their ideas of its affinities are consequently at variance. According to Jussieu (*Dict. des Sciences*, 38. 49.), the "parts

taken for petals are nothing but inner divisions of the calyx, usually in a coloured state, and wanting in several species;" and, therefore, in the judgment of that venerable Botanist, the Order is apetalous. De Candolle adopts the same view of the nature of the floral envelopes as Jussieu; but he nevertheless considers the Order polypetalous; a conclusion which I confess myself unable to understand, upon the supposition of the inner series of floral envelopes being calyx. Other Botanists, and I think with justice, consider the outer series of the floral envelopes as the calyx, and the inner as the corolla, for two principal reasons. In the first place, they have the ordinary position and appearance of calyx and corolla, the outer being green, and the inner coloured; and, in the second place, there is no essential difference between the calyx and corolla, except the one being the outer, and the other the inner of the floral envelopes. And if the real nature of these parts is to be determined by analogy, an opinion in which I do not, however, concur, the great affinity, as I think, of the Order with Violetworts would confirm the idea of its being polypetalous rather than apetalous. The nature of the filamentous appendages, or coronet, or rays as they are called, which proceed from the orifice of the tube, and of the membranous or fleshy, entire or lobed, flat or plaited, annular processes which lie between the petals and the stamens, is ambiguous. I am disposed to refer them to a peculiar form of petals, rather than to the stamens, for the reasons which I have assigned in the *Hort. Trans.* vol. 6, p. 309, for understanding the normal metamorphosis of the parts of fructification to be centripetal. There can, at least, be no doubt of their being of an intermediate nature between petals and stamens. With regard to the affinity of Passionworts, Jussieu, swayed by the opinion he entertained of their being apetalous, and De Candolle, who partly agreed and partly disagreed with Jussieu in his view of their structure, both assigned the Order a place near Cucurbits, and there can be doubt that Cucurbits are really little more than Passionworts with separate sexes and inferior fruit; but when we consider the stipitate fruit, occasionally valvular, the parietal placentæ, the sometimes irregular flowers, the stipulate leaves, and the climbing habit of these plants, it is difficult not to admit their greater affinity with Capparids or Violetworts, the dilated disk of the former of which is probably analogous to the innermost of the annular processes of Passiflora. That the fleshy covering of the seeds in this Order is a real aril, is clear from the seeds of a capsular species nearly related to *P. capsularis*, a drawing of which, by Ferdinand Bauer, exists in the Library of the Horticultural Society. In this plant the apex of the sculptured testa is uncovered by the aril. *Smeathmannia* forms a connecting link between Passionworts and Samyds.

Crownworts (Malesherbiaceæ) are perhaps not very distinct; their differences, such as they are, are noticed in the proper place. Passionflowers are the pride of South America and the West Indies, where the woods are filled with their species, which climb about from tree to tree, bearing at one time flowers of the most striking beauty, and of so singular an appearance, that the zealous Catholics who discovered them, adapted Christian traditions to those inhabitants of the South American wilderness; and at other times fruit, tempting to the eye and refreshing to the palate. One or two extend northwards into North America. Several are found in Africa and the neighbouring islands; and a few in the East Indies.

As far as we have any knowledge of the uses of these plants they appear, notwithstanding their eatable fruit, to possess active and rather dangerous qualities. *Passiflora quadrangularis*, whose fruit is the great Granadilla sometimes seen in our hot-houses, has an emetic root (*Martius*), and is powerfully narcotic, on which account it is said by Mr. Burnett, on the authority of a French writer, to be cultivated in several French settlements for the sake of its root. It is said to owe its activity to a peculiar principle called Passiflorine. *P. Contrayerva* is said to be alexipharmic and carminative. According to Browne, a tincture of the flowers of *P. rubra*, formed by infusion in wine or spirits, is used in the leeward parts of Jamaica, under the name of Dutchman's Laudanum, as a safe narcotic. *P. fetida*, and some allied species, are esteemed as emmenagogues, and are thought to be serviceable in hysteria; the infusion of the flowers is also taken as a pectoral medicine in the West Indies. The foliage is used in Brazil in poultices, against erysipelas and inflammatory affections of the skin. The bitter and astringent leaves of *P. laurifolia* have some reputation as anthelmintics. *P. pallida*, *maliformis*, and *incarnata* are employed in cases of intermittent fevers. *Murueja oculata*, a West Indian climber, is said to be anthelmintic, diaphoretic, and antihysterie. Among the species whose fruit is eaten, the most important are *Passiflora filamentosa*, *pallida*, *lutea*, *coccinea*, *maliformis*, *laurifolia*, *edulis*, *incarnata*, and *serrata*, *Tacsonia mollissima*, *tripartita* and *speciosa*, and the Madagascar shrub called *Paropsis edulis*.

GENERA.

Ryania, <i>Vahl.</i>	Passiflora, <i>Juss.</i>	Decaloba, <i>DC.</i>	Disemma, <i>Labill.</i>
Patristia, <i>L. C. Rich.</i>	Granadilla, <i>Tournef.</i>	Granadilla, <i>DC.</i>	Tacsonia, <i>Juss.</i>
Smeathmannia, <i>Sol.</i>	Tetrapathica, <i>DC.</i>	Anthactinia, <i>Bory.</i>	Distephana, <i>Juss.</i>
Bulowia, <i>Schum.</i>	Cieca, <i>Medik.</i>	Dysosmia, <i>DC.</i>	Distephia, <i>Salisb.</i>
Paropsia, <i>Noronh.</i>	Astephananthes, <i>Bory.</i>	Astrophea, <i>DC.</i>	? Vareca, <i>Gärtn.</i>
Thompsonia, <i>R. Br.</i>	Monactinirma, <i>Bory.</i>	Murucuja, <i>Tournef.</i>	
Deidamia, <i>Thouars.</i>	Balduina, <i>Raf.</i>		

NUMBERS. GEN. 12. Sp. 210.

*Papayaceæ.*POSITION.—*Samydaceæ.*—PASSIFLORACEÆ.—*Malesherbiaceæ.**Capparidaceæ.*

ORDER CXIV. MALESHERBIACEÆ.—CROWNWORTS.

Malesherbiaceæ, *Don in Jameson's Journal*, 321. (1826) ; *Ed. pr. lii.* ; *Endl. Gen. cxcviii.* ; *Meisner Gen. p. 193.*—Passifloræ, § Malesherbiæ, *DC. Prodr.* 3. 337. (1828.)

DIAGNOSIS.—*Violæ Exogens*, with polypetalous coronetted flowers, perigynous imbricated petals, stamens on the stalk of the ovary, simple dorsal styles, seeds without aril, and leaves without stipules.

Herbaceous or half-shrubby plants. Leaves alternate, lobed, without stipules. Flowers axillary or terminal, solitary, yellow or blue. Calyx tubular, membranous, inflated, 5-lobed, the lobes with an imbricated æstivation. Petals 5, alternate with the segments of the calyx, persistent, with a convolute æstivation, arising from without a short membranous rim or coronet. Stamens 5 or 10, perigynous ; filaments filiform, distinct, or connected with the stalk of the ovary ; anthers versatile. Ovary superior, stipitate, 1-celled, with parietal placentæ ; ovules 00, pendulous, anatropal ; styles 3, filiform, very long, arising from distant points of the apex of the ovary ; stigmas clavate. Fruit capsular, 1-celled, 3-valved, membranous, more or less many-seeded. Seeds attached to placentæ arising either from the axis of the valves, or from their base ; testa brittle, with a fleshy crest, and no aril ; embryo taper, in the midst of abundant fleshy albumen, with the radicle next the hilum.

According to Don, by whom these plants were first considered the rudiments of an Order, "they agree on the one hand with Passionworts, and on the other with Turneraads;" and I am persuaded that this is their true position. From the former they differ in the insertion of their styles at the back, not on the apex of the ovary, in their taper embryo, want of aril and of stipules, and altogether in their habit : from Turneraads, to which their habit quite allies them, they differ in the presence of a membranous coronet within the petals, in the remarkable insertion of the styles, and in the want of all trace of an aril. In their thin-sided fruit they approach *Smeathmannia* in Passionworts. Their tubular, somewhat furrowed calyx is not altogether different from that of *Frankeniads*.

All are natives of Chili and Peru.

Their uses are unknown.

GENERA.

Malesherbia, *Rutz. et Pav.* | *Gynopleura*, *Cav.*

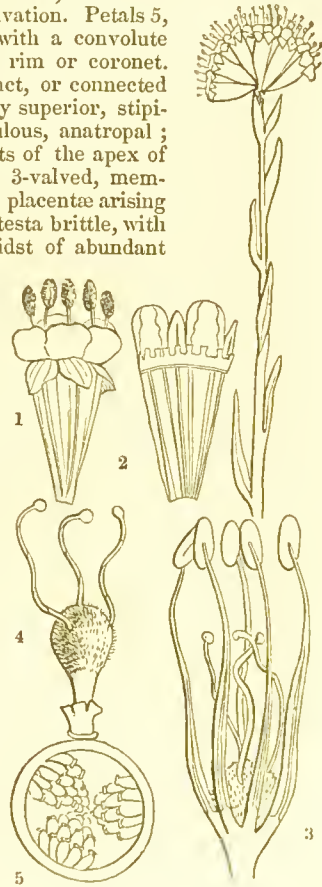


Fig. CCXXVIII.

NUMBERS. GEN. 2. Sp. 5.

POSITION.—Turneraceæ.—MALESHERBIACEÆ.—Passifloræ.

Fig. CCXXVIII.—*Malesherbia fasciculata* ; 1. a flower ; 2. a part of the calyx seen from within, showing 2 petals and a portion of the coronet ; 3. the stamens and pistil ; 4. the pistil apart ; 5. a section of the ovary.—*Endlicher.*

ORDER CXV. MORINGACEÆ.—MORINGADS.

Moringæ, *R. Brown in Denham*, p. 33. (1826); *Bartl. Ord. Nat.* 425. (1830); *Decaisne in Ann. Sc. N. S.*, 4. 203. (1835); *Endl. Gen. p.* 1321.; *Meisn. Gen. p.* 78.; *Wight and Illustr.* 1. f. 75.

DIAGNOSIS.—*Violal Exogens*, with a many-leaved calyx, perigynous petals and stamens, 1-celled anthers, stipitate consolidated siliquose fruit, and exalbuminous seeds.

Trees, with 2-3-pinnated leaves, whose leaflets very readily drop off, and thin, deciduous, coloured stipules. Flowers irregular, white, in loose panicles. Sepals 5, petaloid, nearly equal, deciduous; the tube lined with a fleshy disk; aestivation slightly imbricated. Petals 5, visibly unequal, the uppermost of which is ascending. Stamens 8 or 10, arising from the top of a disk lining the tube of the calyx; 5 opposite the sepals, sometimes sterile; filaments slightly petaloid, callosus and hairy at the base; anthers simple, 1-celled, with a thick convex connective. Ovary stipitate, superior, 1-celled, with 3 parietal placentæ bearing numerous suspended anatropal ovules; style filiform, terminal, obliquely recurved; stigma simple. Fruit a long pod-like capsule, with 3 valves, and only 1 cell; the valves bearing the seeds along their middle. Seeds numerous, half buried in the fuggous substance of the valves, sometimes winged; embryo amygdaloid, without albumen; radicle straight, superior (turned to the hilum), very small; cotyledons fleshy, plano-convex.

This is a little group of small trees, with an appearance so peculiar that one hardly knows with what to compare them. It however seems generally admitted that they resemble some plants of the Leguminous Order; and it is to the vicinity of those that all Botanists, except myself, seem agreed in referring them, moved thereto by their pinnated leaves, with glands between the leaflets, declinate decaudrous perigynous stamens, and pod-like fruit. De Candolle, who did not overlook the anomalous structure of *Moringa* as a Leguminous plant, accounted for the compound nature of its fruit upon the supposition, that although unity of carpels is the normal structure of Leguminosæ, yet the presence of more ovaries than one, in a few instances in that Order, explained the constantly trilocular state of that of *Moringa*. It has, however, always seemed to me that the resemblance which Botanists have found with the Leguminous Order are trifling, while the discrepancies are of the first importance. For example, the habit of the plant consists in a doubly pinnated foliage, which would do as well for Roseworts, or Citronworts, or Rueworts; the declinate stamens may be found in Rueworts, Milkworts, Capparids, and many others; and as to the pod-like form of the fruit, it is not worth a thought. The objections are, that the sepals are of the same texture as the petals, the anthers 1-celled, the ovary composed of 3 carpels which have not the power of turning inward their sides so as to form dissepiments, and that the attachment of the carpels is strictly parietal. It is true that the latter circumstance will not be so much at variance



Fig. CCXXIX.

Fig. CCXXIX.—1. *Moringa pterygosperma*; 2. its fruit; 3, the section of a flower of *M. aptera*; 4. its anther; 5. a section of its seed.—*Wight and Decaisne*.

with the Leguminous structure as it appears to be if it should be proved that sutural and parietal placentation are of the same nature, which seems to be the fact ; but, connected as it is with the other points of difference, and considering that it is parietal placentation in excess, it appears to be of considerable moment. This has always led me to regard the Moringads as a member of some great parietal Alliance, and as claimants of a nearer affinity with Violetworts than with any other Order ; and to this opinion I adhere, for the following reasons ; the stamens are definite in number, the corolla is manifestly irregular, the placentation is parietal, and the flowers are not isomeric, the parts of the fruit being 3, while those of the calyx, corolla, and stamens are 5. The main objection to this view is derived from the stamens being perigynous ; and it will be seen from the altered arrangements introduced into the present volume, that I now attach much more importance to that circumstance than formerly. But it must be remembered that Moringa is not at all more perigynous than Verrucularia and others among Malpighiads, or than Reseda among the Crucifers, or than Escholtzia among Poppyworts ; and that, in fact, it may be very well regarded as standing in the same relation to Violetworts as Escholtzia to Poppyworts. While, however, the parietal placentation seems to turn the scale in favour of the near affinity of Moringads to Violetworts, there can be little doubt that they also approach the anisomerous Sapindal Alliance, especially Milkworts, in their declinate stamens, 1-celled anthers, and petaloid calyx.

The species are natives of the East Indies and Arabia.

The root of the Moringa pterygosperma has a pungent odour, with a warm, biting, and somewhat aromatic taste, very like Horseradish ; it is used as a stimulant in paralytic affections and intermittent fever ; it is also employed as a rubefacient. Dr. Wight suggests that it would greatly increase the activity of sinapisms. He adds that a large quantity of gum, resembling Tragacanth, exudes from wounds in the bark. The seeds of this plant, called by the French Pois Quéniques and Chicot, have been used in venereal affections. They are the Ben-nuts of old writers, from which the oil of Ben was extracted, formerly more famed than at present. It is chiefly used by perfumers as the basis of various scents, and by watchmakers, because it does not readily freeze. The flowers, leaves, and tender seed-vessels, are eaten by the natives of India in their curries.

GENERA.

Moringa, Burm.	Anoma, Lour.	Alandina, Neck.
Hyperanthera, Forsk.	Hypelate, Smith.	Balanus, Endl.

NUMBERS. GEN. 1. Sp. 4.

Fabacæ.
 POSITION. ————— MORINGACEÆ. — Violacææ.
 Polygalacææ.

ORDER CXVI. VIOLACEÆ.—VIOLETWORTS.

Violariæ, *DC. Fl. Fr.* 4. 801. (1805); *Juss. Ann. Mus.* 18. 476. (1811); *DC. Prodr.* 1. 287. (1824); *Bartl. Ord. Nat.* 283. (1830); *Endl. Gen. ex.*; *Meisner Gen.* 20; *Wight Illustr.* 1. 142.—Violaceæ, *Lindl. Synops.* 35. (1829.)

DIAGNOSIS.—*Violæ Exogens*, with polypetalous flowers, a many-leaved calyx, hypogynous petals, stamens all perfect, anthers crested and turned inwards, consolidated fruit, and albuminous seeds.

Herbaceous plants or shrubs. Leaves simple, usually alternate, sometimes opposite, stipulate, with an involute vernation. Inflorescence various. Sepals 5, persistent, with



Fig. CCXXX.



Fig. CCXXXI.



Fig. CCXXXII.

3 outer sepals; style single, usually declinate, with an oblique hooded stigma; ovules anatropal. Capsule of 3 valves, bearing the placentæ in their axis. Seeds 00, or definite, roundish or winged, often with a tumour at their base; embryo straight, erect, in the axis of fleshy albumen.

The Violetworts are distinctly defined by their definite stamens, whose anthers turn inwards, and extend their connective into a crest; but the irregularity of their flowers,

Fig. CCXXX.—*Corynostylis Ilybanthus*. 1. a set of stamens, each having the connective lengthened beyond the anther, in the form of a scale; 2. a spurred petal; 3. a transverse section of an ovary, showing the three parietal placentæ; 4. a ripe fruit; 5. an embryo.

Fig. CCXXXI.—Side view of the flower of *Viola tricolor*.

Fig. CCXXXII.—Its fruit.

an imbricate æstivation, usually elongated at the base. Petals 5, hypogynous, equal or unequal, usually withering, and with an obliquely convolute æstivation. Stamens 5, alternate

with the petals, occasionally opposite them, inserted on a hypogynous disk, often unequal; anthers 2-celled, bursting inwards, either separate or cohering, and lying close upon the ovary; filaments dilated, lengthened beyond the anthers; two, in the irregular flowers, generally furnished with an appendage or gland at their base. Ovary 1-celled, many-seeded, or rarely 1-seeded, with 3 parietal placentæ opposite the

although a very common circumstance, is a mere peculiarity of certain genera. Rock Roses (Cistaceæ), by some associated with them, are very different in their indefinite stamens, curled embryo, and orthotropal ovules. So also the Sundews (Droseraceæ), another race to which they approach, are far separated by their minute embryo in the midst of profuse albumen, by their numerous styles, circinate leaves, and want of stipules. Passionworts, to which the bacate genera of Violetworts, and especially *Corynostylis* (*Calyptrion*, DC.), which has a twining stem, undoubtedly approach, are distinguished by a multitude of characters, among the more striking of which are their petals adhering to the tube of the calyx and the long stalk of the ovary.

Of the two Sub-orders recognised among these plants, *Viola* chiefly consist of European, Siberian, and American plants; a few only being found within the tropics of Asia. They are abundant in South America, where the forms are, however, materially different from those of the more temperate parts of the world, most of the species being shrubby while the northern Violets are uniformly herbaceous, or nearly so. *Alsodindæ* are exclusively South American and African, with the exception of *Pentaloba*, which belongs to the Malayan Flora.

The roots appear to be more or less emetic, a property which is strongly possessed by the South American species, and in a less degree only by those of Europe. Hence they form part of the herbs known under the name of *Ipecacuanha*. *Ioidium parviflorum*, and others, called *Cuchunchully* in Peru, are violent purgatives and emetics, and have a great reputation as a cure for the disease called *Cocobay*, in Jamaica, or *Mal de S. Lazaro* in Spanish America, the *Elephantiasis tuberculata*; they are used by the Spanish Americans, and I. Poaya by the Brazilians, as a substitute for *Ipecacuanha*. The root of another species called *Poaya*, *Poaya de praia*, and *Poaya branca*, the *Ioidium Itubu* of Kunth, is commonly sold as true *Ipecacuanha*, to which it approaches very nearly in its properties; at Pernambuco it is esteemed the very best remedy that can be employed in dysentery; and the inhabitants of *Rio-Grande-do-Norte* consider it a specific against gout. The foliage of the *Conohoria Lobolobo* is used in Brazil for the same purposes as Spinach with us. Boiled, it becomes mucilaginous. *Viola canina* is reputed a powerful agent for the removal of cutaneous affections; and *Anchietea salutaris*, a creeping bush, with the smell of Cabbage, and a nauseous taste, is accounted by the Brazilians not only a purgative, but also a remedy against similar maladies. A. de St. Hilaire remarks, that this notion deserves attention, as connected with the depurative properties ascribed in Europe to *Viola canina*, of which, although *Anchietea* is botanically related to it, there is nothing in the appearance which would have led the Portuguese settlers to attribute the virtues of the one to the other. The petals of *Viola odorata* are used as a laxative for children, one drachm operating pretty freely; the seeds possess similar properties; the root is emetic and purgative. The aqueous tincture of the flowers is a useful chemical test: uncombined acids changing the blue to red and alkalis to green. The Romans had a wine made of violet flowers, and it is said they are still used in the preparations of the Grand Signor's sherbet. By some the flowers are considered auodyne; they certainly induce faintness and giddiness in particular constitutions, as I have witnessed. Triller mentions a case in which they produced apoplexy. When bruised, the leaves of *Viola tricolor* smell like Peach kernels, hence they have been supposed to contain prussic acid. They were once esteemed efficacious in the cure of cutaneous disorders, and are still employed in Italy in *tinea capitis*. *Viola ovata* is said to be a remedy for the bite of the rattlesnake.

GENERA.

I.—VIOLÆÆ.		II.—ALSODEÆÆ.	
<i>Viola</i> , Linn.	<i>Bigelovia</i> , DC.	<i>Amphirrhox</i> , Spreng.	<i>Conohoria</i> , Aubl.
<i>Erpetion</i> , DC.	<i>Violoides</i> , Michx.	<i>Amphirrhoge</i> , Rehb.	<i>Riana</i> , Aubl.
<i>Mnemion</i> , Spach.	<i>Anchietea</i> , St. Hil.	<i>Spathularia</i> , St. Hil.	<i>Passoura</i> , Aubl.
<i>Cittaronium</i> , Rehb.	<i>Noisettia</i> , Mart. et Zucc.	<i>Bradleya</i> , Fl. Flum.	<i>Rinorea</i> , Aubl.
<i>Hybanthus</i> , Jacq.	<i>Schweiggeria</i> , Spreng.		<i>Cranthera</i> , Philis.
<i>Solea</i> , Spreng.	<i>Glossarrhen</i> , Mart. et Zucc.		<i>Passalia</i> , Soland.
<i>Pigea</i> , DC.	<i>Corynostylis</i> , Mart. et Zucc.		? <i>Prosthesia</i> , Blum.
<i>Ioidium</i> , Vent.			<i>Tetrathyliacium</i> , Pöpp.
<i>Pentaloba</i> , Vand.	<i>Calyptrion</i> , Ging.		<i>Pentaloba</i> , Lour.
<i>Noisettia</i> , Kunth.			? <i>Farcea</i> , Roxb.
			<i>Hymenanthera</i> , R. Br.

NUMBERS. GEN. 11. Sp. 300.

Droseraceæ.

POSITION.—*Passifloraceæ.*—*VIOLACEÆ.*—*Frankeniaceæ.*

Cistaceæ.

ORDER CXVII. FRANKENIACEÆ.—FRANKENIADS.

Frankeniaceæ, *Aug. de St. Hilaire, Mém. Plac. Centr.* 39. (1815); *DC. Prodr.* 1. 349; *Endl. Gen.* xcii.; *Meisner, Gen.* 22.

DIAGNOSIS.—*Violæ Exogens*, with polypetalous flowers, a tubular furrowed calyx, and hypogynous unguiculate petals.

Herbaceous plants or under-shrubs. Stems very much branched. Leaves opposite, exstipulate, with a membranous sheathing base; often revolute at the edge. Flowers sessile in the divisions of the branches, and terminal, embosomed in leaves, usually pink. Sepals 4-5, united in a furrowed tube, persistent, equal. Petals alternate with the sepals, hypogynous, unguiculate, often with appendages at the base of the limb. Stamens hypogynous, either equal in number to the petals, and alternate with them, or having a tendency to double the number; anthers roundish, versatile, opening longitudinally. Ovary superior; style filiform, 2-3- or 4-fid; ovules 00, anatropal, attached to parietal placenta, and usually arising from long stalks. Capsule 1-celled, inclosed in the calyx, 2-3- or 4-valved, many-seeded. Seeds very minute; embryo straight, erect, in the midst of albumen (divided into two plates, *Gartn. fil.*) with a very short inferior radicle.



Fig. CCXXXIII.

Allyed on the one hand to Clove-worts, from which they are distinguished by their different placentation, and by the form of their embryo; and on the other to Violet-worts, which differ in having a loculicidal, not septiceidal, dehiscence. Their great feature is the presence of a long furrowed calyx, within which the petals are inserted below the ovary, by means of long stalks. The petals, moreover, have generally a sealy appendage. Wormskioldia is a very anomalous plant. It seems more nearly allied to this than any other Order, and cannot possibly belong to Droseraceæ, in which it is placed by Achille Richard provisionally. It seems to indicate a relation between Frankeniads, on the one hand with Moringads, and on the other with Capparids. The nearest approach to the tubular calyx of Frankeniads is to be found in Crown-worts (Malesherbiaceæ).

This Order is chiefly found in the north of Africa and south of Europe. Two species are natives of the Cape of Good Hope, one of South America, four of New Holland, and three of temperate Asia. None have been found in tropical India or North America.

Endlicher says that Frankeniads are mucilaginous and slightly aromatic. The leaves of *Beatsonia portulacifolia* are used in St. Helena as tea.

GENERA.

Frankenia, Linn.
Nothria, Berg.
Franca, Michel.

Bentsonia, Roxb.
Anisadenia, Wall.

Wormskioldia, Thonn.
Tricliceras, DC.

Schumacheria, Spr.
Streptopetalum, Hochst.

NUMBERS. GEN. 4. Sp. 24.

Caryophyllaceæ.

POSITION.—*Violaceæ.*—FRANKENIACEÆ.—*Sauvagesiacere.*

Fig. CCXXXIII.—*Frankenia ericifolia*.—*Webb.* 1. a flower; 2. its stamens, &c.; 3. a perpendicular section of the ovary; 4. a section of a seed.

ORDER CXVIII. TAMARICACEÆ.—TAMARISKS.

Tamariscinæ, Desvoux, in a Dissertation read before the French Institute (in 1815,) according to the *Ann. Sc. Nat.* 4. 344. (1825); *A. St. Hil. Mém. Mus.* 2. 205. (1816); Ehrenb. in *Annales des Sciences*, 12. 68. (1827); *DC. Prodr.* 3. 95. (1828); *Endl. Gen.* cxxi.; *Meisner*, p. 129; *Wight, Illustr.* 1. t. 24.

DIAGNOSIS.—*Violæ Exogens*, with polypetalous flowers, a many-leaved calyx, hypogynous petals, distinct styles, consolidated fruit, and 00 basal comose seeds without albumen.

Shrubs or herbs, with rod-like branches. Leaves alternate, resembling scales, entire, usually with pits on the surface. Flowers in close spikes or racemes. Calyx 4- or 5-parted, persistent, with an imbricated aestivation. Petals inserted into the base of the calyx, withering; with an imbricated aestivation. Stamens hypogynous, either equal to the petals in number, or twice as many, distinct or monadelphous. Anthers turned inwards, 2-celled, opening longitudinally. Ovary superior; styles 3; ovules numerous, ascending, anatropal. Capsule 3-valved, 1-celled, many-seeded; placentæ 3, either at the base of the cavity, or along the middle of the valves. Seeds erect or ascending, comose; albumen none; embryo straight, with an inferior radicle.

Botanists are divided in opinion as to the proper place, in the Natural system, of the Tamarisk, that common but beautiful bush, and its allies. De Candolle stations it near Purslaues, from which its straight embryo and want of albumen remove it; others have suggested an affinity to Lythrad, or even to Onagrad; Meisner adopts the view of De Candolle, which I too have formerly followed. Eudlicher is inclined to station Tamarisks next to Reaumuriads, with which they not only agree in habit, but in very many respects of structure. The main differences consist in Reaumuriads having a many-celled fruit, axile placentæ, mealy albumen round the embryo, and petals with unequal sides, while Tamarisks have a 1-celled fruit, with a basal and partially parietal placentation, no albumen, and their petals are equal-sided. Endlicher is also of opinion that a tendency towards Lythrad is observable among these plants. I think, however, that, notwithstanding the resemblances with Reaumuriads, the true place of the Order must be in this Violal Alliance, where it may perhaps be regarded as a near ally of Sauvageads and Houseleeks. The habit of some of the latter is not very different from that of Tamarisks. The most important distinctions are the total absence of albumen in Tamarisks, and the axile or sutural placentation of Houseleeks. The presence of albumen is of less consequence than usual in an Alliance whose embryo is so highly developed. The placentation is however of greater importance, and more than anything else throws doubt upon the affinity now suggested.

The species are exclusively confined to the northern hemisphere, and even to its eastern half, that is, to the Old World, on which they extend as far as the Cape de Verds. They usually grow by the sea-side, but occasionally by the edges of rivers and torrents. The maximum of species and of individuals also is found in the basin of the Mediterranean. The Order appears bounded on the south by the 8th or 9th parallel of N. lat., and on the north by that of 50° and 55° in Siberia, Germany, and England.

Their bark is slightly bitter, astringent, and probably tonic. *Tamarix gallica* and *africana* are remarkable for the quantity of sulphate of soda which their ashes contain. Ehrenberg found that the Manna of Mount Sinai is produced by *Tamarix mannifera*. This substance, being analysed by Mitscherlich, was ascertained to contain no crystallisable Mannite, but to consist wholly of pure mucilaginous sugar.* The galls of *Tamarix*



Fig. CCXXXIV.

* Ehrenberg considers it as an exudation produced by a species of *Coccus* (*manniparus*) which inhabits the tree, and this is confirmed by Mr. Malcolmson, who in a note I received from him some time since.

Fig. CCXXXIV—*Tamarix*. 1, a flower; 2, a view of the interior of the ovary; 3, placentæ seen from above; 4, a ripe seed-vesicle split open; 5, a seed.

indica, *dioica*, *Furas*, and *orientalis* are highly astringent, and are used both in medicine and dyeing. *Myricaria germanica*, a common shrub in our gardens, has a balsamic astringent bitter bark, which was formerly official. *Myricaria herbacea* is used as tea among the Monghols, and its woody tissue is considered to be tonic.

GENERA.

Tamarix, *L.*

|

Myricaria, *Desv.*

|

Trichaurus, *Arn.*

NUMBERS. GEN. 3. Sp. 43.

Lythraceæ ?

POSITION.—*Crassulaceæ* ?.—TAMARICACEÆ.—*Frankeniaceæ*.

Reaumuriaceæ.

observes that the Persian manna known by the name of *Gen*, is formed by an insect in that way, and is not found on the upper branches or leaves, but only on the larger branches covered by those minute insects, and none is formed near wounds or cracks in the bark. This was particularly observed by Colonel Frederick in Persia, in a latitude not much south of Mount Sinai, and his account corresponds with that of a traveller who saw it in the same country both on a Tamarisk and on the small Oak of *Kermanshaw*. It is remarkable that the secretion should be unknown in Egypt and Arabia, where the *T. gallica* would seem to be common. Forskahl, who says it is the *Tarfa* of the Arabs, takes no notice of any manna being produced by it, and Mr. Malcolmson informs me that he could gain no intelligence of manna being produced by the Tamarisk in any of the south and west coasts of Arabia and Upper Egypt. He observed the trees frequently secreting salt, but not sugar. I must however add, that the plant which this gentleman found the Arabs calling *Tarfa*, was *T. orientalis*, not *T. gallica*, as appeared from the specimens he brought home. The bark of *T. gallica* is slightly bitter and astringent.—*Flora Medica*.

ORDER CXIX. SAUVAGESIACEÆ.—SAUVAGEADS.

Violaceæ, § Sauvageæ, DC. Prod. 1. 315. (1824).—Sauvagesiæ, Bartl. Ord. Nat. 289. (1830); Endl. Gen. exci.; Meisn. Gen. p. 21.—Sauvagesiaceæ, Von Martius Conspectus, No. 238. (1835).

DIAGNOSIS.—*Violæ Exogens*, with polypetalous flowers, a many-leaved calyx, hypogynous petals, stamens partly sterile and petaloid, anthers opposite the petals, naked, and turned outwards, consolidated fruit, and albuminous seeds.

Smooth shrubs or annual herbs, with a terete, simple, or branched stem. Leaves alternate, simple, shining, feather-veined, nearly sessile, with fringed permanent stipules. Flowers perfect, regular, white, pink, violet or yellow, generally in terminal panicles or racemes, and on slender thread-shaped stalks. Sepals 5, equal or unequal, imbricated. Petals 5, twisted in aestivation, deciduous. Stamens hypogynous, definite and opposite the petals, or 00, all fertile, in more rows than one, of which the innermost alone is fertile, the exterior assuming the appearance of petaloid scales. Anthers turned outwards, 2-celled, opening lengthwise. Ovary free, 1-celled, with 3 parietal placentæ, sometimes 3-celled at the base and 1-celled at the apex; style terminal and stigma simple or nearly so; ovules parietal, anatropal. Capsule 3-valved, 1-celled or 3-celled at the base, with the seeds attached to the edges of the valves. Seeds small, oblong, pitted, with a straight embryo in the axis of fleshy albumen, and the radicle next the hilum.

Among the other differences between these plants and Violetworts may be mentioned their stamens, when definite in number, being opposite the petals, the anthers not having a membranous termination, the presence of 5 hypogynous scales representing sterile stamens, the fruit having a septicial dehiscence, so that the seeds adhere to the edges and not the centre of the valves, and the strongly ribbed and imbricated calyx. The last character brings them near Tutans, with which they accord in habit, but they differ in their stipules and decidedly parietal placentation. They are also said to approach Sundews; but this is by no means clear. Endlicher points out their affinity with Frankeniads, from which, however, they are easily distinguished by their polysepalous calyx, stipules, and anthers turned outwards.

Almost nothing is known of their uses. *Sauvagesia erecta*, the herb of St. Martin, is very mucilaginous. It has been used in Brazil for complaints in the eyes, in Peru for disorders of the bowels, and in the West Indies as a diuretic, or rather in cases of a slight inflammation of the bladder.



Fig. CCXXXV.

GENERA.

Sauvagesia, Linn.
Sauvagea, Neck.
Iron, P. Br.

Lavrada, Velloz.
Luxemburgia, St. Hil.
Plectanthera, Mart. et Zucc.

NUMBERS. GEN. 3. Sp. 15.

POSITION.—Violaceæ.—SAUVAGESIACEÆ.—Frankeniaceæ.
Hypericaceæ.

Fig. CCXXXV.—*Lavrada Vellozii*.—A. St. Hilaire. 1. an expanded flower; 2. the stamens with exterior petaloid scale; 3. a seed; 4. a section of it.

ORDER CXX. CRASSULACEÆ.—HOUSE-LEEKs.

Sempervivæ, *Juss. Gen.* 207. (1789).—Succulentæ, *Vent. Tabl.* 3. 271. (1799).—Crassulæ, *Juss. Dict. des Sc. Nat.* 11. 369. (1818).—Crassulaceæ, *DC. Bull. Philom.* n. 49. p. 1. (1801); *Fl. Fr. ed. 3. v. 4. p.* 271. (1805); *Mémoire* (1828); *Prodr.* 3. 381. (1828); *Endl. Gen. clix.*; *Meisn. p.* 134.—Sedææ, *Spreng.*

DIAGNOSIS.—*Violæ Exogens*, with polypetalous or monopetalous flowers, a many-leaved calyx, hypogynous petals, and follicular apocarpous fruit.

Succulent herbs or shrubs. Leaves entire or pinnatifid; stipules none. Flowers usually in cymes, sessile, often arranged on one side only, along the divisions of the cymes. Sepals from

3 to 20, more or less united at the base. Petals inserted in the bottom of the calyx, either distinct or cohering in a monopetalous corolla. Stamens inserted with the petals, either equal to them in number and alternate with them, or twice as many, those opposite the petals being shortest, and arriving at perfection after the others; filaments distinct, subulate; anthers of 2 cells, bursting lengthwise. Hypogynous scales several, 1 at the base of each carpel, sometimes obsolete. Carpels of the same number as the petals, opposite to which they are placed around an imaginary axis, 1-

celled, tapering into stigmas, sometimes consolidated; styles continuous with the ovaries; ovules sutural, 00, or definite in number, horizontal or pendulous, anatropal. Fruit consisting of several follicles, opening by the suture, or collected into a capsule of several cells opening at the back. Seeds attached to the margins of the suture, variable in number; embryo straight, in the axis of fleshy albumen, with the radicle pointing to the hilum.

All these plants are remarkable for the succulent nature of their stems and leaves, in which they resemble many other and very different Orders. De Candolle suggests that their real affinity is with Saxifrages through Penthorum, and with Knotworts (Illecebracæ) through Tillæa. In both those Orders the hypogynous scales of Houseleeks are wanting.



Fig. CCXXXVI.



1 Fig. CCXXXVII. 2

Are not these bodies analogous to the scales out of which the stamens of *Beaucarpis* spring? If so, an unsuspected affinity exists between these Orders. To me it appears that if we were to resolve the fruit of a *Sauvagesia*, or any other of this *Violal Alliance*, into its component parts, the result would be what we find in *Sedum* and *Crassula*. Eudlicher entertains a similar opinion, considering the *Houseleeks* certainly allied to *Turnerads*. De Candolle observes (*Mémoire*, p. 5.) that there is no instance of a double flower in the Order, although it might have been expected from their analogy in structure with *Cloverworts*. *Sempervivum tectorum* exhibits almost constantly the singular phenomenon of anthers bearing ovules instead of pollen. Adolphe Brongniart has remarked that in certain *Houseleeks* no medullary rays are to be found. He describes the woody cylinder of *Sempervivum* as consisting of little parcels of annular and spiral vessels immediately around the pith, on the outside of which are placed fusiform woody fibres with very fine 4-sided dots, arranged in radiating rows, and intermingled with some parcels of annular and reticulated vessels. These fibres are all in contact, are entirely destitute of medullary processes, and are only interrupted in order to leave a passage for the vascular bundles belonging to the leaves, and for the cellular tissue that accompanies them. M. Brongniart states, however, that this structure is not of constant occurrence in the Order of *Houseleeks*. On the contrary, he describes the *Crassula portulacacea* in the following words: "In this plant it may be said, notwithstanding the large size at which it arrives in a few years, that there is no woody zone at all; in it, that very hard tissue, which is found in regular concentric circles in other *Houseleeks*, and which consists of dotted woody fibre and vessels, is entirely wanting; the stem in fact contains nothing more than bundles of the medullary sheath, composed entirely of spiral vessels, false tracheæ, with annular and reticulated vessels; but these bundles increase and multiply, so that they may be from 40 to 50 in an old stem, while there is not more than 20 or 24 in a young branch. They then are 2 or 3 millimetres thick, in the direction of the rays, instead of half a millimetre. Finally, the cellular space which they surround, or the pith, itself augments from 4 or 5 millimetres to 3 or 4 centimetres. So that every part continues to grow, whether cellular or vascular; but the bundles of the medullary sheath, thus increased in number and size, still remain entirely composed of annular vessels or false spirals, without intermixture of woody fibre, and are separated by hard medullary processes. Thus we have in this Order an example of essential differences in the anatomical structure of the trunk."—*Obs. on Sigillaria*, *Arch. Mus.* 1. 437. Schleiden found in an old stem of an *Echeveria* an entire uniform mass of wood, formed of parenchyma without vessels, and scattered therein were vertical cords of very thin-sided parenchyma, in the midst of which ran spiral vessels, most of which might still be unrolled (*Wiegman*, 1839); and he suspects that it may belong to the whole of this Natural Order. I do not, however, find it in *Echeveria lurida*, whose succulent stem has a very large pith, and a ring of extremely imperfect wood, among which spiral vessels are distributed with great irregularity.

It appears, from De Candolle's researches, that of the 272 species of which he supposed the Order to consist, 133 are found at the Cape of Good Hope, 2 in South America beyond the tropics, 2 in the same country within the tropics, none in the West Indies or the Mauritian Islands, 8 in Mexico, 7 in the United States, 12 in Siberia, 18 in the Levant, 52 in Europe, 18 in the Canaries, 1 in Southern Africa beyond the limits of the Cape, 9 in Barbary, 3 in the East Indies, 4 in China and Japan, and 2 in New Holland. To these are to be added several species from the Himalayas. They are found in the driest situations, where not a blade of grass nor a particle of moss can grow, on naked rocks, old walls, sandy hot plains, alternately exposed to the heaviest dews of night and the fiercest rays of the noon-day sun. Soil is to them a something to keep them stationary, rather than a source of nutriment, which in these plants is conveyed by myriads of mouths, invisible to the naked eye, but covering all their surface, to the juicy beds of cellular tissue which lie beneath them.

Refrigerant and abstergent properties, mixed sometimes with a good deal of acridity, distinguish them. The fishermen of Madeira rub their nets with the fresh leaves of the *Ensião* or *Sempervivum glutinosum*, by which the nets are rendered as durable as if tanned, provided they are steeped in some alkaline liquor. Malic acid exists in *Sempervivum tectorum* combined with lime. *Kalanchoe brasiliensis* appears to form an exception to the general acrid and stimulating properties of the Order. The Brazilians use it as a refrigerant; and this is the common quality of the Order. *Sedum ochroleucum*, the *αἰζόων το μικρον* of Dioscorides, and *Sempervivum tectorum* are notable instances; *Sedum Telephium* is another, and also astringent: its leaves boiled in milk are used by country people in diarrhœa. Its acridity on the other hand gave its name to *Sedum acre*, a rubefacient emetic and purgative. *Bryophyllum calycinum* is considered a vul-

nerary. The herbage of *Crassula tetragona*, boiled in milk, is used at the Cape of Good Hope against dysentery; that of *Rhodiola rosea* is an esculent among the Greenlanders.

GENERA.

I. CRASSULÆ.

Tillæa, Mich.
Bulliarda, DC.
Helophytum, Eck. et Z.
Dasytemon, DC.
Telmisæa, Fenzl.
Septas, Linn.
Crassula, Haw.
Gomara, Adans.
Sarcotripes, Eck. et Zh.
Petrogiton, Eck. et Zh.
Tetraphyle, Eck. et Zh.
Disporocarpa, C.A.M.
Pyrgosca, Sweet.
Turgosca, Haw.

Globulea, Haw.
Thisantha, Eckl. et Zeyh.
Grammanthes, DC.
Vauanthes, Haw.
Cyrtogyne, Haw.
Rochea, DC.
Danielia, DC.
Larocœa, Haw.
Franciscaria, DC.
Franciscœa, DC.
Kalosanthes, Haw.
Dietrichia, Tratt.
Kalanchoë, Adans.
Verca, Willd.
Bryophyllum, Salisb.

Crassovia, Comm.
Physocalycium, Vest.
Cotyledon, DC.
Pistorinia, DC.
Umbilicus, DC.
Orostachys, Fisch.
Cotyle, DC.
Cotylephyllum, Link.
Mucizonia, DC.
Rosularia, DC.
Echeveria, DC.
Pachyphyllum, Kl.
Sedum, Linn.
Rhodiola, Linn.
Anacamperos, Tourn.

Procrassula, Gris.
Althales, Webb et Berth.
Sempervivum, Linn.
Jovibarba, DC.
Monanthes, DC.
Chronobium, DC.
Aichryson, Webb et B.
Æonium, Webb et Bth.
Greenovia, Webb et B.
Petrophyte, Webb et B.

II. DIAMORPHEÆ.

Diamorpha, Nutt.
Penthorum, Linn.

NUMBERS. GEN. 22. Sp. 450.

Caryophyllacæ.

POSITION.—Sauvagesiacæ.—CRASSULACEÆ.—Turneracæ.

Saxifragacæ.

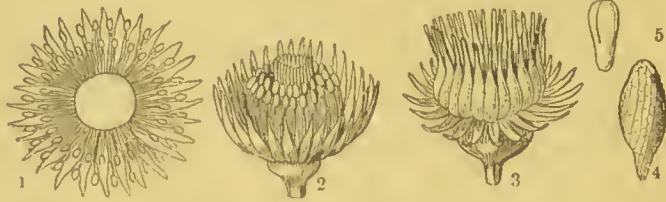


Fig. CCXXXVIII.

Fig. CCXXXVIII.—*Greenovia* (*Sempervivum aureum*).—Webb. 1. petals and stamens; 2. flower seen from one side; 3. ripe fruit; 4. seed; 5. its embryo.

ORDER CXXI. TURNERACEÆ.—TURNERADS.

Loasac, § of Turneraceæ, Kunth. *N. G. et. Sp.* 6. 123. (1823).—Turneraceæ, DC. *Prodr.* 3. 345.; *Endl. Gen. excilii.*; *Meisner*, p. 123.

DIAGNOSIS.—*Violæ Exogens*, with polypetalous flowers, perigynous contorted petals, forked styles and exstipulate leaves.

Herbaceous plants, having sometimes a tendency to become shrubby, with a simple or occasionally stellate pubescence. Leaves alternate, without stipules, most commonly with 2 glands on the petiole. Flowers axillary, their pedicel either distinct or cohering with the petiole; with 2 bractlets. Petals yellowish, rarely blue. Calyx inferior, often coloured, with 5 equal lobes, imbricated in æstivation, lined by a very thin plate. Petals 5, inserted into the tube of the calyx, equal, with a twisted æstivation. Stamens 5, inserted into the tube of the calyx below the petals, with which they are alternate; filaments distinct; anthers oblong, erect, 2-celled. Ovary superior, 1-celled, with 3 parietal placentæ; ovules 00, anatropal; styles 3, cohering more or less, and simple, split, branched or multifid at the apex. Capsule 3-valved, 1-celled, opening from the point about as far as the middle, the valves bearing the placentæ in their median line. Seeds with a thin membranous strophiole on one side, crustaceous, reticulated; embryo slightly curved, in the middle of fleshy albumen; radicle turned towards the hilum; cotyledons somewhat plano-convex, acquiring the texture of leaves when germinating.

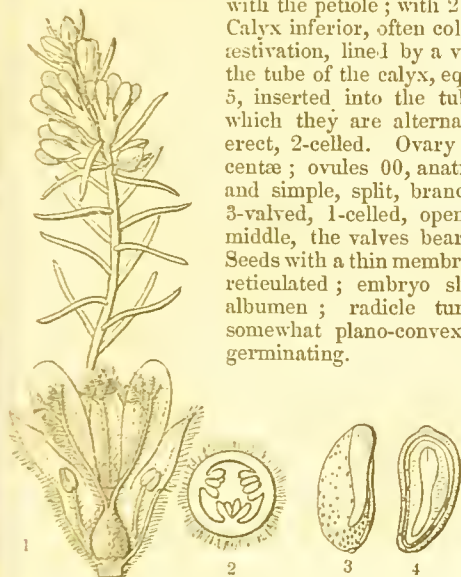


Fig. CCXXXIX.

of the radicle to the hilum, agreeing with them in habit. With Mallowworts the Order corresponds in the twisted æstivation of the corolla, and in habit. But with Passionworts and Loasads there is most in common: the presence of glands upon the ends of the petioles of Turnerads is a confirmation of their affinity to the former. They are distinguished from Loasads by their fruit being superior, and by their definite stamens; the former character is, however, weakened by the nearly superior fruit of some Loasads. The hypogynous petals of Frankeniads sufficiently distinguish that Order, to say nothing of their unguiculate petals. The forked styles of Turnerads are very peculiar.

Natives exclusively of the West Indies and South America. There seems no good reason for supposing *Turnera triouiflora* to be a native of Japan, as has been asserted.

The herbage of some of them is rather aromatic. *Turnera opifera* is astringent, and is employed in Brazil against dyspepsia.—*Martius*. *Turnera ulmifolia* is considered a tonic and expectorant.

GENERA.

Turnera, Plum.
Pumila, P. Br.
Bobadachia, Presl.

Piriqueta, Aubl.
Burghartia, Neck.
Burkartia, Scop.

NUMBERS. GEN. 2. Sp. 60.

Loasaceæ.

POSITION. Frankeniaceæ.—TURNERACEÆ.—Malesherbiaceæ.

Cistaceæ.

Fig. CCXXXIX. *Turnera tenuifolia*. *Et. Hill.* 1. a flower cut open; 2. a section of the ovary; 3. a seed. 4. a section of it.

ALLIANCE XXVII. CISTALES.—THE CISTAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, parietal or sutural placenta, and a curved or spiral embryo, with little or no albumen.*

If we consider the Violal Alliance to be closed by Turnerads, that of Cistals will necessarily commence with Rock Roses, which have much the habit of the former, but which are distinctly separated by their convolute embryo and orthotropal seeds, to say nothing of divers other characters. If the Rock Roses are regarded as an Order with indefinite stamens, they will join Capparids, but if the genera with definite stamens are assumed to be the point of departure onwards, then it is into Crucifers that the line will pass. The parietal placentation of Rock Roses is universal; and though the number of placenta is never reduced to two, yet if Fig. CCXII, 2, in the following page has one of its placenta removed and the other two brought into contact, we shall have the silicle of a Crucifer. There is no distinct passage from Crucifers into Weldworts, which may be regarded as an anomalous form of Capparids rather than in direct succession from Crucifers; but to Capparids themselves Crucifers pass by the whole division of Cleomæ among the former, some of which are actually hexandrous. The stipitate fruit of Capparids brings us easily to Sterculiads in the next Alliance.

Supposing these views to be just, then the mutual relation of the Orders included in the Cistal Alliance may be thus expressed:

Turneraceæ.—*Cistaceæ*: *Brassicaceæ*: *Capparidaceæ.*—*Sterculiaceæ.*
Resedaceæ.

NATURAL ORDERS OF CISTALS.

<i>Stamens not tetradynamous, generally indefinite. Flowers $\frac{3}{4}$ or $\frac{5}{4}$. Seeds with albumen. Fruit closed up</i>	}	122. CISTACEÆ.
<i>Stamens tetradynamous. Flowers $\frac{4}{4}$</i>		
<i>Stamens not tetradynamous, definite. Flowers not tetramerous. Seeds without albumen. Fruit usually open at the point</i>	}	124. RESEDACEÆ.
<i>Stamens not tetradynamous. Flowers $\frac{4}{4}$. Seeds without albumen. Fruit closed up</i>		
	}	125. CAPPARIDACEÆ.

ORDER CXXII. CISTACEÆ.—ROCK-ROSES.

Cisti, *Juss. Gen.* 294. (1789).—Cistoidæ, *Vent. Tabl.* 3. 219. (1799).—Cistineæ, *DC. Prodr.* 1. 233. (1824).—Cistaceæ, *Ed. Pr.* lxi. (1836); *Endl. Gen.* clxxxviii.; *Meisner*, p. 8; *Spach in Ann. Sc. n. s. 6.* 365.

DIAGNOSIS.—*Cistal Ecogens*, with trimerous or pentamerous flowers, stamens usually 00 and never tetradynamous, closed up fruit and albuminous seeds.

Shrubs or herbaceous plants. Branches often viscid. Leaves entire, opposite or alternate, stipulate or exstipulate, generally feather-veined, but sometimes fan-veined. Racemes usually unilateral. Flowers white, yellow, or red, very fugacious. Sepals 3-5, continuous with the pedicel, persistent, unequal, the three inner with a twisted æstivation. Petals 5, very rarely 3, hypogynous, fugitive, often crumpled in æstivation, and twisted in a direction contrary to that of the sepals. Stamens definite or indefinite, hypogynous, distinct; anthers 2-celled, opening longitudinally. Ovary free, 1- or many-celled; ovules orthotropal, (very rarely anatropal, *Spach*); style single; stigma simple. Fruit capsular, usually 3- or 5-valved, occasionally 10-valved, either 1-celled with parietal placenta in the axis of the valves, or imperfectly 5- or 10-celled with dissepiments proceeding from the middle of the valves, and touching each other in the centre. Seeds definite or 00. Embryo inverted, either spiral or curved, in the midst of mealy, or somewhat horny albumen. Radicle remote from the hilum.

These plants are perfectly distinguished from Violetworts, with which they were formerly confounded, by their annular and inverted embryo; from Bixids by this last character, by their mealy albumen, habit, and not having the leaves ever dotted; from Tutsans, by the latter character, and the structure of the fruit; they are also akin to Poppyworts by the genus *Dendromecon*. None of their affinities, or of others that may have been mentioned by other Botanists, appear, however, so strong as with Crucifers and Capparids, to which their curved embryo and parietal placentation bring the Rock Roses very near. From all the Cistal Alliance they are, moreover, known by the presence of albumen in some abundance.

A remarkable plant, found in Asia, Africa, and South America, and named *Cochlospermum*, seems to offer the most highly developed form of this Order, from which it differs in very little except its habit. Botanists usually place it in the Theads, but its parietal placenta, anisomerous flowers, and curved embryo lying in the midst of albumen, seem fatal objections to that association. In fact it has no resemblance to the



Fig. CCXL.

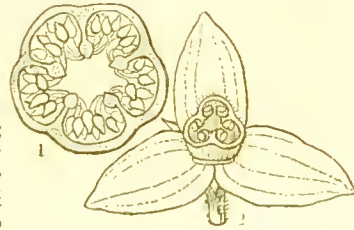


Fig. CCXLI.

Fig. CCXL.—*Cistus Berthelotianus*. 1. a vertical section of ovary and calyx; 2. a seed cut through; the pointed end being the true apex.

Fig. CCXLI.—1. a section of the ovary of *Cistus Berthelotianus*; 2. calyx and divided ovary of *Helianthemum canariense*.—*Webb*.

Theads except in its indefinite stamens. An anonymous writer in the *Linnaea*, whose views are often judicious, would place the Rock Roses in the neighbourhood of Mesembryaceæ, Nyctaginaceæ, and Polygonaceæ, and next Portulacaceæ: an opinion evidently formed upon the supposed importance of a curved embryo and mealy albumen.

South Europe and the north of Africa are the countries that Rock Roses chiefly inhabit. They are rare in North America, extremely uncommon in South America, and scarcely known in Asia.

The species have no marked properties, except that the resinous balsamic substance, called Ladanum, is obtained from *Cistus creticus*, and others; it has been much esteemed as a stimulant and emmenagogue; it has also been recommended in chronic catarrh. *Helianthemum vulgare* had once some reputation as a vulnerary, but it is now forgotten. The trunk of *Cochlospermum Gossypium* yields the gum Kuteera, which in the north-western provinces of India is substituted for Tragacanth.—*Royle*. A decoction of the roots of *Cochlospermum insigne*, called in Brazil *Butua do curvo*, is employed in internal pains, especially such as are produced by falls or accidents; it is also asserted to heal abscesses already commenced. *C. tinctorium* is used in cases of amenorrhœa, and also as a yellow dye.

GENERA.

<i>Fumana</i> , Spach.	<i>Stephanocarpus</i> , Spach.	<i>Argyrolepis</i> , Spach.	<i>Lechea</i> , Linn.
<i>Cistus</i> , Tournef.	<i>Helianthemum</i> , Tournef.	<i>Tuberaria</i> , Dun.	<i>Lechidium</i> , Spach.
<i>Halimium</i> , Dunal.	<i>Brachypetalum</i> , Dun.	<i>Lecheoides</i> , Dun.	<i>Hudsonia</i> , Linn.
<i>Ladanum</i> , Spach.	<i>Aphananthemum</i> , Sph.	<i>Crocanthemum</i> , Spach.	<i>Tæniostoma</i> , Spach.
<i>Rhodocistus</i> , Spach.	<i>Eriocarpum</i> , Dun.	<i>Heteromeris</i> , Spach.	<i>Cochlospermum</i> , Kunth.
<i>Erythroclistus</i> , Dunal.	<i>Pseudocistus</i> , Dun.	<i>Trichasterophyllum</i> , Willd.	<i>Wittelsbachia</i> , Mart.
<i>Ledonia</i> , Spach.	<i>Rhodax</i> , Spach.		<i>Maximiliana</i> , Schk.

NUMBERS. GEN. 7. Sp. 185.

Sterculiaceæ.

POSITION.—*Brassicaceæ.*—*CISTACEÆ.*—*Capparidaceæ.*

Hypericaceæ.

ORDER CXXIII. BRASSICACEÆ.—CRUCIFERS.

Crucifera, *Juss. Gen.* 237. (1789); *DC. Mémoire sur les Crucifères; Syst.* 2. 139; *Prodr.* 1. 131; *Barth. Ord. Nat.* 261; *Endl. Gen. clxxxi.*; *Meisner, Gen.* p. 9.

DIAGNOSIS.—*Cistul Exogens, with tetramerous flowers and tetradynamous stamens.*

Herbaceous plants, annual, biennial, or perennial, very seldom suffruticose. Leaves alternate. Flowers usually yellow or white, seldom purple, without bracts, generally in racemes. Sepals 4, deciduous, imbricate or valvate. Petals 4, cruciate, alternate with the sepals. Stamens 6, of which two are shorter, solitary, and opposite the lateral sepals; occasionally toothed; and four longer, in pairs, opposite the anterior and posterior sepals, generally distinct, sometimes connate, or furnished with a tooth on the inside. Disk with various green glands between the petals and the stamens and ovary. Ovary superior, unilocular, with parietal placentæ usually meeting in the middle, and forming a spurious dissepiment. Stigmas 2, opposite the placentæ. Fruit a silique or silicule, 1-celled, or spuriously 2-celled; 1- or many-seeded; dehiscing by two valves separating from the replum; or indehiscent. Seeds attached in a single row by a funiculus to each side of the placentæ, generally pendulous. Albumen none. Embryo with the radicle folded upon the cotyledons, which are occasionally slit or lobed.

This Order is among the most natural that are known, and its character of having what Linnæan Botanists call tetradynamous stamens is scarcely subject to exception. It has a near relation to Capparids, with which it agrees in the number of the stamens of some species of that Order, in the fruit having two placentæ and a similar mode of dehiscence, and in the quaternary number of the divisions of the flower. To Poppyworts it is thought to approach in the unusual number of the petals and in the structure of the fruit of some genera of that Order, such as *Glaucium* and *Chelidonium*; with the silique-fruited *Fumeworts* it has also some analogy, and even with the whole of that Order in the number of its petals, supposing the common opinion of the nature of the floral envelopes of *Fumeworts* to be correct, or in the binary division of its flower, from which the quaternary is only a slight deviation, upon the hypothesis I have suggested in speaking of that Order. But the totally different structure of the seed forbids *Crucifers* to be associated in the same group with the latter.

Crucifers may be said to be characterised by their deviation from the ordinary symmetry observable in the relative arrangement of the parts of fructification of other plants,—deviations which are of a very interesting nature. Their stamens are arranged thus:—two stand opposite each of the anterior and posterior sepals, and one opposite each of the lateral sepals; there being 6 stamens to 4 sepals, instead of either 4 or 8, as would be normal. Now in what way does this arise? Is the whorl of stamens to be considered double, one of the series belonging to the sepals, and one to the petals, and of these, a part imperfect? I am not aware of any such explanation having been offered, nor do I know of a better one. It appears to me that the outer series is incomplete, by the constant abortion of the stamens usually belonging to the anterior and



Fig. CCXLII.

Fig. CCXLII.—*Erucastrum Canariense.* 1. a flower; 2. the stamens; 3. the silique, with the valve separating from the replum; 4. a transverse section of a seed; 5. a perfect seed.

posterior sepals, the two pairs that remain belonging in fact to the four petals. But it is in their fruit that the great peculiarity consists.



Fig. CCXLIII.

Since the placentæ are opposite the lobes of the stigma in this Order, it is difficult to reconcile the fruit with any general theory of structure. Either it is in reality composed of four carpels, two of which are abortive, as was first suggested by me in the *Botanical Register*, fol. 1168, or each of the two lobes of the stigma is composed of two half lobes belonging to different carpels, as in Poppyworts. In any view, the dissepiment which cuts off the interior of the fruit into two cells must be considered spurious, and a mere expansion of the placentæ.

The opinions of Botanists are much divided as to this matter; M. Kunth agrees with me in considering the fruit composed of four carpels. And a variety of evidence has gradually collected in favour of this theory. M. Alph. De Candolle has shown that the common Wall-flower is occasionally 4-celled (*Monstruosités Végétaux*, 15. t. 5.) There is a genus called *Tetracellion*, which derives its name from the same circumstance. Mr. Barker Webb has published an account of a Canary shrub, named *Parolinia*, in which the valves are constantly extended into stigmas. But Mr. Howell (*Ann. N. Hist.* x. 254.) adopts Brown's view of the subject, and, because of the supposed affinity of Poppyworts, concludes that the fruit of Crucifers is only composed of two carpels. He does not, however, offer any direct proof of the correctness of this opinion.

Almost all Crucifers are destitute of bracts, and have the



Fig. CCXLIV.

Fig. CCXLIII.—1. *Cheiranthus cheiri*; 2. its stigma; 3. the same with one valve off; 4. a cross section of a seed; 5. a diagram to illustrate the position of the parts of the flower.

Fig. CCXLIV.—Fruits of *Parolinia ornata*, after *Webb*.

calyx imbricated in æstivation ; but Brown has noticed (*Denham*, p. 7.) that in *Savignya* and *Ricotia* it is valvate.

Linnaeus divided the Order, which is the same as his *Tetradynamia*, by the form of the fruit, under two heads, bearing the names of *Siliquosa* and *Siliculosa*. More recently divisions have been founded upon the nature of the plicature of the cotyledons and the position of the radicle with respect to them. It is difficult to say what degree of importance really deserves to be attached to these characters, which are however at present in general use.—See *Torrey in Ann. Lyc. N. York*, iv. 90.

This is an Order eminently European ; 166 species are found in northern and middle Europe, and 178 on the northern shore or islands of the Mediterranean ; 45 are peculiar to the coast of Africa, between Mogador and Alexandria ; 184 to Syria, Asia Minor, Tauria, and Persia ; 99 to Siberia ; 35 to China, Japan, or India ; 16 to New Holland and the South Sea Islands ; 6 to the Isle of France and the neighbouring Islands ; 70 to the Cape of Good Hope ; 9 to the Canaries or Madeira ; 2 to St. Helena ; 2 to the West Indies ; 41 to South America ; 48 to North America ; 5 to the islands between North America and Kamtchatka ; and 35 are common to various parts of the world. This being their general geographical distribution, it appears that, exclusive of species that are uncertain, or common to several different countries, about 100 are found in the southern hemisphere, and about 800 in the northern, or 91 in the New, and the rest in the Old World. Finally, if we consider them with regard to temperature, we shall find that there are,—

In the frigid zone of the northern hemisphere	205
In all the tropics (and chiefly in mountainous regions)	30
In the temperate zone	{ of the northern hemisphere 548 } . . . 634
	{ of the southern ditto . . . 86 }

Such were the calculations of De Candolle in 1821. Although requiring considerable modification, especially in the Asiatic and North American numbers, which are much too low, they serve to give a general idea of the manner in which this Order is dispersed over the globe.

The universal character of Crucifers is to possess antiscorbutic and stimulant qualities, combined with an acrid flavour. The officinal species are among the commonest of all plants, and only require to be named. They are found to contain a great deal of nitrogen, to which it is supposed is due their animal odour when rotting. Mustard, Cress, Horseradish, and many others, are extremely stimulating and acrid. The seeds of *Sinapis chinensis* are considered by Hindoo and Mahometan practitioners as stimulant, stomachic, and laxative. The seeds of one species of *Arabis* (*chinensis*, *Rottler*) are prescribed by the Indian doctors as stomachic and gently stimulant ; but they apprehend its bringing on abortion if imprudently given. When the acrid flavour is dispersed among an abundance of mucilage, various parts of these plants become a wholesome food ; such as the root of the Radish and the Turnip, the herbage of the Water-cress, the Cabbage, and the Sea-kale. According to Muller the Water-cress contains iodine. Sulphur exists in the oils of Mustard and Horseradish to the extent of about 30 per cent.—*Ch. Gaz.* 1843, p. 674. The oil of the seeds is one of their more important products. That from Rape is in very general use, and the residue, rich in nitrogen, is largely employed by the farmer as manure, or cattle feed, under the name of Oil-cake. Another of the oil plants is *Camelina*



Fig. CCXLV.

sativa, or Gold of Pleasure ; but its cake is said to be too acrid for cattle, (*Gardeners' Chronicle*, 1843, p. 678 ;) brooms are made from the dry haulm. *Cochlearia officinalis*, or Scurvy-grass was once in great repute as an antiscorbutic. It is stimulant and diuretic if eaten fresh, but becomes inert when dried. *Cardamine pratensis* is said to

Fig. CCXLV.—*Anastatica hierochuntina*.

be stimulant, diaphoretic and diuretic. The dried flowers have been a popular remedy for epilepsy in children. The great fleshy root of *Crambe tatarica*, sometimes called Tartar bread, is eaten in Hungary, peeled and sliced with oil, vinegar, and salt, or even when boiled. *Isatis tinctoria*, or Woad, was formerly a favourite blue dye in this country. Numerous species are celebrated for their beauty, of which the Wall-flower, Stock, Honesty, and Rocket, are every-day examples. Finally, one of the Order possesses strongly-marked hygrometrical qualities. This plant, the *Anastatica hierochuntina* or Rose of Jericho, is an annual, found wild in the Egyptian deserts, and when full grown contracting its rigid branches into a ball, which is soon caught up by the wind and hurried from place to place. But as soon as it is exposed to water the branches relax and spread flat, as if its life was renewed. Some superstitious tales are told of it, among which it is said to have first bloomed on Christmas eve, to salute the birth of the Redeemer, and paid homage to His resurrection by remaining expanded till Easter.—See *Gardeners' Chronicle*, 1842, p. 363.

GENERA.

I. PLEURORHIZÆ.

(0 =).
ARABIDÆ.
Matthiola, R. Br.
Leucoium, Mönch.
Pachynotum, DC.
Luparia, DC.
Pinnaria, DC.
Acinotum, DC.
Triceras, Andrzejew.
Notoceras, R. Br.
Dicercatium, Ait.
Parolinia, Webb.
Andrzejewskya, Reichenb.
Macroceratium, DC.
Cheiranthus, R. Br.
Schelhammeria, Herit.
Cheiri, Adans.
Ptilostylis, Andr.
Dichroanthus, Webb et Ber.
Jodanthus, Torr. et A. Gr.
Clausia, Troltzk.
Oudneya, R. Br.
Nasturtium, R. Br.
Cardaminum, Mönch.
Sisymbrium, Magnol.
Iacumerta, Fl. Wetter.
Brachylobos, Allion.
Radicula, Dill.
Roripa, Scop.
Caroli-Gmelina, Fl. Wetter.
Clandestinaria, DC.
Barbarea, R. Br.
Streptanthus, Nutt.
Euclesia, Nutt.
Turrilis, Dill.
Pachyneurum, Bung.
Arabis, Linn.
Abazicarpus, Andr.
Campylocarpus, C. A. M.
Turrilella, C. A. M.
Cardaminopsis, C. A. M.
Leptostylis, C. A. Mey.
Calalobus, C. A. Mey.
Stevenia, Fisch. et Adam.
Parrya, R. Br.
Neuroloma, Andr.
Leisopora, C. A. Mey.
Ermannia, Cham.
Phenicaulis, Nutt.
Macropodium, R. Br.
Cardauine, Linn.
Pteroneuron, DC.
Dentaria, Tournef.
Leavenworthia, Torr.
ALYSSIDÆ.
Lunaria, Linn.
Brachypus, Led.
Ricotia, Linn.
Scopolia, Adans.
Parsetia, Torr.
Alyssum, Adans.

Cyclocarpæa, DC.
Fibigia, Medik.
Menocous, Desv.
Berteron, DC.
Alysson, Medik.
Mönchia, Roth.
Stevensia, Andr.
Aubrietia, Adans.
Vesicaria, Lam.
Alyssoides, Medik.
Physaria, Nutt.
Coluteocarpus, Boiss.
Glyce, Lindl.
Koniga, Adans.
Clypeola, Neck.
Ocladenia, R. Br.
Lobularia, DC.
Schiwreckia, Andr.
Aurinia, Desv.
Psilonema, C. A. Mey.
Alyssum, Linn.
Adyson, Scop.
Odontarrhena, C. A. Mey.
Ptilotrichum, C. A. Mey.
Clypeola, Linn.
Fossclinia, Scop.
Jouthlaspi, Tournef.
Orium, Desv.
Bergeria, Desv.
Peltaria, Linn.
Bohatschia, Crantz.
Petrocallis, R. Br.
Zizia, Roth.
Draba, Linn.
Odontocyclus, Turcz.
Erophila, DC.
Gansblum, Adans.
Cochlearia, Linn.
Rhizobotrya, Tausch.
Kernera, Medik.
Armoracia, Rupp.
Raphanis, Mönch.
Grællsia, Boiss.
TETRAPOMIDÆ, Turcz.
Holargidium, Turcz.
Tetraponia, Turczan.
Tetracellion, Turczan.
SELENIDÆ.
Selenia, Nutt.
THLASPIDÆ.
Didymophysa, Boiss.
Thlaspi, Dillen.
Pachyphragma, DC.
Pterolobium, Andr.
Carpoceras, Link.
Nomisna, DC.
Neurotropis, DC.
Pterotropis, DC.
Lyrocarpa, Harr.
Brossardia, Boiss.
Toesdalia, R. Br.
Guepina, Bart.
Iberis, Linn.
Arabis, Adans.

Pseudo-Thlaspi, Magn.
Thlaspidium, Andr.
Cynocardanum, Webb et Berth.
Heldreichia, Boiss.
Zygopeltis, Fenzl.
Biscutella, Linn.
Jondraba, Medik.
Thlaspidium, Medik.
Dithyrea, Harr.
Diastrophis, Fisch. et Mey.
Megacarpa, DC.
Creularia, Boiss.
Moriera, Boiss.

CRENOLOMIDÆ.
Crenolobus, DC.
Menonvillea, DC.
ANASTATICIDÆ.
Moretia, DC.
Nectouxia, DC.
Anastatica, Gärtn.
Hierocentis, Adans.

RUGLIDIDÆ.
Enclidium, R. Br.
Soria, Adans.
Ochthodium, DC.
Bnias, Desv.

CAKILIDÆ.
Cakile, Tournef.
Chorispora, DC.
Chorispermum, R. Br.
Corlylocarpus, Desf.

II. NOTORHIZÆ.

(0!).
SISYMBRIDÆ.
Malcolmia, R. Br.
Citharella, Bung.
Hesperis, Linn.
Hesperidium, DC.
Deilosma, Andr.
Arabidium, C. A. Mey.
Plagioloba, C. A. Mey.
Dontostemon, Andr.
Androskia, DC.
Hesperidopsis, DC.
Tonguea, Endl.
Pachypodium, Webb et Berth.
Sisymbrium, Linn.
Erysimum, Tournef.
Velarum, DC.
Kluckia, Andr.
Chamaepium, Wallr.
Norta, Adans.
Psilostylum, DC.
Leptocarpea, DC.
Descarainia, Webb et Berth.
Descurea, Guett.
Sophia, Hall.
Inguentia, Reichenb.
Kibera, Adans.
Albaria, Adans.

Arabidopsis, DC.
Halmolobus, Tausch.
Drabopsis, Koch.
Tropidocarpum, Hook.
Erysimum, Linn.
Agonolobus, C. A. Mey.
Cuspidaria, Link.
Chiroopsis, C. A. Mey.
Cheirinia, Link.
Erysimastrum, C. A. M.
Coringia, Heist.
Gorinkia, Presl.
Crantzia, Lagasc.
Tetracme, Bung.
Tetracratum, DC.
Smelowskia, C. A. Mey.
Taphrospermum, C. A. M.
Braya, Sternb. et Hopp.
Syrenopsis, Jaub.
Leptalenn, DC.
Christolea, Camb.
Thelypodium, Endl.
Pachypodium, Nutt.
Stanleya, Nutt.
Podolobus, Rafin.
Warea, Nutt.

CAMELINIDÆ.
Syrenia, Andr.
Stylonema, DC.
Menkea, Lehm.
Camelina, Crantz.
Myagrum, DC.
Leiolobium, DC.
Stenopetalum, R. Br.
Endema, H. B. K.
Mathewsia, Hook.
Platypetalum, R. Br.
Eutrema, R. Br.
Aphragmus, Andr.
Orobium, Reichenb.
Oreas, Cham.
Platyspermum, Hook.

LEPIDIDÆ.
Capsella, Vent.
Marsycarpus, Neck.
Rodschedia, Gärtn.
Bursa, Guett.
Hymenolobus, Nutt.
Ionopsidium, Reichenb.
Bivonæa, DC.
Eunomia, DC.
Hutchinsia, R. Br.
Nocca, Reichenb.
Nasturtiolum, Gray.
Iberidella, Boiss.
Lepidium, R. Br.
Kandis, Adans.
Cardaria, Desv.
Cardiopsis, Wallr.
Jundzillia, Andr.
Ellipsaria, DC.
Bradyptium, DC.
Cardamon, DC.
Nasturtium, Berth.

Lepia, Desv.
Lasioptera, Andr.
Dileptium, Raf.
Nasturtioides, Medik.
Senckenbergia, Fl. Wet.
Lepidiastrum, DC.
Physolepidium, Schrk.
Hymenophysa, C. A. Mey.
Æthionema, R. Br.
Campyloptera, Boiss.
Hexaptera, Hook.
♀ Displettophorus, Lehmn.
 ISATIDÆ.
Tetrapterygium, Fisch. et Mey.
Isatis, Linn.
Glastum, DC.
Sameraria, Desv.
Pachypterygium, Bunge.
Pachypteris, Kar.
Tauscheria, Fisch.
Chastoloma, Bunge.
Texteria, Jaub.
Glastaria, Boiss.
Boreava, Jaub.
Neslia, Desv.
Vogelia, Med.
Rapistrum, Hall.
Myagrum, Tournef.
Deltocarpus, Herit.
Sinistrophorum, Schrk.
Traillia, Lindl.
Lachnoloma, Bunge.
 ANCHONIDÆ.
Goldbachia, DC.

Anchonium, DC.
Sterigma, DC.
Stenigmoneumon, M. B.
Anthrolopus, Stev.
Morisia, Gay.
Cryptospora, Kar.
 III. ORTHOPOCEÆ.
 (0 > >).
 BRASSICIDÆ.
Sinapideudrou, Low.
Disaccium, DC.
Brassica, Linn.
Brassica, Tournef.
Rapa, Tournef.
Napus, Tournef.
Sinapis, Tournef.
Sinapistrum, Reichnb.
Rhamphospermum, Andr.
Bonania, Presl.
♀ Hirschfeldia, Mönch.
Douepea, Cambess.
Erucastrum, Presl.
Micropodium, DC.
Güntheria, Andr.
Orychophragmus, Bunge.
Moricandia, DC.
Diploxaxis, DC.
Eruca, Tournef.
Euzomum, Link.
 VELLIDÆ.
Vella, DC.
Boleum, Desv.
Stroganovia, Kar.
Stubendorfia, Schr.

Currichterera, DC.
Suceowia, Medik.
Saviguya, DC.
 PSYCHIDÆ.
Schouwla, DC.
Psychine, Decf.
 ZILLIDÆ.
Zilla, Forsk.
Muricaria, Desv.
Calepina, Adans.
 RAPHANIDÆ.
Crambe, Tournef.
Rapistrum, Boerh.
Schrankia, Medik.
Condylocarya, Bess.
Arthrolobus, Andr.
Didesmus, Desv.
Euarthrocarpus, Labill.
Raphanistrum, Tournef.
Dondisia, Neck.
Ormycarpus, Neck.
Durandea, Delarbr.
Raphanus, Tournef.
 FORTUYNIDÆ, Boiss.
Fortuynia, Shutt.
 IV. SPIROLOBEÆ.
 (0 |||).
 BUNIADÆ.
Bunias, R. Br.
Erucago, DC.
Lælia, Adans.
 ERUCARIDÆ.
Erucaria, Gärtn.
Cycloptychis, E. M.

V. DIPLECOLOBEÆ
 (0 ||||).
 SENEBIERIDÆ.
Senebiera, Poir.
Nasturtiolum, Medik.
Carava, Medik.
Coronopus, Hall, DC.
Cotyliscus, Desv.
Monoploca, Bunge.
Cycloptychis, E. M.
Brachycarpea, DC.
 SUBULARIDÆ.
Subularia, DC.
Consana, Adans.
 HELIOPHILIDÆ.
Heliphila, N. Burm.
Trentepohlia, Roth.
Carponima, DC.
Leptormis, DC.
Ormiscus, DC.
Sclenocarpea, DC.
Orthocelis, DC.
Pachystylum, DC.
Lanecolaria, DC.
Carpopodium, DC.
Chamira, Thunb.
 SCHIZOPETALIDÆ.
Schizopetalon, Hook.
Peyreymondia, Barnéoud.
 ?*Redowskia*, Cham. et Sch.
Schimpera, Stud. et Hoch.
Discoovium, Raf.

NUMBERS. GEN. 173. Sp. 1600.

Papaveraceæ.

POSITION.—Cistaceæ.—BRASSICACEÆ.—Capparidaceæ.

Fumariaceæ.

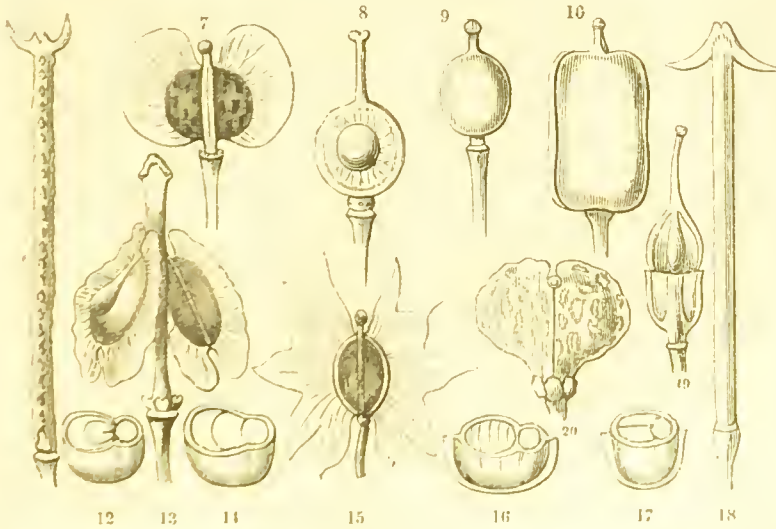


Fig. CCXLVI.

Fig. CCXLVI.—Fruits of various genera. 6, silique of *Mathiola livida*; 7, silicle of *Thlaspi latifolium*; 8, silicle of *Alyssum spatulatum*; 9, silicle of *Schivereckia podolica*; 10, silicle of *Farsolia*; 12, seed of *Didesmus Ægypticus* cut across; 13, silicle of *Menouvillea linearis*; 14, seed of *Lepidium africanum*; 15, silicle of *Æthionema cristatum*; 16, seed of *Heliphila erithimifolia*; 17, seed of *Mathiola oxyceras*; 18, silique of *Mathiola oxyceras*; 19, silicle of *Didesmus Ægypticus*; 20, silicle of *Senebiera serrata*.

ORDER CXXIV. RESEDACEÆ.—WELDWORKS.

Resedaceæ, *DC. Théor. cd. 1. 214. (1813)*; *Aug. de St. Hil. Ann. Soc. Roy. Orl. vol. 13.*; *Endl. Gen. clxxxiii.*; *Meisner, Gen. p. 18*; *Wight Illustr. 1. 36.*

DIAGNOSIS.—*Cistal Exogens, with definite not tetradynamous stamens, not tetramerous flowers, exalbuminous seeds, and fruit usually open at the point.*

Soft herbaceous plants, or in a few instances small shrubs, with alternate entire or pinnately divided leaves, and minute gland-like stipules. Flowers in racemes or spikes.

Calyx many-parted. Petals broad fleshy plates, having lacrated appendages at the back, unequal. Disk hypogynous, 1-sided, glandular. Stamens definite, inserted into the disk; filaments erect; anthers 2-celled, opening longitudinally. Ovary sessile, 3-lobed, 1-celled, many-seeded, scarcely closed, usually with 3-6-parietal placenta, sometimes surrounding a free central ovule-bearing body. Stigmas 3, glandular, sessile. Ovules amphitropal or campulitropal. Fruit dry and membranous, or succulent, opening at the apex; or apocarpous, with empty carpels surrounding a central placenta; or even hooded and 1-seeded. Seeds several, reniform; embryo taper, arcuate, without albumen; radicle next the hilum.

The flowers of these plants, of which the common Mignonette may be taken as the type, differ in many respects from those of other Orders, especially in the presence of a very large glandular 1-sided plate, out of which the stamens grow, and in the petals bearing a great resemblance to that disk. This led me, in the *Collectanea Botanica*, and in the first edition of this work, to describe the structure of Weldworks, as consisting of an apparent calyx which was really an involucre, while the petals are abortive male flowers, and the disk a calyx of one central bisexual flower. I am, however, now convinced, by the arguments of Heuslow, that this theory was erroneous, and I accordingly revert to the old view of the organisation and affinities of the Order. These latter are chiefly with Capparids, with which the seeds, the great disk out of which the stamens arise, and the parietal placenta, agree.

All these plants are weeds inhabiting Europe, the adjoining parts of Asia, the basin of the Mediterranean, and the adjacent islands. A very few occur in the North of India, the Cape of Good Hope, and California.

Little more is known of their uses than that *Reseda luteola*, called Weld, yields a yellow dye, and that the Mignonette (*R. odorata*) is among the most fragrant of plants. They were once regarded as sedative, as is indicated by the word *Reseda*. They are generally sub-acrid; nevertheless *Reseda Phyteuma*, the *ὄχλιστα* of the modern Greeks, is eaten as a kitchen esculent in the Greek Archipelago.

GENERA.

Ochradenus, Delil.
Reseda, Linn.
Lulcola, Tournef.

Eresda, Spach.
Oligomeris, Cambess.
Resedella, Webb et B.

Elimia, Nutt.
Holopetalum, Turcz.
Astrocarpus, Neck.

Sesamoides, Tournef.
Sesamella, Reichenb.
Caylusea, St. Hil.

NUMBERS. GEN. 6. Sp. 41.

POSITION.—RESEDACEÆ.—Capparidaceæ.

Fig. CCXLVII.—*Reseda mediterranea*. 1. a flower seen from above, much magnified; 2. a section of the same, showing the great disk on one side of the ovary, and within which the stamens arise; 3. a cross section of the ovary; 4. a seed; 5. a section of it.

ORDER CXXV. CAPPARIDACEÆ.—CAPPARIDS.

Capparidææ, *Juss. Gen.* 242. (1789); *Ann. Mus.* 18. 474; *DC. Prodr.* 1. 237; *Endl. Gen.* clxxxii; *Meisner, Gen.* p. 17; *Wight. Illustr.* 1. 33.

DIAGNOSIS.—*Cistal Exogens*, with stamens not tetradynamous, tetramerous flowers, exalbuminous seeds, and a closed up fruit.

Herbaceous plants, shrubs, or even trees, without true stipules, but sometimes with spines in their place. Leaves alternate, stalked, undivided, or palmate. Flowers soli-

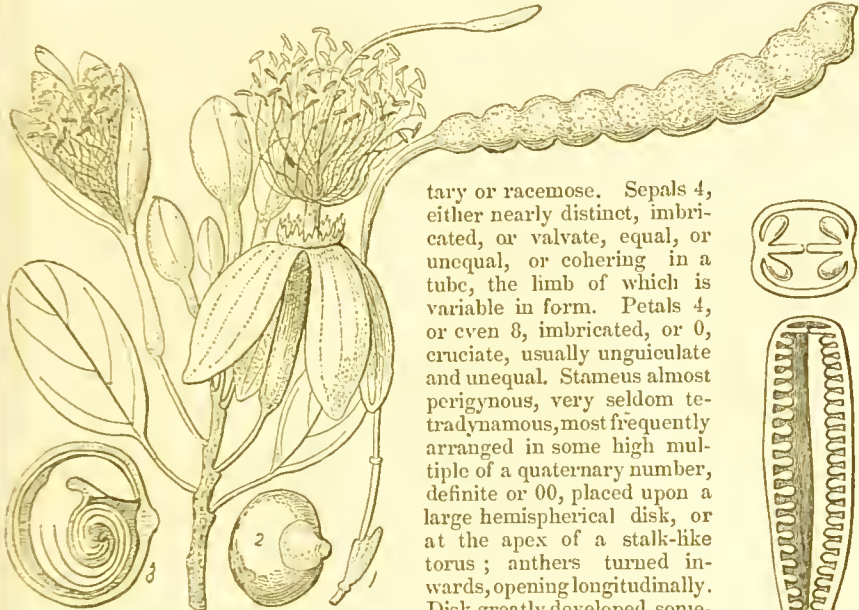


Fig. CCXLVIII.

cal, roundish, or stalk-like body, sometimes as a nectariferous glandular plate of various forms, sterile on one side and anther-bearing on the other. Ovary stalked, or sessile, 1-celled, with 2 or more parietal placentæ; ovules amphitropal or campylotropal; style 0, or filiform; stigma generally round. Fruit either podshaped and dehiscent, or baccate, 1-celled, very rarely 1-seeded, most frequently with polyspermous placentæ. Seeds generally reniform, without albumen, but with the lining of the testa tumid, attached to the margin of the valves; embryo curved; cotyledons foliaceous, flattish; radicle taper, short or long, turned to the hilum.

Distinguished from Crucifers by their stamens being often indefinite, if definite never tetradynamous, or scarcely ever, and by their reniform seeds. They are related to Passionworts in their stipitate ovary, and fleshy indehiscent fruit with parietal polyspermous placentæ; and to Bixads in the structure of their fruit, parietal placentæ, and indefinite stamens; from these last they are known by their narrow placentæ, exalbuminous seeds, and peculiar habit; and from the former by a number of obvious characters. Brown remarks (*Denham*, 15,) that some species of Capparids, of which *C. spinosa* is an example, have as many as β placentæ. Aug. de St. Hilaire and Moquin Tandon state that Capparids are referable to a tetrandrous type, which is very possible. But the explanation they give, or the proofs they offer of this, are less clear than could be desired. (See *Ann. des Sc.* 20. 321.)

Capparids are chiefly found in the tropics and in the countries bordering upon them, where they abound in almost every direction. Of the capsular species, a single one, *Cleome violacea*, is found in Portugal; another, *Polanisia graveolens*, occurs as far to the north as Canada; and one or two others are met with in the southern provinces of the United States. Of the fleshy-fruited kinds, the common Caper, *Capparis spinosa*, a native of the most southern parts of Europe, is that which approaches the nearest to the north. Africa abounds in them.

tary or racemose. Sepals 4, either nearly distinct, imbricated, or valvate, equal, or unequal, or cohering in a tube, the limb of which is variable in form. Petals 4, or even 8, imbricated, or cruciate, usually unguiculate and unequal. Stamens almost perigynous, very seldom tetradynamous, most frequently arranged in some high multiple of a quaternary number, definite or ∞ , placed upon a large hemispherical disk, or at the apex of a stalk-like torus; anthers turned inwards, opening longitudinally. Disk greatly developed, sometimes as a fleshy, hemispherical



Fig. CCXLIX.

Fig. CCXLVIII.—*Mearia angolensis*.—*Delessert*. 1. a ripe fruit; 2. a seed; 3. a section of it.
Fig. CCXLIX.—*Capparis Sinclairii*. 1. a transverse; 2. a longitudinal section of its ovary.

De Candolle compares Capparids with Crucifers in regard to their sensible qualities ; and they no doubt resemble each other in many respects ; for instance, the flower-buds of the Caper (*Capparis spinosa*, *rupestris* in Greece, *Fontanesii* in Barbary, and *egyptiaca* in Egypt) are stimulant, antiseorbutic, and aperient, and form a well-known pickle ; the bark of the root passes for a diuretic ; and some species of *Cleome* and *Polanisia* have a pungent taste, like that of mustard ; the root of *Cleome dodecaedra* is used as a vermifuge in the United States. The bark of the root of *Cratæva gynandra* (the Garlick Pear) blisters like *Cantharides* ; so does that of *Capparis cynophallophora*, *amygdalina*, and *ferruginea*. *Polanisia icosandra* acts as a vesicatory, and is used in Cochin China as a sinapism. But on the other hand the pungent principle becomes in some cases so concentrated as to be dangerous. *Colicodendron* Yeo is said by Martius to be dangerous to mules and horses. There is a plant called *Fruta de Burro*, found in the neighbourhood of Carthage, the fruit of which is extremely poisonous ; it is supposed to be a species of *Capparis*, nearly allied to the *C. puleherrina* of Jacquin ; and must not be confounded with the *Fruta del Burro* of Humboldt, found in Guiana, which is a valuable medicinal plant, belonging to Anonads. Although they are in general plants of small dimensions, yet from *Cratæva exelsa* the people of Madagascar, who call it *Vouëu pouën*, cut planks as much as four feet broad,



Fig. CCXLIX. bis.

according to Bojer.—*Ann. Sc. N. N. S.* xx. 58. The bruised leaves of *Cratæva Tapia* are used in Brazil against inflammation ; its bark is bitter and tonic. *Capparis Sodada* has a narcotic odour, and its acrid stimulating fruits are employed by women to produce fecundity. The root of *Cadaba indica* is said to be aperient and anthelmintic. The juicy berries of *Cratæva Nurvala* are said to be agreeable.

GENERA.

I. CLEOMEÆ.—Fruit a capsule.	<i>Polanisia</i> , Raf.	<i>Desmocarpus</i> , Wall.	<i>Utrerveria</i> , Bert.
<i>Cleomella</i> , DC.	<i>Corynandra</i> , Schrad.	<i>Thylacium</i> , Lour.	<i>Breyniastrum</i> , DC.
<i>Gynaudropsis</i> , DC.	<i>Raimanissa</i> , Endl.	<i>Niebulria</i> , DC.	<i>Breynia</i> , Plum.
<i>Gymnagonia</i> , R. Br.	<i>Cyrbasim</i> , Endl.	<i>Boscia</i> , Lam.	<i>Busbeckea</i> , Endl.
<i>Cleome</i> , DC.	<i>Cristatello</i> , Nutt.	<i>Podoria</i> , Pers.	<i>Morisonia</i> , Plum.
<i>Sinapistrum</i> , Mönch.	<i>Isomeris</i> , Nutt.	<i>Streblocarpus</i> , Arnott.	<i>Cratæva</i> , Linn.
<i>Pedicellaria</i> , DC.	<i>Dipterygium</i> , Decaisne.	<i>Maerua</i> , Forsk.	<i>Othrys</i> , Noronh.
<i>Ataluta</i> , Nutt.	<i>Pteroloma</i> , St.	<i>Colicodendron</i> , Mart.	<i>Ritchiea</i> , R. Br.
<i>Peritoma</i> , DC.	II. CAPPARIDÆÆ.—Fruit a berry.	<i>Calanthea</i> , DC.	<i>Steriphoma</i> , Spreng.
<i>Siliquaria</i> , Forsk.	<i>Schepperia</i> , Neck.	<i>♀ Quadrella</i> , DC.	<i>Rümericia</i> , Tratt.
<i>Roridula</i> , Forsk.	<i>Macromerum</i> , Burch.	<i>Capparis</i> , Linn.	<i>Stephania</i> , Willd.
<i>Rorida</i> , Röm. et Sch.	<i>Atamisquea</i> , Miers.	<i>Sodada</i> , Forsk.	<i>Tovaria</i> , Rutz et Pav.
<i>Dactylæna</i> , Schrad.	<i>Cadaba</i> , Forsk.	<i>Homback</i> , Adans.	<i>? Siugana</i> , Aubl.
<i>Physostemon</i> , Mart. et Zucc.	<i>Stromia</i> , Vahl.	<i>Lindackeria</i> , Sieb.	<i>Sterbeckia</i> , Schreb.
		<i>Capparidastrium</i> , DC.	<i>? Hermupoa</i> , Liff.
		<i>Cynophalla</i> , DC.	<i>? Roydsia</i> , Roxb.

NUMBERS. GEN. 28. Sp. 340.

POSITION.—*Brassicacea*.—CAPPARIDACEÆ.—*Resedacea*.
Flacourtiacea.

Fig. CCXLIX. bis.—*Physostemon lanceolatum*. 1. a flower of the natural size ; 2. the calyx, stamens, and ovary ; 3. the ripe fruit, with one valve separating ; 4. a seed ; 5. the same cut vertically, to show the incurved embryo.

ALLIANCE XXVIII. MALVALES.—THE MALVAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, axile placentæ, valvate calyx, an imbricated or twisted corolla, definite or ∞ stamens, and embryo with little or no albumen.*

This Alliance is little else than the old Order of Malvæ or Columniferæ, with the addition of Indian Cresses and Vivianiads. The limit of it is determined by the valvate calyx in combination with a twisted or much imbricated corolla, if any corolla is present. The Sterculiads, with their long-stalked ovary, indicate an approach to the very edge of Capparids, whose calyx is sometimes valvate; and at the other end of the series Lindenblooms are not unaptly brought into contact with the Poreworts (Tremandræceæ), which are also valvate.

It is not, however, with Sapindals that Malvals are most allied; they claim a much nearer affinity to Geranials, which differ in their imbricated calyx more than in any thing else, and to which the Indian Cresses form a direct transition. But I have not succeeded in bringing together the Alliances of Hypogynous Exogens, so as to allow Geranials to follow or precede Malvals. There is also another kind of relationship on the part of Malvals, equally strong, and equally impossible to describe lineally; namely, with Spurgeworts, which Sterculiads and Byttneriads (especially the latter) quite touch at several points.

The real position of the Malval Alliance may therefore be expressed somewhat in the following manner:—

Sterculiaceæ.—Byttneriaceæ.—Vivianiaceæ.—Tropæolaceæ.—Malvaceæ.—Tiliaceæ.
Euphorbiaceæ. Geraniaceæ.

NATURAL ORDERS OF MALVALS.

- Stamens columnar, all perfect. Anthers 2-celled, turned outwards.* 126. STERCULIACEÆ.
- Stamens monadelphous, in most cases partly sterile. Anthers* } 127. BYTTNERIACEÆ.
- 2-celled, turned inwards.* }
- Stamens free. Disk none. Seeds with albumen. Embryo curved.* } 128. VIVIANIACEÆ.
- Petals permanent. Calyx ribbed.* }
- Stamens free. Disk none. Seeds without albumen. Embryo* } 129. TROPÆOLACEÆ.
- amygdaloid* }
- Stamens columnar, all perfect. Anthers 1-celled, turned inwards.* . 130. MALVACEÆ.
- Stamens free, on the outside a disk. Seeds with albumen. Embryo* } 131. TILIACEÆ.
- straight.* }

ORDER CXXVI. STERCULIACEÆ.—STERCULIADS.

Sterculiaceæ, *Vent. Malm.* 2. 91. (1799); *Endl. Meletem.* p. 30.; *Gen. cœx.*; *Meisner, Gen.* p. 28.—*Bombacææ, Kunth. Diss. Malv.* p. 5. (1822); *DC. Prodr.* 1. 475.; *A. St. Hilaire Fl. Br. Merid.* 1. 275; *Ed. pr. No. 26.* (1830); *Wight Illustr.* 1. p. 66.

DIAGNOSIS.—*Malval Exogens with columnar stamens all perfect, and 2-celled anthers turned outwards.*

Large trees or shrubs. Hairs, if present, stellate. Leaves alternate, simple or compound, sometimes digitate, often toothed, with free deciduous stipules. Inflorescence variable. Flowers regular or irregular, frequently ♂ ♀ by abortion. Calyx either naked or surrounded with an involucre, consisting of 5 sepals, more or less united at the base, with a valvate or nearly valvate æstivation, except where the calyx is irregularly ruptured. Petals 5, (or none), hypogynous, convolute in æstivation. Stamens indefinite, monadelphous in various ways; anthers 2-celled, turned outwards, sometimes anfractuose. Pistil consisting of 5, or rarely 3, carpels, either distinct or cohering into a single ovary, often seated upon a column-like axis. Styles equal in number to the carpels, distinct or united; ovules orthotropical or anatropal, erect if definite; sometimes indefinite. Fruit capsular, with 3 or 5 cells, or even drupaceous or berried, or composed of distinct foliicles, opening by the ventral suture long before the ripening of the seeds. Seeds ovate or angular, sometimes winged or woolly; albumen oily or fleshy, rarely wanting; embryo straight or curved; cotyledons either foliaceous, flat, and plaited, or rolled round the plumule, or else very thick, but this only in the seeds without albumen; radicle next the hilum, or at the opposite end of the seed, or even transverse.

These have the columnar stamens of Mallowworts, and therein exhibit a near approach to that Order; but their anthers are 2-celled, and turned outwards. Sterculiads also lie on the borders of Byttneriads, from which they are readily distinguished by their columnar stamens not being partially sterile, and by the anthers being turned outwards. The Sub-Order Bombacææ is remarkable for having a tough leathery calyx, which sometimes splits irregularly so as to hide the true manner in which the sepals are arranged. The fruit of *Sterculia* often exhibits beautiful illustrations of the real nature of that form of fruit which Botanists call the foliicle, and helps to demonstrate that it, and hence all simple carpels, are formed of leaves, the sides of which are inflexed, and the margins dilated into placentæ bearing ovules. In *Firruiana platanifolia*,

in particular, the foliicles burst and acquire the form of coriaceous leaves, bearing the seeds upon their margin.

According to Dr. R. Brown, the Sub-Order Sterculeæ is remarkable for the different positions taken by the radicle within the seed; although in the majority it is at the extremity most remote from the hilum, yet in others it is next the hilum, and in some transverse with respect to that part, an unusual circumstance in the same Natural Order.—*Pl. Javan.* p. 224.

Nearly all the known species are tropical, or at least natives of very warm climates. They are extensively scattered over the world, the Sterculeæ preferring India and Africa, the Bombacææ America; Helicteræ seem to be unknown in Africa. The Baobab trees are from Senegal, where they are remarkable for their enormous size and prodigious longevity, estimated, but no doubt incorrectly, to amount in certain instances to some thousand years. The various species of *Bombax* and *Ceiba* are prodigious American



Fig. CCL.

Fig. CCL.—*Helicteres brevispira*.—*A. St. Hilaire*. 1. a column of stamens; 2. an anther; 3. a pistil; 4. a ripe fruit.

forest trees, with huge buttresses projecting from their colossal trunks. A few of the Helicteræ are remote from the latitudes usually assigned by nature for the habitation of Sterculiads, extending as far to the southward as Tasuamnia and New Zealand.

Sterculiads, like the Orders most nearly related to them, are chiefly remarkable for the abundance of mucilage they contain. The seeds of *Sterculia tomentosa*, *acuminata*, the true Kola spoken of by African travellers, when chewed or sucked, render the flavour of water, even if half putrid, agreeable. Those of the Chichâ, *Sterculia Chicha*, and lasiantha, are eaten as nuts by the Brazilians. So are those of *Sterculia nobilis* in Asia. The Gum Tragacanth of Sierra Leoue is produced by *S. Tragacantha*. *S. urens* in Corouandel yields a gum which is exceedingly like Tragacanth, and has been imported as such into England. The pod of *S. fœtida* is, according to Horsfield, employed in gonorrhœa in Java; the leaves are considered repellent and aperient; a decoction of the fruit is mucilaginous and astrigent. The bark of a species of *Sterculia* is employed in the Moluccas as an emmeagogue; and the seeds of all that genus are filled with an oil, which may be expressed and used for lamps. There is a slight acridity in the seeds of *Sterculia*. It is said that the seeds of *Pterygota alata* are narcotic.

Bombax and its allied genera are more remarkable for their noble aspect than for their utility. They are, however, not without interest. The seeds of many are enveloped in long hairs, like those of the true Cotton: it is found, however, that this wool cannot be manufactured, in consequence of no adhesion existing between the hairs. The woolly coat of the seeds of the Arvore de Paina (*Chorisia speciosa*), and several species of *Eriodendron* and *Bombax*, is employed in different countries for stuffing cushions, and for similar domestic purposes. *Bombax pentandrum*, the Cotton Tree of India, yields a gum, which is given in conjunction with spices in certain stages of bowel complaints. The bark of such trees is, however, reported to be emetic; this is more especially the case with *Salmalia* and the American species of *Bombax*. The honey of the flowers of *Salmalia malabarica* is said to be purgative and diuretic. One of the largest trees in the world is the *Adansonia*, or Baobab Tree, the trunk of which has been found with a diameter of 30 feet; but its height is not in proportion. It is emollient and mucilaginous in all its parts. The leaves dried and reduced to powder constitute Lalo, a favourite article with the Africans, which they mix daily with their food, for the purpose of diminishing the excessive perspiration to which they are subject in those climates; and even Europeans find it serviceable in cases of diarrhœa, fevers, and other maladies. The fruit is, perhaps, the most useful part of the tree. Its pulp is slightly acid and agreeable, and frequently eaten; while the juice is expressed from it, mixed with sugar, and constitutes a drink which is valued as a specific in putrid and pestilential fevers. The dried pulp is mixed with water, and administered, in Egypt, in dysentery. It is chiefly composed of gum, like Gum Senegal, a sugary matter, starch, and an acid which appears to be the malic. The fruit of the Durian (*Durio zibethinus*), is considered one of the most delicious productions of nature; it is indeed fœtid, and therefore disagreeable to those who are unaccustomed to it, but it universally becomes in the end a favourite article of the dessert; it is found in the islands of the Indian Archipelago, where it is cultivated extensively. *Ochroma Lagopus*, a West Indian tree, is used for many purposes. Its light wood is used instead of cork, its bark is antisyphilitic, the woolly lining of its fruit is applied to various purposes, and its wounded trunk discharges abundance of gum. The Handplant of Mexico, or *Manita*, (*Cheirostemon platanoides*), has no petals, but a large angular calyx, resembling a leather cup, from the centre of which rises up a column, bearing 5 narrow curved anthers with a curved style in the middle; these have considerable resemblance to a hand furnished with long claws. *Helicteres Sacarolla*, called by the latter name only in Brazil, is used against venereal disorders: a decoction of the root is administered. It is supposed that its effects depend upon its mucilaginous properties. *Myrodia angustifolia* is said by Martius to have similar qualities.

GENERA.

I. BOMBACEÆ.—Leaves palmate or digitate. Flowers perfect.	<i>Bombax</i> , Linn. <i>Ceiba</i> , Mart. et Zucc. <i>Salmalia</i> , Schott. et Endl. <i>Cavanillesia</i> , Ruiz et Pav. <i>Pourretia</i> , Willd. <i>Durio</i> , Rumph. <i>Ochroma</i> , Sieurtz. <i>Cheirostemon</i> , Humb. <i>Cheiranthodendron</i> , Lavrad. <i>Neesia</i> , Blum. <i>Ezenbeckia</i> , Blum. <i>Colytaphora</i> , Meisn.	? <i>Montezuma</i> , Moc. et Sen. ? <i>Hampea</i> , Schlecht.	? <i>Lexarza</i> , Llav. <i>Quararibica</i> , Aubl. <i>Gerberia</i> , Scop. <i>Matisia</i> , Humb. et Bonpl. <i>Methorium</i> , Schott. <i>Helicteres</i> , Linn. <i>Orthocarpa</i> , DC. <i>Spirocarpa</i> , DC. <i>Isora</i> , Schott. et Endl. <i>Atictres</i> , Neck. <i>Orthothecium</i> , Schott. <i>Ungerin</i> , Schott. et Endl. <i>Reevesia</i> , Lindl.
<i>Adansonia</i> , Linn. <i>Baobab</i> , P. Alpin. <i>Ophelia</i> , Lour. <i>Pachira</i> , Aubl. <i>Carolinæa</i> , Linn. f. <i>Chorisia</i> , H. B. K. <i>Eriotheca</i> , Schott. et Endl. <i>Eriodendron</i> , DC. <i>Campylanthera</i> , Schott. <i>Gossampinus</i> , Rumph. <i>Eriose</i> , Schott et Endl.		II. HELICTERÆÆ.—Leaves simple. Flowers perfect.	
		<i>Plagianthus</i> , Forst. <i>Asterotrichon</i> , Kl. <i>Blepharanthemum</i> , Kl. <i>Hoheria</i> , A. Cunningham. <i>Myrodia</i> , Schreb.	

III. STERCULÆÆ. — Leaves simple or palmate. Flowers unisexual by abortion.	<i>Clompanus</i> , Rumph. <i>Ivira</i> , Aubl. <i>Theodoria</i> , Neck. <i>Chichea</i> , Presl. <i>Malcalia</i> , Fl. Flum. <i>Southwellia</i> , Salisb. <i>Balanghas</i> , Burm. <i>Cavalam</i> , Rumph. <i>Cavallium</i> , Sch. et Endl. <i>Triphaca</i> , Lour.	<i>Astrodendron</i> , Dennst. <i>Brachylichiton</i> , Schott <i>Pecclodermis</i> , Id. <i>Trichosiphon</i> , Id. <i>Hildegardia</i> , Sch. et Endl. <i>Cola</i> , Bauh. <i>Lunana</i> , DC. <i>Eduardia</i> , Raf. <i>Bichy</i> , Lunan.	? <i>Culhamia</i> , Forsk. <i>Scaphium</i> , Sch. et Endl. <i>Firmiana</i> , Marsigl. <i>Erythropsis</i> , Lindl. <i>Pterygota</i> , Scht. et Endl. <i>Tetradia</i> , R. Br. <i>Pterocymbium</i> , R. Br. <i>Courtenia</i> , R. Br. <i>Micrandra</i> , R. Br.
<i>Heritiera</i> , Ait. <i>Balanopteris</i> , Gärtn. <i>Sutherlandia</i> , Gmel. <i>Sonandura</i> , Linn. <i>Atunus</i> , Rumph. <i>Sterculia</i> , Linn.			

NUMBERS. GEN. 34. Sp. 125.

*Ternstroemia*æ.

POSITION.—Malvaceæ.—STERCULIACEÆ.—Byttneriaceæ.
Capparidaceæ.

ORDER CXXVII. BYTTNERIACEÆ.—BYTTNERIADS.

Byttneriaceæ, *R. Brown in Flinders*, 2. 540. (1814); *Kunth Diss.* p. 6.; *DC. Prodr.* 1. 481.; *Aug. St. Hil. Fl. Bras. Mer.* 1. 139. (a § of Malvaceæ); *Endl. Gen. cexi.*; *Meisn. Gen.* p. 32; *Wight Illustr.* 1. 72.—Hermanniaceæ and Dombeyaceæ, *Barth. Ord. Nat.* 341.—Philippodendrew, *Endl. Gen.* 1004.

DIAGNOSIS.—*Malval Erogens*, with monadelphous stamens, in most cases partly sterile, and 2-celled anthers turned inwards.

Trees, shrubs, or undershrubs, occasionally with a climbing habit; their surface usually covered with stellate or forked hairs, occasionally with scurfs. Leaves alternate, simple,

feather-veined or hand-veined, commonly notched at the edge; stipules deciduous, in a few instances 0. Flowers often in clusters, but also in spikes or panicles. Calyx herbaceous, membranous, or leathery, 4-5-lobed, valvate in aestivation. Corolla 0, or consisting of as many petals as there are lobes to the calyx, either flat, but twisted in aestivation, or arched and drawn out into a strap; folded inwards at the edges and valvate in aestivation, either permanent or deciduous, often adhering to the tube of stamens. Stamens hypogynous, definite and opposite the petals, or twice as many and half only fertile and opposite the petals, or 00, as many being barren as there are sepals, and opposite them; almost always united into a cup or tube; anthers turned inwards, 2-celled, opening lengthwise, very rarely by a pore or cleft near the point. Ovary free, sessile, or on a short stalk, composed of from 4 to 10 carpels arranged round a central column, or reduced to one only; ovules 2 in each cell, anatropal, ascending, or nearly horizontal, or even pendulous; styles terminal,



Fig. CCL I.

consolidated; stigmas equal in number to the cells. Fruit generally a capsule, splitting through the cells or resolving itself into its original elements by dividing at the partitions; seeds sometimes winged, but generally round. Embryo generally lying in a small quantity of fleshy or mucilaginous albumen, straight or bowed; cotyledons fleshy or generally leafy, entire or split, plaited or folded up, occasionally spiral: radicle straight or curved, next the hilum.—*Chiefly from Endlicher.*

Byttneriads are often united with Sterculiads, from which their slightly monadelphous stamens, with the anthers turned inwards, and, excepting the Sub-orders Hermannææ and Eriolacnææ, the stamens partially imperfect, sufficiently divide them. Their two-celled anthers and not columnar stamens distinguish them from Mallowworts. The tendency to a loss of petals, an abortion of the stamens, and even a separation of the



Fig. CCL II.

Fig. CCL I.—*Byttneria celtoides*.—*A. St. H.* 1. an expanded flower; 2. cup of stamens; 3. abortive stamen; 4. pistil.

Fig. CCL II.—*Melochia graminifolia*.—*A. St. H.* 1. flower; 2. stamen and pistil; 3. ripe fruit; 4. a cocoon; 5. section of a seed.

sexes, which is so frequently observable in Sterculiads and Byttneriads, is an indication of a lower degree of organisation than occurs among Mallowworts, and clearly brings the Malval into contact with the Euphorbial Alliance.

These are wholly tropical, or from temperate climates. The Lasiopetaleæ are Australasian, Hermannææ are South African, Dombeyææ African and Asiatic, Erioleneæ exclusively Asiatic, and Philippodendreæ from New Zealand, (not Nepal, as has been stated by Mr. Poiteau); Byttnerææ are both Asiatic and American.

Beyond all other products Cacao or Cocoa, the chief ingredient in Chocolate, is remarkable in this Order. It is the seed of Theobroma Cacao, a small tree of which whole forests occur in Demerara. An ardent spirit is distilled from the pulp of the fruit. The Waltheria Douradinha is used in Brazil as a remedy for venereal disorders, for which its very mucilaginous nature renders it proper. The fruit of Guazuma ulmifolia is filled with a sweet and agreeable mucilage, which the Brazilians suck with much pleasure. In Martinique the young bark is used to clarify sugar, for which the copious mucilage it yields when macerated qualifies it. In the same island the infusion of the old bark is esteemed as a sudorific, and useful in cutaneous diseases. The bark of Kydia calycina is applied in India to the same purpose. The fibrous tissue of the bark of many species is so tough as to be well adapted for manufacturing into cordage; this is more especially the case with Microkœna spectabilis, and Abroma augustum. The bark of Dombeya spectabilis is made into ropes in Madagascar. The Pterospermums are all mucilaginous.

GENERA.

I. LASIOPETALEÆ.

Seriugia, Gay
Gaya, Spreng.
Guichenotia, Gay.
Thomasia, Gay.
Leucothamnus, Lindl.
Lasiopetalum, Smith.
Corethrostylis, Endl.
Keraudrenia, Gay.
Sarotes, Lindl.
Fleischeria, Steud.

II. BYTTNEREÆ.

Rulingia, R. Br.
Commersonia, Forst.
? Medusa, Lour.
Jürgensia, Spreng.
Abronia, Jacq.
Ambroma, Linn. f.
Hastingsia, König.
Byttneria, Löffl.
Chatœa, Jacq.

Heterophyllum, Boj.

Telfairia, Newm.
Ayenia, Linn.
Dayenia, Mill.
Herrania, Goudot.
Lightia, Schomb.
Theobroma, Linn.
Cacao, Tournef.
Guazuma, Plum.
Bubroma, Schreb.
Kleinhovia, Linn.
Actinophora, Wall.
Pentaglottis, Wall.

III. HERMANNEÆ.

Waltheria, Linn.
Lophanthus, Forst.
Astropus, Spreng.
Melochia, Linn.
Riedlea, Vent.
Riedicia, DC.
Altheria, Thouars.

Lochenia, Arn.

Physodium, Presl.
Hermannia, Linn.
Mahernia, Linn.

IV. DOMBEYEÆ.

Ruizia, Cav.
Astyria, Lindl.
Pentapetes, Linn.
Moranda, Scop.
Brotera, Cav.
Sprangelia, Schult.
Vitalia, Vis.
Assonia, Cav.
Königia, Commers.
Vahlia, Dahl.
Dombeya, Cav.
Paulowilhelmia, Hochst.
Xeropetalum, Delil.
Leucenchoeckia, E. Mey.
Melhania, Forsk.
Astrapœa, Lindl.
Hilsenbergia, Boj.

Glossostemon, Desfont.
Trochetia, DC.
Pterospermum, Schreb.
Vclaga, Adans.
Vclago, Gärtn.
Pterolœna, DC.
Kydia, Roxb.

V. ERIOLENEÆ.

Eriolœna, DC.
Schillera, Reichenb.
Microlœna, Wall.
Walliehia, DC.
Jaekia, Spreng.
? Visenia, Houtt.
Wisenia, Gmel.
Aleurodendron, Rejnw.
Glossospermum, Wall.
? Exitelia, Blum.
Maranthes, Blum.

VI. PHILIPPODENDREÆ.
Philippodendron, Poit.

NUMBERS. GEN. 45. Sp. 400.

POSITION.—Sterculiaceæ.—BYTTNERIACEÆ.—Tiliaceæ.
Euphorbiaceæ.

ORDER CXXVIII. VIVIANIACEÆ.—VIVIANIADS.

Vivianiaceæ, *Klotzsch in Linnæa*, 10. 433. (1836); *Meisner, Gen.* 58; *Endl. Gen.* p. 1169.

DIAGNOSIS.—*Malval Exogens*, with free stamens, no disk, seeds with albumen, a curved embryo, permanent petals, and ribbed calyx.

Herbaceous or half-shrubby plants. Leaves opposite or whorled, entire or notched, without stipules, often covered beneath with a hoary down. Flowers in panicles or corymbs, white, red, or pink. Calyx ten-ribbed, with 5 valvate divisions. Petals 5, hypogynous, furnished with claws, often drying up and remaining permanently round the seed-vessel, with a twisted æstivation. Stamens 10, hypogynous; those opposite the sepals inserted into a fleshy gland; filaments distinct; anthers 2-celled, opening lengthwise. Ovary free, 3-celled; stigmas 3, sessile; ovules 2 in each cell, attached to the central axis, one ascending, the other suspended. Capsule



Fig. CCLIII

3-lobed, 3-celled, splitting through the cells; the valves bearing the partitions in the middle. Seeds roughish, containing a curved embryo lying among a large quantity of fleshy albumen; cotyledons linear; radicle next the hilum.

The few plants which recent writers have combined into this Natural Order, have been generally referred to some place in the Geranial Alliance, from all which they are distinguished by their valvate calyx; from Indian Cresses (*Tropæolaceæ*) they are distinguished by their small albuminous seeds, and regular flowers; from Mal-lowworts, &c. by their not having columnar stamens. Their ribbed calyx and permanent withering corolla are quite peculiar. It may be that we have here an approach to Frankeniads.

All the members of this Order which have yet been discovered inhabit Chili and South Brazil.

They are not reported to possess any useful properties; but the *Vivianias* would be pretty greenhouse plants if they could be procured.

GENERA.

Cæsarea, *Cumbers*.
Viviania, *Cav*.
Macraea, *Lindl*.
Xeropetalon, *Hook*.

Cissarobryon, *Pöpp*.
Linostigma, *Klotzsch*.

NUMBERS. GEN. 4. Sp. 15.

POSITION.—*Tiliaceæ*.—*VIVIANIACEÆ*.—*Tropæolaceæ*.

Fig. CCLIII.—*Viviania crenata*; 1. a flower; 2. a section of the ovary; 3. stamens and ovary.

ORDER CXXIX. TROPÆOLACEÆ.—INDIAN CRESSES.

Tropæolææ, *Juss. Mem. Mus.* 3. 447. (1817); *DC. Prodr.* 1. 683. (1824); *Endl. Gen. celviii.*—*Limnantheæ*, *R. Br. in Lond. and Edinb. Philosoph. Mag.* July 1833; *Lindley Bot. Reg. t.* 1673. (1834); *Nixus Plantarum*, p. 11. (1833); *Martius Conspectus*, No. 272. (1835); *Endl. Gen. cclix.*

DIAGNOSIS.—*Malval Exogens*, with free stamens, no disk, seeds without albumen, and an amygdaloid embryo.

Smooth herbaceous plants, of tender texture and with an acrid taste, trailing or twining. Leaves alternate, without stipules. Peduncles axillary, 1-flowered. Flowers



Fig. CCLIV.

yellow, scarlet, orange, or even blue! Sepals 3-5, the upper one with a long distinct spur; aestivation usually valvate, or very slightly overlapping. Petals 1-5, hypogynous, equal or unequal, with a convolute aestivation, sometimes partially abortive. Stamens 6-10, perigynous, distinct; anthers innate, erect, 2-celled. Ovary 1, 3-cornered, made up of 3 or 5 carpels; style 1; stigmas 3-5, acute; ovules solitary, erect, or pedunculous. Fruit indehiscent, the pieces separable from a common axis, sometimes winged. Seeds large, without albumen, filling the cavity in which they lie; embryo large; cotyledons 2, straight, thick, consolidated into a single body, or distinct; radicle next the hilum.

Indian Cresses form an Order standing on the limits between the Malval and Geranial Alliances. Its valvate calyx is almost the only character which determines its preference for the former; for if that were imbricated and ribbed there would be little to separate Indian Cresses from the Cranesbills. *Tropæolum majus* has the very spur of a *Pelargonium*, only in the latter the spur is adnate to the flower-stalk. *Limnanthes*, which Dr. Brown first proposed as a distinct Order, do not seem to be naturally distinguished, and, considering the very small extent of the Order of Indian Cresses, are far better combined with them. If the leaves of *Limnanthes Douglasii* and *Tropæolum majus* are chewed, their flavour is so similar that one is hardly able to distinguish them. The principal difficulty in the way of stationing *Limnanthes* with Indian Cresses, consists in the perigynous insertion of the stamens of the former; but in this instance other considerations must, I think, outweigh that circumstance. Perhaps *Limnanthes* should

Fig. CCLIV.—1. *Chymocarpus pentaphyllus*; 2. a longitudinal section of its flower; 3. ovary of *Tropæolum majus*; 4. a vertical section of a carpel, showing the position of the ovule; 5. a perpendicular section of a seed.

be regarded as an approach to Rueworts on the one hand, and Nolanads on the other, because of its deeply lobed pistil; but this is probably a similarity of but little importance.

All are natives of the temperate parts of North and South America.

The fleshy fruit of *Tropæolum majus* is acrid, and possesses the properties of Cress; and De Caudolle remarks, that the caterpillar of the Cabbage butterfly feeds exclusively upon Crucifers and *Tropæolum*. The root of *T. tuberosum* is eaten in Peru. *Chymocarpus* is used in Brazil as an antiscorbutic, under the Portuguese name of Chagas da Miuda. *Limnanthes* has all the peculiar pungency of a *Tropæolum*.

GENERA.

I. TROPÆOLACEÆ.—Flowers irregular. Ovules pendulous.

Tropæolum, *L.*
Magallana, *Cav.*
Chymocarpus, *D. n.*

II. LIMNANTHEÆ.—Flowers regular. Ovules erect.

Limnanthes, *R. Br.*
Flörkea, *W.*



Fig. CCLV.

NUMBERS. GEN. 5. Sp. 43

Geraniaceæ.

POSITION.—*Vivianiaceæ.*—TROPÆOLACEÆ.— — — — .

Nolanaceæ.

Fig. CCLV.—Flower of *Tropæolum majus*, showing the spur.

ORDER CXXX. MALVACEÆ.—MALLOWWORTS.

Malvaceæ, *Juss. Gen.* 271. (1789) *in part.*; *Brown in Voy. to Congo*, p. 8; *Kunth. Diss.* p. 1; *DC. Prodr.* 1. 429. (1829); *Endl. Gen. ccix.*; *Meisner, Gen.* p. 26.; *Wight. Illustr.* 1. p. 55.

DIAGNOSIS.—*Malval Exogens*, with columnar stamens all perfect, and 1-celled anthers turned inwards.

Herbaceous plants, trees, or shrubs. Leaves alternate, more or less divided, stipulate. Hairs stellate if present. Peduncles usually axillary. Flowers showy, often inclosed in an involucre of various forms. Sepals 5, very seldom 3 or 4, more or less united at the

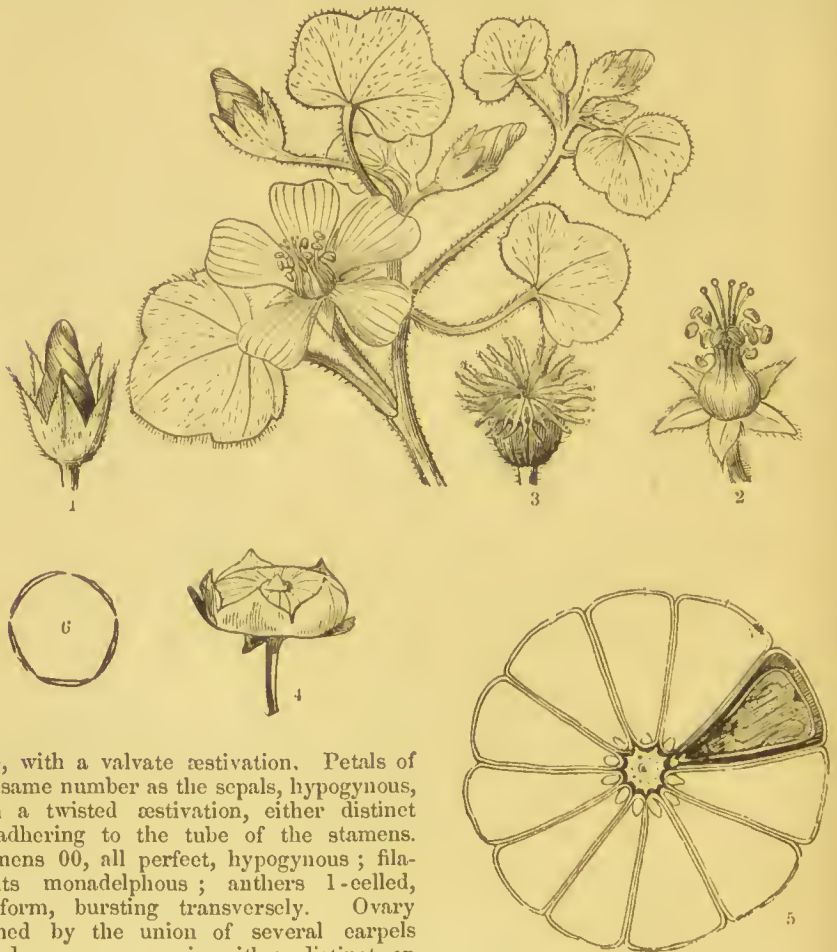


Fig. CCLVI.

base, with a valvate æstivation. Petals of the same number as the sepals, hypogynous, with a twisted æstivation, either distinct or adhering to the tube of the stamens. Stamens ∞, all perfect, hypogynous; filaments monadelphous; anthers 1-celled, reniform, bursting transversely. Ovary formed by the union of several carpels round a common axis, either distinct or united; ovules definite or indefinite, attached to the inner angle of the cells, amphitropal or semianatropal; styles the same number as the carpels, either united or distinct; stigmas variable. Fruit either capsular or baccate, its carpels being either monosper-

Fig. CCLVI.—*Abutilon macropodum*. 1. an unexpanded flower; 2. the stamens and styles; 3. a ripe fruit, consisting of many carpels, whose upper extremities are free and radiant; 4. a ripe fruit of the *Malva sylvestris*, natural size; 5. a transverse section of the same fruit, from which all the seeds have been taken except one, which is seen at C; 6. a section of a calyx, showing its valvate structure.

mous or polyspermous, sometimes united in one, sometimes separate or separable into distinct cocci or follicles; dehiscence either loculicidal or septicidal. Seeds sometimes hairy; albumen none, or fleshy and in small quantity; embryo curved, with twisted and doubled cotyledons.

The relation of Mallowworts with Sterculiads, Lindenblooms, and Byttneriads, is clearly indicated by their general accordance in structure, combined with the valvate aestivation of their calyx. A less immediate affinity is indicated with Crowfoots by means of the curious genus *Malope*, whose carpels are separate and collected in considerable numbers over a central torus, although its organisation is in all other respects that of Mallowworts. There also seems to be a considerable degree of relationship between them and Cranesbills, Chlenads, and Flaxworts (*Linacææ*). To the first they approach by their monadelphous stamens and crumpled embryo, to the second by their involucre and columnar stamens, to the third by their twisted corollas, and mucilaginous properties. The whole of these Orders are, however, sufficiently distinguished by the characters severally assigned to them in their proper places. Theads (*Ternströmiacææ*) are another Order to which Mallowworts have been occasionally compared; but the slightly monadelphous condition of the stamens in that Order is very different from their columnar structure in Mallowworts, and there is little else in common between them.

These plants are found in great abundance in the tropics, plentifully in the hotter parts of temperate regions, but gradually diminishing to the north. Thus in Sicily they form $\frac{1}{8}$ of the flowering plants, in France $\frac{1}{45}$, in Sweden $\frac{1}{285}$, in Lapland they are unknown, in the temperate parts of North America $\frac{1}{25}$, in the equinoctial parts of the same continent $\frac{1}{7}$; or taking into account only the vegetation of the valleys, they, according to Humboldt, form $\frac{1}{37}$ of the flowering plants in the tropics, $\frac{1}{208}$ in the temperate zone, and are not found in the frigid zone. But these calculations no doubt include Sterculiads.

The uniform character of the Order is to abound in mucilage, and to be totally destitute of all unwholesome qualities. The use to which Mallows and Marshmallows are applied in Europe is well known. The whole plant of the latter, especially the root, yields in decoction a plentiful, tasteless, colourless muceilage, salutary in cases of irritation. It is used as a demulcent for children, and is a favourite medicine with the French, who employ it constantly in poultices, lozenges, &c., under the name of *guimave*. The flowers of the gandy Hollyhock (*Althæa rosea*, *μαλαχη*, *Diosc.*) are officinal in Greece for the same purposes. Similar properties are possessed by European species. *Sida cordifolia* mixed with rice is used to alleviate the bloody flux. Emollient fomentations are prepared from *Sida mauritiana* by the Hindoo doctors. The flowers of *Bençao de Deos*, *Abutilon esculentum*, are used in Brazil as a boiled vegetable. A decoction of *Sphaeralcea cisplatina* is administered in the same country for inflammation of the bowels, and is generally employed for the same purposes as the Marshmallow in Europe. *Pavonia diuretica* is prescribed in Brazil as a diuretic; but is supposed to act rather as an emollient. The chewed leaves of another species, *S. carnifolia*, are applied in Brazil to the punctures of wasps. And finally, to omit a great quantity of plants having similar qualities, it is sufficient to name the *Abelmoschus esculentus*, whose fruit, called *Ochro*, *Goubo*, *Gobbo*, *Bandikai*, &c., is a favourite ingredient in soup, to which it imparts its mucilaginous quality. The wood is always very light, and of little value. Rocket-sticks are obtained from the light straight stems of *Sida micrantha*. The bark is often so tenacious as to be manufactured into cordage. *Malva crispa* was found by Cavanilles to be fit for this purpose; and several species of *Hibiscus* are employed in like manner in tropical countries. From the fibres of the bark of *Hibiscus arboreus* the whips were manufactured with which the negroes were lashed in the West India Islands; the plant is called *Mohoe* or *Mohaut*. *Sida abutila* is said to be cultivated in China, as we know *Hibiscus cannabinus*, or *Sun*, in India, as a substitute for hemp. The bark of this plant is called *Waak*; a coarse kind of oil is expressed from the seeds. Various other species are named as furnishing serviceable fibres. The petals of some are astringent; this property exists in *Malva leca* and in *Hibiscus Rosa sinensis*, of which the Chinese make use to blacken their eyebrows and the leather of their shoes. The leaves of *Althæa rosea* are said to yield blue colouring matter not inferior to indigo. A decoction of the root and stem of *Urena lobata* is employed in Brazil as a remedy in windy colic; the flowers are used as an expectorant in dry and inveterate coughs. The bark furnishes good cordage. A few species, such as *Hibiscus Sidalirilla* and *suratensis*, &c., are slightly acid. The musky seeds of *Abelmoschus moschatum* are considered cordial and stomachic, and by the Arabians are mixed with coffee. In the West Indies these seeds, called *Gumbo musqué*, reduced to powder, and steeped in rum, are regarded as a potent remedy against serpent bites. The root of *Sida lanceolata* is intensely bitter, and is considered

a valuable stomachic. The Cotton of commerce is the hairy covering of the seeds of several species of *Gossypium*. For an excellent account of this plant, and the various species used in commerce, see *Royle's Illustr.* p. 84., and *Wight's Illustr.* The young leaves and seeds of *Gossypium vitifolium* are employed in Brazil in dysentery, and steeped in vinegar are applied to the head in hemicrania.—*Martius*.

GENERA.

I. MALOPEÆ. — Carpels distinct, crowded into a heap.	<i>Phymosia</i> , Desv. <i>Sphaeroma</i> , DC. ? <i>Meliphlea</i> , Zucc. <i>Modiola</i> , Münch. <i>Haynea</i> , Reichenb. <i>Urena</i> , Linn. <i>Pavonia</i> , Cav. <i>Typhalea</i> , DC. <i>Malache</i> , Trev. <i>Cancellaria</i> , DC. <i>Pentaspermum</i> , DC. <i>Thorntonla</i> , Reichenb. <i>Columella</i> , Commers. <i>Malvaviscoides</i> , Endl. <i>Anotea</i> , DC. <i>Lopimia</i> , Nees et Mart. <i>Pentameris</i> , E. M. <i>Lebretonia</i> , Schrank. <i>Goethea</i> , Nees et Mart.	<i>Sabdariffa</i> , DC. <i>Polychlæna</i> , Don. <i>Trionum</i> , Medik. <i>Bombycella</i> , DC. <i>Malvaviscus</i> , Dill. <i>Achania</i> , Sw. <i>Fugosia</i> , Juss. <i>Cienfugosia</i> , Cav. <i>Cienfugia</i> , Willd. <i>Redoutea</i> , Willd. <i>Serræa</i> , Cav. <i>Senreca</i> , Willd. <i>Senra</i> , DC. <i>Dumreichera</i> , Steud. <i>Abelmoschus</i> , Medik. <i>Bamia</i> , R. Br. <i>Hymenocalyx</i> , Zenk. <i>Manihot</i> , DC. <i>Lagunaria</i> , Don. <i>Paritium</i> , Ahr. Juss. <i>Pariti</i> , Rheed. <i>Azanza</i> , Moc. et Sess. <i>Thespesia</i> , Cav. <i>Malvaviscus</i> , Gärtn. <i>Decaschistia</i> , <i>Wight et A.</i>	<i>Gossypium</i> , Linn. <i>Xylon</i> , Tournef. IV. <i>SIDEÆ</i> .—Fruit consisting of cocci or a capsule. No involucre. <i>Anoda</i> , Cav. <i>Cristaria</i> , Cav. <i>Sida</i> , Linn. <i>Napeea</i> , Linn. <i>Stevartia</i> , Forsk. <i>Malvinda</i> , Medik. <i>Periptera</i> , DC. <i>Dietyocarpus</i> , Wight. <i>Gaya</i> , H. B. K. <i>Malachra</i> , Linn. <i>Abutilon</i> , Gärtn. <i>Lawrencia</i> , Hook. <i>Bastardia</i> , Kunth. <i>Lagunea</i> , Cav. <i>Solandra</i> , Murr. <i>Triguera</i> , Cav. <i>Wissadula</i> , Medik. ? <i>Ingenhouzia</i> , <i>Moc. et Sess.</i>
II. MALVÆ. — Fruit consisting of several cocci. An involucre.	III. <i>HIBISCKÆ</i> .—Fruit a capsule. An involucre. <i>Kosteletzkya</i> , <i>Prestl.</i> <i>Hibiscus</i> , Linn. <i>Ketmia</i> , Tournef. <i>Furcaria</i> , DC. <i>Cremontia</i> , DC.		
<i>Lavatera</i> , Linn. <i>Axolopha</i> , DC. <i>Olbia</i> , Medik. <i>Savinionia</i> , Webb et B. <i>Navæa</i> , Webb et Bth. <i>Stegia</i> , Münch. <i>Althæa</i> , Cav. <i>Althæa strum</i> , DC. <i>Ferberia</i> , Scop. <i>Alcea</i> , Linn. <i>Malva</i> , Linn. <i>Nullallia</i> , Dieks. <i>Callirhoë</i> , Nutt. <i>Anthema</i> , Medik. <i>Sphæralcea</i> , <i>St. Hil.</i>			

NUMBERS. GEN. 37. Sp. 1000.

Geraniaceæ.

POSITION.—*Sterculiacœ*.—MALVACEÆ.—*Byttneriaceæ.*

Chlœnaceæ.

ORDER CXXXI. TILIACEÆ.—LINDENBLOOMS.

Tiliaceæ, *Juss. Gen.* 290. (1789) in part.; *Kunth. Malv. Diss.* p. 14. (1822); *DC. Prodr.* 1. 503. (1824); *Lindl. Coll.* p. 54. (1829); *Endl. Gen. cexli.*; *Meisner, Gen.* p. 36.—*Elæocarpeæ, Juss. Ann. Mus.* 11. 223. (1808); *DC. Prodr.* 1. 519. (1824); *Arnott. Prodr. Penins. Ind.* 1. 81. (1834).—*Maquina, Mart.*—*Aristolieaceæ, Endl.*

DIAGNOSIS.—*Malval Exogens, with free stamens on the outside of a disk, albuminous seeds, and straight embryo.*

Trees or shrubs, very seldom herbaceous plants. Leaves simple, stipulate, toothed, alternate. Flowers axillary, usually perfect. Sepals 4 or 5, distinct or united, with a

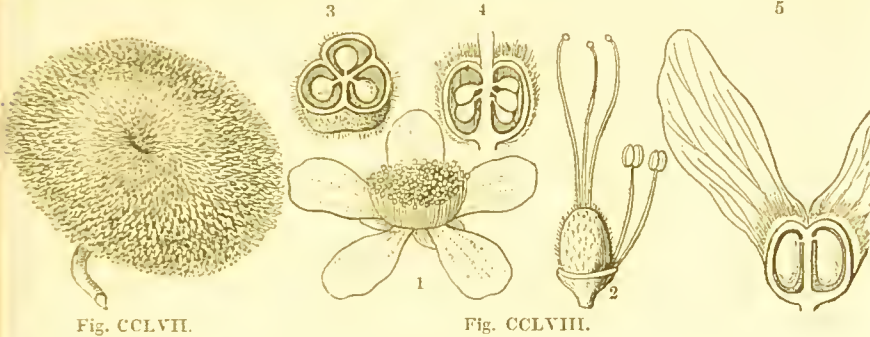


Fig. CCLVII.

Fig. CCLVIII.

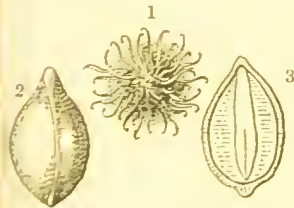


Fig. CCLIX.

valvate aestivation. Petals 4 or 5, entire, usually with a little pit at their base, or wanting; most commonly the size of the sepals. Stamens generally 00, hypogynous, distinct, sometimes surrounded at the base by the lobed and enlarged border of the stalk of the pistil; anthers 2-celled, dehiscing longitudinally or by pores, the outer stamens sometimes abortive and petaloid. Ovary single, composed of from 2 to 10 carpels, which are sometimes disunited; style 1; stigmas as many as the carpels; ovules attached to the inner angle, either free or 00, in two rows, pendulous, horizontal, or ascending, anatropal.

Fruit dry or pulpy, often prickly, sometimes winged, with several cells, or one only by abortion. Seeds solitary or numerous; embryo erect in the axis of fleshy albumen, with flat foliaceous cotyledons and a radicle next the hilum.

Although this Order is apparently limited by the character assigned to it in the Diagnosis, yet it includes so many instances of anomalous structure, that some reasonable doubt must be entertained as to its being really so natural an assemblage as it seems to be. The petals are sometimes absent. A genus called *Diplophractum* is remarkable for having a fruit with several spurious cells, and the placente in the circumference instead of the axis. *Apeiba* has sometimes as many as 24 cells in the fruit. Brown notices the existence of an African genus of this Order (*Christiania, DC.*), remarkable in having a calyx of 3 lobes, while its corolla consists of 5 petals; the fruit composed of 5 single-seeded capsules connected only at the base. The genus *Aristoliea*, sometimes placed near *Homalials* or *Philadelphads*, seems to have most affinity with this Order, notwithstanding that its calyx is not valvate; it has formed the type of an Order called *Maquina* by *Martius*, and *Aristolieaceæ* by *Endlicher*. In most respects *Lindenblooms* resemble *Stereuliads*, *Mallowworts*, and the Orders allied to them, more especially in the valvate aestivation of their calyx. They are sufficiently known by their glandular disk and distinct stamens, with 2-celled anthers.

The principal part of the Order is found within the tropics all over the world, forming mean weed-like plants, or shrubs, or trees, with handsome, usually white or pink, flowers. A small number are peculiar to the northern parts of either hemisphere, where they form timber-trees.

Fig. CCLVII.—Fruit of *Apeiba aspera*.—*Gertner.*

Fig. CCLVIII.—*Berrya ammonilla*.—*Wight.* 1. a flower; 2. the ovary and two stamens; 3. a cross section of the ovary; 4. a perpendicular section of it; 5. a portion of its fruit.

Fig. CCLIX.—*Triumfetta cordifolia*. 1. a fruit; 2. a seed; 3. a section of it.

They have all a mucilaginous, wholesome juice. The leaves of *Corchorus olitorius* are used in Egypt as a pot-herb. The berries of some of them are succulent and eatable. The species are most remarkable for the toughness of the fibres of their inner bark, which are used for various economical purposes. Fishing lines and nets, rice bags or gunny, and a coarse kind of linen called tat, are made in India of *Corchorus capsularis*; and the Russian mats of commerce are manufactured from the *Tilia*. The bark of *Luhca grandiflora* is used in Brazil for tanning leather. The wood of *Luhca divaricata*, which is white and light, but very close grained, makes good musket-stocks, and wooden soles for shoes; the Brazilians call all such *Açoita cavallos*, because the sticks they use for driving their cattle are obtained from them. The flowers of *Tilia*, separated from the bracts, are used in infusion, according to Host, with much success in vertigo and spasms; they promote perspiration and alleviate coughs; but if the bracts and fruits are mixed with the flowers, the infusion then becomes astringent, and confines the bowels. Some species of *Grewia*, as *G. sapida*, *asiatica*, &c., bear pleasant acid berries, much used in the manufacture of sherbet. The wood of *Grewia elastica*, called *Dhamnoo*, affords timber highly valued for its strength and elasticity, and therefore much used for bows, the shafts of carriages, &c. The excellent light timber called *Trineomalec* wood, employed in the construction of the *Massoola* boats of Madras, is furnished by *Berrya Ammonilla*. The berries of *Aristotelia Maqui* are eatable, and made into wine; the tough bark makes the strings, and the wood the sides of musical instruments.

The leaves of *Vallea cordifolia* are used for dyeing yellow. The furrowed, sculptured, bony fruit of the *Eleocarps*, being freed from its pulp, forms handsome necklaces, which are not uncommonly set in gold, and sold in the shops. The name *Julpai*, or *Olive*, is applied to the fruit of some species of *Eleocarp*, which is eaten; while that of others is dried and used in the curries of the natives of India, and is also pickled. Roxburgh did not succeed in extracting any oil from the fruit. Dr. Horsfield says that the bark of one of the *Java Eleocarps* is bitter and used as an anthelmintic.

The mucilaginous, and at the same time astringent, properties of the leaves and fruit of certain *Triumfettas*, called *Carapixo da Calçada* in Brazil, which grow everywhere in that country, especially on the road-side and in the vicinity of dwellings, render them serviceable in injections for inveterate gonorrhœas.

GENERA.

I. TILIACE.—Corolla 0, or the petals entire. Anthers opening longitudinally.

SLOANIDÆ.

Hasseltia, H. B. K.
Ablania, Aubl.
Trichocarpus, Schreb.
Dasyneima, Schott.
Adenobasium, Presl.
Myriochæta, DC.
Foveolaria, DC.
Ioanea, Linn.
Sloana, Plum.
Gymstoma, DC.
Oxyandra, DC.

GREWIDÆ.

Vantanea, Aubl.
Lemniscia, Schreb.
Apciba, Aubl.
Aubletia, Schreb.
Luhca, Willd.

Brotrea, Flor. Flum.
Allegria, Moc. et Sess.
Mollia, Mart. et Zucc.
Schlechtendalia, Sprng.
Helicarpus, Linn.
Montia, Houtt.
Eutelea, R. Br.
Sparmannia, Thunb.
Clappertonia, Meisn.
Honkenya, Willd.
Corchoropsis, Sieb. et Zucc.
Corchorus, Linn.
Antichorus, Linn. f.
Caricleria, Scop.
Coreta, P. Br.
Mærcensta, DC.
Ganja, Rumph.
Triumfetta, Plum.
Lappida, DC.
Bartramia, Gärtn.
? *Porpa*, Blum.
Tilia, Linn.
Lindnera, Reichenb.
Brownlowia, Roxb.

Humea, Roxb.
Christiana, DC.
Grewia, Juss.
Nehemia, Endl.
Mallocoeca, Forst.
Chadara, Forsk.
Siphomeris, Boj.
Microcos, Linn.
Arsis, Lour.
Damine, Endl.
Vincentia, Boj.
Belotia, A. Rich.
Diplophractum, Desf.
Columbia, Pers.
Colona, Cav.
Berrya, Roxb.
Espera, Willd.
Muntingia, Linn.
Calabura, Plukn.
Trilix, Linn.
Jacquinia, Mut.
Bancroftia, Macfad.
Aristotelia, Herit.

II. ELÆOCARPEÆ.—Petals lacerated. Anthers opening by a transverse valve at the apex.

Eleocarpus, Linn.
? *Adenodus*, Lour.
Lochneria, Scop.
Gantrus, Gärtn.
? *Craspedum*, Lour.
Monocera, Jack.
Diccras, Endl.
Dicra, Forst.
Beythea, Endl.
Friesia, DC.
Acronodia, Blum.
Acrozus, Spreng.
Vallea, Mut.
Tricuspidaria, R. et Pav.
Tricuspis, Pers.
Criudendron, Molin.

NUMBERS. GEN. 35. Sp. 350.

POSITION.—Malvaceæ.—TILIACEÆ.—

Tremandræca.

ALLIANCE XXIX. SAPINDALES.—THE SAPINDAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous unsymmetrical flowers, axile placentæ, an imbricated calyx and corolla, definite stamens, and little or no albumen.*

In every Order, comprehended under this Alliance, the flowers are more or less unsymmetrical, and in several of them such irregularity occurs in more than one series of the floral organs. Thus, the Porworts, which are among the most symmetrical, are pentamerous except the ovary, which consists of 2 carpels, Bladder-nuts have similar proportions, while Malpighiads and Erythroxylys combine a 3-merous ovary with a 5-merous flower.

The Orders seem to be all bound up in close relationship, with the exception of Vochyads, which are but little known and whose true station is therefore doubtful. Petiveriads, though generally disunited from Sapindals by a long interval, can hardly be regarded as anything more than an apetalous, very simple form of Soapworts.

The passage into Guttiferals is not through Erythroxylys, which stand last in the following series, but through Soapworts, which are extremely near the Guttiferal Rhizobols.

NATURAL ORDERS OF SAPINDALS.

- | | | |
|--|---|----------------------|
| <i>Flowers complete, partially symmetrical. Calyx valvate.</i> | } | 132. TREMANDRACEÆ. |
| <i>Anthers 2-4-celled, opening by pores</i> | | |
| <i>Flowers complete (irregular), unsymmetrical. Petals naked.</i> | } | 133. POLYGALACEÆ. |
| <i>Anthers 1-celled, opening by pores. Seeds carunculate.</i> | | |
| <i>Flowers complete, unsymmetrical, very irregular. Petals naked. Anthers opening longitudinally. Carpels 3. Seeds winged. (In one case the ovary is adherent)</i> | } | 134. VOCHYACEÆ. |
| <i>Flowers complete, partially symmetrical. Calyx imbricated. Ovules ascending. Stigmas simple. Leaves opposite, with stipules</i> | | |
| <i>Flowers complete, unsymmetrical. Petals usually with an appendage or 0. Anthers opening longitudinally. Carpels 3. Seeds usually arillate, wingless.</i> | } | 136. SAPINDACEÆ. |
| <i>Flowers apetalous. Carpel solitary</i> | | |
| <i>Flowers complete, unsymmetrical. Petals naked or 0. Anthers opening longitudinally. Carpels 2. Seeds without an aril</i> | } | 138. ACERACEÆ. |
| <i>Flowers complete, partially symmetrical. Calyx imbricated. Petals naked, stalked. Ovules hanging by cords. Stigmas simple. Embryo usually convolute</i> | | |
| <i>Flowers complete, partially symmetrical. Calyx imbricated. Petals with an appendage. Ovules sessile, pendulous. Stigmas capitate. Embryo straight</i> | } | 140. ERYTHROXYLACEÆ. |
| | | |
| | | 137. PETIVERIACEÆ. |
| | | 139. MALPIGHIACEÆ. |

ORDER CXXXII. TREMANDRACEÆ.—POREWORTS.

Tremadraceæ, *R. Brown in Flinders*, p. 12. (1814); *DC. Prodr.* 1. 343. (1824); *Endl. Gen.* cccxxii.

DIAGNOSIS.—*Sapindal Exogens*, with partially complete symmetrical flowers, a valvate calyx, and 2-4-celled anthers opening by pores.

Slender heath-like shrubs, with their hairs usually glandular. Leaves alternate or whorled, without stipules, entire or toothed. Pedicels solitary, axillary, 1-flowered. Flowers often large and showy. Sepals 4 or 5, equal, with a valvate æstivation, slightly cohering at the base, and deciduous. Petals equal in number to the sepals, with an involute æstivation, wrapping up the stamens in pairs, much larger than the calyx, and deciduous. Stamens hypogynous, distinct, 2 before each petal, and therefore either 8 or 10; anthers 2- or 4-celled, opening by a pore at the apex. Ovary 2-celled; ovules from 1 to 3 in each cell, anatropal, with a hooked apex, pendulous; styles 1 or 2. Fruit capsular, 2-celled, 2-valved; dehiscence loculicidal. Seeds pendulous, ovate, with a hooked appendage at the apex, but with none about the hilum; embryo cylindrical, straight, in the axis of fleshy albumen, and about half as long, the radicle next the hilum.



Fig CCLX.

There is little to divide these plants from Milkworts, except their regular symmetrical flowers, and valvate calyx. They want the caruncula of that Order, in room of which they have the chalazal end of the seed extended into a hooked process. Their stamens being opposite the petals in pairs may, taken with the valvate calyx, be regarded as an indication of some tendency towards Rhamnads, and the general condition of their flower is much like that of Pittosporads, except in the great development of the embryo.

All are natives of New Holland.

Their properties are unknown.

De Candolle placed them between Milkworts and Pittosporads, Meisner between Frankeniads and Milkworts; Endlicher in his Polygalinæ consisting of Poreworts and Milkworts only, and Adolphe Brongniart takes the same view of their affinity.

GENERA.

Tetratheca, Sm.
Tremandra, R. Br.
Platythea, Steetz.

NUMBERS. GEN. 3. Sp. 16.

Tiliacæ.

POSITION.—TREMANDRACEÆ.—Polygalacæ.

Pittosporacæ.

Fig. CCLX.—*Tetratheca hirsuta*. 1. the stamens; 2. the pistil, with one of the cells laid open.

ORDER CXXXIII. POLYGALACEÆ.—MILKWORTS.

Polygalæ, *Juss. Ann. Mus.* 14. 386. (1809); *R. Brown in Flinders*; *Juss. Mem. Mus.* 1. 385.; *DC. Prodr.* 1. 321.; *Aug. de St. Hilaire and Moquin-Tandon Mém. Mus.* 17. 313.; *Wight's Illustr.* 1. 46.; *Endl. Gen.* cccxxiii.—*Krameriaceæ*, *Martius, Ed. pr.* 87.—*Trigoniceæ*, *Martius Consp.* 247.; *Endl. Gen.* p. 1080.—*Moutabeæ*, *Endl. Ench.* p. 365.—*Soulameæ*, *Id.* p. 570.

DIAGNOSIS.—*Sapindal Exogens*, with complete (irregular), unsymmetrical flowers, naked petals, 1-celled anthers opening by pores, and carunculate seeds.

Shrubs or herbaceous plants, sometimes twiners. Leaves generally alternate, sometimes opposite, mostly simple, and always destitute of stipules. Flowers usually racemose, often small and inconspicuous, but showy in many species of *Polygala*.



Fig. CCLXI.

Pediceles with 3 bracts. Sepals 5, very irregular, distinct, often glumaceous; 3 exterior, of which 1 is superior and 2 anterior; 2 interior (the wings) usually petaloid, and alternate with the upper and lower ones. Petals hypogynous, usually 3, of which 1 is anterior and larger than the rest (the keel), and 2 alternate with the upper outer, and lateral inner sepals, and often connate with the keel; sometimes 5, and then the 2 additional ones minute and between the wings and the lower sepals. Keel sometimes entire, and then either naked or crested; sometimes 3-lobed, and then destitute of a crest. Stamens hypogynous, 8 usually combined in a tube, unequal, and ascending; sometimes 4, and distinct; the tube split opposite the upper sepal; anthers clavate, innate, mostly 1-celled and opening at their apex, sometimes 2-celled.

Disk either absent or present, regular or irregular. Ovary superior, compressed, with 2 or 3 cells, which are anterior and posterior, the upper one occasionally suppressed; ovules solitary, very rarely twin, pendulous, anatropal; style simple, curved, sometimes very oblique and cucullate at the apex, which is also entire or lobed; stigma simple. Fruit usually opening through the valves; occasionally indehiscent, membranous, fleshy, coriaceous, or drupaceous, winged, or apterous. Seeds pendulous, with a caruncula next the hilum, naked or enveloped with hairs; the outer integument crustaceous, the inner membranous; albumen abundant, fleshy, rarely reduced to a thin gelatinous plate; embryo straight, or slightly curved, with the radicle next the hilum.

The structure of this Order has been explained by Aug. de St. Hilaire and Moquin-Tandon, from whose Memoir, above quoted, the foregoing character is extracted.

Fig. CCLXI.—*Polygala erioptera*. 1. an entire flower seen from the side; 2. the same cut open to exhibit the stamens; 3. the pistil; 4. a section of a ripe seed; in the middle is the embryo; at the apex, which represents the real base, is seen a caruncula.

Fig. CCLXII.—Anthers of *Polygala vulgaris*, expanded.

Milkworts are remarkable, among other things, for the irregularity of their flowers, which is such as to obscure, in a great measure, the relative position of the sepals and petals. The calyx apparently consists of but three pieces, which are usually green, and like sepals in their common state; but their real number is 5, the two coloured lateral petal-like bodies sometimes lying within the apparent sepals, being in reality part of the series of the calyx. The corolla is mostly monopetalous, and, if carefully examined, formed of 3 pieces; namely, the keel and two petals, all blended together. We have, therefore, an abortion of two petals, according to the laws of alteration. But this is not all; there is not only an abortion of two petals, but of those two which would, if present, be found right and left of the keel. The monopetalous corolla is, therefore, formed by the cohesion of the two posterior and the anterior petal of a pentapetalous corolla, of which the two lateral petals are suppressed. The keel has an appendage of an anomalous character, called technically a crest, and often consisting of one or even two rows of fringes or divisions, originating not from the margin, but from within it, and sometimes cohering in a common membrane at their base. Ang. de St. Hilaire has shown that this crest is nothing more than the deeply-lobed middle segment of a keel, with these lobes in such a state of cohesion that the central lobe is pushed outwards, while the lateral ones cohere by their own margins and with its back. The stamens are only 3: two therefore are suppressed. This relative position of the fifth sepal and petal respectively, was first indicated by Brown.

Milkworts are stationed by De Candolle between Sundews and Poreworts (*Tremandraceæ*), and in the immediate vicinity of Violetworts. With the latter they were thought to be related on account of their hypogynous stamens, irregular flowers, and cucullate stigma; and with Poreworts on account of the caruncula of their seed. To Funeworts they approach in the general aspect of their flowers, and in little more. Leguminous plants are, notwithstanding their perigynous stamens, an Order with which Milkworts seem at first sight to have some affinity; the irregularity of corolla is of a similar nature in both; there is in Leguminous plants a tendency to suppress the upper lateral petals in *Erythrina*, as in *Polygala*, and the ascending direction of the style with a cohesion of stamens are characters common to both Orders. Many additional observations are made to the same effect by St. Hilaire and Moquin-Tandon, who, moreover, compare the Order with Rueworts; but those authors appear to have finally decided upon the true position of Milkworts being in the vicinity of Soapworts; remarking that "the calyx of the latter is unequal, the corolla very irregular, and the ovary of *Schmidelia* usually 2-celled and 2-seeded, like that of *Polygala*. Moreover, a great part of the genera of that Order have, with a calyx of five divisions, a corolla with four petals, and the place of the fifth is manifestly vacant. This suppression is not exactly the same as what is observed in the corolla of *Polygala*, where there are only 3 petals with 5 sepals; but the suppression has more analogy with what concerns the stamens, since with a quinary number in the calyx each Order has eight antheriferous filaments." In this

view I fully agree. The unsymmetrical flowers, more especially manifested in the reduction of the number of carpels to 2 or 3 in a structure otherwise quinary, the definite ovules, the twining habit of *Comesperma*, the samaroid fruit of *Scemridaca*, and it may even be added, the deleterious qualities of some *Polygalas*, together with the saponaceous secretions of the *Momimas*, are all arguments of the strongest kind in favour of Milkworts and Soapworts belonging to the same Alliance.

Certain anomalous genera, belonging as I think to this Order, have been elevated to the rank of Natural Orders. Of these *Trigonina*, a genus of tropical American trees, has been divided from Milkworts because of its leaves being opposite and having sti-



Fig. CCLXIII.

Fig. CCLXIII.—*Trigonon crotonoides*.—A. de St. Hilaire. 1. a flower seen from the side; 2. the corolla, with the petals displayed in their natural position; 3. a pistil; 4. cross section of the ovary; 5. cross section of a seed.

pules, of some supposed difference in the relative position of the largest petal, the anthers opening longitudinally, and the presence of some fleshy glands between the ovary and stamens; I cannot, however, concede anything like ordinal importance to these circumstances. Trigonia may be regarded either as an approach on the part of Milkworts to the Sapindaceous structure, as is indicated by the longitudinal dehiscence of its anthers, the greater symmetry of its flowers, and its 3-valved fruit; or as actually a member of the Soapworts, approaching Milkworts. The supposed relation between it and Spindle trees or Leguminous plants, which M. Cambessédes suggests, appears to be a very slight indication of analogy.—See *Fl. Bras. Mer. v. 2. p. 112.*

Krameria has much higher claims to separation. The whorls of its flowers are so completely dislocated that it is difficult to determine the relative position of the parts; there is no trace of the quasipapilionaceous structure generally characteristic of Milkworts, its ovary is imperfectly 2-celled, and it is said that no albumen exists in its seeds. Certainly these are points of moment. Nevertheless, its definite hypogynous stamens, porous anthers, unsymmetrical flowers, definite pendulous ovules, bur-like fruit, which resembles that of *Salomonina*, and in some degree its habit, are conformable to the Milkwort structure; and in the absence of all trace of the existence of other genera approaching this kind of organisation, it seems expedient to regard it as a mere exception to the usual structure of an Order whose general condition is in many respects very anomalous. It, too, may be regarded as assisting to bring into contact the Milkworts and Soapworts, for *Krameria eytisoides* has ternate leaves.

Soulamea is another instance of the elevation of a solitary genus into a Natural Order. This is a Molucca plant, also without albumen in its seeds, and having a regular trimerous flower with 2-celled anthers. It may perhaps be considered as an instance of the usual irregular flower of Milkworts assuming a regular type.

Lastly, of the genus *Moutabea*, promoted by Endlicher, who stations it near *Storaxworts*, regarding it as monopetalous, it may be said with tolerable confidence that it has not a single feature that can justify its separation from Milkworts. Like *Xanthophyllum* its petals are equal-sized, and as for their adhesion into a tube, that is no more than what occurs in all the Polygalas, whose stamens hold together parts which under ordinary circumstances are distinct. So entirely, indeed, does *Moutabea* agree with *Polygala*, that it even has its eight 1-celled anthers opening at the point, in combination with a 5-petalled corolla. The berries of *Moutabea longifolia* are said to be eatable; so are those of *Mundia spinosa*. A tubular calyx exists in *Moutabea*, but that will hardly be insisted upon as a ground for forming it into a Natural Order.

Most of the genera are limited to one or two of the five parts of the globe; thus *Salomonina* is only found in Asia, *Soulamea* in the Moluccas, *Muraltia* at the Cape of Good Hope, and *Monnina* and *Badiera* in South America. *Comesperma* is found both in Brazil and New Holland, and, what is very remarkable, there is in the former country a species of the Cape genus *Mundia*. *Polygala* itself occurs in four of the five parts; under the torrid zone and in temperate climates, at Cayenne, and on the mountains of Switzerland; it is, however, very unequally distributed. This genus inhabits almost every description of station—dry plains, deep morasses, woods, mountains, cultivated and barren soils. *Comesperma* is only known in Brazil and Australia. *Monnina* and *Krameria* inhabit open places in the temperate parts of South America.

Milkworts offer, as has been stated, considerable diversities of structure, and therefore, as might have been anticipated, the purposes to which they are applicable are by no means uniform. The greater part are bitter, and in their roots milky. To this category may be referred the following cases. *Polygala amara* is a European perennial, all the parts of which are extremely bitter; it is much extolled in pulmonary complaints and spitting of blood. *P. vulgaris* and *major* have similar uses, but are inferior in energy. A strong bitter taste pervades all the parts of *Polygala rubella*, a North American



Fig. CCLXIV.

Fig. CCLXIV.—*Krameria cistoides*.—Hooker. 1. an expanded flower; 2. a diagram, showing the relative position of the parts; 3. a stamen; 4. a perpendicular section of an ovary.

species; in small doses its infusion is found useful as a tonic and stimulant to the digestive organs; in large doses it opens the body and excites diaphoresis. In a Molucca plant, the *Soulamea amara*, called by Rumphius *Rex amaroris*, all the parts, especially the roots and fruit, have an intense bitterness (*horrenda amarities Rumpf.*). They are employed in the Malayan Archipelago with extraordinary success in cholera and pleurisy, and are regarded as being most valuable as a febrifuge.

Others are distinguished for their emetic, purgative, and diuretic action. Of these the most celebrated is a North American herb called Snake-root, *Polygala senega*; of this plant the root is somewhat acid and acrid. It acts as a sudorific and expectorant in small doses, and as an emetic and cathartic in large ones. It is employed in pneumonia, asthma, croup, dropsy, chronic rheumatism, and especially in such uterine complaints as amenorrhœa. Dr. Areher has extravagantly praised it in cynanche trachealis. Chemists refer the action to the presence of a peculiar principle called Polygaline or Senegine. *P. sauguinea* and *purpurea* in North America, *Chamaebuxus* in Europe, *P. pauciculata*, a very common West Indian annual, *P. serpentaria* of the Cape, *P. crotalariaoides* in the Himalayas, all appear to participate in these qualities, and it is not a little remarkable that the whole of these plants have the reputation of being antidotes to snake bites; the oppressions of breathing observable in such cases appears to be certainly relieved by them. Some are mere emetics; such as *P. poaya*, used successfully in Brazil in bilious fevers, and *P. glandulosa* and *scoparia*, Mexican species. *P. thesioides*, called *Chinchin* in Chili, is said to have a powerfully diuretic root. *Badiera diversifolia*, a little West Indian bush, is said to rival Guaiacum in its peculiar qualities. Finally, these principles become so concentrated in *P. venenosa*, called *Katu-tutu* in Java, as to render that plant a poison; it is dreaded by the natives, who say that its heavy noxious odour, or even the touch, produces violent sneezing and severe headache.

Among plants whose uses are not reducible to either of the foregoing heads may be mentioned the following. The drupes of *Mundia spinosa*, a Cape shrub, are eatable. The bark of the root of *Monnina polystachya* and *salicifolia*, when fresh, pounded and moulded into balls, or their dry bark, is detergent; it readily froths when agitated in water, and is used by the Peruvians as a substitute for soap; the ladies of Peru ascribe the beauty of their hair to the use of its infusion, and the silversmiths of Huancoco employ it for cleansing and polishing wrought silver. It is also used with great success in the cure of dysenteries and irritating diarrhœas in Peru, where it is preferred to Quassia. This saponaceous quality is, among other things, an indication of the relation borne by Milkworts to Soapworts (*Sapindaceæ*). *P. tinctoria* is used by the dyers in Arabia. The wood of *Xanthophyllum*, a genus of trees of considerable size, is said to be valuable. The *Kramerias*, anomalous plants inhabiting the temperate parts of South America, and called *Rhatany*-roots, are intensely astringent. The infusion of their roots is blood-red, and is employed to adulterate Port wine; in Peru, an extract is formed from *K. triandra*, which is a mild, easily assimilated, astringent medicine, possessed of great power in passive bloody or mucous discharges; and also in weakness of the digestive organs, muscular debility, and even in intermittent and putrid fevers. The powder forms, along with charcoal, an excellent tooth powder; and an infusion is used as a gargle and wash. Such other species as have been examined seem to be identical in their nature.

GENERA.

<i>Salomonina</i> , Lour.	<i>Badiera</i> , DC.	<i>Monnina</i> , Ruiz et Pav.	<i>Cardiocrarpus</i> , Reinw.
<i>Polygala</i> , Linn.	<i>Penca</i> , Plum.	<i>Hebeandra</i> , Bonpl.	<i>Trigonin</i> , Aubl.
<i>Psychanthus</i> , Raf.	<i>Comesperma</i> , Labill.	<i>Carpolobia</i> , G. Don.	<i>Mainea</i> , Fl. Flum.
<i>Blepharidium</i> , DC.	<i>Catocoma</i> , Bth.	<i>Lophostylis</i> , Hochst.	<i>Montabea</i> , Aubl.
<i>Clinclinia</i> , Feuill.	<i>Muraltia</i> , Neck.	<i>Securidaca</i> , Linn.	<i>Cryptostomum</i> , Schreb.
<i>Timutua</i> , DC.	<i>Heisteria</i> , Berg.	<i>Krameria</i> , Liff.	<i>Acosta</i> , Ruiz et Pav.
<i>Senega</i> , DC.	<i>Mundia</i> , Kunth.	<i>Xanthophyllum</i> , Roxb.	? <i>Bredemeyera</i> , Willd.
<i>Chamaebuxus</i> , Dill.	<i>Nylandtia</i> , Dumort.	<i>Jackia</i> , Blum.	? <i>Huyenanthera</i> , R. Br.
<i>Triclisperma</i> , Raf.	<i>Vascoa</i> , DC.	<i>Soulamea</i> , Lam.	
<i>Brachytopis</i> , DC.			

NUMBERS. GEN. 19. Sp. 495.

POSITION.—*Trochandraceæ*.—*Polygalaceæ*.—*Sapindaceæ*.
Violaceæ?

ORDER CXXXIV. VOCHYACEÆ.—VOCHYADS.

Vochysiaceæ, *Mart. Nov. Gen.* 1. 123. (1824); *Endl. Gen. cclx.*; *Melsner*, 119.—Vochysiæ, *A. St. Hil. Mém. Mus.* 6. 265. (1820); *DC. Prodr.* 3. 25. (1828).

DIAGNOSIS.—*Sapindal Exogens*, with complete, unsymmetrical, very irregular flowers, naked petals, anthers opening longitudinally, 3 carpels, and winged seeds.

Trees or shrubs. Branches opposite, when young 4-cornered. Leaves opposite, sometimes towards the extremities of the branches alternate, entire, with glands or 2 stipules at the base. Flowers usually in terminal panicles or racemes. Sepals 4-5, combined at the base, very unequal, the two outer the smallest, the two in front the largest, imbricated in aestivation, the upper one much the largest and spurred. Petals 1, 2, 3 or 5, alternate with the segments of the calyx, and inserted into their base, unequal. Stamens 1-5, usually opposite the petals, rarely alternate with them, arising from the bottom of the calyx, for the most part sterile, 1 of them having an ovate fertile 4-celled anther. Ovary free, or partially adherent, 3-celled; ovules in each cell, solitary or twin, or 00, attached to the axis, amphitropal, with the foramen uppermost; occasionally 1-celled, with 2 anatropal ovules rising from the base; style and stigma 1. Capsule 3-cornered, 3-celled, 3-valved, the valves bursting along their middle, with a central columella; occasionally indehiscent, 1-celled, 1-seeded, and crowned by the sepals grown out into wings. Seed without albumen, erect, usually winged; embryo straight in the capsular genera, with large leafy cotyledons and a short superior radicle; in the monospermous fruit, orthotropal, cylindrical, with semi-cylindrical cotyledons, and a short inferior radicle.

Such is the character that Botanists give to a most curious race of trees and shrubs, which few have had the opportunity of studying, but which are remarkable for the beauty of their large and gaily coloured flowers. It seems, however, certain that the Order, as thus described, contains genera which must hereafter be separated, and that it cannot be at present regarded as being at all well limited. De Candolle speaks of it as being in habit and flower somewhat allied to Guttifers or Margriviads, but distinct from both in the stamens being inserted into the calyx; perhaps more directly connected with Myrobalans, on account of the convolute cotyledons and inverted seeds; and even perhaps allied to some Onagrad, on account of the abortive solitary stamen. To me it still appears to be more allied to Violetworts, an affinity strongly pointed out by the irregular flowers, 3-celled ovary, and stipules, but also to be yet nearer Milkworts, from which the calcareate flowers and ascending ovules principally distinguish it. The main difficulty in associating it with any Alliance to which these Orders belong, consists in the stamens being truly perigynous. But there is no perigynous Alliance to which it seems referable, and the peculiar proportion of the 3-celled ovary to the 5-parted calyx and corolla, strongly indicates the true affinity to be with the Sapindal Alliance.

Natives of equinoctial America, where they inhabit ancient forests, by the banks of streams, sometimes rising up mountains to a considerable elevation. They are often trees with large spreading heads.



Fig. CCLXV.

Fig. CCLXV.—*Salvertia convallarioides*.—*St. Hilbre*. 1. an expanded flower; 2. a portion of the calyx, with the stamens; 3. a pistil; 4. a transverse section of the ovary.

Little is known of any use to which they can be applied. Their flowers are reputed to be very sweet, and some are said to have a resinous juice. The Itaballi, or Copai yé wood of Guiana, a hard but not very durable timber, is obtained from *Vochya guianensis*, according to Schomburgk.

GENERA.

<i>Callisthene</i> , Mart. et Zuc.	<i>Schuchia</i> , Endl.	<i>Salmonia</i> , Neck.	? <i>Erisma</i> , Rudge.
<i>Callisthenia</i> , Spreng.	<i>Vochysia</i> , Juss.	<i>Cucullaria</i> , Schreb.	<i>Debræa</i> , Röm. et Schl.
<i>Amphilochia</i> , Mart.	<i>Vochy</i> , Aubl.	<i>Struckeria</i> , Fl. Fl.	<i>Ditmaria</i> , Spreng.
<i>Agardhia</i> , Spreng.	<i>Vochya</i> , Vandell.	<i>Salvertia</i> , St. Hil.	? <i>Lozania</i> , Seb. Mut.
<i>Qualea</i> , Aubl.			

NUMBERS. GEN. 8. Sp. 51.

Violacæ.

POSITION.—*Polygalacæ.*—*VOCHYACEÆ.*—*Sapindacæ.*

ORDER CXXXV. STAPHYLEACEÆ.—BLADDER-NUTS

Celastrineæ, † Staphyleaceæ, DC. *Prodr.* 2. 2. (1825).—Staphyleaceæ, Lindl. *Synopsis*, 75. (1829);
Endl. Gen. ccxxxv.

DIAGNOSIS.—*Sapindal Exogens*, with partially complete, symmetrical flowers, an imbricated calyx, ascending ovules, simple stigmas, opposite leaves, with stipules.

Shrubs. Leaves opposite (rarely alternate), pinnate, with both common and partial deciduous stipules. Flowers in terminal, stalked racemes, sometimes ♀-♂. Sepals 5, connected at the base, coloured, with an imbricated aestivation. Petals 5, alternate, with an imbricated aestivation, inserted in or around a free ereuated saucer-shaped disk. Stamens 5, alternate with the petals, perigynous. Ovary 2- or 3-celled, free, with the carpels more or less distinct; ovules several, horizontal or ascending, anatropal; styles 2 or 3, cohering at the base. Fruit membranous or fleshy, indehiscient or opening internally, often deformed by the abortion of some of the parts. Seeds ascending, roundish, with a bony testa; hilum large, truncate; albumen little or none; cotyledons thick; radicle short, next the hilum.

Combined with Spindle-trees by De Candolle, but distinguished by Ad. Brongniart (*Mém. sur les Rhamnées*, p. 16), this Order appears to be essentially characterised by its opposite pinnate stipulate leaves, and to be far more closely allied to Soapworts, from

which it is distinguished by the number of its sepals, petals, and stamens being alike.

The very few species which belong here are irregularly scattered over the face of the globe. Of the genus *Staphylea*, 1 is found in Europe, 1 in North America, 1 in Japan, 2 in Jamaica, 1 in Peru; and of *Turpinia*, 1 is Mexican, and 1 East India.

Very little is known of their uses. The Bladder-nuts are handsome trees of small size; their seeds are oily, rather austere, and slightly purgative. The inner bark of *Euscaphis staphyleoides*, a Japan plant, is bitter and astringent, and is used in dysentery and chronic diarrhœa, according to Siebold.

GENERA.

Turpinia, Vent.	|	Staphylea, Linn.
Datrymytea, Roxb.		Staphylo dendron, Tournef.
Euscaphis, Sieb. et Zucc.		Bumalda, Thunb.

NUMBERS. GEN. 3. Sp. 14.

POSITION. ——— STAPHYLEACEÆ.—Sapindaceæ.
Celastraceæ.



Fig. CCLXVI. 2

Fig. CCLXVI.—*Staphylea Bumalda*.—*Delessert*. 1. a flower; 2. a perpendicular section of it; 3. a section of its ovary.

ORDER CXXXVI. SAPINDACEÆ.—SOAPWORTS.

Sapindi, *Juss. Gen.* 246. (1789).—Sapindaceæ, *Juss. Ann. Mus.* 18. 476. (1811); *DC. Prodr.* 1. 601. (1824); *Cambessédes in Mém. Mus.* 18. 1. (1829); *Endl. Gen.* cxxx.; *Wight Illustr.* 1. p. 141.—Æsculaceæ, *Ed. pr.* lxii.—Hippocastaneæ, *DC. Théorie, Ed.* 2. 244. (1819); *Prodr.* 1. 597. (1824); *Endl. Gen.* p. 1075.—Castaneaceæ, *Link Enum.* 1. 354. (1821).—Millingtonieæ, *Jack in Malay. Misc.* 2. 32; *Hooker Journal*, 377.—Millingtoniaceæ, *Wight and Arnott in Ed. Ph. Journ.* 15. 177. (1833); *Prodr. Penins.* 115. (1834); *Royle Illustr.* p. 139. (1835); *Wight Illustr.* 1. t. 53.—Meliosmeæ, *Endl. Gen.* p. 1074.

DIAGNOSIS.—*Sapindal Exogens*, with complete, unsymmetrical flowers, petals usually with an appendage, anthers opening longitudinally, 3 carpels, and usually arillate, wingless seeds.

These are for the most part trees of considerable size, or twining shrubs bearing tendrils, or, though seldom, climbing herbs. Their timber has frequently several distinct axes of growth. Leaves alternate,



Fig. CCLXVII.

Embryo seldom straight, usually curved, or spirally twisted. Radicle next the hilum. Cotyledons incumbent, sometimes combined into a thick mass.

This Order is composed of a great diversity of species, which assume appearances widely different from each other; so that Botanists have not unnaturally supposed that it really contains the elements of several distinct Natural Orders. Thus the Horse-chesnuts have been separated because of their opposite leaves, and a singular peculiarity of the ovules, which are both erect and suspended in the same cell; and Meliosmeæ

Fig. CCLXVII.—*Sapindus senegalensis*. 1. an expanded flower; 2. a petal; 3. the ovaries before fertilisation; 4. a vertical section of a ripe drupe, showing the embryo.

have been set apart because of their fruit being a drupe, their ovules all suspended, and their stamens reduced to two only in a fertile condition. There does not, however, appear to be in these cases such differences from the true Soapworts as can stamp the supposed Orders with authority; and, as might have been expected, the progress of discovery does not sanction the separation by adding new members to such groups. The true character of Soapworts resides in their unsymmetrical flowers, (the stamens never agreeing in number or power with the sepals,) in their anthers bursting longitudinally, and in the petals having an appendage, while the seeds have an aril and the embryo is curved or spiral. But none of the latter characters are constant, and consequently the definition of the Order becomes very difficult. From Maples they hardly differ. At least, the characters usually pointed out as distinguishing them are fallacious in practice. The opposite leaves of Maples are found in *Æsculus* and others, and that genus has not appendages on its petals more than *Acer* itself, and a whole race of the Soapworts has samaroid fruit, which is the more obvious mark of the Order of Maples. To Milkworts they are no doubt akin in the singular combination of 8 stamens with 5 unequal sepals, and an uncertain number of petals; and also in their aril, which may be compared to the caruncula of Milkworts, although somewhat different in its origin. The dried leaves resemble, as De Caudolle remarks, those of *Connarads*. Their climbing habit and tendency to produce tendrils indicate a relation to Vines, which, however, is not very near. Malpighiads are known with certainty by their symmetrical flowers, although they too have the "keys" or samaras that are so common among Soapworts. *Petiveriads* are certainly very near this Order; but, in addition to their constant want of petals, their carpel is always solitary, and absolutely simple.

A very general character of the Soapworts is to have their embryo either curved, or twisted spirally. This occurs in a remarkable manner in the nut of a Demerara tree, called the Snake-nut, in consequence of the large embryo resembling a snake coiled up. Sir R. Schomburgk, who first described this production in the *Annals of Natural History*, vol. 5. p. 204, has called the tree *Ophiocaryon paradoxum*. The accompanying figure represents it in a germinating condition. Another peculiarity resides in the trunk of such as have a climbing habit. These remarkable plants possess several distinct woody axes, held together



Fig. CCLXVIII.

by masses of cortical matter, so that they resemble several thick-barked stems, forced together with violence. Instances of this structure have been figured by Gaudichaud, at Plate XIII. of his *Recherches sur l'Organographie*.

Natives of most parts of the tropics, but especially of South America and India. Africa knows many of them, but they are wanting in the cold regions of the north. None are found wild in Europe. *Dodonea* represents the Order in New Holland; Horse Chesnuts in the north of India, Persia, and the United States.

It is singular that while the leaves and branches of many of these plants are unquestionably poisonous, the fruit of others is valuable as an article of the dessert. Thus the Longan, the Litchi, and the Rambutan, fruits among the more delicious of the Indian archipelago, are the produce of different species of *Nephelium*. *Picardaria sativa* and *dulcis*, to which belong the Rambah and Choopa of Malacca, and *Hedyocarpus malayanus* producing the Tampui, are other fruit trees of the Order. The fruit of *Schmidelia edulis* is known at deserts in Brazil, under the name of *Fruta de paraó*; it is said to have a sweet and pleasant taste. Various species of Sapindus are mentioned as fruit trees. The blacks of Senegal highly value the berries of *S. senegalensis*; the fruit of *S. esculentus* is very fleshy, and much esteemed by the inhabitants of *Certaó*, by whom it is called *Pittomba*. *Melicocca bijuga*, a West Indian tree, is now cultivated in Brazil for its agreeable subacid vinous berries. The fruit of *Pappea capensis* is called *Wild Prunes* at the Cape of Good Hope; its seeds abound in oil. The succulent aril of the Akee tree (*Blighia* or *Cupania sapida*), of *Panllinia subrotunda*, and *Schleichera trijuga*, are also articles of food in their respective countries.

Nevertheless, these fruits belong to a race eminently dangerous; and, as in other

Fig. CCLXVIII.—Germinating seed of *Ophiocaryon paradoxum*. a. radicle; b. cauliculus; cc. cotyledons, which, when at rest and unexpanded, are folded down upon d.

cases, appear to be parts in which the deadly juices of the branches and leaves are too much diffused among watery matter to be dangerous. For example, although the fruit of *Sapindus senegalensis* is eaten, its seeds are known to be poisonous; those of the eatable *Nephelia* are so bitter as to excite suspicion as to their nature; and it is asserted that both the fruit and leaves of the Buck-eye, or American Horse Chesnut, *Aesculus ohioensis*, are a mortal poison, both to man and animals. In no part of this Order is the narcotic quality more developed than in the genus *Paullinia*. Of all the species, *P. pinnata* is supposed to be the worst; bark, leaves, and fruit abound in an acrid principle, and the Brazilian blacks prepare from them an insidious poison, which slowly but certainly destroys life. Martius suggests that the nature of this poison should be inquired into, and experiments made as to whether it may not be advantageously administered in hydrophobia and insanity. A venom for their arrows is prepared by the savages of Guiana from *Paullinia Cururu*; *P. australis* and *Serjania lethalis* are together supposed to furnish the Lecheguana honey, which has been found a most dangerous food. (See *Edinb. Ph. Journ.* 14. 269, and *Plantas Remarquables*, p. 192.) From *P. Cupana* an inebriating drink is prepared on the banks of the Oronoë. The leaves of *Magonia pubescens* and *glabrata*, called Tinguy in Brazil, are used for stupefying fishes; their bark is employed for healing sores in horses, caused by the stings of insects. *Serjania triternata* is also employed as a fish poison. The roots of the American Horse Chesnut are held to be poisonous.

Some are used in medicine as astringents. The root of *Schmidelia serrata* is employed in India to stop diarrhœa. The bark of *Schleichera trijuga* is rubbed up with oil in the same country to cure the itch. The bark of the Horse Chesnut, *Aesculus Hippocastanum*, has been recommended as a valuable febrifuge in intermittent and other fevers; a decoction has been recommended in gangrene, and its powder as an errhine. Its young leaves are aromatic, and have been used instead of Hops in brewing beer, according to Endlicher. The fruits of *Blighia* (or *Cupania*) *sapida*, boiled down with sugar and cinnamon, are used in diarrhœa.

A saponaceous principle exists in a remarkable degree in certain species. The seeds of the common Horse Chesnut are not free from it. The acrid fruits of *Sapindus saponaria*, *inequalis*, and others, lather freely in water, and are used in the West Indies instead of soap; "a few of them will cleanse more linen than 60 times their weight of soap." Pounded and thrown into water, they intoxicate fish. A tincture of the berries has been recommended in chlorosis. The distilled water of the flowers of *Blighia sapida* is regarded by negro women as a cosmetic, probably owing to the presence of the saponaceous matter just alluded to.

Notwithstanding these qualities, a food called Guarana bread is prepared by the Brazilian savages from the seeds of *Paullinia sorbilis*. Martius, who has investigated the nature of this substance, says that oblong or round cakes of it are sold all over Brazil as an indispensable requisite for travellers, and a cure for many disorders. His brother Theodore found them to be composed chemically of an astringent matter, forming a green precipitate with iron, resin, fat oil of a green colour, gum, starch, vegetable fibre, and a white crystalline bitter substance, which he called Guaraneine, and which appears to be identical with Theine and Caffeine. The Brazilians pound this bread in water, sweeten it, and esteem it as a stomachic, febrifuge, and aphrodisiac. Martius regards it as a substance of considerable activity ("nobile remedium"), and adds, "Appetitum venereum movet, spermatis vero fœcunditatem diminuere dicitur."

In addition to the uses already indicated, Soapworts present occasionally other qualities. The root of *Cardiospermum Halieacabum* is diaphoretic, diuretic, and aperient. Its leaves are cooked as a vegetable in the Moluccas. The seeds of the Horse Chesnut are an excellent sheep-food,* and have been recommended as a good substitute for Coffee. The *Dodonæas* are somewhat aromatic; the leaves of *D. viscosa* are used in baths and fomentations; the wood of *D. dioica* is carminative; *D. Thunbergiana* is said to be slightly purgative and febrifugal. The branches of *Plösslea floribunda*, a Cape plant, are covered with a gummy exudation. The timber of some of the South African trees of the Order appears to be valuable. That of *Pteroxylon utile* is said to be as hard and handsome as Mahogany; its sawdust makes the workmen sneeze, wherefore they call

* Whilst I was at Geneva in the autumn of 1837, I observed every one collecting carefully the fruit of the Horse Chesnut, and on inquiry I learnt that the butchers and holders of grazing-stock bought it readily at a certain price per bushel. I inquired of my butcher, who himself kept a very extensive grazing farm, and he told me it was given to those sheep in particular that were fattening. The Horse Chesnuts were well crushed; something in the way, so I understood, that Apples are, previous to cider being made. They are crushed or cut up in a machine kept solely in Switzerland, for that purpose; then about two pounds' weight is given to each sheep morning and evening. Sheep eat the food greedily; it must be portioned out to them, as too much would disagree with them, it being of a very heating nature. The butcher told me that it gave an excellent rich flavour to the meat. The Geneva mutton is noted for being as highly flavoured as any in England or Wales.—*Gardeners' Chronicle*, 1843, p. 737.

it Nieshout; it is found to burn rapidly, though green, and is used by the Hottentots for lighting their fires. *Hippobroma alatum*, commonly called Pardepis, is extensively employed for timber at the Cape of Good Hope.

GENERA.

<p>I. SAPINDÆÆ. — Leaves alternate. Ovules generally solitary. Embryo curved, or occasionally straight.</p> <p><i>Cardiospermum</i>, Linn. <i>Corindum</i>, Tournef. <i>Erythrophila</i>, E. M. <i>Urvillea</i>, H. B. K. <i>Serjania</i>, Plum. <i>Seriana</i>, Schmach. <i>Toulicia</i>, Aubl. <i>Poneæ</i>, Schreb. <i>Bridgesia</i>, Bert. <i>Triptocarpus</i>, Meisn. <i>Paullinia</i>, Linn. <i>Semariilaria</i>, R. et Pav. <i>Cururu</i>, Plum. <i>Enourea</i>, Aubl. <i>Natalia</i>, Hochst. <i>Schmidelia</i>, Linn. <i>Allophyllus</i>, Linn. <i>Ornitrophe</i>, Juss. <i>Toxicodendron</i>, Gärtn. <i>Azamaça</i>, Hochst. <i>Aoretica</i>, Forst. <i>Gemella</i>, Lour. <i>Usabis</i>, Burm. <i>Nassavia</i>, Fl. Flum. <i>Valenzuela</i>, Bert. <i>Irina</i>, Blum. <i>Prostea</i>, Camb. <i>Lepisanthes</i>, Blum. <i>Sapindus</i>, Linn. <i>Pappæ</i>, Eckl.</p>	<p><i>Erioglossum</i>, Blum. <i>Matayba</i>, Aubl. <i>Ephiclis</i>, Schreb. <i>Ernstingia</i>, Neck. <i>Moulinia</i>, Camb. <i>Cupania</i>, Plum. <i>Trigonis</i>, Jacq. <i>Vouarava</i>, Aubl. <i>Molinea</i>, Juss. <i>Gelontum</i>, Gärtn. <i>Tina</i>, Röm. et Schult. <i>Stadmannia</i>, Lam. <i>Mischocarpus</i>, Blum. <i>Guioa</i>, Cav. <i>Blighia</i>, König. <i>Akeasia</i>, Tuss. <i>Harpulia</i>, Roxb. <i>Bonnania</i>, Raf. <i>Dimereza</i>, Labill. <i>Diplopetalon</i>, Spreng. <i>Ratonia</i>, DC. <i>Erioglossum</i>, Guill. et Perr. <i>Digonocarpus</i>, Fl. Fl. <i>Trigonocarpus</i>, Fl. Fl. <i>Aphania</i>, Blum. <i>Talisia</i>, Aubl. <i>? Acladodea</i>, R. et Pav. <i>Nephelium</i>, Linn. <i>Euphoria</i>, Commers. <i>Scytalia</i>, Gärtu. <i>Dimocarpus</i>, Lour. <i>Pometia</i>, Forst. <i>Li-tchi</i>, Sonner. <i>Thouinia</i>, Poit. <i>Thyana</i>, Hamilt. <i>? Vargasia</i>, Bert</p>	<p><i>Hypelate</i>, P. Br. <i>Spharococca</i>, DC. <i>Exothea</i>, Macf. <i>Melicocca</i>, Linn. <i>Oococca</i>, DC. <i>Casimira</i>, Scop. <i>Schleichera</i>, Willd. <i>Cussambium</i>, Rumph. <i>Koon</i>, Gärtn. <i>? Pierardia</i>, Jack. <i>Pierardia</i>, Blum. <i>? Hedycarpus</i>, Jack.</p> <p>II. HIPPOCASTANÆÆ.— Leaves opposite. Ovules 2 in each cell, one ascending, the other suspended. Embryo curved with great fleshy consolidated cotyledons.</p> <p><i>Ungnadia</i>, Endl. <i>Æsculus</i>, Linn. <i>Hippocastanum</i>, Tourf. <i>Pavia</i>, Boerh.. <i>Macrothyrsus</i>, Spach. <i>Calothyrsus</i>, Spach.</p> <p>III. DODONÆÆ.—Leaves alternate. Ovules 2 or 3 in each cell. Embryo rolled spirally.</p> <p><i>Kœlreuteria</i>, Lam. <i>Cossignia</i>, Cambess. <i>Lagunoa</i>, Ruiz. et Pav. <i>Amirola</i>, Pers.</p>	<p><i>Diplopeltis</i>, Endl. <i>Dodonæa</i>, Linn. <i>Alectryon</i>, Gärtn. <i>Evonymoides</i>, Soland. <i>Ophiocaryon</i>, Schomb.</p> <p>IV. MELIOSMÆÆ. Leaves alternate. Flower extremely irregular. Stamens 5, of which 2 only are fertile. Ovules 2 in each cell, both suspended. Embryo folded up. Fruit a drupe.</p> <p><i>Meliosma</i>, Blum. <i>Millingtonia</i>, Roxb. <i>Wellingtonia</i>, Meisn.</p> <p>Anomalous Genera. <i>Plösslea</i>, Endl. <i>Xanthoceras</i>, Bung. <i>Magonia</i>, St. Hil. <i>Phœocarpus</i>, M. et Zuc.</p> <p>Doubtful Genera. <i>Valentiuia</i>, Swartz. <i>Racaria</i>, Aubl. <i>Eustathes</i>, Lour. <i>Pedicellia</i>, Lour. <i>Pta-roxylon</i>, Eckl. et Zey. <i>Hippobroma</i>, Eckl. et Zey. <i>Tarrietia</i>, Blum. <i>Deinbellia</i>, Schumach. <i>Hornschuchia</i>, Nees.</p>
--	--	---	--

NUMBERS. GEN. 50. Sp. 380.

Vitacæ.

POSITION.—Polygalacææ.—SAPINDACEÆ.—Aceracææ.

ORDER CXXXVII. PETIVERIACEÆ.—PETIVERIADS.

Petiveriæ, *Agardh Classes*, (1825); *Endl. Gen.* p. 975.—Petiveriaceæ, *Link Handb.* 1. 392. (1829); *Ed. pr. clix.*; *Meisn. Gen.* p. 316.

DIAGNOSIS.—*Sapindal Exogens, with apetalous flowers and a solitary carpel.*

Under-shrubs or herbaceous plants, with an alliaceous odour. Leaves alternate, entire, with distinct stipules, often with minute pellucid dots. Flowers racemose or paucied. Calyx of several distinct leaves. Stamens between perigynous and hypogynous, either indefinite, or, if equal to the segments of the calyx, alternate with them. Ovary superior, 1-celled; style one; stigma lateral; ovule erect. Fruit 1-celled, indehiscent, dry, either wingless, wedge-shaped and spiny at the point, or extended at the back into a narrow flat wing (*samaras*). Seed erect without albumen; embryo straight or curved; cotyledons convolute; radicle inferior.

According to Brown and Endlicher these plants are only a section of Phytolacæads. They are, however, distinguished by the presence of stipules, and by their straight exalbuminous embryo with spiral cotyledons. Their habit too is adverse to this approximation, while the key-like fruit of *Seguiera* and its inflorescence suggests a relationship to Soapworts, which does not seem removed by a comparison of the exact structure of the two. It is true that the latter Order in general has petals, and that Petiveriads have none; but then we have many apetalous genera among Soapworts. In both the seeds are erect, the exalbuminous embryo rolled up, the radicle inferior; and even in the number of their stamens they correspond, if we compare *Seguiera* with *Prosteca*. In fact, instead of separating these Petiveriads from Soapworts by a long interval, they might almost be regarded as an apetalous form of that Order, with carpels reduced to one. It is to be observed that *Petiveria* and *Seguiera* are not entirely like one another, and that these remarks apply to *Seguiera* only.

West Indian or tropical American plants; for the *Seguiera asiatica* of *Loureiro* probably does not belong to the Order.

All the parts of *Petiveria alliacea*, the Guinea-hen weed of the West Indies, are excessively acrid; a small portion of the leaves chewed is said by *Burnett* to render the tongue as dry and black and rough as it appears in cases of malignant fever. The negroes consider it a sudorific, and say that vapour baths or fumigations of it will restore motion to paralysed limbs. The roots are used in the West Indies as a remedy for toothache; the negroesses also administer it to procure abortion.—*Schomb. in Linnæa*, ix. 511. *P. tetrandra* is employed in Brazil under the name of *Raiz de Pipi* in warm baths and lotions, as a remedy for defective contractibility of the muscles, or in paralysis of the extremities arising from cold. It has an intense alliaceous odour.—*Martius*. The same writer informs us that the root, wood, and all the herbaceous parts of *Seguiera alliacea* have a powerful odour of garlic or *asafoetida*; baths impregnated with them are in repute in Brazil in cases of rheumatism, dropsy, and hæmorrhoidal affections. Fomentations of the leaves and young branches are employed to alleviate tumours of the prostate; the wood abounds in potash, and the ashes are employed in clarifying sugar and in soap-making in Brazil.

GENERA.

Petiveria, L. | *Seguiera*, L. | *Gallesia*, *Casar.*

NUMBERS. GEN. 3. Sp. 10.

Phytolaccacea.

POSITION.——————PETIVERIACEÆ.—Sapindaceæ.



Fig. CCLXIX.

Fig. CCLXIX.—*Seguiera floribunda*. 1. a flower; 2. a perpendicular section of an ovary; 3. samaras.

ORDER CXXXVIII. ACERACEÆ.—MAPLES.

Acera, *Juss. Gen.* 50. (1789); *Ann. Mus.* 18. 477. (1811).—*Acerinea*, *DC. Théorie*, *ed.* 2. 244. (1819); *Prodr.* 1. 593. (1824); *Endl. Gen.* cxxvii; *Meisner, Gen.* p. 56.

DIAGNOSIS.—*Sapindal Exogens*, with complete unsymmetrical flowers, petals naked or 0, anthers opening longitudinally, 2 carpels, and seeds without an aril.

Trees. Leaves opposite, simple, usually with palmate veins, rarely pinnate, without stipules. Flowers often polygamous, in axillary corymbs or racemes. Calyx divided into 5, or occasionally from 4 to 9 parts, with an imbricated æstivation. Petals equal in number to the lobes of the calyx, imbricated, inserted round an hypogynous disk, or 0. Stamens inserted upon the disk, generally 8, not often any other number, always definite. Ovary free, 2-lobed; style 1; stigmas 2; ovules in pairs, amphitropal, pendulous. Fruit formed of two nuts, which are indehiscent, with a narrow wing at the back (samaroid); each 1-celled, with 1 or 2 seeds. Seeds ascending, with a thickened lining to the testa; albumen none; embryo curved, with foliaceous wrinkled cotyledons, and an inferior radicle.



Fig. CCLXX.

The species are only known for the sugary sap of *Acer saccharinum* and others, from which sugar is extracted in abundance, and for their light useful timber. It is said, however, that their juices become acrid as the season advances. The bark is astringent, and yields the dyer reddish brown and yellow colours.

GENERA.

Acer, *Linn.*
Negundo, *Mbch.*
Sapindum, *Raf.*
Dobinea, *Hamill.*

NUMBERS. GEN. 3. Sp. 60.

POSITION.—*Petiveriaceæ*.—*ACERACEÆ*.—*Sapindacææ*.

Fig. CCLXX.—1. *Acer circinatum*.—*Hooker*. 2. flower of *A. campestre*, *Gartner*; 3. its samara; 4. the same, with the seed laid bare; 5. the embryo unfolded.

ORDER CXXXIX. MALPIGHIACEÆ.—MALPIGHIADS.

Malpighiaceæ, *Juss. Gen.* 252. (1789); *Ann. Mus.* 18. 479; *DC. Prodr.* 1. 577; *Endl. Gen.* cxxxviii.; *Adrien de Jussieu, Monogr.* (1843); *Wight Illustr.* 1. 136.—Nitrariaceæ, *Ed pr.* No. cxlix. (1830).

DIAGNOSIS.—*Sapindal Exogens*, with complete, partially symmetrical flowers, an imbricated calyx, naked stalked petals, ovules hanging by cords, simple stigmas, and usually a convolute embryo.

Trees or shrubs, often having a climbing habit. The leaves usually opposite or whorled, rarely alternate, simple, usually entire, generally stalked, and having glands on



Fig. CCLXXI

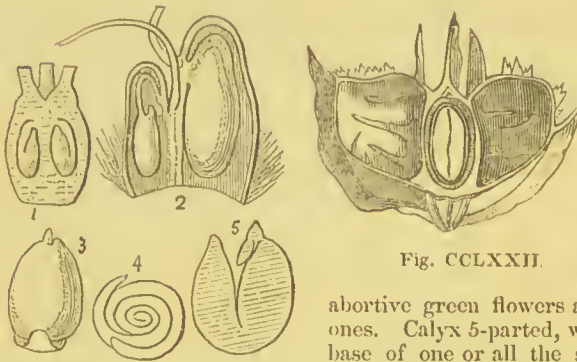


Fig. CCLXXIII.

the stalk or under side; stipules generally short and deciduous, occasionally larger, and intrapetiolar. If there are any hairs they are fixed by their middle, and sometimes are stiff and brittle. The inflorescence is variable. The flowers ♂ or ♂-♀-♀, red, or more commonly yellow, rarely white, and very rarely blue; in a few instances abortive green flowers are intermixed with the perfect ones. Calyx 5-parted, with conspicuous glands at the base of one or all the segments, very rarely without glands; in æstivation quincuncial, seldom valvate. Petals 5, unguiculate, with a convolute æstivation. Stamens mostly double the number of the petals, often monadelphous, usually with a fleshy connective that projects beyond the lobes of the anthers. Carpels generally 3, rarely 2, very rarely 4, altogether or partially consolidated, often crested at the back; ovules solitary, orthotropal, rising up from a long pendulous cord, with which they form a sort of hook; styles distinct or united; stigmas the same number, simple, capitate, truncate, or variously expanded. Fruit very various; a drupe, or a woody nut, or samaroid, the wings of different forms and in different positions. Seed suspended obliquely by a short cord below the apex; albumen 0; embryo with a short superior radicle and

Fig. CCLXXI.—*Diptopteris paralias*; 1. a flower-bud, showing the double glands of the calyx; 2. an expanded flower; 3. the carpels; 4. ripe fruit of *Ryssopteris timorensis*.

Fig. CCLXXII.—*Jubelina riparia*, after *A. de Jussieu*.

Fig. CCLXXIII.—1. Section of ovary of *Malpighia*; 2. of *Coleostachys*; 3. embryo of *Burdachia*; 4. of *Byrsonhna*; 5. of *Brachypterys*.—*A. de Jussieu*.

longer cotyledons, which are straight, and equal, or unequal, curved, or plaited, or even rolled up, very thick or leafy.

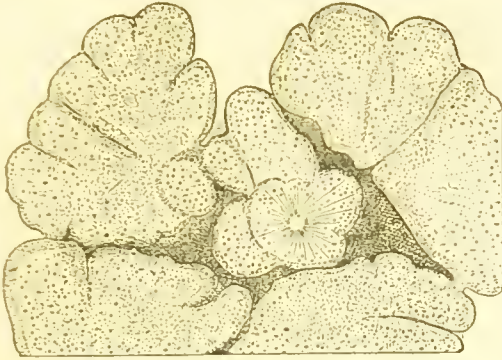


Fig. CCLXXIV.

This remarkable Order has been treated at great length, and with infinite skill, by M. Adrieu de Jussieu, from whom the principal part of the following and previous remarks is borrowed. Among the most striking peculiarities of the race is the presence upon the calyx of certain glands of such large size, sometimes, as to constitute a considerable part of the whole calycine apparatus; it is very remarkable that when these glands are missing, it is those which are next the outside of the inflorescence that disappear. They are secreting organs, and according to Payen, their exudations are (in certain Malpighias) of the nature of a fatty oil containing a fluid substance, besides one that is concrete. Another very remarkable circumstance is, the general tendency that has been observed among the stems of the climbing kinds, to assume appearances quite anomalous among Exogens. In these instances there is in the beginning the usual formation of a woody circular zone round pith, but immediately afterwards the woody matter is deposited in the most irregular lobed and zoneless ribs. Many details relating to this matter have been given by M. Adrien de Jussieu. The distinctions between this Order and others in its alliance, will be evident upon comparing the Diagnosis already given; and will be further explained under the other Orders.

The genus *Nitraria*, consisting of a few salt plants from the west of Asia, the north of Africa, and N. Holland, appears to be not essentially distinct from the present Order, of which it has the unsymmetrical ovary, peculiar ovules, and drupaceous fruit. Its principal distinctions consist in the entire consolidation of its styles, and in the stamens being collected in parcels lodged in the cavity of concave petals. It has, however, given rise to a supposed Order,* originally suggested in the first edition of the present work, No. 149, (1830), as possessing some affinity on the one hand with Goosefoots, and the other with Buckthorns (*Rhamnaceæ*).

The following is the distribution of the Order, according to M. A. de J.; Africa: 14 on the continent, 11 in Madagascar; Asia:

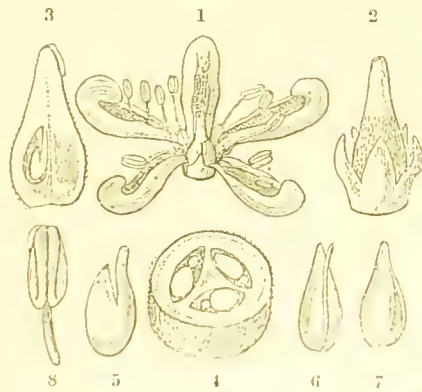


Fig. CCLXXV.

* The following is the character of the supposed Order called *NITRARIACEÆ*: Shrubs with deciduous succulent alternate leaves, which are sometimes fasciated. Flowers in cymes, or solitary. Calyx inferior, 5-toothed, fleshy. Corolla of five petals, which arise from the calyx, with an inflexed valvular aestivation. Stamens 3 times the number of the petals, perigynous; anthers innate, with 2 oblique longitudinal lines of dehiscence. Ovary superior, 3- or more celled, with a continuous fleshy style, at the apex of which are as many stigmatic lines as there are cells; ovules pendulous, by means of a long funiculus. Fruit drupaceous, opening by 3 or 6 valves. Seeds solitary, with no albumen, and a straight embryo, with the radicle next the hilum.

Fig. CCLXXIV.—Wood of *Heteropteryx anomala*.—A. de Jussieu.

Fig. CCLXXV.—*Nitraria Schoberi*. 1. an expanded flower; 2. the calyx and pistil; 3. a perpendicular section of the ovary; 4. a cross section of it; 5. an ovule; 6. a seed; 7. an embryo; 8. an anther.

Arabia, India, and Ceylon 16, Indian Archipelago, China and Polynesia 14; West Indies 56; Mexico 61; South America 408, of which 290 come from Brazil. They are nearly all tropical.

Of the uses of the species of this Order little can be said. A large number are beautiful trees or climbers with gaudy flowers; and they seem to be generally astringent. Byrsonima bark is of common employment by tanners in Brazil, under the name of Murici. The wood of some kinds, especially Byrsonima verbascifolia, is bright red. The fruit of the Malpighias and Byrsonimas is eaten in the West Indies; the hairs of a few are painfully pungent. The bark of Byrsonima crassifolia, or Malpighia Moureila, according to Anblet, is employed in Cayenne as a febrifuge. That of the Chapara Manteca, Byrsonima crassifolia, is astringent, and is used in infusion or decoction taken inwardly, as an antidote to the rattlesnake bite; it is also employed successfully as a remedy for abscesses in the lungs. It is said that Aleornoco bark is the produce of Byrsonima laurifolia, rhopalæfolia, and coccolobæfolia. The acid astringent berries of Byrsonima spicata (Bois-tan) are prescribed in dysentery. It is said that the seed of Bunchosia armeniaca, a Peruvian tree, is poisonous.

GENERA.

MALPIGHIÆ, <i>A. de J.</i>	<i>Dialla</i> , <i>Grisb.</i>	III. <i>HIREÆ</i> , <i>A. de J.</i>	<i>Dinemandra</i> , <i>A. de J.</i>
<i>Malpighia</i> , <i>Plum.</i>	<i>Heladraia</i> , <i>A. de J.</i>	<i>Tristellateia</i> , <i>Pet. Th.</i>	<i>Dinemagonum</i> , <i>A. de J.</i>
<i>Byrsonima</i> , <i>Rich.</i>	<i>Thryallis</i> , <i>Marl.</i>	<i>Zymum</i> , <i>Norouh.</i>	IV. GAUDICHAUDÆ, <i>A. de J.</i>
<i>Burdachia</i> , <i>A. de J.</i>	<i>Nitraria</i> , <i>L.</i>	<i>Hiptage</i> , <i>Gærtn.</i>	<i>Gaudichaudia</i> , <i>Kth.</i>
<i>Curusia</i> , <i>Mart.</i>	II. <i>BANISTERIÆ</i> , <i>A. de J.</i>	<i>Gærtnera</i> , <i>Schreb.</i>	<i>Aspicarpa</i> , <i>Lga.</i>
<i>Coleostachys</i> , <i>A. de J.</i>	<i>Lophopterys</i> , <i>A. de J.</i>	<i>Molina</i> , <i>Cav.</i>	<i>Acosmus</i> , <i>Desy.</i>
<i>Lophanthera</i> , <i>A. de J.</i>	<i>Brachypterys</i> , <i>A. de J.</i>	<i>Succovia</i> , <i>Dennst.</i>	<i>Camarea</i> , <i>St. Hil.</i>
<i>Pterandra</i> , <i>A. de J.</i>	<i>Stigmaphyllon</i> , <i>A. de J.</i>	<i>Triaspis</i> , <i>Burch.</i>	<i>Janusia</i> , <i>A. de J.</i>
<i>Verrucularia</i> , <i>A. de J.</i>	<i>Rysopterys</i> , <i>Blume.</i>	<i>Flabellaria</i> , <i>Cav.</i>	<i>Schwannia</i> , <i>Endl.</i>
<i>Galphimia</i> , <i>Cav.</i>	<i>Banisteria</i> , <i>L.</i>	<i>Aspidopterys</i> , <i>A. de J.</i>	<i>Fimbriaria</i> , <i>St. Hil.</i>
<i>Thryallis</i> , <i>L.</i>	<i>Peivotoa</i> , <i>A. de J.</i>	<i>Triopterys</i> , <i>L.</i>	GENERA INSUFFICIENTLY KNOWN.
<i>Spachea</i> , <i>A. de J.</i>	<i>Heteropterys</i> , <i>Kth.</i>	<i>Tetrapterys</i> , <i>Cav.</i>	<i>Caucanthus</i> , <i>Forsk.</i>
<i>Meckelia</i> , <i>Mart.</i>	<i>Tricomaria</i> , <i>Hk. et Arn.</i>	<i>Hirca</i> , <i>Jacq.</i>	<i>Platynema</i> , <i>Wight et A.</i>
<i>Bunchosia</i> , <i>Rich.</i>	<i>Acridocarpus</i> , <i>Guillem.</i>	<i>Mascagnia</i> , <i>Bert.</i>	<i>Beubix</i> , <i>Lour.</i>
<i>Malacmea</i> , <i>Gris.</i>	<i>Anomalopteris</i> , <i>G. Du.</i>	<i>Diplopterys</i> , <i>A. de J.</i>	
<i>Echinopteris</i> , <i>A. de J.</i>		<i>Jubelina</i> , <i>A. de J.</i>	

NUMBERS. GEN. 42. Sp. 555.

POSITION.—ACERACEÆ.—MALPIGHIACEÆ.—SAPINDACEÆ.

ORDER CXL. ERYTHROXYLACEÆ.—ERYTHROXYLS.

Erythroxyleæ, *Kunth in Humb. N. G. Am.* 5. 175. (1821); *DC. Prodr.* 1. 573. (1824); *Endl. Gen. cexxix.*; *Meisn. Gen.* p. 56; *Martius Beiträge zur Kenntniss der g. Erythroxylon* (1840); *Wight Illustr.* 1. 135.

DIAGNOSIS.—*Sapindal Exogens, with complete, partially symmetrical flowers, an imbricated calyx, petals with an appendage, sessile pendulous ovules, capitate stigmas, and a straight embryo.*

Shrubs or trees; young shoots often compressed and covered with acute imbricated scales. Leaves alternate, usually smooth; stipules within the petioles. Flowers small, whitish or greenish. Peduncles axillary, solitary or clustered, emerging from numerous imbricated scale-like bracts. Sepals 5, combined at the base, persistent. Petals 5, hypogynous, broad at the base, with a plaited scale there, equal, the margins lying upon each other in æstivation. Stamens 10, monadelphous; anthers innate, erect, 2-celled, deliiscing lengthwise. Ovary 3-celled, with 2 cells spurious; styles 3, distinct, or united almost to the point; stigmas 3, capitate; ovule solitary, pendulous, anatropal, not suspended by a cord. Fruit drupaceous, 1-seeded. Seed angular; albumen between fleshy and mealy, or 0; embryo straight, central; cotyledons plano-convex; radicle superior, taper, straight.

The Erythroxyls are distinguished from Malpighiads by their flowers growing from amongst small imbricated scales, having no glands on the calyx, a pair of parallel membranous plates on the petals, capitate stigmas, and ovules which are truly anatropal, without any cord to connect them with the placentæ. These marks are, however, hardly sufficient for the characteristics of a Natural Order, and it would perhaps be better to merge the Order in the Malpighiads, as has been done with *Nitraria*. An elaborate account of the genus will be found in *Martius's Memoir*, above quoted.

Chiefly West Indian and South American. A few are found in the East Indies, several in the Mauritius and Madagascar, and one in New Holland. Brazil within the tropics is their favourite haunt.

The wood of some is bright red; that of *E. hypericifolium*, is the Bois d'huile of the Isle of France. A permanent reddish brown dye is obtained from the bark of *Erythroxylum suberosum*, called in Brazil Gallinha choça and Mercurio do campo. *E. areolatum*, a shrub found near Carthagera, is said to have some medical value; its young branches are refrigerant, its bark tonic, from the juice of the leaves is prepared an ointment employed against scald head, and the sub-acid juice of its fleshy fruit is purgative and diuretic. The bark of the root of *E. anguifugum* is regarded as an alexipharmic in Brazil; that of *E. campestre* is employed in the same country as a purgative.—*Martius mat. m. Bras.*

Erythroxylon Coca is a plant much used by the miners of Peru for its remarkable power in stimulating the nervous system, in which respect it quite resembles opium. Its leaves are chewed with a small mixture of finely powdered chalk. No effects that have been ascribed to the immoderate use of opium are exceeded by what seems the consequence of chewing the Coca leaf. See a curious account of this plant in *Pöppig's Reise in Chile*.

GENUS.

Erythroxylon, Linn.
Venelia, Commers.
Roelana, Commers.
Staudelia, Spreng.
Sethia, Kunth.

NUMBERS. GEN. 1. Sp. 75.

POSITION. ——— ERYTHROXYLACEÆ. — Malpighiaceæ.

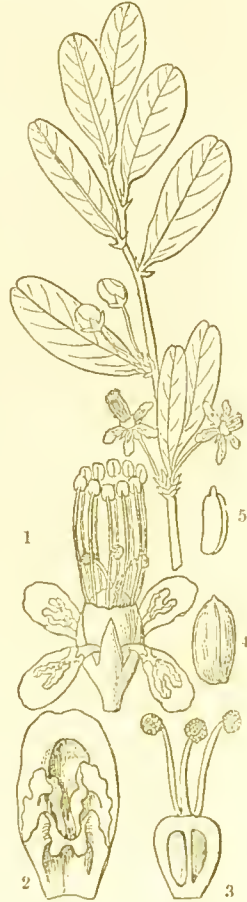


Fig. CCLXXXVI.

Fig. CCLXXXVI.—*Erythroxylon*.—*Martius*. 1. a flower. 2. one of the petals. 3. the pistil with 3 capitate stigmas. 4. a drupe. 5. the embryo.

ALLIANCE XXX. GUTTIFERALES.—THE GUTTIFERAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, axile placenta, an imbricated calyx, an imbricated or twisted corolla, 00 stamens, and an embryo with little or no albumen.*

The true passage from Sapindals into this Alliance is from Soapworts to Rhizobols; for the habit of *Æsculus* in the former is the same as that of most of the latter, and they nearly correspond in their structure. But Rhizobols have an indefinite number of stamens. It is in that respect indeed that Guttiferals principally differ from Sapindals, and the former may be almost regarded as a polyandrous form of the latter. It is however customary to find no want of symmetry in the calyx, corolla, and stamens of Guttiferals, while the reverse is generally characteristic of Sapindals. These too have seldom, if ever, resinous secretions; while, on the other hand, those are often remarkable for their abundance of resin.

The near relationship of all the Orders here collected is undisputed. They lean towards the diclinous structure in some Guttifers, and approach the diclinous series in the Dipterads, which have a strong analogy to Mastworts.

NATURAL ORDERS OF GUTTIFERALS.

- | | |
|---|------------------------|
| <i>Leaves simple, alternate, with large convolute stipules. Flowers symmetrical. Petals equilateral. Calyx unequal, permanent, winged. Anthers beaked. Fruit one-celled, one-seeded . . .</i> | } 141. DIPTERACEÆ. |
| <i>Leaves simple, alternate, without stipules or with very small ones. Flowers symmetrical. Petals equilateral. Anthers versatile. Seeds few or single. Stigmas on a long style</i> | } 142. TERNSTRÖMIACEÆ. |
| <i>Leaves digitate, opposite. Flowers symmetrical. Petals equilateral. Stigmas sessile. Seeds solitary. Embryo with an enormous radicle</i> | } 143. RHIZOBOLACEÆ. |
| <i>Leaves simple, opposite, without stipules. Flowers symmetrical. Petals equilateral. Anthers adnate, beakless. Seeds solitary or few. Stigmas sessile, radiating</i> | } 144. CLUSIACEÆ. |
| <i>Leaves simple, alternate, without stipules. Flowers unsymmetrical. Petals equilateral. Anthers versatile. Seeds innumerable, minute. Stigmas sessile</i> | } 145. MARCGRAVIACEÆ. |
| <i>Petals oblique, glandular. Seeds numerous, naked. Styles long, distinct</i> | } 146. HYPERICACEÆ. |
| <i>Petals oblique, glandless. Seeds few, shaggy. Styles long, distinct</i> | } 147. REAUMURIACEÆ. |

ORDER CXLI. DIPTERACEÆ.—DIPTERADS.

Dipterocarpeæ, *Blume Bijdr.* p. 222. (1825); *Fl. Java* (1829); *Wight and Arnott, Prodr. Fl. Ind. Penins.* 1. 83. (1834); *Endl. Gen.* cxxiii.; *Meisner Gen.* 35.; *Wight Illustr.* 1. t. 36, 37.

DIAGNOSIS.—*Guttiferæ Exogens*, with simple alternate leaves, large convolute stipules, symmetrical flowers, equilateral petals, an unequal, permanent, winged calyx, beaked anthers, and a 1-celled 1-seeded fruit.

Gigantic trees, abounding in resinous juice. Leaves alternate, involute in veneration, with veins running out from the midrib to the margin; stipules deciduous, oblong, convolute, terminating the branches with a taper point. Flowers usually large; the racemes terminal and paniced, or axillary and solitary, or several from the same leaves, or from the axils, often one-sided. Calyx tubular, 5-lobed, unequal, persistent, and afterwards enlarged, naked at the base; æsuvation imbricated. Petals hypogynous, sessile, often combined at the base; æstivation contorted. Stamens indefinite, hypogynous, distinct, or slightly and irregularly polyadelphous; anthers innate, subulate, opening longitudinally towards the apex; filaments dilated at the base. Ovary superior, without a disk, 3-celled; ovules in pairs, pendulous; style single; stigma simple. Fruit coriaceous, 1-celled by abortion, 3-valved or indehiscent, surrounded by a calyx having tough leafy enlarged permanent divisions which crown the fruit. Seed single, without albumen; cotyledons planoconvex, or more commonly twisted and crumpled; radicle superior.

These trees, which are apparently unknown in Europe in a living state, are described by Dr. Wight as deserving cultivation for ornamental purposes, for the sake of their majestic size, handsome forms, the beauty of their clustered flowers, and the richly coloured wings of their curious fruit. They form a remarkable Order, which is one of those whose limits are best defined, and yet it appears

to participate in the affinities of plants which cannot be brought into its vicinity by any



Fig. CCLXXVII.

Fig. CCLXXVII.—*Dipterocarpus trinervis*.—*Blume.* a an anther; b a perpendicular, c a transverse, section of an ovary; d a fruit; e section of seed of *Dryobalanops cumphora*; f its embryo unfolded. — *Gartner.*

of the schemes for classification which Botanists have hitherto employed. It has, for example, the peculiar rolled-up stipules which occur in Magnoliads; while the Oak is strikingly like Dipterads in foliage, in the germination of the seeds, which takes place underground without the cotyledons rising into the air, and in a constant tendency to lose the major part of the ovules in the process of maturing one; it is also to be remarked that the hard cupule or involucre of Mastworts (*Corylaceæ*) is much like the hardened calyx of these Dipterads. It is here, indeed, that the great feature of the latter resides; we have nothing elsewhere exactly like the long wing-like lobes of their calyx. Botanists generally contrast Dipterads with the *Elæocarpeous* division of Lindenblooms, but their valvate calyx, diskless flowers, and peculiar fruit indicate a distant relationship only. The resinous juice, compound superior ovary, drupaceous fruit, numerous long anthers, irregular coloured calyx, and single exalbuminous seed, ally Dipterads, as Blume remarks, to Guttifers, from which their stipules and the activation of the corolla abundantly distinguish them.

Only found in India, and especially in the eastern islands of the Indian Archipelago, where, according to Blume, they form the largest trees of the forest. *Shorea robusta* limits the northern distribution of the Order, being found all along the foot of the Himalayas.

All the species seem filled with balsamic resin, which assumes various forms. *Dryobalanops camphora* yields the hard Camphor of Sumatra; this substance is found in a concrete state in cavities and fissures in the heart of the tree; it is less volatile than the common camphor of commerce; the same tree, which is fully described in Blume's *Flora Javae*, also yields the camphor-oil of Borneo and Sumatra; the latter is supposed to be camphor in a partially formed state. *Shorea robusta* produces a balsamic resin used in the temples of India under the name of Ral or Dhoona; Saul, the best and most extensively used timber in India, is produced by the same tree. *Vateria indica* furnishes the resin called in India Copal (in England known by the name of Gum animi), and very nearly approaching the true resin of that name; in its recent and fluid state it is used as a varnish (called Piney varnish) in the south of India, and, dissolved by heat, in closed vessels, is employed for the same purpose in other parts of India; it is extremely tenacious and solid, but melts at a temperature of $97\frac{1}{2}$ Fahr. Dr. Wight tells us that the natives obtain it by the simple process of cutting a notch in the tree, sloping inwards and downwards; the resin collects there and soon hardens. Under the name of Piney Dammar this most useful substance is applied in India to many purposes; it forms an excellent varnish, and on the Malabar coast is made into candles which "diffuse in burning an agreeable fragrance, give a clear bright light, with little smoke, and consume the wick so as not to require snuffing. Some of these candles, that were sent home, were highly prized and sold for very high prices" (*Wight*), but their importation was stopped by the excessive duties that were levied upon them. The resin of *Dipterocarpus trinervis* is found an excellent material for plaisters; and made into tincture, or formed into an emulsion with yolk of egg, it acts upon the mucous membranes like Balsam of Copaiva.—*Blume*. The natives of Java smear the leaves of the Plantain with this resin, and so form torches, which are said to yield a white light and to produce a not unpleasant smell. Other kinds of resin are furnished by other species; as, by *Shorea robusta* and *Tumbagaia*, the dhoona or dammer pitch, generally used in India for marine purposes, and as incense; by various species of *Dipterocarpus*, the balsam called by the natives of India Gurjun, by the Cinghalese Dhoouatil, and by the English Wood-oil. This also is used like Balsam of Copaiva.

GENERA.

<i>Dipterocarpus</i> , Gärtn.	<i>Anisoptera</i> , Korth.	<i>Isauxis</i> , Arn.	<i>Vatica</i> , Linn.
<i>Pterygium</i> , Corr.	<i>Dryobalanops</i> , Gärtn. f.	<i>Scidlia</i> , Kostel.	<i>Shorea</i> , Roxb.
<i>♀ Caryolobis</i> , Gärtn.	<i>Vateria</i> , Linn.	<i>Retinodendron</i> , Korth.	<i>Hopea</i> , Roxb.

NUMBERS. Gen. 7. Sp. 47.

Tiliacæ.

POSITION.— *Ternströmiacæ.*—*DIPTERACEÆ.*—*Clusiacæ.*

Corylaceæ.

LOPHIRACEÆ.—Endl. Under this name Mr. Endlicher proposes to establish an Order, of which the following is the description. "Trees from tropical Africa, having a pyramidal form, many branches, and a dry bark. Leaves alternate, stalked, quite entire, with raised veins, and a jointed stalk; stipules very small and deciduous, planted on each side of the leaf-stalk at the base. Flowers perfect, regular, axillary and terminal, panicled, yellow, with straggling flower-stalks which are jointed above the base, and furnished with 2 very small bracts at the articulation. Sepals 5, the 3 inner smaller and concave, the two outer opposite, larger, and finally expanded into a pair of wings. Petals 5, hypogynous, without claws, their points twisted together in re-stivation, eventually spreading flat. Stamens hypogynous, indefinite, nearly in two rows; filaments filiform, short; anthers 2-celled, their cells linear, opposite, parallel, adnate, opening at the point by a lateral cleft. Disk 0. Ovary conical, one-celled; ovules 00, long, curved backwards, hooked, placed upon a thick free basal placenta; stigmas 2, very small, twisted, reflexed. Nut leathery, spindle-shaped, contracted at the base, and consolidated with the enlarged calyx, one-celled, and by abortion one-seeded. Seeds erect, with a thin membranous skin. Embryo without albumen; cotyledons amygdaloid, plano-convex; radicle very short, immersed, inferior.—The solitary genus which constitutes this Order is allied to nothing yet known. It is very different from Dipterocarpeæ (Dipteracæ), with which it is associated because of its two enlarged calyx-leaves, and yet it can scarcely be excluded from the Guttiferous class."—*Enchiridion*, p. 526.—In his Guttiferous class Mr. Endlicher includes Dipteraceæ, Chlœnacæ, Ternstroemiaceæ, Clusiaceæ, Marcgraaviaceæ, Hypericaceæ, Elatinaceæ, Reaumuriaceæ, Tamaricaceæ. It must be confessed that none of these present any marked resemblance to *Lophira*, which is the Scrubby Oak of Sierra Leone, except Dipterads and Guttifers. To the irregular fruit of the former that of *Lophira* is quite similar, but its ovary is one-celled, with a crowd of ovules upon a free central placenta, its seed is solitary with the radicle downwards, and the cotyledons are plano-convex, all points of difference from Dipterads, which have an ovary with 3 cells, a pair of pendulous ovules in each, a seed with the radicle upwards, and crumpled cotyledons. Moreover *Lophira* wants the large stipules of Dipterads. On the other hand, its foliage is so like that of *Calophyllum*, a genus of Guttifers, that the one might be mistaken for the other, except that the leaves of *Lophira* are alternate; but in all the structure of the fruit the genus differs from the Guttiferous Order. Nevertheless, although *Lophira* is so different from Dipterads it is to be observed that it agrees with that Order not alone in its peculiar calyx; for in both cases the ovules are anatropal, and consequently the radicle is directed to the hilum, and in *Lophira* there is an evident tendency to produce the long anthers which are so characteristic of Dipteracæ. The late M. Guillemin regarded it as being absolutely a Dipterad, because "of the convoluted aestivation of the petals, the length of the 2 sepals extended into membranous wings, one of them being moreover out of all proportion to the others, the alternate leaves furnished with little deciduous stipules, and the dry corky bark not filled with milky secretions."—See *Flora Senegambicæ Tentamen*, p. 110.

GENUS.
Lophira, Banks.

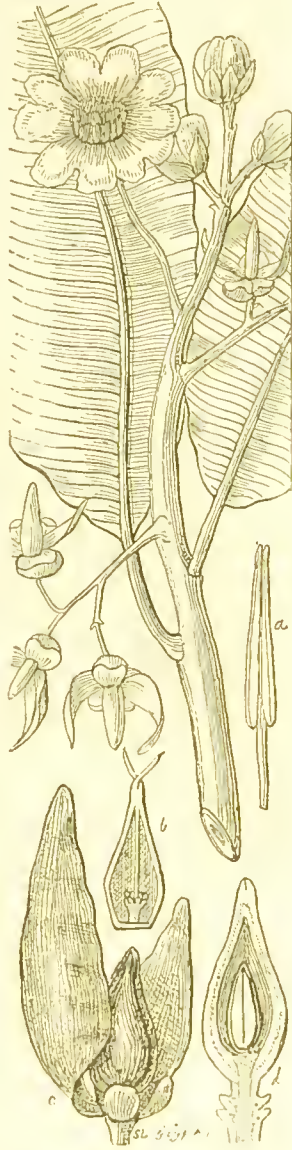


Fig. CCLXXVIII.

Fig. CCLXXVIII.—*Lophira alata*.—*Decaisne*. a an anther; b a perpendicular section of an ovary; c a fruit; d a perpendicular section of a fruit.

ORDER. CXLII. TERNSTRÖMIACEÆ.—THEADS.

Ternströmiæ, *Mirbel. Bull. Philom.* 381. (1813).—Ternströmiaceæ, *DC. Mém. Soc. II. N. Genev. vol. 1* (1823); *Prodr.* 1. 523. (1824); *Cambessédes Mémoire*, (1823); *Endl. Gen.* ccxv.; *Meisn. Gen.* p. 40.; *Wight Illustr.* 1. p. 94.—Theaceæ, *Mirbel. Bull. Phil.* (1813).—Camelliæ, *DC. Théor. Elém. ed. 1.* (1813); *Prodr.* 1. 529. (1824).

DIAGNOSIS.—*Guttiferæ Exogens*, with simple alternate leaves, without stipules or with very small ones, symmetrical flowers, equilateral petals, versatile anthers, few or single seeds, and stigmas on a long style.

Trees or shrubs. Leaves alternate, coriaceous, generally without stipules, usually undivided, now and then with pellucid dots. Peduncles axillary or terminal, articulated



Fig. CCLXXIX.

at the base. Flowers generally white, seldom pink or red, occasionally polygamous. Sepals 5 or 7, imbricated in æstivation, concave, coriaceous, deciduous, the innermost often the largest. Petals 5, 6, or 9, not equal in number to the sepals, often combined at the base. Stamens ∞, hypogynous; filaments filiform, monadelphous or polyadelphous, or distinct; anthers versatile, or adnate, 2-celled, opening longitudinally; ovary superior, with several cells; styles from 3 to 7, filiform, more or less combined; ovules pendulous, or erect, or peltate. Capsule 2-7-celled and capsular, with the dehiscence taking place in various ways; sometimes coriaceous and indehiscent; usually with a central column. Seeds attached to the axis, large, very few; albumen none, or in very small quantity; embryo straight, bowed, or folded back, the radicle turned to the hilum; cotyledons very large, often filled with oil, occasionally plaited lengthwise; an aril sometimes present.

This Order originated in 1813, with Mirbel, who separated some of its genera from Citronworts, where they had been placed by Jussieu, and at the same time founded another closely allied Order, under the name of Theads. These opinions were substantially adopted by Kunth and De Candolle, the latter of whom, moreover, formed several sections among the genera. Since that time the Theads have attracted the attention of several Botanists, especially of M. Cambessédes, whose views are generally adopted. He, however, combines under this Order genera with axile and parietal placentation, with truly albuminous and exalbuminous seeds, with large amygdaloid embryos, and those whose embryo is too small to be easily found among its copious albumen, to say nothing of other differences of considerable moment. It is therefore difficult to suppose that such an arrangement can be maintained; and at least we must, I think, remove a genus called Saurauja, consisting of about 30 Asiatic trees or shrubs, in which there is a tendency to form a monopetalous corolla, an infinite number of minute seeds, a very small embryo lying in the base of abundant albumen, and anthers opening by pores; it

Fig. CCLXXIX.—*Kielmeyera rosea*. 1. the pistil; 2. a transverse section of it; 3. a ripe fruit; 4. embryo.

has, in fact, the habit of a *Clethra* and seems to bring into contact the Rana and Ericol Alliances. Abstracting this genus and *Coeliospermum*, which is transferred to the Cistal Alliance, a better limited group remains, of which the *Camellia* may be taken as the type, and which differs from Guttifers in having alternate leaves, versatile anthers, and a long style, without any tendency to form the flowers on a quaternary plan.

Although the plants of this Order which are known in European gardens are chiefly from China or North America, they form but an inconsiderable part of the whole : 7 or 8 are all that are contained in the first of these countries, and 4 in the latter; while between 60 and 70, all beautiful trees or shrubs, are natives of the woods of South America : about a score are known in the East Indies, and one in Africa.

Their properties are ill understood, but little being known of the greater part of the species. The tea which is so extensively consumed by Europeans is produced by two or three species of *Thea* : its slightly stimulating properties become narcotic in very hot latitudes, as at Peuang. For a most valuable account of this plant, see *Royle's Illustr.*, p. 107. An excellent table oil is expressed from the seeds of *Canellia oleifera*. The different species and varieties of *Camellia japonica* are the glory of gardeners. The leaves of *Kielmeyera speciosa* are employed in Brazil for fomentations, for which they are well adapted, on account of the mucilage in which they abound. The bark of *Gordonia* is used by tanners in the United States.

GENERA.

<i>Anneslea</i> , Wall.	<i>Hoferia</i> , Scop.	<i>Ixonanthes</i> , Jack.	<i>Polyspora</i> , Sweet.
? <i>Dicalyx</i> , Lour.	<i>Mukoff</i> , Kämpf.	<i>Kielmeyera</i> , Mart. et Zucc.	<i>Franklinia</i> , Marsh.
<i>Sariva</i> , Reinw.	<i>Sukaki</i> , Kämpf.	<i>Martineria</i> , Fl. Fluu.	<i>Lacathea</i> , Salisb.
? <i>Visnea</i> , Linn. f.	<i>Freziera</i> , Swartz.	<i>Catostemma</i> , Benth.	<i>Closaschima</i> , Korth.
<i>Mocanera</i> , Juss.	<i>Erottum</i> , Soland.	<i>Ochthocosmus</i> , Benth.	<i>Antheischima</i> , Korth.
<i>Feinwardtia</i> , Korth.	<i>Lettsomia</i> , Ruiz et Pav.	<i>Caraiya</i> , Aubl.	<i>Schima</i> , Reinw.
<i>Ternstromia</i> , Mut.	<i>Vententia</i> , Pal.	<i>Marilya</i> , Swartz.	<i>Pyrenaria</i> , Blum.
<i>Toanabo</i> , Aubl.	? <i>Microsema</i> , Lab.	<i>Monoporina</i> , J.S. Presl.	<i>Camellia</i> , Linn.
<i>Tonabea</i> , Juss.	<i>Ploiarium</i> , Korth.	<i>Scyphaea</i> , C. B. Presl.	<i>Sasanqua</i> , Nees.
<i>Dupinia</i> , Neck.	<i>Laplacea</i> , H. B. K.	<i>Anisosticle</i> , Bartl.	<i>Kissi</i> , Endl.
<i>Amphania</i> , Banks.	<i>Hemocharis</i> , Salisb.	<i>Mahurea</i> , Aubl.	<i>Thea</i> , Linn.
<i>Sarosantnera</i> , Korth.	<i>Wikströmia</i> , Schrad.	<i>Bonnetia</i> , Schreb.	? <i>Godoya</i> , Ruiz et Pav.
<i>Ainandra</i> , Jack.	<i>Lindleya</i> , Nees.	<i>Stuartia</i> , Catesb.	<i>Godovia</i> , Pers.
<i>Eurya</i> , Thunb.	<i>Bonnetia</i> , Mart. et Zucc.	<i>Malachodendron</i> , Cav.	? <i>Leucoxydon</i> , Blum.
<i>Geeria</i> , Blum.	<i>Kieseria</i> , Nees.	<i>Gordonia</i> , Ellis.	? <i>Euryanthe</i> , Schlechtend.
<i>Cleyera</i> , Thunb.	<i>Archytæa</i> , Mart. et Zucc.	<i>Lasianthus</i> , Catesb.	

NUMBERS. GEN. 33. Sp. 130.

*Sterculiaceæ.*POSITION.—*Clusiaceæ.*—TERNSTROMIACEÆ.—*Hypericaceæ.**Dilleniaceæ.*

ORDER CXLIII. RHIZOBOLACEÆ.—RHIZOBOLS.

Rhizoboleæ, *DC. Prodr.* 1. 599. (1824); *Cambessédes in Aug. St. III. Fl. Bras. Merid.* 1. 322. (1827); *Endl. Gen.* ccxxx.

DIAGNOSIS.—*Guttiferal Exogens, with digitate opposite leaves, symmetrical flowers, equal-lateral petals, sessile stigmas, solitary seeds, and an embryo with an enormous radicle.*

Trees of very large size. Leaves opposite, digitate, coriaceous, with a jointed stalk and no stipules. Flowers large, regular, arranged in racemes, with their stalks jointed



Fig. CCLXXX.

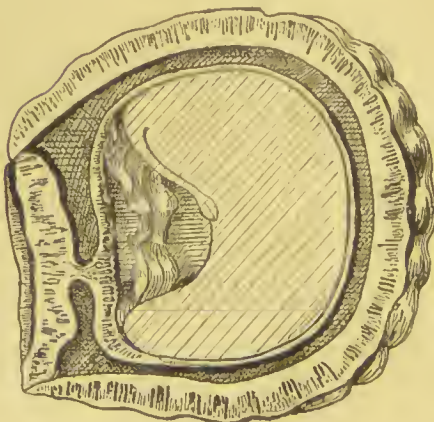


Fig. CCLXXXI.

at the base and below the apex. Sepals 5 or 6, more or less combined, imbricated in aestivation. Petals 5 to 8, equal-sided but unequal, thickish, arising along with the stamens from a hypogynous disk. Stamens extremely numerous, slightly monadelphous, arising in a double row from a disk, the innermost being shorter and often abortive; anthers roundish, 2-celled, opening lengthwise. Ovary superior, 4 or 5, or even many-celled; styles as many as the cells; stigmas minute; ovules solitary, attached to the axis by their middle, semianatropal, with the foramen uppermost. Fruit formed of several combined nuts, part of which are sometimes abortive; each nut indehiscent, 1-seeded, 1-celled, with a thick double putamen. Seed reniform, without albumen, with a funicle which is dilated into a spongy exerescence; radicle very large, constituting nearly the whole of the almond-like substance of the nut, with a long 2-edged caulicle, having two small cotyledons at the top, and lying in a furrow of the radicle.

This very distinct Order De Candolle thought allied to Soapworts in its hypogynous flowers and its fruit; and especially to *Æsculus* on account of its opposite compound palmate leaves; but in that genus the radicle is small, and the cotyledons very large, while in Rhizobols the radicle is enlarged, and the cotyledons small. It however appears to be with Guttifers that Rhizobols best agree. "In these two Orders we find the leaves opposite and articulated at their base, hypogynous petals, a similar aestivation, numerous hypogynous stamens, and exalbuminous seeds. The large flowers of *Caryocar* call to mind those of most Guttifers; its inflorescence is nearly that of *Moronoba*; its fruit has a relation to that of *Mammea*, and presents, in that genus, as in several others of the same Order, a single seed in each cell."—*Camb. in Aug. St. II. Fl. Bras.* 1. 323. Endlicher traces a resemblance between them

Fig. CCLXXX.—*Anthodiscus trifoliatus*. 1. a flower bud; 2. a flower; 3. a perpendicular section of the pistil.

Fig. CCLXXXI.—*Caryocar butyrosum*; a section of one of the lobes of its fruit.

and Terebinths, through the intervention of Mangifera among the former. Their great peculiarity is the seeds having a radicle of enormous size, compared with the cotyledons. If it were not for that, the Order could not be satisfactorily distinguished from Guttifers.

A few large trees, found in the forests of the hottest parts of South America, constitute the whole of this Order.

It is from trees belonging to it that are produced the Souari (or Suwarrow) Nuts of the shops, the kernel of which is one of the most delicious fruits of the nut kind that is known. An oil is extracted from them not inferior to that of the Olive. They chiefly come from *Caryocar butyrosu*m, the wood of which is said to be of much value for ship-building. These nuts must not be confounded with what are called Brazil Nuts, which are the seed of *Bertholletia excelsa*, a genus of the Myrtal Alliance. The timber of *Caryocar butyrosu*m (*Pekea tuberculosa*) is excellent for ship-timber, mill-work, planks, &c., according to Schomburgk, who also speaks of another timber tree of this Order, known under the name of Cakaralli or Kukaralli, whose bark consists of numerous layers, which the Indians, by beating, separate till they are as thin as satin paper, when they use them as wrappers for cigars. Is not this the very different *Lecythis ollaria*?—See LECYTHS.

GENERA.

<i>Caryocar</i> , Linn.	|	<i>Pekea</i> , Aubl.
<i>Rhizobolus</i> , Gärtn.	|	<i>Souari</i> , Aubl.
<i>Acanthocarya</i> , Arruda.	|	<i>Anthodiscus</i> , G. W. F. Mey.

NUMBERS. GEN. 2. Sp. 8.

POSITION.—Clusiaceæ.—RHIZOBOLACEÆ.—
Sapindaceæ.

ORDER CXLIV. CLUSIACEÆ.—GUTTIFERS.

Guttiferæ, *Juss. Gen.* 243. (1789); *DC. Prodr.* 1. 557. (1824); *Meisner*, p. 42; *Wight Illustr.* 1. 114; *Cambessèdes, Mémoire* (1828).—Clusiaceæ, *Ed. pr.* lv. (1836).

DIAGNOSIS.—*Guttiferal Exogens, with simple opposite leaves, without stipules, symmetrical flowers, equilateral petals, adnate beakless anthers, solitary or few seeds, and sessile radiating stigmas.*

Trees or shrubs, occasionally parasitical, yielding resinous juice. Leaves without stipules, opposite, coriaceous, entire, with a strong midrib, and often with the lateral veins running through to the margin. Flowers usually numerous, axillary, or terminal,



Fig. CCLXXXII.

white, pink, or red, articulated with their peduncle, ♂ or ♀ by abortion. Sepals 2, 4, 5, 6, or 8, imbricated by alternate pairs, usually persistent, round, membranous, frequently unequal and coloured like petals. Petals hypogynous, equal in number to the sepals, or the same power, and sometimes passing insensibly into them. Stamens numerous, either distinct, or combined in one or more parcels, hypogynous, rarely definite; filaments of various lengths; anthers adnate, bursting inwards, sometimes very small, occasionally bursting outwards, sometimes 1-celled, and sometimes opening by a pore or transversely; even immersed in a fleshy receptacle. Disk fleshy, occasionally 5-lobed. Ovary solitary, superior, 1- or many-celled; ovules solitary, orthotropal or anatropal, (*Endl.*), erect, or ascending, or numerous and attached to central placentæ; style none, or very short; stigma peltate, or radiate. Fruit either dry or succulent, 1- or many-celled, 1- or many-seeded, dehiscent or indehiscent. Seeds frequently nestling in pulp; their coat thin and membranous; always wingless; very frequently with an aril; albumen noue; embryo straight; cotyledons thick, inseparable; radicle either turned to or from the hilum.

Their opposite coriaceous leaves, broken-whorled calyces, equilateral petals, indefinite stamens, and sessile radiant stigmas, must be regarded as the main features of the Guttifers, to which may usually, though not always, be added the binary arrangement of their calyx and corolla. If these are neglected the Order merges in that of Tutsans. Dr. Wight has indeed proposed to send into that Order *Clusia* and all the other genera having the calyx and corolla arranged in fives; but to this proposition there are great objections; not the least of which must be the destruction of the precise character of both the Orders. The reader is, however, referred to that excellent Botanist's work above quoted, for an explanation of the reasons which have led him to this conclusion. It is not a little remarkable, that a strong tendency to the separation of sexes should be found among plants so high in the scale of organisation as these are.

Fig. CCLXXXII.—*Cambogia gutta*. 1. a ♀ flower, with the sterile stamens surrounding the pistil; 2. a ♂ flower; 3. an anther, which opens by throwing off a cap, in consequence of transverse dehiscence; 4. a transverse section of the ovary.

Cambessédes remarks, that "Guttifers differ from Tutsans in their branches, their leaves, and their articulated peduncles; in the normal number of the parts of their flowers, which appears to be two and its multiples, instead of five which obtains in Tutsans; in their anthers united the whole length with the filament, and not articulated at its summit; in their seeds, which often have an aril, and are solitary in each cell of the ovary, a character found in no Tutsans (the monospermous cells of the fruit of some *Visnias* is due to abortion); finally, in the structure of the embryo, which is different in the two Orders. Tutsans, moreover, have the carpels often nearly distinct. *Maregraaviads* are distinguished by their alternate leaves, the singular form of their lower bracts, their petals frequently united, their unsymmetrical flowers, and by their seeds being very small, and exceedingly numerous." Royle remarks that Guttifers are in some respects allied to Ebonyworts, as may be seen by comparing species of *Garcinia* with some kinds of *Diospyrus*.

All natives of the tropics, the greater part of South America; a few are from Madagascar and the continent of Africa. They generally require situations combining excessive heat and humidity.

An acrid, purgative, yellow gum resin appears to be a very general secretion of the various species of this Order. In one of its forms it becomes the gamboge of commerce, a substance well known because of its use as a pigment, and as an active medicine dangerous in over-doses. The best gamboge comes in the form of pipes from Siam, and this is conjectured to be the produce of *Garcinia cochinchinensis*; another kind, in lumps, has been said to be derived from *Cambogia gutta*, called also *Hebradendron cambogioides*; but Dr. Wight's last experiments are not favourable to this supposition, and he expressly states that the tears of *Cambogia gutta* "are a substance altogether distinct from true gamboge." Roxburgh says he received frequent samples of the gamboge of his *Garcinia pictoria* from a correspondent at Tellicherry, and uniformly found it, even in its crude unrefined state, superior in colour, while recent, to any other kind he had tried, but not so permanent as that from China. Dr. Royle confirms this statement. The yellow juice, however, of *Xanthochymus pictorius* is said to be of very inferior quality.

The seeds of *Calophyllum inophyllum* yield an oil, and a resin exudes from the roots, which is supposed by some authors to be the same as the *Tacamahaca* of the Isle of Bourbon. The true East India *Tacamahaca* is produced by *C. Calaba*; and *Maynas* resin is referred to the same species. Martins states that *C. brasiliense* also yields an acrid aromatic lemon-scented resin. The Hog Gum tree of Jamaica is stated by Dr. Bancroft to be a plant of this Order allied to *Ochrocarpus* and *Garcinia*. The gum is a resinous substance, burning with a smoke and yielding an aromatic agreeable odour.—*Hook. Journ.* 4. 144. Dr. Macfadgen asserts that this Hog gum is the same as the mani or oanani of Brazil, and therefore belongs to *Moronobea coccinea*, to which he refers it. It is largely used in the West Indies for the same purposes as pitch, and also in the form of pills, as a substitute for balsam of copaiva. Endlicher, on the contrary, refers the Hog gum to *Clusia flava*. Balsam of Maria comes from *Verticillaria acuminata*; and a great many more furnish similar balsamic substances. In the West Indies the juice of *Maunnea* is employed to destroy the chiggers (*Culex penetrans*), little insects which attack the naked feet, introducing themselves into the flesh below the toe-nails. The Butter and Tallow-tree of Sierra Leone, which owes its name (*Pentadesma butyracea*) to the yellow greasy juice its fruit yields when cut, belongs to this Order. The flowers of *Clusia insignis* seep a considerable quantity of resin from the disk and



Fig. CCLXXXIII.

stamens ; so much indeed, that Von Martius says he obtained an ounce from two flowers ; this resin, rubbed down with the butter of the Choocolate-nut, the Brazilian women employ to alleviate the pain of a sore breast. A few are cultivated for their timber. *Calophyllum angustifolium*, the Piney-tree, furnishes the straight spars called Peon at Penang, and in the islands to the eastward of the Bay of Bengal, and the *Mesua* are said to have excessively hard timber. Of these last plants the root and bark are bitter and aromatic, and powerfully sudorific, their leaves mucilaginous, their unripe fruit aromatic, acrid, and purgative ; the blossoms of *Mesua ferrea* occur in the bazaars of India under the name of Nagkesur, being used in medicine and esteemed for their fragrance. Lastly, the fruit of many species acquires great excellence and is highly esteemed in tropical desserts. The Mamnee Apple, or Wild Apricot of South America, is said to rival the Mangosteen : its seeds are anthelmintic ; its flowers yield, by distillation, a stomachic spirit called Eau de Créole : and a wine is obtained by fermenting its sap. The large berries of *Platonia insignis* (called Paecoury-iva in Brazil), are very sweet and delicious, while their seeds have the taste of Almonds. The Mangosteen itself, produced in the Straits of Malacca by *Garcinia Mangostana*, has the reputation of being the finest of all fruits ; it resembles a middle-sized Orange, and is filled with a sweet and most delightful pulp. It is generally thought that this tree will not thrive beyond the hot and damp atmosphere of Malacca : but Dr. Wight states that it has been introduced into the gardens of Courtallum, where it had already begun to bear in the year 1840. *Illustr.* 1. 115. *Garcinia eornea*, *Kydiana* and *pedunculata* are mentioned as other species whose fruit is brought to table, but they are represented to be very inferior ; that of *G. pedunculata* is said to be the nearest approach to the Mangosteen.

GENERA.

<p>I.—CLUSIÆÆ.</p> <p><i>Tovomita</i>, <i>Aubl.</i> <i>Mariatva</i>, <i>Vand.</i> <i>Mariatvea</i>, <i>Mart.</i> <i>Beauharnoisia</i>, <i>Ruiz.</i> <i>et Pav.</i> <i>Micranthera</i>, <i>Chois.</i> <i>Bertolonia</i>, <i>Spreng.</i> <i>Ochrocarpus</i>, <i>Thouars.</i> <i>Chrysochlamys</i>, <i>Pöpp.</i> <i>Verticillaria</i>, <i>Ruiz et Pav.</i> <i>Chloromyron</i>, <i>Pers.</i> <i>Havetia</i>, <i>H. B. K.</i> <i>Renggeria</i>, <i>Meisn.</i> <i>Schweiggera</i>, <i>Mart.</i> <i>Rengia</i>, <i>Pöpp.</i></p>	<p><i>Quapoya</i>, <i>Aubl.</i> <i>Xanthe</i>, <i>Schreb.</i> <i>Clusia</i>, <i>Linn.</i> <i>Triplandron</i>, <i>Benth.</i> <i>Arrudea</i>, <i>St. Hil.</i></p> <p>II.—MORONOBÆÆ.</p> <p><i>Chrysopia</i>, <i>Noronh.</i> <i>Moronobea</i>, <i>Aubl.</i> <i>Symphonia</i>, <i>Linn. f.</i> <i>Blackstonia</i>, <i>Scop.</i> <i>Ancuriscus</i>, <i>Presl.</i></p> <p>III.—GARCINIÆÆ.</p> <p><i>Mammea</i>, <i>Linn.</i></p>	<p><i>Garcinia</i>, <i>Linn.</i> <i>Mangostana</i>, <i>Rumph.</i> <i>Oxycarpus</i>, <i>Lour.</i> <i>Brindonia</i>, <i>Thouars.</i> <i>Xanthochlymus</i>, <i>Roxb.</i> <i>Stalagmitis</i>, <i>Mun.</i> <i>? Discostigma</i>, <i>Hassk.</i> <i>Pentadesma</i>, <i>R. Br.</i> <i>Cambogia</i>, <i>L.</i> <i>Hebradendron</i>, <i>Grah.</i> <i>Gynotroches</i>, <i>Bl.</i> <i>Platonia</i>, <i>Marl.</i></p> <p>IV.—CALOPHYLLÆÆ.</p> <p><i>Mesua</i>, <i>Linn.</i></p>	<p><i>Rhyma</i>, <i>Scop.</i> <i>Nagassarium</i>, <i>Rumph.</i> <i>Calophyllum</i>, <i>Linn.</i> <i>Bitagor</i>, <i>Rumph.</i> <i>Calysaccion</i>, <i>Wight.</i> <i>Kayea</i>, <i>Wall.</i> <i>Apoterium</i>, <i>Blum.</i></p> <p><i>?Rheedea</i>, <i>Linn.</i> <i>Van-Rheedea</i>, <i>Plum.</i> <i>?Stelechospermum</i>, <i>Blum.</i> <i>?Macanea</i>, <i>Juss.</i> <i>Macahanca</i>, <i>Aubl.</i> <i>?Macoubea</i>, <i>Aubl.</i> <i>?Souala</i>, <i>Blanc.</i></p>
---	--	---	--

NUMBERS. GEN. 30. Sp. 150.

Ebenaceæ.

POSITION.—*Hypericaceæ.*—CLUSIACEÆ.—*Ternströmiaceæ.*

ORDER CXLV. MARGRAVIACEÆ.—MARGRAVIADS.

Margraviaceæ, *Juss. Ann. Mus.* 14. 397. (1809); *P.C. Prod.* 1. 565. (1824); *Endl. Gen.* cexvii.; *Meisn. Gen.* 44.

DIAGNOSIS.—*Guttiferal Exogens*, with simple alternate leaves without stipules, unsymmetrical flowers, equilateral petals, versatile anthers, sessile stigmas, and innumerable minute seeds.

Trees or shrubs, sometimes climbing and rooting. Leaves alternate, simple, coriaceous, entire, without stipules. Flowers regular, in umbels, racemes, or terminal spikes, usually furnished with bracts which are sometimes bag-shaped or hooded. Sepals from 2 to 7, usually coriaceous and imbricated. Corolla hypogynous; sometimes monopetalous, calyptriform, entire, or torn at the point; sometimes consisting of five imbricated petals. Stamens usually indefinite, inserted either on the receptacle or on a hypogynous membrane; filaments dilated at the base; anthers long, innate, 2-celled, bursting inwards. Ovary single, superior, usually furrowed, 3 or many-celled; style single; stigma simple or capitate; ovules numerous, attached to the projecting lobes of a central placenta, ascending, with the foramen downwards. Fruit supposed to be usually succulent; but also capsular, coriaceous, and consisting of several valves which separate slightly; dissepiments proceeding from the middle of the valves, but not meeting in the centre, so that the fruit becomes 1-celled. Seeds very minute and numerous, nestling in pulp, [oblong, blunt at each end, straight or incurved, with the outer skin hardish and netted, with a lateral hilum. Embryo without albumen, incurved, between club-shaped and cylindrical, with very short obtuse cotyledons, and a long conical acute radicle, which is inferior, contiguous to the hilum, and parallel with it.—*Endlicher.*]



Fig. CCLXXXIV.

The true station of this Order is not clearly made out. It approaches Ebonyworts in its monopetalous corolla cut round at the base, in the anthers attached by their base, and the alternate leaves; Heathworts in the anthers and disk of the genus *Antholoma*; Tutans and Guttifers in the hypogynous stamens, the polypetalous corolla of some genera, placentation, and numerous seeds; wherefore Jussieu stationed the Order near *Clusia*. And this view of the relationship of Margraviads is generally accepted. Indeed, *Endlicher* says, that the species hardly differ from Guttifers except in their alternate leaves and versatile anthers. But we really know very little about them. Some of the genera are remarkable for the singular condition of their bracts, which assume the appearance of hoods, pouches, or spurs. *Turpin* has somewhere remarked, that such bracts offer a clear explanation of the conversion of a degenerated leaf into an ovule.

Fig. CCLXXXIV.—*Ruyschia amazonica*.—*Martius*.—1, a calyx and pistil; 2, a section of the ovary; 3, a seed; 4, the same, with a portion of the testa torn open to show the cotyledons. [*N.B.* Figs 3 and 4 are reversed in the cut.]

All the species occur in equinoctial America, except the doubtful genus *Antholoma*, which is a native of New Caledonia.

They are handsome and curious plants, remarkable for their singular cucullate bracts. The stem, root, and leaves of *Marcgravia umbellata* are regarded in the West Indies as diuretic and antisiphylitic.

GENERA.

<i>Ruyschia</i> , Jacq. <i>Souroubea</i> , Aubl. <i>Surubea</i> , Mey.	<i>Lophania</i> , Scop. <i>Norantea</i> , Aubl.	<i>Ascium</i> , Schreb. <i>Schwarzia</i> , Fl. Flum.	<i>Marcgravia</i> , Plum. ? <i>Antholoma</i> , Labill.
--	--	---	---

NUMBERS. GEN. 4. Sp. 26.

Ebenaceæ.

POSITION.—*Clusiaceæ.*—MARCRAVIACEÆ.—*Hypericaceæ* ?

ORDER CXLVI. HYPERICACEÆ.—TUTSANS.

Hyperica, *Juss. Gen.* 254. (1789).—*Hypericineæ*, *Chois. Prodr. Hyp.* 32. (1821); *DC. Prodr.* 1. 541. (1824); *Endl. Gen.* cxxviii.; *Meisner, Gen.*, p. 44; *Wight Illustr.* 1. t. 43; *Spach. in Ann. Sc. Nat. ser. 2. v. 157.* 349.—*Hypericaceæ*, *Ed. Pr.* lviii.—*Eucryphiaæ*, *Endl. Ench.* p. 528.

DIAGNOSIS.—*Guttiferal Exogens*, with oblique glandular petals, numerous naked seeds, and long distinct styles.

Herbaceous, or even occasionally annual, plants, shrubs, or trees, having a resinous juice, and often with angular branches. Leaves opposite, entire, without stipules, occasionally alternate, sometimes crenelled, usually impressed with transparent dots, and bordered with black glands. Flowers in most instances yellow, sometimes red or white, regular, with various forms of inflorescence. Sepals 4 or 5, free from the ovary, persistent, so arranged as to have two exterior to the others, separate or partially united. Petals of the same number as the sepals, unequal-sided, twisted spirally in aestivation, bordered with black dots, sometimes having a fleshy scale or a hollow at their base.



Fig. CCLXXXV.

Stamens hypogynous, almost always 00, sometimes distinct, occasionally monadelphous but almost always polyadelphous; sometimes having fleshy glands intervening between the bundles of stamens; filaments filiform; anthers 2-celled, opening lengthwise, frequently surmounted by a gland. Carpels 3 to 5, partially united round a placenta, which forms the axis, and introduces its arms into their cavity; styles as many as the carpels, usually distinct, but occasionally cohering at the base; stigmas capitate or truncate, rarely 2-lobed; ovules 00, (rarely definite,) generally horizontal, rarely ascending, occasionally pendulous, anatropal, or, in some instances, amphitropal. Fruit sometimes 1-celled, but in most instances either a dry or fleshy capsule, of many valves and many cells; the edges of the former being curved inwards. Seeds minute, usually tapering, attached to a placenta in the axis, or adhering to the inner edge of the dissepiments; embryo straight or curved, with an inferior radicle and no albumen.

The unequal-sided petals, and dark glands upon their edge, offer in most cases a ready means of recognising this Order, which moreover commonly possesses polyadelphous stamens. Its long styles, and distinctly apocarpous fruit, afford a further means of recognition. Keeping these characters in view, no doubt can be entertained of the two genera *Eucryphia* and *Carpodanton*, separated by Mr. Endlicher, being genuine members of the Order of Tutsans; but for the inequality of the petals is distinctly visible in the latter genus. Nor does it appear desirable to separate from the Tutsans the curious genus

Fig. CCLXXXV.—*Hypericum floribundum*; 1, an entire flower; 2, a bundle of stamens; 3, a pistil with 3 carpels; 4, a seed laid horizontally and cut through, to show the embryo and netted testa; 5, a piece of a leaf with transparent dots.

Parnassia, whose fringed glands can scarcely be doubted to represent phalanges of sterile stamens, and consequently, indicate a tendency to the production of an indefinite number of polyadelphous stamens, which is one of the characteristics of Tutsans. If indeed the seeds of Parnassia were really parietal, as they are described to be, that would be a reason for removing it to some other place: but its exalbuminous seeds forbid its being stationed among Sundews, and it has nothing in common with Saxifragæ except its habit. I believe, however, that in Parnassia, as in Hypericum, the placentæ are truly axile and projected into the cavities of the ovary, which closes over them and adheres to them; and it is certain that the petals are in some species very unequal-sided, while the anthers of others are tipped by the glands of Tutsans, and the petals themselves, if they have not projecting glands possess immersed glands, in no inconsiderable quantity.

Tutsans are very generally spread over the surface of the earth, inhabiting mountains and valleys, marshes and dry plains, meadows and heaths. The following is the distribution of the species, according to Choisy:—Europe, 19; North America, 41; South America, 21; West Indies, 1; Asia, 24; New Holland, 5; Africa and the neighbouring islands, 7; Azores and Canaries, 5; common to Europe and Asia, 4; common to Europe, Asia, and Africa, 1.—*Choisy Prodr.* 1821. Many have, however, to be added for Asia and South America.

The juice of many is slightly purgative and febrifugal. In the European species this yellow juice is in small proportion to the essential oil, and the rest of the vegetable matter, and they have been used as tonics and astringents; especially *H. perforatum*, (*ασκυρον*), and *Androsæmum officinale*. Some of the American species are possessed of a more copious yellow juice, and more energetic properties; that obtained from *Vismia guianensis*, a Mexican and Surinam tree, is known in commerce and called American Gummi Gutta. So also the *Vismias micrantha* and *laccifera* yield red sticks of a drastic gum-resin analogous to gamboge.—*Martius*. *Hypericum hircinum* is foetid. A gargle for sore throats is prepared in Brazil from the *Hypericum connatum*, commonly called Orelha de Gato. A decoction of the leaves of another species, *Hypericum laxiusculum*, or Allecrim brabo, is reputed in the same country to be a specific against the bites of serpents. The United States people prepare a stomachic tincture from *Elodea virginica*. *Cratoxylon Hornschuchia* is slightly astringent and diuretic.

GENERA.

I. HYPERICÆÆ. — No glands between the stamens.	<i>Coridium</i> , Spach.	<i>Reveura</i> , Fl. Flum.	<i>Coapia</i> , Piso.
	<i>Crossophyllum</i> , Spach.	<i>Sarothra</i> , Linn.	<i>Psorospermum</i> , Spach.
	<i>Olympia</i> , Spach.	<i>Eucryphia</i> , Cav.	<i>Haronga</i> , Thouars.
<i>Ascyrum</i> , Linn.	<i>Campylopus</i> , Spach.	<i>Carpodontos</i> , Lab.	<i>Harongana</i> , Lam.
<i>Isophyllum</i> , Spach.	<i>Psorophyllum</i> , Spach.		<i>Arongana</i> , Pers.
<i>Hypericum</i> , Linn.	<i>Androsæmum</i> , Allion.	II. ELODÆÆ. — Glands alternating with the bundles of stamens.	<i>Hæmocarpius</i> , Noronh.
<i>Eremosporus</i> , Spach.	<i>Eremanthe</i> , Spach.		<i>Elicæ</i> , Cambess.
<i>Drosanthe</i> , Spach.	<i>Campyloporus</i> , Spach.	<i>Parnassia</i> , L.	<i>Cussonia</i> , Commers.
<i>Webbia</i> , Spach.	<i>Norysca</i> , Spach.	<i>Elodea</i> , Adans.	<i>Lanigerostemma</i> , Chpl.
<i>Holosepalum</i> , Spach.	<i>Roscyna</i> , Spach.	<i>Martia</i> , Spreng.	<i>Ancistrolobus</i> , Spach.
<i>Milleporum</i> , Spach.	<i>Myriandra</i> , Spach.	<i>Triadenia</i> , Spach.	<i>Tridesmis</i> , Spach.
<i>Adenosepalum</i> , Spach.	<i>Brathydium</i> , Spach.	<i>Vismia</i> , Velloz.	<i>Cratoxylon</i> , Blum.
<i>Drosocarpium</i> , Spach.	<i>Brathys</i> , Mut.		<i>Hornschuchia</i> , Blum.

NUMBERS. GEN. 13. Sp. 276.

Saxifragacææ.

POSITION.—Clusiaceæ.—HYPERICACEÆ.—Reaumuriacææ.

ORDER CXLVII. REAUMURIAEÆ.—REAUMURIADS.

Reaumuriæ, Ehrenberg in *Ann. des. Sc.* 12. 78. (1827).—Reaumuriaceæ, *Ed. pr.* lxx.; *Endl. Gen.* ccxx.; *Meisner*, p. 129.

DIAGNOSIS.—*Guttiferal Exogens, with oblique glandular petals, a few shaggy seeds, and long distinct styles.*

Small shrubs with fleshy scale-like leaves, which are alternate, have no stipules, and are overspread by resinous sunk glands. Calyx 5-parted, surrounded externally by imbricated bracts. Petals 5, hypogynous, unequal-sided, sometimes having a pair of membranous plates planted upon their middle. Stamens definite or indefinite, hypogynous, monadelphous or polyadelphous, with or without a hypogynous disk; anthers ovate, turned inwards, and bursting longitudinally. Carpels free, 2-4-5, partially separate from each other, surrounding a central placenta which passes into the base of each; ovules 2 or 4, ascending, anatropal; styles filiform, or subulate. Fruit capsular, with 2 to 5 valves and as many cells, unless the number is diminished by abortion. Seeds shaggy, definite, erect; embryo straight, surrounded by a small quantity of mealy albumen; radicle next the hilum.

Ehrenberg suggested (*Ann. des Sc.* 12. 78.) that Reaumuria and Hololachna might constitute a little group, to be called Reaumuriaceæ. At that time the true relations of plants were ill understood, and if he had referred the genera he knew to Tutsaus, he would never have had his opinion called in question. In fact there is nothing to distinguish these Orders except that Reaumuriads have shaggy seeds, and appendages at the base of the petals, which appear to be destitute of glands. They have no affinity with Ficoids or Tamarisks.

Natives of the coast of the Mediterranean and the salt plains in the milder parts of northern Asia.

It seems that these plants abound in saline matter, a circumstance that is doubtless owing to the situations in which they grow. Reaumuria vermiculata is used at Alexandria as a cure for itch. Its bruised leaves are applied externally, and a decoction is administered internally.



Fig. CCLXXXVI.

GENERA.

Hololachna, Ehrhb.

Reaumuria, Hasskq.

Eichwaldia, Ledeb.

NUMBERS. GEN. 3. Sp. 4.

POSITION.—Hypericaceæ.—REAUMURIAEÆ.

Fig. CCLXXXVI.—Reaumuria hypericoides. 1. a flower and its bracts; 2. the same divided perpendicularly; 3. a petal; 4. capsule; 5. seed divided perpendicularly and much magnified.—Schnitzlein.

ALLIANCE XXXI. *NYMPHALES*.—THE NYMPHAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with dichlamydeous flowers, axile or sutural placenta, 00 stamens, and an embryo on the outside of a large quantity of albumen; or, if exalbuminous, the seeds have a very large plumule.*

The singular fact of the embryo lying on the outside of a large mass of albumen would enable the Botanist to distinguish Nymphals with certainty from all those Orders with which they are here associated, if it were not for the Waterbeans, which appear to have no albumen at all. With them, however, it would seem as if an enormous plumule compensated for the absence of this substance. The species are among the most highly developed of any in the vegetable kingdom, if we only regard their flowers; but the total absence of a woody stem places them, on the other hand, among less noble allies. They differ from the Ranal Alliance principally in their embryo, and seem to run close upon the Crowfoots themselves, through both the Waterbeans and Watershields. They have no obvious alliance with any part of Guttiferals, except Guttifers themselves; but they touch the Ranal Alliance at every point.

The stamens are often attached to the sides of the ovary, and are even not liberated in some cases till the very summit of it; but this seems a mere modification of the hypogynous structure.

NATURAL ORDERS OF NYMPHALS.

- Carpels united into a many-celled fruit, with dissepimental placenta.* 148. NYMPHEACEÆ.
Carpels distinct. Albumen copious. Torus absent. 149. CABOMBACEÆ.
Carpels distinct. Albumen 0. Torus honey-combed, very large. 150. NELUMBIACEÆ.

ORDER CXLVIII. NYMPHÆACEÆ.—WATERLILIES.

Nymphaeaceæ, *Salisbury, Ann. Bot.* 2. p. 69. (1805); *DC. Propr. Med. ed.* 2. p. 119. (1816); *Syst.* 2. 39. (1821); *Prodr.* 1. 113. (1824); *Wight's Illustrations*, p. 24; *Endl. Gen.* clxxxvii.; *Meisner Gen.* 6.

DIAGNOSIS. — *Nymphal Exogens*, with a many-celled fruit and dissepimental placentæ.

Herbs, with petlate or cordate fleshy leaves, arising from a prostrate trunk, growing in quiet waters. Flowers large, showy, often sweet-scented. Sepals usually 4, free, rarely adherent; petals numerous, imbricated, often passing gradually out of the last into stamens; the former persistent, the latter deciduous, and inserted upon the disk, sometimes forming a monopetalous corolla. Stamens numerous, inserted above the petals into the disk, filaments petaloid; anthers adnate, bursting inwards by a double longitudinal cleft. Disk large, fleshy, surrounding the ovary more or less. Ovary polyspermous, many-celled, with radiating stigmas, alternate with the dissepiments; ovules numerous, anatropal, attached to the sides of the dissepiments. Fruit many-celled, indehiscent. Seeds very numerous, attached to spongy dissepiments. Albumen farinaceous. Embryo small, on the outside of the base of the farinaceous albumen, inclosed in a fleshy vitellus; cotyledons fleshy, concave; plumule oblique.

The opinions of Botanists are divided concerning the true nature of the structure of these beautiful plants, and consequently as to their proper station in a Natural System. This has been caused by some peculiarities in the embryo on the one hand, and by the want of any resemblance in the internal condition of the stem and that of *Exogens*. Richard supposed the vitellus, or amniotic sac, in which the embryo is inclosed, to be a cotyledon, enveloping a two-lobed plumule; and hence the Order was referred to *Endogens*, or *Monocotyledons*, and placed in the vicinity of *Hydrocharads*. But it is now well known that Richard's cotyledon is a vitellus, analogous to that of Peppers, Gingerworts, and others; and that what Richard and his followers denominated plumule, is a 2-lobed embryo, whence the Order is more generally placed in *Exogens*, or *Dicotyledons*. Even Von Martius, who once adhered to the opinion that Waterlilies are monocotyledonous, and nearly related to *Hydrocharads*, (see *Hortus Regius Monacensis*, p. 25.) now places the Order near *Crowfoots* (see *Compositus*, No. 183). Those who are curious to examine the different opinions on this subject are referred to *Dr. Candolle's Memoir*, in the first volume of the *Transactions of the Physical and Natural History Society of Geneva*.



Fig. CCLXXXVII.

Fig. CCLXXXVII. *Nymphaea alba*. 1. the pistil; 2. a perpendicular section of a seed; 3. half an embryo, showing the great plumule lying in the cavity of one cotyledon.

It seems, however, desirable to state, in this place, what the reasons are which have led so many modern Botanists to place the Order in the class of Exogens. If the rhizome of *Nymphaea* is examined it will be found to consist principally of cellular tissue, with a very confused distribution of fibrovascular bundles among it, not at all like that of Exogens, but more resembling what occurs in succulent Endogens. But, according to Mirbel's examination of the anatomy of the roots of *Nuphar luteum*, in the *Annales du Muséum*, vol. 16, pl. 20, the bundles of fibres are there placed in a concentric circle, the youngest being outermost. Secondly, the leaves are those of Dicotyledons, and so is their convolute vernation, which is not known in Monocotyledons, together with their insertion and distinct articulation with the stem. Thirdly, the flowers of Waterlilies have so great an analogy generally with Dicotyledons, and particularly with those of Magnoliads, and their fruit with Poppyworts, that it is difficult to doubt their belonging to the same group.

It is not possible to refuse assent to the importance of some, at least, of these considerations; but I do not think that they quite dispose of the question as to where, in a Natural System, *Nymphaea* and its allies are to be placed. To the foliage little value can be assigned, for it is sufficiently like that of *Hydrocharis*. Nor does the structure of the root of *Nuphar* prove the stem to be an anomalous form of Exogens; for the circle of fibrovascular bundles found there is the common character of the roots of Endogens, as Schleiden first pointed out, and has no resemblance to that of Exogens. The argument derived from internal structure is therefore more in favour of Waterlilies being Endogens than Exogens. The true ground for considering them Exogens is certainly confined to the two-lobed embryo. It seems to have been forgotten that when Brown and Brongniart proved Richard's cotyledon to be nothing more than the amniotic sac, they did not also prove, as a necessary consequence, that the so-called plumule of Richard was a dicotyledonous embryo. It may be monocotyledonous, notwithstanding its vitellus. Certainly its two lobes are very like those of Exogens; but I find that in *Nymphaea alba* the lobes are not suddenly contracted at their base like true cotyledons, (nor are they in *Nelumbium*;) and, moreover, that the plumula is, in that plant, placed in an oblique direction with respect to the lobes; so that, in fact, the embryo of *Nymphaea* is much like a modification of such monocotyledonous embryos as those of *Aponogeton*, *Cymodocea*, and *Posidonia*.—See *Ann. Sc. n. s.* xi. t. 17. Indeed, I perceive no reason why it should not be regarded as having one split cotyledon, rather than two distinct ones. The principal mass of the nucleus in the seeds of *Oreohids* appears from the researches of Professor Link to be an analogous case. In these plants the nucleus is a spheroidal cotyledon, from whose surface the radicle and plumule respectively protrude. We have only to imagine it elevated on each side, and we should have the two-lobed body of this Order. For the present, however, I am not prepared to disturb existing arrangements; though I much suspect that it

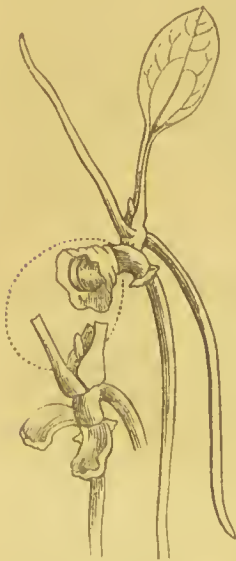


Fig. CCLXXXVII. bis.

will be done by some other Botanist. Indeed M. Ad. Brongniart has lately declared that the position of Waterlilies appears to him very doubtful.—*Enumeration* xxv. De Candolle assigns as a further reason for considering Waterlilies to be Dicotyledons, that they are lactescent, a property not known in Monocotyledons. But in this he is mistaken; *Limncharis*, a genus belonging to *Butomads* is lactescent. Finally, Mr. Hassal appeals to the condition of the pollen of Waterlilies, which he thinks proves them to be undoubted Monocotyledons. The pollen grain of *Nymphaea* is described by this observer as being oval, hispid, with a furrow down one side, and emitting a single pollen tube, which marks he regards as characteristic of Endogens.

The germination of *Nymphaea alba* is not exactly either exogenous or endogenous. The radicle is clearly endorhizal, as in the latter; but the cotyledons lengthen their bases to allow the plumule to escape, just as in an acorn; and this is perhaps one of the strongest arguments in favour of the lobes of the embryo being really cotyledons.

Supposing this Order to be exogenous and dicotyledonous, its immediate affinity will be with Poppyworts, with some genera of which it agrees in the very compound nature of the fruit, from the apex of which the sessile stigmas radiate, in the presence of narcotic principles and a milky secretion, and in the great breadth of the placenta. Waterlilies are also considered akin to Magnoliads, with which they agree

in the imbricated nature of the petals, sepals, and stamens; to Waterbeans their resemblance is evident; with Crowfoots they are connected through the tribe of Pæonies, with which they agree in the dilated state of the disk, which, in Pæonia papaveracea and Moutan, frequently rises as high as the top of the ovaries, and in the indefinite number of their hypogynous stamens; but in Crowfoots the placentæ only occupy the suture of each of the carpels of which the fruit is made up; so that in Nigella, in which the carpels cohere in the centre, the seeds are attached to the axis, while in Waterlilies the placentæ occupy the whole surface of each side of the individual carpels, of which the fruit is composed.

On the other hand, if we consider Waterlilies as a part of the Endogenous class, we shall be at no loss to find strong affinities for them in that series; as for example with Hydrocharads, and more particularly with the Alismal Alliance, whose indefinite carpels, habit, and peculiar placeation, are very important points of resemblance.

Independently of the circumstances to which allusion has just been made, this Order is remarkable in some other respects. It offers one of the best examples which can be adduced of the gradual passage of petals into stamens, and of sepals into petals: if attentively examined, the transition will be found so insensible that many intermediate bodies will be seen to be neither precisely petals nor stamens, but both in part. The development of the torus, which is so remarkable in Waterbeans, is here represented by a similar enlargement of the disk, which in some, as in Nuphar, is merely a hypogynous expansion, out of which grow the stamens and petals; in others, as Nymphæa, elevates itself as high as the top of the ovary, to the surface of which it is adnate, and as the stamens are carried up along with it, we have these organs apparently proceeding from the surface of the ovary; in the genus Barclaya, the petals are also carried up with the stamens, on the outside of which they even cohere into a tube, so that in this genus we have a singular instance of an inferior calyx and a superior corolla in the same plant. In Victoria the sepals are also aduate to this disk, and thus a half-adherent ovary is produced. In Nymphæa alba, the seeds are inclosed in a true arillus; but M. Planchon (*Mém. sur les Arilles*, p. 18) has shown that no such integument exists in Nuphar luteum.

Floating plants, inhabiting the whole of the northern hemisphere, occasionally met with at the southern point of Africa, but generally rare in the southern hemisphere; on the continent of South America they are represented by Victoria.

This Order has the reputation of being antiaphrodisiac, sedative, and narcotic—properties not very clearly made out, but generally credited. Dr. Wight has, however, well observed that these are quite imaginary qualities, assumed to exist in consequence of the habitation of Waterlilies “in the midst of cool and placid waters, combined with the chaste whiteness of their flowers.” The Turks prepare a cooling drink from the flowers of Nuphar luteum, which they call Puffer cicoghi. Their stems are certainly bitter and astringent, for which reason they have been prescribed in dysentery. They contain a considerable quantity of starch, and after repeated washings, are capable of being used for food without danger. The seeds are eagerly sought after in times of scarcity, by the wild people in those countries they grow. They taste like Poppy-seeds, and are used either boiled or raw like Millet. Victoria, the most gigantic and beautiful of water plants, is said to be on that account called Water Maize in South America. Euryale seeds are in like manner a favourite food among the Indians and Chinese. The large quantity of starch contained in them accounts for this. The rhizomes of various species of Nymphæa are esteemed by the negroes of Senegal, who are said to roast and eat them like Potatoes. In India the farinaceous seeds are eaten either in a raw state, or after having been roasted in heated sand. It is said by Fée that the rhizomes of Nymphæa alba are better than Oak-galls for dyeing gray; they have also been long employed advantageously for tanning leather; and a tolerable sort of beer has been prepared from them. The leaves of Nuphar luteum are reported to be styptic.—*Endl.*

GENERA.

Tribe 1. Euryalide.— Tribe of the calyx adherent to the disk. Petals distinct.	Tribe 2. Nupharide.— Calyx and petals both distinct.	Tribe 3. Barclayide.— Calyx free. Corolla adhering to the disk, monopetalous.
Euryale, Salisb. Anacelis, Andr. Victoria, <i>Endl.</i>	Nymphæa, Neek. Castalia, Salisb. Leucomyphæa, Boerh. Gynera, DC.	Lotos, DC. Castalia, DC. Nuphar, Smith. Nymphæandrus, Rich. Nemuphar, Hayn. Barclaya, Wall.

NUMBERS. GEN. 5. Sp. 50.

PAPAVEROACEÆ.

POSITION.—Cabombaceæ.—Nymphaeaceæ.—Nelumbiaceæ.
Alismaceæ.

ORDER CXLIX. CABOMBACEÆ.—WATERSHIELDS.

Cabombaceæ, *Torrey and Gray*, 1. 54. (1838).—Cabombææ, *Rich. Anal. Fr.* (1808); *Endl. Gen. cixxxvi*—Podophyllaceæ, § Hydropeltideæ, *DC. Syst.* 2. 36. (1821); *Prodr.* 1. 112. (1824)—Hydropeltideæ, *Schleiden in Wiegman. Arch.* 5. 230.

DIAGNOSIS.—*Nymphal Exogens*, with distinct carpels, abundant albumen, and no visible torus.

Aquatic plants, with floating peltate leaves. Flowers axillary, solitary, yellow, or purple. Sepals 3 or 4, coloured inside. Petals 3 or 4, alternate with the sepals. Stamens definite or indefinite, hypogynous, arising from an obscure torus; anthers linear, turned inwards, continuous with the filament. Carpels 2 or more, terminated by a short style. Ovules orthotropal, pendulous. Fruit indehiscient, tipped by the hardened style. Seeds definite, pendulous; embryo minute, two-lobed, inclosed in the fleshy sac of the amnios, and external to an abundant fleshy albumen.

There can be no doubt about the near relationship of these plants to Waterlilies, with which they correspond in having a minute embryo inclosed in a vitellus, and from which they only differ in having disunited carpels, and a very small number of sutural ovules. From Waterbeans, with which they correspond in their disunited carpels, they are distinguished by their abundant albumen, minute embryo, nearly total want of torus, and having more seeds than one in each carpel. Their relationship to Podophyls is much more remote, nor can they belong to the same Alliance, although they have been combined with that Order by De Candolle. Richard, who regarded Waterlilies as Monocotyledons, referred these plants also to that great class; but he misunderstood the structure of their embryo, which has been well illustrated by

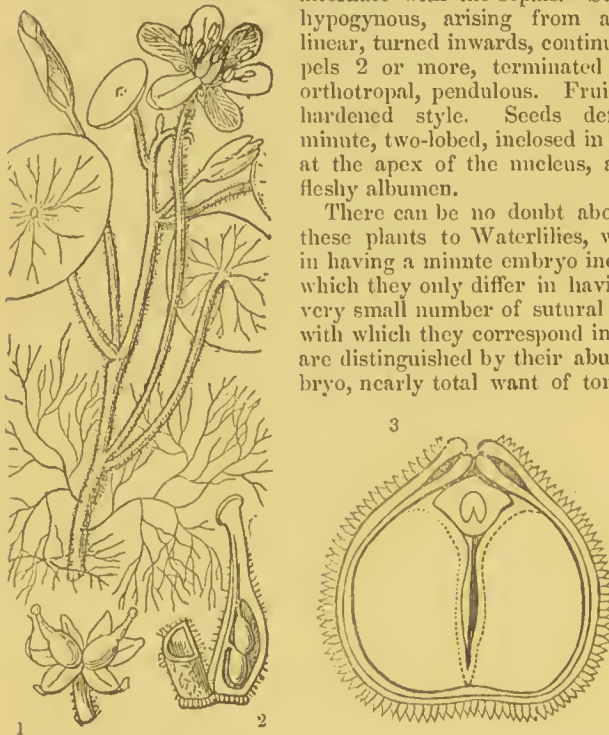


Fig. CCLXXXVIII.

Schleiden. Nuttall describes the young leaves and flowers, together with the other parts exposed to the air, to be covered "with an inconspicuous flocculent pubescence, immersed in a gelatinous substance." This Schleiden states to be a remarkable state of the epidermis, which consists of a very thick layer of well-defined insoluble gelatine, in which the cells of the epidermis are introduced.—*Wiegman.* 5. 230. The same author says, that not a trace of spiral vessels can be found in any of the submersed parts. I find the stem to consist of a mass of small cellular tissue surrounding 15 or 16 large air-tubes, and some smaller ones, in the centre of which is a pair of woody bundles, crescent-shaped in their transverse section, with the convexity directed inwards. These bundles consist of thin-walled elongated tissue, in the middle of which is a solitary tube of larger size, apparently also an air-tube, for I can find no trace of spiral structure in it.

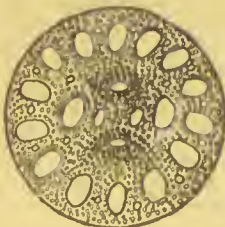


Fig. CCLXXXIX.

Fig. CCLXXXVIII.—*Cabomba aquatica*. 1. the pistil and calyx; 2. sections of the carpels (*Turpin*); 3. a section of its seed.—*Schleiden*.
Fig. CCLXXXIX.—Section of the stem of *Hydropeltis purpurea*.

American water-plants, found from Cayenne to New Jersey, and also on the coast of New Holland, beyond the tropics, according to Endlicher.

Hydropeltis purpurea is said to be nutritious, but slightly astringent. The leaves are employed as a remedy for phthisis and dysentery.

GENERA.

Cabomba, Aubl.
Nectris, Schreb.
Hydropeltis, Mich.
Brasenia, Pursh.
Rondachina, Bosc.

NUMBERS. GEN. 2. Sp. 3.

Ranunculacæ.

POSITION.—*Nymphæacææ.*—CABOMBACEÆ.—*Nelumbiacææ.*

ORDER CL. NELUMBIACEÆ.—WATER BEANS.

Nymphæaceæ, § Nelumboneæ, *DC. Syst.* 2. 43. (1821); *Prodr.* 1. 113. (1824)—Nelumboneæ, *Martius Conspicuos*, No. 187. (1835); *Endl. Gen.* cxxxix.—Nelumbiaceæ, *Ed. Pr. Wight Illustr.* i. t. 9.

DIAGNOSIS.—*Nymphal Exogens*, with distinct carpels immersed in a large honeycombed torus, and without albumen.

Herbs, with peltate, fleshy, floating leaves arising from a prostrate trunk, growing in quiet waters. [The rhizome growing at the point, with bundles of vessels forming a net-like cylinder, from whose outer and inner part bundles pass to the leaves and lateral flowers.—*Unger.*] Sepals 4 or 5. Petals numerous, oblong, in many rows, arising from without the base of the torus. Stamens numerous, arising from within the petals, in several rows; filaments petaloid; anthers adnate, bursting inwards by a double longitudinal cleft. Torus fleshy, elevated, excessively enlarged, inclosing in hollows of its substance the carpels, which are numerous, one-seeded, with a very short style and simple stigma. Ovule single, suspended from the point of a cord rising from the base of the cavity, anatropal. Nuts numerous, half buried in the hollows of the torus, in which they are, finally, loose. Seeds solitary, rarely 2; albumen none; embryo large, with two fleshy cotyledons and a highly developed plumule, inclosed in its proper membrane.

This beautiful race of water plants offers one of the most striking exceptions to the usual importance of albumen as a general mark of affinity; for, although undoubtedly a member of the Nymphal Alliance, it has not a trace of albumen. Its cotyledons, however, are crammed with starch, and it has a plumule so completely organised, that it is ready to perform all the functions of growth the instant that germination is excited, and thus that necessity for a separate magazine of food, which is so great with the feeble Nymphaeaceous embryo, does not here exist. The nature of what is here called the proper membrane of the plumule is not explained by Botanists. Richard regarded it as a cotyledon, the apparent cotyledons being in his view a two-lobed radicle. Ad. Brongniart refers it to the sac of the amnios, which seems inadmissible. De Candolle regarded it as a stipule; but it is found in connection only with the first leaf of the plumule, while, if De Candolle is right, it ought to be present at the base of the second leaf also. The singular enlargement of the torus, which constitutes so striking a feature in these plants, is probably a less important circumstance than their large exalbuminous embryo.

Natives of stagnant or quiet waters in the temperate and tropical regions of the northern hemisphere, both in the Old and the New World; most abundant in the East Indies. They were formerly common in Egypt, but are now extinct in that country, according to Delile.

Chiefly remarkable for the beauty of the flowers. The fruit of *Nelumbium speciosum* is believed to have been the Egyptian Bean of Pythagoras, and the flower that Mythic Lotus, which so often occurs on the monuments of Egypt and India. The nuts of all the species are eatable and wholesome. The root, or more properly the creeping stem,



Fig. CCXC.

Fig. CCXC.—*Nelumbium speciosum*. 1. a section of its young carpel, 2. a section of the same when ripened into a bean, and showing the structure of the seed.

is used as food in China. Dr. Roxburgh relates that the tender shoots of the roots (rootstock), between the joints, are eaten by the natives of India, either simply boiled or in their curries. The seeds are eaten raw, roasted, or boiled. Nuttall states that the tubers of *Nelumbium luteum* resemble those of the Sweet Potato, are as farinaceous and agreeable when boiled, and are used for food by the American Indians. Endlicher says that the milky viscid juice of the leaf-stalks and flower-stalks is employed as a remedy against sickness and diarrhœa, and that the petals, which smell of Anise flowers, are slightly astringent and used like Rose flowers. Dr. Wight informs us that the leaf and flower-stalks abound in spiral vessels, which are carefully extracted in India and formed into those wicks "which on great and solemn occasions are burnt in the lamps of the Hindoos placed before the shrines of their gods." Similar wicks are prepared from some *Nymphæas*, but are not considered so sacred.

GENUS.

Nelumbium, Juss.
Nelumbo, Gærtn.
Cyamus, Salisb.

NUMBERS. GEN. 1. Sp. 3, at least.

POSITION.—*Nymphæaceæ*.—*NELUMBIACEÆ*.—*Cabombaceæ*.

ALLIANCE XXXII. RANALES.—THE RANAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, sutural or axile placentæ, 60 stamens, and a minute embryo inclosed in a large quantity of fleshy or horny albumen.*

Under this name are collected some of the most common, and at the same time the most highly developed species of the Vegetable Kingdom. In general they are characterised by the presence of a distinct calyx and corolla; but it is by no means uncommon to find these organs so blended together as to be undistinguishable, while in other instances the corolla is wholly wanting, and it even occurs occasionally that neither one nor the other is present. In appearance Ranals are singularly different even in the same Order; as, for example, in the Crowfoots, under which arrange themselves the common Crowfoot, the Aconite, Thalictrum, and Xanthorrhæa. But although there is so much diversity of appearance among them, nevertheless they certainly form a well compacted group, no one member of which can be spared, as will be seen by examining the remarks made under each Order. In general they have an indefinite number of stamens, but the genus *Boeagea* presents a very remarkable exception to that rule. They pass into the Berberal Alliance by the Poppyworts, some of which resemble Sarraceniads, and others the common forms of the Crowfoot Order. A clear case of transition to the Eriical Alliance also seems to be established by the genus *Saurauja*, which to the disunited styles of Ranals and their indefinite stamens, adds the minute indefinite seeds, porous anthers, and monopetalous corolla of Heathworts themselves; that genus may be regarded as a *Clethra*, with the indefinite stamens of *Tetracera*, or as a *Tetracera* with the monopetalous corolla, minute seeds, and porous anthers of a *Clethra*. To Umbellifers in the Epigynous series they pass by way of their genus *Thalictrum*, whose whole habit is that of the former Order, and whose fruit would, if it adhered to the calyx, be nearly that of an Umbellifer.

NATURAL ORDERS OF RANALES.

<i>Carpels distinct. Stipules large, convolute. Corolla imbricated. Albumen homogeneous</i>	} 151. MAGNOLIACEÆ.
<i>Carpels distinct. Stipules 0. Corolla valvate. Albumen ruminat.</i>	152. ANONACEÆ.
<i>Carpels distinct. Stipules 0. Corolla imbricated. Albumen homogeneous. Seeds arillate</i>	} 153. DILLENIACEÆ.
<i>Carpels distinct. Stipules 0. Corolla imbricated. Albumen homogeneous. Seeds without an aril</i>	} 154. RANUNCULACEÆ.
<i>Carpels consolidated. Calyx permanent. (Placentæ axile)</i>	155. SARRACENIACEÆ.
<i>Carpels consolidated. Calyx deciduous. (Placentæ usually parietal)</i>	} 156. PAPAVERACEÆ.

ORDER CLI. MAGNOLIACEÆ.—MAGNOLIADS.

Magnoliæ, *Juss. Gen.* 280. (1789)—Magnoliaceæ, *DC. Syst.* 1. 439. (1818); *Prodr.* 1. 77. (1824); *Blume Fl. Jav.*; *Endl. Gen.* clxxvi.; *Meisner Gen.* p. 3.; *Wight Illustr.* 1. 9.—Winteræ, *R. Brown in De Cand. Syst.* 1. 548. (1818)—Illiciæ, *DC. Prodr.* 1. 77. (1824), a section of Magnoliaceæ.

DIAGNOSIS.—*Ranul Erogens*, with distinct carpels, (usually) large convolute stipules, an imbricated corolla, and homogeneous albumen.

Fine trees or shrubs. Scales of the leaf-bud formed of stipules either placed face to face or rolled up. Leaves alternate, sometimes with pellucid dots, coriaceous, articulated distinctly with the stem; usually with deciduous stipules which, when young, are rolled together like those of *Ficus*, and mark the branches with ringed scars where they fall off. Flowers solitary, often strongly odoriferous, usually ♂, but in *Tasmania* ♂-♀. *Trochodendron* has neither calyx nor corolla. Sepals 3-6 (rarely 2-4), deciduous. Petals 3 or more, imbricated, hypogynous, in several rows. Stamens ∞, distinct, hypogynous; anthers adnate, long. Carpels several, arranged upon a torus above the stamens, 1-celled; ovules anatropal, one or more, ascending or suspended; styles short, stigmas simple. Fruit either dry or succulent, consisting of numerous carpels, which are either dehiscent or indehiscent, distinct or partially connate, always numerous, often collected in a cone upon a lengthened axis, sometimes terminated by a membranous wing. Seeds solitary, or several, attached to the inner edge of the carpels, from which, when ripe and open, they often hang suspended by a delicate umbilical cord, often enveloped in an aril. Embryo minute, at the base of fleshy albumen.

In this Order are included some of the finest trees and shrubs in the world, strikingly beautiful in their flowers and foliage, often of very considerable size, and in the majority of cases emitting the most fragrant odours. They are closely allied to *Dilleniads*, which have a quinary arrangement of the calyx and corolla and no stipules, and to *Anonads*, which also have a ternary arrangement of the floral envelopes and a very great similarity in general structure; but in that Order the petals have a valvate æstivation, and no stipules are present, besides which the albumen is ruminated like that of a Nutmeg. In *Winter's Barka*, or *Winteræ*, which do not seem to possess any solid distinction from *Magnoliads*, the wood has been observed to present the singular circular disks which are so abundant and remarkable in *Coniferous plants*.* The genus *Tasmania*, called in books *dicocious*, seems

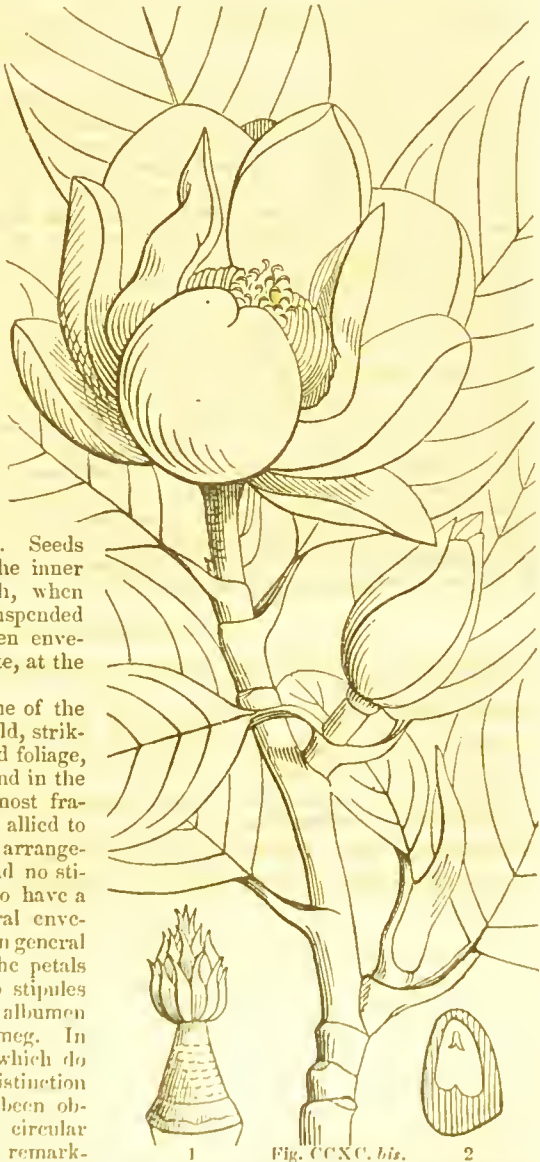


Fig. CCXC. bis.

Fig. CCXC. bis.—*Magnolia glauca*. 1. the pistil; 2. a section of the seed.

* This has been denied or confirmed, I hardly know which, by Goepfert, who, in a Memoir on the subject says in one place that the woody tubes of *Drimys Winteri* are constructed "comme nous les voyons chez les *Araucaria*," and in another he calls this a resemblance "remarquable sans doute, mais qu'on ne saurait confondre avec celle des *Conifères*."—*Ann. Sc. Nat.* 2. ser. 18. 320.

rather to be polygamous, and therefore has no claim to be regarded as an exception to the hermaphrodite character of this Order; the tendency, however, in that genus to unisexuality corroborates the opinion of some Botanists, that Magnoliads approach certain diclinous Orders included in the Urtical Alliance, as is indicated by their large convolute stipules, which are very like those of Figs and other genera of Morads. *Tasmannia* is, indeed, quite an anomalous plant. It is so nearly related to the aromatic Winter's Bark, *Drimys Winteri*, from which its unisexual flowers and solitary carpels chiefly distinguish it, that it must follow the affinity of that plant. For this reason it seems necessary to associate it with the Order of Magnoliads rather than with that of Kadsurads or Anonads. The three Orders are generally distinguished by the following characters:—Magnoliads are bisexual, have stipules of large size, and their flowers have an imbricated revivation. Kadsurads resemble them in all things, except the want of stipules, and their flowers being absolutely unisexual. Anonads are bisexual like Magnoliads, but they have no stipules, their corolla is valvate, and their albumen ruminant. Moreover Magnoliads are astringent sub-aromatic trees or bushes; Anonads are similar in quality, but they are more aromatic; Kadsurads are scrambling plants with no aroma. If we regard the aromatic quality of *Tasmannia*, it will belong to either Magnoliads or Anonads; but from the former it differs in the want of stipules, from the latter in its imbricated corolla, and from both in its unisexual flowers. On the other hand it has the unisexual flowers of Kadsurads, but not their habit nor their mucilaginous qualities. Its unisexual flowers, however, point strongly in the direction of Kadsurads; but then it is not separable from *Drimys*, which is bisexual, and, moreover, its own flowers are in reality in many cases furnished with a central carpel. *Tasmannia* must then be regarded as having a manifest tendency towards hermaphroditism, while no such attribute is known among Kadsurads. For these reasons it will be stationed along with *Drimys* among bisexual Natural Orders, and then will necessarily fall into the ranks of Magnoliads; for its imbricated corolla and homogenous albumen are at variance with the most essential peculiarity of Anonads. It, however, like *Drimys* itself, wants the stipules of Magnoliads, in which respect it is exceptional to the usual character of that Natural Order, and must be regarded as a genus stationed on the frontier between Kadsurads and Magnoliads. The small perigynous Order of Calycanthus is moreover so like *Illicium* in appearance, and there is so much resemblance between them in their separate carpels, that, although their affinity is by no means direct, yet we must suppose that some cross relationship exists between them. According to Blume, the umbilical cord, which is so remarkably extensible in some of these plants, is wholly composed of a multitude of delicate spiral vessels.

The focus of the Order is undoubtedly North America, where the woods, the swamps, and the sides of the hills abound with the species. Thence they straggle, on the one hand, into the West India Islands, and on the other, into India, through China and Japan. Brown remarks (*Congo*, 465), that no species have been found on the continent of Africa, or any of the adjoining islands.

The general character of the plants of this Order is to have a bitter tonic taste, and fragrant flowers. The latter produce a decided action upon the nerves; *Magnolia tripetala*, according to De Candolle, induces sickness and headache; and on the authority of Barton, *Magnolia glauca* is so stimulating as to produce paroxysms of fever, and even an attack of inflammatory gout. The bark has been found to be destitute of tannin and gallic acid, notwithstanding its intense bitterness. None of the species can be said to have eatable fruits. Among the most fragrant are the *Tsjampac* or *Champaca*, a species of *Michelia* so called, which is the delight of the people of Hindostan; the *Magnolia grandiflora*, one of the noblest of evergreen trees; *Magnolia pumila*, well known in green-houses for its brownish-green flowers; while the *Yulan*, *Magnolia conspicua*, is unrivalled among northern trees for the surpassing brilliancy of its large and snow-white flowers upon gray and naked branches. As tonics many have great value. The *Swamp Sassafras*, or *Beaver tree* (*Magnolia glauca*), has a bitter and aromatic bark, resembling and even rivalling in its qualities *Cinchona*. It is particularly useful in chronic rheumatism, whether the bark, seeds, or cones are employed. The same qualities are recognised in *Liriodendron tulipifera*, the seeds of *Magnolia Yulan*, called in China *Tsin-y*, *grandiflora*, and others. All the parts of *Michelia Tsjampaca* appear to be powerfully stimulant. Of *Magnolia Frazeri* (*auriculata*, *Bartr.*), and *M. acuminata*, both called *Cucumber-trees* in the United States, the bitter and somewhat aromatic infusion of the green cones in whisky or brandy is extensively used against intermittent fevers, and also in rheumatic affections. The tonic qualities of these plants are partly owing to their aromatic secretions, which sometimes become very intense. The *Aromadendron elegans* of Java is one of the most remarkable, and has a great local reputation as a stomachic, antihysterie, and curminative. *Michelia montana* bark is

compared for efficacy to Cascarilla, but it is less bitter. *Michelia gracilis* bark smells strongly of Camphor. The whole plant of *Illicium anisatum*, especially the fruit, has a pleasant aromatic flavour of Anise, sweetish and rather pungent. It is reckoned a stomachic and carminative among the Chinese, and is used as a spice in their cookery. The fruit is aromatic and carminative,



2

Fig. CCXCI.



1

and by distillation yields an oil which has most of the properties of oil of Anise, for which it is often substituted. It is chiefly used in the fabrication of liqueurs. *Illicium floridanum* and other species have similar spicy qualities. The seeds of *Illicium religiosum* are so fragrant that the Chinese burn them in their temples. *Drimys Winteri* yields the Winter's Bark, which is known for its resemblance to that of Cinnamon. A bark called Melambo Bark, possessing similar properties, is described by Cadet in the *Journal de Pharmacie*, 1815, p. 20; but it is very uncertain whether it belongs to any plant of this Order. The bark of *Drimys granatensis*, called Casca d'Anta in Brazil, is much used against eolic. It is tonic, aromatic, and stimulant, and resembles, in nearly all respects, the *Drimys Winteri*, or Winter's Bark. Similar in their nature are *Drimys axillaris* and *Tasmannia aromatica*, one a New Zealand and the other a New Holland tree, whose fruit is occasionally used as pepper by the settlers in Tasmania. Many are valuable for their timber. *Michelia Doltsopa* is one of the finest trees in Nipal, yielding an excellent fragrant wood, much used in that country for house-building.—*Don, Prodr.* 226. *Magnolia exeelsa* has a valuable timber called Champ, at first greenish, but soon changing into a pale yellow; the texture is fine. *Manglietia glauca* has a white solid wood which is largely employed in Java, and supposed to prevent the decay of corpses put into coffins made of it. Another valuable timber of the same country is that of *Aromadendron elegans*. Blume remarks that Magnoliads are absolutely known from Dilleniads by their bitter aromatic properties; the latter never being anything beyond styptics.

GENERA.

<p>I. MAGNOLIÆ.—Carpels arranged in a cone. Leaves not dotted, or scarcely.</p> <p><i>Talauma, Juss.</i> <i>Blumia, Nees.</i> <i>Magnolia, Plum.</i> <i>Aromadendrum, Blum.</i> <i>Magnolia, Linn.</i> <i>Grillimia, Rottl.</i></p>	<p><i>Liriodendron, Spach.</i> <i>Yulania, Spach.</i> <i>Tulipastrum, Spach.</i> <i>Lirianthe, Spach.</i> <i>Manglietia, Blum.</i> <i>Michelia, Linn.</i> <i>Champaca, Rheed.</i> <i>Sampaca, Rumph.</i> <i>Liriodendron, Linn.</i> <i>Tulipifera, Herm.</i></p>	<p>II. WINTERÆ.—Carpels whorled, in a single row. Leaves with pellucid dots, and often with no stipules.</p> <p><i>Tasmannia, R. Br.</i> <i>Drimys, Forst.</i> <i>Wintera, Murr.</i> <i>Winterana, Sol.</i></p>	<p><i>Magallana, Commers.</i> <i>Canella, Domb.</i> <i>Boique, Molin.</i> <i>Illicium, Linn.</i> <i>Skimmi, Kämpf.</i> <i>Badianifera, Linn.</i> <i>Cymbostemon, Spach.</i> <i>Trochodendron, Sieb. et Z.</i> <i>Gymnanthus, Jungh.</i> ? <i>Temus, Molin.</i></p>
---	--	---	--

NUMBERS. GEN. 11. Sp. 65.

Moracæ.

POSITION.—ANONACEÆ.—MAGNOLIACEÆ.—DILLENIACEÆ.

Schizandraceæ.

Monimiaceæ?

Fig. CCXCI.—1. stamens and pistil; 2. fruit, of *Aromadendron elegans*.

ORDER CLII. ANONACEÆ.—ANONADS.

Anonæ, Juss. Gen. 283. (1789).—*Anonaceæ*, Rich. Anal. Fr. 17. (1808); Dunal, Monogr. (1817); DC. Syst. 1. 462. (1818); Prodr. 1. 83. (1824); Bl. Fl. Jav.; Alph. De Cand. in Mem. Phys. Genev. (1832); Wight Illustr. 1. 17; Endl. Gen. clixiv.; Meisner, Gen. p. 4.—*Glyptospermæ*, Vent. Tab. 3. 75. (1799.)

DIAGNOSIS.—*Ranal Exogens, with distinct carpels, no stipules, a valvate corolla, and ruminated albumen.*

Trees or shrubs. Leaves alternate, simple, almost always entire, without stipules. Flowers usually green or brown, axillary, solitary, or 2 or 3 together, shorter than the



Fig. CCXCII.

leaves; the peduncles of abortive flowers sometimes indurated, enlarged, and hooked. Sepals 3, persistent, usually partially cohering. Petals 6, hypogynous, in two rows, coriaceous, with a valvate aestivation, sometimes united into a monopetalous corolla, very rarely absent. Stamens indefinite, covering a large hypogynous torus, packed closely together, very rarely definite; filaments short, more or less angular; anthers adnate, turned outwards, with an enlarged 4-cornered connective, which is sometimes nectariferous. Carpels usually numerous, closely packed, separate or cohering, occasionally definite; styles short; stigmas simple; ovules solitary, or a small number, erect or ascending, anatropal. Fruit consisting of a number of carpels, which are either succulent or dry, sessile or stalked, 1- or many-seeded, attached to the suture in one or two rows, sometimes furnished with an aril; testa brittle; embryo minute, in the base of hard, fleshy, ruminated albumen.



Fig. CCXCIII.

The flowers are pentamerous in *Hentschelia*.

Fig. CCXCII.—*Anona furfuracea*. 1. an expanded flower; 2. a vertical section of ♂ and ♀ apparatus, which latter occupies the centre; 3. a vertical section of a carpel; 4. ditto of a ripe seed, showing the ruminated albumen and embryo.

Fig. CCXCIII.—Section of ripe fruit of *Anona squamosa*.—*Martius*.

The corolla of these plants is so frequently monopetalous that it affords one of the most striking instances that can be found of the worthlessness of the monopetalous structure as a fundamental mark of distinction. And none of the affinities point in the direction of monopetalous Orders. No doubt can be entertained of the close resemblance of this Order to Magnoliads, from which, however, it differs in the want of stipules, in its valvate corolla, and in the form of the anthers: agreeing in the ternary division of the parts of fructification, and the indefinite stamens and ovaries. An affinity has been pointed out with Menispermads; but it appears to be weak. The great feature of the Order is its ruminated albumen, to which there is no exception, and very few parallels. The parietal insertion of ovules, ascribed to the Order by De Candolle, is not universal. The ovules are erect in *Anona*, *Guatteria*, and *Anaxagorea*. A remarkable plant is described by Brown, in the Appendix to *Flinders's Voyage*, under the name of *Eupomatia laurina*, in which the stamens are manifestly perigynous, and the tube of the calyx (!) coherent with the ovaries. This plant affords one of the most remarkable exceptions we know of to habitual structure. It is no doubt analogous to *Eschscholtzia* among Poppyworts and *Rosa* in Roseworts. I have remarked in *Anona laurifolia* that the pollen is arranged in two distinct rows in each cell of the anther, and that when that organ bursts, the grains of pollen fall out, cohering in a single row, so as to have the appearance of a necklace. Anonads are connected with Berberids through *Bocagea*. I also think there can be no doubt of the alliance of the Order to Nutmegs; as has been indicated by Blume and fully admitted by Endlicher.

The tropics of the Old and New World are the natural land of these plants: thence they spread, in a few instances, to the northward and the southward. Some of them, useful to man, such as the Custard-apple, the Cherimoyer, and others, have been carried by colonists far from their native stations.

Their general character is, to have a powerful aromatic taste and smell in all the parts. The bark of *Uvaria tripetaloides* yields, being tapped, a viscid matter, which hardens in the form of a fragrant gum. The flowers of many species, especially of *Artabotrys odoratissima* and *Guatteria virgata*, are exceedingly sweet. The dry fruits of others are very aromatic; those of *Xylopia aromatica* are the Piper æthiopicum of the shops, and are commonly used as pepper by the African negroes. The leaves of *Artabotrys* are regarded as invaluable in Java against cholera. The *Polyalthias* of Java are employed in Java with advantage as aromatics of great energy, especially their roots. The leaves of *Anona squamosa* have a heavy disagreeable odour, and the seeds contain a highly acrid principle fatal to insects, on which account the natives of India use them powdered and mixed with the flour of Gram, or *Cicer arietinum*, for occasionally washing their hair. *Xylopia sericea*, a large tree found in forests near Rio Janeiro, where it is called *Pindaíba*, bears a highly aromatic fruit, with the flavour of pepper, for which it may be advantageously substituted. Its bark is tough, and readily separated into fibres, from which excellent cordage is manufactured. Blume remarks that the Javanese species require, because of their powerful properties, to be employed with caution; for if they are administered for too great a length of time, or in too large doses, they produce vertigo, hæmorrhage, or even abortion, in pregnant women. The carpels are chewed after dinner in Java for dispelling flatulence. *Xylopia glabra*, we are told, is called Bitter-wood in the West Indies, because of the presence of well-marked bitterness in every part. The wood, bark, and berries are said to taste like Orange seeds. The wild pigeons that feed on the berries are said to acquire their flavour, and sugar hogsheads made of the wood are reported to render their contents uncatable, even by cockroaches. Of some species the fruit is succulent and agreeable, containing a sugary mucilage, which predominates over the slight aromatic flavour that it possesses. Of this kind are the delicious Custard-apples of the East and West Indies, the Cherimoyer of Peru, and others. In *Uvaria triloba* an acid is present of a very active nature, according to Dulaunel; but this is not certain. Its leaves are used to bring languid abscesses to a head; its seeds are said to be emetic. The *Anona sylvatica*, called *Araticum do mato*, in Brazil, has a light white wood, very fit for the use of turners, and for the same purposes as the Lime-tree of Europe. Its fruit is described as good for the dessert. The wood of the root of *A. palustris* is employed in Brazil for corks. Martins has remarked that many species of *Xylopia* strike root with great facility, even though the smallest pieces are committed to the earth. The strong elastic wood called *Lancewood* by the coachmakers, the *Yari yari* of Guiana, is stated by Schomburgk to be obtained from *Duguetia quitarensis*. Martins found the specific gravity of the wood of a species of *Guatteria*, called *Pindaíba preta* to be 0.839 after being kept for 20 years in a dry room. See that author's *Flora Brasiliensis* for many interesting particulars concerning the plants of this Order. The Indians on the Orinoco, particularly in Atures and Maypura, have an excellent febrifuge, called *Fruta de Burro*, which is the fruit of *Uvaria febrifuga*, or *Xylopia grandiflora*,

according to Martius. The Calabash Nutmeg, *Monodora Myristica*, is a rival of the true Nutmeg for aromatic qualities; it is not, however, quite certain that it belongs to this place.

GENERA.

I. <i>Bocagææ</i> .— <i>Endl.</i>	<i>Xylopia</i> , Linn.	<i>Asimina</i> , Adans.	<i>Gutteria</i> , Ruiz et Pav.
<i>Bocagen</i> , <i>St. Hil.</i>	<i>Bulfiarda</i> , Neck.	<i>Orchidocarpum</i> , L. C.	<i>Cananga</i> , Aubl.
<i>Poppowia</i> , <i>Endl.</i>	<i>Xylopicron</i> , P. Br.	Rich.	<i>Aberemoa</i> , Aubl.
<i>Oropheia</i> , <i>Blum.</i>	<i>Embira</i> , Marcgr.	<i>Porcelia</i> , Ruiz et Pav.	<i>Oxandra</i> , A. Rich.
<i>Milisia</i> , <i>Alph. DC.</i>	<i>Pindaiba</i> , Piso.	<i>Melodorum</i> , Lour.	<i>Duguetia</i> , <i>St. Hil.</i>
<i>Saccopetalum</i> , <i>Benn.</i>	<i>Ibira</i> , Marcgr.	<i>Trigynia</i> , Schlecht.	<i>Cardiopetalum</i> , Schl.
	<i>Habzelia</i> , Alph. DC.	<i>Desmos</i> , Lour.	<i>Anona</i> , Linn.
	<i>Waria</i> , Aubl.	<i>Marenaria</i> , Noronh.	<i>Guanabanus</i> , Plum.
II. <i>Xylopeææ</i> .— <i>Endl.</i>	<i>Cœclocline</i> , <i>Alph. DC.</i>	<i>Hexalobus</i> , <i>Alph. DC.</i>	§ <i>Atta</i> , Martius.
<i>Polyalthia</i> , <i>Blum.</i>	<i>Pantonia</i> , <i>Wight.</i>		<i>Rollinia</i> , <i>St. Hil.</i>
<i>Oxymitra</i> , <i>Blum.</i>	<i>Uvaria</i> , Linn.	III. <i>Anonææ</i> .— <i>Endl.</i>	<i>Monodora</i> , <i>Dun.</i>
<i>Kentia</i> , <i>Blum.</i>	<i>Unona</i> , Linn. f.	<i>Anaxagorea</i> , <i>St. Hil.</i>	<i>Lobocarpus</i> , <i>Wight et</i>
<i>Goniothalamus</i> , <i>Blum.</i>	<i>Krockeria</i> , Neck.	<i>Artabotrys</i> , R. Br.	<i>Art.</i>
	<i>Mitrephora</i> , <i>Blum.</i>		

NUMBERS. GEN. 20. Sp. 300.

POSITION.—Magnoliacææ.—*Myristicacææ.*
 ANONACEÆ.—
Berberidacææ.

ORDER CLIII. DILLENIACEÆ.—DILLENIADS.

Dilleniaceæ, DC. Syst. 1. 395. (1818); Prodr. 1 67; A. St. H. Fl. Bras. 1 23; Endl. Gen. clxxvii.; Meism. Gen. 2; Wight Illustr. 1. 6.

DIAGNOSIS.—*Ranal Exogens, with distinct carpels, no stipules, an imbricated corolla, homogeneous albumen, and arillate seeds.*

Trees, shrubs, or under-shrubs, rarely herbaceous plants. Leaves usually alternate, almost always without stipules, very seldom opposite, most commonly coriaceous, and with strong veins running straight from the midrib to the margin, entire or toothed, often separating from the base of the petiole, which remains adhering to the stem. Flowers solitary, in terminal racemes, or in panicles, often yellow. Sepals 5, persistent, 2 exterior, 3 interior. Petals 5, imbricated, deciduous, hypogynous in a single row. Stamens 00, hypogynous, arising from a torus, either distinct or polyadelphous, and either placed regularly around the pistil or on one side of it; filaments dilated either at the base or apex; anthers adnate, 2-celled, usually bursting longitudinally, always turned inwards. Ovaries definite, more or less distinct, with a terminal style and simple stigma; ovules ascending, anatropal, solitary, or several. Fruit consisting either of from 2 to 5 distinct carpels, or of a similar number cohering together, (now and then one carpel only is present;) the carpels either baccate or 2-valved, pointed by the style. Seeds fixed in a double row to the inner edge of the carpels, either several or only 2, occasionally solitary by abortion; surrounded by a pulpy aril. Testa hard. Embryo minute, lying in the base of solid fleshy albumen.

These are nearly akin to Magnoliads, from which they are distinguished by their want of stipules and the quinary arrangement of the parts of fructification; also to Crowfoots, from which their persistent calyx, stamens, and whole habit, in general divide them. They are universally characterised by the presence of an aril round their seeds. The most genuine form of the Order is known by the veins of the leaves running straight from the midrib to the margin.

Some of the genera are remarkable for having the stamens developed only half way round the pistil, so that the central part of the flower has a one-sided appearance. In this respect they tend towards Pittosporads, where Cheiranthera has also declinate stamens. To Anonads they also approach in a variety of ways, especially in the genus Acrotrema, whose albumen is irregularly indented upon the surface, as if it were approaching to a ruminated state.

The genus Saurauja is usually stationed among Theads (Pernstromiaceæ), from which its minute embryo, indefinite seeds, and very copious albumen remove it. From Dilleniads it differs in the want of an aril, and in little else that can be regarded as essential; for its styles, which are divided to the very base, afford conclusive evidence as to its having a tendency to disunite its carpels.

If it were not for that circumstance, and its indefinite stamens, it might be placed among Heathworts, of which it has the embryo, the minute indefinite seeds, a tendency to form a monopetalous corolla, and anthers opening by pores. I can scarcely doubt that it forms a complete transition from the Ranal to the Erical Alliance.

The larger part of this Order is found in Australasia, India, and equinoctial America; a comparatively small number is known from equinoctial Africa.

The plants of the Order are generally astringent. The Brazilians make use of a decoction of Davilla rugosa and Tetracera Breyniana and oblongata, in swellings of the



Fig. CCXCIV.

Fig. CCXCIV.—Candollea tetrandra. 1. stamens and pistil; 2. pistil; 3. section of a half-ripe carpel, showing the arillate seeds.

legs and other parts, very common maladies in hot and humid parts of South America. Davilla elliptica is also astringent, and furnishes the vulnerary called Sambaibinha in Brazil. In Curatella Sambaiba the same astringent principle recommends its decoction as an excellent wash for wounds; this plant is also used by tanners in Brazil. The young calyxes of Dillenia scabrella and speciosa have a pleasantly acid taste, and are used in curries by the inhabitants of Chittagong and Bengal. Tetracera Tigarea (Liane rouge) is diaphoretic and diuretic, and has the reputation of being an antisyphilitic. The acid juice of Dillenia speciosa fruit is, according to Rheede, when added to syrup, considered useful as a cough mixture. The ripe fruits are said to be laxative, and even to produce diarrhœa. Almost all Delimeæ have the foliage covered with asperities, which are sometimes so hard that the leaves are even used for polishing.

The Indian species are in almost all cases plants of great beauty. Dr. Wight speaks of them as remarkable, not less for the grandeur of their foliage than the magnificence of their flowers. He adds, that several species of Dillenia are large trees, and afford hard, durable, valuable timber.

GENERA.

I. DILLENEÆ. — Connective of anthers equal, or narrow at the point. Asiatic and Australian.	<i>Adrastea</i> , DC.	II. DELIMEÆ. — Connective of anthers dilated at the point. Chiefly American.	<i>Hemistemma</i> , Commers.	<i>Empedoclea</i> , St. Hil.
	<i>Hibbertia</i> , Andr.		<i>Aglaja</i> , Norouh.	<i>Davilla</i> , Velloz.
	<i>Burtonia</i> , Salisb.		<i>Acrotrema</i> , Jack.	<i>Hieronia</i> , Flor. Flum.
	<i>Cistomorpha</i> , Caley.		<i>Tetracarpæa</i> , Hook.	<i>Delima</i> , Linn.
	<i>Saurauja</i> , W.			<i>Tetracera</i> , Linn.
	<i>Palava</i> , R. & P.			<i>Tigarea</i> , Anbl.
	<i>Apatelia</i> , DC.			<i>Rhinium</i> , Schreb.
	<i>Scapha</i> , Nor.			<i>Euryandra</i> , Forst.
	<i>Vanalphimia</i> , Lesch.			<i>Assa</i> , Houtt.
	<i>Maramia</i> , Reinw.		<i>Curatella</i> , Linn.	<i>Wahlbomia</i> , Thunb.
	<i>Reinwardtia</i> , Nees.		<i>Pinzona</i> , Mart. et Zucc.	<i>Röhlvingia</i> , Dennst.
	<i>Blumia</i> , Spreng.		<i>Dollocarpus</i> , Roland.	<i>Trachytella</i> , DC.
	<i>Trochostigma</i> , Sieb.		<i>Calinea</i> , Anbl.	<i>Actea</i> , Lour.
	<i>Pleurandra</i> , Labill.		<i>Soramia</i> , Aubl.	<i>Calligonum</i> , Lour.
<i>Candollea</i> , Labill.	<i>Mappia</i> , Schreb.	? <i>Recchia</i> , Moc. et Sess.		
<i>Pachynema</i> , R. Br.	<i>Othlis</i> , Schott.			

NUMBERS. GEN. 26. Sp. 200.

Pittosporacea.

POSITION.—Ranunculaceæ.—DILLENACEÆ.—Magnoliaceæ.

Ericacea.

ORDER CLIV. RANUNCULACEÆ.—CROWFOOTS.

Ranunculi, Juss. Gen. (1789).—Ranunculaceæ, DC. Syst. 1. 127. (1818); Prodr. 1. 2; Bartling Ord. 253. Endl. Gen. clxxviii.; Meisner Gen. p. 1; Wight Illustr. 1. p. 1.—Podophyllaceæ, § Podophylleæ, DC. Syst. 2. 32. (1821); Prodr. 1. 111.—Podophylleæ, Mart. Conspect. No. 171. (1835).

DIAGNOSIS.—Ranul Exogens, with distinct carpels, no separate stipules, an imbricated corolla, homogeneous albumen, and seeds without an aril.

Herbs, or rarely shrubs. Leaves alternate or opposite, generally much divided, with the petiole dilated and forming a sheath half clasping the stem. Stipule-like processes occasionally present. Hairs, if any, simple. Inflorescence variable. Flowers usually conspicuous; if apetalous, then with the sepals large and gaily coloured. Sepals 3-6, hypogynous, deciduous, generally imbricate in æstivation, occasionally valvate or duplicate. Petals 3-15, hypogynous, in one or more rows, distinct, sometimes deformed, in some cases missing. Stamens ∞, (very rarely definite,) hypogynous; anthers adnate. Carpels numerous, 1-celled or united into a single many-celled pistil; ovary one or more-seeded, the ovules sutural; styles simple; ovules anatropal. Fruit either consisting of dry akenia; or bæcate with one or more seeds; or follicular with one or two valves. Seeds albuminous; when solitary, either erect or pendulous. Embryo minute. Albumen horny.



Fig. CCXCV. 1. Ranunculus bulbosus; 2. pistil of Ranunculus reptans; 3. a perpendicular section of one of its carpels; 4. a similar section of its ripe achenium.

Under the name of Crow-foots is collected a very considerable number of plants, differing from each other materially in the nature of their calyx and corolla, but very similar otherwise. Some of them have perfectly distinct sepals and petals, in others these parts seem completely blended together, as in *Caltha* and *Anemone*; in others it is manifest that the former only are present, as in *Clematis*. These too, which have their parts quite distinct, vary greatly from the real Crowfoots in their nature, the calyx or corolla being extended into spurs, and assuming a very irregular condition in various ways, as in the *Clematis* and *Larkspurs*. It is, however, very interesting to find the spurred irregular-flowered plants of this Order assimilated with the regular spurless species by means of *Ranunculus acris*, an Antarctic species, the petals of which have a socket in their middle, evidently anticipating the spurs of *Aquilegia*, &c.

The Order has a strong affinity with some which are widely apart from each other. Its most immediate resemblance is with *Dilleniads*, *Magnoliads*, and their

Fig. CCXCV.—1. *Ranunculus bulbosus*; 2. pistil of *Ranunculus reptans*; 3. a perpendicular section of one of its carpels; 4. a similar section of its ripe achenium.

allies, to which it approaches in the position, number, and structure of its parts of fructification generally, differing however in abundance of particulars; as from Dilleniads in the want of an aril, a deciduous calyx, and whole habit; from Magnoliads in the want of true stipules; from Poppies and Water-lilies in the distinct, not concrete, carpels, watery, not milky fluids, and acrid, not narcotic properties. To Berberids it approaches so very closely that Podophyllum is by many authors placed in that Order; from which, however, it differs essentially in its stamens not bursting by recurved valves; it, however, evidently forms a connecting link between the two Orders. More distant analogy may be traced with Roseworts, with which Crowfoots strikingly agree in their numerous carpels, floral divisions, and indefinite stamens; but differ in their stamens being hypogynous instead of perigynous, in the presence of large albumen surrounding a minute embryo, want of true stipules, and acrid properties. With Umbellifers they accord in the last particular, and also in their sheathing leaves, habit, and abundant albumen, with a minute embryo; but those plants differ in their calyx being concrete to the ovary, and in their stamens being invariably definite.



Fig. CCXCVI.



Fig. CCXCVII.



Fig. CCXCVIII.

Another analogy has been indicated by Botanists between this Order and Water-plantains, which agree in their numerous carpels, habit, and sometimes in a ternary structure of their flowers; but Water-plantains are monocotyledonous. An instance is described of the polypetalous regular corolla of *Clematis viticella* being changed into a monopetalous irregular one, like that of Labiatae.—*Nor. Act. Acad. N. C.* 14, p. 642, t. 37. The genus *Paeonia* is remarkable for producing in one of its species, the Moutan, the largest form of disk known in the vegetable kingdom.

The largest proportion of this Order is found in Europe, which contains more than 1-5th of the whole; North America possesses about 1-7th, India 1-25th, South America 1-17th; very few are found in Africa, except upon the shores of the Mediterranean: eighteen species have, according to De

Fig. CCXCVI.—*Aquilegia vulgaris*.Fig. CCXCVII.—*Delphinium tricorne*. 1, petals and stamens; 2, carpels; 3, a branch of ripe fruit.Fig. CCXCVIII.—The ovary of *Paeonia Moutan*, surrounded by its broken disk.

Candolle, been discovered in New Holland. They characterise a cold damp climate, and are, when met with in the tropics, found inhabiting the sides and summits of mountains : in the lowlands of hot countries they are almost unknown.

Acridity, causticity, and poison, are the general characters of this suspicious Order, which, however, contains species in which those qualities are so little developed as to be innocuous. The caustic principle is, according to Krapfen, as cited by De Candolle, of a very singular nature ; it is so volatile that, in most cases, simple drying, infusion in water, or boiling, are sufficient to dissipate it : it is neither acid nor alkaline : it is increased by acids, sugar, honey, wine, spirit, &c. and is only effectually destroyed by water and vegetable acids. The leaves of *Kuowltonia vesicatoria* are used as vesicatories in Southern Africa. *Ranunculus glacialis* is a powerful sudorific : *Aconitum Napellus* and *Cammarum* are diuretic. The *Hepatica*, *Actæa racemosa*, and *Delphinium consolida*, are regarded as simple astringents. The roots and leaves of several *Hellebores* are drastic purgatives ; of the perennial *Adonises*, according to Pallas, emmenagogues ; and of several *Acuites*, especially *Napellus* and *ferox*, acrid in a high degree. The black Hellebore of the ancients was *H. officinalis* rather than *H. niger*, (see *Bot. Reg.* 1842, t. 34 & 58). The root of an Aconite of India, one of the substances called *Bikh*, or *Bishi*, is a most virulent poison. According to Hamilton, the *Bishma*, or *Bikhma*, is a strong bitter, very powerful in the cure of fevers : the *Bishi*, *Bikh*, or *Kodoya Bikh*, has a root possessing poisonous properties of the most dreadful kind, whether taken into the stomach, or applied to wounds : the *Nir Bishi*, or *Nirbikhi*, has no deleterious properties, but is used in medicine. For some important information on this *Bikh*, *Vish*, *Visha*, or *Ativisha*, which Wallich considers his *Aconitum ferox*, see *Plant. As. Rar.* vol. i. p. 33, tab. 41, and especially *Royle's Illustrations*, 40. *Ranunculus flammula* and *sceleratus* are powerful epispastics, and are used as such in the Hebrides, producing a blister in about an hour and a half. Their action, is, however, too violent, and the blisters are difficult to heal, being apt to pass into irritable ulcers. Beggars use them for the purpose of forming artificial ulcers, and also the leaves of *Clematis recta* and *flammula*. The root of *Ranunculus Thora* is reported to be extremely acrid and poisonous, its juice having been formerly used by the Swiss hunters of wild beasts to envenom their javelins, whose wound by that means became speedily fatal and incurable. The root of *Hydrastis canadensis* has a strong and somewhat narcotic smell, and is exceedingly bitter ; it is used in North America as a tonic, under the name of Yellow-root. The root of *Coptis trifolia*, or Gold-thread, is a pure and powerful bitter, devoid of anything like astringency ; it is a popular remedy in the United States for aphthous affections of the mouth in children. The wood and bark of *Xanthoxiliza apiifolia* are a very pure tonic bitter. The shrub contains both a gum and resin, each of which is intensely bitter. The seeds of *Nigella sativa* were formerly employed instead of pepper ; those of *Delphinium Staphisagria* are vermifugal, caustic, drastic, and emetic ; those of *Aquilegia* simply tonic. It is supposed that a pungent seed used by the Afghans under the name of *Siah dana*, for flavouring curries, is the Black Cumin of Scripture, and a species of *Nigella*.—*Royle*. Pæony seeds are emetic and cathartic ; the root has the credit of being antispasmodic. The black berries of the Banberry, *Actæa spicata*, are poisonous, the roots antispasmodic, expectorant, astringent ; they are reported to have afforded very marked relief in cases of catarrh. Similar qualities are assigned to *Botrophis actæoides* (*Actæa racemosa*, *L.*), whose nauseous, astringent bitter roots are regarded, in the United States, as a remedy for the bite of the rattlesnake. For further details, see *Endlicher's Encheiridion*.

The fruit of the May-apple (*Podophyllum peltatum*) is very acid, whence one of its names is Wild Lemon, and it may be eaten ; but if other parts are used it is a sure and active cathartic. The rhizome is administered in fine powder. The leaves are poisonous, and the whole plant narcotic.

Dr. Wight remarks that, notwithstanding their ancient reputation, the whole Order, with a few exceptions, has fallen into disuse ; Hellebore being almost the only evacuant retained, and that, from the uncertainty of its operation, is seldom used.—*Illustr.* 1. 3. Dr. Fleming has indeed shown that of all the European Aconites, one only, *A. Napellus*, is of any value ; the remainder, including *A. Cammarum*, being feeble and unimportant in their action. This *A. Cammarum* is what the London College of Physicians directs to be employed exclusively, under the name of *A. paniculatum* !

GENERA.

<p>I. CLEMATEÆ. — Calyx valvate, or induplicate,</p> <p><i>Clematis</i>, Linn.</p> <p><i>Vitellia</i>, Dillen.</p> <p><i>Styburis</i>, Raf.</p> <p><i>Trigloa</i>, Noronh.</p>	<p><i>Clematopsis</i>, Boj.</p> <p><i>Florna</i>, Pers.</p> <p><i>Atragene</i>, DC.</p> <p><i>Naravella</i>, DC.</p>	<p>anastivation imbricated.</p> <p>Achenia one-seeded, tailed. Seed inverted.</p> <p>Cyrtorhynch. Null.</p> <p><i>Thalictrum</i>, Tournef.</p> <p><i>Triptarium</i>, DC.</p>	<p><i>Physocarpum</i>, DC.</p> <p><i>Physocarpidium</i>, Rehb.</p> <p><i>Synedemon</i>, Hoffmanns.</p> <p><i>Anemomanthe</i>, Spach.</p> <p><i>Anemone</i>, Hall.</p> <p><i>Pulsatilla</i>, Tournef.</p>
<p>II. ANEMONEÆ. — Calyx usually coloured, in</p>			

Caupanaria, Endl.
Prœnanthus, Ehrh.
Anemanthus, Endl.
Pulsatilloides, DC.
Asteranemia, Reichb.
Anemonanthea, DC.
Oriba, Adans.
Anemonospermos, DC.
Homalocarpus, DC.
Hepatica, Dill.
Knowltonia, Salisb.
Ananemia, Vent.
 ? *Thebesia*, Neck.
Hamadryas, Commers.
Hydrastis, Linn.
Wamercia, Mill.
Adonis, Dill.
Sarpedocia, Adans.
Consiligo, DC.
Adonauthe, Spach.
Callianthemum, C.A.M.
Myosurus, Dill.
Aphanostemma, St. Hil.

III. RANUNCULÆÆ. —
 Calyx in æstivation,
 imbricated. Achenia

without tails; seed
 erect.

Casalea, St. Hil.
Ranunculus, L.
Batrachium, DC.
Ranunculastrum, DC.
Krapfia, DC.
Cypriaulthe, Spach.
Thora, DC.
Heccatonia, Lour.
Philomotis, Reichenb.
Echinella, DC.
Ceratocephalus, Mönch.
Ficaria, Dillen.
Scotarium, Adans.
Oxygraphis, Bung.

IV. HELLEBOREÆ.—Calyx,
 in æstivation, imbricated.
 Fruit many-seeded
 follicles.

Caltha, Linn.
Nirbisia, G. Don.
Psychrophila, DC.
Populago, DC.
Thaeta, Spach.

Trollius, Linn.
Geisnia, Raf.
Hegenone, Buugo.
Eranthis, Salisb.
Koellea, Birt.
Robertia, Merat.
Helleborus, Mönch.
Helleboroides, Adans.
Helleborus, Adans.
Helleboraster, Mönch.
Isopyrum, Linn.
Olfa, Adans.
Thalictrella, A. Rich.
Leptopyrum, Reichenb.
Enemion, Raf.
Coptis, Salisb.
Chrysa, Raf.
Chrysocoptis, Nutt.
Pterophyllum, Nutt.
Garidella, Tournef.
Nigella, Tournef.
Erobato, DC.
Aquilegia, Tournef.
Delphinium, Tournef.
Consolida, DC.
Aconitella, Spach.
Delphinellum, DC.

Phledinium, Spach.
Delphiniastrum, DC.
Staphisagria, DC.
Aconitum, Tournef.
Anthora, DC.
Lycotonium, DC.
Cammarum, DC.
Napellus, DC.
Pœonia, L.
 § *Onopria*, Lindl.

V. АСТЕÆÆ. — Calyx
 coloured, imbricated.
 Fruit succulent, indehiscent,
 one or many-seeded.

Trautvetteria, Fisch. et M.
Actæa, Linn.
Christophoriana, Tourn.
Botrophis, Raf.
Macrotys, Raf.
Pityroperma, Sieb.
Actinospora, Turcz.
Cimicifuga, Linn.
Xanthorrhiza, Marsh.
Zanthorrhiza, Herit.
Podophyllum, L.

NUMBERS. GEN. 41. Sp. 1000.

Apiaceæ.

Berberidaceæ.

POSITION.—*Papaveraceæ.*—*RANUNCULACEÆ.*—*Dilleniaceæ.*

Alismaceæ.



Fig. CCXCVIII. bis.

CEPHALOTÆÆ, (R. Brown, *Phil. Mag.* (1832).—Cephalotaceæ, *Lindl. Key*, No. 5. (1835); *Ed. pr.* No. 5).
 A stemless herb with exstipulate leaves, among which are mingled operculate pitchers. Scape simple,
 bearing a compound terminal spike. Flowers small. Calyx coloured, six-parted, with a valvate
 æstivation. Corolla 0. Stamens 12, those opposite the sepals shortest, inserted into the edge of a deep
 glandular perigynous disk; anthers with a thick granular connective. Carpels 6, distinct, one-seeded;
 ovule erect. Akenia membranous, opening by the ventral suture, surrounded by the persistent calyx
 and stamens. Seed solitary (very seldom two) erect. Embryo minute, in the base of the axis of a fleshy
 friable somewhat oily albumen.—The single species on which this imaginary Order has been founded is
 a native of the marshes of King George's Sound in New Holland. It is allied, according to Labillardiere,
 to Roseworts, and according to Jussieu, to Houseleeks; according to Brown, the Order should be
 placed between Houseleeks and Francoads. Its very copious albumen and apocarpous fruit seem,
 however, to fix it far from the former of those Orders, and to place it unquestionably in the Ranal
 Alliance, from which it forms a transition to Francoads in the Berberal Alliance, and through those
 plants to Sarraeniads, in which the leaves are in like manner transformed into pitchers. The difficulty
 that Botanists have found in deciding where to place it, has arisen out of the apparently perigynous
 station of its stamens, which are represented as growing from the outer edge of a deep glandular perigynous
 disk. But if, as seems probable, that disk is a mere expansion of the footstalk, analogous to what
 occurs in *Eschscholtzia*, then all difficulty about the station is removed, and the genus will fall into
 the ranks of the Crowfoots; a probability somewhat increased by its valvate æstivation, which is like
 that of *Clematis*. GENUS. *Cephalotus*, R. Br. Gen. 1. Sp. 1.

Fig. CCXCVIII. bis. — *Ceratocephalus orthoceras*. 1. flower; 2. ripe fruit; 3. ovaries of *Ranunculus Krapfia*; 4. section of carpel and seed of the same.

ORDER CLV. SARRACENIACEÆ.—SARRACENIADS.

Sarraceniæ, Turpin in *Dict. des Sc. c. ic.* (?) ; *De la Pylaie in Ann. Linn. Par. 6.* 388. t. 13. (1827) ; *Hooker Fl. Boreal. Am. p.* 33. (1829) ; *Endl. Gen. p.* 901 ; *Meisner, p.* 334.

DIAGNOSIS.—*Ranal Exogens, with consolidated carpels, a permanent calyx, and axile placentæ.*

Herbaceous perennial plants, living in bogs. Roots fibrous. Leaves radical, with a hollow urn-shaped petiole, at whose apex is articulated the lamina, which fits on like a lid. Scapes each having 1 or more large flowers, of a more or less herbaceous colour, or white. Calyx 4-6-leaved, broken-whorled, much imbricated, without a corolla ; or consisting of 5 persistent sepals, often having a 3-leaved involucre on the outside, and 5 hypogynous, unguiculate, concave petals. Stamens 00, hypogynous ; anthers oblong, adnate, 2-celled, bursting internally and longitudinally. Ovary free, 3-5-celled, with polyspermous placentæ in the axis ; style simple, truncate, or expanded into a large peltate plate with 5 stigmatic angles ; ovules anatropal. Capsule with 2-5 cells. Seeds very numerous, minute, slightly warted or winged, covering large placentæ, which project from the axis into the cavity of the cells ; albumen abundant ; embryo cylindrical, lying near the base of the seed, with the radicle turned to the hilum.

The genus *Sarracenia*, inhabiting the bogs of North America, bears the strange name of Side-saddle Flower, in allusion to the singular tubular leaves of itself and its ally. So long as the former alone was known, no clear idea could be formed of its affinity, and a large peltate plate which terminates the style and leaves a stigma beneath each of its 5 angles, was thought to be essential to the Order which it represents ; but the discovery in Guiana, by Sir R. Schomburgk, of a very curious genus in which the stigma is reduced to a truncated point, shows that opinion to be unfounded. The same fact also proves that the floral envelopes are subject to great diversity of condition, consisting, in *Sarracenia* itself, of 5 sepals and 5 distinct petals, but reduced in *Heliamphora* to 4, 5, or perhaps 6, imbricated segments, standing in the place of both calyx and corolla. This deviation from what may be termed the typical structure of the Order is quite analogous to what occurs among Crowfoots, where *Ranunculus* may be compared to *Sarracenia* and *Caltha* to *Heliamphora*. This leads to the supposition that it is in the neighbourhood of the Ranal Alliance that *Sarraceniads* are to be placed ; and in fact *Poppyworts*, which are Ranals with completely consolidated carpels, must be taken as the nearest connection of these singular plants.

The pitchers appear to be secreting organs, for they are lined by hairs of a very singular nature, as is mentioned in Mr. Bentham's Memoir on *Heliamphora*, in *Linn. Trans.* xviii. p. 429 ; but their physiological action remains to be ascertained.

The species are confined to the bogs of North America, with the exception of *Heliamphora nutans*, found in Guayana.

Their uses are unknown.

GENERA.

Sarracenia, Linn. | *Coltophyllum*, Moris. | *Bucanaphyllum*, Pluk. | *Heliamphora*, Benth.

NUMBERS. GEN. 2. Sp. 7.

Dioscoreæ.

POSITION.—*Papaveracæ.*—SARRACENIACEÆ.—*Ranunculacæ.*



Fig. CCXCIX.

Fig. CCXCIX.—*Heliamphora nutans*. 1. the stamens and pistil ; 2. the latter separate ; 3. a cross section of the ovary ; 4. a perpendicular section of a seed.

ORDER CLVI. PAPAVERACEÆ.—POPPYWORDS.

Papaveraceæ, *Juss. Gen.* 236. (1789) *in part*; *DC. Syst.* 2. 67. (1818); *Prodr.* 1. 117. (1824); *Bernhardi in Linnæa.* 8. 401. (1833); *Endl. Gen.* clxxx.; *Meisner, p.* 7; *Wight Illustr.* 1. 27.

DIAGNOSIS.—*Ranal Exogens, with dimercous or trimercous flowers, consolidated carpels, deciduous calyx, and usually parietal placentæ.*

Herbaceous plants or shrubs, often with a milky juice. Leaves alternate, simple or divided, without stipules. Peduncles long, 1-flowered; flowers never blue. Sepals 2 (or 3), deciduous. Petals hypogynous, either 4 (or 6), or some multiple of that number, usually crumpled before expansion, occasionally 0. Stamens hypogynous, 00; anthers 2-celled, innate. Ovary 1-celled, with parietal placentæ; which in *Romneya* adhere in the axis; style short, or none; ovules 00, anatropal. Fruit 1-celled, either pod-shaped, with parietal or sutural placentæ, or capsular, with several placentæ. Seeds numerous; albumen between fleshy and oily; embryo minute, straight, at the base of the albumen, with plano-convex cotyledons.

The common Redweed of the corn fields offers a good representation of the general character of the plants of this Order, whose appearance is varied principally by the flowers being white or yellow, and occasionally by their being collected into dense panicles, when they are greatly reduced in size, and even in the number of their parts, *Bocconia* having no petals. In this state they approach the Crowfoots through *Thalictrum*. In general also their carpels are completely consolidated, but in the curious genus *Platystemon*, they are as distinct as in a Crowfoot, and in fact that genus would be referable to *Ranunculacæe* if it were not for its 2 sepals, no such number being known in that Order.

The siliquose-fruited genera, such as *Glaucium* and *Eschscholtzia*, have been supposed to indicate the near affinity of this Order to Crucifers; but the totally different structure of their seeds is such as to neutralise what little affinity may be indicated by the form of the fruit. Through *Papaver* the Order approaches Water Lilies. To *Rock-roses* an unexpected relationship has been established by the discovery of *Dendromecon*. The greatest affinity is, however, with *Crowfoots*, from which it is sometimes extremely difficult to know this Order, without ascertaining that the juice is milky and narcotic. *Platystemon* is the connecting link between the two Orders. *Bernhardi* indeed denies that true Poppywords are universally lactescent plants, and he quotes *Hunnemannia*, *Eschscholtzia*, and *Glaucium*, as instances to the contrary; but in reality



Fig. CCC.



Fig. CCC1.

Fig. CCC.—*Romeria refracta*. 1. its stamens and pistil; 2. a cross section of the ovary of *Eschscholtzia californica*; 3, 4. seeds of *Papaver orientale*.

Fig. CCC1.—Flower and fruit of *Chelidonium majus*.

they are all furnished with milk, as every gardener well knows. The anomalies in the Order are of little importance, with the exception of *Eschscholtzia*, which has its stamens arising from the throat of a bell-shaped excavation of the flower-stalk, analogous to what occurs in the Rose, and which gives the stamens the appearance of being perigynous instead of hypogynous. A comparison of the structure of Poppyworts and Crucifers, by Mirbel, is to be found in the *Ann. des Sc.* 6. 266. A plant called *Romneya*, found in California by Coulter, offers a very remarkable structure. It approaches in many respects very near *Argemone*; but its placentæ meet in the axis and divide the cavity of the ovary into many distinct cells, in which respects it agrees with *Sarraceniads*; moreover, the ovules are distributed over the whole surface of the dissepiments, a character proper to *Water-lilies*. Thus the genus *Romneya*, whose seeds indeed are unknown, forms a link between all the three Orders just mentioned.

Europe, in all directions, is the principal seat of Poppies, almost two-thirds of the whole Order being found in it. Two species only are, according to De Candolle, peculiar to Siberia, three to China and Japan, one to the Cape of Good Hope, one to New Holland, and six to Tropical America. Several are found in North America, beyond the tropics; and it is probable that the Order will yet receive many additions from that region. Most of them are annuals. The perennials are chiefly natives of mountainous tracts. They are unknown in a wild state within the tropics.

Every one knows what narcotic properties are possessed by the Poppy, and this character prevails generally in the Order. The seed is universally oily, and generally in no degree narcotic. The oil obtained from the seeds of *Papaver somniferum* is found to be perfectly wholesome, and is, in fact, consumed on the Continent in considerable quantity. It is also employed extensively for adulterating olive oil. Its use was at one time prohibited in France by decrees issued in compliance with popular clamour; but it is now openly sold, the government and people having both grown wiser. *Meconopsis napalensis*, a Nipal plant, is described as being extremely poisonous, especially its roots. The *Sanguinaria canadensis*, or Puccoon, is emetic and purgative in large doses, and in smaller quantities stimulant, diaphoretic, and expectorant. The seeds of *Argemone mexicana*, called *Fico del inferno* by the Spaniards, are said to be narcotic, especially if smoked with tobacco, and purgative. They are used in the West Indies as a substitute for *ipecacuanha*; and the juice is considered by the native doctors of India as a valuable remedy in ophthalmia, dropt into the eye and over the tarsus; also as a good application to chancres. It is purgative and deobstruent. The Brazilians administer the juice of this plant, their *Cardo santo*, to persons or animals bitten by serpents, but, it would appear, without much success. The juice of *Chelidonium majus* is a violent acrid poison. It has been regarded officinally as stimulating, aperient, diuretic, sudorific, and a powerful deobstruent. It is a popular remedy for warts, and has been employed successfully in opacities of the cornea. The narcotic principle of opium is an alkaline substance, called *Morphia*. The same drug contains a peculiar acid, called the *Meconic*; and a vegetable alkali, named *Narcotine*, to which the unpleasant stimulating properties are attributed by Magendie. To these principles chemists add *Codeine*, *Thebaine* or *Carbamorphine*, *Narceine*, *Meconine*, and *Comenic* and *Pyromconic* acids. It is curious that the native country of the Opium Poppy should be unknown. Homer records its virtues when Gorgythion was wounded in the breast, and oppressed by the weight of his helmet:—

“ μήκων δ' ὡς ἕτερώσε κάρη βάλεν, ἦτ' ἐν' ἰκίηφ,
καρπῷ βριθομένη νοτίησί τε εἰαρινῆσιν·
ὡς ἕτερωσ' ἦμυσε κάρη πῆληκι βαρυθέν.”

Ancient Latin songs record its cultivation in the gardens of *Tarquinius superbus*, and *Charlemagne* thought it worthy of a place in his *Capitularies*. See the *Encheiridion* of *Endlicher*, who derives *Mag* or *Magci* from *μηκων* or *μακων*, the name of the Opium Poppy.

GENERA.

<i>Bosconia</i> , Plum.	<i>Meconopsis</i> , Vignier.	<i>Rhœadum</i> , Spach.	<i>Hunnemannia</i> , Sweet.
<i>Macleaya</i> , R. Br.	<i>Ceratitæ</i> , Gray.	<i>Argemoneidum</i> , Spach.	<i>Dendromecon</i> , Benth.
<i>Sanguinaria</i> , Linn.	<i>Papaver</i> , Tournef.	<i>Closterandra</i> , Belang.	<i>Platystigma</i> , Benth.
<i>Chelidonium</i> , Tournef.	<i>Galmecon</i> , Spach.	<i>Rameria</i> , Medik.	<i>Meconiella</i> , Nutt.
<i>Stylophorum</i> , Nutt.	<i>Meconium</i> , Spach.	<i>Glaucium</i> , Tournef.	<i>Platystemon</i> , Benth.
<i>Argemone</i> , Tournef.	<i>Meconidium</i> , Spach.	<i>Eschscholtzia</i> , Cham.	<i>Romneya</i> , Harv.
<i>Ikthura</i> , Lour.	<i>Mecometta</i> , Spach.	<i>Chryscis</i> , Talbot.	

NUMBERS. GEN. 18. Sp. 130.

Nymphaeacea.

POSITION.—*Sarracenaceæ.* PAPAVERACEÆ.—*Rubiaculaceæ.*
Fumariaceæ.

ALLIANCE XXXIII. BERBERALES.—THE BERBERAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous flowers, unsymmetrical in the ovary, sutural, parietal, or axile placentæ, definite stamens, and embryo inclosed in a large quantity of fleshy albumen.*

The combination in the same Alliance of Epimedium and Vines, or of Fumitories and Berberies, may at first appear paradoxical. But the sequence of affinities shows that this association is truly natural. The Berberal Alliance is connected with the Ranal by means of Fumeworts, which are so nearly related to Poppyworts, that some Botanists refuse to separate them as independent Orders. The affinity of Fumitories and Epimedium with the plants generally associated with Fumeworts under the name of Nandineæ is obvious; to the latter all Botanists ally the true Berberids. The passage from Berberids proper to Vines is by no means difficult to perceive, and thence Vines may be regarded as passing into Pittosporads by means of the climbing fleshy-fruited Billardieras in the latter Order.

The characteristic marks of the Berberal Alliance are its unequal-parted flowers, definite number of stamens, and minute embryo, lying inclosed in hard horny albumen. The only exception to this distinction is found in Berberis itself, whose embryo is much larger than in the remainder of the Alliance, but in that genus the long radicle and small cotyledons proclaim its relationship to be with the Orders characterised by the large quantity of their albumen. From the Erial Alliance they differ in little except the number of parts in the flower being unequal; that is to say, although the stamens, corolla, and calyx, may correspond in the number of their parts, yet the ovary is at variance with them in that respect. For this reason the Sundews are stationed here, although their habit is rather that of the Erial Alliance, to which they may be regarded as a transition. The parietal placentæ of Sundews are also in conformity with that portion of the Berberals which constitute the Fumeworts.

The true passage from Ranals is at once into Fumeworts; but Sundews being as much a modification of the structure of Poppyworts as Fumeworts themselves, the two Orders stand on the same level, and in a lineal arrangement must necessarily interfere, by the one taking a precedence to which it is not entitled.

NATURAL ORDERS OF BERBERALS.

<i>Flowers regular and symmetrical. Placentæ parietal. Stamens alternate with the petals, or twice as many.</i>	} 157. DROSERACEÆ.
<i>Flowers irregular and unsymmetrical. Placentæ parietal. Stamens opposite the petals</i>	} 158. FUMARIACEÆ.
<i>Flowers regular, symmetrical. Placentæ sutural. Stamens opposite the petals. Anthers with recurved valves.</i>	} 159. BERBERIDACEÆ.
<i>Flowers regular, symmetrical. Placentæ axile. Stamens opposite the petals. Anthers opening longitudinally.</i>	} 160. VITACEÆ.
<i>Flowers regular, symmetrical. Placentæ axile and parietal. Stamens alternate with the petals. Ovules ascending or horizontal. Corolla imbricated</i>	} 161. PITTOSPORACEÆ.
<i>Flowers regular, symmetrical. Placentæ axile. Stamens alternate with the petals. Ovules pendulous. Corolla valvate</i>	} 162. OLACACEÆ.
<i>Flowers regular, symmetrical. Placentæ axile. Stamens alternate with the petals if equal to them in number. Ovules pendulous. Corolla imbricated</i>	} 163. CYRILLACEÆ.

ORDER CLVII. DROSERACEÆ. SUNDEWS.

Droseraceæ, DC. *Théoric*, 214. (1819); *Prodr.* 1. 317. (1824); *Endl. Gen.* clxxxix.; *Meisner*, p. 22.

DIAGNOSIS.—*Berberal Exogens*, with regular symmetrical flowers, parietal placentæ, and stamens alternate with the petals, or twice as many.

Delicate herbaceous plants, often covered with glands. Leaves alternate, with stipular fringes and a circinate venation. Peduncles, when young, circinate. Sepals 5, persistent, equal, with an imbricated æstivation. Petals 5, hypogynous, imbricated.

Stamens distinct, withering, either equal in number to the petals and alternate with them, or 2, 3, or 4 times as many. Ovary single; styles 3-5, either wholly distinct, or slightly connected at the base, bifid or branched. Ovules 00, parietal, or attached to a placenta at the base, anatropal. Capsule of 3 or 5 valves, which bear the placentæ either in the middle or at their base, and sometimes turn in their edges so as to form almost perfect dissepiments. Seeds either naked or furnished with an aril. Embryo minute, in the base of fleshy albumen.

These plants are generally supposed to be nearly allied to Violetworts, from which their circinate venation, several styles, and exstipulate leaves, distinguish them. They are also no doubt related to Tutsans, among which *Parnassia* accords with Sundews. Rock-roses (*Cistaceæ*) are also named as approaching Sundews, and so are Turner-

ads, the parietal placentation of these Orders having led to the comparison. But if we regard the minute embryo and copious albumen of Sundews as the first point of importance in their structure, then they must be removed from immediate relation to all the Orders already mentioned, and will fall into either the Berberal or Erical Alliance. They will correspond with the former in the number of parts in their ovary not agreeing with that of the surrounding parts, and with Furneworts in their parietal placentation; on the other hand they will claim affinity with Ericals in their general appearance. *Aldrovanda*, a water plant, inhabiting the ditches in the South of Europe, is remarkable for its whorled, cellular, shell-like leaves.

At the Cape of Good Hope, in South America, North America, New Holland, China, Europe, Madagascar, the East Indies, wherever there are marshes or morasses, these plants are found. *Drosophyllum lusitanicum* grows on the barren sands of Portugal.

The common *Droseras* are rather acid, slightly acid, and according to some, poisonous to cattle. The *Drosera communis* of Brazil is said by A. de St. Hilaire to be poisonous to sheep. *Drosera lunata* has viscid leaves with glandular fringes, which close upon



Fig. CCCII.

Fig. CCCII.—*Dionaea muscipula*. 1. its pistil; 2. a sectional view of it showing the placentæ; 3. a seed; 4. the same without its crustaceous skin, and opened so as to show the embryo.

Fig. CCCIII.—*Drosera rotundifolia*. 1. a flower; 2. a perpendicular section of the ovary; 3. a perpendicular section of a seed.

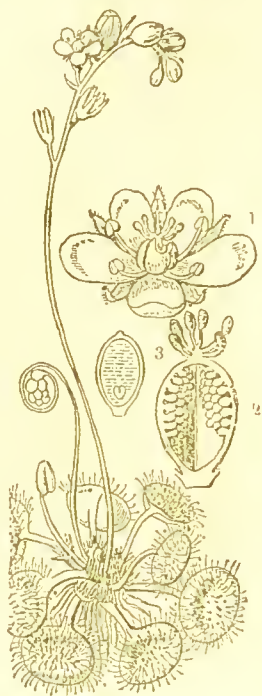


Fig. CCCIII.

flies and other insects that happen to alight upon them. It is probable it would yield a valuable dye. It is also believed that some of the Swan River species of *Drosera* might be turned to account in that way, for every part of *D. gigantea* stains paper of a brilliant deep purple, and when fragments are treated with ammonia they yield a clear yellow. The bulbs of *D. erythorhiza* and *stolonifera* have similar dyeing qualities; they have been stated by Dr. Milligan to be eatable, but that is a mistake, according to Drummond. The irritability of the glandular hairs which clothe the leaves is one of the peculiar features of the Order, and reaches its maximum in the curious genus *Dionæa*, whose leaves, bordered by stiff teeth, and divided into two halves, are furnished on each half with 3 minute bristles arranged in a triangle, which bristles are extremely irritable, and when touched cause the two sides of the leaf to collapse with such considerable force, that they cannot be separated again without employing violence: they, however, spontaneously open again in a short time.

GENERA.

<i>Drosera</i> , Linn. <i>Rorolla</i> , Rupp. <i>Ros-Solis</i> , Tourn. <i>Esera</i> , Neck.	|	<i>Aldrovanda</i> , Monti. <i>Byblis</i> , Salisb. <i>Drosophyllum</i> , Link. <i>Dionæa</i> , Ellis.	|	<i>Roridula</i> , Linn. <i>Iridion</i> , Burm. <i>Sondera</i> , Lehm.
---	--	--	--	---

NUMBERS. GEN. 7. Sp. 90.

Pyrolaccæ.

POSITION.—Fumariaceæ.—DROSERACEÆ.—Berberidaceæ.
Violaccæ.

ORDER CLVIII. FUMARIACEÆ.—FUMEWORTS.

Fumariaceæ, *DC. Syst.* 2. 105. (1821); *Prodr.* 1. 125. (1824); *Endl. Gen.* p. 858; *Meisner*, p. 8.

DIAGNOSIS.—*Berberal Exogens*, with irregular unsymmetrical flowers, parietal placenta, and stamens opposite the petals.

Herbaceous plants, with brittle stems and a watery juice. Leaves usually alternate, multifid, often with tendrils. Flowers purple, white, or yellow. Sepals 2, deciduous.



Fig. CCCIV.

Petals 4, cruciate, very irregular. Stamens 4, distinct, hypogynous, or 6, in 2 parcels, opposite the outer petals, very seldom all separate; anthers membranous, the outer of each parcel 1-celled, the middle one 2-celled. Ovary free, 1-celled; ovules horizontal, amphitropal; style filiform; stigma with two or more points. Fruit various; either an indehiscent 1- or 2-seeded nut, or a 2-valved or succulent indehiscent polyspermous pod. Seeds horizontal, shining, crested. Albumen fleshy. Embryo minute, out of the axis; in the indehiscent fruit straight; in those which dehisce somewhat curved.

Any one who compares *Fumaria* with *Epimedium*, or *Aceranthus* with *Hypococum*, will see their very near resemblance, and thus will be led to admit, what at first sight seems inadmissible, the affinity of *Fumeworts* and *Berberids*. De Candolle remarks that "Fumeworts are very near *Poppies*, on account of their two-leaved deciduous calyx, of the structure of the fruit of those species in which it splits, and of their fleshy albumen; but they differ, firstly, in their juice being watery, instead of milky; secondly, in their petals being usually irregular, and in adhering to each other; thirdly, in their

Fig. CCCIV.—*Fumaria officinalis*. 1. a flower seen from below; 2. the same from the side; 3. the pistil, stamens, and a portion of the bagged upper petal; 4. a parcel of anthers, inaccurately drawn, for the two at the sides should be half anthers; 5. the fruit.

diadelphous stamens, which bear indifferently 1- and 2-celled anthers." I am, however, inclined to suspect that the floral envelopes of Fumeworts are not rightly described. I am by no means sure that it would not be more consonant to analogy to consider the parts of their flower divided upon a binary plan; thus understanding the outer series of the supposed petals as calyx, and the inner only as petals; while the parts now called sepals are perhaps more analogous to bracts; an idea which their arrangement, and the constant tendency of the outer series to become saccate at the base, which is not uncommon in the calyx of Crucifers, but never happens, as far as I know, in their petals, would seem to confirm. Of this, some further evidence may be found in the stamens. Those organs are combined in two parcels, one of which is opposite each of the divisions of the outer series, and consists of one perfect 2-celled anther in the middle and two lateral 1-celled ones; now, supposing the lateral 1-celled anthers of each parcel to belong to a common stamen, the filament of which is split by the separation of the two parcels, we shall find the number of stamens of Fumeworts to be 4, one of which is before each of the divisions of the flower; an arrangement that is precisely what we should expect in a normal flower consisting of 2 sepals and 2 petals, and the reverse of what ought to occur if the divisions of the flower were really all petals, as has been hitherto believed. M. Gay, however, objects to this view, and considers the stamens of a Fumitory to be essentially of the same nature as those of a Crucifer, and therefore truly 6 (*Ann. Sc. Nat.*, ser. 2. 18. 216.), an opinion in which I am quite unable to concur, for reasons that need not be here explained. It is sufficient to say that Hypecom negatives M. Gay's theory.

The economy of the sexual organs of Fumitories is remarkable. The stamens are in two parcels, the anthers of which are a little higher than the stigma; the two middle ones of these anthers are turned outwards, and do not appear to be capable of communicating their pollen to the stigma; the four lateral ones are also naturally turned outwards, but by a twist of their filament their face is presented to the stigma. They are all held firmly together by the cohesion of the tips of the flower, which, never unclosing, offer no apparent means of the pollen being disturbed, so as to be shed upon the stigmatic surface. To remedy this inconvenience, the stigma is furnished with two blunt horns, one of which is inserted between and under the cells of the anthers of each parcel, so that without any alteration of position on the part of either organ, the mere contraction of the valves of the anthers is sufficient to shed the pollen upon that spot where it is required to perform the office of fecundation. At first sight Fumeworts are entirely unlike Poppies, and common observers would scarcely suspect their close relationship. But the seeds, and very often the fruit, of these plants are so much the same, and the genus Hypecom is so exactly intermediate between the two, that there is not much to object to those who look upon Fumeworts as an irregular form of Poppyworts with definite stamens. The latter circumstance, by itself, perhaps, would not be very important, but taken with the former it sanctions the propriety of regarding them as independent Natural Orders.

Fumeworts offer every gradation, from monospermous to polyspermous fruit, and between indehiscence, as in *Fumaria* itself, and deliscence, as in *Corydalis*.

Their principal range is in the temperate latitudes of the northern hemisphere, where they inhabit thickets and waste places. Two are found at the Cape of Good Hope.

The usual character of Fumeworts is, to be scutless, a little bitter, in no degree milky, and to act as diaphoretics and aperients. The tuber of *Corydalis tuberosa* has been found to contain a peculiar alkali called Corydalin. *C. bulbosa* has a tuber which is somewhat aromatic, extremely bitter, slightly astringent and acrid, and was formerly used as a substitute for Birthworts in expelling intestinal worms, and as an emmenagogue. *Dicentra Cucullaria* has been employed in North America in the same way; and *Corydalis Capnoides* seems to possess similar properties.

GENERA.

I. HYPECOEÆ.—Stamens distinct.	<i>Dicentra</i> , Borkh. <i>Diclytra</i> , DC.	<i>Phacocapnos</i> , Bernh. <i>Corydalis</i> , DC.	<i>Leonticoides</i> , DC. <i>Discocapnos</i> , Cham. et Sch.
<i>Hypecom</i> , Tournef.	<i>Eucapnos</i> , Bernh.	<i>Capnogorium</i> , Bernh.	<i>Sarcocapnos</i> , DC.
<i>Ancmosilla</i> , Forsk.	<i>Capnorchis</i> , Borkh.	<i>Capnoides</i> , Boerh.	<i>Cysticapnos</i> , Boerh.
<i>Chiazospermum</i> , Bernh.	<i>Cucullaria</i> , Raf.	<i>Nckeria</i> , Scop.	<i>Capnocystis</i> , Juss.
<i>Pteridophyllum</i> , Sib.	<i>Bicucullata</i> , March.	<i>Borkhausenia</i> , Fl. Wet.	<i>Fumaria</i> , Tournef.
II. FUMARIÆÆ.—Stamens diadelphous.	<i>Macrocapnos</i> , Royle.	<i>Capnites</i> , Endl.	<i>Sphaerocapnos</i> , DC.
<i>Dactyleapnos</i> , Wall.	<i>Adlumia</i> , Raf. <i>Bicuculla</i> , Borkh.	<i>Bulbocapnos</i> , Bernh.	<i>Platycaunos</i> , DC.

NUMBERS. GEN. 15. Sp. 110.

Papaveracæ.

POSITION.—*Droseracæ.*—FUMARIACEÆ.—*Berberidacæ.*

Brassicacæ.

ORDER CLIX. BERBERIDACEÆ.—BERBERIDS.

Berberideæ, *Vent. Tabl.* 3. 83. (1799); *DC. Syst.* 2. 1. (1821); *Prodr.* 1. 105. (1824); *Endl. Gen.* clxix. Meisner *Gen.* 6.

DIAGNOSIS.—*Berberis Exogens*, with regular symmetrical flowers, sutural placenta, stamens opposite the petals, and recurved anther-valves.

Shrubs or herbaceous perennial plants, for the most part hairless, but very often spiny. Leaves alteruate, compound, usually without stipules. Flowers solitary, racce-



Fig. CCCV.

mose or panicle. Sepals 3-4-6, deciduous, in a double row, surrounded externally by petaloid scales. Petals hypogynous, either equal to the sepals in number, and opposite to them, or twice as many, sometimes with an appendage at the base in the inside. Stamens equal in number to the petals, and opposite to them; anthers with two cells, opening with a valve from the bottom to the top. Carpel solitary, free, 1-celled; style rather lateral; stigma orbicular; ovules anatropal, attached to the suture, numerous, or in pairs, ascending or suspended. Fruit berried or capsular. Seeds crustaceous or membranous; albumen between fleshy and horny; embryo minute, occasionally as long as the axis of the albumen.

Fig. CCCV.—*Berberis vulgaris*. 1. stamen; 2. perpendicular section of a pistil with one stamen and one petal adhering; 3. cross section of the fruit; 4. 5. perpendicular section of the seed of *B. vulgaris* and *B. aquifolium*.

Among the conflicting opinions of Botanists who have referred these plants to many different places, it appears clear that they are in fact allied, as Auguste de St. Hilairo affirmed, to Vines, with which they so nearly agree in fructification that if a Berberry had two consolidated carpels and anthers opening longitudinally it would be almost a Vine. While, however, the Berberry itself touches the Vine, some plants of its family show a very different tendency, and are so organised as to resemble very nearly the Fumeworts; these are the Sub-order Nandiuæ, in which Epimedium has all the habit and much of the structure of a Fumaria. Some Botanists fancy that Podophyllum should stand here: but the main distinction between Berberids and Crowfoots consists in the recurved anther-valves of the former, and as Podophyllum has not such valves, it must go to Crowfoots. In the singular structure of their anthers there is a striking analogy with Laurels, Plume Nutmegs (Atherospermaceæ), and Witch Hazels, Orders not otherwise akin to Berberids. Caulophyllum thalictroides offers one of the few instances of seeds being absolutely naked, that is to say, not covered by any integument originating in the pericarp. In this plant the ovary is ruptured at an early stage by the expansion of the ovule, which, having been impregnated, continues to grow, and ultimately arrives at maturity, although deprived of its pericarpial covering. The spines of the common Berberry are a curious state of leaf, in which the parenchyma is absorbed, and the ribs are indurated. They, as well as all the simple leaves of the other species, are articulated with the petiole, and are therefore compound leaves reduced to a single leaflet; wherefore the supposed genus Mahonia does not differ essentially from Berberis in foliage any more than in fructification. Berberids are related to Anonads through the genus Bocagea; and their ovary is described as being sometimes strikingly like that of Davilla in Dilleniads. Some of the pinnated species of Berberis have stipules.

Natives of mountainous places in the temperate parts of the northern hemisphere, and of South America as far as the Straits of Magellan; none in Africa, Australasia, or the South Sea Islands. They are very common in the northern provinces of India.

The berries of Berberis vulgaris and other species are acid and astringent, and form with sugar an agreeable refreshing preserve. Their acid is the oxalic (malic, Royle.) The stem and bark of the Berberry are excessively astringent, and are employed for that reason by dyers, who also obtain from them a bright yellow colour. Dr. Royle has ascertained that the *λυκίον ινδικόν* of Dioscorides was a Berberry; to this day an extract of the root, stem, and branches of Indian Berberries is employed in cases of ophthalmia, and it is said with great advantage. The fruits of *B. asiatica* are dried in the sun like raisins. The somewhat bitter leaves of *Epimedium alpinum* were formerly regarded as sudorific and alexipharmic; the same properties are ascribed to the roots of *Caulophyllum thalictroides*, whose seeds have been employed as a substitute for Coffee. The leaves of *Bongardia Chrysogonum* are eaten in the East like Sorrel. The root of *Leontice Leontopetalum* is used at Aleppo as a substitute for soap; and is regarded by the Turks as a corrective of overdoses of Opium. The tubers of *Bongardia Rauwolfii* are eaten, both boiled and roasted, in Persia.

GENERA.

§ 1. BERBERIDÆ.	§ 2. NANDINÆ.	Achlys, DC.	Croomia, Torrey.
Berberis, L.	Epimedium, L.	Caulophyllum, Michx.	Aceranthus, Morren.
Mahonia, Nutt.	Nandina, Thunb.	Diphylleja, Michx.	Vancouveria, Morren.
Odestema, Raf.	Leontice, L.	Jeffersonia, Bart.	Bongardia, Meyer.
	<i>Leontopetalum</i> , Tourn.		

NUMBERS. GEN. 12. Sp. 100.

Araliaceæ.

POSITION.—Fumariaceæ.—BERBERIDACEÆ.—Vitaceæ.

Ranunculaceæ.

ORDER CLX. VITACEÆ.—VINEWORKS.

Vites, Juss. Gen. 267. (1789).—Sarmentaceæ, Vent. Tabl. 3. 167. (1799).—Viniferæ, Juss. Mem. Mus. 3. 444. (1817).—Ampelidæ, Kunth in Humboldt, N. G. et Sp. 5. 223. (1821); DC. Prodr. 1. 627. (1824); Endl. Gen. clxiv.; Meisner Gen. 51.; Wight Illustr. 1. 149.; Royle Illustr. 144.—Leeaceæ, Bartling Ord. Nat. p. 354. 1830.

DIAGNOSIS.—*Berberal Exogens*, with regular symmetrical flowers, axile placenta, stamens opposite the petals, and anthers opening longitudinally.

Scrambling, climbing shrubs, with tumid separable joints, or erect bushes; the woody tissue abounds with dotted ducts of large size, which, at certain seasons, pour forth sap in unusual quantity. Leaves with or without stipules at the base, the lower opposite, the upper alternate, simple or compound. Peduncles racemose, sometimes by abortion changing to tendrils, often opposite the leaves. Flowers small, green, arranged in thyrses, umbels, or panicles. Calyx small, nearly entire at the edge. Petals 4 or 5, inserted on the outside of a disk surrounding the ovary; in aestivation turned inwards at the edge, in a valvate manner, and often inflexed at the point. Stamens equal in number to the petals, and opposite them, inserted upon the disk, sometimes sterile by abortion; filaments distinct, or slightly cohering at the base; anthers ovate, versatile. Ovary superior, 2-6-celled; style 1, very short; stigma simple; ovules erect, definite, anatropal. Berry round, often by abortion 1-celled, pulpy. Seeds 4 or 5, or fewer by abortion, bony, erect; albumen hard; embryo erect, about one-third the length of the albumen; radicle inferior.

The main point of distinction in this Order is, independently of general facts, the stamens being opposite the petals; and by this circumstance it is known among its allies in the same way as Rhamnads, Primworts, &c., among theirs; and, perhaps, Vines ought to be regarded as having a certain amount of relation to Rhamnads, though they have none to Primworts. They have, however, other very strong, though not direct affinities. If the Vine is compared with *Aralia racemosa*, the relationship of the present Order to it will be too obvious to be mistaken. Suppose that *Aralia racemosa* had an adherent calyx, erect ovules, with stamens opposite the petals, and it would be a *Vitis*. A remarkable character in Umbellifers is their petals turned inwards at the points; this occurs also in *Ampelopsis quinquefolia*; in foliage there is no material difference between them, and even a trace of similarity between the sensible properties of Vineworts and Umbellifers may be perceived in the acrid berries of some species of *Cissus*. The propriety of placing *Leea* along with Vineworts has been questioned, and that plant has either been referred absolutely to *Meliads*, or erected into a distinct Order, as by Von Martius.



Fig. CCCVI.

Fig. CCCVI. — *Vitis vinifera*. 1. a flower; 2. the same casting its petals; 3. the pistil and stamens; 4. a section of the ovary; 5. of the seed.

Adrien de Jussieu has, however, in his Dissertation upon Meliads, satisfactorily shown (p. 33) that the genus ought not to be divided from Vine-worts. The tumid joints, which separate from each other by an articulation, along with the many other points of agreement in their fructification, approximate the Order to Cranesbills; the habit and inflorescence to Caprifoliaceae, through *Hedera*. The tendrils of the Order are the branches of inflorescence, the flowers of which are abortive. A singular variety of *Vitis vinifera*, with capsular fruit and loculicidal dehiscence, is described in the *Linnaea*, 5. 493. One of the most curious of all plants is *Pterisanthes*, which bears innumerable flowers on a thin flattened wing-like receptacle. It is well figured and described in the *Linnaea*, vol. 1844. t. viii.

The species are inhabitants of woods in the milder and hotter parts of both hemispheres, especially in the East Indies. None are wild in Europe. As to the Grape Vine, which follows the steps of civilised man everywhere, it is considered certain that its native country is the shores of the Caspian, in lat. 37°, where it is called Dewaz. But it is worth inquiry whether the *Vitis iudica* is not also a wild form of the same plant. For much information regarding these matters, see *Royle*, in the place above quoted.

Acid leaves, and a fruit like that of the common Grape, are the usual characters of this Order. The sap or tears of the Vine are a popular remedy in France for chronic ophthalmia, but they are of little value. The leaves, on account of their astringency, are sometimes used in diarrhoea. But the dried fruit, called Raisins and Currants (Corinths), and wine, are the really important products of the Grape; products which are, however, yielded by no other of the Order, if we except the Fox-grapes of North America, which scarcely deserve to be excepted. The acid of Grapes is chiefly the tartaric; malic acid, however, exists in them. The sugar contained in Grapes differs slightly from common sugar in composition, containing a smaller quantity of carbon. The leaves of *Cissus cordata* and *C. setosa* are described as being acrid, and useful in bringing indolent tumours to suppuration. The berries of the latter are also acrid, as indeed are those of some other species. Both leaves and fruit of *Cissus tinctoria* abound in a green colouring matter, which soon becomes blue, and is highly esteemed by the Coroados and other Brazilian Indians as a dye for cotton fabrics.—*Martius*.

GENERA.

I. VITACEÆ.—Petals distinct. Stamens distinct. Ovules in pairs. Tendrils.

Cissus, Linn.
Sclanthus, Forsk.
Columellia, Lour.
Botria, Lour.
Capraria, Juss.
Ingenhousia, Dennst.
Irsiola, P. Br.
Ampelopsis, L. C. Rich.
Vitis, Linn.
Pterisanthes, Blum.

II. LEEÆ.—Petals united at base. Stamens monadelphous. Ovules solitary. Tendrils 0.

Leea, Linn.
Aquilicia, Linn.
Ottilis, Gärtn.
? *Geruma*, Forsk.
? *Lasianthera*, Palis.
? *Bersama*, Fresen.

NUMBERS. GEN. 7. Sp. 260.

Araliaceæ.

POSITION.—Berberidaceæ.—VITACEÆ.—Pittosporaceæ.

Rhamnaceæ.

ORDER CLXI. PITTOSPORACEÆ.—PITTOSPORADS.

Pittosporæ, *R. Brown in Flinders' Voyage*, 2. 542. (1814); *DC. Prodr.* 1. 345. (1824); *Ach. Rich. in Dict. Class* 13. 643. (1825); *Endl. Gen.* cxxxiv.; *Meisner, Gen.* 66. *Putterlick, Synopsis Pittosporarum*, 1839.

DIAGNOSIS.—*Berberal Exogens*, with regular symmetrical flowers, axile and parietal placentæ, stamens alternate with the petals, ascending or horizontal ovules, and imbricated petals.

Trees or shrubs. Leaves simple, alternate, without stipules, usually entire, sometimes serrated. Flowers terminal or axillary, ♂, with imbricated æstivation. Sepals 4-5, deciduous, either distinct or partially cohering. Petals 4-5, hypogynous, sometimes slightly cohering. Stamens 5, hypogynous, distinct, alternate with the petals. Anthers two-celled, opening longitudinally or by a pore. Ovary single, distinct, with the cells or the placentæ 2 or more in number, and many-seeded; style 1; stigmas equal in number to the placentæ; ovules horizontal or ascending, anatropal. Fruit capsular or berried, with many-seeded cells, which are sometimes incomplete. Seeds often covered with a glutinous or resinous pulp; embryo minute, near the hilum, lying in fleshy albumen; radicle rather long; cotyledons very short.

Brown, in establishing this as an Order, remarks that it is widely different from Rhamnads and Spindletrees, but he seems to have been unable to point out its real affinity; De Candolle places it between Milkworts and Frankeniads; according to Achille Richard, it is very near Rueworts, to which he thinks it allied by a crowd of characters. Endlicher puts it into his Frustraguleous group. To me, however, it appears that the great mass of albumen in the seeds, the minute embryo, and the general accordance of the flowers with the structure of Vineworts, which is further established by the succulent fruit and climbing habit of *Billardiera*, seem to place Pittosporads in the same Alliance as the Vine and Berberry. The little genus *Cheiranthra* forms a transition from Pittosporads to Dilleniads, at once curious and unexpected.

Chiefly New Holland plants. A few occur in Africa and the adjacent islands, and one in Nipal. Brown remarks that *Pittosporum* itself has been found not only in New Holland, but also in New Zealand, Norfolk Island, the Society and Sandwich Islands, the Moluccas, China, Japan, and even Madeira. They seem to be unknown in America.

The berries of *Billardiera* are eatable; but they have a resinous odour, and a bitter subacid taste. The bark of *Pittosporum Tohira* has a resinous smell, and this resinous quality seems very general in the Order. Mr. Backhouse states that *Billardiera mutabilis* has a green cylindrical fruit, becoming of a lighter green, or amber colour, when ripe, possessing a pleasant subacid taste; but the seeds are numerous and hard.



Fig. CCCVII.

GENERA.

<i>Criobatus</i> , <i>A. Cunningh.</i>	<i>Marianthus</i> , <i>Huget.</i>	<i>Campylanthera</i> , <i>Hook.</i>	? <i>Stachyurus</i> , <i>Sieb. et Zucc.</i>
<i>Pittosporum</i> , <i>Soland.</i>	<i>Cheiranthra</i> , <i>Cunning.</i>	<i>Billardiera</i> , <i>Smith.</i>	? <i>Koerberlinia</i> , <i>Zucc.</i>
<i>Schoutensia</i> , <i>Endl.</i>	<i>Sollya</i> , <i>Lindl.</i>	<i>Billardiera</i> , <i>Röm. et</i>	
<i>Bursaria</i> , <i>Cav.</i>	<i>Fronaya</i> , <i>Huget.</i>	—	<i>Schult.</i>
<i>Oreosporum</i> , <i>Putterl.</i>	<i>Spiranthera</i> , <i>Hook.</i>		

NUMBERS. GEN. 12. Sp. 78.

*Dilleniaceæ.*POSITION.—*Oleaceæ.*—PITTOSPORACEÆ.—*Vitaceæ.**Tremandraceæ.*

Fig. CCCVII.—1. *Cheiranthra linearis*; 2. its pistil and stamens; 3. a cross section of its ovary; 4. a seed of *Pittosporum undulatum*, cut across to show the minute embryo.

CANELLACEÆ, (*Von Martius, Nov. Gen. et Sp.* 3. 163. (1829); *Conspectus, No.* 300. (1835); *Ed. pr. under Guttiferae, p.* 75, *Endl. Gen. p.* 1029). This name has been given to a supposed Order of plants represented by *Canella alba*, a common West Indian aromatic shrub, with evergreen, coriaceous, obovate, alternate, stalked leaves, no stipules, and corymbs of purple flowers. The calyx is leathery, and consists of 3 blunt, tough, permanent, concave sepals, which imbricate each other. The petals are 5, twisted in aestivation. Within these stands a tough truncated hypogynous cone, whose upper half, on the outside, bears about 20 linear parallel 2-celled anthers, which open longitudinally and touch each other. Its ovary is ovate, and tapers into a stiff style, whose end is emarginate. According to Botanical writers, the stigma is permanent and 2-lobed, while the ovary is 3-celled, with more ovules than are attached to the central angle. But I can find no such structure; on the contrary, although the stigma is very slightly emarginate, yet the ovary does not offer a trace of even two cells, but is absolutely one-celled, with 2 or 3 half anatropal ovules hanging by long cords from a little below the dome of the cavity. Gærtner has figured what purports to be the fruit of this plant, representing it to have 3 cells, of which 2 are abortive, and 2 or 3 seeds in the perfect cell, somewhat rostrate, consisting of hard homogeneous albumen, and containing a very small curved cylindrical embryo, lying obliquely with the radicle turned towards the rostrum. But this fruit can hardly belong to *Canella alba*, if it is correctly drawn; and yet, from the appearance of the calyx in Gærtner's figure, and from his having obtained his fruits out of the Banksian collection, one can scarcely doubt that they really do belong to *Canella*; in which case we may assume that the seed-vessel has been incorrectly observed. Upon this supposition *Canella* can have nothing to do with Guttifers, from which in fact its alternate leaves and general appearance remove it. Nor can it be possibly associated, as Martius proposes, with *Platonia*, a Brazilian tree with the look of a *Clusia*; neither is it by any means clear that the *Canella axillaris* of Nees, now called *Cinnamodendron*, is allied to it. However, as I have had no opportunity of examining the fruit of *Canella*, or of seeing *Cinnamodendron*, it must be enough to suggest that the plants referred to *Canelleæ* are much more like *Pittosporum* than *Clusia*, and to refer the question of their real place in the natural system to Botanists who possess the means of studying both in all their details. *Canella alba* is often called Wild Cinnamon in the West Indies, on account of its warm aromatic fragrant qualities. Its bark yields by distillation a warm aromatic oil, reckoned carminative and stomachic. It is often mixed with oil of cloves in the West Indies. In this country it is principally employed as an aromatic addition either to tonics or purgatives in debilitated conditions of the digestive organs. *Canella* bark has also been employed in scurvy. It is exported in considerable quantities from the Bahamas, under the name of White Wood Bark, and is so called in consequence of the whiteness of the trees after they have been stripped. It is only the inner smooth white bark that is exported, the rough outside rind being easily separated by bending. *Cinnamodendron nixillnre*, a Brazilian tree, is also aromatic; its bark is used with success as a tonic and antiscorbutic; it is prescribed in low fevers, and is made into gargles in debility of the tonsils.

GENERA.

Canella, P. Br.

Winterania, Linn.

?*Cinnamodendron, Endl.*

NUMBERS. GEN. 2. Sp. 3.

ORDER CLXII. OLACACEÆ.—OLACADS.

Olacineæ, *Mirb. Bull. Philom.* n. 75. 377. (1813); *DC. Prodr.* 1. 531. (1824); *Bartl. Ord. Nat.* p. 423. (1830); *Endl. Gen.* cccxiii.; *Bentham in Linn. Trans.* 18. 676; *Wight. Illustr.* 1. t. 40.

DIAGNOSIS.—*Berberal Exogens*, with regular symmetrical flowers, axile placentæ, stamens alternate with the petals, pendulous ovules, and valvate corolla.

Trees or shrubs, often spiny. Leaves simple, alternate, entire, without stipules; occasionally altogether wanting (rarely compound). Flowers small, axillary, often

fragrant. Calyx small, entire, or slightly toothed, finally becoming, in many cases, enlarged. Petals definite, hypogynous, valvate in æstivation, either altogether separate, or cohering in pairs by the intervention of stamens, often having thick matted hairs along the middle vein or on some other part. Stamens usually part fertile, part sterile; the former varying in number from 3 to 10, hypogynous, usually cohering with the petals, and alternate with them; the latter opposite the petals, to which they in part adhere, their upper end resembling an appendage; filaments compressed; anthers innate, oblong, 2-celled, bursting longitudinally. Ovary free, or partially adherent, seated in a disk, which is sometimes small and sometimes thickened and united with the calyx; 1-celled, or occasionally imperfectly 3-4-celled, or 2-celled out of the centre;



Fig. CCCVIII.

ovules 2, 3 only, or even 1 only, either pendulous from the apex of free placentæ or adherent to the ovary or the spurious dissepiments, pendulous, anatropal.—*Benth.* Style filiform; stigma simple. Fruit somewhat drupaceous, indehiscent, frequently surrounded by the enlarged calyx, 1-celled, 1-seeded. Seed pendulous; albumen large, fleshy; embryo small, in the base of albumen or in the axis, with very short cotyledons, its radicle near the hilum.

If we neglect the internal structure of the seed the present Order will stand, as De Candolle supposes, near Citronworts; if we suppose the tendency of the corolla to be towards a monopetalous condition with epipetalous stamens, then it must be stationed, with Jussieu, near Sapotads; those who undervalue the perfect adhesion of the calyx and the ovary will pronounce the nearest affinity to be with Sandalworts; but if the condition of the embryo and albumen are considered, a very different view will be entertained of its affinity, and Humiriads, if they really have a small embryo and copious albumen, will be fixed upon as the true point of nearest resemblance. To the latter opinion I adhere; and I am glad to find that Mr. Bentham joins in it. In fact, if it were not for the great dilated connective of the Humiriads, their somewhat imbricated corolla, more numerous stamens and balsamic secretions, I hardly know how they could be distinguished. They obviously agree with the Berberal Alliance, in the anisomerous structure of their flowers, and must be regarded as near allies of Canellaceæ, if indeed that supposed Order does not in reality belong to them. See p. 442.

A small Order, consisting of tropical or nearly tropical shrubs, chiefly found in the East Indies, New Holland, and Africa. One only is known in the West Indies. A few are from the Cape of Good Hope.

It is often said that the wood of *Heisteria coccinea* is the Partridge-wood of the

Fig. CCCVIII. — *Apodytes dimidiata*. 1. a flower; 2. a corolla spread open; 3. a pistil; 4. section of an ovary; 5. section of ripe fruit.

cabinet-makers, but this is certainly a mistake, as is shown in the *Penny Cyclopædia*, article Partridge-wood. The drupes of *Ximenia americana* have a sweet aromatic taste, but are a little rough to the palate. They are eaten in Senegal. The flowers are very sweet scented. *Olax zeylanica* has a foetid wood with a saline taste, and is employed in putrid fevers; its leaves are used in salad.

GENERA.

* OLACÆ, Benth.

Heisteria, L.

Ximenia, Plum.

Heymassoli, Aubl.*Rottböllia*, Scop.*Tetanosia*, Rich.

Hypocarpus, A. DC.

Olax, L.

Fissilia, Commers.*Spermaxyrum*, Lab.*Roxburghia*, König.*Schæpfia*, Wall.

** OPILÆ, Benth.

Opilia, Roxb.

Groulia, Guillem.

Cansjera, Gmel.

*** ICACINÆ, Benth.

Icacina, A. Juss.

Gomphandra, Wall.

Apodytes, E. M.

Leretia, Vell.

Emmoteca, Desv.

Pogopetalum, Benth.

? Pseudaleia, Thouars.

? Pseudaleioides, Thouars.

? Platea, Blum.

? Stemonurus, Blum.

Anacalosa, Blum.

? Quilesia, Blanc.

? Lepionurus, Bl.

Parastemon, A. DC.

Tripetaleia, Sieb.

Liriosma, Popp.

NUMBERS. GEN. 21. Sp. 48.

Santalaceæ.

POSITION.—Cyrillaceæ.—OLACACEÆ.—Pittosporaceæ.

Humiriaceæ.

ORDER CLXIII. CYRILLACEÆ.—CYRILLADS.

Cyrilleæ, Torrey and Gray, *Fl. Bor. Am.* 1. 256. (1838); *Endl. Ench.* p. 578.

DIAGNOSIS.—*Berberal Exogens*, with regular symmetrical flowers, axile placenta, stamens alternate with the petals if equal to them in number, pendulous ovules, and an imbricated corolla.

Shrubs, with evergreen simple leaves without stipules. Flowers usually in racemes. Calyx 4-5-parted. Petals 5, distinct, hypogynous, with an imbricated æstivation. Stamens 5 or 10, hypogynous. Anthers bursting lengthwise. Ovary 2-3-4-celled, always composed of some number of carpels different from that of the calyx, corolla and stamens; ovules solitary, pendulous; style short; stigma with as many lobes as there are cells of the ovary. Fruit a succulent capsule, or a drupe. Seeds inverted. Embryo in the axis of a very large quantity of albumen, with a very long superior radicle.

There can be no doubt that these plants are nearly related to Olacads, from which they are principally known by their imbricate, not valvate petals, destitute of all traces of hairiness. That being so, the connection between Olacads and Heathworts is established; for *Ledum* and *Clethra* in the latter come very near *Cyrillads*; these are, however, forced into a different Alliance by the want of any definite proportion between the whole of the parts of the flower. Endlicher suggests an affinity between *Cyrillads* and *Hollyworts*. The genus *Pickeringia*, now regarded as a sub-genus of *Ardisia*, seems to connect this Order with *Ardisiads*.

They are all inhabitants of North America.

Nothing has been recorded of any uses to which they could be applied.

GENERA.

Cyrilla, Linn.
Mylocaryum, Wf.
Cliftonia, Sol.
Walteriana, Fraz.
Elliottia, Muhl.

NUMBERS. GEN. 3. Sp. 5.

? *Myrsinacea*.

POSITION.—*Pittosporaceæ*.—CYRILLACEÆ.—*Olacaceæ*.

Ericaceæ.

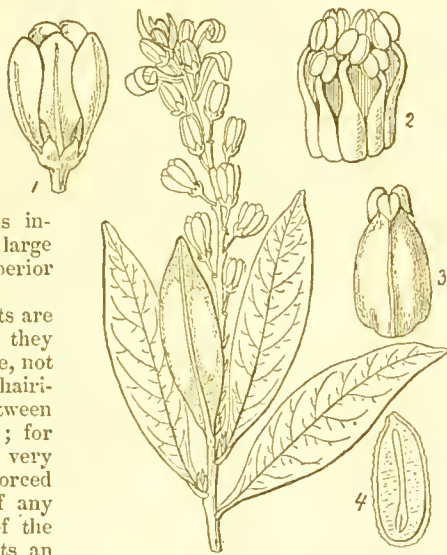


Fig. CCCIX.

Fig. CCCIX.—*Mylocaryum ligustrinum*. 1. a flower; 2. stamens; 3. ovary; 4. section of seed.

ALLIANCE XXXIV. *ERICALES*.—THE ERICAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with dichlamydeous flowers, symmetrical in the ovary, axile placentæ, definite stamens, and embryo inclosed in a large quantity of fleshy albumen.*

The striking resemblance in interior structure between the seeds of Wintergreens, Fir-rapes, Francoads, and Sundews is such as to render it improbable that they should not be placed by nature in very close affinity; and it is only the want of correspondence in the number of the floral organs of the latter which has led to its being detained on the borders of the neighbouring Berberal Alliance.

Ericals join Berberals by way of Humiriads, which are very like Olacads, and they evidently pass into Rutals through the assistance of *Correa* among Rueworts; nor is this a feeble indication of consanguinity.

Among more distant affinities, one with Dilleniads is very remarkably established by means of the curious genus *Saurauja* in that Order.

NATURAL ORDERS OF ERICALS.

<i>Flowers polypetalous. Stamens all perfect, monadelphous. Anthers 2-celled, with a long membranous connective</i>	} 164. HUMIRIACEÆ.
<i>Flowers monopetalous. Stamens all perfect, free. Seeds with a firm skin. Anthers 1-celled, opening longitudinally</i>	} 165. EPACRIDACEÆ.
<i>Flowers half-monopetalous. Stamens all perfect, free. Seeds with a loose skin. Embryo at the base of the albumen</i>	} 166. PYROLACEÆ.
<i>Flowers polypetalous. Stamens half-sterile and scale-like, free. Seeds with a firm skin</i>	} 167. FRANCOACEÆ.
<i>Flowers half-monopetalous. Stamens all perfect, free. Seeds with a loose skin or wing. Embryo at the apex of the albumen</i>	} 168. MONOTROPACEÆ.
<i>Flowers monopetalous. Stamens all perfect, free. Seeds with a firm or loose skin. Anthers 2-celled, opening by pores</i>	} 169. ERICACEÆ.

ORDER CLXIV. HUMIRIACEÆ.—HUMIRIADS.

Humiriaceæ, *Adrien de Jussieu in Aug. de St. Hill. Flora Bras. Merid.* 2. 87. (1829); *Martius Nov. Gen.* 2. 147. (1826); *Endl. Gen.* ccxxii.; *Meisner*, p. 47.

DIAGNOSIS.—*Erical Exogens*, with *polypetalous flowers*, *perfect monadelphous stamens*, and *2-celled anthers with a long membranous connective*.

Trees or shrubs with balsamic juice. Leaves alternate, simple, coriaceous feather-veined, without stipules. Flowers in terminal or axillary cymes, or corymbs. Calyx imbricated, in 5 divisions. Petals imbricated, regular, alternate with the lobes of the calyx. Stamens hypogynous, 4 times or many times as numerous as the petals, monadelphous; anthers 2-celled, with a fleshy connective extended beyond the 2 lobes. Ovary superior, usually surrounded by an annular or toothed disk, 5-celled, often furnished with a transverse partition, with from 1 to 2 suspended anatropal ovules in each cell; style simple; stigma 5-lobed. Fruit drupaceous, with 5 cells on the same plauve, or with secondary cells near the apex, sometimes with fewer, on account of the abortion of a part. Seed with a membranous integument; embryo narrow, orthotropal, sometimes lying in fleshy albumen; radicle long, superior.

The affinities of Humiriads cannot be satisfactorily discussed until their seeds shall have been more exactly examined. As the evidence at present stands, there is nothing to show that all the genera now collected really belong to the same group. *Helleria*, for instance, is said to have no albumen. They differ from *Meliads* much in habit, and in many respects in fructification, especially in having the aestivation of the corolla quincuncial, not valvate, and the stamens sometimes indefinite; the anthers of Humiriads, as Von Martius observes, are very different from those of *Meliads* in the great dilatation of their connective; their albuminous seeds and slender embryo are also at variance with *Meliads*. In the latter respect, and in their balsamic wood, they agree better with *Storaxworts*, as also in the variable direction of the embryo. Besides these points of affinity, Von Martius compares Humiriads with *Chlænads*, on account of both Orders containing definite and indefinite monadelphous stamens, several stigmas, partially abortive cells, inverted albuminous seeds, and a singular complicated vernation, by which two longitudinal lines are impressed upon each leaf. To me it formerly appeared that the real affinity is with *Citronworts*; as is indicated by their inflorescence, the texture of their stamens, their disk, their winged petioles, and their balsamic juices. But this cannot be, if their seeds are really albuminous, as is stated. Assuming the latter to be correct, they will form a connecting link between the *Erical* and *Berberal Alliances*, because of their resemblance to *Olacads*. If really connected with *Heathworts*, it must be through some such genus as *Clethra*.

All are natives of the tropical parts of America.

Humirium floribundum, when the trunk is wounded, yields a fragrant liquid yellow balsam, called *Balsam of Umiri*, resembling the properties of *Copaiva* and *Balsam of Peru*. The juice of *Humirium balsamiferum* and *floribundum* has a reddish colour, and smells of *Storax*; an ointment prepared from it is used for pain in the joints, and internally as a remedy for *blennorrhœa* and attacks of *tœnia*.

GENERA.

<i>Saccoglottia</i> , Mart.	<i>Myrodendron</i> , Schr.	<i>Werniseckia</i> , Scop.	<i>Vantanea</i> , Aubl.
<i>Humirium</i> , Mart.	<i>Humiri</i> , Aubl.	<i>Helleria</i> , Nees et Mart.	<i>Lumniscia</i> , Schreb.
<i>Humiria</i> , Juss.			

NUMBERS. GEN. 4. Sp. 10.

Olacacæ.

POSITION.—*Ericacææ.*—*HUMIRIACEÆ.*—

Aurantiacæ.

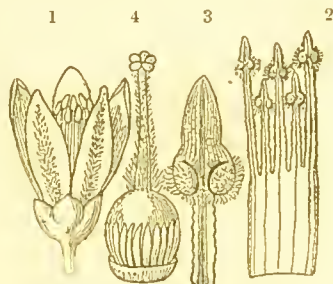


Fig. CCCX.

Fig. CCCX.—*Humirium crassifolium*. 1. its flower; 2. a part of its stamens; 3. an anther; 4. pistil.

ORDER CLXV. EPACRIDACEÆ—EPACRIDS.

Epacridæ, *R. Brown Prodr.* 535. (1810); *Link Handb.* 1. 601. (1829), a § of Ericæ; *DC. Prod.* 7. 734; *Endl. Gen.* clx.

DIAGNOSIS.—*Erical Exogens, with monopetalous flowers, perfect free stamens, seeds with a firm skin, and 1-celled anthers opening longitudinally.*

Shrubs or small trees, their hair, when present, being simple. Leaves alternate, very rarely opposite, entire or occasionally serrated, usually stalked; their bases sometimes dilated, cucullate, overlapping each other and half sheathing the stem, without a midrib, but with the veins simple and parallel, or radiating from the base. Flowers white or purple, seldom blue, either in spikes or terminal racemes, or solitary and axillary; the calyx or pedicels with 2 or several bracts, which are usually of the same texture as the calyx. Calyx 5-parted (very seldom 4-parted), often coloured, persistent. Corolla hypogynous, monopetalous, either deciduous or withering, sometimes capable of being separated into 5 pieces, its limb with 5 (rarely 4) equal divisions, sometimes, in consequence of the cohesion of the segments, bursting transversely; the aestivation valvate or imbricated. Stamens equal in number to the segments of the corolla, and alternate with them; very seldom fewer in number. Filaments arising from the corolla, or hypogynous. Anthers one-celled, with a single receptacle of pollen, which forms a complete partition sometimes having a border; undivided, opening longitudinally. Pollen either nearly round or formed of 3 connate grains. Ovary sessile, usually surrounded at the base with 5 distinct or connate scales; with several, rarely a single, cell; ovules solitary and pendulous, or 00; style 1; stigma simple, or occasionally toothed. Fruit drupaceous, baccate, or capsular. Seeds with albumen. Embryo taper, straight in the axis, more than half as long as the albumen; the cotyledons very short, the radicle superior in the drupaceous species, variable in the capsular.

This Order differs from Heathworts chiefly in the structure of the anther; but that organ being one of the principal features of Heathworts, any material deviation from it acquires an unusual degree of consequence. In the latter Order the anther consists of 2 cells, usually furnished with peculiar appendages; in Epacrids it is 1-celled, with no appendages whatever. In some other respects Epacrids are different from Heathworts: their stamens very commonly adhere to the sides of the corolla, a circumstance which is at variance with the *Erical* and all the neighbouring *Alliances*, and their leaves have veins with quite the structure of *Eudogens*, so that although the two Orders have but slender verbal distinctions, they are in reality extremely dissimilar.

All natives of the Indian archipelago, or Australasia, or Polynesia, where they abound as Heathworts do at the Cape of Good Hope. It is remarkable that only 1 or 2 Heathworts are found in the countries occupied by Epacrids.

The species are chiefly remarkable for the great beauty of their flowers and the singular structure of their leaves, as above described. All the fruits of the berry-bearing section, especially those of *Lissanthe sapida*, are esculent; but the seeds are too large, and the pulpy covering too thick, to render them very available for food; *Astroloma humifusum*, the Tasmanian Cranberry, is found all over that colony. It has a fruit of a

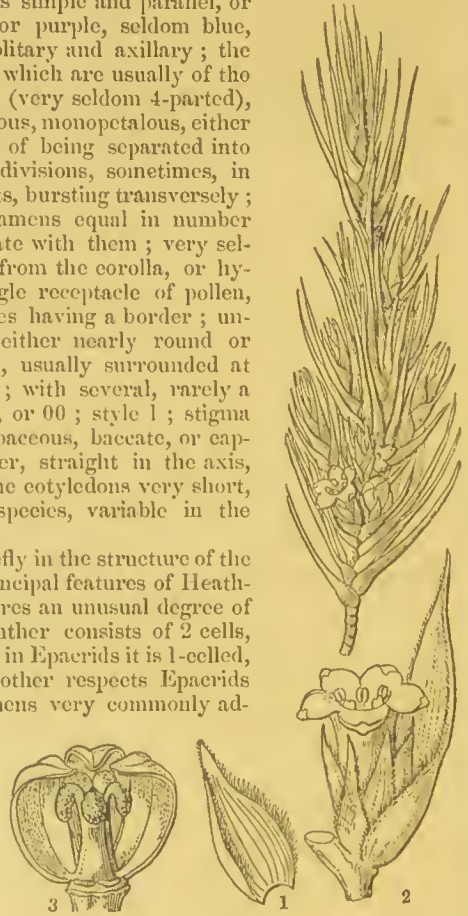


Fig. CCCXI.

Fig. CCCXI.—*Dracophyllum scoparium*.—*Hooker*. 1. a sepal; 2. a flower with its bract; 3. section of a seed-vessel.

green or whitish colour, sometimes slightly red, about the size of a black currant, consisting of a viscid, apple-flavoured pulp inclosing a large seed. This fruit grows singly on the trailing stems of the plant, which resembles Juniper, bearing beautiful scarlet blossoms in winter. The fruit of *Styphelia adscendens*, a small prostrate shrub, resembles in appearance and character that of *Astroloma humifusa*. *Leucopogon Richei*, called Native Currant, is a large dense shrub, growing only on the sea-coast, and attaining to a height of from four to seven feet. The berries are small, white, and of a herby flavour. In D'Entrecasteaux's voyage in search of La Perouse, a French naturalist named Riche was lost for three days on the south coast of New Holland, and supported himself principally upon the berries of this plant; in commemoration of which circumstance it has received its specific name.—*Buckhouse*.

GENERA.

I. STYPHELIEÆ.—One-seeded.	<i>Melidepas</i> , Endl. <i>Cyathodes</i> , <i>R. Br.</i> <i>Lissanthe</i> , <i>R. Br.</i> <i>Androstoma</i> , <i>Hook fl.</i> <i>Leucopogon</i> , <i>R. Br.</i> <i>Perajoa</i> , Cav. <i>Peroa</i> , Pers. <i>Monotoca</i> , <i>R. Br.</i> <i>Acrotriche</i> , <i>R. Br.</i> <i>Trochocarpa</i> , <i>R. Br.</i> <i>Decaspora</i> , <i>R. Br.</i> <i>Pentachondra</i> , <i>R. Br.</i>	<i>Needhamia</i> , <i>R. Br.</i> <i>Oligarrhena</i> , <i>R. Br.</i>	<i>Andersonia</i> , <i>R. Br.</i> <i>Atheroccephala</i> , DC. <i>Poncelletia</i> , <i>R. Br.</i> <i>Sprengelia</i> , <i>Smith.</i> <i>Poirctia</i> , Cav. <i>Cystanthe</i> , <i>R. Br.</i> <i>Pilitis</i> , <i>Lindl.</i> <i>Richea</i> , <i>R. Br.</i> <i>Dracophyllum</i> , <i>Lab.</i> <i>Dacryanthus</i> , <i>Endl.</i> <i>Sphenotoma</i> , <i>R. Br.</i>
<i>Conostephium</i> , <i>Benth.</i> <i>Styphelia</i> , <i>Smith.</i> <i>Soleniscia</i> , DC. <i>Astroloma</i> , <i>R. Br.</i> <i>Ventenatia</i> , Cav. part. <i>Stomarrhena</i> , DC. <i>Stenanthera</i> , <i>R. Br.</i> <i>Brachyloma</i> , <i>Sonder.</i> <i>Melichrus</i> , <i>R. Br.</i> <i>Ventenatia</i> , Cav. part.		II. EPACRIFÆ.—Many-seeded. <i>Epacris</i> , <i>Smith.</i> <i>Lysinema</i> , <i>R. Br.</i> <i>Julicta</i> , Leschen. <i>Lebetanthus</i> , <i>Endl.</i> <i>Alloape</i> , <i>Endl.</i> <i>Prionotes</i> , <i>R. Br.</i> <i>Cosmelia</i> , <i>R. Br.</i>	

NUMBERS. GEN. 30. Sp. 320.

POSITION.—Ericaceæ.—EPACRIDACEÆ.—

ORDER CLXVI. PYROLACEÆ.—WINTERGREENS.

Pyrolææ, *Lindl. Coll. Bot. t. 5. (1821).*—Pyrolacææ, *Ed. pr. clxiv. (1836); Endl. Gen. p. 760. DC. Prodr. 7.580.*

DIAGNOSIS.—*Erical Exogens, with half monopetalous flowers, the stamens free and all perfect, loose-skinned seeds, and an embryo at the base of the albumen.*

Herbaceous plants, rarely under-shrubs. Stems round, naked; in the frutescent species leafy. Leaves simple, entire or toothed. Flowers in terminal racemes, or solitary. Sepals 5, persistent, inferior. Corolla slightly monopetalous, hypogynous, regular, deciduous, 4- or 5-parted, with an imbricated aestivation. Stamens hypogynous, twice as numerous as the divisions of the corolla, those opposite the petals sometimes without anthers; anthers 2-celled, opening by pores. Ovary superior, 4- or 5-celled, many-seeded, with an hypogynous disk; style 1, declinate; stigma slightly indusiate. Fruit capsular, 4- or 5-celled, dehiscent, with central placente. Seeds indefinite, minute, with a loose winged skin; embryo minute, at the base of a fleshy albumen, placed across the principal axis of the exterior skin.

Wintergreens are usually considered a portion of the Order of Heathworts, but their habit is so different, that I cannot hesitate to separate them, especially as their minute embryo and declinate styles are real marks of difference. *Cladothamnus fruticosus* forms a passage to Heathworts, and *Pyrola aphylla* to Fir-rapes. An approach to the indusiate stigma of Goodeniads occurs in that of *P. aphylla* and some others.

Natives of Europe, North America, and the northern parts of Asia, in Fir woods, or similar situations.

Chimaphila umbellata is a most active diuretic; it is also found to possess valuable tonic properties. The leaves, which are bitter-sweet, applied to the skin, act as slight vesicatories. *C. maculata*, a very closely allied species, is asserted by some American practitioners to be wholly inert. It is said to be a palliative in strangury and nephritis, and to alleviate the ardor urinæ. It appears to possess a narcotic action. But this is contrary to the statement of Pursh, who says it has active properties; and therefore Wood and Bache are of opinion that it probably possesses the same qualities as *Chimaphila corymbosa*. *Pyrola rotundifolia* had once a great reputation as a vulnerary.



Fig. CCCXII.

GENERA.

<i>Cladothamnus</i> , Bung.	<i>Shortia</i> , Torr et Gr.	<i>Galax</i> , Linn.	<i>Blandfordia</i> , Andr.
<i>Tolmiea</i> , Hook.	<i>Pyrola</i> , Tournef.	<i>Erythrorhiza</i> , L. C.	<i>Viticella</i> , Mich.
<i>Chimaphila</i> , Pursh.	<i>Moneses</i> , Salisb.	Rich.	<i>Belvedera</i> , Gronov.
<i>Chimaza</i> , R. Br.	<i>Bryophthalmum</i> , E.	<i>Solenandria</i> , Palis.	
<i>Pseva</i> , Raf	Mey.		

NUMBERS. GEN. 5. Sp. 20.

Gentianaecæ.

POSITION.—*Monotropacææ.*—*Pyrolacææ.*—*Francoacææ.*

Orobanchacææ.

Fig. CCCXII.—*Pyrola chlorantha.*—*Hooker.* 1. a pistil; 2. an anther; 3. seeds; 4. a seed much more magnified, with the nucleus cut through; 5. a section of the nucleus, showing the embryo.

ORDER CLXVII. FRANCOACEÆ.—FRANCOADS.

Galacineæ, Don in *Edinb. New Phil. Journ.* Oct. 1828. *Ed. Pr. No.* 146. (1830).—Francoaceæ, *Ac de Juss. Ann. Sc. Nat.* 25. 9. (1832). *Lindl. in Bot. Reg. fol.* 1645 (1834); *Key to Bot.* 47. (1835) *DC. Prodr.* 7. 777.; *Endl. Gen.* p. 812.

DIAGNOSIS.—*Erical Erogens, with polypetalous flowers, the stamens free, half sterile and scale-like, and tight-skinned seeds.*

Stemless herbaceous plants, with lobed or pinnated leaves, without stipules. Stems scape-like, with a racemose inflorescence. Petals persistent for a long time. Calyx deeply four-cleft. Petals 4, inserted near the base of the calyx. Stamens sub-hypogynous, four times as numerous as the petals, alternately rudimentary. Ovary superior, with 4 cells opposite the petals; ovules numerous; stigma 4-lobed, sessile. Capsule membranous, 4-valved, with a loculicidal or septicidal dehiscence. Seeds numerous, minute, with a minute embryo in the base of fleshy albumen.

The importance of the character derived from the presence of a very minute embryo in the base of a large quantity of albumen not having been taken into account, Botanists do not seem to have judged correctly of the true position of Francoads in a natural system. They stand near Saxifrages according to Don, Roseworts in the opinion of De Candolle, Houseleeks according to Adrien de Jussieu, Hooker, and Endlicher. It is true, that looking to the separation of the carpels of Francoa when ripe, and its abortive stamens, a case in favour of the approximation of the Order to Houseleeks (Crassulaceæ) may seem to be made out; but then Tetilla does not separate its carpels, but divides them through the back; and moreover, there is no resemblance either in habit, or in the proportions of the flowers, or in the structure of the fruit, or in the organisation of the seeds between that Order and Francoads. There can be no doubt that the real affinity of these plants is with Dionæa, which chiefly differs in its unilocular fruit, anisomerous flowers, and the want of sterile stamens. Its seeds are absolutely the same in all essential respects.

All the species hitherto discovered are Chilian.

The juice of the Francoas is said to be regarded in Chili as cooling and sedative; the root dyes black. Tetilla is called in the same country Teta de capra and Culantrillo; according to Pöppig, the leaf-stalks are eaten as a remedy for dysentery, and are remarkable for their astringency.



1 Fig. CCCXIII.

GENERA.

Francoa, Cav.
Llapiñake, Feuill.

Tetilla, DC.
Dimorphopetalum, Bert.

Anarmosa, Miers.
Tetraplasium, Kunze.

NUMBERS. GEN. 2. Sp. 5.

Crassulacea.

POSITION.—*Pyrolaceæ.*—FRANCOACEÆ.—

Droseracea.

Fig. CCCXIII.—*Francoa appendiculata*. 1. stamens and pistil; 2. cross section of the ovary; 3. perpendicular section of the seed.

ORDER CLXVIII. MONOTROPACEÆ.—FIR-RAPES.

Monotropææ, *Nutt. Gen.* 1. 272. (1818); *Endl. Gen.* p. 760.; *DC. Prodr.* 7. 779.

DIAGNOSIS.—*Erical Exogens, with half monopetalous flowers, free stamens all perfect, loose-skinned or winged seeds, and an embryo at the apex of the albumen.*

Parasites growing on the roots of Pines and other trees. The stems brown or almost colourless, with no true leaves, but covered with scales. Flowers in terminal spikes or racemes. Sepals 4, 5, membranous, tapering, distantly arranged in a broken whorl. Petals the same number, either imbricated and saccate at the base, or combined into a monopetalous corolla. Stamens 8-10, hypogynous, sometimes alternating with 10 hypogynous recurved glands; anthers 2-celled, sometimes opening longitudinally, the cells becoming confluent by the rolling back of the short anterior valves, and producing the appearance of a bilabiate anther; sometimes parallel-celled with bristles at the base. Ovary round, 4-5-furrowed, articulated, with a short cylindrical style, terminating in a succulent funnel-shaped stigma; 4-5-celled at the base, 1-celled, with 5 parietal placente at the apex. Fruit a dry capsule, splitting through the cells and bearing the placente on the middle of the valves. Seeds 00, with a loose skin, or winged at the end; embryo minute, undivided, inclosed within the apex of fleshy albumen.

The dehiscence of the anthers separates these from Wintergreens, as well as their leafless, scaly, and parasitical habit; besides which, there is a difference in the position of the embryo, that organ being at the apex of the albumen in Fir-rapes, and at its base in Wintergreens. The curious leafless *Pyrola* called *P. aphylla* exhibits, among Wintergreens, the peculiar scaly brown aspect of Fir-rapes, and thus connects the two Orders.

Natives of Europe, Asia, and North America, in cool places, especially in Fir woods.

Several species smell of Violets or Pinks. In Germany the powder of *Monotropa Hypopithys* is given to sheep when attacked by coughs. The North American Indians are said to employ *Pterospora andromedea* as an anthelmintic and diaphoretic.



Fig. CCCXIV

GENERA.

Monotropa, <i>Nutt.</i>	|	<i>Orobanchoides</i> , <i>Tournf.</i>	|	<i>Schweinitzia</i> , <i>Ell.</i>	|	? <i>Corallophyllum</i> , <i>Kunth.</i>
Hypopithys, <i>Dill.</i>		<i>Pterospora</i> , <i>Nutt.</i>		<i>Monotropis</i> , <i>Schwein.</i>		? <i>Pholisma</i> , <i>Nuttall.</i>

NUMBERS. GEN. 6. Sp. 10.

Orobanchaceæ?

POSITION.—*Pyrolaceæ.*—MONOTROPACEÆ.—

Fig. CCCXIV.—*Monotropa Hypopithys*. 2. a flower; 3. a pistil; 4. the same divided perpendicularly; 5. a seed.—*Nees*. 6. seed of *Pterospora andromedea*; 7. a section of it.

ORDER CLXIX. ERICACEÆ.—HEATHWORTS.

Ericæ, *Juss. Gen.* 159 (1789).—*Ericææ*, *R. Brown Prodr.* 557. (1810).—*Rhododendra*, *Juss. Gen.* 158, 1789.—*Ericineæ*, *Desv. Journ. Bot.* 28. (1833); *Don in Edinb. Phil. Journal*, p. 150. (1834); *Klotzsch in Linneæ*, vol. 9. 67. *Litt.* (1835).—*Rhodoracææ* and *Ericacææ*, *DC. Fl. Fr.* 3. 671. and 675. (1815).—*Ericacææ*, *Ed. Pr. clxvi.* (1836); *Endl. Gen. clxi.*; *DC. Prodr.* 7. 580; *Meisner*, p. 244.

DIAGNOSIS.—*Erical Exogens*, with monopetalous flowers, free stamens all perfect, loose-skinned or tight-skinned seeds, and 2-celled anthers opening by pores.

Shrubs or under-shrubs. Leaves evergreen, rigid, entire, whorled, or opposite, without stipules. Inflorescence variable, the pedicels generally bracteate. Calyx 4- or



Fig. CCCXV.

5-cleft, nearly equal, inferior, persistent. Corolla hypogynous, monopetalous, 4- or 5-cleft, occasionally separable into 4 or 5 pieces, regular or irregular, often withering, with an imbricated aestivation. Stamens definite, equal in number to the segments of the corolla, or twice as many, hypogynous, or scarcely inserted into the base of the corolla; anthers 2-celled, the cells hard and dry, separate either at the apex or base, where they are furnished with some kind of appendage, and dehiscing by a pore. Ovary surrounded at the base by a disk, or secreting scales; many-celled, many-seeded; style 1, straight; stigma 1, undivided or toothed, or 3-cleft, with an indication of an indusium. Fruit capsular, many-celled, with central placentæ; dehiscence various. Seeds indefinite, minute; testa firmly adhering to the kernel; embryo cylindrical, in the axis of fleshy albumen; radicle much longer than the cotyledons and next the hilum.

This Natural Order contains some of the most beautiful plants of which we have any knowledge. They were formerly separated into two Orders by Jussieu, who distinguished *Ericæ* and *Rhododendra* by the dehiscence of their capsule; a character not now esteemed of ordinal importance, and consequently abandoned. Heathworts differ from Bilberries and Bellworts in their superior ovary, from Epacrids in the 2-celled anthers, from Wintergreens and Fir-rapes in the structure of their seeds and habit, and from all the Orders of which Figworts and Gentianworts



Fig. CCCXVI.

Fig. CCCXV.—*Rhododendron albiflorum*; 1 a calyx and pistil, with all the stamens removed save one; 2 an anther; 3 a ripe capsule burst; 4 a vertical section of a seed.

Fig. CCCXVI.—*Arctostaphylos pungens*. 1. a stamen; 2. a cross section of an ovary.

may be considered the representatives, in the stamens not growing upon the petals, and in the cells of the ovary agreeing in number with the lobes of the calyx and corolla. The genus *Saurauja* among Dilleniads, has very much the structure of a *Clethra*. In Horsfield's *Plante Javanica*, p. 86, mention is made of the peculiar nature of the stigma in these plants, which Mr. Bennett justly compares to the indusium of *Coodeniads*. I have endeavoured to show that this rim is nothing more than the points of carpellary leaves separated from the stigma, which is itself a prolongation of the placenta. See *Botanical Register*, 1840, t. 9, and some observations on *Babingtonia* in the same work.

Heathworts are most abundant at the Cape of Good Hope, where immense tracts are covered with them; they are common in Europe and North and South America, both within and without the tropics; less common in Northern Asia and India, and almost unknown in Australasia, where their place is supplied by *Epaerids*. Although found in tropical countries, as for example, Java, it is only in their highlands.

It is worthy of note that although Botanists do not now admit the two sections of this Order to be of the same value as was assigned to them by Jussieu, yet that there is a considerable difference in the nature of their secretions. *Ericææ* are to a large extent inert, there not being, in the whole of the vast genus *Erica*, a single instance of a medicinal species, for *Erica arborea*, once held to be an alexipharmic, seems to have been a merely superstitious medicine. *Calluna vulgaris*, the common Heather, is however astringent, and is employed both by fullers and dyers; its tough branches are the common material out of which brooms are made in this country, and the flowers are peculiarly grateful to bees. We do, however, find among the *Ericææ* species to which useful qualities cannot be denied. Some are astringents; as *Aretostaphylos Uva ursi*, believed to be a decided palliative in nephritic paroxysms; it is also employed in dysuria, catarrhus vesicæ, leucorrhœa and gonorrhœa. Its action is slow, and it therefore requires to be given for a considerable period; although the effects are uncertain they sometimes give astonishing relief.—*Peruvia*. The fruit of *Gaultheria procumbens*, a little dwarf North American evergreen, contains an aromatic, sweet, highly pungent volatile oil, which is antispasmodic and diuretic. A tincture has been useful in diarrhœa. Coxe states that the infusion is serviceable in asthma. It is used in North America as tea; and brandy in which the fruit has been steeped is taken in small quantities in the same way as common bitters. The oil is known under the name of Oil of Wintergreen, and is used by druggists to flavour syrups, and also by perfumers.

The berries of the succulent-fruited kinds are usually grateful, and sometimes used as food. *G. procumbens* and *Shallon*, *Aretostaphylos alpina*, and *Brossœa coccinea*, are examples of this. In Van Diemens Land the *G. hispida*, or Waxeluster, bears snow-white berries, with a flavour by no means unpleasant; in taste it is said to resemble the Gooseberry, but it is somewhat bitter; but according to some, the *G. antipoda* is said to have more merit as a fruit. The *Arbutus Unedo* (*κομάρος* of Dioscorides) bears a red fruit something like a Strawberry, whence the plant has been familiarly named the Strawberry-tree; its bark and leaves are astringent. A wine is made from the fruit in Corsica, but it is reported to be narcotic, if taken in quantity. *A. Andrachne* is stated to have similar qualities. In some instances this narcotic quality is so concentrated that the plants become poisonous. The shoots of *Andromeda ovalifolia* poison goats in Nipal. It is stated by Dr. Horsfield that a very volatile heating oil, with a peculiar odour, used by the Javanese in rheumatic affections, is obtained from another species of *Andromeda*. *A. polifolia*, a small shrub, found wild in the bogs of the North of Europe, is an acrid narcotic, and proves fatal to sheep. Similar properties have been observed in the United States in *A. mariana*, and others. It is however in the *Rhododendron* that dangerous narcotic qualities are most prevalent. The leaves of *Ledum latifolium* and *palustre* infused in beer render it unusually heady, producing headache, nausea, and even delirium. They have nevertheless been used, it is said, with advantage in tertian agues, dysentery, and diarrhœa. The leaves of *Kalmia latifolia* are poisonous to many animals, and are reputed to be narcotic, but their action is feeble. Bigelow states that the flesh of pheasants which have fed upon the young shoots is poisonous to man, and some cases of severe illness are on record which have been ascribed to this cause alone. The flowers exude a sweet honey-like juice, which is said when swallowed to bring on intoxication of a phrenitic kind, which is not only formidable in its symptoms but very lengthened in its duration.—*Burnett*. *Rhododendron chrysanthum*, a Siberian bush, is one of the most active of narcotics. Pallas and Koehpîn assert that a strong decoction of the leaves is of the greatest service in chronic, but dangerous in acute, rheumatism. Its value as a means of removing arthritic complaints has also been highly spoken of. Finally, Pallas mentions an inveterate case of nervous sciatica, which had brought the patient to a state of lameness and deplorable emaciation, which was completely cured by perseverance in the use of the leaves for two years. No sub-

sequent inconvenience was experienced, nor any signs of habitual drunkenness, although the dose was as much as 4 fluid ounces of the concentrated infusion daily. It has been said that the common evergreen shrub, *Rhododendron ponticum*, was the plant from whose flowers the bees of Pontus collected the honey that produced the extraordinary symptoms of poisoning described as having attacked the Greek soldiers in the famous retreat of the 10,000. Xenophon says that after eating it the men fell stupefied in all directions, so that the camp looked like a battle-field covered with corpses. But the Russian traveller Pallas is of opinion that *Azalea pontica* was the real cause of the mischief. He says that the effects of the Euxine honey are like those of *Lolium temulentum*, and occurs in a country where no *Rhododendron* grows. The natives are well aware of the deleterious qualities of the plant, and it is related that goats which browse on the leaves, before the pastures are green, suffer in consequence, and moreover that cattle and sheep perish. *R. maximum* is said by some writers to be a mere astringent, and by others to be certainly a poison. The Swiss *R. ferrugineum* is another narcotic; an oil is obtained from its buds, which in Piedmontese medicine is called *Olio di Marmotta*, and is used in pains of the joints. The flowers of *R. arborcum* are eaten by the hill people of India, and are formed into a jelly by European visitors. The ferruginous leaves of *R. campanulatum* are used as snuff by the natives of India, as, we are informed by De Candolle, is in the United States the brown dust that adheres to the petioles of *Kalmias* and *Rhododendrons*. *Loiseleuria procumbens* has some reputation as an astringent medicine.

GENERA.

- I. ERICACEÆ.—Fruit loculicidal, rarely septicidal or berried. Buds naked.
- * ERICINEÆ.
- Salix*, Salisb.
Coccyperna, Klotsch.
Lagenocarpus, Klotsch.
Scyphogyne, Brongn.
Tristemon, Klotsch.
Omphalocarpus, Klotsch.
Codonostigma, Klotsch.
Colostigma, Benth.
Thamnum, Klotsch.
Colanthemum, Klotsch.
Sydesmanthus, Klotsch.
Macrolinum, Klotsch.
Sympieza, Lichtenst.
Microgomphus, Benth.
Sinocheilus, Benth.
Plagiostemon, Klotsch.
Thamnus, Klotsch.
Thoracosperma, Klotsch.
Octogonia, Klotsch.
Pachycalyx, Klotsch.
Acrostemon, Klotsch.
Comarophabia, Klotsch.
Grisbachia, Klotsch.
Finckeia, Klotsch.
Eremia, Don.
Podermia, Benth.
Mieronia, Benth.
H. restmon, Klotsch.
Mieretrena, Klotsch.
Baria, Linn.
Eriocnella, Klotsch.
Philippia, Klotsch.
Eleutherostemon, Klotsch.
Bruckenthalia, Reichenb.
Erica, Linn.
Ectaxis, Benth.
Calliodon, Benth.
Permia, Don.
Polylermia, Benth.
Chromostegia, Benth.
- Eriodesmia*, Don.
Amphodea, Salisb.
Geissostegia, Benth.
Gigandra, Salisb.
Pelostoma, Salisb.
Didymanthera, Benth.
Syringodea, Benth.
Eurylepis, Benth.
Callibotrys, Salisb.
Pleurocallis, Salisb.
Evanthe, Salisb.
Chona, Don.
Octopero, Benth.
Dasyanthes, Benth.
Batrachium, Salisb.
Stellanthe, Benth.
Myra, Salisb.
Ceramus, Salisb.
Erytoma, Don.
Platyloma, Benth.
Callista, Don.
Cyatholoma, Benth.
Platyspora, Salisb.
Lamprotis, Don.
Eurystegia, Benth.
Trigemma, Salisb.
Oxytoma, Benth.
Pseudemia, Benth.
Pachysa, Don.
Anacnasis, Benth.
Hernes, Benth.
Diphilus, Salisb.
Loconeria, Salisb.
Eremocallis, Salisb.
Pyronium, Salisb.
Gypsocallis, Salisb.
Cramia, Don.
Ephelus, Salisb.
Orophaneæ, Salisb.
Leptodendron, Benth.
Heliophaneæ, Salisb.
Lophandra, Don.
Melanemum, Salisb.
Erytoma, Benth.
Plycodon, Benth.
Elytrodigia, Benth.
- Arsace*, Salisb.
Chlorocodon, Benth.
Pentapera, Klotsch.
Macnabia, Benth.
Nabea, Lehmann.
Calluna, Salisb.
- ANDROMEDINEÆ.
- Menziesia*, Smith.
Eryanthus, Gmel.
Phyllodoce, Salisb.
Dabbeeta, Don.
Boretta, Neck.
Arcimbalda, Endl.
Candollea, Baumg.
Andromeda, Linn.
Cassiope, Don.
Polifolia, Buxb.
Cassandra, Don.
Lyonia, Reichenb.
Dipluria, Raf.
Banmannia, DC.
Chamedaphne, Buxb.
Zenobia, Don.
Leucothoe, Don.
Cassiphone, Rehb.
Maria, DC.
Agauria, DC.
Pieris, Don.
Agarista, Don.
Oxydendron, DC.
Lyonia, Nutt.
Xotisma, Raf.
Clethra, Linn.
Curtlaria, Ruiz et Pav.
Tinus, Linn.
Volkameria, R. Br.
Junia, Adans.
Epigæa, Linn.
Memecylon, Mitch.
Gaultheria, Linn.
Gautiera, Kalm.
Chiogenes, Salisb.
Glycyphylla, Raf.
Phalerocarpus, Don.
Amphicalyx, Blum.
- Duplicosia*, Blum.
Shottowium, Raf.
Pernetia, Gaudich.
Arbutus, Tournef.
Uwdo, Link.
Enkyanthus, Lour.
Melidora, Salisb.
Arctostaphylos, Adans.
Una ursi, Tournef.
Mairania, Neck.
Comarostaphylis, Zucc.
- II. RHODODENDEÆ.—Fruit capsular, septicidal. Buds scaly, and resembling cones.
- Azalea*, Linn.
Loiseleuria, Desv.
Chamaecistus, Gray
Chamaedon, Link.
Osmothamnus, DC.
Kalmia, Linn.
Rhodothamnus, Reichb.
Adodendron, Neck.
Chamaecistus, Don.
Ledum, Michel.
Rhododendron, Linn.
Anthodendron, Reich.
Thcis, Salisb.
Pentanthera, Don.
Rhodora, Linn.
Bevernckia, Salisb.
Vireya, Blum.
Booram, Endl.
Byramia, DC.
Hymenanthus, Blum.
Bejaria, Mont.
Bejaria, Adr. Juss.
Aenna, Ruiz et Pav.
Leiophyllum, Pers.
Ammyrsine, Pursh.
Fischeria, Swartz.
Dendrium, Desv.
Ledum, Linn.
Datia, Adans.

NUMBERS. GEN. 42. Sp. 850.

Rutacea.

POSITION.—Pyrolaceæ.—ERICACEÆ.—Epaeridaceæ.

Dilleniaceæ.

ALLIANCE XXXV. RUTALES.—THE RUTAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous symmetrical flowers, axile placentæ, an imbricated calyx and corolla, definite stamens, and an embryo with little or no albumen.*

The larger part of this Alliance might and even has been regarded as one Natural Order, and by all Botanists the members of it are placed in very close relationship, with the exception of Waterpeppers and Podostemads. The two latter are, however, so very like degraded forms of Rueworts, that I cannot but regard them as standing in the same relation to Rutals as Hippurids to the Myrtal Alliance. They are, however, in tracing affinities, to be looked upon as mere lateral offshoots from some of the higher Orders, and not as either terminating a line or completing a circle of affinities.

Strictly speaking, the Rutal Alliance touches the Erical by means of Rueworts themselves, among which *Correa* assumes the appearance of an *Andromeda*; in like manner it does not pass into the Geraniac Alliance by way of Podostemads, but through Beanpeppers, which stand close to Oxalids, or even Cranesbills, of which they have the stipules.

Terebinths approach the genus *Juglans* in the Diclinoous series, through such of their unisexual genera as *Pistacia*.

NATURAL ORDERS OF RUTALS.

- | | |
|---|-----------------------|
| <i>Fruit consolidated, succulent, indehiscent. Petals imbricated. Stamens free, or nearly so. Leaves dotted</i> | } 170. AURANTIACEÆ. |
| <i>Fruit consolidated, hard, dry, somewhat valvular. Petals valvate. Stamens free. Leaves generally dotted</i> | } 171. AMYRIDACEÆ. |
| <i>Fruit consolidated, capsular. Stamens deeply monadelphous or free. Seeds numerous, winged</i> | } 172. CEDRELACEÆ. |
| <i>Fruit consolidated, berried or capsular. Stamens deeply monadelphous. Seeds few, wingless. Leaves dotless</i> | } 173. MELIACEÆ. |
| <i>Fruit apocarpous. Ovule single, suspended by a cord rising from the base of the carpel</i> | } 174. ANACARDIACEÆ. |
| <i>Fruit apocarpous. Ovules collateral, ascending, orthotropal, sessile</i> | } 175. CONNARACEÆ. |
| <i>Fruit finally apocarpous, few-seeded, with the pericarp separating in two layers. Ovules sessile, pendulous. Flowers ♀.</i> | } 176. RUTACEÆ. |
| <i>Fruit finally apocarpous, few-seeded, with the pericarp separating in two layers. Ovules sessile, pendulous. Flowers ♂-♀-♀.</i> | } 177. XANTHOXYLACEÆ. |
| <i>Fruit finally apocarpous, one-seeded, with the pericarp not laminating, and a succulent conical torus</i> | } 178. OCHNACEÆ. |
| <i>Fruit finally apocarpous, one-seeded, with the pericarp not laminating, and a dry inconspicuous torus. Albumen wanting. Leaves alternate, without stipules</i> | } 179. SIMARUBACEÆ. |
| <i>Fruit finally apocarpous, few-seeded, with the pericarp not laminating, and a dry inconspicuous torus. Albumen present. Leaves opposite, with stipules</i> | } 180. ZYGOPHYLLACEÆ. |
| <i>Fruit finally apocarpous, many-seeded. Flowers polypetalous</i> | } 181. ELATINACEÆ. |
| <i>Fruit finally apocarpous, many-seeded. Flowers apetalous, very imperfect</i> | } 182. PODOSTEMACEÆ. |

ORDER CLXX. AURANTIACEÆ.—CITRONWORTS.

Aurantaceæ, *Corr. Ann. Mus.* 6. 376. (1805); *Mirb. Bull. Philom.* 379. (1813); *DC. Prodr.* 1. 536. (1824); *Endl. Gen.* cxxiv.; *Wight Illustr.* 1. t. 42.

DIAGNOSIS.—*Rutalægens*, with consolidated succulent indehiscent fruit, imbricated petals, free or nearly free stamens, and dotted leaves.

Trees or shrubs, almost always smooth, and filled everywhere with little transparent receptacles of volatile oil. Leaves alternate, often compound, always articulated with the petiole, which is frequently winged. Spines, if present, axillary. Calyx urecolate or campanulate, somewhat adhering to the disk, short, 3- or 5-toothed, withering. Petals 3 to 5, broad at the base, sometimes distinct, sometimes slightly combined, inserted upon the outside of an hypogynous disk, slightly imbricated at the edges. Stamens equal in number to the petals, or twice as many, or some multiple of their number, inserted upon the same hypogynous disk; filaments flattened at the base, sometimes distinct, sometimes slightly combined in one or several parcels; anthers terminal, innate. Ovary free, many-celled; style 1, taper; stigma slightly divided, thickish; ovules solitary, twin, or 00, pendulous or occasionally horizontal, anatropal. Fruit pulpy, one or more-celled, sometimes with a leathery rind replete with receptacles of volatile oil, and even separable from the cells; cells often filled with pulp. Seeds attached to the axis, sometimes numerous, sometimes solitary, usually pendulous, occasionally containing more embryos than one; raphe and chalaza usually very distinctly marked; albumen 0; embryo straight; cotyledons thick, fleshy; radicle very short.

These are readily known by the abundance of oily receptacles which are dispersed

over all parts of them, by their deciduous petals, compound leaves, often with a winged petiole, imbricated petals, and succulent or pulpy fruit. They are nearly related to Amyrids on the one hand, and to various genera of Rueworts on the other, but differ from the first in their pulpy fruit and imbricated petals, and from the latter in their consolidated juicy fruit. It is more difficult to distinguish them from Xanthoxyls, unless attention is paid to the fruit, the apocarpous structure of the ovary, and the polygamous flowers. *Luvunga* is remarkable for having the climbing habit of Xanthoxyls, and the fruit of Citronworts. The raphe and chalaza are usually distinctly marked upon the testa, and sometimes beautifully. The genus *Citrus* is very subject to a monstrous separation of the carpels, which produces what are called horned Oranges, and fingered Citrons, the last of which is the genus *Sarcodactylis* of the younger Gartner (t. clxxxv.), or to a multiplication of the normal number of carpels, in which case Orange is formed within Orange.

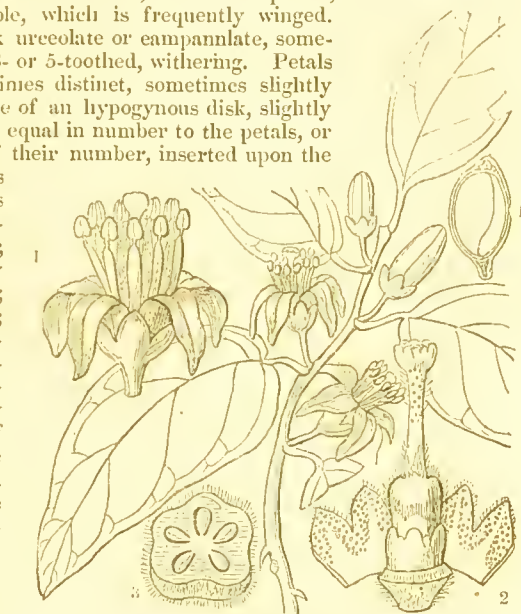


Fig. CCCXVII.

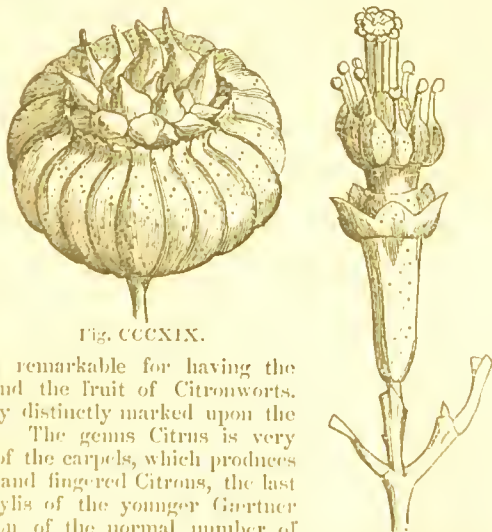


Fig. CCCXIX.

Fig. CCCXVIII.

Fig. CCCXVII.—*Micromelum monophyllum*.—Wight 1. a flower; 2. the pistil when the calyx is removed; 3. a cross section of an ovary; 4. longitudinal section of a seed.

Fig. CCCXVIII.—A young Orange, with a row of supernumerary carpels.

Fig. CCCXIX.—The fruit produced by this.

Citronworts are almost exclusively found in the East Indies, whence they have in some cases spread over the rest of the tropics. Two or three species are natives of Madagascar; one is described as found wild in the woods of Essequibo; and Prince Maximilian of Wied Neuwied speaks of a wild Orange of Brazil, called Laranja da terra, which has by no means the delicious refreshing qualities of the cultivated kind, but a mawkish sweet taste. This is called by Martius *Citrus Aurantium efferata*; but must have been introduced. *Limonia laureola* is remarkable as the only plant of this family found on the tops of cold and lofty mountains, where it is for some months of the year buried under the snow. The Hill people of India call it Kidar-patri and Kuthar-chara, and say that it is by feeding on its leaves that the Musk acquires its peculiar flavour.—*Royle*.

The wood is universally hard and compact; the leaves abound in a volatile, fragrant, bitter, exciting oil; the pulp of the fruit is always more or less acid. The Orange, Lemon, Lime, Shaddock, Pomelmoose, Forbidden Fruit, and Citron, Indian fruits, some of which have now become so common in other countries as to give a tropical character to a European dessert, are the most remarkable products of the Order. To this must be added the excellence of their wood, and the fragrance and beauty of their flowers. The fruits just mentioned are not, however, its only produce. The Wampee, a fruit highly esteemed in China and the Indian archipelago, is the produce of *Cookia punctata*. The berries of *Glycosmis citrifolia* are delicious; those of *Triphasia* are extremely agreeable. The productiveness of the common Orange is enormous. A single tree at St Michael's has been known to produce 20,000 Oranges fit for packing, exclusively of the damaged fruit and the waste, which may be calculated at one-third more. The juice of the Lime and the Lemon contains a large quantity of citric acid. Oranges contain malic acid. A decoction of the root and bark of *Ægle Marmelos* is supposed, on the Malabar coast, to be a sovereign remedy in hypochondriasis, melancholia, and palpitation of the heart; the leaves in decoction are used in asthmatic complaints, and the fruit a little unripe is given in diarrhoea and dysentery. Roxburgh adds, that the Dutch in Ceylon prepare a perfume from the rind; the fruit is most delicious to the taste, exquisitely fragrant and nutritious, but laxative; the mucus of the seed is a good cement for some purposes. The leaves of *Bergera Königii* are considered by the Hindoos as stomachic and tonic; an infusion of them toasted stops vomiting; the green leaves are used raw in dysentery; the bark and root internally as stimuli. The young leaves of *Feronia elephantum* have, when bruised, a most delightful smell, much resembling Anise; the native practitioners of India consider them stomachic and carminative; its gum is very like Gum Arabic. Orange-leaves are sometimes prescribed to hysterical females instead of Tea. Oil of Neroli and Napha water, two delicious perfumes, are distilled from Orange-flowers; Cedrati, a variety of the Lime, is another perfume in much esteem. See further, *Royle's Illustrations*, p. 129.

GENERA.

<i>Atalantia</i> , <i>Corr.</i>	<i>Bergera</i> , <i>Kön.</i>	<i>Acronychia</i> , <i>Forst.</i>	<i>Ægle</i> , <i>Corr.</i>
<i>Triphasia</i> , <i>Lour.</i>	<i>Murraya</i> , <i>Kön.</i>	<i>Clausena</i> , <i>Burm.</i>	<i>Belou</i> , <i>Adans.</i>
<i>Limonia</i> , <i>Linn.</i>	<i>Chalcas</i> , <i>Lour.</i>	<i>Micromelum</i> , <i>Blum.</i>	<i>Citrus</i> , <i>Linn.</i>
<i>Winteria</i> , <i>Demst.</i>	<i>Marsana</i> , <i>Sonn.</i>	<i>Paramignya</i> , <i>Wight.</i>	<i>Sarcodactylis</i> , <i>Gærtu.</i>
<i>Glycosmis</i> , <i>Corr.</i>	<i>Cookia</i> , <i>Sonner.</i>	<i>Lavanga</i> , <i>Hamil.</i>	<i>Papeda</i> , <i>Hassk.</i>
<i>Sclerostylis</i> , <i>Blum.</i>	<i>Quinaria</i> , <i>Lour.</i>	<i>Lavanga</i> , <i>Meisu.</i>	? <i>Chionotria</i> , <i>Jack.</i>
<i>Rissoa</i> , <i>Arn.</i>	? <i>Aulacia</i> , <i>Lour.</i>	<i>Feronia</i> , <i>Corr.</i>	? <i>Severinia</i> , <i>Tenor.</i>

NUMBERS. GEN. 20. Sp. 95.

POSITION.—Amyridaceæ.—AURANTIACEÆ.—Xanthoxylaceæ.

ORDER CLXXI. AMYRIDACEÆ.—AMYRIDS.

Terebinthaceæ, *Juss. Gen.* 368. (1789) in part; tribes 4 & 5. *DC. Prodr.* 2. 81. (1825).—Amyridææ, *R. Brown in Congo*, 431. (1818); *Kunth in Ann. Sc. Nat.* 2. 353. (1824).—Amyridaceæ, *Ed. pr. cxviii. Prodr.* 2. 81. (1825).—Bursaceæ, *Kunth in Ann. Sc. Nat.* 2. 333. (1824); *Endl. Gen. cxvli.*; *Meisner, Gen.* p. 77.—?Balaniteæ, *Endl. Ench.* p. 547. (1841).

DIAGNOSIS.—*Rutal Exogens, with consolidated, hard, dry, and somewhat valvular fruit, valvate petals, free stamens, and generally dotted leaves.*

Trees or shrubs, abounding in balsam or resin. Leaves alternate or opposite, ternate or unequally pinnate, occasionally with stipules, and pellucid dots. Flowers axillary or terminal, in racemes or panicles, sometimes unisexual by abortion. Calyx persistent, somewhat regular, with from 2 to 5 divisions. Petals 3-5, inserted below a disk arising from the calyx; æstivation usually valvate, sometimes imbricated. Stamens twice as many as the petals, all fertile. Disk orbicular or annular. Ovary 1-5-celled, superior, sessile in or upon the disk; style solitary and compound; stigmas as many as the cells of the ovary, and where there is but one cell capitate; ovules in pairs, attached to the apex of the cell, anatropal, collateral. Fruit hard and dry, 1-5-celled, with its outer part often splitting into valves. Seeds without albumen; cotyledons either wrinkled and plaited, or amygdaloid; radicle superior, straight, turned towards the hilum.

These are plants with the appearance of Oranges, and in the instance of *Amyris* itself, with the dotted leaves of that Order; nor have they any positive mark of distinction, except their fruit forming a shell whose husk eventually splits into valve-like segments. In general, however, the petals have a valvate æstivation; and *Amyris*, which wants that character, has only a one-celled ovary. The genera collected under this name are by no means perfectly known, and demand a scrupulous revision. *Copaifera* and *Myrospermum*, placed here in the last edition of this work, belong to the Leguminous Order. In referring the genus *Balanites* hither, I do so without having had the opportunity of examining its fruit, the seeds of which are said to be albuminous. Its calyx is certainly not valvate, as it has been described to be, but is truly imbricated.

What species have as yet been ascertained are exclusively natives of tropical India, Africa, and America.

It is here that we find the trees yielding myrrh and frankincense, besides which the species have all an abundance of fragrant resinous juice. The resin of *Boswellia* is used in India as frankincense, and also as pitch. It is hard and brittle, and, according to Roxburgh, is boiled with some low-priced oil to render it soft and fit for use. The native doctors prescribe it, mixed with ghee (clarified butter), in cases of gonorrhœa, and also in what they call *Ritta Kaddapoo*, which signifies flux accompanied with blood.

The wood is heavy, hard, and durable. *Boswellia serrata*, called *Libanus thurifera* by Colebrooke, produces the gum-resin *Olibanum*, a substance chiefly used as a grateful incense, but which also possesses stimulant, astringent, and diaphoretic properties. Arabian frankincense has also been said to be the produce of the same tree, but this is very uncertain. Myrrh, or *Hobali*,



Fig. CCCXXI.

Fig. CCCXX.

Fig. CCCXX.—*Magnia obtusifolia*.—*Delavert.* 1. a flower, 2. the same divided vertically; 3. a fruit; 4. a section of the same.

Fig. CCCXXI.—Embryo of *Elyonurus excelsum*.—*Tournef.*

is obtained on the Abyssinian coast from *Balsamodendron Myrrha*, a dwarf shrub called Kerobeta by the natives. Balm of Mecca, Beshan (perhaps the origin of the word Balsam), the Balessan of Bruce, is yielded by *B. Opobalsamum*.—Harris in *Chem. Gaz.* 1844. 148. *B. Gileadense* is also said to furnish it. A species of *Balsamodendron* is also mentioned by Mr. Griffith as being one of the most cultivated plants in Afghanistan for its aromatic and stimulant properties; it is called Schnee.—*Ann. Nat. Hist.* x. 194.

A kind of coarse resin is obtained from *Boswellia glabra*, and is used, boiled with oil, for pitching the bottom of ships. *Bursera paniculata*, called Bois de Colophane in the Isle of France, gives out, from the slightest wound in the bark, a copious flow of limpid oil of a pungent turpentine odour, which soon congeals to the consistence of butter, assuming the appearance of camphor. The gum of *Canarium commune* has the same properties as those of the Balsam of Copaiva; the three-cornered nuts are eaten in Java both raw and dressed, and an oil is expressed from them, which is used at table when fresh, and for burning when stale. The raw nuts are, however, apt to bring on diarrhoea.

Among fragrant products of less moment may be named *Bdellium*, the resin, in Africa, of the Niouttout or *Balsamodendron africanum*, and in India of *B. Roxburghii*, supposed to be the same plant as *Commiphora madagascariensis*; *Tacamahac* from *Elaphrium tomentosum*; Incense-wood from *Icica guianensis*; American Elemi in part from *Icica Icicariba*; American Balm of Gilead from *Icica Carana*; Balsam of Acouchi from *Icica Araeouchini*; Chibou or Cachibou resin from *Bursera gummifera*; Resin of Carana from *Bursera acuminata*; Beaume à cochon or Beaume à suerier, a substitute for Copaiva, from *Hedwigia balsamifera*; Resin of *Commia* from *Icica ambrosiaca*. Finally, it is said that *Amyris toxifera* is poisonous; that *Amyris Plumieri*, and another species called by Dr. Hamilton *A. hexaudra*, yield a part of the Gum Elemi of commerce; and that the wood of *Amyris balsamifera*, a Jamaica tree, furnishes one of the sorts of *Lignum Rhodium*. *Picramnia ciliata*, a Brazilian tree, has a bitter subaerid bark, which is administered successfully as a substitute for *Cascarilla*, according to Martius. The layers of the liber of a species of *Amyris* were found by Cailliaud to be used by the Nubian Mahometans as paper, on which they write their legends. *Icica altissima* furnishes the Curana, Samaria, Acuyari, Mara, or Cedar-wood of Guiana, one variety of which is red, the other white, according to Sir R. Schomburgk. It is light, easily worked, and very aromatic. This distinguished traveller states that one of his canoes, 42 feet long and 5½ feet wide, had been made from a single tree of this species. The leaves of *Balanites ægyptiaca*, a tree cultivated in Egypt under the Negro name of Sonn, and the Arabic Hilelgie or Haledsch, are slightly acid, and have the reputation of being anthelmintic. The unripe flesh of its drupes is acrid, extremely bitter, and violently purgative; but when ripe it is eaten without inconvenience. A fat oil, called Zachum, is pressed from its seeds. The fruits are said to be mixed in commerce with Myrobalans.

GENERA.

I. BURSERIDÆ. — Ovary with more cells than one.	<i>Elaphrium, Jacq.</i>	? <i>Coproxyton, Tuss.</i>	? <i>Loureira, Meisn.</i>
	<i>Icica, Aubl.</i>	? <i>Knorria, Moq. et Sess.</i>	? <i>Toluifera, Lour.</i>
	<i>Bursera, Jacq.</i>	<i>Garuga, Roxb.</i>	? <i>Triceros, Lour.</i>
<i>Boswellia, Roxb.</i>	<i>Trattinickia, Willd.</i>	? <i>Kunthia, Dennst.</i>	? <i>Barbylus, P. Br.</i>
<i>Libanus, Colebr.</i>	? <i>Daeryodes, Vahl.</i>	<i>Hemprichia, Ehrenb.</i>	? <i>Pachylobus, G. Don.</i>
<i>Ploesstea, Endl.</i>	<i>Marignia, Commers.</i>	? <i>Balanites, Del.</i>	
<i>Protium, Burm.</i>	<i>Dannara, Gärtn.</i>	? <i>Pagarastrum, Don.</i>	II. AMYRIDÆ. — Ovary one-celled.
<i>Balsamodendron, Kuntz.</i>	<i>Canarium, Linn.</i>	? <i>Picramnia, Swartz.</i>	<i>Amyris, Linn.</i>
<i>Heudelotia, A. Rich.</i>	? <i>Pimela, Lour.</i>	? <i>Methysephyllum, Eckl. et Zeyh.</i>	<i>Elemifera, Plum.</i>
<i>Niouttout, Adans.</i>	<i>Colophonia, Commers.</i>	? <i>Tapiria, Juss.</i>	<i>Lucinium, Plukn.</i>
<i>Balsamea, Gled.</i>	<i>Hedwigia, Swartz.</i>	? <i>Joncquelia, Schreb.</i>	
<i>Balessan, Bruce.</i>	? <i>Tetragastris, Gärtn.</i>		
<i>Commiphora, Jacq.</i>	<i>Schwägrichenia, Reic.</i>		

NUMBERS. GEN. 22. Sp. 45.

POSITION.—Anacardiaceæ.—AMYRIDACEÆ.—Aurantiaceæ.

ORDER CLXXII. CEDRELACEÆ.—CEDRELADS.

Cedreleæ, *Brown in Flinders*, 61. (1814).—*Meliaceæ*, § *Cedreleæ*, *DC. Prodr.* 1. 624. (1824).—*Cedrelaceæ*, *A. de Jussieu Mémoire* (1830); *Ed. pr.* lxxviii.; *Endl. Gen.* cxxvi.; *Meisner* p. 47.

DIAGNOSIS.—*Rutal Exogens*, with consolidated capsular fruit, deeply monadelphous or free stamens, and numerous winged seeds.

Trees, with timber which is usually compact, scented, and beautifully veined. Leaves alternate, pinnated, without stipules. Flowers in terminal panicles. Calyx 4-5-cleft. Petals 4-5, longer. Stamens 8-10; the filaments either united into a tube (*Swietenicæ*), or distinct (*Cedreleæ*), and inserted into an hypogynous disk. Style and stigmas simple. Cells of the ovary equal in number to the petals, or fewer (3), with the ovules ascending or pendulous, anatropal, 4, or often more, imbricated, in two rows. Fruit capsular, with the valves separable from the thick axis, with whose angles they alternate. Seeds flat, winged; albumen thin or none; embryo orthotropal, straight; cotyledons flattish or fleshy; radicle very short, next the hilum.

Nearly related to *Meliads*, in whose affinities they participate, and chiefly distinguished by their winged and indefinite seeds. *Flindersia*, a genus established by Brown in the Appendix to Captain Flinders' *Voyage*, differs from *Cedrelads* both in the insertion of its seeds, which are erect, in the dehiscence of its capsules, and also in having moveable dissepiments: these last, however, Brown considers as segments of a common placenta, having a peculiar form. *Flindersia*, and *Chloroxylon* are distinct from the rest of the Order, in having the leaves dotted with pellucid glands, in which respect they serve to connect *Cedrelads* with *Citronworts*, and, notwithstanding

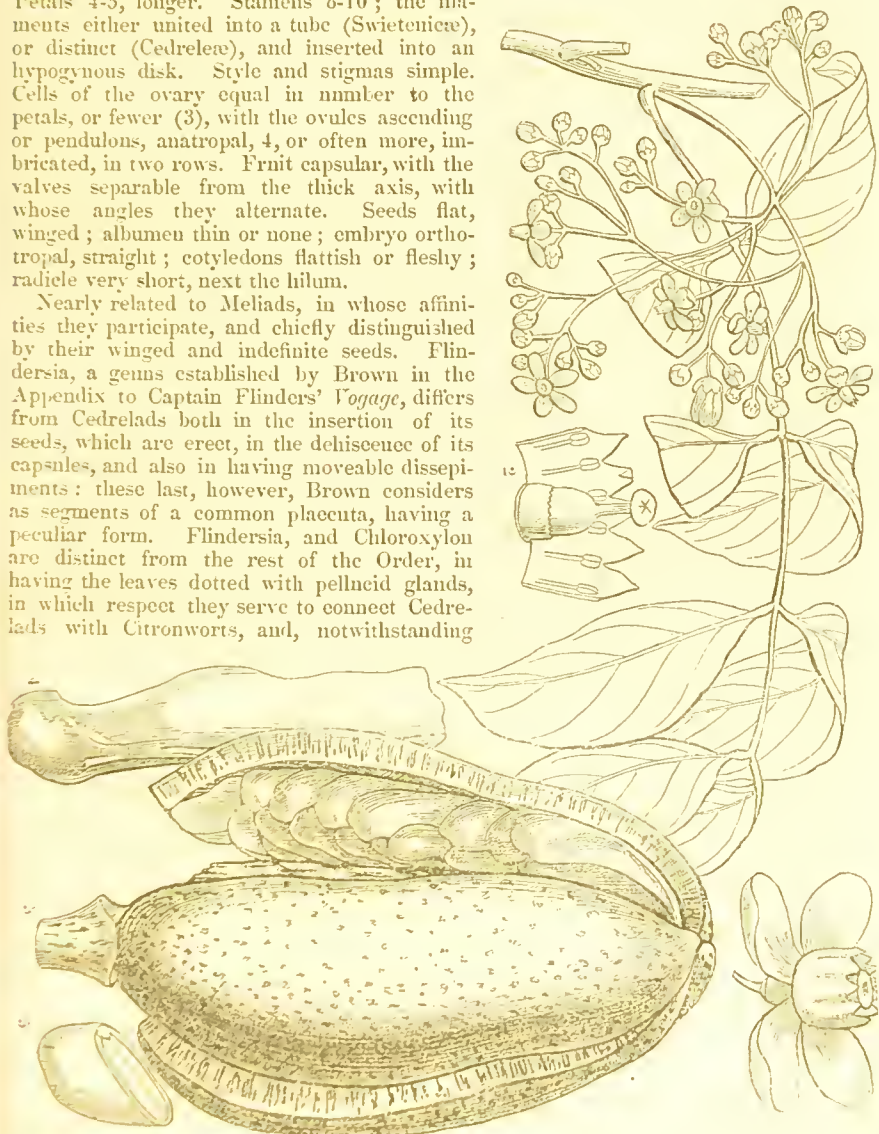


Fig. CCCXXII.

the absence of albumen, even with *Rueworts*. See the Appendix and Atlas to *Flinders' Voyage*.

Fig. CCCXXII.—*Swietenia Malayanica*.—*Hooker*. 1, a flower, 2, a cup of stamens spread open, and the pistil; 3, fruit; 4, a seed, 5, a section of it to show the crescent embryo.

These are common to the tropics of America and India, but are very rare on the continent of Africa, and the adjoining islands.

The wood of the Order is in general fragrant and aromatic. The bark of *Cedrela* is fragrant and resinous; that of *C. Toona*, and of Mahogany (*Swietenia Mahagoni*) is also accounted febrifugal. The former is a powerful astringent, and though not bitter, a tolerably good substitute for Peruvian Bark in the cure of remitting and intermitting fevers; particularly when joined with a small portion of the powdered seed of *Cæsalpinia Bonducella* (Kutulegee of the Bengalese), which is a most powerful bitter. The bark was used in Java by Dr. Blume, with much success in the worst epidemic fevers, diarrhoea, and other complaints; Horsfield also applied it in various cases of dysentery, but in the last stage, when the inflammatory symptoms had disappeared. The bark of *Soyimida febrifuga*, the Rohuna of Hindostan, called on the Coromandel coast the Red-wood tree, is a useful tonic in India in intermitting fevers; but Ainslie found that if given beyond the extent of 4 or 5 drachms in 24 hours, it deranged the nervous system, occasioning vertigo and subsequent stupor. It has also been employed successfully in India in bad cases of gangrene, and in Great Britain in typhus fever, and as an astringent. That of Khaya, the Kassou-Khaye of Senegal, is a common febrifuge in the swampy districts on the banks of the Gambia. *Cedrela febrifuga* bark is said by Blume to be employed successfully against the intermitting fevers of Java; he observes that it is tonic and useful in cases of diarrhoea, &c., but that it should never be used where there is a tendency to inflammation. The bark of *Chickrassia tabularis* has been found to be powerfully astringent without bitterness.—*Roxb.* Juriballi bark, a Demerara product, is also supposed to belong to some plant of this Order; it is described as being a potent bitter and astringent, far superior to Peruvian bark in fevers of a typhoid and malignant nature. It is cordial and purgative; and is also a powerful diaphoretic, especially if taken warm.—*Hancock.* An essential oil is found in *Flindersia* and *Chloroxylon*, as is indicated by their dotted leaves. The young shoots of *Cedrela angustifolia* have a powerful smell of Garlic, according to Ruiz and Pavon. Satin-wood is the produce of *Chloroxylon Swietenia*, which is one of the plants that yield the wood oil of India.—*Royle.* *Oxleya xanthoxyla*, a large tree, is the Yellow-wood of New South Wales. Mahogany is the timber of *Swietenia Mahagoni*.

GENERA.

<p>I. SWIETENIÆ. — <i>Stamens monadelphous.</i> <i>Swietenia, Linn.</i> <i>Mahagoni, Adans.</i> <i>Rosa, Scop.</i> <i>Cedrus, Mill</i></p>	<p><i>Khaya, Adr. Juss.</i> <i>Soyimida, Adr. Juss.</i> <i>Chickrassia, Adr. Juss.</i> <i>Chukrassia, Adr. Juss.</i> <i>Plagiotaëx, Wall.</i></p>	<p>II. CEDRELÆ. — <i>Stamens distinct.</i> <i>Chloroxylon, DC.</i> <i>Flindersia, R. Br.</i> <i>Oxleya, A. Cunn.</i> <i>Cedrela, Linn.</i></p>	<p><i>Jonesia, Adans.</i> <i>Cedrus, Mill part.</i> <i>Toona, Endl.</i> <i>Cuvcracca, Jones.</i> <i>Surenus, Rumph.</i> <i>Vavava, Benth.</i></p>
--	---	--	---

NUMBERS. GEN. 9. Sp. 25.

POSITION.—*Meliaceæ.*—*CEDRELACEÆ.*—*Aurantiaceæ.*

ORDER CLXXIII. MELIACEÆ.—MELIADS.

Meliæ, Juss. Gen. 263. (1789).—Meliaceæ, Juss. Mém. Mus. 3. 436. (1817); DC. Prod. 1. 619. (1824); Adr. de Juss. Mémoire (1830); Ed. pp. lxxvii.; Endl. Gen. cexxxv.

DIAGNOSIS.—*Rutal Exogens*, with consolidated berried or capsular fruit, deeply monadelphous stamens, a few wingless seeds, and dotted leaves.

Trees or shrubs. Leaves alternate, or occasionally somewhat opposite, simple, or pinnate, without stipules. Flowers sometimes imperfect by abortion, usually in loose



Fig. CCCXXIII.

masses. Sepals 3, 4, or 5, more or less united. Petals the same number, hypogynous, conniving at the base, or even cohering, usually having a valvate or imbricated aestivation. Stamens twice as many as the petals; filaments cohering in a long tube; anthers sessile within the orifice of the tube. Disk frequently highly developed, surrounding the ovary like a cup. Ovary single, with the same number of cells as petals, or fewer (3-2), very seldom many more (10-12) cells; style 1; stigmas distinct or combined; ovules anatropal, semi-anatropal, amphitropal or orthotropal! 1 or 2 in each cell, very rarely 4. Fruit berried, drupaceous or capsular, often, in consequence of abortion, 1-celled, the valves, if present, having the dissepiments in their middle. Seeds not winged, with or without an aril; albumen fleshy (*Meliæ*), or usually absent (*Trichiliæ*). Embryo with leafy or amygdaloid cotyledons, within which the radicle is drawn back.

This Order was ill understood until it was investigated by Adrien de Jussieu, from whose Memoir I borrow the principal part of what follows. It is, no doubt, related to Citronworts, although *Canella*, which was considered a case of transition, is removed from it. The inflorescence of Citronworts terminating in dichotomies with a central and præcocious flower, the union that sometimes occurs between the filaments of Citronworts, the number of stamens often double that of the petals, and the embryo with a short radicle drawn back between thick cotyledons, are all points in which there is an accordance between the two Orders. The occasionally monadelphous stamens of *Rueworts* indicate an analogy with that Order, which is confirmed by the general tendency in both cases to produce two ovules in each cell of the ovary. The number and the relative position of the parts of the flower show an affinity with Soapworts, the structure of whose seeds is often absolutely the same as that of *Meliads*; their accordance in habit is incontestable, and in fact the species of the two Orders are often mixed together in herbaria. *Cedrelads* are chiefly distinguished by their

Fig. CCCXXIII.—*Ekobergia Senegalensis*. 1. a flower; 2. the calyx and staminal tube; 3. a transverse section of the ovary; 4. a ripe fruit; 5. a vertical section of the latter.

winged seeds and the stamens being in a less degree monadelphous. As to a supposed affinity between Vineworts and this Order, it seems to be of a very distant description.

The species are found all over the world; in about equal quantities in America and Asia, and four times fewer in Africa; but these proportions are possibly due to the difference in the degree that those parts of the world have been examined. The Order does not extend further to the north than 40°; *Melia Azedarach* is naturalised as it were in Provence; and an *Hartighsea* exists in New Zealand. The extra-tropical species are, however, rare.

Bitter, astringent, and tonic qualities belong to the species of this Order, and are often developed in so considerable a degree as to render their application dangerous without precaution. A Brazilian plant called Jito is a powerful purgative, but Piso in mentioning it, warns us against the danger of employing it, and says that it is more often a poison than a medicine; it is supposed to be a species of *Guarea*, perhaps either *G. purgans* or *spiciflora*, which Martius informs us act violently on the uterus, and in an overdose produce abortion. *Trichilia cathartica* is reputed to have similar properties. The juice of the bark of *Guarea Aubletii* is a purgative and a violent emetic; the bark of *Guarea trichilioides* has similar qualities. The same power is assigned to the Arabian *Elcaija* (*Trichilia emetica*). Jacquin says that the negroes employ the root of *T. trifoliolata* to procure abortion. The root of *Melia Azedarach* is bitter and nauseous, and is used in North America as an anthelmintic; the pulp that surrounds the seeds is said to be deleterious; but this is denied by Turpin, who asserts that dogs which he has seen eat it experienced no inconvenience; and children in Carolina swallow the seeds with impunity. It is supposed that the *Melia Azedarachta*, or Neem-tree of India, possesses febrifugal properties; a kind of Toddy, which the Hindoos consider a stomachic, is obtained from it by tapping; it is also called the Margosa-tree. From the fruit of the same plant an oil is obtained, which is fit for burning and for other domestic purposes, and, as Ach. Richard observes, is another instance, after the Olive, of the pericarp yielding that substance which is usually obtained from the seed. This oil is said to possess antispasmodic qualities. Blume attributes to the root of *Sandoricum indicum* properties similar to those of *Melia*; but the latter has a repulsive odour, while the other is aromatic; it is employed against leucorrhœa, combined with the bark of the root of *Carapa obovata*, which is bitter and astringent. The bark of *Carapa guianensis* has great reputation as a febrifuge; its oil is bitter and anthelmintic, and is said to be particularly useful in guarding iron against rust. *Carapa Touloucouma* or *guineensis* yields the Tallicoona or Kundah oil, an anthelmintic and purgative; it is acrid and bitter, and said to be well suited for lamps. *Trichilia Catigoa* (Caá-tiguá, *Braz.*) stains leather a bright yellow. Rumphius mentions the extreme bitterness of *Xylocarpus Granatum*. An alliaceous odour found in two species of *Cedrela* also occurs in a very prominent degree in some species of *Dysoxylon* and *Hartighsea*; the Javanese mountaineers use the fruit of these trees as Garlic. Blume suspects that some species of *Epicharis* have similar properties. A warm pleasant-smelling oil is prepared from the fruit of *Trichilia speciosa*, which the Indian doctors consider a valuable external remedy in chronic rheumatism and paralytic affections. Some delicious fruits of the Indian Archipelago, called Langsat, or Lanséh, and Ayer Ayer, are species of the genus *Lansium*; they have a watery pulp, with a cooling pleasant taste. *Milnea edulis* is another plant of the Order, with eatable fruit. See further *Royle's Illustrations*, p. 141.

GENERA.

I. MELIÆ. — Embryo with albumen.	II. TRICHILIÆ. — Embryo exalbuminous.	<i>Dysoxylon</i> , Blum.	<i>Heynea</i> , Roxb.
<i>Quivisia</i> , Commers.	<i>Aglaiia</i> , Lour.	<i>Schizochiton</i> , Spreng.	<i>Trichilia</i> , Linn.
<i>Gilibertia</i> , Gmel.	<i>Camunium</i> , Rumph.	<i>Chisocheton</i> , Blum.	<i>Elcaja</i> , Forsk.
<i>Calodryum</i> , Desv.	<i>Cambania</i> , Commers.	<i>Synoum</i> , Adr. Juss.	<i>Portesia</i> , Cav.
<i>Naregamia</i> , Wight et Ar.	<i>Milnea</i> , Roxb.	<i>Schoutensia</i> , Endl.	<i>Torpesia</i> , Endl.
<i>Munronia</i> , Wight.	<i>Nyaletia</i> , Denust.	<i>Hartighsea</i> , Adr. Juss.	<i>Moschoxylum</i> , Adr. Juss.
<i>Turreea</i> , Linn.	<i>Lansium</i> , Rumph.	<i>Maerachiton</i> , Blum.	<i>Guarea</i> , Linn.
<i>Melia</i> , Linn.	<i>Spherosaeme</i> , Wall.	<i>Epicharis</i> , Blum.	? <i>Elutheria</i> , P. B.
<i>Azedarach</i> , Tournef.	<i>Nemodra</i> , Juss.	<i>Cabræa</i> , Adr. Juss.	<i>Carapa</i> , Aubl.
<i>Azadirachta</i> , Adr. Juss.	<i>Amoora</i> , Roxb.	<i>Didymochiton</i> , Blum.	<i>Xylocarpus</i> , Schreb.
<i>Mallea</i> , Adr. Juss.	<i>Amura</i> , Sehlnt.	<i>Goniochiton</i> , Blum.	<i>Persoonia</i> , Willd.
<i>Cipadessa</i> , Blum.	<i>Andersonia</i> , Roxb.	<i>Sandoricum</i> , Cav.	<i>Xylocarpus</i> , Adr. Juss.
	<i>Aphanamixis</i> , Blum.	<i>Ekebergia</i> , Sparm.	? <i>Odontandra</i> , H. B. K.
		<i>Walsura</i> , Roxb.	? <i>Aitonia</i> , Linn. f.

NUMBERS, GEN. 33, Sp. 150.

POSITION.—*Amrantiacæe*.—*MELIACEÆ*.—*Cedrelicæe*.
Pittosporacæe.

ORDER CLXXIV. ANACARDIACEÆ.—ANACARDS, OR TEREBINTHS.

Terebintaceæ, *Juss. Gen.* 368. (1789) *in part.*—Cassuviere or Anacardiæ, *Brown in Congo*, 431. (1818); *Bartl. Ord. Nat.* p. 395. (1830).—Terebintaceæ, *Kunth in Ann. des Sc. Nat.* 2. 333. (1824). trib. 1 and 2. *DC. Prodr.* 2. 62. §c. (1825); *Juss. Dict. des Sc. Nat.* v. 53. (1828); *Arnott in Encycl. Brit.* p. 106. (1832).—Spondiaceæ, *Kunth in Ann. Sc. Nat.* 2. 362. (1824); *Martius Conspectus*, No. 268. (1835); *Ed. pr.* lxxxi.; *Wight Illustr.* 1. t. 76.

DIAGNOSIS.—*Rutal Erogens*, with apocarpous fruit, and a single ovule rising by a cord from the base of the cell.

Trees or shrubs, with a resinous, gummy, caustic, or even milky juice. Leaves alternate, simple, or ternate or unequally pinnate, without pellucid dots. Flowers terminal or axillary, with bracts, commonly ♂ ♀ by abortion, sometimes absolutely so. Calyx



Fig. CCCXXIV.

usually small and persistent, with 5, or occasionally 3-4, or 7 divisions. Petals equal in number to the segments of the calyx, perigynous, (occasionally wanting), imbricated in æstivation. Stamens equal in number to the petals and alternate with them, or twice as many or even more, equal or alternately shorter, or partly sterile; filaments distinct, or in the genera without a disk cohering at the base. Disk fleshy, annular or cup-shaped, hypogynous, occasionally wanting. Ovary single, very rarely 5 or 6, of which 4 or 5 are usually abortive, superior, (very rarely inferior), 1-celled; styles 1 or 3, occasionally 4, sometimes none; stigmas as many; ovule solitary, amphitropal or half anatropal, attached to the bottom of the cell by a cord, which is either free or adherent to the angle of the cell, so that the ovules not uncommonly appear pendulous. Fruit indehiscent, most commonly drupaceous. Seed without albumen; radicle either superior or inferior, but always directed towards the hilum, sometimes curved suddenly back; cotyledons thick and fleshy, or leafy.

The Order called Terebintaceæ by Jussieu and other Botanists has been broken up by Brown and Kunth, but preserved entire by De Candolle, Arnott, and others. As now limited the Anacards are distinctly known by their seeds hanging from the end of a thread which rises up from the base of the carpels, which in general are solitary, or at least quite distinct, and are sometimes, when ripe, placed at the end of an excessively enlarged disk, as in the Cashew-nut itself. Melanorrhœa is remarkable for its indefinite stamens, and especially for its hypogynous petals becoming enlarged, foliaceous, and deep red as the fruit advances to maturity.

There is in tropical countries a genus called Spondias, whose fruit is eaten under the name of Hog-plum, which genus it has been proposed to erect into an Order called

Fig. CCCXXIV.—*Pistacia atlantica*. 1. ♂ flowers; 2. an ovary; 3. the same cut open to show the ovule; 4. a ripe fruit opened to show the seed; 5. a cross section of the embryo; 6. ♀ flowers.

Spondiaceæ. It differs from Anacards in having a many-celled instead of a 1-celled, 1-seeded drupe ; and on this more than anything else the character of the supposed Order was made to depend. But it appears that in the beginning Spondias has 5 distinct carpels, inclosed within a large fleshy cup, and that the growing together of these carpels is an after operation, unconnected with original structure ; a Mango, in fact, if it had 5 carpels instead of 1, would be almost a Spondias. For this reason the supposed Order does not seem to be tenable. It is true that its ovules are described as being suspended from the apex of the cells ; but this seems to arise from the cord contracting an adhesion with the side of the cells.

A writer in the *Linnaea* suggests that Anacards should be placed in the same class with Malpighiads (xiv. 243). A better approximation would have been to the Order of Juglands, with which they are not associated, chiefly because of their flowers not being amentaceous, nor usually absolutely ♂ ♀. Pistacia, indeed, is so, and some others ; but the mass of the Order is polygamous, or has distinct rudiments of a ♀ in the ♂ flowers.

Chiefly natives of tropical America, Africa, and India ; a few are found beyond the tropics, both to the north and south. Pistacias and some species of Rhus inhabit the south of Europe ; many of the latter genus occupy stations in North America and Northern India, and also at the Cape of Good Hope ; Duvaua and Schinus inhabit exclusively Chile and the adjacent districts. The Order is unknown in New Holland.

Large trees, with inconspicuous flowers, abounding in a resinous, sometimes acrid, highly poisonous juice, are the ordinary representatives of this Order, to which belong the Cashew-nut, (*Anacardium occidentale*), the Pistacia-nut (*Pistacia vera*), and the Mango fruit (*Mangifera indica*). Of these trees the Mango is the most important, its fruit being as highly valued in tropical as the Peach in temperate countries ; its bark, especially that of the root, is a bitter aromatic, and is employed against diarrhœa, leucorrhœa, &c. ; the young leaves are pectoral, the old leaves are used for cleaning the teeth, the seeds are anthelmintic ; a resin that flows from the stem is reputed to be antisypilitic. Some are celebrated for yielding a clammy juice, which afterwards turns black, and is used for varnishing in India ; as the common Cashew-nut. The varnish of Sylhet is chiefly procured from *Semecarpus Anacardium*, the marking Nut-tree of commerce ; and the varnish of Martaban from the Theet-see or Kheu, a plant called by Wallich *Melanorrhœa usitatissima*. All these varnishes are extremely dangerous to some constitutions ; the skin, if rubbed with them, inflames and becomes covered with pimples that are difficult to heal ; the fumes have been known to produce a painful swelling and inflammation of the skin, which, in a case recorded by Brewster, extended from the hands as far as the face and eyes, which became swelled to an alarming degree. I have known an instance of similar effects having been produced by roasting the nuts of *Anacardium occidentale*. But there are some constitutions which are not affected in any degree by such poisons. These varnishes are at first white, and afterwards become black. This has been ascertained by Brewster to arise from the recent varnish being an organised substance, consisting of an immense congeries of small parts, which disperse the sun's rays in all directions, like a thin film of unmelted tallow ; while the varnish which has been exposed to the air loses its organised structure, becomes homogeneous, and then transmits the sun's rays of a rich, deep, uniform red colour. Such a secretion is probably the substance mentioned by Ainslie as the Black Lac of the Burmah country, with which the natives lacquer various kinds of ware. The valuable black hard varnish called Japan Lacquer, is obtained from *Stagnaria verniciflua* in the Indian archipelago : this resin is extremely acrid, causing excoriations and blisters if applied to the skin ; the people of Sumatra consider it dangerous even to sit or sleep beneath its shade ; the manner of preparing its varnish is fully described in Jack's *Malayan Miscellanies*, p. 81. (Calcutta edition.) A black varnish well known in India is manufactured from the nuts of *Semecarpus Anacardium* and the berries of *Holigarna longifolia*. *Augia chinensis* produces a varnish in China and Siam. *Odina wodier*, *Buchanania latifolia*, and many more Indian species, have the same property. Several *Comocladias* stain the skin black. The leaves of some species of *Schinus* are so filled with a resinous fluid, that the least degree of unusual repletion of the tissue causes it to be discharged ; thus some of them fill the air with fragrance after rain ; and *S. Molle*, *Duvaua latifolia*, and some others expel their resin with such violence when immersed in water as to have the appearance of spontaneous motion, in consequence of the recoil. See *Bot. Reg.* 1580. *Schinus Arroeira* is said by Anguste de St. Hilaire to cause swellings in those who sleep under its shade. The fresh juicy bark of this shrub is used in Brazil for rubbing newly-made ropes, which it covers with a very durable bright dark-brown coating. The juice of the same plant is applied by the Indians in diseases of the eye. This last plant, and also *Rhus coriaria*, possess acid qualities. The fruit of *Cassavium occidentale* and *Anacardium orientale* is said to exercise a singular effect upon the brain. Mastich, a resin useful for strengthening the gums and sweetening the breath, is the

produce of *Pistacia atlantica* and *Lentiscus*; Scio turpentine, a limpid, fragrant balsamic resin, with an odour between Lemon and Fennel, is yielded by *Pistacia Terebinthus*; a substance like mastich is exuded by *Schimus Molle*, and the Peruvians use it also for strengthening their gums. A full account of the mode of obtaining mastich at Chio, from the *Pistacia Lentiscus*, is given in the *Annals of Chemistry*, vol. 1. p. 223. The juice of many species of *Rhus* is milky, stains black, and is sometimes, as in *R. toxicodendron* and *radicans*, extremely venomous; being volatile it is capable of poisoning persons who approach such plants in hot weather; and the same effects are produced by *R. veneuata*. *R. coriaria*, a powerful astringent, is used by tanners; its acid fruits are eaten by the Turks and used to sharpen their vinegar. The bark of *R. glabrum* is considered a febrifuge, and is also employed as a mordant for red colours. *R. Cotinus*, *Arbre à perruque* of the French, and Venetian Sumach of the English, has wood called Young Fustick, which is astringent as well as the fruit; it dyes a bright yellow colour. *R. vernix*, a Japanese tree, exudes a whitish resinous juice, which soon becomes black in the air. *R. succedaneum* and *verniferum* have a similar property. *R. metopium*, a Jamaica plant, yields a gum called Doctors' Gum, which has powerful purgative, emetic, and diuretic effects. It is also said to be a vulnerary (*Pharm. Journal*, v. 60). But are not different plants mixed up under the name of Doctors' Gum and Hog Gum?

The fruit of several species of *Spondias*, especially *S. purpurea* and *Mombin*, is eatable in the Brazils and West Indies, where they are called Hog Plums. Martius says that the juice of the fruit of *S. tuberosa* is drunk in Brazil in fevers. The bark of *S. venulosa* is an aromatic astringent, employed in diarrhœa, blennorrhœa, &c. The most agreeable of these fruits is the *S. cytherea* or *dulcis*, a native of the Society Islands, whose golden drupes are compared for flavour and fragrance to the Pine-apple. The negroes of Senegal make an intoxicating beverage from the fruit of *S. Birrea*.

GENERA.

<i>Pistacia</i> , Linn.	<i>Lithræa</i> , Miers.	<i>Römeria</i> , Thunb.	<i>Semecarpus</i> , Linn.
<i>Terebinthus</i> , Juss.	<i>Llithi</i> , Feuill.	<i>Loxostylis</i> , Spreng.	<i>Anacardium</i> , Lam.
<i>Lentiscus</i> , Tournef.	<i>Malosma</i> , Nutt.	<i>Anasyllis</i> , E. Mey.	<i>Bouea</i> , Meisn.
<i>Dnpuisia</i> , A. Rich.	<i>Rhus</i> , Linn.	<i>Astronium</i> , Jacq.	<i>Cambessedea</i> , Wight.
<i>Sorindeia</i> , Thowars.	<i>Cotinus</i> , DC.	<i>Melanorrhœa</i> , Wall.	<i>Buchanania</i> , Roxb.
<i>Comocladia</i> , P. Br.	<i>Sumac</i> , DC.	<i>Gluta</i> , Linn.	<i>Launcea</i> , Buchan.
<i>Dodonœa</i> , Plum.	<i>Metopium</i> , P. Br.	<i>Stagmaria</i> , Jack.	<i>Cambessedea</i> , Kunth.
<i>Cyrtocarpa</i> , H. B. E.	<i>Pocophorum</i> , Neck.	<i>Syndesmis</i> , Wall.	<i>Coniogeton</i> , Blum.
<i>Odina</i> , Roxb.	<i>Toxicodendrum</i> , Tournef.	<i>Heligarna</i> , Roxb.	<i>Phlebochiton</i> , Wall.
<i>Wodër</i> , Anders.	<i>Pezophorum</i> , Neck.	<i>Hadestaphyllum</i> , Denst.	<i>Cardiophora</i> , Benth.
<i>Haberlia</i> , Dennst.	<i>Thezera</i> , DC.	<i>Pennantia</i> , Forst.	<i>Spondias</i> , Linn.
<i>Lannea</i> , A. Rich.	<i>Lobadium</i> , Raf.	<i>Mangifera</i> , Linn.	<i>Mombin</i> , Plum.
<i>Pezia</i> , Colebr.	<i>Turpinia</i> , Raf.	<i>Erythrostigma</i> , Hassk.	<i>Cytherea</i> , DC.
<i>Solenocarpus</i> , Wight et A.	<i>Schmalzia</i> , Desv.	<i>Anacardium</i> , Rottb.	? <i>Wirtgenia</i> , Jungh.
<i>Schinus</i> , Linn.	<i>Styphnomia</i> , Nutt.	<i>Cassuvium</i> , Rumph.	<i>Poupartia</i> , Commers.
<i>Molle</i> , Clus.	<i>Botryceras</i> , Willd.	<i>Acajou</i> , Tournef.	? <i>Huertea</i> , Ruiz et Pav.
<i>Mulli</i> , Feuill.	<i>Laurophyllus</i> , Thunb.	<i>Acajuba</i> , Gärtn.	? <i>Rumphia</i> , Linn.
<i>Durava</i> , Kunth.	<i>Daphnitis</i> , Spreng.	<i>Rhinocarpus</i> , Bert.	? <i>Augia</i> , Lour.
<i>Manria</i> , Kunth.	<i>Anaphrenium</i> , E. Meyer.	<i>Monodynamus</i> , Pohl.	? <i>Sabia</i> , Colebr.
<i>Pennantia</i> , Forst.	<i>Ozoroa</i> , Del.		
	<i>Heeria</i> , Meisn.		

NUMBERS. GEN. 41. Sp. 95.

Juglandaceæ.

POSITION.—Xanthoxylaceæ.—ANACARDIACEÆ.—Meliaceæ.

Celastraceæ.

ORDER CLXXV. CONNARACEÆ.—CONNARADS.

Terebintaceæ, *Juss. Gen.* 368. (1789) *in part.*—Connaraceæ, *R. Brown in Congo*, 431. (1818); *Kunth in Ann. Sc. Nat.* 2. 359; *Endl. Gen.* cclxvii.; *Meisner Gen.* 78; *Wight Illustr.* 1. 162.

DIAGNOSIS.—*Rutal Exogens, with apocarpous fruit, and collateral ascending orthotropical sessile ovules.*

Trees or shrubs, sometimes climbing. Leaves compound, not dotted, alternate, without stipules. Flowers terminal and axillary, in racemes or panicles, with bracts, ♂, rarely ♂ ♀ by abortion. Calyx 5-parted, regular, persistent; aestivation either imbricate or valvular. Petals 5, inserted on the calyx, imbricated, rarely valvate in aestivation. Stamens twice the number of petals, hypogynous, those opposite the petals shorter than the others; filaments usually monadelphous. Carpels solitary, or several, each with a separate style and stigma; ovules 2, collateral, orthotropical, ascending; styles terminal; stigmas usually dilated. Fruit dehiscent, follicular, splitting lengthwise internally. Seeds erect, in pairs, or solitary, with or without albumen, often with an aril; radicle superior, at the extremity opposite the hilum; cotyledons thick in the species without albumen, foliaceous in those with albumen.



Fig. CCCXXV.

Brown says that the genus *Connarus* can only be distinguished from leguminous plants by the relation the parts of its embryo bear to the umbilicus of the seed; that is to say, by the radicle being at the extremity most remote from the hilum. This observation must, however, be understood to refer only to some particular cases among leguminous plants, and also to the fructification; the want of stipules and regular flowers being usually sufficient to distinguish Connarads. From Anacards and others they are at once known by the total want of resinous juice, and their orthotropical ovules. Brown considers that *Cnestis* approaches *Averrhoa* in Oxalids, and this genus, according to *Adrien de Jussieu*, is allied to *Xanthoxyls* through *Brunellia*. *Cnestis* has a valvate calyx, and some albumen about its embryo. *Dr. Wight*, who has had opportunities of studying the Order, observes that the hypogynous insertion of the stamens and the 5-celled ovary, on a gynobase, of *Connarus* and *Cnestis*, indicate a very close approach to *Xanthoxyls*.

The species are all tropical, and most common in America, according to *Endlicher*.

The aril of some species of *Omphalobium* is eatable, and their seeds oily. *Eurycoma longifolia*, the Punowur Pait of Malacca, is regarded by *Oxley* as a valuable febrifuge.—*Griffith*. The beautiful Zebra-wood of the cabinet-makers has been ascertained by *Schomburgk* to be produced by *Omphalobium Lambertii*, a large Guiana tree. *Dr. Wight* says that they are handsome flowering shrubs, conspicuous for their bright red capsules.

GENERA.

<i>Connarus</i> , Linn.	<i>Malbrancia</i> , Neck.	<i>Connarus</i> , Kunth.	<i>Cnestis</i> , Juss.
<i>Rourea</i> , Aubl.	<i>Santaloides</i> , Linn.	<i>Byrsocarpus</i> , Schum.	? <i>Thysanus</i> , Lour.
<i>Robergia</i> , Schreb.	<i>Omphalobium</i> , Gärtn.	<i>Tapomana</i> , Adans.	? <i>Eurycoma</i> , Jack.

NUMBERS. GEN. 5. Sp. 41.

Fabacæ.

POSITION.—Anacardiaceæ.—CONNARACEÆ.—

Fig. CCXXV.—*Connarus pinnatus*.—*Wight*. 1. a flower; 2. stamens and pistil; 3. ovary opened perpendicularly; 4. a cross section of it; 5. half a seed-vessel; 6. cross section of an embryo.

ORDER CLXXVI. RUTACEÆ.—RUEWORTS.

Rutæ, *Juss. Gen.* 296. (1789) *in part.*—Rutaceæ, *DC. Prodr.* 1. 709. (1824); *Endlicher Gen. cclii.*—Rutææ, *Adrien de Juss. Rutacées*, 78. (1825); *Aug. de St. Hilaire Fl. Bras. Mer.* 1. 93. (1825).—Diosmeæ, *R. Broen in Flinders*, (1814); *Ad. de Jussieu Rutacées*, 1. 83. (1825); *Endlicher Gen. cclii.*—Fraxinellæ, *Nees and Martius Nov. Act. Bonn.* 11. 149. (1823).—Cuspariææ, *DC. Mem. Mus.* 9. 141. (1822); *Prodr.* 1. 729. (1824), a § of Rutaceæ,—? Cneoreæ, *Webb in Lond. Journ. Bot.* 1. 254. (1842).—Biebersteinia, *Endl. Gen.*

DIAGNOSIS.—*Rutal Exogens*, with a few-seeded fruit which finally becomes apocarpous, and separates its pericarp into 2 layers, sessile pendulous ovules, and ♂ flowers.

Trees or shrubs, very rarely herbaceous plants. Leaves without stipules, opposite or alternate, simple or pinnate, covered with pellucid resinous dots. Flowers axillary or terminal ♂, regular or irregular. Calyx in 4 or 5 divisions. Petals either as many as the divisions of the calyx, distinct, or combined into a monopetalous corolla, or occasionally wanting; aestivation for the most part twisted, very rarely somewhat valvular. Stamens equal in number to the petals, or twice or thrice as many, or even fewer in consequence of abortion, hypogynous, very rarely perigynous, placed on the outside of a disk or cup surrounding the ovary, and either free or combined with the base of the corolla, or in part abortive. Ovary sessile or stalked, its lobes equal to the number of petals, or fewer; ovules twin and collateral, or one above the other, rarely 4, seldom more; style single, occasionally divided towards the base into as many parts as there are lobes of the ovary; stigma simple or dilated; ovules usually 2, sometimes 4, partly ascending, partly suspended. Fruit consisting of several capsules, either cohering firmly or more or less distinct. Seeds twin or solitary, with a testaceous integument; embryo with a superior radicle, which is either straight or oblique, and cotyledons of variable form; albumen present or absent.

There are two principal divisions in this Order; the one Rutææ proper, which have seeds containing albumen, and a fruit, the sarcocarp of which is said not to separate from the endocarp; the other Diosmeæ, whose seeds have no albumen, and whose sarcocarp and endocarp divide into distinct bodies when the fruit is ripe.

But *Aug. de St. Hilaire (Pl. Bras.* 1. 74.) suspects that those two parts are equally separable in Rutææ, and that the specimens in herbaria which have been found otherwise were gathered before their fruit was quite ripe. Nevertheless *Endlicher* preserves the distinction as a mark of two Orders, which supposing it to be valid, is inadmissible; for if differences in dehiscence are alone to constitute the distinctions of Orders, the term Natural Order will no longer have an intelligible meaning. At all events, the difference is very slight, and the absence or presence of a small quantity of albumen can no longer be insisted upon now that so many cases of its absence or presence in the same Order are known; indeed, *Hortia*, a Diosmeous genus, has albumen, according to *Aug. de*



Fig. CCCXXVI.

Fig. CCCXXVI.—*Eriostemon myoporoides*. 1. a complete flower; 2. the ovary, seated in a cup-shaped disk, surrounded by a calyx; 3. the ripe fruit, separated spontaneously into its component carpels.

St. Hilaire. Rutaceæ are allied to Bean-capers through Peganum, which A. de Jussieu actually stations among the former, although its stipulate leaves, destitute of pellucid dots, seem to determine its greatest affinity to be with the latter. Rueworts differ from Citronworts in their capsular fruit invariably splitting into its component parts, from Xanthoxyls in the flowers being ♂, and from Anacards (Anacardiaceæ) in the ovules being sessile and suspended, not attached to the end of a long cord rising from the base of the ovary. The Cneoræ of Mr. Barker Webb seem to be a form of this Order of Rueworts rather than of Xanthoxyls; for their flowers are ♂ and their habit is not unlike that of Phebalium. The truly monopetalous corolla of Correa is very remarkable, and brings this Order so close to Heathworts that the indefinite seeds, porous anthers, but more especially the abundant albumen of the latter, form the principal marks of distinction.

M. Adrien de Jussieu thus describes the peculiarities of the pistil in that division of the Order which is called Diosmeæ:—"The ovaries, whether combined by their central axis, or distinct, always contain 2 ovules; if 4, or sometimes but 1, are found, that occurs only in genera stationed at the extreme limits of the group. They are collateral, or more frequently placed one above the other, and then one is usually ascending, and the other suspended. This position, which at first sight appears singular, is very natural; for the ovary is usually pierced by the vessels of the style only in the middle, and it is at that point that the two ovules are inserted, both at nearly the same height. If, therefore, they are placed one above the other, it is indispensable that one should ascend and the other descend. These ovules may be considered peritropal, rather than either ascending or suspended, or in other terms, attached by their middle rather than by either extremity."—"If the ovary of a Diosmea is divided across, its coat will be found to consist of two layers, the outer rather the most fleshy, and the inner thin or almost absent on the side next the axis, the side which is traversed from bottom to top by the vessels of the peduncle. These vessels at a certain height, meet those of the style, either at the point of its insertion or below it; united to these, they penetrate the cavity of the cell, the shell of which they pierce, and there form funiculi, to which the ovules are attached. Thus far the structure of Diosmea is little different from that of other Rutaceous plants. But this becomes modified as the ovary advances towards the state of fruit. The endocarp hardens by degrees, and at the same time separates from the sarcoarp. Its form resembles that of a bivalve shell, and may be more especially compared to that of a musel; it presents two extremities, one superior, the other inferior, two lateral faces which are more or less convex, and two edges more or less acute, which unite them, the one external, the other internal. The two valves are woody and touch at the edges, except perhaps at a part of their inside where they are separated; this space is filled by a membrane which passes from one to the other: it is either slightly fleshy, or, which is more common, extremely thin, thickened in the middle by the passage of the vessels of the seed which penetrate it; and as, after having pierced it, they are almost immediately inserted into the seed, the latter appears to be actually borne by the membrane itself. When the fruit is perfectly ripe, the sarcoarp of each cell opens from above inwards, following a longitudinal furrow, which had become visible some time previously. Its inner surface is seen to be covered by projecting lignified vessels, which are directed obliquely from the inner edge towards the outer, and are indicated externally by some transverse projections. The endocarp is loose in the inside of the shell, unless at its membrane, by means of which it continues to preserve some degree of adhesion with the other parts; but it soon opens, the two valves separate in different directions, and force out the seeds. When this separation takes place, the membrane is torn all round, and either falls away or sticks to the seed. In the latter case it is found attached to the hilum, if one seed only has ripened; but when in removing it, the remains of the abortive ovule may be found on one side. If both seeds have arrived at maturity, they are usually seen one resting on the other by their contiguous flattened extremities, and the membrane extends along their inner edge, being enlarged at their point of contact, where two transverse prolongations are perceptible."

Rutaceæ are found in the south of Europe, whence they extend in our hemisphere as far as the limits of the Old World, following the southern part of the temperate zone, and very rarely advancing within the tropics. Dictamnus is found in the south of Europe. The Cape of Good Hope is covered with different species of Diosma and nearly allied genera; New Holland abounds in Boronias, Phebaliums, Correas, Eriostemons, and the like; great numbers of Cuspariæ and Pilocarpeæ inhabit the equinoctial regions of America.

The species are characterised by their powerful odour and their bitterness; they act principally on the nerves. Common Rue, and another species, are said to be emmenagogue, anthelmintic, and sudorific. Ruta montana, a Spanish plant, is so acrid that it

blisters the hands of those who gather it, through three pairs of gloves, and produces erysipelas and ulcerous pustules when applied to the naked head. Egyptian women bruise the leaves of *Haplophyllum tuberculatum* in water and wash their hair with it in order to make it grow. The *Diosmeæ*, or *Bucku* plants, of the Cape, are well known for their powerful and usually offensive odour; several, especially *Barosma erenata*, are recommended as antispasmodics and diuretics. The American species possess, in many cases, febrifugal properties. There is an excellent bark used by the Catalan Capuchin friars of the missions on the river Carony in South America, called the Quina de la Gnayna, or de la Angostura, or Angostura bark, which is said to be the produce of *Galipea cusparia* (*Bonplandia trifoliata*, W.), a plant of this family. Dr. Hancock, however, thinks that it is a distinct species, which he calls *Galipea officinalis*. He says that he is fully convinced, from ample experience of the virtues of this bark, that it is one of the most valuable febrifuges we possess, being adapted to the worst and most malignant bilious fevers, while the fevers in which *Cinchona* is chiefly administered are simple intermittents, for the most part unattended with danger. The Indians also use the bruised bark as a means of intoxicating fishes, which is a very singular coincidence with what is mentioned by Dr. Saunders, of the same use being made of *Cinchona* bark by the Peruvians. Melambo bark, another bitter aromatic astringent, is supposed to belong to some allied species. *Esenbeckia febrifuga*, one of the Quinas of Brazil, has a bark so powerfully febrifugal as to compete with that of *Cinchona*. A bark much spoken of by the miners of Brazil, under the name of Casca de larangeira da terra, and in which *Cinchonine* was detected by Dr. Gomez, probably belongs to this tree. One of the Quinas of Brazil is the *Tieorea febrifuga*: its bark is a powerful medicine in intermittent fevers. *Hortia Braziliana* possesses similar properties, but in a less degree. An infusion of the leaves of *Tieorea jasmiflora* is drunk in Brazil as a remedy for the disease called by the Brazilian Portuguese Bobas, and by the French *Frambæsia*. *Dietamnus* abounds in volatile oil to such a degree, that the atmosphere surrounding it becomes inflammable in hot weather. Its root was formerly esteemed as a sudorific and vermifuge. The settlers in New Holland employ the leaves of *Correas* for tea, especially of *C. alba*.

GENERA.

I. CUSPARIÆ.	<i>Monnieria</i> , Linn. <i>Aubletia</i> , Rich.	<i>Phebalium</i> , Vent. <i>Didymeria</i> , Lindl. <i>Choriflæna</i> , Endl. <i>Diplolæna</i> , R. Br. <i>Correa</i> , Smith. <i>Mazeutoxeron</i> , Lab. <i>Antouarchia</i> , Aubl. <i>Hügelia</i> , R. Br.	<i>Parapetalifera</i> , Wendl. <i>Agathosma</i> , Willd. <i>Bucco</i> , Wendl. <i>Dichosma</i> , DC. <i>Macrostylis</i> , Bartl. et Wl. <i>Empleurum</i> , Sol.
<i>Spiranthera</i> , St. Hil. <i>Ternpanthus</i> , Ns. et M. <i>Almeida</i> , St. Hil. <i>Aruba</i> , Nees et Mart <i>Galipea</i> , Aubl. <i>Raputia</i> , Aubl. <i>Pholidandra</i> , Neck. <i>Sciuris</i> , Schreb. <i>Cusparia</i> , Humb. <i>Bonplandia</i> , Willd. <i>Angostura</i> , Röm. et St. <i>Conchocarpus</i> , Mik. <i>Itavia</i> , Nees et Mart. <i>Laristolænum</i> , Ns. et M. <i>Obentonia</i> , Velloz. <i>Dangervillea</i> , Fl. Flum. <i>Bosenia</i> , Fl. Flum. <i>Diglottis</i> , Nees et Mart. <i>Erythrochiton</i> , Ns. et M. <i>Tieorea</i> , Aubl. <i>Ozophyllum</i> , Schreb. <i>Sciuris</i> , Nees et Mart. <i>Costa</i> , Fl. Flum. <i>Lemonia</i> , Lindl.	II. PILOCARPEÆ. <i>Melicope</i> , Forst. <i>Entoganum</i> , Banks. <i>Evodia</i> , Forst. <i>Esenbeckia</i> , H. B. K. <i>Colythrum</i> , Schott. <i>Evodia</i> , St. Hil. <i>Polembryum</i> , ADR. JS. <i>Metrodorea</i> , St. Hil. <i>Pilocarpus</i> , Vahl. <i>Hortia</i> , Vandel. <i>Cholsya</i> , Kunth. <i>Geigeria</i> , Schott.	IV. EUDIOSMEÆ. <i>Pachystigma</i> , Hooker. <i>Calodendron</i> , Thunb. <i>Pallusia</i> , Houtt. <i>Adeuandra</i> , Willd. <i>Glandulifolia</i> , Wendl. <i>Ockenia</i> , Dietr. <i>Ockia</i> , Dietr. <i>Hænkeæ</i> , Smith. <i>Coleonema</i> , Bartl. <i>Diosma</i> , L. <i>Euchætis</i> Bartl. et Wdl. <i>Gymnonychium</i> , Bartl. <i>Acmadenia</i> , Bartl. et Wl. <i>Barosma</i> , Willd. <i>Baryosma</i> , Röm.	V. DICTAMNEÆ. <i>Dictamnus</i> , Linn. <i>Fraxinella</i> , Tournef.
	III. BORONIÆ.		VI. RUTEÆ. <i>Biebersteinia</i> , Steph. <i>Boeninghausenia</i> , Rehb. <i>Ruta</i> , Tournef. <i>Desmophyllum</i> , Webb. <i>Rutaria</i> , DC. <i>Haplophyllum</i> , ADR. Jus.
	<i>Zieria</i> , Smith. <i>Boronia</i> , Smith. <i>Cyanothamnus</i> , Lindl. <i>Eriostemon</i> , Smith. <i>Crowea</i> , Smith. <i>Philotheca</i> , Rudge.		? VII. CNEOREÆ. <i>Cneorum</i> , Linn. <i>Chamaëlea</i> , Tournef. <i>Heterodendron</i> , Desf.

NUMBERS. GEN. 47. Sp. 400.

*Ericocææ.*POSITION.—*Anfautiaceæ.*—RUTACEÆ.—*Xanthoxylaceæ.*

ORDER CLXXVII. XANTHOXYLACEÆ.—XANTHOXYLS.

Terebintaceæ, *Juss. Gen.* 368. (1789) in part.—*Xanthoxyloæ*, *Nees and Martius in Nov. Act. Bonn* 11. (1823); *Adrien de Jussieu Rutacées*. p. 114. (1825); *Endl. Gen. ecl.*; *Wight. Illustr.* 1. 168.—*Pteleaceæ*, *Kunth. Ann. des Sc.* 2. 345. (1824).—*Terebintaceæ*, trib. 6. *DC. Prodr.* 2. 82. (1825).

DIAGNOSIS.—*Rutal Exogens*, with a few-seeded fruit which finally becomes apocarpous and separates its pericarp into distinct layers, sessile pendulous ovules, and ♀-♂-♂ flowers.

Trees or shrubs. Leaves without stipules, alternate or opposite, either simple, or more commonly abruptly or uncequally pinnate, with pellucid dots. Flowers axillary or

terminal, gray, green, or pink, ♀-♂-♂, regular. Sepals imbricated, 3, or more commonly 4 or 5. Petals the same number, very rarely none, usually longer than the calyx; aestivation generally imbricated. Stamens equal to the petals in number, or twice as many, arising from around the base of the stalk of the abortive carpels; in the ♀ wanting or imperfect.

Ovary made up of the same number of carpels as there are petals, or of a smaller number, either altogether combined, or more or less distinct; ovules in each cell 2, collateral, or one above the other, very seldom 4; styles more or less combined, according to the degree of cohesion of the carpels. Fruit either berried or membranous, sometimes of from 2 to 5 cells, sometimes consisting of several drupes or 2-valved capsules, of which the sarcocarp is fleshy and partly separable from the endocarp. Seeds solitary or twin, pendulous, usually smooth and shining, with a testaceous integument; embryo lying within fleshy albumen; radicle superior; cotyledons ovate, flat.

If we neglect the constant tendency which the Order of Xanthoxyls has to produce unisexual flowers, we shall have no good character to distinguish it from Rueworts. If the dry apocarpous, deliscent character of the fruit is left out of consideration it will merge in Citronworts, among which *Lavunga* climbs like a *Xanthoxylum*. *Correa de Serra* has also pointed out a passage from one to the other through *Cookia*. "A mixture of bitter and aromatic principles, the presence of receptacles of oil that are scattered over every part, which give a pellucid dotted appearance to the leaves, and which cover the rind of the fruit with opaque spaces,—all these characters give the two families a considerable degree of analogy. This has already been indicated by *Jussieu* in speaking of *Toddalia*, and in his remarks upon the families of Citronworts and Anacards; and it is confirmed by the continual mixture, in all large herbaria, of unexamined plants of Anacards, Xanthoxyls, and Citronworts. The fruit of the latter is, however, extremely different; their seeds resembling, as they do, Anacards, are on that very account at variance with Xanthoxyls, but at the same time establish a further point of affinity between them and some Rutaceous plants which are destitute of albumen. Unisexual flowers, fruit separating into distinct cocci, seeds solitary or twin in those cocci, inclosing a usually

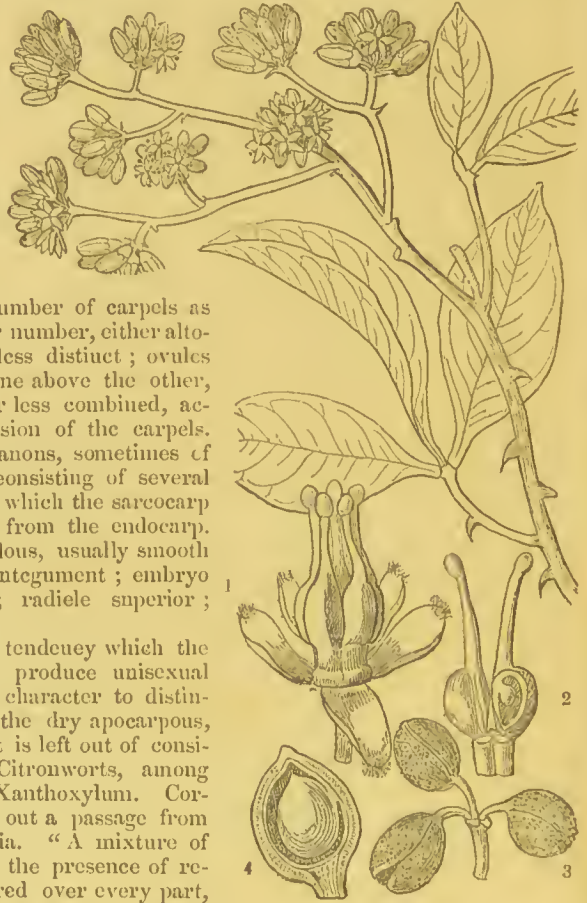


Fig. CCCXXVII.

Fig CCCXXVII.—*Toddalia floribunda*. 1. a flower; 2. a pair of carpels, one of which shows its ovule; 3. fruits; 4. a perpendicular section of one of them.

smooth and blackish integument, which is even sometimes hollowed out on its inner edge; a fleshy albumen surrounding an embryo the radicle of which is superior, are all points of analogy between Xanthoxyls and Spurgeworts, particularly between those which have in their ♂ flowers from 4 to 8 stamens inserted round the rudiment of a pistil, and in the ♀ flowers cells with 2 suspended, usually collateral ovules. Finally, several Xanthoxyls have in their habit, and especially in their foliage, a marked resemblance to the Ash. The dioecious flowers of Fraxinus, its ovary, the two cells of which are compressed, having a single style, 2 ovules in the inside, and scales on the outside, and which finally changes into a samara which is 1-celled and 1-seeded by abortion, all establish certain points of contact between Ptelea and Fraxinus."—*Ad. de Juss.*

Most of the species belong to America, especially to the tropical parts; some are found in temperate regions; they are rare in Africa; some exist in the Isles of France and Madagascar, and in New Holland: many are natives of India and China.

The species are nearly all aromatic and pungent. The Xanthoxylums are popularly called Peppers in the countries where they are found. X. Clava and fraxineum are powerful sudorifics and diaphoretics; they are remarkable, according to Barton, for their extraordinary power in exciting salivation, whether applied immediately to the gums or taken internally; both plants are reputed to have been used successfully in paralysis of the muscles of the mouth, in toothache, and in rheumatic affections. X. caribæum is held to be a febrifuge. The Chinese enumerate the root of X. nitidum among calefacient, sudorific, febrifugal, and emmenagogue medicines. The seeds of X. Budrunga have the fragrance of Lemon-peel. The unripe capsules of X. Rhetsa are gratefully aromatic, tasting like the peel of a fresh Orange. A plant called Coentrilho in Brazil (X. hiemale) is employed as a remedy for pain in the ear, for which purpose the powder of its bark is made use of. Its wood is very hard, and valuable for building. The fruit of Ptelea has a strong, bitter, aromatic taste, and is said to have been used with some success as a substitute for Hops. Every part of the shrub has a strong pungent taste, more especially the roots when fresh. The leaves are eaten raw for pains in the bowels, and the pungent ripe berries make an admirable pickle.—*Wight.* The capsules and seeds of X. hastile, called Tej-bul by the natives, are employed in northern India for intoxicating fish; they are also given as the Faglhureh of Avicenna. X. piperitum and Avicennæ are used in China and Japan as an antidote against all poisons; they would, undoubtedly, in many cases be of considerable use as a stimulant remedy. The bark of the root of Toddalia aculeata is said to be employed as a cure for the remittent fevers caught in the jungles of the Indian hills.—*Royle's Illustr.* 157.

GENERA.

Lictyoloma, DC.	Pentamone, Moç. et Ses.	Crantzia, Schreb.	Spathelia, Linn.
Pitavia, Molin.	Pohlana, Nees et Mrt.	Vepris, Commers.	Spatha, P. Br.
Galezia, Ruiz et Pav.	Langsdorfia, Leandr.	Asaphes, DC.	Ailanthus, Desf.
Brunellia, Ruiz et Pav.	Maqueria, Commers.	Boscia, Thunb.	Aspidostigma, Hochst.
Xanthoxylon, Kunth.	Rheta, Wight et Arn.	Duncania, Rehb.	Ptelea, Del.
Pterota, P. Brown.	Typalia, Deunst.	Ptelea, Linn.	? Pseudiosma, Adr. Juss.
Lacaria, Hamilt.	Aubertia, Bory.	Belluccia, Adans.	? Tetradium, Lour.
Espara, Lam.	Blackburnia, Forst.	Cyminosma, Gärtn.	? Philagonia, Blum.
Tobinia, Desv.	Boymia, Adr. Juss.	Jambolifera, Linn.	? Bischofia, Blum.
Ochroxylum, Schreb.	Cyclocarpus, Jungh.	Gela, Lour.	? Phelline, Labill.
Curtisia, Schreb.	Toddalia, Juss.	Laxmannia, Smith.	? Guindilia, Gill.
Kampmannia, Raf.	Scopolia, Smith.	Doriena, Dennst.	

NUMBERS. GEN. 20. Sp. 110.

Euphorbiacæ.

POSITION.—Rutaceæ.—XANTHOXYLACEÆ.—Aurantiacæ.

Oleacæ.

ORDER CLXXVIII. OCHNACEÆ.—OCHNADS.

Ochnaceæ, *DC. Ann. Mus.* 17. 398. (1811); *Prodr.* 1. 735. (1824); *Endl. Gen.* cclxviii.; *Meisner*, p. 66.

DIAGNOSIS.—*Rutal Exogens*, with a one-seeded finally apocarpous fruit, whose pericarp does not laminate, and a succulent conical torus.

Very smooth trees, or more generally under-shrubs, sometimes downy, having a watery juice. Leaves alternate, simple, entire, or toothed, with 2 stipules at the base, or one in the axil. Flowers usually in racemes, with an articulation in the middle of the pedicels. Sepals 5, persistent, imbricated in æstivation. Petals hypogynous, definite, sometimes twice as many as the sepals, deciduous, spreading, imbricated in æstivation. Stamens 5, opposite the sepals, or 10, or ∞, arising from a hypogynous disk; filaments persistent; anthers 2-celled, innate, opening by pores, or longitudinally. Carpels equal in number to the petals, lying upon an enlarged, tumid, fleshy disk, (the gynobase); their styles combined in one; ovule erect or pendulous, anatropal. Fruit composed of as many pieces as there were carpels, indehiscens, somewhat drupaceous, 1-seeded, articulated with the gynobase, which grows with their growth. Seeds without albumen or nearly so; embryo straight; radicle next the hilum; cotyledons thick.

The great fleshy gynobase, or torus, of the species constituting this Order, affords their strongest mark of recognition. In this respect, indeed, there is an approach to the peculiar structure of Cranesbills, or even of some Mallowworts. The foliage is sometimes very shining and marked with closely set veins like those of *Calophyllum*, a genus of the Order of Guttifers. From the other Orders now associated with them they are often known by their anthers opening by pores, and their solitary, erect ovules; but neither of them are always characteristic of Ochnads. The great succulent torus must always be regarded as one of their chiefest distinctions. According to the views of an anonymous writer in the *Linnaea*, this Order should be placed near Roseworts, and not Rueworts, with which and the kindred Orders he thinks that Ochnads have little affinity.—*Linnaea*, xiv. 248.



Fig. CCCXXVIII.

Found in tropical India, Africa and America; a few are from the Cape of Good Hope.

These plants are for the most part bitter. *Walkera serrata* has a bitter root and leaves, and is employed in Malabar, in decoction in milk or water, as a tonic, stomachic, and anti-emetic. The bark of *Oelina hexasperma* is used in Brazil as a cure for the sores produced in cattle by the punctures of insects. It probably acts as an astringent. *Castela Nicolsoni* or Goatbush, is said to be as bitter as *Quassia* itself. The root and leaves of *Gomphia angustifolia* are bitter, and employed in Malabar, in decoction in milk or water, as a tonic, stomachic, and anti-emetic. *G. hexasperma* and *Jabotapita* are Brazilian remedies exhibited where bitters are demanded. The oil of *G. parviflora* is used in salads in Brazil.

Fig. CCCXXVIII.—*Ochna dubia*.—*Decaisne*. 1. expanded flower; 2. section of pistil and stamens; 3. pistil; 4. section of a ripe carpel.

GENERA.

Tribe 1. Casteleæ.—
Anthers turned outwards.
Seeds inverted, with albumen.

Castela, Turp.
Elvasia, DC.

Tribe 2. Ochnææ.—
Anthers turned inwards.
Seeds erect, without albumen.

Gomphia, Schreb.

Jabotapita, Plum.
Ouvated, Aubl.
Corrcia, Velloz.
Philomeda, Noronh.
Ciltorrhynchus, Willd.

Oelma, Schreb.
Diporidium, Wendl.
? *Walkera*, Schreb.
Meesia, Gärtn.
Euthemis, Jack.

NUMBERS. GEN. 6. Sp. 82.

Rosacææ.

POSITION.—*Simarubacææ.*—*OCHNACEÆ.*—*Xanthoxylacææ.*

Geraniacææ.

CORIARIÆÆ, (DC. *Prodr.* 1. 739. 1824; *Ed. pr. cvi.*; *Endl. Gen. p. 1065*; *Meisner Gen. p. 56.*) A few plants inhabiting the South of Europe, Chili, Peru, New Zealand, and Nepal, have been associated by Botanists in a genus of which the following is the character. Shrubs with opposite branches, which sometimes are very long and feeble, often 3 on each side, 2 of them being secondary to an intermediate principal one. Leaves oppo-

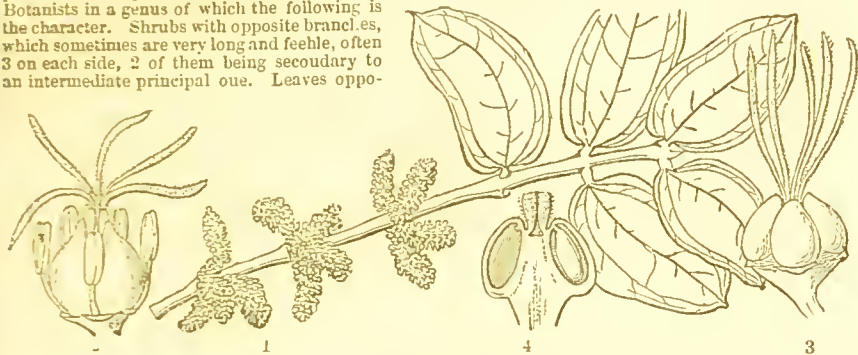


Fig. CCCXXIX.

site, simple, ribbed, entire. Buds scaly. Racemes terminal and axillary. Flowers ♂ or ♀ - ♂ - ♂ . Calyx campanulate, 5-parted, ovate. Petals 5, alternate with the lobes of the calyx, and smaller than they are, fleshy, with an elevated keel in the inside. Stamens 10, hypogynous, 5 between the lobes of the calyx and the backs of the carpels, 5 between the petals and the joinings of the carpels; filaments filiform; anthers oblong, 2-celled. Carpels 5 (or 6), arranged obliquely round a thickish gynobase; stigmas 5, long, subulate; ovules solitary, pendulous, anatropal. Fruits crustaceous, covered over by the membranous sepals and fleshy petals, indehiscent, 1-seeded. Seed pendulous; albumen none; embryo straight; cotyledons 2, fleshy; radicle short, blunt, next the hilum.—It is very difficult to say what is the affinity of this plant. Decandolle places it, as the type of a distinct Order, immediately after Ochnads, with which it agrees in having its ovaries distinct, and surrounding a fleshy axis; but the stigmas in *Coriaria* are long, linear, and distinct, with no style, while Ochnads have a single style connecting the carpels and minute stigmas; the former, therefore, are apocarpous, the latter syncarpous. *Coriaria* is also allied to *Rueworts*, but differs from them as it does from Ochnads; and, besides, the carpels are in *Rueworts* connate. De Candolle understands *Coriaria* as apetalous, but I do not see upon what principle, either of structure or analogy. In his *Essai sur les Propriétés Médicales* he referred it to the vicinity of *Rhamnads*. Jussieu placed it near *Malpighiads*, and this view has been also taken by Endlicher and others, who consider it as being absolutely a member of that Order. But M. Adrien de Jussieu (*Monogr. Malp.* 1st part, p. 135) justly objects to this upon the double ground that *Coriaria* has neither the very peculiar ovule of *Malpighiads*, nor that broken (or spiral) arrangement of parts which pervades the Order in its genuine form; besides, *Malpighiads* never have 5 carpels, when in their natural state.—*Coriaria myrtifolia* and *ruscifolia* are used by dyers for staining black. The fruit is poisonous. It is said that several soldiers of the French army in Catalonia were affected by eating it; 15 became stupefied, and 3 died. Its leaves have been used to adulterate Senna, and have produced fatal consequences, exciting violent fits of tetanus, giving place to apoplectic coma. The French call it *Redout* or *Roudont*. Nevertheless, the fruit of *Coriaria napalensis* is frequently eaten in the north of India without inconvenience, according to Royle, and we learn from Forster that the berries of the New Zealand *Coriaria sarmentosa* are greedily sucked by the natives; the seeds, however, they regard as poisonous.

Gen. 1. Sp. 8.

Fig. CCCXXIX.—1. *Coriaria napalensis*; 2. flower of *Coriaria myrtifolia* without its calyx; 3. its pistil; 4. a perpendicular section of it.

ORDER CLXXIX. SIMARUBACEÆ.—QUASSIADS.

Simarubaceæ, *Rich. Anal. du Fr.* 21. (1808); *Endl. Gen.* ccxlix.—Simarubæ, *DC. Diss. Ochn. Ann. Mus.* 17. 323. (1811); *Prodr.* 1. 733. (1824); *Adrien de Juss. Rutacées*, 129. (1825); *Meisner, Gen.* p. 65.

DIAGNOSIS.—*Rutal Exogens*, with a few-seeded finally apocarpous fruit, whose pericarp does not laminate, a dry inconspicuous torus, exalbuminous seeds, and alternate leaves without stipules.

Trees or shrubs. Leaves without stipules, alternate, occasionally simple, most usually compound, without dots. Peduncles axillary or terminal. Flowers whitish, green, or

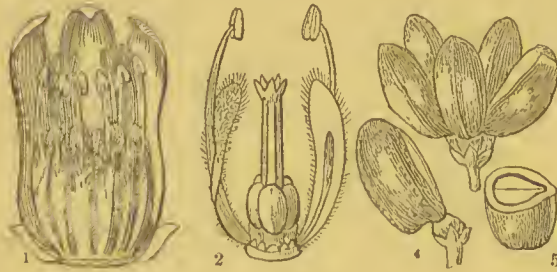


Fig. CCCXXX.

purple. Flowers hermaphrodite, or occasionally by abortive unisexual. Calyx in 4 or 5 divisions, imbricated. Petals the same number, longer, either spreading or combined in a tube; æstivation imbricated. Stamens twice as many as the petals, each arising from the back of an hypogynous scale. Ovary 4- or 5-lobed, placed upon a stalk from the base of which the stamens arise, 4- or 5-celled, each cell with 1 suspended anatropal ovule; stylo simple; stigma 4- or 5-lobed. Fruit consisting of 4 or 5 drupes arranged around a common receptacle, indehiscent. Seeds pendulous, with a membranous integument; embryo without albumen; radicle superior, short, drawn back within the thick cotyledons.

Quassiads are akin to Beancapers in their stamens inserted upon hypogynous scales, and to Oelmads in their deeply-lobed ovary, or nearly separate ovaries; from these latter they are distinguished by their want of a succulent torus, and by their anthers bursting by longitudinal slits, not by terminal pores. A. de Jussieu says, "They are known from all Rutals by the co-existence of these characters; namely, ovaries with but one ovule, indehiscent drupes, exalbuminous seeds, a membranous integument of the embryo, and the radicle being retracted within thick cotyledons."

All are natives of tropical America, India, or Africa, with the exception of one Nipal plant.

The species are intensely bitter. A plant called Paraiba in Brazil, the *Simaruba versicolor* of St. Hilaire, possesses such excessive bitterness that no insects will attack it. Specimens of it placed among dried plants which were entirely devoured by the larvæ of a species of *Ptius*, remained untouched. The Brazilians use an infusion in brandy as a specific against the bite of serpents, and also employ it with very great success to cure the lousy diseases to which people are subject in those countries. The wood of *Quassia amara* is intensely bitter. Lund and others assert that it does not yield the *Quassia* chips of the European druggists, but refer them to *Pieræna excelsa*. But Guibourt says that the wood of both the root and stem of this *Quassia* is imported in the form of white scentless very light cylinders 1-2 inches in diameter; and that the *Pieræna* wood is inferior in quality. I learn however from Mr. Lance, who resided for many years in Surinam, that although large quantities of *Quassia* were exported 20 or 30 years since, yet that for many years none has been collected for that purpose, and he did not hear of a single instance of its shipment during the 10 years he passed in Surinam. *Quassia* wood is in fact no longer used even in that colony as a medicine being thought to have some bad properties along with its intense bitter. The flowers are however still infused in wine or water as a stomachic. The bitter has been used as a substitute for hops in the manufacture of beer; an infusion of the chips is employed to poison flies. *Simaruba amara* is more commonly employed. The bark of the root is stripped off and sent to Europe. In Cayenne the decoction, which is bitter, purgative, and even emetic, is used in fevers and diarrhœa. The wood has similar

Fig. CCCXXX.—*Simaruba guianensis*. 1. a flower with part cut away; 2. pistil and two stamens; 3. fruit; 4. a single carpel; 5. cross section of it and of the seed which it contains.

properties, but is less active. The Jamaica plant, which being diœcious, may be another species, has an inodorous bitter bark which yields its properties to both alcohol and water. It has been remarked that the infusion is more bitter than the decoction. It acts as a tonic and is used in dyspepsia, diarrhœa, chronic dysentery, and all cases of impaired tone of the alimentary canal. *Nima quassioides* is used for similar purposes in the North of India. The timber of *Simaruba amara* is described by Sir R. Schomburgk as resembling White Pine, both in colour and quality. *Niepa* bark, an Indian febrifuge, is obtained from *Samadera indica*. *Brucea antidysenterica* and *Sumatraua* possess properties similar to those of *Quassia*.

GENERA.

<i>Quassia</i> , DC.	<i>Samadera</i> , Gärtn.	<i>Biporeia</i> , Thouars.	<i>Harrisonia</i> , R. Br.
<i>Simaruba</i> , Aubl.	<i>Samandura</i> , Linn.	<i>Mauduyta</i> , Commers.	<i>Ebelingia</i> , Reichenb.
<i>Simaba</i> , Aubl.	<i>Locandi</i> , Adans.	<i>Mawungala</i> , Blanco.	<i>Lasiolëpis</i> , J. J. B.
<i>Aruba</i> , Aubl.	<i>Vittmannia</i> , Vahl.	<i>Nima</i> , Hamilt.	? <i>Picrasma</i> , Blume.
<i>Phyllostema</i> , Neck.	<i>Niota</i> , Lam.	<i>Picrana</i> , Lindl.	? <i>Brucea</i> , Banks.
<i>Zwingera</i> , Schreb.			

NUMBERS. GEN. 10. Sp. 35.

POSITION.—Zygophyllaceæ.—SIMARUBACEÆ.—Xanthoxylaceæ.

ORDER CLXXX. ZYGOPHYLLACEÆ.—BEANCAPERS.

Zygophyllææ, *R. Brown in Flinders*, (1814); *DC. Prodr.* 1. 703. (1824); *Adrien de Juss. Rutacées*, 67. (1825); *Endl. Gen. ccliii.*—*Melanthææ, Endl. p. 1165.*

DIAGNOSIS.—*Rutal Exogens, with few-seeded finally apocarpous fruit, whose pericarp does not laminate, a dry inconspicuous torus, albuminous seeds, and opposite leaves with stipules.*

Herbaceous plants, shrubs, or trees, with a very hard wood, the branches often articulated at the joints. Leaves opposite, with stipules, very seldom simple, usually



Fig. CCCXXXI.

unequally pinnate, not dotted. Flowers solitary, or in pairs or threes, white, blue, or red, often yellow, hermaphrodite, regular. Calyx divided into 4 or 5 pieces, with convolute aestivation. Petals unguiculate, alternate with the segments of the calyx and a little longer, in aestivation, which is imbricated, at first very short and scale-like. Stamens double the number of the petals, dilated at the base, sometimes naked, usually placed on the back of a small scale, hypogynous. Ovary simple, surrounded at the base with glands or a short sinuous disk. More or less deeply 4- or 5-furrowed, with 4 or 5-cells; ovules in each cell 2 or more, attached to the inner angle, pendulous, or occasionally erect; style simple, usually with 4 or 5 furrows; stigma simple, or with 4 or 5 lobes. Fruit capsular, rarely somewhat fleshy, with 4 or 5 angles or wings, bursting by 4 or 5 valves bearing the dissepiments in the middle, or into as many close cells; the sarcoarp not separable from the endocarp. Seeds usually fewer than the ovules, either compressed and scabrous when dry, or ovate and smooth, with a thin herbaceous integument. Embryo green; radicle superior; cotyledons foliaceous; albumen in small quantity, whitish, between horny and cartilaginous, in *Tribulus* wanting.

These plants are remarkable in the Rutal Alliance for their opposite leaves and conspicuous stipules. With *Quassia*s they otherwise accord in the stamens springing from the back of a hypogynous scale. *Adrien de Jussieu* also observes that the petals are remarkable for their being, in an early state, minute and hidden by the calyx, which they only exceed about the time of flowering, while in other Rutal Orders the petals are always larger than the calyx. The distinguishing characters in the vegetation or habit of this Order are not only the leaves being constantly opposite, with lateral or intermediate stipules, but also in their being generally compound, and always destitute of the pellucid glands which universally exist in true *Rueworts*. For this reason the genus *Biebersteinia* must be excluded, although its leaves have stipules. It is also a very common character of the Order to have the radicle at that extremity of the seed which is most remote from the hilum; but this, which is of great importance in many natural families, is of less value in *Beaucapers*. (See many good remarks upon this subject in *Brown's Appendix to Denham*, p. 27.) An anonymous author expresses his opinion (*Linnaea*, xv. 249.) that the true affinity of this Order is with *Oxalids*, not *Rueworts*. He would not however keep them in the neighbourhood of *Cranesbills*, but thinks *Mallowworts* their true relations.

Guaiaecum, *Porlieria*, and *Larrea*, are peculiar to America. *Fagonia* is distributed over the south of Europe, the Levant, Persia, and India. *Zygophyllum* inhabits the same regions, and also the south of Africa, and is represented in New Holland by *Røpera*. *Tribulus* occurs in all the Old World within the tropics, or in countries bordering upon them. *Melanthus*, a most anomalous genus, is remarkable for being found both at the Cape of Good Hope and in Nipal, without any intermediate station. The abundance of *Beaucapers* constitutes one of the most striking features of the vegetation of the Egyptian deserts.

Fig. CCCXXXI.—*Røpera fabagifolia*. 1. a flower; 2. pistil; 3. perpendicular section of it; 4. fruit; 5. section of a seed.

Zygophyllum Fabago is sometimes employed as an anthelmintic. The ligneous plants of the Order are remarkable for the extreme hardness of their wood. All the *Guaiacums* are well known for their exciting properties; the bark and wood of *Guaiacum sanctum* and *officinale* have a somewhat bitter and acrid flavour, and are principally employed as sudorifics, diaphoretics, or alteratives; they contain a particular matter often designated as resin or gum-resin, but which is now considered a distinct substance, called *Guaiacine*. According to Dr. Hancock (in the *Gardeners' Chronicle*), the medical value of *Guaiacum* resides principally in the bark. The foliage is very detersive, and is frequently used in the West Indies to scour and whiten floors, which it is said to do better than soap. *Porlieria hygrometrica* has similar properties. The wood called *Lignum vitæ* is remarkable for the direction of its fibres, one layer of which often crosses another diagonally; a circumstance first pointed out to me by Professor Voigt. This valuable timber is generally said to be furnished by *Guaiacum officinale*; but it is probably the wood of some other species, for the small size of that tree seems quite incompatible with the production of timber 4 or 5 inches in diameter.—*See Bot. Rey. l. c.* The flowers of *Melianthus major* are so full of honey, that the natives of the Cape of Good Hope, where it grows wild, obtain it for food by shaking the branches, when it falls in a heavy shower. The flowers of *Zygophyllum Fabago* are a substitute for Capers; the smell of *Z. simplex* is so detestable that no animal will touch the foliage, not even the camel; the Arabs, however, beat the leaves in water, and apply the infusion in diseases of the eyes. The Turks use the seeds of *Peganum Harmala* as a spice, and for dyeing red.

GENERA.

<p>I. TRIBULÆE. — Seeds without albumen.</p> <p><i>Tribulus, Tournef.</i> <i>Kallströmia, Scop.</i> <i>Ehrenbergia, Mart.</i> <i>Heterozygia, Bung.</i></p>	<p>II. ZYGOPHYLLÆE. — Seeds with albumen.</p> <p><i>Peganum, L.</i> <i>Harmala, Muhl.</i> <i>Malacocarpus, F. et M.</i> <i>Chitonia, Moç. et Sess.</i> <i>Juliania, Latv. et Lex.</i></p>	<p><i>Fagonia, Tournef.</i> <i>Sarcozygium, Bunge.</i> <i>Röpera, Adr. Juss.</i> <i>Zygophyllum, Linn.</i> <i>Fabago, Tournef.</i> <i>Agrophyllum, Neck.</i> <i>Eurynema, Endl.</i></p>	<p><i>Trichanthera, Ehrenb.</i> <i>Larrea, Cav.</i> <i>Porlieria, Ruiz et Pav.</i> <i>Plectrocarpa, Gill.</i> <i>Guajacum, Plum.</i> <i>Seetzenia, R. Br.</i> <i>Melianthus, L.</i></p>
---	---	---	---

NUMBERS. GEN. 7. Sp. 100.

POSITION.—*Simarubaceæ.*—*ZYGOPHYLLACEÆ.*—*Elatinaceæ.*
Oculidaceæ.

ORDER CLXXXI. ELATINACEÆ.—WATER-PEPPERS.

Elatinæ, *Cambessèdes* in *Mém. Mus.* 18, 225. (1829); *Aug. de St. H. Fl. Bras.* 2, 159. (1830); *Fl. Seneg.* 1, 42. (1832); *Fischer and Meyer in Linnæa*, x, 69. (1835); *Wight Illustr.* 1, t. 25; *Endl. Gen.* ccxix.; *Meisner Gen.* p. 131; *Fenzl Darstellung*, &c., p. 30.

DIAGNOSIS.—*Rutal Exogens*, with a many-seeded fruit which is finally apocarpous, and polypetalous flowers.

Little annuals, growing in marshy places, with fistular rooting stems. Leaves opposite, with stipules between the petioles. Sepals 3-5, imbricated, distinct, or slightly connate at the base. Petals of the same number as the sepals, imbricated, hypogynous.



Fig. CCCXXXII.

Stamens hypogynous, usually twice as numerous as the petals. Ovary with from 3 to 5 cells, an equal number of styles, and capitate stigmas; ovules 00, anatropal. Fruit capsular, 3-5-celled, opening at the sutures, crowned by the styles; the valves either flat at the edge, or rolled inwards and alternating with the angles of a central placenta. Seeds 00, without albumen, wrinkled transversely, cylindrical, with a straight embryo, whose radicle is turned to the hilum, which is at one end of the seed.

This little Order was established by *Cambessèdes*, who distinguished it from *Alsiniaceæ*, with which a part had been confounded, by its capitate stigmas, the dehiscence of its fruit, the small quantity of albumen, and the straight, not curved, embryo. It does not, however, appear that the Water-peppers have any immediate relation to the *Silenal Alliance*, of

which *Alsiniaceæ* form a part. On the contrary, the species agree much better with *Tutsans* (*Hypericaceæ*) even in the presence in the leaves of receptacles of resinous secretions; but they differ in having a persistent central axis in the fruit, and definite stamens, on which latter account they fall into the ranks of the *Rutal* rather than the *Guttiferal Alliance*. This view of their affinity seems confirmed by the curious genus *Tetradiclis*, a Syrian plant, with the habit of a *Tillaea*, on which account it has been even referred to the Order of *Houseleeks* by *Bungo* (*Linnæa*, xiv, 177). It is remarkable for having in each cell of its fruit two seeds enveloped in the laminated sides of the dissepiments, which sides adhere to the seeds, and seem as if they were really a part of them; the other seeds, however, are naked, and lie in the space between the lateral seeds. If it were not for this singular breaking up of the tissue of the dissepiments, *Elatine* would be very near *Tetradiclis*. Now, there can be no doubt of the latter genus being a member of the *Rutal Alliance*; but its numerous seeds attached to two arm-like free placentæ forbid its being stationed in *Rueworts*, whither *Mr. Fenzl* has referred it (*Linnæa*, xv, 295), or in *Bean Capers*, among which I had assigned it a doubtful place in the *Botany* (still unpublished) of *Col. Chesney's Expedition to the Euphrates*. It falls, however, well into the Order of *Water-peppers*, and contributes to confirm the importance of that little Order.

Found in marshes in the four quarters of the globe. The *Elatinæ* are natives of Europe and Asia, *Bergias* of the Cape of Good Hope and the East Indies, *Merimeca* of South America, and *Tetradiclis* of the Syrian region.

Dr. Wight says that in India the little *Bergia ammannioides* bears the Tamool name of *Necr-mel-neripoo*, or *Water-fire*, which seems a curious coincidence with the word *Water-pepper*, given in English to *Elatine*, and seems to indicate a popular belief in these plants possessing some acridity.

Fig. CCCXXXII.—*Elatine hydropeper*.—*Sowerby*. 1. a flower; 2. a capsule after splitting; 3. the placenta; 4. and 5. seeds.

I observe that Dr. Bunge considers Ehrenberg's genus *Anatropa* identical with *Tetradiclis*. M. Decaisne long since pointed out to me the close relation between the two, and at the same time expressed his opinion that the former would constitute a new Order between Rueworts and Beancapers. But since *Anatropa* has stipules, according to Ehrenberg, it seems premature to combine them.

GENERA.

<i>Elatine</i> , Linn.	<i>Birolia</i> , Bellard.	<i>Bergia</i> , Linn.	<i>Tetradiclis</i> , Stev.
<i>Crypta</i> , Nutt.	<i>Alsinastrum</i> , Endl.	<i>Lancrota</i> , Del.	<i>Anatropa</i> , Ehrenb.
<i>Cryptina</i> , Raf.	<i>Potamopitrys</i> , Buxb.	<i>Merimea</i> , Camb.	? <i>Tridia</i> , Korth.
<i>Hydropiper</i> , Endl.			

NUMBERS. GEN. 6. Sp. 22.

POSITION.—Zygophyllaceæ.—ELATINACEÆ.—Podostemaceæ.
Hypericaceæ.

ORDER CLXXXII. PODOSTEMACEÆ.—PODOSTEMADS.

Podostemæ, *Richard and Kunth in Humb. N. G. et Sp.* 1. 246. (1815); *Martius Nov. G. et Sp.* 1. 6. (1822); *Bartl. Ord. Nat.* 72. (1830); *Bongard in Mem. de l'Acad. Imp. Petersb. VI. ser. III.* 69. (1834); *Endl. Gen.* lxxxv.; *Meisn. Gen.* p. 122.; *Griffith in Ann. Sc. Nat. ser. II.* 9. 183.

DIAGNOSIS.—*Rotal Exogens*, with many-seeded fruit, which is finally apocarpous, and apetalous very imperfect flowers.

Herbaceous branched floating plants without stomates or spiral vessels, and with the habit of Liverworts or Scale-mosses. Leaves capillary, or linear, or lacerated irregularly, or minute and densely imbricated, decurrent on the stem, with which they are not articulated. Flowers axillary or terminal, inconspicuous, usually ♀, naked, or with a very imperfect calyx, or with 3 sepals bursting through an irregularly lacerated spathe. Stamens hypogynous, varying from 1 to an indefinite number, either placed all round the ovary or on one side of it, distinct or monadelphous; anthers oblong, 2-celled, bursting longitudinally. [Pollen shaped like an hour-glass, consisting of two spherules, inseparably united in Podostemon.—*Griffith.*] Ovary 2- or 3-celled, with numerous ascending anatropal ovules attached to a fleshy central placenta; styles or stigmas 2 or 3, acute and sessile. Fruit slightly pedicellate, ribbed, capsular, opening by 2 or 3 valves, which fall off from the dissepiment, which is parallel with them. Seeds numerous, minute, containing an exalbuminous dicotyledonous orthotropal embryo.

Von Martius has the following remarks upon this curious Order. "It is very doubtful in what part of the natural series Podostemads should be arranged; for they are connected with so many other Orders, in so various and complicated a manner, that it is probable that several genera, the affinities of which will be more apparent, still remain to be discovered. Nothing can be more singular than the mixture of different characters which they exhibit. Thus, the structure of their spathes, and the want of a true calyx and corolla, approximate them to Naiads (*Fluviales*) and Arads, while the character of their stamens and fruit is very much that of *Juncaginacæ*; the former of these, however, differ in their lower degree of organisation, and the latter in the presence of a more or less perfect perianth, and in the composition of their capsule. Lemna, a genus closely allied to Arads, seems to be more related to them in its spathe, hypogynous stamens, habit, and mode of life, but is distinguished by its less highly developed few-seeded fruit. Again, *Mniopsis*, in its ramification, in the form and position of its leaves, and in its stipules, and *Lacis* and *Podostemon* in the character of their spathe and the emersion of their pedicels at the time of flowering, call remarkably to mind the habit of *Jungermannia*; so that we should probably not be far from the truth, if we were to say that this Order forms a transition from Naiads (*Fluviales*) to *Juncaginacæ*, on the one hand touching upon Arads, and being, as it were, a sort of noble analogy of Liverworts among Monocotyledons."—*Nov. G. et Sp.* 1. 7. So far as the general appearance of Podostemads is concerned, this account of them may be received; but since they have a dicotyledonous not monocotyledonous embryo,

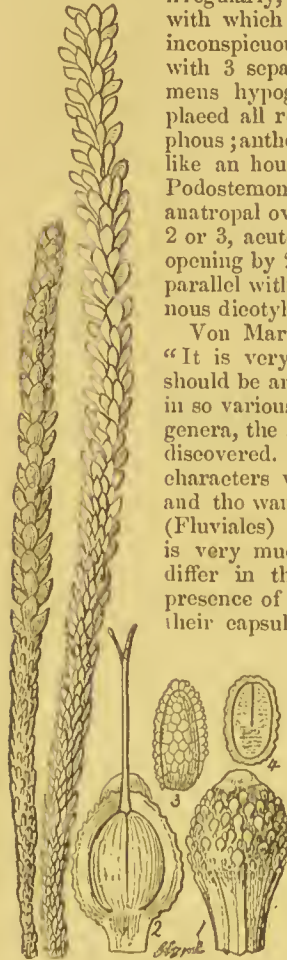


Fig. CCCXXXIII.

other affinities must be looked for. Bongard first represented their true structure, and more recently Mr. Griffith has described two Indian species of Podostemon, with his habitual accuracy; entirely confirming the view which I upon mere theoretical reasoning formerly took of their being Exogeus.—*Ed. pr.* p. 190. And I am still of opinion that if we have among Exogens one type of structure more nearly approaching that of

Fig. CCCXXXIII.—The ♀ of *Hydrostachys verruculosa*. 1. the calyx; 2. the same opened to show the ovary; 3. a seed; 4. a vertical section of it.—*Dcaise.*

Acrogens than another it is this, which, with the habit of Liverworts and Scale-mosses, has wholly the structure of flowering plants. According to Bongard, the species have neither spiral vessels nor stomates; the latter would of course be absent, on account of the submersed habits of the species of Mourera to which his observations chiefly apply. And Mr. Griffith confirms his statements as regards his two Indian Podostemons. But although Podostemads must be considered to present a very strongly marked approach to flowerless plants in some respects, yet we must look for some more immediate relation. This I formerly thought might be found with Peppers, or Callitriche; Meisner suggests Hornworts. But if we regard hermaphrodite flowers, hypogynous stamens, and an exalbuminous embryo as the most important features in these plants, our views of its affinity will take a very different direction, and we can scarcely fail to suspect an approach to Waterpeppers, whose manner of life is in some respects similar. In fact, upon comparing the two Orders, we find that they are otherwise much alike, except that Podostemads are more incompletely formed in the floral envelopes, and seem to want the capitate stigmas of that Order. Both have 2-celled anthers bursting inwards longitudinally, and a separable placenta bearing numerous anatropal seeds. It seems, therefore, probable that Podostemads stand in the same relation to Waterpeppers as Hippurids to Onagrad, and Lemnads to Arads.

Natives of rocks, in rivers, still waters, and damp places in South America and the islands off the east coast of Africa; 1 species is found in North America, 2 in the East Indies.

Some species of Lacis yield, when burnt, a considerable quantity of salt from their ashes.—Schomburgk.

GENERA.

Mniopsis, Mart.	<i>Dicreia</i> , Thouars.	Lacis, Lindl.	Hydrostachys, Thouars.
<i>Crenias</i> , Spreng.	Mourera, Aubl.	Tristicha, Thouars.	Halophila, Thouars.
Hydrobryum, Endl.	<i>Xcolacis</i> , Cham.	<i>Dufourea</i> , Bory.	? Lemnopsis, Zippel.
Podostemon, L. C. Rich.	<i>Marathrum</i> , H. B. K.	<i>Philocrene</i> , Bong.	

NUMBERS. GEN. 9. Sp. 25.

Haloragcæ.

POSITION.—Elatinacæ.—PODOSTEMACEÆ.—Piperacæ.

Marchantiacæ.

ALLIANCE XXXVI. GERANIALES.—THE GERANIAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monodichlamydeous, symmetrical flowers, axile placentæ, an imbricated calyx, a twisted corolla, definite stamens, and an embryo with little or no albumen.*

If we seek for a positive character by which the present Alliance may be known from its relations, we shall find it in the combination of three circumstances, viz: a definite number of stamens, an imbricated calyx, and a twisted corolla. Malvals have a twisted corolla, but their stamens are usually indefinite and their calyx is always valvate; for which latter reason Indian Cresses are removed from the Geranial Alliance. Rutals have definite stamens and an imbricated calyx, but their corolla is imbricated, not twisted.

The only doubtful Order of the Alliance is that of Chlenads, which in habit is like some Sterculiads; but it corresponds with Balsams in their unsymmetrical flowers, and it has not a stronger relation to any Malval than to the Order of Geranials. Chlenads may perhaps be regarded as a kind of approach on the part of Geranials to the Malval Alliance.

NATURAL ORDERS OF GERANIALS.

<i>Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with little or no albumen</i>	} 183. LINACEÆ.
<i>Flowers regular, unsymmetrical, with a permanent cup-like involucre. Stamens monadelphous. Albumen abundant</i>	} 184. CHLÉNACEÆ.
<i>Flowers symmetrical. Styles distinct. Carpels longer than the torus. Seeds with abundant albumen</i>	} 185. OXALIDACEÆ.
<i>Flowers very irregular and unsymmetrical, without an involucre. Stamens distinct. Albumen none</i>	} 186. BALSAMINACEÆ.
<i>Flowers usually symmetrical. Styles and carpels combined round a long beaked torus</i>	} 187. GERANIACEÆ.

ORDER CLXXXIII. LINACEÆ.—FLAXWORKS.

Linæw, *DC. Théorie*, ed. 1. 217. (1819); *Prodr.* 1. 423. (1824); *Endl. Gen. cclv.*; *Meisner, Gen.* 57.

DIAGNOSIS.—*Geranial Exogens*, with symmetrical flowers, distinct styles, carpels longer than the torus, and seeds with little or no albumen.

Annual or perennial plants, or even small shrubs. Leaves alternate or opposite, rarely in whorls, simple, entire, without stipules, sometimes with a pair of glands. Flowers very fugitive, white, yellow, red, or blue. Sepals 3-4-5, with an imbricated aestivation, continuous with the peduncle, persistent. Petals equal in number to the sepals, hypogynous, unguiculate, with a twisted aestivation. Stamens equal in number to the petals, and alternate with them, united at the base in a hypogynous ring, from which proceed little teeth opposite to the petals, indicating abortive stamens; anthers ovate, innate. Ovary with about as many cells as sepals, seldom fewer; styles equal in number to the cells; stigmas capitate; ovules pendulous, anatropal. Capsule generally pointed with the indurated base of the styles, many-celled; each cell completely or partially divided in two by an imperfect spurious dissepiment arising from the dorsal suture; dehiscing with two valves at the apex. Seeds in each cell single, compressed, inverted; albumen 0, or in very small quantity; embryo straight, fleshy, with the radicle pointing towards the hilum; cotyledons flat.

It is remarked by De Candolle that this Order is intermediate, as it were, between Cloveworts, Mallowworts, and Cranesbills. Aug. de St. Hilaire considers it a mere section of the latter, from which however it is removed by its continuous stems, exstipulate leaves, and unbeaked fruit. Its nearest affinity is with Oxalids, from which there is little to divide it except the peculiar structure of its carpels, whose spurious dissepiments are however scarcely of ordinal importance, its simple leaves, and the very small quantity of albumen found in the seeds. It is not without resemblance to Waterpeppers, of which I formerly suggested that Flaxworts might be an exstipulate decandrous form.

Europe and the North of Africa are the principal stations of this Order, which is, however, scattered more or less over most parts of the globe. Several are natives of North and South America, 2 only are found in India, 1 in New Zealand, and none in New Holland; for the *L. angustifolium* mentioned by De Candolle as having been sent him from that country, had probably, as he suggests, been introduced from Europe. It is stated by Richardson that the most northern limit of this Order in North America is 54° N.

The tenacity of their fibre, and the mucilage of their diuretic seeds, are striking characters of Flaxworts, which are also usually remarkable for the beauty of their flowers. The leaves of *L. catharticum* are purgative. *Linum selaginoides* is considered in Peru bitter and aperient. The meal of the seeds of *Linum usitatissimum* is used for poultices. The infusion is demulcent and emollient. The oil mixed with lime-water has been a favourite application to burns. The tenacious and delicate fibre called Flax is obtained from that plant, and forms the most beautiful of our linen fabrics.

GENERA.

Linum, Linn.
Calhartolinum, Reich.
Adenolinum, Reich.

Linopsis, Reich.
Xantholinum, Reich.
Macrolinum, Reich.

Reinwardtia, Dumort.
Chococca, Bab.
Radiola, Dillen.

NUMBERS. GEN. 3. Sp. 90.

Elatinaceæ.

POSITION.—Oxalidaceæ.—LINACEÆ.—Geraniaceæ.

Malvaceæ.



Fig. CCCXXXIV.

Fig. CCCXXXIV.—*Linum perenne*. 1. a single flower; 2. the calyx and stamens, &c.; 3. the stamens, &c. without the calyx; 4. a cross section of the ovary; 5. a section of a seed.

ORDER CLXXXIV. CHLÆNACEÆ.—CHLÆNADS.

Chlænaceæ, *Thouars' Hist. Veg. Afr. Austr.* 46. (1806); *DC. Prodr.* 1. 521. (1824); *Endl. Gen. celv.*; *Meisner*, p. 35.

DIAGNOSIS.—*Geranial Exogens*, with regular unsymmetrical flowers, in a permanent cup-like involucre, monadelphous stamens, and abundant albumen.

Handsome trees or shrubs, with fine showy flowers usually of a red colour. Leaves alternate, feather-veined, entire, sometimes plaited longitudinally; stipules terminating the branches in a conical way, and rolling up or inclosing the leaves, quickly deciduous. Flowers in corymbs, racemes or panicles. Involucre 1-2-flowered, persistent, of variable form and texture. Sepals 3, small; aestivation imbricated. Petals 5, hypogynous, convolute, broader at the base, sometimes cohering there. Stamens either very numerous, or sometimes only 10; filaments either cohering at the base within a cup-like disk, or adhering to the tube of petals; anthers roundish, aduate, or loose, 2-celled. Ovary single, 3-celled; style 1, filiform; stigma triple; ovules 2 or more, anatropal, pendulous from the inner angle. Capsule 3-celled, or 1-celled by abortion. Seeds solitary or numerous, attached to the centre, suspended; embryo green, central; albumen fleshy according to Jussieu, or horny according to Du Petit Thouars; cotyledons foliaceous, wavy; radicle superior.

These are very curious plants, presenting the singular properties of 3 in the calyx, 5 in the corolla and stamens, and 3 in the ovary; besides which, their flowers are inclosed in an involucre, which is usually 5-toothed. The monadelphous stamens and involucrated flowers seem to indicate an affinity between these plants and Mallowworts. But Jussieu refers the Order rather to the vicinity of Ebenads, considering it monopetalous. Very little is, in fact, known of it. I formerly supposed it to have some relation to the Rock-roses (*Cistacææ*), having had no opportunity of examining the plants myself. The acquisition of 2 or 3 species has, however, satisfied me, that if the calyx were valvate the Chlænads could not be removed from the Malval Alliance. The tendency of their calyx being, however, to the imbricated structure, the Geranial Alliance necessarily becomes their station, where they may be regarded as a connecting link with Malvals. The propriety of placing them in the Geranial Alliance seems to be confirmed by Balsams exhibiting a similar tendency to the unsymmetrical structure.

Whatever the real place of this group may eventually prove to be, it is certain that

Fig. CCCXXXV.—*Leptolana multiflora*. 1. a perpendicular section of its flower; 2. a diagram of its structure; 3. a section of its seed.



Fig. CCCXXXV.

Mr. Endlicher has destroyed all ideas of its nature by introducing such plants as *Hugonia*, *Ventematia*, and *Eucryphia*, which are noticed elsewhere, the one belonging to Oxalids, the second possibly to Theads, and the last being certainly not far removed from the Order of Tutsaus, if it be distinguishable.

All the species are natives of Madagascar.

Nothing is known of their uses.

GENERA.

Sarcolæna, *Thouars*.

Leptolæna, *Thouars*.

Schizolæna, *Thouars*.

Rhodolæna, *Thouars*.

NUMBERS. GEN. 4. Sp. 8?

POSITION.—Balsaminaceæ.—CHLÆNACEÆ.—

Sterculiaceæ.

ORDER CLXXXV. OXALIDACEÆ.—OXALIDS.

Oxalidæ, DC. Prodr. 1. 689. (1824); Endl. Gen. cclvi.; Meisner Gen. 57.—Ledocarpeæ, Meyen Reise. 1. 307.; Klotzsch in Linnæa 10. 431.; Endl. Gen. p. 1169.—Rhyncothecæ, Endl. Gen. p. 1169.—Hugoniaceæ, Arnott Prodr. Fl. Ind. Penins. 1. 71. (1834); Ed. pr. lxxvii.; Wight Illustr. 1.; Endl. Gen. p. 1016; Meisner, p. 35.

DIAGNOSIS.—*Geranial Exogens*, with symmetrical flowers, distinct styles, carpels longer than the torus, and seeds with abundant albumen.

Herbaceous plants, undershrubs, or trees. Leaves simple or compound, alternate, usually but not always without stipules; occasionally opposite. Sepals 5, sometimes slightly cohering at the base, persistent, imbricated. Petals 5, hypogynous, equal, unguiculate, with a spirally-twisted æstivation; occasionally 0. Stamens 10, usually more or less monadelphous, those opposite the petals forming an inner series, and longer than the others; anthers 2-celled, innate. Ovary with 3 to 5 cells; styles as many, filiform; stigmas capitate or somewhat bifid; ovules anatropal. Fruit capsular, membranous, or drupaceous, with 3-5 cells and as many or twice as many valves, if it is dehiscent. Seeds few, fixed to the axis, sometimes inclosed within a fleshy integument, which curls back at the maturity of the fruit, and expels the seeds with elasticity. Albumen between cartilaginous and fleshy. Embryo the length of the albumen, with a long radicle pointing to the hilum, and flat cotyledons.

These plants were formerly included in the Order of Cranesbills, from which, in the judgment of many, they are not sufficiently distinct. According to De Candolle, they are rather allied to Beencapers; an opinion which their compound leaves appear to confirm. The species are generally described with an aril; but, according to Augusto de St. Hilaire, the part so called is nothing but the outer integument of the seed. The genus *Hugouia*, which has been placed first in one Order, then in another, and even considered the type of an Order apart from all others, chiefly differs in its simple leaves and deciduous stipules. The true character of Oxalids resides in their regular flowers, beakless fruit, and albuminous seeds, to which may be added the very general tendency among them to form compound leaves.

Natives of all the hotter and temperate parts of the world, most abundantly however in America and the Capo of Good Hope; more rarely in the East Indies and equinoctial Africa; and sparingly in the temperate parts of Asia and in Europe. The shrubby species are confined to the hotter parts of the world.

Averrhoa Bilimbi and the pinnated *Oxalis* called *Biophytum* have sensitive leaves. The chief quality of the typical species of this Order resides in their strong acidity, caused by oxalic acid, formed by them in great abundance; hence they are used as substitutes for Sorrel. In the *Blimbing*, and *Carambola* (*Averrhoa Bilimbi*, and *Carambola*), whose fruit is eaten in the East Indies, this acidity is intolerable to Europeans, who use them chiefly as pickles. On the same account several species of *Oxalis* are used in Brazil against malignant fevers. A species of *Oxalis* (*renata*), found in Columbia, bears tubers like a Potato, and is one of the plants called *Arracacha*: the tubers are insipid, and not worth cultivation; the stalks of the leaves are intensely acid, and make an agreeable preserve. Another species, the *Oxalis Deppei*, has,



Fig. CCCXXXVI.

Fig. CCCXXXVI.—*Oxalis confertifissima*. 1. calyx; 2. stamen; 3. pistil; 4. seed and its section of *O. acetosella*.

however, fleshy roots, quite free from acidity, and abounding in a matter analogous to that of salep: these roots are as large as small Parsnips, and are becoming esteemed for culinary purposes. The species called *Oxalis crassicanlis*, *tetraphylla*, and *esculeuta*, are reported to possess similar good qualities. Some bitterness has been remarked in *Oxalis sensitiva*, whose leaves are said to be tonic and slightly stimulating. *Hugonia Mystax* too, an anomalous species of the Order, is of a like nature, but in a more marked degree; its root smells like violets, and is said to be diuretic, diaphoretic, and anthelmintic. In certain species an irritability of so marked a kind has been found as to cause them to be classed among Sensitive Plants. *Averrhoa Bilimbi* and *Oxalis sensitiva* are the most remarkable; but the same irritability has been observed by Professor Morren in the European *Oxalis stricta*.—*Ann. Sc. n. s.* xiv. 350.

GENERA.

Oxalis, Linn.
Biophytum, DC.
Averrhoa, Linn.
Bilimbi, Endl.
Carambola, Endl.

Ledocarpum, Desf.
Balbisia, Cav.
Cruckshanksia, Hook.
Cistocarpum, Kunth.

Wendtia, Meyen.
Martiniera, Guillem.
Hugonia, L.
Rhynchotheca, R. et P.

NUMBERS. GEN. 6. Sp. 325.

POSITION.—Linaceæ.—OXALIDACEÆ.—Geraniaceæ.
Zygophyllaceæ.

ORDER CLXXXVI. BALSAMINACEÆ.—BALSAMS.

Balsamineæ, *Ach. Rich. Dict. Class.* 2. 173. (1822); *DC. Prodr.* 1. 685. (1824); *Lindl. Synops.* 59. (1829); *Röper de Floribus et Affinitatibus Balsaminearum*, (1830); *Wight and Arnott, Prodr. Fl. Ind. Penins.* 1. 134. (1834); *C. B. Presl. Bemerkungen über den bau der Blumen der Balsamineen*, (1836); *Wight and Röper Linnea* ix. 112. (1835); *Bernhardt, ib.* xii. 669. (1838); *Kunth in Mém. Soc. Hist. Nat. Par.* iii. 384. (1827); *Wight in Madras Journal* (Jan. 1837); *Lindl. in Bot. Reg. sub. t.* 8. (1840); *Endl. Gen.* cclvii.; *Meisner Gen.* p. 58.—Hydrocereæ, *Blume Bijdr.* 241. (1825); *Ed. Prior, No.* 125. (1830).

DIAGNOSIS.—*Geranial Exogens*, with very irregular and unsymmetrical flowers without an involucre, distinct stamens, and no albumen.

Succulent, usually annual, herbaceous plants, having simple, opposite, or alternate leaves, without stipules. Peduncles axillary, or quasiterminal and racemose. Flowers very irregular. Sepals 5, irregular, deciduous, with an imbricated æstivation; the two exterior opposite, lateral, somewhat unsymmetrical, with a valvate æstivation, but giving way for the projection of the spur of the odd sepal; the odd sepal spurred, symmetrical, with an equitant æstivation in the bud, looking towards the axis of the axillary racemose or umbellate inflorescence, containing honey; the two dorsal sepals usually connate, sometimes unsymmetrical, orbicular, always coloured, appearing at that side of the flower which is opposite to the spurred sepal. Petals either distinct or adhering, 5, combined into 2 or 3, irregular, deciduous; the dorsal usually abortive, and the side ones united more or less in pairs; their two larger lobes next the spur, their two smaller next the odd petal; æstivation convolute. Stamens 5, symmetrical, alternate with the petals. Carpels 5, alternate with the stamens, consolidated into a 5-celled ovary; style clear of the carpellary leaves, simple; stigma sessile, more or less divided in 5; cells 5, 2- or many-seeded. Fruit capsular, with 5 elastic valves, and 5 cells formed by membranous projections of the placenta, which occupies the axis of the fruit, and is connected with the apex by 5 slender threads; sometimes succulent and indehiscence. Seeds solitary, or numerous, suspended; albumen none; embryo straight, with a superior radicle and plano-convex cotyledons.

The Balsams are, in the opinion of some Botanists, scarcely distinguished from Cranesbills. But the latter evidently differ in the torus or gynobase being lengthened into a beak, in their leaves having stipules, their stems swollen articulations, and their carpels but one seed in each cell. Their flowers too have none of the peculiar breaking up of symmetry which is so characteristic of Balsams, and which at once divides them from even Oxalids, to which they certainly approach very nearly.

Much discussion has taken place among Botanists as to the real nature of the parts which constitute the very irregular flower of a Balsam. According to Röper and others, two membranous external seales, and a spur, alone belong to the calyx, of which the two other sepals are usually deficient on that side of the flower which is opposite the spur; on the other hand, the corolla consists of a large upper or back piece, and of two lateral inner wings, each of which last consists of two petals; and this view was adopted in the last edition of this work. On the other hand, Achille Richard considers two smaller exterior seales, together with the spurred and the back interior pieces, as forming a four-leaved calyx, while he regards the two



Fig. CCCXXXVII.

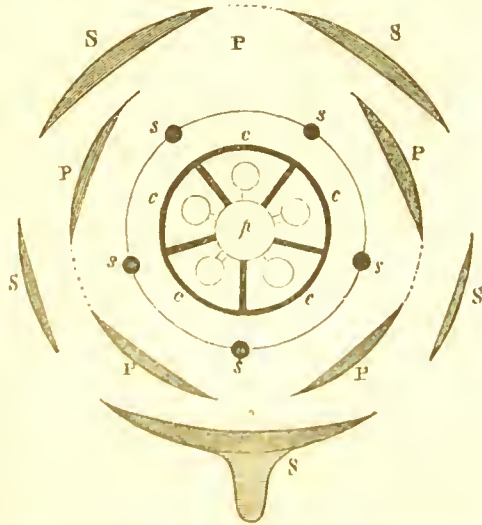
Fig. CCCXXXVII.—1. *Impatiens macrochilla*; 2. a diagram of its flower; 3. its stamens; 4. fruit of *I. Balsamina*; 5. its embryo.

innermost lobed pieces as two pairs of petals of a four-leaved corolla. A third view is that of Bernhardi, who regards the exterior scales as bracts, the calyx as consisting of five parts, of which three only, namely the spur and the back piece, which is double, are present, and the others rudimentary or missing; while the corolla also consists of five parts, of which the four lower are united in pairs into the two innermost lobed pieces, and the fifth is either separate, as in *Hydrocera*, or consolidated with the two back united sepals into what he calls a petal-sepal. A fourth view is that of Kunth, who considers the large back piece of the flower to be composed of two sepals, and together with the spur and exterior scales to form a five-leaved calyx; while he finds in the two innermost parts a corolla of four petals united in pairs, and he assumes the fifth petal to be abortive. This opinion has been adopted by Arnott in 1833, and by Presl in 1836, the latter having discovered the fifth or missing petal to be present occasionally in the garden Balsam, and always in *Hydrocera triflora*; both these Botanists finding in the genus *Hydrocera* the back piece, which is simple in *Impatiens*, composed of two parts, and therefore confirming the accuracy of the theory of Kunth. Other opinions, more or less resembling these, have been formed by others, but it is clear that Kunth's theory is the only one that is correct.

If we make a section horizontally through a young flower-bud of *Impatiens macrochila*, we find the following structure:—There is in the centre an ovary of five cells; with these alternate the five stamens, of which the fifth or anterior has a longer filament than the others; so far the structure is regular, and we have all the necessary evidence of the flower, however irregular, being formed upon a quinary type. Right and left of the stamens stand the two innermost pieces; these cannot be simple, because they are opposite the intermediate stamens; but their two-lobed figure, when full grown, shows that each is double, and then, their apparent centre being in fact their united margins, they alternate with the anterior stamens, and so fall into the place usually destined for petals. The last mentioned parts are half enveloped by the back piece, which might, from its position, be the fifth petal; but the case of *Hydrocera* showing it really to consist of two united parts, they must be opposite the stamens, and consequently are sepals. Next comes the spur, which overlaps the back piece, and stands opposite the anterior stamen; as no tendency to divide on the part of this piece is ever found, it must be a sepal. Finally, the external scales, placed right and left of the whole flower, alternate with those parts already shown to be sepals, and consequently are recognised as the two parts of the calyx required to complete the quinary plan of the whole flower. It will be remarked, that a fifth petal has not been found; if the eye is turned upon the back piece, already found to be composed of two sepals, it will be seen that a part is missing between those two and the two corresponding stamens; and this is the place where the abortion of a fifth of the corolla may, upon the evidence of this flower, be assumed to occur, and where it is proved to take place by the evidence of *Hydrocera*, in which the part missing in the Balsam makes its appearance.

The annexed diagram will serve to illustrate the preceding observations; the parts of the flower, as they really exist in *Impatiens* being projected upon a plane consisting of five circles, of which the exterior (S) represents the sepals or calyx, the next (P) the petals or corolla, the third (s) the stamens, the fourth (c) the carpels, and the central (p) the placenta, or axis.

Connected with these plants is a point of structure deserving of attention. In some species it will be found that the style is surrounded below its apex by five points, which are evidently continuations of the backs of the five carpellary leaves, which certainly in these plants are separate from the placenta, and are merely pressed down upon it so as to cover the ovules, thus confirming the accuracy of the views concerning placentation held by Schykofsky and Schleiden. If so, what else can the upper part of the style and the stigmas be, except the naked apex of the placenta,



prolonged beyond the carpellary leaves? And then is not the conducting tissue of a style in most cases an extension of the placenta? and may we not consider the indusium of Goodeniads, and, *à fortiori*, the well-known rim found upon the stigma in Heathworts, as the expanded end of the carpellary leaves, while the stigma of those plants is the upper end of the placenta?

Natives of damp places among bushes in the East Indies; 1 is found in Madagascar, 1 in Europe, 2 in North America, and 1 in Russia in Asia. India swarms with species, all of which deserve the care of the cultivator. According to Dr. Wight, (*Madras Journal*, January, 1837,) at least a hundred occur in those districts from which Roxburgh described only three. Forty-seven species are named by Wallich from Silhet, Pundooa, Nipal, and the Peninsula, and multitudes occur in Ceylon, and the islands of the Indian Archipelago. Dr. Wight states that a moist climate and moderate temperature are the circumstances most favourable, if not indispensable, to their production. At Courtallum, for example, they most abound in shady places on the tops of hills, with a mean temperature during the season of their greatest perfection not exceeding 70°, if so much. At Shevaggery, about fifty miles north of Courtallum, he found five out of seven species on the highest tops of the mountains, none of the five under 4000 feet, and three of them above 4500 feet of elevation; the mean temperature being 65° Fahr. Two found at a lower elevation, were both either growing in the gravelly beds of streams, or immediately on their banks; the temperature of which was ascertained to be 65°, while that of the air at noon was only about 75°.

The species are chiefly remarkable for the elastic force with which the valves of the fruit separate at maturity, expelling the seeds. For a supposed explanation of this phenomenon, see Dutrochet, *Nouvelles Recherches sur l'Exosmose et Endosmose*. According to De Candolle, they are diuretic; it is also said that the distilled water of *Impatiens Nolitangere*, taken in large quantity, brings on attacks of diabetes.

GENERA.

Impatiens, Linn.
Balsamina, Gærtn.
Hydrocera, Blum.
Tytonia, Don.

NUMBERS. GEN. 2. Sp. 110.

POSITION.—Chlænaceæ.—BALSAMINACEÆ.—Geraniaceæ.
Tropæolaceæ.

ORDER CLXXXVII. GERANIACEÆ.—CRANESBILLS.

Gerania, Juss. Gen. 268. (1789).—Geraniaceæ, DC. Fl. Fr. 4 828 (1805); Prodr. 1. 637. (1824); Endl. Gen. ecliv.; Meisner Gen. p. 57.

DIAGNOSIS.—*Geranial Exogens*, with usually symmetrical flowers, and with styles and carpels combined round a long beaked torus.

Herbaceous plants or shrubs. Stems tumid, and separable at the joints. Leaves either opposite or alternate; in the latter case opposite the peduncles, with membranous stipules. Flowers white, red, yellow, or purple. Sepals 5, persistent, ribbed, more or less unequal, with an imbricated aestivation; 1 sometimes saccate or spurred at the base. Petals 5, seldom 4, in consequence of 1 being abortive; unguiculate, twisted in aestivation, equal or unequal, either hypogynous or perigynous. Stamens usually monadelphous, hypogynous, twice or thrice as many as the petals; some occasionally abortive. Ovary composed of 5 carpels placed round a long awl-shaped torus or growing point, each 1-celled, 2-seeded; styles 5, cohering round the torus and separable from it; ovules semianatropal, adhering to the torus. Fruit formed of 5 shells, cohering round a long beaked torus; each piece containing 1 seed, having a membranous pericarp, and terminated by an indurated style, which finally curls back from the base upwards, carrying the pericarp along with it. Seeds solitary, without albumen. Embryo curved and doubled up; radicle pointing to the base of the cell; cotyledons foliaceous, convolute, and plaited.



Fig. CCCXXXVIII.

The long beak-like torus, round which the carpels are arranged, and the presence of membranous stipules at joints which are usually tumid, are the true marks of this Order; and all plants not possessing those peculiarities must be excluded. Among them is a South American genus called *Rhynchotheca*, which has been even elevated into a Natural Order, but which is surely an Oxalid without petals; for the beak observed in its fruit belongs to the carpels and not to the torus. It is clear that in this Order the ovules do not spring from the margins of the carpellary leaves. *E. g.* take *P. zonale*,

half-ripe, when the embryo first appears in the albumen as a pale green line. At that time the carpels may be taken away from the ovules, leaving the latter adhering to a central placenta, and this may be done without at all disturbing or tearing the margin of the carpellary leaves. The suspended position of the seed has been given as a general character of Cranesbills; but the position of the ovules varies according to species in the genera *Erodium* and *Geranium*; and in consequence of the inequality of growth the seed is always ascending in the capsule.

The species are very unequally distributed over various parts of the world. A great proportion is found at the Cape of Good Hope, chiefly of the genus *Pelargonium*; *Erodium* and *Geranium* are principally natives of Europe, North America, and Northern Asia. It is worthy of remark that *Pelargonium* is found in New Holland.

An astringent principle and an aromatic or resinous flavour are the characteristics of this Order. The stem of *Monsonia spinosa* burns like a torch, and gives out an agreeable odour. In North Wales *Geranium Robertianum* has acquired celebrity as a remedy for nephritic complaints. The root of *Geranium maculatum*, or Alum-root, is a most powerful astringent, containing considerably more tannin than Kino. According to Bigelow, it is particularly suited to the treatment of such diseases as continue from debility after the removal of their exciting cause. The tincture is an excellent local application in sore throat and ulcerations of the mouth. Many others have a similar reputation, but are not used in modern medicine, especially species of the genus *Erodium*, among which *E. moschatum* is more especially remarkable for its powerful smell of musk. The *Pelargoniums* are chiefly noted for their beautiful flowers, but they, too, are astringents. *P. antidysentericum* is used as a remedy for diarrhoea among the Namaquas. One of the species with tuberous roots, of which many are known at the Cape of Good Hope, namely, *P. triste*, is eatable, and Mr. Baekhouse speaks of the fleshy tubers of *Geranium parviflorum* being eaten by the natives of Van Diemens Land, where it is called the Native Carrot.

GENERA.

<i>Erodium</i> , Herit.	<i>Sarcocaulon</i> , DC.	<i>Polyactium</i> , DC.	<i>Chorisma</i> , Sweet.
<i>Scelopacium</i> , Eckl. et Zeyh.	<i>Pelargonium</i> , Herit.	<i>Isopetalum</i> , Sweet.	<i>Ciconium</i> , Sweet.
<i>Geranium</i> , Herit.	<i>Hoarea</i> , Sweet.	<i>Campylia</i> , Sweet.	<i>Cortusina</i> , Eckl.
<i>Monsonia</i> , Linn. f.	<i>Dimacria</i> , Sweet.	<i>Phymatanthus</i> , Sweet.	<i>Eumorpha</i> , Eckl.
<i>Odontopetalum</i> , DC.	<i>Cynobata</i> , DC.	<i>Myrrhidium</i> , DC.	<i>Calliopsis</i> , Sweet.
<i>Holopetalum</i> , DC.	<i>Peristera</i> , DC.	<i>Jenkinsonia</i> , Sweet.	<i>Anisopetalum</i> , DC.
	<i>Otidia</i> , Sweet.		

NUMBERS. GEN. 4. Sp. about 500.

(After deducting the hybrids introduced by De Candolle.)

Tropæolacææ.

POSITION.—Balsaminacææ.—GERANIACEÆ.—Oxalidacææ.



Fig. CCCXXXIX.

Fig. CCCXXXIX.—Diagram of the flower of *Geranium Robertianum*.

ALLIANCE XXXVII. *SILENALES*.—THE SILENAL ALLIANCE.

DIAGNOSIS.—*Hypogymous Exogens, with monodichlamydeous flowers, a free central placenta, an external embryo curved round a little mealy albumen, and more than one carpel completely combined into a compound fruit.*

At this point a considerable advance in structure is evident among Exogens. Among these plants a corolla appears with all its fragrance and gaudy colours, and the ovary is constituted, not by the rolling up of a solitary carpellary leaf, but by the complete consolidation of several. The combining process is indeed carried occasionally so far among these plants as to divide the cavity of the ovary into distinct cells; but it is certain that the placentation is in all cases strictly central, no power being possessed by the carpellary leaves of generating ovules on their margin or sides.

The Buckwheat Order (*Polygonaceæ*) establishes a transition from the Chenopodals, by virtue of its uniform want of corolla; another passage is supplied by Knotworts (*Illecebraceæ*), which are only Amaranths of a higher grade. In both these Orders the ovary may seem to be in many instances as simple as in the Chenopodal Alliance; but its compound nature is brought into evidence by the number of its separate stigmas or by the manner in which the seed-vessel splits when ripe.

NATURAL ORDERS OF SILENALS.

- | | | |
|--|---|----------------------|
| <i>Calyx and corolla usually both present and symmetrical (4 and 4, or 5 and 5), the latter conspicuous. Ovules amphitropal. Leaves opposite, without stipules</i> | } | 188. CARYOPHYLLACEÆ. |
| <i>Calyx and corolla usually both present and symmetrical (4 and 4, or 5 and 5), the latter rudimentary. Ovules amphitropal. Leaves with scarious stipules</i> | | |
| <i>Calyx and corolla both present and unsymmetrical (2 and 5), the latter usually conspicuous. Ovules amphitropal. Leaves alternate, succulent, without stipules</i> | } | 190. PORTULACACEÆ. |
| <i>Calyx only present, but often coloured. Ovules orthotropal. Nut usually triangular</i> | | |
| | | 191. POLYGONACEÆ. |

ORDER CLXXXVIII. CARYOPHYLLACEÆ.—CLOVEWORTS.

Caryophyllæ, *Juss. Gen.* 299. (1789); *De Cand. Prodr.* 1. 388. (1824); *Endl. Gen. covii.*; *Meisner Gen.* 24.—*Sileneæ*, *DC. Prodr.* 1. 351. (1824); *Barth. Ord. Nat.* 305. (1830); *Braun in Ann. Sc. Nat.* 2. ser. xx. 170.—*Alsineæ*, *DC. Fl. Franc. Ed.* 3. 4. 766. (1805); *Barth. Ord. Nat.* 204. (1830); *Fenzl. Versuch.* (1833).—*Queriaeæ*, *DC. Prodr.* 3. 379. (1828).—*Minuartiæ*, *Id.* (1828).—*Molluginæ*, *Fenzl. Monogr.*—*Sieudeliæ*, *Id.*

DIAGNOSIS.—*Sileneal Exogens*, with symmetrical flowers, a conspicuous corolla, amphitropal ovules, and opposite leaves without stipules.

Herbaceous plants, occasionally becoming suffrutescens. Stems tumid at the articulations. Leaves always opposite and entire, often connate at the base. Flowers ♂, occasionally imperfect by abortion, variously arranged. Sepals 4-5, continuous with the peduncle, persistent, distinct, or cohering in a tube. Petals 4-5, hypogynous, unguiculate, inserted upon the pedicel of the ovary; frequently split into 2 parts, occasionally wanting. Stamens usually twice as many as the petals, sometimes equal in number to the sepals and opposite them, occasionally fewer, inserted upon the pedicel of the ovary along with the petals; filaments subulate, sometimes monadelphous; anthers imate, 2-celled, opening longitudi-



Fig. CCCXL.

nally. Ovary stipitate on the apex of a pedicel (called the gynophore), composed of from 2 to 5 carpels, whose edges are either adherent and valvate, or turned inwards so as sometimes to touch the free central placenta; stigmas 2-5, sessile, filiform, papillose on the inner surface; ovules few or ∞, amphitropal. Capsule 2-5-valved, either 1-celled or 2-5-celled, in the latter case with a loculicidal dehiscence. Placenta central, in the 1-celled capsules distinct, in the 2-5-celled capsules adhering slightly to the edge of the dissepiments. Seeds indefinite in number, rarely definite; albumen mealy; embryo external, curved round the albumen, sometimes straight, very rarely spiral, with hardly any albumen; radicle pointing to the hilum.

Fig. CCCXL. 1. *Stellaria Holostea*; 2. pistil, calyx and petals of *Lychnis Flos Cuculi*; 3. vertical section of its pistil; 4. vertical section of its seed.

These plants, the greater part of which are inconspicuous herbs, form a group which is readily known by its opposite undivided leaves without stipules, tumid nodes, and free central placenta surrounded by several carpellary leaves. They hardly differ from Purslanes except in their symmetrical flowers. In general appearance they nearly approach some of the species of the Geraniac Alliance, from which their free central placenta clearly divides them. That this placenta is really central in its origin is proved by a beautiful monstrosity discovered by Mr. Babington, and published by him in the *Gardeners' Chronicle*, for 1844, p. 557, in which the carpellary leaves are partially turned inwards without touching the placenta, which bears a cluster of ovules and is perfectly clear of all connection with those partitions. There is a learned and important Memoir on these plants by Braun (*Ann. Sc. n. s. xx. 156*), to which the reader is referred for valuable details as to the limits of the genera.

In the succeeding Table of Genera, Sileneæ and Alsineæ are what all Botanists recognise as Clove-worts; the Mollugineæ consist of a portion of the Purslane tribe as it stands in Endlicher's *Genera Plantarum*, where it is broken up into Polpodeæ and Adenogrammeæ, sections which it is scarcely desirable to maintain. The reasons which have led to this separation are given under the Order of Purslanes.

Natives principally of the temperate and frigid parts of the world, where they inhabit mountains, hedges, rocks, and waste places. Those which are found within the tropics are usually met with on high elevations and mountainous tracts, almost always reaching the limits of eternal snow, where many of them exclusively vegetate. Some Sileneæ are scattered in many different parts of the globe. According to the calculation of Humboldt, Clove-worts constitute $\frac{1}{22}$ of the flowering plants of France, $\frac{1}{27}$ of Germany, $\frac{1}{17}$ of Lapland, and $\frac{1}{12}$ of North America.

The species are remarkable for little except their uniform insipidity. A few, such as *Dianthus* and *Lychnis*, are handsome flowers; but the greater part are mere weeds. *Vaccaria vulgaris* is said to increase the lacteal secretions of cows fed upon it. It contains Saponine, as also does the Egyptian Soap-root, which is derived from *Gypsophila Struthium*.—*Blow*. *Lychnis dioica*, and *L. chalconica*, have also saponaceous properties: *Saponaria* has been used in syphilis. A decoction of the root of *Silene virginica* is said to have been employed in North America as an anthelmintic. *Spurrey*, *Spergularia arvensis*, is sometimes cultivated as food for sheep. *Gypsophila Struthium* is somewhat acrid; *Silene Outes*, which is bitter and astringent, has been employed in dropsy. The seeds of *Vaccaria vulgaris* are said to be diuretic; those of *Agrostemma Githago* (the Corn-cockle), are reported to render corn unwholesome, when ground into flour.

GENERA.

Order I. ALSINEÆ.—	<i>Phalox</i> , Dumort.	<i>Facchinia</i> , Rehb.	<i>Calalsine</i> , Endl.
Sepals distinct, opposite the stamens, when the latter are of the same number.	<i>Alsineella</i> , Dill.	<i>Wierzbickia</i> , Rehb.	<i>Sabulina</i> , Reichenb.
	<i>Buffonia</i> , Sauvag.	<i>Minuartia</i> , Löffl.	<i>Cherleria</i> , Hall.
	<i>Bufoxia</i> , Linn.	<i>Tryphane</i> , Fenzl.	<i>Saginella</i> , Fenzl.
	<i>Querla</i> , Löffl.	<i>Sommeraueria</i> , Hopp.	<i>Spergella</i> , Fenzl.
	<i>Alsine</i> , Wahlenb.	<i>Sieberia</i> , Schrad.	<i>Alsinauthe</i> , Fenzl.
Angina, Linn.	<i>Neumayeria</i> , Rehb.	<i>Dufourea</i> , Gren. part.	<i>Alsinoecarpus</i> , Endl.

Fig. CCCXLI.—1. Monstrous flower of a *Cernitium*; 2. the pistil and stamens separate; 3. the very forced open to show the origin of the ovules and the nature of the imperfect dissepiments; 4. a monstrous ovule.

Psammophila, Fenzl.
Triplactia, Bartl.
Hymenella, Moç. et Ses.
Houkenya, Ehrh.
Haltianthus, Fries.
Haltia, Dumort.
Ammonatia, Desv.
Leprodiclis, Fenzl.
Merckia, Fisch.
Wilhelmsia, Reichenb.
Dolophragma, Fenzl.
Thylacosperma, Fenzl.
Periandra, Cambess.
Flourensia, Cambess.
Bryomorpha, Karel.
Arenaria, Linn.
Ermogone, Fenzl.
Euthalia, Feuzl.
Plinthine, Rehb.
Alsinanthus, Desv.
Porphyrantha, Fenzl.
Gouffia, Robill. et Cast.
Dicranilla, Fenzl.
Möhriugia, Linn.
Krascheninikovia, Turcz.
Brachystemma, Don.
Odontostemma, Benth.
Holostemum, Linn.
Stellaria, Linn.
Schizolechium, Fenzl.
Larbrca, St. Hil.
Leucostemma, Benth.

Adnonema, Bung.
Cerastium, Linn.
Dichodon, Bartl.
Schizodon, Fenzl.
Strophodon, Sering.
Orthodon, Sering.
Esmarchia, Reichenb.
Mönchia, Ehrh.
Malachium, Fries.
Myosoton, Mönch.

Suborder II. *SILENEÆ*.—
 Sepals united into a
 tube, opposite the stamens,
 when the latter are of the
 same number.

Velezia, Linn.
Dianthus, Linn.
Caryophyllum, Endl.
Tunica, Scop.
Kohtrauschia, Kunth.
Pseudotunica, Fenzl.
Heliosperma, Griseb.
Saponaria, L.
Rootia, Neck.
Proteina, Ser.
Gypsophila, Linn.
Dichoglottis, Fisch. et
 Mey.
Hagenia, Mönch.
Heterochroa, Bung.

Struthium, Ser.
Rokejcka, Forsk.
Banffyia, Baumg.
Saponaria, Fenzl.
Smegmanthe, Fenzl.
Botanthus, Ser.
Cymanthus, Endl.
Smegmathamnium, Endl.
Silenanthe, Fenzl.
Helicosperma, Rehb.
Melandrium, Fries.
Elisanthe, Endl.
Gastrolychnis, Fenzl.
Vaccaria, Medic.
Eudianthe, Rehb.
Ankryopetalum, Fenzl.
Silene, Linn.
Behenantha, Otth.
Otites, Otth.
Coniomorpha, Otth.
Stachymorpha, Otth.
Rupifraga, Otth.
Siphonomorpha, Otth.
Atocion, Otth.
Viscaria, Röhl.
Hymenanthe, Fenzl.
Coronaria, L.
Coccygonthe, Rehb.
Agrostemma, L.
Githago, Desf.
Uebelina, Hochst.
Petrocoptis, Braun.

Lychnis, Tournef.
Iledcoma, Lour.
Gastrolychnis, Fenzl.
Cucubalus, Tournef.
Scribæa, Flor. Wetter.
Lychnanthus, Gmel.
Drypis, Michel.
Acanthophyllum, C. A. M.

Suborder III. *MOLLUGINEÆ*.—
 Sepals distinct or nearly so,
 alternate with the stamens
 when the latter are of the
 same number.

Mollugo, Linn.
Cerviana, Minuart.
Trichlis, Hall.
Galiastrum, Heist.
Pharnaceum, Linn.
Ginginsia, DC.
Hypertelis, E. Mey.
Psammotropha, Eckl. et
 Zeyh.
Mallogonum, Fenzl.
Cœlanthium, E. Mey.
Acrosanthes, Eckl. et Zey.
Schiedea, Cham. et Schl.
Colobanthus, Bartl.
Polpoda, Presl.
Adenogramma, Reichenb.
Stuedelia, Presl.

NUMBERS. GEN. 53. Sp. 1055.

Geraniaceæ.

POSITION. ——— CARYOPHYLLACEÆ.—Illecebraceæ.

Malvaceæ.



Fig. CCCXLI.*

Fig. CCCXLI.*—1. *Lychnis diurna*, (*Sileneæ*); 2. a flower of *Stellaria media*, (*Alsiaceæ*); 3. its stamens and pistil; 4. its placenta loaded with seed; 5. a seed cut through vertically to show the embryo curved round mealy albumen.

ORDER CLXXXIX. ILLECEBRACEÆ.—KNOTWORTS.

Herniaria, *Cat. Hort. Par.* (1777).—Illecebreæ, *R. Brown Prodrômus*, 413. (1810).—Paronychiææ, *Aug. St. Hil. Mém. Plac. lib.* p. 56. (1815); *Juss. Mém. Mus.* 1. 387. (1815); *DC. Prodr.* 3. 365. (1828); *Mémoire sur les Paronych.* (1829); *Earl. Ord. Nat.* p. 301. (1830).—Paronychiaceæ, *Meisn. Gen.* 132; *Wight Illustr.* 2. 42.

DIAGNOSIS.—*Sileneal Exogens*, with both calyx and corolla present and symmetrical, but the latter rudimentary, amphitropal ovules and scarious stipules.

Herbaceous or half-shrubby branching plants, with opposite or alternate, often fasciated, sessile, entire leaves, and scarious stipules. Flowers minute, with scarious bracts. Sepals 5, seldom 3 or 4, sometimes distinct, sometimes cohering more or less. Petals minute, inserted upon the calyx between the lobes, occasionally wanting. Stamens exactly opposite the sepals, if equal to them in number, sometimes fewer by abortion, sometimes more numerous; filaments distinct; anthers 2-celled. Ovary 1-celled, rarely 3-celled, with 1 or more ovules, superior; styles 2-5, either distinct or partially combined. Fruit small, dry, 1-celled, rarely 3-celled, either indehiscent or opening with 3 valves. Seeds either numerous, upon a free central placeuta, or solitary and pendulous from a funiculus originating in the base of the cavity of the fruit; albumen farinaceous; embryo lying on one side of the albumen, curved more or less, with the radicle always pointing to the hilum; cotyledons small.

Very near Purslanes, Amaranths, and Clove-worts, from which they are distinguished with difficulty. From the latter their scarious stipules will separate them; and there is scarcely any other character that will; for no value seems assignable to a slight tendency to a perigynous insertion of the stamens which is observable in both Orders. From Purslanes they are best known by the position of the stamens before the sepals instead of the petals, and by the number of the sepals. With Houseleeks, particularly Tillæa, they often agree in habit, but their concrete carpels will always distinguish them. According to Cambessédes, the genus *Spergularia*, in which the petals and stamens are very often perigynous, the styles sometimes consolidated at their base, and the stamens 5 in number, establishes a passage between Clove-worts and Knot-worts, and tends to confirm the opinion of those who consider these two Orders as belonging to the same Alliance.

The south of Europe and the north of Africa are the great stations of the Order, where the species grow in the most barren places, covering with a thick vegetation soil which is incapable of bearing anything else. A few are found at the Cape of Good Hope; and North America, including Mexico, comprehends several.

A trace of astringency pervades the Order, and is the only sensible property that it is known to possess.

GENERA.

Corrigiola, Linn.	<i>Sellovia</i> , Roth	<i>Cerdia</i> , Moq. et Sess.	<i>Mollia</i> , Willd.
<i>Polygonifolia</i> , Vaill.	? <i>Lithophila</i> , Swartz.	<i>Polycarpon</i> , Löffl.	<i>Lahaya</i> , Röm. et Schl.
Herniaria, Tournef.	<i>Pteranthus</i> , Forsk.	<i>Trichlis</i> , Hall.	<i>Ngala</i> , Herit.
Illecebrum, Gært. f.	<i>Louchea</i> , Herit.	<i>Arversia</i> , Cambess.	<i>Aylmeria</i> , Mart.
Cardionema, DC.	<i>Cometes</i> , Burm.	<i>Hapaloxia</i> , Wight et A.	<i>Spergularia</i> , Pers.
<i>Blechnæa</i> , Moq. et Sess.	<i>Sillia</i> , R. Br.	<i>Ortega</i> , Löffl.	<i>Lepigonum</i> , Fries.
<i>Pentacæna</i> , Barth.	<i>Pollichia</i> , Soland.	<i>Ortega</i> , DC.	<i>Stipularia</i> , Haw.
<i>Acanthomychia</i> , D.	<i>Neckeria</i> , Gmel.	<i>Juncaria</i> , Clus.	<i>Della</i> , Dumort.
Paronychia, Juss.	<i>Moeberurgia</i> , Münch.	<i>Stipulicida</i> , L. C. Rich.	<i>Balardia</i> , Cambess.
<i>Anychia</i> , L. C. Rich.	<i>Telephium</i> , Tournef.	<i>Polycarpon</i> , Lam.	<i>Spergula</i> , Linn.
<i>Gymnocarpon</i> , Forst.	<i>Læflingia</i> , Linn.	<i>Haya</i> , Vent.	<i>Drymaria</i> , Willd.
? <i>Winterlia</i> , Spr. ng.			

NUMBERS. GEN. 24. Sp. 100 †

Amaranthaceæ.

POSITION.—*Portulacææ.*—*ILLECEBRACEÆ.*—*Caryophyllacææ.*

Fig. CCCXLII.—*Paronychia capitata*. 1. a section of a flower; 2. of the ovary; 3. ripe seed; 4. a section of it.—*Nees.*

ORDER CXC. PORTULACÆ.—PURSLANES.

Portulacæ, *Juss. Gen.* 313. (1789) *in part*; *A. St. Hil. Mém. Plac. Cent.* 42. (1815); *DC. Prodr.* 3. 351. (1828); *DC. Mém. de la Soc. d'Hist. Nat. de Paris, Aug.* (1827); *Endl. Gen.* ccvi.; *Meisner Gen.* 130.; *Wight Illustr.* 2. 41.

DIAGNOSIS.—*Silical Exogens, with the calyx and corolla unsymmetrical $\frac{2}{5}$, the latter usually conspicuous, amphitropal ovules, and alternate succulent leaves without stipules.*

Succulent shrubs or herbs. Leaves alternate, seldom opposite, entire, without stipules, often with bundles of hairs in their axils. Flowers axillary or terminal, usually ephemeral, expanding only in bright sunshine, unsymmetrical in their calyx and corolla. Sepals 2, cohering by the base. Petals generally 5, either distinct or cohering in a short tube. Stamens inserted along with the petals irregularly into the base of the calyx or hypogynous, variable in number, all fertile, sometimes opposite the petals; filaments distinct; anthers versatile, with 2 cells, opening lengthwise. Carpels 3 or more, combined into a one-celled ovary, which is usually free (or partially adherent); style single or none; stigmas several, much divided; ovules amphitropal. Capsule 1-celled, dehiscing either transversely or by valves, occasionally 1-seeded and indehiscent. Seeds numerous, if the fruit is dehiscent; attached to a central placenta; albumen farinaceous; embryo curved round the circumference of the albumen, with a long radicle next the hilum.

Ovary partially adherent in some Portulacæ.

In general the Purslanes are easily recognised by their succulent condition and gay ephemeral flowers; but in some the flowers are inconspicuous, and in others the succulence inconsiderable. They, in such cases, would have little to distinguish them from Cloveworts (*Caryophyllacæ*), except their 2-leaved calyx, and that in truth, combined with the other characters, furnishes the essential mark of the Order. Endlicher, however, extends the limits of the Purslane group much beyond this, admitting a number of perigynous genera whose flowers are quite symmetrical. These are spoken of elsewhere. In his view, the difference between Purslanes and Cloveworts consists mainly in this, that the former have the stamens alternate with the sepals when they are equal to them in number, and the latter opposite under the same circumstances. But in Orders where the number of stamens is sometimes indefinite and sometimes has no sort of relation to the sepals, as is, in fact, the case with the whole Portulacaceous Order as it stands here, it is plain that such a distinction has no existence. I have, therefore, thought it advisable to reject a portion of Endlicher and Fenzl's Purslanes, in which the perigynous insertion is very marked, placing them in the Ficoid Alliance, while all his hypogynous genera with symmetrical flowers are conveniently arranged among the Cloveworts. The principal deviation from the general features of the Order strictly limited, consists in some species having the ovary partially adherent, and the stamens, therefore, perigynous. Such instances seem to connect the Order with the genera just alluded to. From Knotworts (*Illecebracæ*) the monospermous genera of Purslanes are distinguished by the want of symmetry in their flowers, and by the stamens being opposite the petals instead of the sepals. De Candolle remarks, that Purslanes



Fig. CCCXLIII.

Fig. CCCXLIII.—*Portulaca australis*.—*Endlicher*. 1. a flower; 2. an expanded corolla; 3. a pistil; 4. a ripe fruit; 5. a section of it.

have been more than once compared to Primworts; and the same author states, in another place, that the genera with indefinite stamens and hairy axils approach the Torch-thistles.

These plants inhabit the Cape of Good Hope and South America, 1 species occurs in Guinea, 2 in New Holland, 1 in Europe, and the remainder in various parts of the world. They are always found in dry parched places.

Inspidity, want of smell, and dull green colour in the foliage, are usual qualities of this Order, of which the only species of any known use is the common Purslane (*ανδραχνη*) of the Greeks, (*Portulaca oleracea*, L.), which has been used from all antiquity as a potherb, and in salads, on account of its cooling and antiseorbatic qualities; the ancients thought the seeds, steeped in wine, to be emmenagogue. *Talinum patens* in Brazil, and *Claytonia perfoliata* in North America, and some *Calandrinias* have similar qualities. The tuberous root of *Claytonia tuberosa*, a Siberian plant, is eaten where it grows wild. Many of the species are beautiful objects on account of their large gay flowers.

GENERA.

<i>Portulaca</i> , Tourn.	<i>Avonia</i> , E. Mey.	<i>Calandrinia</i> , H. B. K.	<i>Limnia</i> , Linn.
<i>Meridiana</i> , L.	<i>Grahamia</i> , Gill.	<i>Cosmia</i> , Domb.	<i>Monocosmia</i> , Fenzl.
<i>Merida</i> , Neck.	<i>Xeranthus</i> , Miers.	<i>Cistanthe</i> , Spach.	<i>Montia</i> , Michel.
<i>Lamia</i> , Vand.	<i>Talinum</i> , Adans.	<i>Tegneria</i> , Lilj.	<i>Cameraria</i> , Dill.
<i>Portulacaria</i> , Jacq.	<i>Phemeranthus</i> , Raf.	<i>Rhodopsis</i> , Lilj.	<i>Alsinoides</i> , Vaill.
<i>Henkea</i> , Salisb.	<i>Talinastrum</i> , DC.	<i>Phacosperma</i> , Haw.	<i>Calyptridium</i> , Nutt.
<i>Anacampseros</i> , Linn.	<i>Talinellum</i> , DC.	<i>Geusia</i> , Flor. mex.	? <i>Ullucus</i> , Lozan.
<i>Telephiastrum</i> , Dill.	<i>Eutmon</i> , Raf.	<i>Claytonia</i> , Linn.	? <i>Leptinia</i> , Raf.
<i>Rulingia</i> , Ehrh.			

NUMBERS. GEN. 12. Sp. 184.

Primulacæ.

POSITION.—*Illecebracæ.*—PORTULACÆ.—*Caryophyllacæ.*

Mesembryacæ.

Cactacæ.

ORDER CXCI. POLYGONACEÆ.—BUCKWHEATS.

Polygonææ, *Juss. Gen.* 82. (1789); *R. Brown, Prodr.* 418. (1810); *Bentham in Linn. Trans.* (1836); *Endl. Gen. ciil.*—Polygonacææ, *Ed. pr.* (1836); *Meisner Gen.* 316.

DIAGNOSIS.—*Sileneal Exogens, with no corolla, and a calyx usually coloured, an orthotropical ovule, and a usually triangular nut.*

Herbaceous plants, rarely shrubs. Leaves alternate, their stipules cohering round the stem in the form of an ochrea; when young, rolled backwards, occasionally wanting.



Fig. CCCXLIV.



Flowers occasionally unisexual, often in racemes. Calyx free, often coloured, imbricated in æstivation. Stamens very rarely perigynous, usually definite and inserted in the bottom of the calyx; anthers dehiscent lengthwise. Ovary free, usually formed by the adhesion of 3 carpels, one-celled, with a single erect ovule, whose foramen always points upwards; styles or stigmas as many as the carpels of which the ovary consists; ovule orthotropical. Nut usually triangular, naked, or protected by the calyx. Seed with farinaceous albumen, rarely with scarcely any; embryo inverted, generally on one side, sometimes in the axis; radicle superior, long.

Brown remarks, that "the erect ovulum with a superior radicle together afford the most important mark of distinction between Polygonacææ and Chenopodiacææ, a character which obtains even in the genus Eriogonum, in which there is no petiolar sheath, and scarcely any albumen, the little that exists being fleshy;" to which may be added, that their orthotropical ovule divides them from all the other Orders of the Sileneal Alliance. Generally speaking, however, the cohesion of the scarios stipules into a sheath, technically called an ochrea, or boot, is sufficient to distinguish Buckwheats from the neighbouring Orders. Their affinity, moreover, does not appear to be so close with Chenopods as with Cloveworts, for they have the very important peculiarity that their ovary is formed by the consolidation of 3 carpellary leaves touching each other in a valvate manner, and thus producing a triangular form in the ripe fruit; and if even this is departed from, yet the ovary is undoubtedly compound and not simple as in Chenopods. Bentham admits two tribes, Polygonææ, which have loose flowers and ochreate stipules, and Eriogonææ which have flowers in involucre and usually no stipules. The latter bring them near Nyctagos.

Fig. CCCXLIV.—*Polygonum lapathifolium*. 1. a flower cut open; 2. a vertical section of the seed; 3. a flower of *P. Convolvuli*; 4. a transverse section of a seed; 5. a diagram of the flower of *Rumex crispus*; 6. a vertical section of its ripe fruit, &c.; 7. its fruit.

There are few parts of the world which do not acknowledge the presence of plants of this Order. In Europe, Africa, North America, and Asia they occupy ditches, hedges, and waste grounds, in the form of Dock and Persicarias; the fields, mountains, and heaths as Sorrels and trailing or twining Polygonums; in South America and the West Indies they take the form of Coccolobas or Seaside-grapes; in the Levant of Rhubarbs; and even in the desolate regions of the North Pole they are found in the shape of Oxyria.

Sorrel on the one hand, and Rhubarb on the other, may be taken as the representatives of the general qualities of this Order. While the leaves and young shoots are acid and agreeable, the roots are universally nauseous and purgative. To these two qualities is to be superadded a third, that of astringency, which is found in a greater or less degree in the whole Order, but which becomes in *Coccoloba uvifera* so powerful as to rival gum Kino in its effects. Some of the Polygonums are also acrid, as the *P. Hydro-piper*, which is said to blister the skin, and there is a species of Polygonum, called *Cataya* in the language of the Brazilian Indians, which has a very bitter peppery taste, an infusion of the ashes of which is used to purify and condense the juice of the sugar-cane, and is employed on the Rio St. Francisco with advantage in the disease called *O Largo*, an enlargement of the colon, caused by debility. Oxalic acid is copiously formed in both Dock and Rhubarbs; the latter moreover contains nitric and malic acids in abundance, and it is these which give an agreeable taste to the stalks of the latter when cooked, but which also render them so ill-suited to the digestion of some persons. For the facts concerning the qualities and origin of the Rhubarbs in medical use, the reader may consult Royle, Guibourt, Pereira, Geiger, Eudlicher, and the *Flora Medica*. It seems probable that some at least of the Turkey Rhubarb is *Rheum palmatum*, that *R. undulatum* is also largely collected, and that *R. Emodi* and *Webbiaum* furnish the Rhubarb used in the hospitals of India. Goebel positively contradicts the statement made by some writers that *Rheum leucorrhizum* yields a fine sort of Rhubarb; he says that it has an insipid slimy taste, not at all like that of Rhubarb.—*Ann. Ch.* 1. 118. Before this sort of drug was so common, the roots of *Rumex alpinus* were employed in its stead, under the name of Monk's Rhubarb; it is however much less active. The *Rheum Ribes*, called *Riwash* or *Ribas* in the East, furnishes the Arabs with an acidulous medicine, and its leaf-stalks are used in the preparation of sherbet. Dock is a species of *Rumex*; their prevailing character is astringency, which has given them some celebrity as remedies for diarrhœa, and as stomachics. *R. Patientia* (*λαπαθον κηρευτον*), although now expelled from gardens, was once esteemed as a subacrid potherb, and its roots were used as laxatives. Sorrels, whose acidity is chiefly owing to oxalic acid, are all species of this same genus; the most esteemed among them for garden purposes is *R. scutatus*. A legion of species forms the genus *Polygonum*, celebrated in various ways. Some are used in dyeing, especially *P. tinctorium*, which yields a blue hardly inferior to indigo, and is largely cultivated for it in France and Flanders. Of *P. Hydro-piper* the leaves are so acrid as to act as vesicants; it is reputed to be a powerful diuretic, but to lose its activity by drying, on which account it requires to be used fresh; it will dye wool yellow. *P. Bistorta* is a useful astringent; the decoction may be employed in gleet and leucorrhœa, as an injection, as a gargle in relaxed sore throat and spongy gums, and as a lotion to ulcers attended with excessive discharge; internally it has been employed, combined with Gentian, in intermittents; it may also be used in passivo hæmorrhages and diarrhœa. Several of the Brazilian Polygonums are said by Martius to be useful as astringents, and to be employed in the treatment of syphilis. The nuts of *Fagopyrum esculentum*, or Buckwheat, tataricum, and others, are used as food for the sake of their mealy albumen; those of *P. aviculare* are said to be powerfully emetic and purgative; but this is doubted by Meisner. The seeds of *Polygonum barbatum* are used as medicine by Hindoo practitioners, to ease the pain of griping in the colic. The leaves of *P. hispidum* are said by Humboldt to be substituted in South America for Tobacco. *Coccoloba americana*, remarkable for the succulent violet calyx in which its nuts are enveloped, is on that account called the Seaside-grape in the West Indies, and yields an extremely astringent extract; its wood dyes red; its currant-like berries are acid, pleasant, and eatable. The root of *Calligonum Pallasia*, a leafless shrub found in the sandy steppes of Siberia, furnishes from its roots, when pounded and boiled, a gummy nutritious substance, resembling Tragacanth, on which the Calmucks feed in times of scarcity, while they chew the acid branches and fruits to allay their thirst. *Muhlenbeckia adpressa* is stated by Mr. Backhouse to have clusters of currant-like fruits of a sweetish taste, which have been made into pies and puddings in the penal settlements of Australia. The trunk and branches of *Triplaris americana* are chambered like those of the Cecropia, or Trumpet-tree, and serve for the habitation of light-brownish ants, which inflict a most painful bite.—*Schunbergk*, in *Ann. N. H.* 1. 266.

GENERA.

I. ERIOGONEÆ.— <i>Benth.</i>	<i>Bistorta</i> , Tournef.	<i>Oxygonum</i> , Burch.	<i>Polygonella</i> , Mx.
<i>Pterostegia</i> , Fisch. et M.	<i>Amblygonon</i> , Meisn.	<i>Calligonum</i> , L.	<i>Lyonia</i> , Raf.
<i>Mucronea</i> , <i>Benth.</i>	<i>Lagunea</i> , Lour.	<i>Polygonoides</i> , Tournef.	<i>Atraphaxis</i> , L.
<i>Chorizanthe</i> , R. Br.	<i>Persicaria</i> , Tournef.	<i>Calliphysa</i> , Fisch. et Mey.	III. TRIPLAREÆ.— <i>Meyer.</i>
<i>Eriogonum</i> , L. C. Rich.	<i>Towara</i> , Adans.	<i>Pterococcus</i> , Pall.	<i>Podopterus</i> , H. et B.
<i>Espinosa</i> , Lagasc.	<i>Antenoron</i> , Rafin.	<i>Pallasia</i> , Linn. fil.	<i>Rupprechtia</i> , Meyer.
II. POLYONEÆ.— <i>Benth.</i>	<i>Echinocaulon</i> , Meisn.	<i>Coccoloba</i> , Jacq.	<i>Triplaris</i> , L.
<i>Oxyria</i> , Hill.	<i>Cephalophilon</i> , Meisn.	<i>Mühlenbeckia</i> , Meisn.	<i>Blochmannia</i> , Weigelt.
<i>Donia</i> , R. Br.	<i>Didymocephalon</i> , Meis.	<i>Ceratogonum</i> , Meisn.	<i>Velasquezia</i> , Bertol.
<i>Rheum</i> , Linn.	<i>Corymbocephalon</i> , Mn.	<i>Emex</i> , Neck.	IV. BRUNNICHEÆ.—
<i>Rhabarbarum</i> , Tourn.	<i>Aconogonon</i> , Meisn.	<i>Vibio</i> , Mönch.	<i>Meisn.</i>
<i>Königia</i> , L.	<i>Avicularia</i> , Meisn.	<i>Centropodium</i> , Burch.	<i>Brunnichia</i> , Banks.
<i>Polygonum</i> , L.	<i>Tiniaria</i> , Meisn.	<i>Rumex</i> , L.	<i>Fallopia</i> , Adans.
	<i>Fagopyrum</i> , Tournef.	<i>Tragopyrum</i> , Bieb.	<i>Antigonon</i> , Endl.
	<i>Ampelygonum</i> , Lindl.	<i>Gonopyrum</i> , Fisch.	

NUMBERS. GEN. 29. Sp. 490.

*Nyctaginaceæ.**Chenopodiaceæ.*

POSITION.—Illecebraceæ.—POLYGONACEÆ.—Caryophyllaceæ.

ALLIANCE XXXVIII. CHENOPODALES.—THE CHENOPODAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with monochlamydeous flowers, free central placenta, an external embryo, either curved round or applied to the surface of a little mealy or horny albumen, solitary carpels, or, if more than one, distinct.*

With these plants, the greater part of which consists of species with inconspicuous flowers, and often with scarcely more floral organs than are absolutely necessary to secure the perpetuation of the race, we have a transition which cannot be mistaken, to the more elaborately constructed Alliances hereafter to be noticed. Nettles and Chenopods are in such strict relationship that we can scarcely say wherein the difference consists in certain cases, unless we refer to the internal structure of the seed, and then indeed we find Chenopods with amphitropal ovules, mealy albumen, and radicle directed towards the base of the fruit, while Nettles have orthotropal or anatropal ovules, fleshy albumen, and a radicle directed towards the apex of the fruit. Both have stamens opposite the sepals of an inconspicuous petalless calyx, and both have their fruit composed of a single, perfectly simple, carpellary leaf; we even find that in some cases among the Urtical Alliance the circular, or spiral, embryo of Chenopods makes its appearance. (See p. 265).

Even as regards the distinction of the stamens and pistil there is a great similarity between the two races under consideration. For if all the Urtical Alliance consists of plants whose flowers are strictly nnisexual ($\delta \text{ } \ominus$), so also does the Chenopodal Alliance contain a great many species which are similarly constituted, notwithstanding that the tendency of the structure is towards a combination of the sexes ($\text{♂} \text{ } \text{♀}$). It is, in fact, among the Chenopodal Alliance that we find most exceptions to the distinctions between diclinous and bisexual organisation; as might be expected, where Orders run so much together otherwise.

From the Silenal Alliance this is known by the absolute simplicity of the ovary, and by no other positive mark: there may be several ovaries present in the same flower, but they are then distinct from each other. It is, however, to be remarked that Chenopodals have, in no case whatever, a corolla, while in a large part of the Silenals, petals are obviously present. Nyctagos, a portion of this Alliance, seem as if they were attempting to emulate the Silenals; for, although they have only a calyx, yet that calyx does, in many instances, assume altogether the ordinary colour and texture of a corolla.

NATURAL ORDERS OF CHENOPODALS.

- | | | |
|---|---|---------------------|
| <p><i>Sepals united into a long (often coloured) plaited tube, which separates from its base, the latter becoming hard, and forming a spurious pericarp</i></p> | } | 192. NYCTAGINACEÆ. |
| <p><i>Sepals separate, flat. Stamens alternate with the sepals or 00. Carpels several (or 1)</i></p> | } | 193. PHYTOLACCACEÆ. |
| <p><i>Sepals separate or nearly so, flat. Stamens opposite the sepals. Anthers often 1-celled. Ovary 1, often several-seeded. (Flowers scarious, surrounded by imbricated bracts)</i></p> | } | 194. AMARANTACEÆ. |
| <p><i>Sepals separate, or nearly so, flat. Stamens opposite the sepals. Anthers 2-celled. Ovary 1, always one-seeded. (Flowers herbaceous, naked)</i></p> | } | 195. CHENOPODIACEÆ. |

ORDER CXCII. NYCTAGINACEÆ.—NYCTAGOS.

Nyctagines, *Juss. Gen.* 90. (1789) ; *R. Brown Prodr.* 421. (1810) ; *Bartl. Ord. Nat.* 109 ; *Endl. Gen. clv.* ; *Melsner*, p. 318.

DIAGNOSIS.—*Chenopodal Exogens*, with a tubular often coloured calyx, which separates from its base, the latter becoming a hard spurious pericarp.

Annuals or perennials, often with fleshy roots, or shrubs or trees, usually articulated at the tumid nodes. [The vascular system double ; the central consisting of bundles scattered among the pith, the circumferential of bundles not adhering to each other.—*Unger.*] Leaves opposite, and almost always unequal ; sometimes alternate. Flowers axillary or terminal, clustered or solitary, sometimes imperfect, having an involuere which is either common or proper, in one piece or in several pieces, sometimes minute, but more generally very large, and sometimes gaily coloured. Calyx tubular, somewhat coloured, contracted in the middle ; its limb entire or toothed, plaited in æstivation, becoming indurated at the base, and losing the limb which is deciduous. Stamens definite, hypogynous, sometimes on one side ; anthers 2-celled. Ovary superior, with a single erect ovule, whose foramen is inferior ; style 1, terminal or somewhat lateral ; stigma 1. Fruit a thin utricle, inclosed within the enlarged persistent base of the calyx. Seed without its proper integuments, its testa being coherent with the utricle ; embryo with foliaceous cotyledons, wrapping round floury albumen ; radicle inferior ; plumule inconspicuous.

Here we have a race of plants, of which the common Marvel of Peru is the type, whose affinity is clearly with the Chenopods and Amaranths, from which it is distinguished by the curious property of converting the base of its thin membranous tubular calyx into a tough or bony shell which acts as a pericarp to the seed, whose real pericarp is but a membrane. Moreover, the tubular calyx, the limb of which is plaited in æstivation, together with the curved embryo and farinaceous albumen, at all times distinguish *Nyctagos* ; add to which, the articulations of the stem are often tumid, as in *Cranesbills*. *Schleiden* states (*Wiegman's Arch.* 1839), that the wood figured at t. 42,

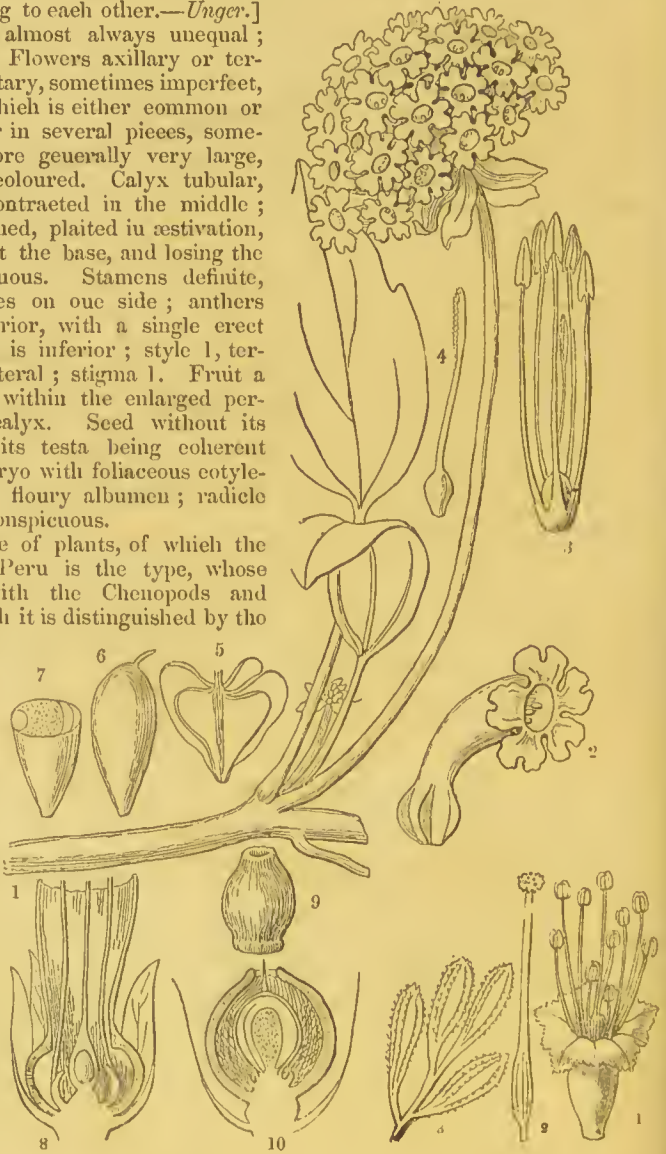


Fig. CCCXLV.

F. g. CCCXLVI.

Fig. CCCXLV.—1. *Abronia mellifera* ; 2. a flower separate ; 3. its stamens and pistil ; 4. the pistil separate ; 5. the fruit ; 6. seed magnified ; 7. a cross section of it ; 8. the lower portion of the flower of *Mirabilis Jalapa* ; 9. its fruit ; 10. a perpendicular section of it.

Fig. CCCXLVI.—*Pisonia grandis*. 1. a flower ; 2. a pistil ; 3. a cluster of fruits.

p. 100, of the third edition of my *Introduction to Botany*, is that of a *Pisonia*, a genus belonging to this Order; and he explains its singular structure by supposing it to consist of numerous vascular bundles, which continue to be developed until they form at last an almost continuous mass. The parenchyma which separated them is thereby compressed into insulated patches, which are scattered through the completely formed wood in little narrow vertical cords (*strange*), which, as regards their origin, may be termed vertical medullary rays; and he finds a similar structure in *Amaranth*, *Beta*, *Atriplex*, *Chenopodium*, and *Peppers*. As this organisation appears from *Schultz* (*Nat. Syst.* fig. I. 2. 5. 6.), to be present also in *Boerhaavia* and *Mirabilis*, it would seem to be characteristic of the Order. I however find a very different structure in *Boerhaavia repanda*, which has zoned wood, although its rings are broken by the introduction of vertical cords of cellular tissue: its pith contains many fistulæ of lax, soft, spheroidal, cellular tissue, surrounded by smaller, harder, more cubical tissue, which passes into the medullary plates. The scrambling *Bugainvillea*, with its large rosc-coloured bracts, gathered into cones like those of a *Hop*, seems to indicate some analogy with *Hempworts*.

The species are natives of the warmer parts of the world in either hemisphere, scarcely extending far beyond the tropics, except in the case of the *Abronia*s found in North-west America, and a few *Boerhaavias* in the Southern hemisphere.

In consequence of the generally purgative quality of the roots of species of this family, one of them (*Mirabilis jalapa*) was supposed to have been the true *Jalap* plant, which is, however, now known to be a mistake. See *CONVOLVULACEÆ*. The flowers of several species of *Mirabilis* are handsome, as are those also of some of the *Abronia*s; but the greater part of the Order is composed of obscure weeds. The genus *Pisonia* consists of trees or shrubby plants agreeing in property with the *Boerhaavias*, of which the species have generally emetic and purgative roots. *Boerhaavia hirsuta* is employed in icterus; *B. tuberosa*, a doubtful plant of the Order, called *Yerba de la purgacion* in Peru, is regarded as an antisiphilitic, but it is also employed as a culinary vegetable. *Boerhaavia procumbens*, an East Indian species, is reckoned antifebrile. According to Anblot, the root of *B. decumbens* (called *Hogmeat* in Jamaica), is emetic, and called *Ipecacuanha* in Guiana. *Schomburgk* states that it is astringent, and used in the form of decoction in dysentery. *Mirabilis dichotoma*, the *Marvel* of Peru, called by the French *Fleur de quatre heures*, and *M. longiflora*, two plants now common in our gardens, are very drastic. *M. suaveolens*, a species with an Anise flavour, is employed in Mexico against diarrhœa and rheumatic pains.

GENERA.

<i>Boerhaavia</i> , Linn.	<i>Calyzhymenia</i> , Orteg.	<i>Bugainvillea</i> , Commers.	<i>Pisonia</i> , Plum.
<i>Collignonia</i> , Endl.	<i>Culymenia</i> , Nutt.	<i>Josepha</i> , Fl. Flum.	<i>Calpidia</i> , Thouars.
<i>Abronia</i> , Juss.	<i>Vitmannia</i> , Turr.	<i>Reichenbachia</i> , Spreng.	<i>Bessera</i> , Flor. Flum.
<i>Tricratus</i> , Herit.	<i>Allionia</i> , Linn.	<i>Salpianthus</i> , H. et B.	<i>Pallavia</i> , Flor. Flum.
<i>Mirabilis</i> , Linn.	<i>Wedelia</i> , Löffl.	<i>Boldoa</i> , Cavan.	<i>Torrubia</i> , Flor. Flum.
<i>Nyctago</i> , Juss.	<i>Okenia</i> , Schiede.	<i>Neea</i> , Ruiz et Pav.	<i>Columella</i> , Flor. Fl.
<i>Jalapa</i> , Tournef.	<i>Tricycla</i> , Cavan.	<i>Mitschertichia</i> , Kunth.	? <i>Epilithes</i> , Blume.
<i>Oxybaphus</i> , Herit.			

NUMBERS. GEN. 14. Sp. 100.?

Polygonaceæ.

POSITION.—*Amarantaceæ.*—NYCTAGINACEÆ.—

Cannabaceæ ?

ORDER CXCIH. PHYTOLACCACEÆ.—PHYTOLACCADS.

Phytolaccæ, *R. Brown in Congo*, 454. (1818); *Bartl. Ord. Nat.* p. 299. (1830); *Meisner Gen.* 322.—*Phytolaccaceæ*, *Ed. Pr.* clvii.; *Endl. Gen.* cviii.—*Rivina*ceæ, *Agh. Martius Conspectus*, No. 91. (1835).

DIAGNOSIS.—*Chenopodal Exogens*, with separate flat sepals, stamens either 00 or alternate with the sepals, and one or several carpels.

Under-shrubs or herbaceous plants. Leaves alternate, entire, without stipules, often with pellucid dots. Flowers racemose, perfect, regular, or somewhat irregular, very variously arranged. Calyx of 4, or 5, imbricated leaves, which sometimes assume altogether the appearance of distinct petals. Stamens hypogynous or nearly so, either indefinite, or if equal to the number of the divisions of the calyx alternate with them; anthers 2-celled, opening lengthwise. Carpels solitary, or several, distinct or but partially combined, each containing 1 ascending ovule, which is either amphitropal or campylotropal; styles and stigmas equal in number to the carpels. Fruit baccate or dry, indehiscent. Seeds ascending, solitary, with a cylindrical embryo curved round mealy albumen, the radicle being next the hilum.



Fig. CCCXLVII.

The small cluster of genera called Phytolaccads, forms an Order nearly related to Chenopods and Buckwheats, from the first of which it is distinguished by the numerous carpels and the stamens exceeding the number of divisions of the calyx, or being alternate with them; or if the carpel is solitary, by the calyx being petaloid, a circumstance which never occurs in Chenopods. From Buckwheats it is known by the radicle being turned towards the hilum, the want of stipules, and the perfect simplicity of the ovaries. *Rivina*, which has the albumen very much reduced in quantity, brings into the same neighbourhood Phytolaccads and *Petiveriads*. *Brown* remarks that these two Orders, widely as they differ in the structure of the pistil, are connected by a species of *Phytolacca* related to *P. abyssinica*, in which the 5 cells are so deeply divided that they merely cohere by their inner angles; and also by *Gisekia*, which has 5 distinct ovaries. *Endlicher* unites to this Order both *Petiveriads* and *Gyrostemons*, both of which will be found elsewhere in this work. The numerous free carpels seem to point out some kind of relation to the *Ranal*, and their verticillate arrangement to the *Malval* Allies.

Many are natives of either America, within or without the tropics; others of Africa and India. *Phytolacca decandra* is naturalised in some of the southern parts of Europe.

The species are generally acrid, but that property is inconsiderable in some, and is dispersed by heat in others. A tincture of the ripe berries of *Phytolacca decandra*, or *Pocan*, seems to have acquired a well-founded reputation as a remedy for chronic and syphilitic rheumatism, and for allaying syphilitic pains. By some it is said to be more valuable than *Guaiacum*. It has had no inconsiderable celebrity as a remedy for cancer, but is no longer esteemed, and it is probable that it was only found serviceable in ill-conditioned sluggish ulcers, which are too frequently mistaken for real cancer. Its pulverised root is an emetic. A spirit distilled from the berries is stated to have killed a dog in a few minutes. According to *De Candolle*, the plant is also a purgative; but it acts so violently, and is accompanied by such ambiguous narcotic symptoms, as not to be at all calculated for internal use. *Bigelow* says that externally applied it causes heat and smarting; he found it useful in psora and tinea capitis. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are eaten in the United States as *Asparagus*, and *Dr. Royle* tells us that *Phytolacca*

acinoso is also so employed in the Himalayas. *P. drastica*, a Chilian plant, with a turnip-shaped root, is said to have a most violent action as an evacuant. Berries of the *Rivina* yield a rich red dye.

GENERA.

Mohlana, Mart.	<i>Linscotia</i> , Adans.	<i>Schollera</i> , Swartz.	<i>Phytolacca</i> , Tournef.
Hüllera, Fl. Fluu.	<i>Dicarpa</i> , Presl.	<i>Ancistrocarpus</i> , Kuntl.	<i>Kermesia</i> , Eudl.
Rivina, Plum.	<i>Gaudinia</i> , Gay.	<i>Aphananthe</i> , Link.	<i>Pircunia</i> , Berter.
<i>Solanoides</i> , Tournef.	<i>Semonvillea</i> , Gay.	<i>Gisekia</i> , Linn.	<i>Anisomeria</i> , Don.
<i>Limeum</i> , Linn.	<i>Microtea</i> , Swartz.	<i>Kalrcutera</i> , Murr.	<i>Ercilla</i> , Adr. Juss.
<i>Stegnosperma</i> , Benth.	<i>Potamophila</i> , Schrank.	<i>Mittus</i> , Lour.	<i>Bridgesia</i> , Hook. et A.

NUMBERS. GEN. 9. Sp. 60. ?

POSITION. —————. *Polygonaceæ.*
 —————. PHYTOLACCACEÆ. — *Chenopodiaceæ.*
 —————. *Ranunculaceæ* ?
 —————. *Malvaceæ* ?

SURIANACEÆ, (*Wight and Arnott, Prodr.* 1. 360; *Ed. pr.* cvii.) is the name given to a supposed Order of plants represented by a solitary species, *Suriana maritima* found on the coast of all tropical countries. In the last edition of this work it is thus described.—A woody plant with alternate leaves without stipules. Hairs capitate, jointed. Flowers racemose, ♂. Calyx 5-parted, slightly imbricated. Petals the like number, equal, shortly clawed. Stamens indefinite, hypogynous, placed in a single row; filaments subulate; anthers roundish, incumbent, bursting internally by two longitudinal fissures. Carpels 5, distinct, attached to a very short gynobase, 1-celled with 2 ascending collateral ovules; styles rising from near the base of the carpels; stigmas simple. Pericarp woody. Seed solitary, erect, compressed. Embryo annular, without albumen, terete, with the cotyledons about the same length as the radicle which is turned to the hilum.—This is one of those obscure forms, whose relationship can hardly be decided satisfactorily until some allied genus shall have been discovered; for it seems improbable that the genera *Heterodendron* and *Cneorum*, with which it has been associated, should have any real affinity. In some respects it may be compared with *Coriariaceæ* and *Craneshills*, but its annular embryo is so peculiar as to indicate a somewhat different relationship; and this, indeed, has led Dr. Wight (*Illustr.* 2. 45.) to suggest an affinity to *Phytolaccads*, especially to the genus *Gisekia*, "which corresponds accurately in the character of the ovary and fruit, and even of the seed." The presence of petals in *Suriana*, he considers unimportant; in which I agree with him. A more grave objection lies in the position of the stamens, which, in *Phytolaccads*, are alternate with the sepals; but in *Suriana*, according to Mr. Arnott, they are opposite to them; and this Endlicher confirms. The accompanying figure is taken from a drawing made in 1820, and it may serve to assist Botanists in coming to some conclusion upon this point.

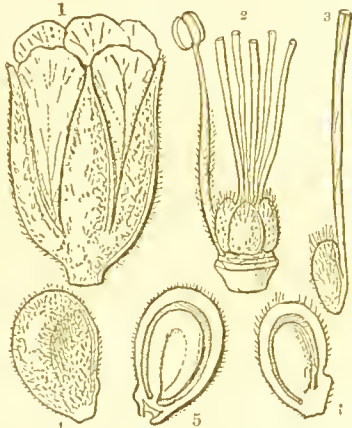


Fig. CCCXLVIII.

Fig. CCCXLVIII.—*Suriana maritima*. 1. a flower; 2. the pistil with one stamen; 3. a carpel; 4. a ripe seed-vessel; 5. a section of it; 6. a section of an ovary.

ORDER CXCIV. AMARANTACEÆ.—AMARANTHS.

Amaranthi, Juss. Gen. 87. (1789).—Amarantaceæ, R. Brown, Prodr. 413. (1810); Von Martius Monogr. (1826); Endl. Gen. cii.; Meisn. Gen. 316.—Polycnemæ, Moq. Tand. in Ann. Sc. n. s. 7. 41.

DIAGNOSIS.—*Chenopodal Exogens, with separate sepals opposite the stamens, usually one-celled anthers, a single ovary often containing several seeds, and scarious flowers buried in imbricated bracts.*

Herbs or shrubs. Leaves simple, opposite or alternate, without stipules. Flowers in heads or spikes, usually coloured, occasionally unisexual, generally hermaphrodite. Pubescence simple, the hairs divided by internal partitions. Sepals 3 or 5, hypogynous, scarious, persistent, herbaceous or coloured, distinct or united at the base, all equal, sometimes with 3 more interior than the others, the back one being sometimes dissimilar, occasionally with 2 bractlets at the base, and generally immersed in dry coloured bracts. Stamens hypogynous, either 5 opposite the sepals, or some multiple of that number, either distinct or monadelphous, occasionally partly abortive; anthers either 2-celled or 1-celled. Ovary single, free, 1- or few-seeded; the ovules amphitropal, hanging from a free central funiculus; style 1 or none; stigma simple or compound. Fruit a membranous utricle, sometimes a caryopsis or berry. Seeds lentiform, pendulous; testa crustaceous; albumen central, farinaceous; embryo curved round the circumference; radicle next the hilum.

Distinct as this Order appears to be from Chenopods in habit, especially if we compare such a genus as Gomphrena with Chenopodium itself, yet it is so difficult to define the differences which distinguish the two Orders, that, beyond habit, nothing certain can be pointed out. Brown remarks (*Prodr.* 413.) that he has not been able to ascertain any absolute diagnosis to distinguish them by; for the hypogynous insertion attributed to their stamens is not only not constant in the Order, but is also found in Chenopods. Martius, in a learned dissertation upon the Order, describes Chenopods as being apetalous, and Amaranths as polypetalous, considering the bractlets of these latter as a calyx, and that which I call a calyx a corolla. But it seems to me that this view of their structure is not borne out by analogy, and that it is impossible to believe the floral envelopes of the two Orders to be of a different nature. Endlicher observes that, although no single character divides them, yet they may be known by several characters taken together: thus Gomphreneæ have one-celled anthers, and Celoseæ many seeds; of the remainder, which are most like Chenopods, some differ from Salicoruids in the stem not being jointed, others from Atriplicids in the ♂ and ♀ flowers not being different. Bartling combines the whole in a single class, along with Caryophylleæ, Phytolaccæ, Scleranthaceæ, and Illecebræ; and there is no doubt of the affinity borne to each other by all these, as is pointed out by their habit and by the structure of their seeds. Illecebræ are in fact only known by their petals, compound ovary, and great membranous stipules. It has been stated by Schleiden that the singular mixed wood of Phytolaccæ and some Chenopods also occurs in *Amaranthus viridis*. I do not, however, find it in the woody species, such as *Deeringia celosoides*, *Cometes abyssinica*, and *Desinochæta flavescens*; but some tendency towards it seems to exist in *Achyranthes arborescens*. The point requires to be carefully investigated. Schultz describes the wood as being something between *Peperomia* and *Piper*. He says that the axis of *Amaranthus* contains very numerous fibrovascular bundles, but *Achyranthes* only 1 or 2.

Amaranths grow in crowds or singly, either in dry, stony, barren stations, or among thickets upon the borders of woods, or a few even in salt marshes. They are much more frequent within the tropics than beyond them, and are unknown in the coldest regions of the world. Of those known to Martius 53 are found in tropical Asia, 105 in

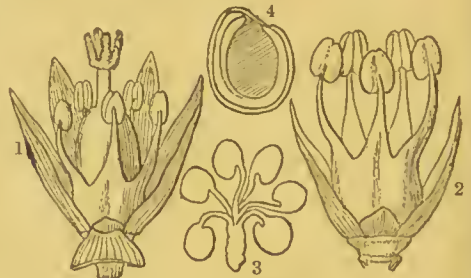


Fig. CCCXLIX.

Fig. CCCXLIX.—*Celosia longifolia*. 1. a flower; 2. the stamens; 3. the ovules; 4. a section of the seed.

tropical America, but 5 in extra-tropical Asia, and but 21 in extra-tropical America ; 5 are natives of Europe, 28 of New Holland, and 9 of Africa and its islands.

Many of the species are used, with the addition of Lenuon-juice, as potherbs, on account of the wholesome mucilaginous qualities of the leaves. *A. viridis* leaves are employed externally as an emollient poultice. The bitter and acrid leaves of *Decringia celosioides* are used against the measles in Java. *Achyranthes aspera* and *fruticosa* are administered in India in dropsical cases. The flowers of the Cockscorn, *Celosia cristata*, are astringent, and are exhibited in Asia in cases of diarrhoea, blenorrhoea, excessive menstrual discharges, hæmatisis, and similar disorders. The seeds of *Amaranthus frumentaceus* (Kiery), and of *A. Anardhana*, are gathered as corn crops in India. *Achyranthes globulifera* and *Amaranthus debilis*, are both used in Madagascar in the form of infusion, as a cure for syphilis. *Amaranthus obtusifolius* is said to be diuretic. Several are objects of interest with gardeners, for the beauty of their colouring and the durability of their blossoms. *Gomphreua officinalis* and *macrocephala* have a prodigious reputation in Brazil, where they are called *Para todo*, *Perpetua*, and *Raiz do Padre Salerma* : as the first of these names imports, they are esteemed useful in all kinds of diseases, especially in cases of intermittent fever, colic, and diarrhoea, and against the bite of serpents. The root is considered a stimulating tonic.

GENERA.

Suborder I.— GOMPHRENEÆ.	<i>Sertuenera</i> , Mart. <i>Pfaffia</i> , Mart. <i>Ucbanthe</i> , Mart. <i>Fröhlichia</i> , Münch. <i>Hoplotheca</i> , Nutt. <i>Xerosiphon</i> , Turcz.	<i>Ptilotus</i> , R. Br. <i>Nyssanthus</i> , R. Br. <i>Achyranthes</i> , Linn. <i>Centrostachys</i> , Wall. <i>Aerua</i> , Forsk. <i>Digera</i> , Forsk. <i>Desmochaeta</i> , DC. <i>Pupalia</i> , Mart. <i>Cyathula</i> , Lour. <i>Syama</i> , Jones. <i>Saltia</i> , R. Br. <i>Polyscalis</i> , Wall. <i>Albersia</i> , Kunth. <i>Scleropus</i> , Schrad. <i>Amaranthus</i> , L. <i>Polychroa</i> , Lour. <i>Chamissoa</i> , H. B. K.	<i>Charpentiera</i> , Gaudich. <i>Allmania</i> , R. Br.
<i>Iresine</i> , Willd. <i>Rosa</i> , Mart. <i>Crucila</i> , Löffl. <i>Philoxerus</i> , R. Br. <i>Gossypianthus</i> , Hook. <i>Trommsdorfia</i> , Mart. <i>Altermanthera</i> , Forsk. <i>Allaganthera</i> , Mart. <i>Teleianthera</i> , R. Br. <i>Bucholzia</i> , Mart. <i>Brandesia</i> , Mart. <i>Mogiphanes</i> , Mart. <i>Gomphrena</i> , Linn. <i>Schulleria</i> , Schrad. <i>Bragantia</i> , Vandell.	Suborder II.—ACHYRAN- THEÆ. <i>Polycnemum</i> , L. <i>Hemichroa</i> , R. Br. <i>Psilotrichum</i> , Blume. <i>Leiospermum</i> , Wall. <i>Trichinium</i> , R. Br. <i>Sericocoma</i> , Fenzl. <i>Kyphocarpa</i> , Fenzl. <i>Euchroa</i> , Fenzl.	Suborder III.—CELOSEÆ. <i>Cladostachys</i> , Don. <i>Celosia</i> , L. <i>Lestiboudesia</i> , Thouars. <i>Hermstädtia</i> , Rchb. <i>Berzelia</i> , Mart. <i>Langia</i> , Endl. <i>Deeringia</i> , R. Br. * * * <i>Tryphera</i> , Blum. <i>Lecanocarpus</i> , Nees. <i>Acroglochis</i> , Schrad. <i>Blitanthus</i> , Rchb. <i>Habilitzia</i> , Bieberst.	

NUMBERS. GEN. 33. Sp. 232.

POSITION.—Chenopodiaceæ.—AMARANTACEÆ.—
Illecebracææ.

ORDER CXCIV. CHENOPODIACEÆ.—CHENOPODS.

Atriplices, Juss. Gen. 83. (1789).—*Chenopodeæ*, Vent. Tabl. 2. 253. (1799); *R. Brown Prodr.* 405. (1810); *G. A. Meyer in Led. Fl. Atl.* 1. 370. (1829); *Moquin Tandon in Ann. Sc. Nov. Ser.* 1. 203. (1834); *Endl. Gen. ci.*; *Moq. Tand. Monogr.* (1840).—*Chenopodiaceæ*, Ed. pr. clvi.; *Meisn.* p. 319.—*Corisperma*, *Moq. Tund.*—*Cynocrambeæ*, *Th. N. ab E. Gen. Pl. Europ.* (1835).

DIAGNOSIS.—*Chenopodal Exogens*, with separate flat sepals opposite the stamens, 2-celled anthers, a single one-seeded ovary, and herbaceous naked flowers.

Herbaceous plants or under-shrubs, sometimes jointed. Leaves alternato without stipules, occasionally opposite. Flowers small, ♀, sometimes ♂-♀-♀, frequently ♂ ♀.



Fig. CCCL.

Calyx deeply divided, sometimes a little tubular at the base, persistent, with an imbricated revestment. Stamens inserted into the base of the calyx, opposite its segments, and equal to them in number, or fewer. Ovary single, superior, or occasionally adhering to the tube of the calyx, with a single amphitropal ovule attached to the base of the cavity; style in 2 or 4 divisions, rarely simple; stigmas undivided. Fruit membranous, not valvular, sometimes baccate. Embryo annular or horseshoe-shaped, surrounding the albumen (*Cyclolobeæ*); or in a flat spiral, separating 2 masses of albumen; or conically spiral without albumen (*Spirolobeæ*), with the radicle in various directions as regards the fruit, but always turned to the hilum.

In this Order we have a crowd of species consisting partly of unisexual, and partly bisexual plants, corresponding so much in general structure otherwise, that Botanists seem to have no disposition at present to divide them. But as they are also provided with exceedingly different seeds, there is small probability of the integrity of the Order being long preserved. Till, however, they shall have been studied with reference to their woody structure, a separation would be premature; in that respect they differ considerably.

Schleiden first remarked that certain plants of this Order, namely, *Beta Cycla*, *Atriplex hortensis*, and *Chenopodium Quinoa*, have the wood very compact and pierced with vertical cords of cellular tissue (see *NYCTAGINACEÆ*). But I do not find this structure

Fig. CCCL.—1. a portion of the spike of *Salicornia herbacea*, with the flowers lodged in the notches of the axis; 2. a flower separate; 3. a flower of *Salsola Kali*; 4. its ripe fruit; 5. the same magnified, with a portion of the leafy dilated calyx torn away; 6. its embryo; 7. a flower of *Chenopodium album*; 8. a section of the same, showing the superior ovary; 9. its seed cut through to show the embryo.

uniform in such woody species as I have examined. It exists, for instance, in *Haloecnum strobilaceum*, *Rhagodia Billardieri*, *Obionia portulacoides*, *Diotis ceratoides*; but does not appear in *Camphorosma monspeliaca*, and some *Salicornias*, which are distinctly zoned; while *Arthrocnemum Arbuscula*, *Salsola fruticosa*, *Salicornia articulata* appear to have a kind of intermediate structure. They all, however, deserve the most careful investigation.

Among other peculiarities, some of the species have a tendency to extend their calyx into horizontal wings, which give them a very peculiar aspect; others secrete a coloured juice abundantly in the sepals, which, growing together in masses, cause an appearance similar to that of the Strawberry. They are distinguished from *Phytolaccads*, independently of the simplicity of the structure of their ovary, by their stamens never exceeding the number of the segments of the calyx, to which they are opposite: in *Phytolaccads*, if they are not more numerous than the segments of the calyx, they are alternate with them. It is evident, however, that *Nettleworts* and their allies stand in the first degree of relationship; and if it were not for the general tendency of this Order to form bisexual flowers, together with the mealy albumen and inferior radicle, it might be doubted whether the *Chenopods* ought not to be even referred to the *Urtical Alliance*. They seem, however, to belong to the series of bisexual hypogynous Orders, at the same time approaching in some parts of their territory to those perigynous plants which are stationed with *Scleranthis* in *Ficoidals*.

Weeds, inhabiting waste places in all parts of the world, but unlike *Amaranthis*, abounding least within the tropics, and most in extra-tropical regions. They are exceedingly common in all the northern parts of Europe and Asia, and are frequent inhabitants of salt marshes.

Some are used as potherbs, as Spinage, English Mercury (*Chenopodium Bonus Henricus*), Garden Orach (*Atriplex hortensis*), and Chard Beet; the roots of others form valuable articles of food, as Beet and Mangold Wurzel, plants now famous as a new source of sugar, capable of being produced in northern countries. Some of them possess an essential oil, which renders them tonic and antispasmodic; such are *Ambrina ambrosioides* and *Botrys*; the former has an aromatic sub-acrid taste, and is regarded in Brazil as a carminative, diaphoretic, and emmenagogue; it is prescribed in amenorrhœa, and for the expulsion of the dead fœtus.—*Martius*. *Chenopodium Quinoa* is a common article of food in Peru. Soda is yielded in immense quantities by *Salsolas*, *Salicornias*, and others. The essential oil of *Ambrina anthelmintica*, known in North America under the name of Worm-seed Oil, is powerfully anthelmintic. The same quality has been observed in *Halogeton tamariscifolium*, a Spanish species, called Spanish Worm-seed. *Chenopodium vulvaria* or *olidum*, a plant with an atrocious odour, has great reputation as an antispasmodic and emmenagogue. *Thelygonium Cynocerambe* (*κυνοκραμβη*, *Diosc.*) is a sub-acrid plant, abounding in acicular saline crystals, and is slightly purgative. It is sometimes used as a potherb. The seeds of *Atriplex hortensis* are said to be so unwholesome as to excite vomiting.

GENERA.

<i>Salicornia</i> , <i>Tournef.</i>	<i>Acnida</i> , <i>Mitch.</i>	<i>Londesia</i> , <i>Fisch. et Mey.</i>	<i>Suaeda</i> , <i>Forsk.</i>
<i>Halostachys</i> , <i>C. A. Mey.</i>	<i>Spinacia</i> , <i>Tournef.</i>	<i>Chenolea</i> , <i>Thunb.</i>	<i>Lerchia</i> , <i>Hall.</i>
<i>Haloecnum</i> , <i>Bieberst.</i>	<i>Exomis</i> , <i>Moq.</i>	<i>Echinopsilon</i> , <i>Moq.</i>	<i>Cochliospermum</i> , <i>Lgsc.</i>
<i>Arthrocnemum</i> , <i>Moq.</i>	<i>Camphorosma</i> , <i>Linn.</i>	<i>Bassia</i> , <i>Allion.</i>	<i>Schoberia</i> , <i>C. A. Mey.</i>
<i>Ceratocarpus</i> , <i>Buxb.</i>	<i>Camphorata</i> , <i>Mönch.</i>	<i>Kochia</i> , <i>R. Br.</i>	<i>Alexandra</i> , <i>Bunge.</i>
<i>Puzosium</i> , <i>Gœrtn.</i>	<i>Kirilovia</i> , <i>Bunge.</i>	<i>Suaeda</i> , <i>Rehb.</i>	<i>Traganum</i> , <i>Delile.</i>
<i>Enrotia</i> , <i>Adans.</i>	<i>Panderia</i> , <i>Fisch et Meyer.</i>	<i>Kochia</i> , <i>Roth.</i>	<i>Salsola</i> , <i>L.</i>
<i>Diotis</i> , <i>Schreb.</i>	<i>Pterochlamys</i> , <i>Fisch.</i>	<i>Willemetia</i> , <i>R. Br.</i>	<i>Caroxylon</i> , <i>Thunb.</i>
<i>CeratospERMUM</i> , <i>Pers.</i>	<i>Sclerolana</i> , <i>R. Br.</i>	<i>Maireana</i> , <i>Moq. Tand.</i>	<i>Horaninovia</i> , <i>F. et M.</i>
<i>Guldenstedtia</i> , <i>Neck.</i>	<i>Anisacantha</i> , <i>R. Br.</i>	<i>Cycloloma</i> , <i>Moq.</i>	<i>Halimocnemis</i> , <i>C. A. Mey.</i>
<i>Krascheninnikovia</i> , Guldenst.	<i>Kentropsia</i> , <i>Moq.</i>	<i>Cyclolepis</i> , <i>Moq.</i>	<i>Halogeton</i> , <i>C. A. Meyer.</i>
<i>Thelygonum</i> , <i>L.</i>	<i>Threlkeldia</i> , <i>R. Br.</i>	<i>Chenopodium</i> , <i>Linn.</i>	<i>Nanophytum</i> , <i>Less.</i>
<i>Atriplex</i> , <i>L.</i>	<i>Didymanthus</i> , <i>Endl.</i>	<i>Oliganthera</i> , <i>Endl.</i>	<i>Cornulaca</i> , <i>Delile.</i>
<i>Schizotheca</i> , <i>C. A. Mey.</i>	<i>Blitum</i> , <i>Linn.</i>	<i>Oligandra</i> , <i>Less.</i>	<i>Anabasis</i> , <i>L.</i>
<i>Obione</i> , <i>Gœrtn.</i>	<i>Morocarpus</i> , <i>Scop.</i>	<i>Lipandra</i> , <i>Moq.</i>	<i>Brachylepis</i> , <i>C. A. Meyer.</i>
<i>Halimna</i> , <i>Wallr.</i>	<i>Agathophytum</i> , <i>Moq.</i>	<i>Rhagodia</i> , <i>R. Br.</i>	<i>Monolepis</i> , <i>Schrad.</i>
<i>Grayia</i> , <i>Hook et Arn</i>	<i>Orthosporum</i> , <i>R. Br.</i>	<i>Teloxys</i> , <i>Moq.</i>	<i>Agriophyllum</i> , <i>Bieberst.</i>
<i>Axyris</i> , <i>Linn.</i>	<i>Roubieva</i> , <i>Moq.</i>	<i>Botrydium</i> , <i>Spach.</i>	<i>Rhagrostis</i> , <i>Buxb.</i>
<i>Fremontea</i> , <i>Tor et Gray.</i>	<i>Ambrina</i> , <i>Spach.</i>	<i>Cryptocarpus</i> , <i>H. B. K.</i>	<i>Corispermum</i> , <i>Juss.</i>
<i>Sarcobatus</i> , <i>Nees.</i>	<i>Beta</i> , <i>Tournef.</i>	<i>Schanginia</i> , <i>C. A. Meyer.</i>	<i>Anthochlamys</i> , <i>Fenzl.</i>
<i>Oxybasis</i> , <i>Karrt.</i>	<i>Enchylæna</i> , <i>R. Br.</i>		<i>Dysphania</i> , <i>R. Br.</i>

NUMBERS. GEN. 63. Sp. 360.

Urticaceæ.

POSITION.—*Amarantaceæ*.—*CHENOPODIACEÆ*.—*Phytolaccaceæ*.

Mesembryaceæ?

Scleranthaceæ.

1. 1.

ALLIANCE XXXIX. *PIPERALES*.—THE PIPERAL ALLIANCE.

DIAGNOSIS.—*Hypogynous Exogens, with achlamydeous flowers, and a minute embryo, at or near the outside of a large quantity of mealy albumen.*

The resemblance to each other of the plants included in this Alliance is manifest; but their affinity to Chenopodals is obscure. It chiefly depends upon the assumption that Piperals stand in near relation to Urticals, and that Chenopodals are the bisexual analogue of the latter. Granting this, which seems to be supported by strong evidence, we must then suppose that Piperals are a lateral sprout from Chenopodals, directing itself, not onwards to the next Alliance, but backwards towards the frontiers of the Dichinous Sub-class, to which the occasional unisexuality of the flowers of Peppercorns and Chloranthus evidently points.

Piperals are clearly indicated by their naked flowers, constantly orthotropal ovule, abundant mealy albumen, and minute embryo, which is either external, or only just within the surface of it.

NATURAL ORDERS OF PIPERALS.

<i>Carpel solitary. Ovule erect. Embryo lying in vitellus. Leaves</i>	}	196. PIPERACEÆ.
<i>opposite or alternate, with or without stipules</i>		
<i>Carpel solitary. Ovule suspended. Embryo naked. Leaves</i>	}	197. CHLORANTHACEÆ.
<i>opposite, with intermediate stipules</i>		
<i>Carpels several, distinct. Ovule erect. Embryo lying in vitellus.</i>	}	198. SAURURACEÆ.
<i>Leaves alternate, with stipules.</i>		

ORDER CXCVI. PIPERACEÆ.—PEPPERWORTS.

Piperaceæ, *Rich. in Humb. Bonpl. et Kunth. N. G. et Sp. Pl.* 1. 39. t. 3. (1815); *Meyer de Houttuynia atque Saurureis*, (1827); *Fuadl. Gen.* lxxxi.; *Misner Gen.* p. 335; *Kunth in Linnaea*, 13. 561; *Miquel in Ann. Sc. n. s.* 14. 167; 15. 285. *Id.*; *Systema Piperacearum*, 8vo.

DIAGNOSIS.—*Piperale Exogens*, with a solitary carpel, an erect ovule, an embryo lying in vitellus, and opposite or alternate leaves, with or without stipules.

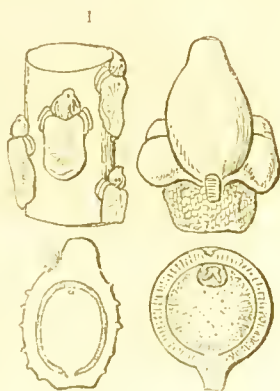
Shrubs or herbaceous plants. Stems articulated. Leaves opposite, verticillate, or alternate in consequence of the abortion of one of the pair of leaves; stipules 0, or in



Fig. CCCLI.

pairs, or single and opposite the leaf. Flowers usually sessile, sometimes pedicellate, in spikes which are either terminal, or axillary, or opposite the leaves, naked, ♂, with a bract on the outside. Stamens 2 or more, arranged on one side or all round the ovary; anthers 1- or 2-celled, with or without a fleshy connective; pollen roundish, smooth. Ovary free, simple, 1-celled, containing a single erect, orthotropal ovule; stigma sessile, simple, rather oblique. Fruit free, somewhat fleshy, indehiscent, 1-celled, 1-seeded. Seed erect, with the embryo lying in a fleshy sac placed at the apex of the seed, on the outside of the albumen.

However distinct the exogenous and endogenous forms of vegetation may be in the majority of the plants referred to those classes, it is well known that in certain cases such differences are much enfeebled. Of this Pepperworts are an instance. According to Richard, they are monocotyledonous; an opinion in which Blume concurs, after an examination of abundance of species in their native places of growth. But if the medullary rays constitute the great anatomical difference between these divisions of the vegetable kingdom (and I know of no other which is absolute), then Pepperworts are surely dicotyledonous, as is shown by Meyer (*Dissertatio de Houttuynia*, 38), and as may be ascertained by any one who will look at an old stem of a Pepper; add to this, the veins of the leaves, their distinct articulation with the stem, and the 2-lobed



3 Fig. CCCLII. 4

Fig. CCCLI.—*Serronia Jaborandi*. 1. a cluster of flowers magnified; 2. a ripe fruit; 3. a vertical section of the same, showing the seed and position of the embryo.

Fig. CCCLII.—*Peperomia blanda*. 1. a highly magnified view of a portion of a spike, with a few flowers attached; 2. a flower seen from the back, showing the ovary and two side anthers; 3. a section of the ovary, showing the ovule and its foramen; 4. a perpendicular section of a ripe fruit, showing the embryo lying in its vitellus.

embryo, and it seems impossible to doubt their being properly stationed among Dicotyledons. In *Peperomia incana*, the young stems are undoubtedly endogenous in appearance, but in *P. nigrum* and *Lonchitis* they are as certainly

exogenous, and it is probable that in the former case the wood eventually arranges itself in rows. It has, however, been remarked by Blume, that the oldest spiral vessels, and those which have acquired a woody consistence, occupy the circumference of the stem, while those more recently formed are seated towards its centre; and this is a point which, as Mr. Bennett has observed, requires a careful examination.—*Horsfield's Pl. Jav.* p. 78. Pepperworts are related to Buckwheats, Saururads, and Nettles; from all which, however, they are



Fig. CCCLIII.

rare in equinoctial Africa. Only three species have been found on the west coast; several exist at the Cape of Good Hope. They delight in low places, valleys, and the banks of rivers.

distinguished by obvious characters; but more especially to *Chloranthis*, from which they differ in the ovule being erect, and in the presence of a vitellus or amniotic sac round the embryo. In the opinion of those who believe Peppers to be Monocotyledons, their station is near Arads, with which, indeed, they must be considered in any point of view to be in some measure connected.

Exclusively confined to the hottest parts of the world, they are extremely common in tropical America and the Indian Archipelago, but, according to Brown, are very

These plants are for the most part pungent aromatics, a property which they derive from the presence of a peculiar acrid resin, an ethereal oil, and a crystalline matter called Piperine. But they are also astringents and narcotics, and sometimes are so in



Fig. CCCLIV.

Cinchona alkalies. See Pereira in *Med. Gaz.* xx. 180. In excessive doses Pepper is a dangerous stimulant. The fruit of *Piper tricoicum* is said to be still more pungent. The female spikes of *Chavica Roxburghii* (*Piper longum*), dried, form the long pepper of the shops. The root and thickest part of the stems cut into small slices and dried, are much consumed for medical purposes in India under the name of Pippala Moola. The

an eminent degree.

Great numbers of species occur in books as aromatics. That which is most extensively employed is

Piper nigrum, whose drupes, when dried with the flesh upon them, form both the Black Pepper of the shops, and White Pepper, when that flesh is removed by washing. Although principally employed as a condiment, in order to excite the stomach and promote digestion, Pepper is also extensively employed in medicine in the form of an ointment mixed with lard, against tinea capitis, in relaxed uvula, and paralysis of the tongue; and infused in spirit and water it is a popular remedy against the return of a paroxysm of intermitting fever. It has been recommended by the Italians for this purpose, and is said to be more certain and speedy, and also milder in its operation than the

effects of Long Pepper are analogous to those of Black Pepper; some consider it less powerful, others are agreed in its being the more acrid of the two. *Chavica Chaba*, *pepuloides*, and *sylvatica*, are employed in India as substitutes for this sort of Pepper. In tropical America similar uses are made of *Chavica officinarum* (*P. Amalago*), *Artanthe adunca*, *Peltobryon longifolium*, *Artanthe trichostachya*, and *crocata*. The aromatic roots of many species are officinal in some countries. A decoction of *Artanthe eucalyptifolia* is used in Brazil as a cure for colic, pains in the limbs, and flatulence. The root of *P. Parthenium* is administered in Brazil, under the name of *Paribaroba*, in amenorrhœa, leucorrhœa, and excessive menstrual discharges; that of *Serronia Jabobrandi*, and *Enckea unguiculata* and *glaucescens* is held to be sialagogue and diuretic, and is employed for similar purposes. *Pothomorpha sidæfolia* (or *umbellata*) and *subpelata* are also said to act as powerful stimulants of the lymphatic system, as deobstruents of some energy, and also for cleansing foul ulcers.—*Martius*.

Another class of remedial agents consists of those Pepperworts which possess the power of allaying inflammation of the urethra and mucous membrane of the intestinal canal. The best known of these species are *Cubeba officinalis*, *canina*, *Wallichii*, and others, whose ripe fruits are sold in the shops under the name of *Cubebs*. They are aromatic, pungent, stimulant, and purgative, and act as a specific in stopping gonorrhœal discharges. According to *Martius*, *Artanthe adunca* has the same effect in Brazil; and the Peruvian *Artanthe elongata* has a similar reputation. Of the narcotic Pepperworts the *Ava* or *Macropiper methysticum* is most celebrated. It has a thick, woody, rugged, aromatic rhizome, used in tincture against chronic rheumatism. Macerated in water it forms an intoxicating beverage, employed by the Otahaitans to cure venereal affections; they make themselves drunk, after which very copious perspiration comes on; this lasts three days, at the end of which time we are told that the patient is cured. The leaves of *Chavica Betle* and *Siriboa* are chewed by the Malays with lime and slices of the nut of *Arcea oleracea* or the Pinang Palm. They produce intoxicating effects, stimulate powerfully the salivary glands and digestive organs, and diminish the perspiration of the skin.

As an astringent, a plant called *Matico*, and supposed to be *Artanthe elongata* (*Piper angustifolium*), is found to be a most powerful styptic and a valuable remedy in certain diseases of the genital organs and rectum. It is much used in South America and Belgium, to stop the hemorrhage from small vessels, leech-bites, or incised wounds. It may be applied in leaf, or in fine powder. It is said also to be taken internally for the same purpose, in the form of infusion, in the proportion of about half an ounce to a pint of boiling water. In Peru the plant is called *Moho Moho*, and is extensively used for the same purposes as *Cubebs*, which this Pepper much resembles in smell. An account of it has been given in the *Pharmaceutical Journal*, 3. 472, from which the annexed figure is borrowed, with the permission of the editor. It is, however to be observed, that the Peruvians apply the name *Matico* to the *Eupatorium glutinosum*, a very different plant.

Many other species of this Order are to be found mentioned as plants possessing useful properties; of which here is only space to name *Aerocarpidium hispidulum*, a West Indian plant used as a bitter and stomachic, *Peperomia pellucida* as a salad, *Cocobryon eapense* a Cape stomachic, *Artanthe adunca* and *Chavica majuscula*, whose bark is rubefacient, and used in Java against rheumatism, and *Artanthe crocata*, whose spikes of fruit are employed in dyeing yellow.

GENERA.

* PEPEROMIDÆ.	<i>Etismia</i> , <i>Miq.</i>	<i>Cubeba</i> , <i>Miq.</i>	<i>Peltobryon</i> , <i>Kl.</i>
<i>Verhnelia</i> , <i>Miq.</i>		<i>Piper</i> , <i>L.</i>	<i>Sphaerostachys</i> , <i>Miq.</i>
<i>Phyllobryon</i> , <i>Miq.</i>	** PIPERIDÆ.	<i>Muldera</i> , <i>Miq.</i>	<i>Artanthe</i> , <i>Miq.</i>
<i>Aerocarpidium</i> , <i>Miq.</i>	<i>Pothomorpha</i> , <i>Miq.</i>	<i>Cocobryon</i> , <i>Klotzsch.</i>	<i>Steffensia</i> , <i>Kth.</i>
<i>Peperomia</i> , <i>R. et P.</i>	<i>Heckeria</i> , <i>Kth.</i>	<i>Callianira</i> , <i>Miq.</i>	<i>Zippelia</i> , <i>Bl.</i>
<i>Micropiper</i> , <i>Miq.</i>	<i>Macropiper</i> , <i>Miq.</i>	<i>Schilleria</i> , <i>Kth.</i>	<i>Serronia</i> , <i>Guill.</i>
<i>Tildenia</i> , <i>Miq.</i>	<i>Chavica</i> , <i>Miq.</i>	<i>Enckea</i> , <i>Kth.</i>	<i>Otonia</i> , <i>Spr.</i>
<i>Duguetia</i> , <i>Gaud.?</i>	<i>Rhyncholepis</i> , <i>Miq.</i>		

NUMBERS. GEN. 20. Sp. 600.

Urticaceæ

POSITION.—*Saurimaceæ*.—*PIPERACEÆ*.—*Chloranthaceæ*.

Polygonaceæ.

ORDER CXCVII. CHLORANTHACEÆ.—CHLORANTHS.

Chlorantheæ, *R. Brown in Bot. Mag.* 2190. (1821) ; *Lindl. Collect. Bot.* 17. (1821) ; *Meyer de Houttuynia atque Saururcis*, 51. (1827) ; *Blume Flora Javae*, (1829).—Chloranthaceæ, *Ed. pr.* cxxxiii. , *Endl. Gen.* lxxx. ; *Meisner Gen.* p. 334.

DIAGNOSIS.—*Piperæ Exogens, with a solitary carpel, a suspended ovule, a naked embryo, and opposite leaves with intermediate stipules.*

Herbaceous plants or under-shrubs, with an aromatic taste. Stems jointed, tumid at the articulations. Leaves opposite, simple, with sheathing petioles and minute intervening stipules. Flowers in terminal spikes. Flowers naked, with a supporting scale. Stamens lateral ; if more than 1, connate, definite ; anthers 1-celled, in *Chloranthus*, bursting longitudinally, each adnate to a fleshy connective, which coheres laterally in various degrees (2-celled, according to some) ; filament slightly adhering to the ovary. Ovary 1-celled ; stigma simple, sessile ; ovule pendulous, orthotropal. Fruit drupaceous, indehiscent. Seed pendulous ; embryo minute, placed at the apex of fleshy albumen, with the radicle inferior, and consequently remote from the hilum ; cotyledons divaricate. Hedysmum and *Ascarina* are both unisexual.

These differ remarkably from Peppers and Saururads, in their naked embryo and pendulous ovule. The want of an amniotic sac (or vitellus) is so unexpected in plants otherwise so nearly akin to those Orders, that nothing but the most careful examination would satisfy the mind of that fact. While, however, Chloranths are in other respects inseparably connected with those Orders, a part of them differ in the very important fact of the flowers being absolutely declinuous. This indicates an affinity to the Urtical Alliance. The anthers of *Chloranthus* consist of a fleshy mass, upon the face of which the cell lies that bears the pollen ; whether these anthers are 1- or 2-celled, is a matter of doubt ; one Botanist considering those which have 2 cells to be double anthers, another understanding those with 1 cell to be half anthers. *Blume* describes a calyx in this genus sometimes present in a rudimentary state, adhering to the ovary, and hence he suspects some affinity between Chloranths and *Opereularia*. But I am persuaded that no such rudiment exists : it is not represented in *Blume's* figures.

Natives of the hot parts of India and South America, the West Indies, and Society Islands.

The whole plant of *C. officinalis*, and *brachystachys*, has an aromatic fragrant odour, which is gradually dissipated in drying ; but its roots retain a fragrant camphorated smell, and an aromatic, somewhat bitter, flavour. They are found to possess very nearly the properties of *Aristolochia serpentaria*, and in as high a degree. There seems to be no doubt that they are stimulants of the highest order. The mountaineers

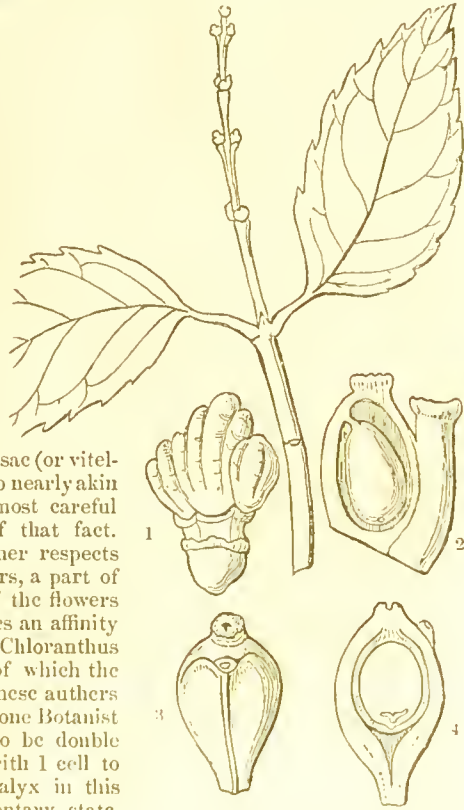


Fig. CCCLV.

Fig. CCCLV.—*Chloranthus monostachys*. 1. exterior view of a flower ; 2. perpendicular section of it, the anther being removed, 3. a ripe fruit, 4. a perpendicular section of it.

of Java employ the roots in infusion, or rubbed up with the bark of *Cinnamomum Culilawau*, as a remedy for spasms in pregnant women. In like manner, mixed with such carminative substances as Anise and Ocymum, they are administered with great success in the malignant small-pox in children. An infusion of the dried root is successfully employed in fevers attended with great muscular debility and a suppression of the functions of the skin. In a typhus which ravaged certain districts of Java, in consequence of long-continued rains following an unusually protracted dry season, the symptoms attendant upon which were extreme debility, a languid pulse, stupor, violent vomiting and bilious evacuations, the roots of this *Chloranthus* were of the greatest service. It was again employed most beneficially in a malignant intermittent fever which visited Java in the year 1824. In such cases the infusion was usually combined with a decoction of *Cedrela Toona*. The root has the great merit of preserving its active properties for a long time if properly prepared, and there can be no doubt that it is one of the most efficacious of all known remedial agents, wherever there is a necessity for continual and active stimulants.—*Blume*. Endlicher says that the dried branches of *Ascarina polystachya*, called *Earaihu* in Tahiti, still retain their hot flavour in the specimens collected during Forster's voyage. Similar qualities seem to exist in the *Hedyosmums*, which are used in the West Indies as antispasmodics and stomachics: 11. *Bonplandianum* is, according to Martius, used in Brazil in malignant fevers and pains in the limbs.

GENERA.

Hedyosmum, Swartz.
Tafalla, Ruiz et Pav.
Ascarina, Forst.

Chloranthus, Swartz.
Nigrina, Thunb.

Crocus, Loureir.
Cryphæa, Hamilt.

Peperidia, Rehb.
Strophæa, Noronh.

NUMBERS. GEN. 3. Sp. 15.

Urticaceæ.

POSITION.—*Piperaceæ*.—*CHLORANTHACEÆ*.—*Saururaceæ*.

ORDER CXCVIII. SAURURACEÆ.—SAURURADS.

Saurureæ, *Rich. Anal.* (1808); *Meyer de Houttuynia atque Saurureis*, (1827); *Martius Hort. Monac.* (1829); *Endl. Gen.* lxxxii.; *Meisner Gen.* p. 335.

DIAGNOSIS.—*Piperales Exogens*, with several distinct carpels, an erect ovule, an embryo lying in vitellus, and alternate stipulate leaves.

Herbaceous plants, growing in marshy places. Leaves alternate, with stipules. Flowers growing in spikes, naked, seated upon a scale, ♀. Stamens 3 to 6, clavate, hypogynous, persistent; filaments slender; anthers continuous with the filament, euneate, with a thick connective and 2 lateral lobes bursting longitudinally. Ovaries 3 or 4, more or less distinct, with one ascending orthotropical ovule and a sessile recurved stigma, or connate into a 3- or 4-celled pistil, with a few orthotropical ovules ascending from the edge of the projecting semi-dissepiments. Fruit either consisting of 4 fleshy indehiscent nuts, or a 3- or 4-celled capsule, opening at the apex and containing a few ascending seeds. Seeds with a membranous integument; embryo minute, lying in a fleshy lenticular sac, which is seated on the outside of hard mealy albumen at the apex of the seed.

These plants are very near Pepperworts, with which they agree in habit, but from which they differ in the compound nature of their ovary, and their alternate constantly stipulate leaves. It has been supposed that they destroyed the distinction between Exogens and Endogens, but this opinion was formed upon incorrect views, and especially upon the erroneous supposition that the genus *Aponogeton*, now known to belong to Arrow-grasses, was a part of the Order of Saururads. If M. Decaisne is right in referring his *Gymnotheca* hither, which is very doubtful, we shall have the singular combination in the same Order of distinct one-seeded carpels, and an inferior ovary with many-seeded parietal placentæ.—*See* LOASADS.

The species are natives of North America, China, and the north of India, growing in marshes or pools of water.

Saururus cernuus has been found to be somewhat acrid; its root, made into a poultice, is employed in North America in pleurisy. The leaves of *Houttuynia* are regarded as emmenagogues by the Cochin Chinese.



Fig. CCCLVI.

GENERA.

Saururus, Linn.
Mattuschkia, Gmel.
Houttuynia, Thunb.
Polypora, Lourèr.

Aneimiopsis, Hook.
Anemia, Nutt.
? *Gymnotheca*, Decaisne.

NUMBERS. GEN. 4. Sp. 7.

POSITION. ————— SAURURACEÆ.—PIPERACEÆ.

Fig. CCCLVI. 1. *Houttuynia cordata*; 2. flower of *Saururus cernuus*; 3. its fruit; 4. its seed divided perpendicularly.

SUB-CLASS III. PERIGYNOUS EXOGENS.

The first group in this Sub-class is so evidently allied to the Chenopodal Alliance, that the genera are in many cases referred to the one or the other according to the varying views of systematists, and Basellads are really almost always considered as a perigynous form of Chenopods, which, moreover, are in certain cases, as for example in Beet, truly perigynous. This seems to show that Chenopodals on the one hand, and Ficoidals on the other, form the boundary between the Hypogynous and Perigynous series.

It is evident that in the Alliances which are thus collected, there is a constant and powerful tendency to the cohesion of the floral organs, for half of them consists of Orders having monopetalous flowers, a structure which is rare in the hypogynous Sub-class, and if it is seen there, is seldom accompanied by any union of the stamens to the petals, such an occurrence, when it is observable, as in Epacrids, being altogether exceptional. Here, on the contrary, the monopetalous corolla is habitually associated with epipetalous stamens. The tendency to adhesion is not indeed confined to the separate parts of the same ring of organs, or to the stamens with the calyx or corolla, but also not unfrequently occurs between the ovary and the parts which grow around it; the consequence of which is, that we find a partly inferior ovary in nearly every one of the Alliances of the Perigynous Sub-class. But although this is a manifest approach to the condition of the Epigynous Class, yet it is seldom the cause of any confusion, because the combination of the calyx, corolla, and stamens with each other is only partial, and is rarely accompanied by a similar cohesion of the carpels, whose styles remain separate even when their ovaries are consolidated. This is obvious among Appleworts and Hydrangeads, two quasi-epigynous forms of the Ranal and Saxifragal Alliances.

ALLIANCE XL. FICOIDALES.—THE FICOIDAL ALLIANCE.

DIAGNOSIS.—*Perigynous Ecogeus, with monodichlamydeous flowers, central or axile placenta, a polypetalous corolla, if one is present, and an external embryo curved round a small quantity of mealy albumen.*

These plants are for the most part fleshy-leaved herbs or bushes, bearing very great resemblance, in some cases, to Purslanes in the Silenal Alliance, and like those plants, having for their character a central placentation combined with an annular embryo and mealy albumen. They are, in fact, the perigynous form of Silenals, and must be regarded as standing on the frontier of that Alliance. Like Silenals, the Ficoidals comprehend plants both with a high development of the corolla, and without a trace of it. They approach the Epigynous structure in some respects; but although their carpels are partially adherent with the calyx in a large proportion of the Alliance, yet the styles are almost always distinct, and generally the carpels also in some degree. Torch-thistles are no doubt a kindred race, but the exigencies of a lincal arrangement compel the systematist to separate them by a long interval.

The great marks of the Ficoidal Alliance are the perigynous stamens, curved external embryo, and mealy albumen. It may be presumed that its axile placentation is a mere modification of the central, and not derived from the margins of carpellary leaves; but this is a point which cannot be always decided

NATURAL ORDERS OF FICOIDALS.

<i>Petals absent. Sepals distinct. Fruit inclosed in a membranous or succulent calyx. Carpel single, solitary. Seed erect . . .</i>	} 199. BASELLACEÆ.
<i>Petals numerous, conspicuous. Carpels several, consolidated . . .</i>	
<i>Petals absent. Carpels several, consolidated</i>	200. MESEMBRYACEÆ.
<i>Petals absent. Sepals united into a tube. Carpel single, solitary. Fruit inclosed in the hardened calyx tube</i>	201. TETRAGONIACEÆ.
	202. SCLERANTHACEÆ.

ORDER CXCIX. BASELLACEÆ.—BASELLADS.

Basellaceæ, Moquin Tandon *Chenopod. Monogr.* p. 10. (1840).

DIAGNOSIS.—*Ficoid* Exogens, with distinct sepals, no petals, fruit inclosed in a membranous or succulent calyx, a single solitary carpel, and an erect seed.

Climbing, herbaceous, or shrubby plants, usually somewhat succulent. Leaves alternate, without stipules. Flowers coloured, naked, sessile or stalked, sometimes without bracts. Sepals imbricated in two rows, fleshy, hardly opening. Stamens

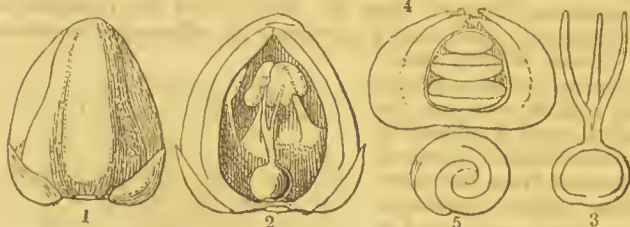


Fig. CCCLVII.

opposite the sepals, inserted into their sides; anthers 2-celled, (in *Basella*, opening outwards longitudinally.) Ovary free, simple, ocellod, with a single erect, sessile, anatropal ovule; styles several. Fruit membranous. Embryo annular, or coiled up spirally, with

mealy albumen in the centre, or separated into two superficial masses; radicle inferior.

These plants, which have all the general characters of scandent Chenopods, have been separated from that Order on account of their coloured calyx, which scarcely opens, and has its sepals distinctly arranged in two rows, and their perigynous stamens. The anthers in *Basella* are moreover turned outwards, but I know not how far that is characteristic of the Order. Basellads differ from *Scleranthus* in the want of a hardened tube to cover over the seed-vessel, and from *Aizoon* in the perfect simplicity of their carpel.

The species are all tropical, with the exception of *Lophiocarpus*, a Siberian plant, if it really belongs here.

Basella rubra and *alba* are employed as pot-herbs in the East Indies, where they are held in some esteem as a substitute for Spinage. *B. tuberosa* has a great fleshy root, which is eaten by the women of Quito, under the idea that it increases their fecundity. *Basella rubra* yields a very rich purple dye, but it is said to be difficult to fix.

GENERA.

Basella, L.
Gandola, Rumph.
Boussingaultia, H. B. K.
Anredera, Juss.
 ? *Lophiocarpus*, Turcz.

NUMBERS. GEN. 4. Sp. 12.

*Chenopodiaceæ.*POSITION.—*Tetragoniaceæ.*—BASELLACEÆ.—*Scleranthaceæ.*

Fig. CCCLVII.—*Basella rubra*. 1. a flower; 2. the same opened vertically; 3. ovary; 4. the ripe fruit and inverted calyx divided perpendicularly; 5. the embryo.

ORDER CC. MESEMBRYACEÆ.—FICOIDS.

Ficoideæ, *Juss. Gen.* 315. (1789); *Dict. Sc. Nat.* 16. 528. (1820); *DC. Prodr.* 3. 415. (1828); *Salm Dyck Monogr. Mesemb.* (1834); *Meisn. Gen.* 129.—Mesembryaceæ, *Ed. pr.* xxxviii.—Mesembryanthemæ, *Endl. Gen. cvv. Fenzl. in Ann. Wien. Mus.* 1. 347.—Lewisieæ, *Hook. in Beechey*, p. 345.—Spætalumæ, *Nuttall Fl. Rocky Mount.* p. 24.

DIAGNOSIS.—*Ficoidal Exogens*, with numerous conspicuous petals, and several consolidated carpels.

Shrubby or herbaceous succulent plants, with opposite simple leaves. Flowers complete, often showy, always terminal, although, from the shortness of the branches on which they grow, apparently lateral; often opening only under the influence of sunshine, and closing in its absence. Sepals definite, usually 5, but varying from 4 to 8, more or less combined at the base, either cohering with the ovary, or distinct from it, equal or unequal, with a quincuncial or valvate aestivation. Petals indefinite, coloured, in many rows. Stamens arising from the calyx, indefinite, distinct; anthers oblong, incumbent. Ovary inferior, or nearly superior, many-celled or one-celled; stigmas numerous, distinct. Ovules 00, amphitropal, attached by cords to a central placenta, which is either wholly free, or united to the edges of the carpels, or sometimes spread over the back of the cavity of each cell. Capsule surrounded by the fleshy calyx, many-celled or 1-celled, opening in a stellate manner at the apex, or when free from the calyx splitting at the base. Seeds definite, or more commonly indefinite, attached to the inner angle of the cells; embryo lying on the outside of mealy albumen, curved or spiral, with the radicle next the hilum.

These are the most perfect of the Ficoidal Alliance, for the carpels are numerous and consolidated, and the apparatus of the corolla abundant and richly coloured. In this respect, indeed, Ficoids approach the Torch-thistles, although otherwise so different. They are to Ficoidals what Purslanes or Cloveworts are to Silenals, the princes of their race. One of the most singular facts connected with them is the variable nature of their placenta, which sometimes occupies the centre, to which the edges of the carpillary leaves are closely applied, sometimes runs up the back, altogether avoiding the centre, as in *Mesembryanthemum acinaciforme* (See *Ladies' Botany*, vol. ii. t. xxxi. 2.), and is sometimes absolutely free, as in *Lewisia*. This curious genus, however, differs a little from the rest of the Order in its perfectly one-celled free ovary, and barely perigynous stamens. It is however near *Glinus*, and there does not seem to be any necessity for regarding it as the type of a peculiar Order. The seed-vessels of the Ficoids exhibit remarkable phenomena, closing when placed in water, opening again when dried, a hygrometrical quality doubtless connected with their manner of life. Inhabitants of the dry places of southern Africa, they only expand and discharge their seeds when rain falls to relax their tissue, for then only would the seeds be able to germinate. This is more especially evident in *M. Tripoliinum*, which has been sold under the name of *Flores Candie*.

The hottest sandy plains of the Cape of Good Hope nourish the larger part of this Order. A few are found in the south of Europe, north of Africa, Chile, China, Peru, and the South Seas.

The succulent leaves of a few are eaten, as of *Mesembryanthemum edule*, which is



Fig. CCCLVIII.

Fig. CCCLVIII.—*Mesembryanthemum*. 1. its fruit; 2. the same opened; 3. a seed; 4. the same divided perpendicularly.

the Hottentot's Fig of the Cape colonists; *Mesembryanthemum emarcidum*, when bruised and fermented, acquires a narcotic property, and is chewed like Tobacco by the Hottentots (*Burnett*); others yield an abundance of soda. *M. crystallinum* in Spain, and *M. copticum* and *nodiflorum* in Egypt, are collected for the purpose of furnishing alkali for glassworks; the former is called *Barilla Moradera* by the Spaniards, who import large quantities of its ashes from the Caucaries, where the seeds are eaten as a common food, according to *Broussonet*. *Mesembryanthemum nodiflorum* is used in the manufacture of Maroquin leather. *M. crystallinum* (the Ice-plant) is remarkable for the abundance of watery pustules with which it is covered; its juice is said to be diuretic, and has been prescribed in dropsy and liver complaints. *M. geniculiflorum* is used in Africa as a potherb, and its seeds are ground into flour. *Lewisia rediviva* is an article of food among the natives of north-west America, who call it *Spatulum* or *Spæt'lum*. The roots, after the bark is stripped off, seem from the relation of travellers to consist of little more than starch.—*Gray and Torrey*, 1. 678. The natives of Australia eat the fruit of *M. æquilaterale* (Pig-faces, or Canagong). The seed-vessel of this plant is about an inch and a half long, of a yellowish, reddish, or green colour, and somewhat obconical. The pulp is sweetish and saline.—*Buckhouse*.

GENERA.

<i>Mesembryanthemum</i> , L.	<i>Glinus</i> , L.	<i>Physa</i> , Thouars.	<i>Axonotichium</i> , Fenz.
<i>Hymenogyne</i> , Haw.	<i>Rolofia</i> , Adans.	<i>Orygia</i> , Forsk.	<i>Lewisia</i> , Pursh.
<i>Mesembryon</i> , Adans.	<i>Ptenckia</i> , Rafin.	<i>Corbichonia</i> , Scop.	? <i>Beloanthera</i> , Massk.

NUMBERS. GEN. 5. Sp. 375.

Cactaceæ.

POSITION. ————— MESEMBRYACEÆ. — Tetragoniaceæ.

Portulacææ.

ORDER CCI. TETRAGONIACEÆ.—AIZOONS.

Tetragoniaceæ, *Ed. pr. p. 209.* (1836).—Tetragonieæ, Aizoideæ, Sesuviere, *Endl. Gen. p. 947.*—Sesuviaceæ, *Wight. Illustr. 2. 42.*

DIAGNOSIS.—*Ficoidal Exogens, with no petals, and several consolidated carpels.*

Succulent-leaved herbaceous plants, or occasionally small shrubs. Leaves alternate, often covered with watery pustules, without stipules. Flowers small, axillary. Calyx 3- 5-cleft, free, or partially adherent to the ovary. Corolla 0. Stamens definite, alternate with the sepals, if they bear any relation to them. Ovary 2- 9-celled; ovules suspended or ascending, solitary or several, anatropal, always with a long cord; foramen superior in the suspended species. Styles as many as the cells of the ovary, distinct. Fruit either an indehiscent tough-shelled nut, or a capsule splitting all round. Seeds with an annular embryo, curved round mealy albumen.

The distinction of Aizoons resides in their want of petals and small number of stamens, otherwise they are like Ficoids. They participate in the affinity of that Order, but approach nearer to the Chenopods, among which Beta has the adherent calyx of a Tetragonia. Cypselea, and the genera near it, also establish a connection with Purslanes, which are positively known by their 2-leaved calyx.

The species, which are plants of no beauty, are found in the South Sea Islands, the residence more especially of Tetragonias, in the Mediterranean, the Cape of Good Hope, or various parts of the tropics.

They are universally insipid or slightly saline, whence they are suited for human food. *Tetragonia expansa*, a New Zealand annual, is a good deal cultivated in Europe under the name of New Zealand Spinage, as a substitute for which herb it is employed. *Sesuvium portulacastrum* and *repens* are used for the same purposes in the tropics of Asia. The ashes of *Aizoon canariense* and *hispanicum* abound in soda.

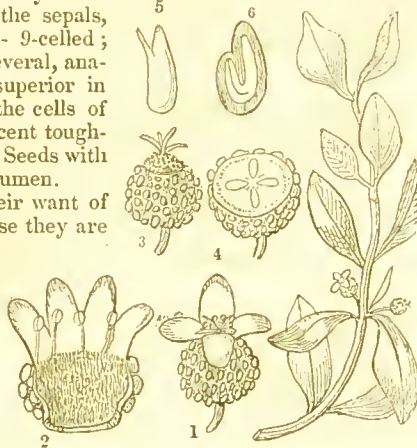


Fig. CCCLIX.

GENERA.

Suborder I. TETRAGO-	<i>Tetragonella</i> , <i>Miq.</i>	Suborder II. SESUVEÆ.	<i>Sesuvium</i> , <i>Linn.</i>
SEÆ.—Fruit woody,	<i>Aizoon</i> , <i>Linn.</i>	—Capsule circumscis-	<i>Aizoon</i> , <i>Andr.</i>
indehiscent.	<i>Vestlingia</i> , <i>Fabric.</i>	sile.	<i>Halimus</i> , <i>Löfl.</i>
<i>Tetragonia</i> , <i>Linn.</i>	<i>Ficoideæ</i> , <i>Dillen.</i>	<i>Trianthema</i> , <i>Saur.</i>	<i>Pyxipoma</i> , <i>Fenzl.</i>
<i>Demidovia</i> , <i>Pall.</i>	<i>Galenia</i> , <i>Linn.</i>	<i>Rocama</i> , <i>Forsk.</i>	<i>Ancistrostigma</i> , <i>Fenzl.</i>
<i>Tetragonocarpus</i> , <i>Com.</i>	<i>Kotleria</i> , <i>Presl.</i>	<i>Papularia</i> , <i>Forsk.</i>	<i>Cypselea</i> , <i>Turp.</i>
	<i>Stalodes</i> , <i>Eckl. et Zeyh.</i>	<i>Zaleya</i> , <i>Burm.</i>	<i>Radiana</i> , <i>Raf.</i>
	<i>Plinthus</i> , <i>Fenzl.</i>	<i>Diplochonium</i> , <i>Fenzl.</i>	<i>Millegrana</i> , <i>Suriau.</i>

NUMBERS. GEN. 11. Sp. 65.

Chenopodiaceæ.

POSITION. Mesembryaceæ.—TETRAGONIACEÆ.—Scleranthaceæ.

Portulacææ.

Fig. CCCLIX.—*Tetragonia*. 1. a flower; 2. the calyx opened out; 3. ripe fruit; 4. a transverse section of it; 5. an ovule; 6. a section of a seed.

ORDER CCII. SCLERANTHACEÆ.—SCLERANTHUS.

Scleranthæ, *Link Enum.* 417. (1821); *DC. Prodr.* 3. 377. (1828) a § of *Illecebreæ*; *Barth. Ord. Nat.* 300. (1830); *Meisn. Gen.* p. 133; *Endl. Gen.* p. 962.

DIAGNOSIS.—*Ficoidæ Exogens*, with no petals, a tubular calyx becoming hardened and covering the fruit, consisting of a single solitary carpel.

Small inconspicuous herbs. Leaves opposite, without stipules. Flowers minute, axillary, sessile. Calyx 4- or 5-toothed, with a stiff tube. Stamens from 1 to 10, inserted into the orifice of the tube. Ovary simple, superior, 1-seeded; styles 2, or 1, emarginate at the apex. Ovules 1 or 2, amphitropal, hanging down from the point of a slender cord which rises from the base of the ovary. Fruit a membranous utricle inclosed within the hardened calyx. Seed pendulous from the apex of a funiculus, which arises from the bottom of the cell; embryo cylindrical, curved round farinaceous albumen; radicle superior, but next the hilum.

The weedy plants called Scleranthus, are by most Botanists, and among the rest by De Candolle, referred to Knotworts, from which they differ in the absence of petals and stipules, in the indurated tube of the calyx, from the orifice of which the stamens proceed, and in the number of the latter often exceeding that of the divisions of the calyx. They are, in fact, perigynous Chenopods, rather than Knotworts. Their affinity seems, however, to be quite as great with *Nyctagos*, with which they agree in most respects except their truly perigynous stamens and small herbaceous ribbed calyx.

Fenzl proposes to divide this trifling Order into two tribes, viz. Eu-

scleranthæ, and *Habrosiæ*, but the advantage of doing so is not obvious.

The species are found in barren fields in Europe, Asia, and North America, and in sterile places in countries of the southern hemisphere beyond the tropics. A single species is described from Peru.

They are all uninteresting weeds, of no known use.

GENERA.

Mniarum, Forst.
Ditoca, Banks.
Scleranthus, L.
Guilleminia, H. B. K.
Habrosia, Fenzl.

NUMBERS. GEN. 4. Sp. 14.

POSITION.—*Tetragoniaceæ*.—*SCLERANTHACEÆ*.—*Basellaceæ*.
Nyctaginaceæ.

Fig. CCCLX.—*Scleranthus perennis*. 1. young calyx forced open; 2. perpendicular section of ripe calyx; 3. ovary; 4. anther; 5. section of seed.

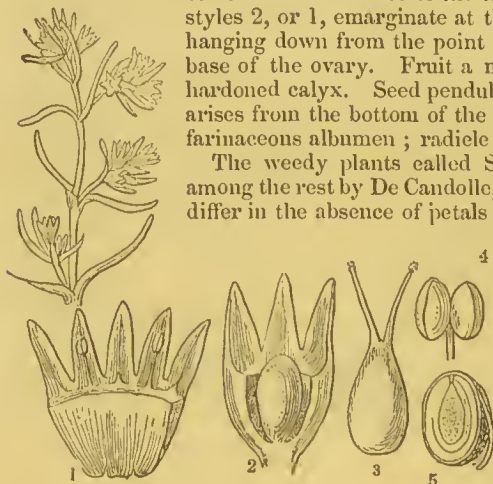


Fig CCCLX.

ALLIANCE XLI. DAPHNALES.—THE DAPHNAL ALLIANCE.

DIAGNOSIS.—*Perigynous Ecogens, with monochlamydeous flowers, a solitary carpel, and an amygdaloid embryo without albumen.*

The Daphnal Alliance consists almost exclusively of shrubs and trees, usually evergreen and often of large dimensions. It is defined by its flowers being monochlamydeous, or, if there be a corolla, by the quasipetals having altogether the colour, texture, and quality of the calyx. It differs from the Ficoidall Alliance in the total absence of albumen, and its great almond-like embryo; nevertheless its Daphnads approach Ficoidals in consequence of the resemblance between some Passerines and Scleranthus. With Rosals it agrees in the nature of its embryo, but is distinguished by the want of petals, or, failing that distinction, by its ovary having a vertical style, which in Rosals always stands more or less obliquely with respect to the ovary. This renders it probable that the fruit of Daphnads is really composed of two or more valvate carpels cohering round a single ovule, as happens in the Order of Buckwheats, while in Rosals the carpels are absolutely simple.

If we regard the further end of the chain of Daphnals we find that Laurels touch Calycanthus among Rosals. Laurels, too, indicate a tendency towards the dielious series, in consequence of their flowers being occasionally unisexual, and seem to bring Daphnals into the vicinity of Plume Nutmegs.

There is also a very strong approach on the part of Daphnals to Rhamnals, as is indicated by the tubular calyx of the latter and their constant tendency to lose their petals. In fact, the two Alliances must stand in actual contact, for there is little to distinguish them except the simple fruit of the one and the compound fruit of the other.

NATURAL ORDERS OF DAPHNALS.

<i>Anthers bursting lengthwise. Apetalous or polypetalous. Ovule solitary, suspended. Calyx imbricated</i>	} 203. THYMELACEÆ.
<i>Anthers bursting lengthwise. Apetalous. Ovules erect. Calyx valvate.</i>	
<i>Anthers bursting by recurved valves. Leaves perfect. Fruit naked.</i>	} 204. PROTEACEÆ.
<i>Anthers bursting by recurved valves. Leaves mere colourless scales.</i>	
<i>Fruit buried in a succulent permanent calyx.</i>	} 205. LAURACEÆ.
	} 206. CASSYTHACEÆ.

ORDER CCIII. THYMELACEÆ.—DAPHNADS.

Thymelacæ, *Juss. Gen.* 76. (1789); *R. Br. Prodr.* 358; *Bartling Ord. Nat.* 114. (1830).—Daphnoideæ, *Vent. Tabl.* ii, 235. (1799); *Endl. Gen.* cix.—Daphnacæ, *C. A. Meyer, Ann. Sc.* xx, 45.—Anthobolæ, *Martius Conspectus*, No. 81. (1835).—Exocarpeæ, *Arnott in Edinb. Encycl.* 128, a § of Santalacæ, (1832).—Hernandiæ, *Blume Bydr.* 550. (1825); *Ed. Pr.* cxlvi.; *Endl. Gen.* p. 232.

DIAGNOSIS.—*Daphnal Exogens*, with apetalous or polypetalous flowers, anthers bursting lengthwise, a solitary suspended ovule, and an imbricated calyx.

Stem shrubby, very seldom herbaceous, with tenacious bark. Leaves without stipules, alternate or opposite, entire. Flowers capitate or spiked, terminal or axillary,



Fig. CCCLXI.

occasionally solitary, sometimes ♂ - ♀ by abortion, often inclosed in an involucre. Calyx inferior, tubular, coloured; the limb 4-cleft, seldom 5-cleft, with an imbricated æstivation. Corolla 0, or sometimes scale-like petals in the orifice of the calyx. Stamens definite, inserted in the tube or its orifice, often 8, sometimes 4, less frequently 2; when equal in number to the segments of the calyx or fewer, opposite to them; anthers 2-celled, dehiscing lengthwise in the middle. Ovary composed of a single carpel, with one solitary pendulous anatropal ovule; style 1; stigma undivided. Fruit hard, dry, and nut-like, or drupaceous. Albumen none, or thin and fleshy; embryo straight; cotyledons plano-convex, sometimes lobed and crumpled; radicle short, superior.



Fig. CCCLXII.

The true affinity of Daphnads, notwithstanding the commonness of the species, does not seem well ascertained. They are generally associated with Oleasters; and if the genus *Elæagnus* really belongs to that Order, it must be admitted that the main distinction between the two Orders consists in the separate sexes of Oleasters. To Proteads they certainly approach, especially in the stamens being opposite to the segments of the calyx, but Daphnads have a pendulous ovule, and Proteads an erect one; in the former, too, the calyx is imbricated, in the latter, valvate. Laurels are known by their reflexed anther-valves. As to Sandalworts, with which Daphnads are often compared, they are far removed by their inferior ovary and copious albumen. Aquilariads have a compound ovary, and therefore belong to the Rharnal Alliance. A supposed Natural Order, called by Blume *Hernandiaceæ*, merely consists of Daphnads with polygamous

Fig. CCCLXI.—*Daphne Mezereum*. 1. a flower cut open; 2. a vertical section of an ovary; 3. the fruit.

Fig. CCCLXII.—*Daphne Mezereum*.—*Gartner*. 1. fruit; 2. the same with a portion of the succulent rind removed; 3. seed; 4. embryo.

flowers and lobed cotyledons ; the former circumstance seems to bring the Alliance at one point into the vicinity of Amentals still more than the manifest affinity with Oleasters.

Natives sparingly of Europe, and the northern parts of the world, common in the cooler parts of India and South America, and abundant at the Cape of Good Hope and in New Holland. *Dirca* occurs in North America, and *Lagetta* is confined to the tropical parts of America. *Drapetes* is a little antarctic plant.

The great feature of this Order is the causticity of the bark, which acts upon the skin as a vesicatory, and causes excessive pain in the mouth if chewed. *Daphne Mezereum* is extensively used in medicine. In Germany the bark of the stem and larger branches is removed in spring, folded in small bundles, and dried for medicinal use. In this country the bark of the root is employed. Its taste is at first sweetish, but afterwards highly acrid. All the parts are excessively acrid, and act as a local irritant poison. Voigt says that it vomits and purges and affects the urinary organs, and that death takes place from its local operation. As a local irritant, *Mezereum* bark is employed in France, under the name of *Garou*, to produce vesication. In this country it is frequently employed as a topical remedy for toothache. Dr. Withering cured a case of difficulty of swallowing by *Mezereum*, which he directed to be chewed frequently. Dr. Cullen says he has employed it with success in some cutaneous diseases. Similar qualities have been remarked in *D. Laureola*, *poutica*, *Guidium*, and several others. The causticity of the *Mezereum* and *Spurge Laurel* are so great that persons who prepare them for medical use often suffer great inconvenience from particles rising and irritating the nostrils while pounding them. The inner bark of the *Mezereum* creates in the month a burning sensation, and if swallowed affects the lining of the œsophagus and stomach in the same manner. Mr. Squire remarks that this effect is followed in *Daphne Laureola* by profuse perspiration of the face, head, and neck, after which the burning sensation subsides. The bark of the root is the most efficacious part.—*Pharm. Journ.* 1. 397. The fruit of *Dirca palustris* is narcotic, producing effects like those of *Stramonium*. That of *Daphne cestrifolia*, a Bogota plant, is poisonous to cattle, according to Mr. Hartweg. The berries of *Daphne Laureola* are poisonous to all animals except birds. The bark of *Gnidia daphnoides*, is manufactured into ropes in Madagascar ; that of *Dais madagascariensis* into paper. From a *Daphne* the Afghans prepare the matches for their match-locks. A soft kind of paper is made from the inner bark of *Daphne Bholua* in Nepal. *Daphne cannabina* is used in a similar way in China. The inner bark of *Lagetta linearia* is the beautiful Lace-bark, so called because, when macerated and stretched laterally, it assumes the appearance of coarse lace ; twisted and knotted it was formerly employed in making the slave whips used by Negro-drivers. *Daphne Gnidium* and *Passerina tuctoria* are used in the south of Europe to dye wool yellow. In *Hernandia sonora* the bark, seed, and young leaves are all slightly purgative. Rumphius says that the fibrous roots chewed and applied to wounds caused by the *Macassar* poison, ensure an effectual cure. The juice of the leaves is a powerful depilatory ; it destroys hair, wherever it is applied, without pain. The wood is light ; according to Aublet, that of *H. guianensis* takes fire readily from a flint and steel, and is used as *Amadou*. The seeds of *Inocarpus edulis* are eaten when roasted, and have the taste of Chestnuts.

GENERA.

<i>Dirca</i> , Linn.	<i>Daphnopsis</i> , Mart.	<i>Choristachys</i> , Endl.	<i>Eriosolena</i> , Blume.
<i>Daphne</i> , Linn.	<i>Schinobilobos</i> , Mart.	<i>Malistachys</i> , Endl.	<i>Diplomorpha</i> , Meisn.
<i>Thymelæa</i> , Scop.	<i>Peddiea</i> , Harv.	<i>Epallage</i> , Endl.	? <i>Coleophora</i> , Miex.
<i>Cajupura</i> , L.	<i>Dais</i> , Linn.	<i>Struthiola</i> , Linn.	<i>Wikströmia</i> , Endl.
<i>Cryptadenia</i> , Meian.	<i>Passerina</i> , Linn.	<i>Jenkinsia</i> , Griff.	<i>Lagetta</i> , Juss.
<i>Edgeworthia</i> , Meyer.	<i>Stollera</i> , Linn.	<i>Enkleia</i> , Griff.	<i>Pumifera</i> , Leand.
<i>Harzaueria</i> , Meyer.	<i>Diarthron</i> , Turczan.	<i>Gnidia</i> , Linn.	<i>Exocarpus</i> , Lab.
<i>Piptochlamys</i> , Meyer.	<i>Drapetes</i> , Lam.	<i>Canalla</i> , F. W. Schm.	
<i>Chlamydanthus</i> , Meyer.	<i>Pimela</i> , Banks et Sol.	<i>Lachnæa</i> , L.	° <i>HERNANDIÆÆ.</i>
<i>Nordmannia</i> , Fisch. Mey.	<i>Banksia</i> , Forst.	<i>Thymelina</i> , Hoffmans.	<i>Inocarpus</i> , Forst.
<i>Arthrosolen</i> , Meyer.	<i>Cookia</i> , Gmel.	<i>Nectandra</i> , Berg.	<i>Antiotum</i> , Soland.
<i>Lyzia</i> , Fusan.	<i>Thecandrea</i> , Wikstr.	<i>Lasiosiphon</i> , Fresen.	<i>Sarcostigma</i> , Wight et A.
<i>Mezereum</i> , Meyer.	<i>Heterolæna</i> , Endl.	<i>Luostonia</i> , Wall.	<i>Hernandia</i> , Plum.
<i>Scopolia</i> , L. fl.	<i>Phyllolæna</i> , Endl.		

NUMBERS. GEN. 33. Sp. 200.

Aquilariaceæ.

POSITION.—*Protocæcæ*.—*THYMELACEÆ*.—*Lauracææ.*

Elaeagnacææ.

ORDER CCIV. PROTEACEÆ.—PROTEADS.

Proteaceæ, *Juss. Gen.* (1789); *R. Brown in Linn. Trans.* 10. 15. (1809); *Prodr.* 363; *Suppl. Prim.* (1830); *Endl. Gen.* cxiii.; *Meisner Gen.* p. 331.

DIAGNOSIS.—*Daphnal Exogens*, with apetalous flowers, anthers bursting lengthwise, erect ovules, and a valvate calyx.

Shrubs or small trees. Branches usually umbellate. Leaves hard, dry, divided or undivided, opposite or alternate, without stipules; their cuticle often covered equally on both sides with stomates. Calyx 4-leaved, or 4-cleft, with a valvate æstivation. Stamens 4, sometimes in part sterile, opposite the segments of the calyx. Ovary consisting of a single carpel, superior; style simple; stigma undivided; ovule one, or two collateral, or several in two rows, anatropal or amphitropal, and ascending. Fruit dehiscent or indehiscent. Seed without albumen; embryo with two or occasionally several cotyledons, straight; radicle inferior, next the hilum, or parallel with it.

There is no difficulty in distinguishing this Order; the hard woody texture of the leaves, the irregular tubular calyxes with a valvate æstivation, the stamens placed upon the lobes, along with a dehiscent fruit, at once characterise it. By these marks it is known from *Daphnads* and all other Orders. According to Brown, the radicle pointing towards the base of the fruit in all Proteads, is a circumstance of the greatest importance in distinguishing the Order from those most nearly related to it; and its constancy is more remarkable, as it is not accompanied by the usual position or even uniformity in the situation of the external umbilicus.—*Linn. Trans.* 10. 36. He has also remarked, with his usual acuteness, that in consequence of the presence of hypogynous scales, we may expect to find octandrous genera belonging to this family. The same writer observes, that there is a peculiarity in the structure of the stamens of certain genera of Proteads, namely, *Simsia*, *Conospermum*, and *Synaphea*, in all of which these organs are connected in such a manner that the cohering lobes of two different anthers form only one cell. Another anomaly equally remarkable exists in *Synaphea*, the divisions of whose barren filament so intimately cohere with the stigma, as to be absolutely lost in its substance, while the style and undivided part of the filament remain perfectly distinct. In another place he remarks: "A circumstance occurs in some species of *Persoonia*, to which I have met with nothing similar in any other plant: the ovarium in this genus, whether it contain one or two ovula, has never more than one cell; but in several of the 2-seeded species, a cellular substance is, after fecundation, interposed between the ovula, and this gradually indurating, acquires in the ripe fruit the same consistence as the putamen itself, from whose substance it cannot be distinguished; and thus, a fruit originally of one cell becomes bilocular; the cells, however, are not parallel, as in all those cases where they exist in the unimpregnated ovarium, but diverge more or less upwards." This is subsequently explained by the same author (*King's Appendix*), by the cohesion of the outer membranes of the two collateral ovules, originally distinct, but finally constituting this anomalous dissepiment, the inner membrane of the ovule consequently forming the outer coat of the seed.

A happier name than that of Proteads could not have been devised, for the diversity of appearance presented by the various genera is such as it would be hard to parallel in

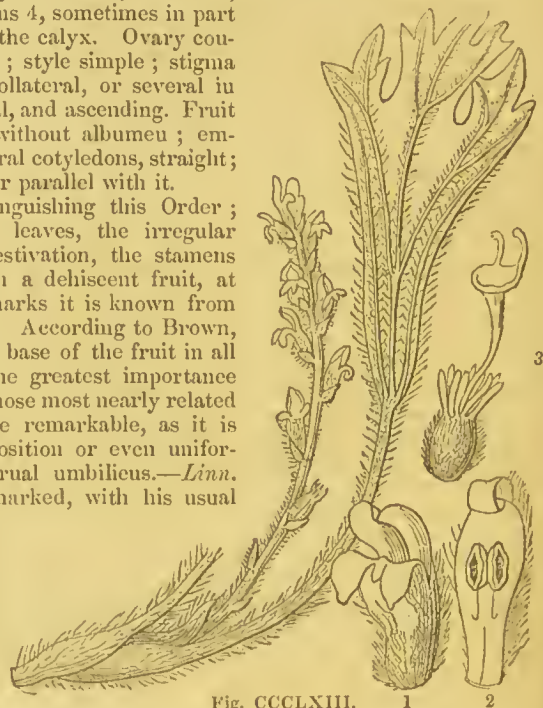


Fig. CCCLXIII.

Fig. CCCLXIII.—*Synaphea dilatata*.—*Ferd. Bauer*. 1. a flower; 2. one of its lobes; 3. the ovary and style and stigma.

the same Natural Order. On the one hand, we have the hard-coned Banksias, and the close-headed Dryandras; then come the loose-flowered Ilakeas and Grevilleas; and the ranks are closed by anomalous genera, bearing the names of Synphea, Conospermum, Franklandia, &c.

The principal stations of this Order are the Cape of Good Hope and adjacent regions, and New Holland. A few only occur in South America, the Malay Archipelago, and elsewhere in the southern hemisphere; in the northern they are scarcely known. *Protea abyssinica* is, however, found in Abyssinia, and *P. Paulina* in Sennaar. In general they occur in land unfit for cultivation. Few are of



Fig. CCCLXIV.

considerable size. Mr. Frazer has reported the existence of a plant he referred to *Banksia grandis*, with a trunk fifty feet high, and frequently more than two feet and a half in diameter, occupying the barren hills on the banks of the river, at Point Frazer, in the Swan River Colony; and *Grevillea robusta*, and *Knightia excelsa*, are other instances of the species acquiring a considerable stature.

Handsome evergreen shrubs, much prized by gardeners for the neatness of their appearance, and the beauty or singularity of their flowers. They are commonly employed as fire-wood at the Cape of Good Hope. The fruit of *Guevinia* is sold like nuts in the markets of Chile, under the name of *Avellano*.

Waggou wheels are constructed at the Cape of Good Hope from the wood of *Protea grandiflora*, which is called, in consequence, *Wagen boom*. The dried flowers of *Pterophila brevifolia* give out to boiling water so brilliant a yellow colour, that it is possible the plant might be turned to account by dyers. The same may be said of *Persoonia macrostachya*. The bark of *Protea grandiflora* is used by the Cape settlers in diarrhœa. The seeds of *Brabejum stellatum* are roasted and eaten like Chesnuts; their shells form a substitute for coffee. The honey that flows from the flowers of *Protea mellifera* and *speciosa* is boiled down at the Cape of Good Hope, and used against coughs. It is reported by Endlicher that the root of *Banksia marcescens* is emetic: but upon no known authority. Upon the whole, the Order must be regarded as one of the most useless to man, notwithstanding the beauty of the flowers and foliage of so many species.

GENERA.

I. NUCAMENTACEÆ.	<i>Lepidocarpodendron</i> , Boerh.	<i>Cyrtostigma</i> , Endl.	<i>Liukia</i> , Cavan.
Tribe I. Proteidæ.	<i>Scolymoccephalus</i> , Hm.	<i>Adenanthos</i> , Labill.	<i>Brabejum</i> , Linn.
<i>Anax</i> , Berg.	<i>Erodendrum</i> , Salisb.	Tribe II. Conospermidæ.	<i>Brabyia</i> , Linn.
<i>Leucadendron</i> , Herm.	<i>Pleuranthe</i> , Salisb.	<i>Synphea</i> , R. Br.	<i>Guevinia</i> , Mol.
<i>Conocarpodendron</i> , Bh.	<i>Gaguedi</i> , Bruce.	<i>Conospermum</i> , Smith.	<i>Quadria</i> , R. et Pav.
<i>Conocarpus</i> , Adans.	<i>Leucospermum</i> , R. Br.	<i>Chilurnus</i> , R. Br.	<i>Nebu</i> , Feuill.
<i>Eurypernum</i> , Salisb.	<i>Conocarpodendron</i> , Bh.	<i>Isomerium</i> , R. Br.	<i>Bellendena</i> , R. Br.
<i>Gisonia</i> , Salisb.	<i>Diatella</i> , Salisb.	<i>Stirlingia</i> , Endl.	II. FOLLICULARES.
<i>Chama</i> , Salisb.	<i>Mimetes</i> , Salisb.	<i>Simsia</i> , R. Br.	Tribe I. Grevillidæ.
<i>Pterophila</i> , R. Br.	<i>Hypophyllocarpodendron</i> , Boerh.	Tribe III. Franklandidæ.	<i>Anadenia</i> , R. Br.
<i>Arthrostigma</i> , Endl.	<i>Serraria</i> , Salisb.	<i>Franklandia</i> , R. Br.	<i>Manglesia</i> , Endl.
<i>Petrophila</i> , Endl.	<i>Serraria</i> , Burin.	Tribe IV. Persoonidæ.	<i>Grevillea</i> , R. Br.
<i>Symphylepis</i> , Endl.	<i>Nivena</i> , R. Br.	<i>Symphioneina</i> , R. Br.	<i>Lissostylis</i> , R. Br.
<i>Xerotale</i> , Endl.	<i>Paranomus</i> , Salisb.	<i>Acastachys</i> , R. Br.	<i>Lyssanthe</i> , Salisb.
<i>Isopogon</i> , R. Br.	<i>Sorocephalus</i> , R. Br.	<i>Cenarrhœnes</i> , Labill.	<i>Ptychocarpa</i> , R. Br.
<i>Atylus</i> , Salisb. part.	<i>Soranthe</i> , Salisb.	<i>Cardiocaryon</i> , Endl.	<i>Eriostylis</i> , R. Br.
<i>Eustrobilus</i> , Endl.	<i>Mischocaryon</i> , Endl.	<i>Spatalla</i> , Salisb.	<i>Stylurus</i> , Salisb.
<i>Hypanthus</i> , Endl.	<i>Cardiocaryon</i> , Endl.	<i>Colostigma</i> , Endl.	<i>Plagiopoda</i> , R. Br.
<i>Protea</i> , Linn.	<i>Spatalla</i> , Salisb.	<i>Persoonia</i> , Smith.	<i>Conogyne</i> , R. Br.
<i>Leucadendron</i> , Linn.	<i>Colostigma</i> , Endl.	<i>Pentadactylon</i> , Gärtn.	<i>Calothyrsus</i> , R. Br.

Fig. CCCLXIV.—*Ilakea acicularis*. *Fed. Baum.* 1. a couple of flowers; 2. a flower magnified; 3. the pistil; 4. a fruit; 5. a seed; 6. half an embryo.

<i>Cycloptera</i> , R. Br.	<i>Roupala</i> , Aubl.	<i>Embothrium</i> , Forst.	Tribe II. Banksiæ.
<i>Hakea</i> , Schrad.	<i>Leinkeria</i> , Scop.	<i>Oreocallis</i> , R. Br.	<i>Banksia</i> , Linn. fl.
<i>Conchium</i> , Smith.	<i>Dickkeckeria</i> , Flor. Fl.	<i>Telopea</i> , R. Br.	<i>Isostylis</i> , R. Br.
<i>Lambertia</i> , Smith.	<i>Andripetalum</i> , Schott.	<i>Hypogyme</i> , Salisb.	<i>Dryandra</i> , R. Br.
<i>Xylomelum</i> , Smith.	<i>Andriapetalum</i> , Pohl.	<i>Lomatia</i> , R. Br.	<i>Josephia</i> , Salisb.
<i>Orites</i> , R. Br.	<i>Helicia</i> , Lour.	<i>Tricondylus</i> , Salisb.	<i>Hemiclidia</i> , R. Br.
<i>Amphiderris</i> , R. Br.	<i>Helitophyllum</i> , Blum.	<i>Amphiloma</i> , Endl.	? <i>Agnostus</i> , A. Cunn.
<i>Oritina</i> , R. Br.	<i>Knightia</i> , R. Br.	<i>Stenocarpus</i> , R. Br.	? <i>Cylindria</i> , Lour.
<i>Adenostephanes</i> , Klotz.	<i>Eucarpha</i> , R. Br.	<i>Cybele</i> , Salisb.	
<i>Rhopala</i> , Schreb.			

NUMBERS. GEN. 44. Sp. 650.

Santalaceæ.

POSITION.—Thymelaceæ.—PROTEACEÆ.—Lauraceæ.

ORDER CCV. LAURACEÆ.—LAURELS.

Lauri, *Juss. Gen.* 80. (1789).—Laurineæ, *Vent. Tabl.* (1799); *R. Brown Prodr.* 401; *Nees in Wall. Pl. As. Rar.* 2. 58; *Laurin. Expositio*, (1833); *Endl. Gen.* cvi.; *Meisn. Gen.* 324.

DIAGNOSIS.—*Daphnal Exogens*, with anthers bursting by recurved valves, perfect leaves, and naked fruit.

Trees, often of great size. Leaves without stipules, alternate, seldom opposite, entire or very rarely lobed. Inflorescence paniced or umbelled. Calyx 4-6-cleft, sometimes



Fig. CCCLXV.

♂ ♀ by abortion, with imbricated æstivation, the limb sometimes obsolete. Petals 0. Stamens definite, perigynous, opposite the segments of the calyx, and usually twice as numerous; the 3 innermost, which are opposite the 3 inner segments of the calyx, sterile or deficient; the 6 outermost scarcely ever abortive; anthers adnate, 2-4-celled; the cells bursting by a longitudinal persistent valve from the base to the apex; the outer anthers valved inwards, the inner valved outwards [or both valved inwards]. Some glands usually present at the base of the inner filaments. Ovary superior, 1-celled, (formed of 3 valvate carpellary leaves, and as many rib-like placente stationed at the sutures, all generally imperfect except one, *Endl.*), with one or two single pendulous ovules; style simple; stigma obtuse, 2- or 3 lobed. Fruit baccate or drupaceous, naked or covered, often placed upon or within the enlarged apex of the flower-stalks. Seed without albumen; embryo inverted; cotyledons large, plano-convex, peltate near the base; radicle very short, superior; plumule conspicuous.

Laurels are distinguished from all incomplete apetalous Dicotyledons, except Plum Nutmegs, by the peculiar dehiscence of their anthers, and they are divided from that Order by the ovule being pendulous, not erect. In sensible qualities they resemble Nutmegs, which are at once known by their unisexual flowers and columnar

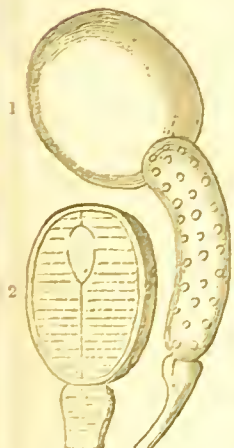


Fig. CCCLXVI.

Fig. CCCLXV.—*Litsea Baneri*. 1. a male flower; 2. a female; 3. a stamen, with a gland at the base; 4. an anther, with the recurved valves; 5. a cluster of fruit; 6. a cotyledon seen from within, with the plumule adhering to the inner face.

Fig. CCCLXVI.—*Dehaasia media*.—*Bumc.* 1. its fruit and thickened peduncle; 2. a section of it.

stamens. According to Nees von Esenbeck, their ovary is composed of three carpels ; and, if so, they are as near Buckthorns as Daphnads ; but this opinion does not seem to be supported by sufficient evidence ; on the contrary, the exterior of the ovary and its interior cavity present all the appearance of simplicity, unless a trifling and occasional lobing of the stigma be taken as proof of a compound structure. Nees v. Esenbeck, however, describes the ovary as being really composed of 3 valvate carpellary leaves, with marginal placentæ. Berberids, another Order, with recurved anther-valves, seem far removed by their polypetalous flowers, hypogynous stamens, and copious albumen.

Trees, inhabiting cool places in the tropics of either hemisphere ; in a very few instances only, straggling to the northward in North America and Europe. On the latter continent *Laurus nobilis* is the only species found in a wild state. Scarcely any species are known to exist on the continent of Africa. This is the more remarkable, as several species of *Laurus* have been found both in Teneriffe and Madeira, and others exist in Madagascar, and in the Isles of France and Bourbon.

The species of this extensive Order are in all cases more or less aromatic and fragrant ; some are valuable for their timber, others bear fruits that partake of the quality of the Nutmeg, a certain number are useful febrifuges, and some yield a fixed as well as volatile oil, and an abundance of camphor. Foremost among them are Cinnamon and Cassia, two well-known spices brought to Europe from the hotter parts of Asia. According to Blume, the finest sort of Cinnamon is produced by the *Cinnamomum zeylanicum* of Nees ; and Chinese Cassia-bark by *Cinnamomum Cassia* (*C. aromaticum*, *Nees*). But Dr. Wight has ascertained that Cassia-bark is really produced by several and perhaps nearly all the species of *Cinnamomum*.—*Hooker's Journal*, 2. 342. Cullawan bark, a very valuable product, with a taste of Cloves, is yielded by *Cinnamomum Cullawan*, and many more species of the same genus have been found to resemble Cinnamoms in their peculiar qualities, especially *C. nitidum*, which is said to have furnished a part of the aromatic dried leaves once employed under the name of *Folia Malabathri*, *Tamalapathri* or *Indi*.—See Blume's *Rumphia*, the works of Dierbach, Geiger, Guibourt, and Pereira, and Endlicher's *Enchiridion*, for further information upon this subject. Many others have the quality of Cinnamon, although belonging to different genera. The Cinnamon of Santa Fé is produced by *Nectandra cinnamomoides* ; of the Isle of France by *Oreodaphne cupularis*. The Clove Cassia of Brazil is the bark of *Dicypellium caryophyllatum*, which Martins terms " *Arbor omniium Laurinearum quas Brasilia alit nobilissima*." To these must be added Brazilian Sassafras (*Nectandra cymbarum*), Bois de Rose (*Licaria guianensis*), and the *Casca preciosa* of the Portuguese (*Mespilodaphne pretiosa*).

Among the timber trees must be mentioned the celebrated Greenheart of Demerara, whose wood is remarkable for its hardness, and which is the *Nectandra Rodiaei* of Schomburgk ; the Siraballi of the same colony is a fragrant and valuable timber obtained from some species allied to *Oreodaphne*. A coarse Mahogany is obtained in Madeira from *Persea indica*, called Viñatico ; the Sweet-wood of Jamaica, a hard yellow durable wood, belongs to *Oreodaphne exaltata*, and the Til of the Canaries, a sort of timber with an atrocious odour, bears the name of *Oreodaphne foetens*.

Of those with aromatic fruits there are the Pichurim Beans of commerce, which have been ascertained to be the cotyledons of *Nectandra Puchury*, and have the flavour of Nutmegs of inferior quality ; the Camara, or Ackawai Nutmeg, produced by *Aerodielidium Camara*, *Schomb.*, considered in Guiana to be one of the most efficacious remedies in colic, diarrhoea, and dysentery ; Cujinary Beans, from *Ayden-dron Cujinary*, and Laurel. The Clove Nutmegs of Madagascar are gathered from *Agathophyllum aromaticum*, and Brazilian Nutmegs from *Cryptocarya moschata*.

Among febrifuges the Bibiri or Beebeeru of Guiana, *Nectandra Rodiaei*, claims a high rank : Dr. MacLagan has shown that sulphate of Beebeerin acts with rapid and complete success in arresting ague.—*Trans. R. S., Edinb.*, xv. The bark of *Caryodaphne densiflora* is brownish, tonic, and contains a great quantity of bitter, somewhat balsamic extractive matter ; the leaves are gratefully aromatic ; they are used in infusion, like tea, against spasms of the bowels, and the convulsive affections of pregnant women. *Sassafras officinale*, a large tree inhabiting the United States, has great reputation as a powerful sudorific, and, combined with Guaiacum and Sarsaparilla, in cutaneous affections, chronic rheumatism, and old syphilitic maladies. The dried leaves contain so much mucilage that they are used in Louisiana for thickening soup, like *Hibiscus esculentus*. The bark of the branches as well as the wood has been employed : but they are inferior to the bark of the root. In Sumatra the place of this tree is taken by another species, the *Sassafras Parthenoxylon*, called Oriental Sassafras. Benzoin odoriferum is another plant with similar qualities. Its bark is highly aromatic, stimulant and tonic ; and is given in decoction or powder in intermittents. An infusion

of the twigs acts as a vermitige; the oil of the berries, which are aromatic, is stimulant. These berries are said to have been used in the United States during the American war as a substitute for Allspice. *Laurus nobilis* has also aromatic leaves, but they are chiefly used by confectioners. Among fatty matters may be mentioned that of *Tetranthera Roxburghii*, whose fruit yields a greasy exudation. It is a fixed oil which is supposed to constitute the principal part of the fruit of *Persea gratissima*, so much esteemed in the West Indies under the name of the Avocado Pear. Camphor is by no means an uncommon secretion of these plants. It occurs abundantly in some species of *Cinnamomum*, especially in their roots, which are so much contaminated by it as to be unfit for use as a spice. The Camphor of commerce, however, or Chinese Camphor, is obtained in *Camphora officinarum* from the wood, branches and leaves, by means of dry distillation. It is a kind of Stearoptine remaining after the Eleoptine or ethereal oil of the live tree is evaporated.—*Nees*. It is chiefly produced in the island of Formosa, and brought by the Clinchew juuks in very large quantities to Cantou, whence foreign markets are supplied. In some cases a volatile oil is obtained from the Laurels in large quantities; that of *Oreodaphne opifera*, a tree found in vast forests between the Oronoko and the Parime, is produced in great abundance by merely making an incision into the bark with an axe, as deep as the liber. It gushes out in such quantity, that several quarts may be obtained by a single incision. It has the reputation of being a powerful discutient. The fruit of this tree yields upon distillation a limpid volatile oil of a yellow wine-colour, an aromatic acrid taste, and smell as if old oil of Orange-peel had been mixed with oil of Rosemary. It is used in Brazil in contractions of the joints, pains in the limbs, and similar cases, under the name of *Cauella de Cheiro*.—*Martius*.

GENERA.

<i>Cinnamomum</i> , Burm.	<i>Caryodaphne</i> , Blume.	<i>Ehrhartia</i> , Scop.	<i>Calosma</i> , Presl.
<i>Malabathrum</i> , Burm.	<i>Agathophyllum</i> , Juss.	<i>Gœppertia</i> , Nees.	<i>Cylicodaphne</i> , Nees.
<i>Camphora</i> , Nees.	<i>Evodia</i> , Gærtn.	<i>Endlicheria</i> , Nees.	<i>Tetranthera</i> , Jacq.
<i>Apollonias</i> , Nees.	<i>Ravensara</i> , Sonner.	<i>Schauera</i> , Nees.	<i>Litsæa</i> , Lam.
<i>Phœbe</i> , Nees.	<i>Mespilodaphne</i> , Nees.	<i>Oreodaphne</i> , Nees.	<i>Tomeæ</i> , Thunb.
<i>Persea</i> , Gærtn.	<i>Aydendron</i> , Nees et Mart.	<i>Aperiphraeta</i> , Nees.	<i>Berrya</i> , Klein.
<i>Eriodaphne</i> , Nees.	<i>Evonymodaphne</i> , Nees.	<i>Agriodaphne</i> , Nees.	<i>Sibifera</i> , Lour.
<i>Machilus</i> , Nees.	<i>Acrodielidium</i> , Nees.	<i>Ocotea</i> , Gærtn. f.	<i>Hexanthus</i> , Lour.
<i>Boldu</i> , Frull.	<i>Misanteca</i> , Schlechtend.	<i>Ceramophora</i> , Nees.	<i>Glabraria</i> , Linn.
<i>Alseodaphne</i> , Nees.	<i>Nectandra</i> , Rottb.	<i>Adenotrachelium</i> , Nees	<i>Fiva</i> , Gmel.
<i>Hufelandia</i> , Nees.	<i>Pomatia</i> , Nees.	<i>Umbellularia</i> , Nees.	<i>Polyadenia</i> , Nees.
<i>Dehaasia</i> , Blume.	<i>Porostema</i> , Schreb.	? <i>Menestrata</i> , Flor. Plum.	<i>Laurus</i> , Tournef.
<i>Haasia</i> , Blume.	<i>Dicypellium</i> , Nees.	? <i>Linhærea</i> , Arruda.	<i>Lepidadenia</i> , Nees.
<i>Endiandra</i> , R. Br.	? <i>Licaria</i> , Auhl.	<i>Camphoromœna</i> , Nees.	<i>Dodecadenia</i> , Nees.
<i>Beilschmiedia</i> , Nees.	<i>Petalanthera</i> , Nees.	<i>Ocotea</i> , Auhl.	<i>Actinodaphne</i> , Nees.
<i>Cecidodaphne</i> , Nees.	<i>Pleurothyrium</i> , Nees.	<i>Strychnodaphne</i> , Nees.	<i>Iozoste</i> , Nees.
<i>Cryptocarya</i> , R. Br.	<i>Teleiandra</i> , Nees.	<i>Scumbiera</i> , Neck.	<i>Daphnidium</i> , Nees.
<i>Peumus</i> , Nees.	<i>Leptodaphne</i> , Nees.	<i>Gymnohalanum</i> , Nees.	<i>Litsæa</i> , Juss.
<i>Gomortega</i> , Ruiz. et P.	<i>Ajovea</i> , Auhl.	<i>Sassafras</i> , Nees.	<i>Tetradenia</i> , Nees.
<i>Alenostemon</i> , Pers.	<i>Douglasia</i> , Schreb.	<i>Benzoin</i> , Nees.	<i>Darwinia</i> , Dennst.
<i>Keulia</i> , Molina.			

NUMBERS. GEN. 46. Sp. 450.

Atherospermaceæ.

POSITION.—Thymelacæe.—LAURACEÆ.—Cassythaceæ.

ORDER CCVI. CASSYTHACEÆ.—DODDER-LAURELS.

Laurinæ, § Cassythææ, *Nees ab Esenb. Laurin. Expos.* 20. (1833).—Cassythææ, *Lindl. Nixus. Pl.* 15. (1833).—Cassythaceæ, *Ed. Pr.* (1836).

DIAGNOSIS.—*Daphnal Exogens, with anthers bursting by recurved valves, scales for leaves, and fruit buried in a succulent permanent calyx.*

These plants have quite the appearance of Dodders, and, like them, appear to live parasitically on other plants. They have no leaves properly so called, but scales appear here and there on their cord-like colourless twining stems. The general structure of their flowers is that of Laurels. The calyx is 6-parted, the 3 outer divisions being small and inconspicuous. The stamens are petaloid, twelve in number, in 4 rows; the two external rows are perfect, with 2-celled anthers, whose valves are recurved and turned inwards; the next row is very much smaller, and has a pair of glands at the base of each, while the valves of the anthers turn outwards; the fourth row is scale-like and abortive. The ovary is one-celled, and contains one ovule; it extends upwards into a short style with a simple stigma. The fruit is a nut, coated by the succulent, enlarged, and permanent calyx; it contains a single seed without albumen, an embryo with plano-convex cotyledons, and an inclosed superior radicle.

The structure, then, is nearly that of Laurels, the main difference consisting in the fruit being inclosed in a berried calyx. I formerly supposed that more valid distinctions existed, having been misled by a description given by Nees v. Esenbeck. Mr. Gardner has, however, shown that this was very erroneous (*Hooker's Journal*, 2. 26), and he entertains no doubt about the identity of Laurels and Dodder-Laurels. It seems to me, however, better to keep them distinct until some connecting link shall have been discovered, if there be such a thing.

The species are found in the hottest parts of the world.

Nothing is known of their uses.



Fig. CCCLXVII.

GENUS.

Cassytha, L.
Volutella, Forsk
Calodium, Lour.

NUMBERS. GEN. 1. Sp. 9.

Cuscutacea?

POSITION.—Lauraceæ.—CASSYTHACEÆ.—

Fig. CCCLXVII.—*Cassytha filiformis*. 1. a flower; 2. a fruit; 3. a section of it transversely.

ALLIANCE XLII. ROSALES.—THE ROSAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with monodichlamydeous flowers, distinct carpels, sutural placentæ, definite seeds, corolla, if present, polypetalous, and an amygdaloid embryo with little or no albumen.*

The sequence of affinities seems to be broken when Daphnals are stationed next Rosals; but if Calycanths are regarded as the equivalent among Rosals of Plume Nutmegs among Menispermals, the transition is not so violent; for the relation of Laurels to Plume Nutmegs is usually admitted, and therefore their affinity to Calycanths must also be conceded. In fact, in Calycanths we have the apetalous structure and aromatic qualities of Laurels combined with the peculiar characters of Roseworts.

The Rosal Alliance is in many instances known by its indefinite stamens, but that character is not found in any large number of Leguminous plants, and is departed from even among Roseworts themselves. Their apocarpous fruit, small number of seeds, and amygdaloid embryo, are better characteristics. The obliquity of the carpels will in all instances show that those organs are simple, and a part of a system of separation, not consolidation, and by this circumstance Roseworts are clearly known from Daphnals, in which the fruit, although simple in appearance, has probably a compound structure.

Rosals touch Ficoidals by Sanguisorbs, and Saxifragals by Roseworts themselves; for the genera of the latter have not unfrequently been confounded by even good Botanists with those of Saxifrages. The small embryo and albumen of the latter offer, however, a clear mark of distinction.

NATURAL ORDERS OF ROSALS.

- | | |
|--|-------------------------|
| <i>Flowers consisting of numerous imbricated scales. Cotyledons convolute.</i> | } 207. CALYCANTHACEÆ. |
| <i>Flowers polypetalous (or apetalous), nearly or quite regular. Carpel solitary. Style proceeding from the base of the ovary.</i> | } 208. CHRYSOBALANACEÆ. |
| <i>Flowers polypetalous (or apetalous), papilionaceous or leguminous. Carpel solitary, with the style proceeding from the apex of the ovary.</i> | } 209. FABACEÆ. |
| <i>Flowers polypetalous, regular, drupaceous. Carpel solitary, with the style proceeding from the apex of the ovary.</i> | } 210. DRUPACEÆ. |
| <i>Flowers polypetalous, regular. Carpels adhering to the calyx by their back.</i> | } 211. POMACEÆ. |
| <i>Flowers apetalous. Carpel solitary, inclosed in a hardened calyx-tube forming a fulse pericarp.</i> | } 212. SANGUISORBACEÆ. |
| <i>Flowers polypetalous. Carpels free from the calyx, and quite or nearly so from each other.</i> | } 213. ROSACEÆ. |

ORDER CCVII. CALYCANTHACEÆ.—CALYCANTHUS.

Calycanthæ, *Lindl. in Bot. Reg. fol. 404. (1819)*; *DC. Prodr. 3. 1.*; *Endl. Gen. cclxxi.*; *Meisner Gen. p. 106.*—Calycanthinæ, *Link. Enum. 2. 66. (1822).*

DIAGNOSIS.—*Rosal Exogens, whose flowers consist of numerous imbricated scales, and have convolute cotyledons.*

Shrubs, with square stems, having 4 woody imperfect axes, surrounding the central ordinary one. Leaves opposite, simple, scabrous, without stipules. Flowers axillary, solitary. Sepals and petals confounded, indefinite, imbricated, combined in a fleshy tube. Stamens

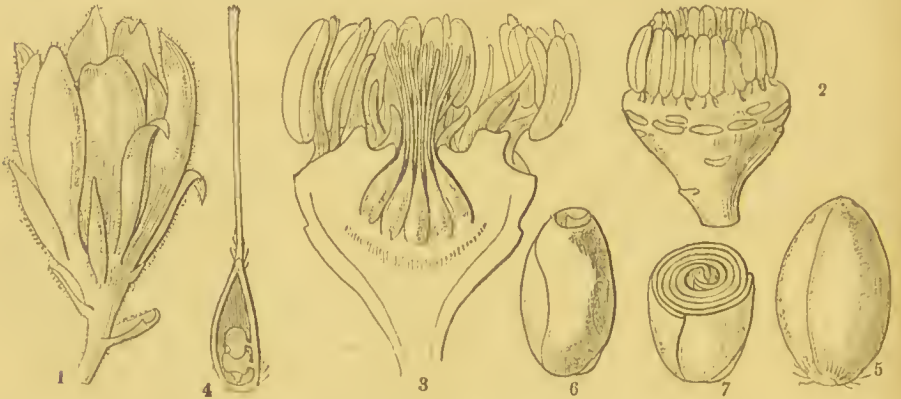


Fig. CCCLXVIII.

indefinite, inserted in a fleshy rim at the mouth of the tube, the inner sterile; anthers adnate, turned outwards. Ovaries several, simple, 1-celled, with one terminal style, adhering to the inside of the tube of the calyx. Ovules anatropal, solitary, or sometimes 2, of which one is abortive, ascending. Nuts inclosed in the fleshy tube of the calyx, 1-seeded, indehiscent. Seed ascending; albumen none; cotyledons convolute, with their face next the axis; radicle inferior.

Jussieu originally placed this Order at the end of Roseworts; he subsequently referred it to Monimiads; and I afterwards formed it into a particular family. With Monimiads it is less nearly related than it appears to be, the principal points of resemblance being the collection of several nuts within a fleshy calyx in both Orders; for Calycanthus can scarcely be considered apetalous, as some Monimiads are, on account of the obvious petals of *Chimonanthus*. The imbricated sepals, in *Calycanthus* chocolate-coloured and becoming confounded with the petals, the fragrance of the flowers, and the plurality of ovaries, seem to indicate an affinity with Magnoliads, and especially with *Illicium*; but the decidedly perigynous stamens and fleshy calyx inclosing the ovaries in its tube, the highly developed embryo, and want of albumen, are great objections to such an approximation. Myrobalans agree in having an exalbuminous embryo, with convolute cotyledons; but with this their resemblance ceases. Myrtleblooms also agree in this same particular, in the case of *Punica*; and their opposite leaves, without stipules, and frequent fragrance, strengthen the affinity indicated by the embryo. Roseworts, however, to which Jussieu originally referred *Calycanthus*, agree much more nearly in the perigynous insertion of their stamens, in the peculiar structure of their calyx, the tube of which in the Rose is entirely analogous to that of *Calycanthus*, in the superposition of their ovules when two are present, and in the high development of their exalbuminous embryo; upon the whole, therefore, no Order appears to have so much affinity with *Calycanthus* as Roseworts; and the sagacity of Jussieu, in originally referring *Calycanthus* to that Order, is completely confirmed by the discovery recently made by Lowe, that the cotyledons of *Chamaemeles*, a genus of Appleworts, are convolute. This, I think, fixes the station of *Calycanthus* in the neighbourhood of Roseworts, from which they are distinguished by the imbricated sepals, and the anthers, partly

Fig. CCCLXVIII.—*Calycanthus floridus*. 1. a flower; 2. the same without the sepals and petals; 3. a perpendicular section of the last; 4. a section of an ovary; 5. a nut; 6. an embryo; 7. a transverse section of it.

fertile and partly sterile, being turned outwards. This Order is also characterised by the singular structure of the wood, a peculiarity originally remarked by Mirbel in one species, and which I have since ascertained to exist in all. In the stems of these plants there is the usual deposit of concentric circles of wood around the pith, and in addition four very imperfect centres of deposition on the outside next the bark; a very unusual structure. A good figure of this interesting fact has been given by Mirbel in the *Annales des Sciences Naturelles*, vol. 14. p. 367. It must be also added that the woody tissue of this Order exhibits disks extremely like those of Conifers.

Natives of North America and Japan.

The aromatic fragrance of the flowers is their well-known quality. It appears that this also exists in their bark, which is consequently employed, in the case of *C. floridus*, as a substitute for Cinnamon in the United States.

GENERA.

Calycanthus, L.
Buttaeria, Duham.
Beureria, Ehret.
Basteria, Adans.
Pompadoura, Bouch.
Chimonanthus, Lindl.
Meratia, Nees.

NUMBERS. GEN. 2. Sp. 6.

Magnoliacæ.

POSITION.—Rosaceæ.—CALYCANTHACEÆ.—Pomaceæ.

Myrtacæ.

ORDER CCVIII. CHRYSOBALANACEÆ.—CHRYSOBALANS.

Chrysobalanæ, *R. Brown, in Tuckey's Voyage to the Congo, App. (1818); DC. Prodr. 2. 525. a § of Rosaceæ; Bartl. Ord. Nat. p. 405; Endl. Gen. cclxxiv.; Meisner Gen. p. 101.*

DIAGNOSIS.—*Rosal Exogens, with polypetalous or apetalous flowers, which are nearly or quite regular, a solitary carpel, and a style proceeding from its base.*

Trees or shrubs. Leaves simple, alternate, stipulate, with no glands, and veins that run parallel with each other from the midrib to the margin. Flowers in racemes, or panicles, or corymbs. Calyx 5-lobed, sometimes unequal at the base, with an imbricated aestivation. Petals with short stalks, more or less irregular, either 5 or none. Stamens either definite or ∞, usually irregular either in size or position. Ovary superior, consisting of a single carpel, 1- or 2-celled, cohering more or less on one side with the calyx; ovules twin, erect, anatropal; style single, arising from the base; stigma simple. Fruit a drupe of 1 or 2 cells. Seed erect. Embryo with fleshy cotyledons, and no albumen.



Fig. CCCLXIX

in the cohesion which takes place between the stalk of the ovary and the sides of the calyx; a character found, as De Candolle well remarks, in *Jonesia* and *Bauhinia*, undoubted leguminous plants: *Chrysobalans* are distinguished from this latter Order by the position of their style and ovules, and by the relation which is borne to the axis of inflorescence by the odd lobe of the calyx being the same as occurs in *Roseworts*. *Brown* remarks that the greater part of the Order has the flowers more or less irregular, and that the simple ovary of *Parinarium* has a dissepiment in some degree analogous to the moveable dissepiment of *Banksia* and *Dryandra*; but we now know, from the more recent observations of this learned Botanist upon the ovule, that the dissepiment of *Proteads* arises differently. The analogy of structure, as to the dissepiment of *Parinarium*, is to be sought in *Amelanchier*.

Chrysobalans are principally found in the tropical regions of Africa and America; none are recorded as natives of Asia; but there is reason to believe, from specimens of large trees seen in the forests of India, without flowers or fruit, by *Wallich*, that one or two species of *Parinarium* are indigenous in equinoctial Asia; and *Royle's* genus *Prinsepia*, founded upon a spiny plant from Nipal, is apparently referable to this Order. One species of *Chrysobalanus* is found as far to the north as the pine-barrens of Georgia in North America; a climate, however, as in all the regions bounding the Gulf of Mexico on the north, much more heated than that of most other countries in the same parallel of latitude.

Many of these are what in Europe are called Stone-fruits. *Moquilea grandiflora* yields eatable drupes in Brazil. The fruit of *Chrysobalanus Icaeo* is eaten in the West

Fig. CCCLXIX.—*Moquilea canomensis*.—*Martius*. 1. a flower; 2. an ovary; 3. a perpendicular section of the last; 4. a fruit; 5. a kernel.

Indies, under the name of Coëoa-plum; another is brought to market in Sierra Leone (*C. luteus*); and the Rough-skinned, or Gray plum of the same colony is the produce of *Parinarium excelsum*. The kernel of *Parinarium campestre* and *montanum* is said by Aublet to be sweet and good to eat. The seeds of *Prinsepia utilis* yield by expression a useful oil.—*Royle*. The root, bark, and leaves of *Chrysobalanus leaco* are prescribed in Brazil against diarrhœa, leucorrhœa, and similar maladies.—*Martius*.

GENERA.

<i>Chrysobalanus</i> , Linn.	<i>Hedycrea</i> , Schreb.	<i>Cou-pia</i> , Aubl.	<i>Thelyra</i> , Thouars.
<i>leaco</i> , Plum.	<i>Batheogyne</i> , Benth.	<i>Actoa</i> , Aubl.	<i>Grangeria</i> , Comm.
<i>Hirtella</i> , Linn.	<i>Leptobalanus</i> , Benth.	<i>Dulacia</i> , Neck.	<i>Prinsepia</i> , Royle.
<i>Cosmibuena</i> , Ruiz et P.	<i>Microdesmia</i> , Benth.	? <i>Cyclandrophora</i> , Has.	<i>Cyenia</i> , Lindl.
<i>Causa</i> , Scop.	<i>Hymenopus</i> , Berth.	<i>Parinarium</i> , Juss.	? <i>Lecostemon</i> , Moç. et Sess.
<i>Balantium</i> , Desv.	<i>Moquilea</i> , Mart et Zucc.	<i>Parinari</i> , Aubl.	? <i>Trilepisium</i> , Thouars.
<i>Braya</i> , Fl. Fl.	<i>Acta</i> , Willd.	<i>Dugortia</i> , Scop.	? <i>Stylobasium</i> , Desf.
<i>Licania</i> , Aubl.	<i>Moquilea</i> , Aubl.	<i>Petrocarya</i> , Schreb.	<i>Macrostigma</i> , Hooker.

NUMBERS. GEN. 11. Sp. 50.

POSITION.—Fabaceæ.—CHRYSOBALANACEÆ.—Drupaceæ.

ORDER CCIX. FABACEÆ.—LEGUMINOUS PLANTS.

Leguminosæ, *Juss. Gen.* 345. (1789); *Bronn. Diss.* (1822); *Prodr.* 2. 93; *Walpers in Linnæa*, xiii. *Endl. Gen.* p. 1253.; *Meisn. Gen.* p. 84.

DIAGNOSIS.—*Rosal Exogens*, with *polyptalous* or *apetalous* flowers, a *papilionaceous* corolla or a *leguminous* fruit, and a *solitary* carpel whose *style* proceeds from the *apex*.

Herbaceous plants, shrubs, or vast trees, extremely variable in appearance. Leaves alternate, most commonly compound, occasionally marked with transparent dots; petiole tumid at the base. Stipules 2 at the base of the petiole, and 2 at the base of each leaflet. Pedicels usually articulated, with 2 bractlets under the flower. Calyx 5-parted, toothed or cleft, inferior, with the odd segment anterior; the segments often unequal, and variously combined. Petals 5, or by abortion 4, 3, 2, 1, or none, inserted into the base of the calyx, either papilionaceous or regularly spreading; the odd petal, if any, posterior. Stamens definite or indefinite, perigynous, rarely hypogynous, either distinct or monadelphous, or diadelphous; very rarely triadelphous; anthers versatile. Pistil simple, superior, 1-celled, 1- or many-seeded, commonly consisting of a single carpel, but occasionally of 2, or even of 5; style simple, proceeding from the upper margin; stigma simple. Fruit either a legume or a drupe. Seeds attached to the upper suture, solitary or several, occasionally with an aril; embryo with or without albumen, either straight or with the radicle bent upon the cotyledons; cotyledons either remaining under ground in germination, or elevated above the ground, and becoming green like leaves, always very large in proportion to the radicle, and very often amygdaloid.



Fig. CCCLXX.

The most common feature of Leguminous plants is to have what are called papilionaceous flowers; and when these exist, no difficulty is experienced in recognising them, for papilionaceous flowers are found nowhere else. Another character is to have a leguminous fruit; and by one of these two characters all the plants of the Order are known. It is remarkable, however, that one or other of these distinctions disappears in a great many cases. Ciesalpinieæ have an irregular flower, with spreading petals and stamens adhering to the calyx; others have no petals at all, or some number less than five; while Mimoseæ have perfectly regular flowers and indefinite hypogynous stamens. Detarium, Dipteryx, and others, instead of a legume, bear a fruit not distinguishable from a drupe. This last circumstance is easily to be understood, if we bear in mind that a legume and a drupe differ more in name than reality, the latter being formed upon precisely the same plan as the former, but with this modification, that its pericarp is thickened, more or less fleshy on the outside and stony on the inside, 1-seeded, and indehiscent. Hence some of the

Fig. CCCLXX.—*Adenocarpus frankenioides*. 1. the standard, wings, and keel split open; 2. the stamens; 3. a cross section of a seed; 4. a legume, with a portion of one of the valves turned back.

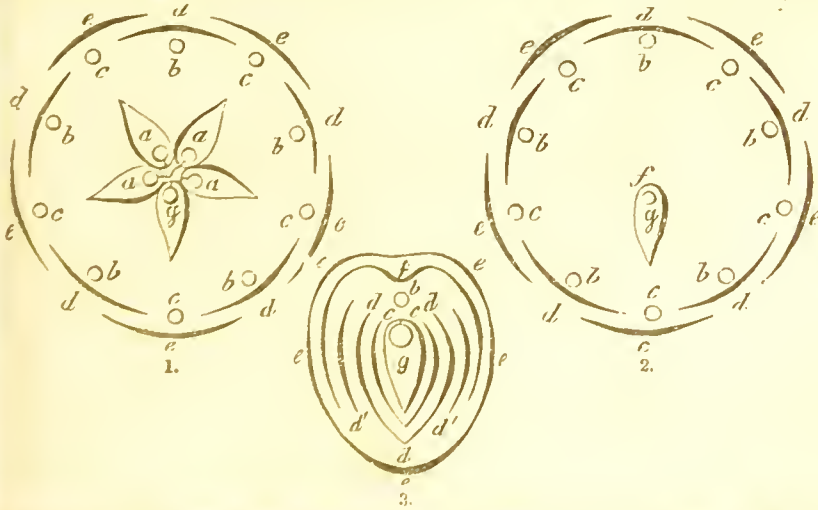
regular-flowered genera with distinct stamens may be said to be Rosaceous in flower, and Leguminous in fruit. Simple, therefore, as the diagnosis of this Order usually is, Brown is perfectly correct in asserting that, until he indicated the difference of the position of the odd lobe of the calyx in Leguminous plants and Roseworts, no positive character had been discovered to distinguish the one Order from the other.

Very few double flowers are known in this Order; those of *Spartium junceum* and *Ulex europæus* are the most remarkable; the nature of the latter I have described in detail in the *Trans. of the Hort. Soc.* vol. 7. p. 237. Two ovaries are common in *Wistaria sinensis*; and the same phenomenon is to be seen, according to De Candolle, in *Gleditschia*: it appears also to be normal in *Diplaca* and *Cesalpinia digyna*. Aug. de St. Hilaire is said (*DC. Mém.* 52) to have found a *Minosa* in Brazil with 5 carpels. On account of these and other circumstances, De Candolle assumes the carpel of Leguminous plants to be solitary by abortion, and that a whorl of 5 is that which is necessary to complete the symmetry of the flowers. Of the accuracy of this view I am satisfied; and it might have been proved from analogy, without the aid of such instances.*

In consequence of the highly irritable nature of the leaves of many of the plants of this Order, and of the tendency to irritability discoverable in them all, some Botanists have placed them at the extremity of their system, in contact with the limits of the animal kingdom. See *Agardh. Classes.* p. 4, and *Martius H. R. M.* p. 176. For observations upon the nature of this irritability, see *Dutrochet sur la Motilité, Paris, 1824*, in which the author endeavours to show that the motion is the effect of galvanic agency; and the same writer's *Nouvelles Recherches sur l'Exosmose, &c.*, in which he alters the explanation of the manner in which galvanism produces the motion, adhering, however, to his opinion of that subtle principle being the real agent. To me, however, it appears more satisfactory to attribute the phenomenon to an inherent vital action, without searching after first causes, which it is impossible, from the nature of things, to investigate.

In many respects this Order is one of the most important which the Botanist can study; more especially as it serves to show how little real importance ought to be attached to dehiscence of fruit in determining the limits of Natural Orders. What may be called the normal fruit of Leguminous plants is a legume, that is to say, a dry simple carpel, with a suture running along both its margins, so that at maturity it separates through the line of each suture into two valves; but every conceivable degree of deviation from this type occurs: *Arachis* and many more are indehiscent; in *Carmichaelia* the valves separate from the suture, which remains entire, like the replum of Crucifers; in all lomentaceous genera, such as *Ornithopus*, the valves are indehiscent in the line of the suture, but separate transversely; in *Eutada* a combination of the peculiarities of *Carmichaelia* and *Lomentaceæ* occurs; in *Hæmatoxylon* the valves

* The plan of what must be regarded as the normal form of Leguminous structure, will be gathered from the following diagrams, in which fig. 1. represents the arrangement that occurs in *Affonsea*; 2. the



theory of the ordinary papilionaceous condition; and 3. the actual state of such a flower. In figs. 1. and 2. e are the sepals; d the petals; b, c stamens; a the abortive carpels; g the perfect carpel; f the maginary axis. In fig. 3. g is the ovary; b the tenth free stamen; c c the tube, split above, and consisting of nine other stamens; d d the two petals that form a carina; d' d' the two wings, and the axillum; e e sepals. These are taken from a paper by Walpers, in *Ann. Nat. Hist.* v. 161.

Braziletto, Logwood, and Rosewoods of commerce; the Laburnum; the classical *Cytisus*; the Furze and the Broom, both the pride of the otherwise dreary heaths of Europe; the Bean, the Pea, the Vetch, the Clover, the Trefoil, the Lucerne, all staple articles of culture by the farmer, are so many Leguminous species. The Gums Arabic and Senegal, Kino, Senna, Tragacanth, and various other drugs, not to mention Indigo, the most useful of all dyes, are products of other species, and these may be taken as a general indication of the purposes to which Leguminous plants may be applied. There is this, however, to be borne in mind, in regarding the qualities of the Order in a general point of view; viz., that upon the whole it must be considered poisonous, and that those species which are used for food by man or animals are exceptions to the general rule: the deleterious juices of the Order not being in such instances sufficiently concentrated to prove injurious, and being, in fact, replaced to a considerable extent by either sugar or starch. This will become more apparent from the detailed account which now follows.

PAPILIONACEÆ.

It is in this part of the Order that we principally find species with nutritious, or at least wholesome qualities; thus Clover, Medick, Lucerne, Trefoil, &c., are well-known fodder plants, as are also Saintfoin, Ornithopus or Serradilla, various *Astragali*, *Crotalaria juncea*, *Desmodium diffusum*, *Indigofera enneaphylla*, &c., in different parts of the world.

—The seeds of many are common articles of food, under the name of Pulse. Of these

the most remarkable is the *Arachis hypogæa*, or under-ground Kidney-bean, whose pods are forced into the ground after the flowering has been accomplished. This and the *Voandzea* are very largely cultivated by the African negroes, who call the *Arachis*, *Munduli*. The seeds contain a very large quantity of oil. More common kinds of pulse are Peas, Beans, Lentils, Pigeon-peas (*Cajanus*), the seeds of various species of *Dolichos*, *Phaseolus*, &c. It is, however, to be remarked, that they are often very unwholesome; the roots of *Phaseolus* are dangerously narcotic, as will be seen hereafter. The ripe seeds of *Lathyrus Aphaca*, called by the French *Vesce cultivé*,



Fig. CCLXXII.

are narcotic and produce excessive headache, but when green they are eaten without inconvenience; and Christison tells us that flour in which the seeds of *Lathyrus Cicera* have been ground up is poisonous. Beans themselves cannot be given to horses in much quantity without bad effects.—Of nutritious or saccharine qualities in other parts we have several useful instances. The roots of the Liquorice (*Glycyrrhiza glabra*) contain an abundance of a sweet mucilaginous juice, which is much esteemed as a pectoral, but it is sub-acrid; similar qualities are ascribed to *Trifolium alpinum* roots, and those of *Glycyrrhiza echinata* and *glandulifera*. The roots of *Abrus precatorius* possess exactly the properties of the Liquorice-root of the shops. In Java they are found demulcent. Those of *Dolichos tuberosus* and *bulbosus*, *Apios*, *Pueraria*, and *Lathyrus tuberosus*, are wholesome food. A kind of Manna is produced by species of *Camelina*-thorn, related to *Alhagi Maurorum*. It is remarkable that this secretion is not formed in India, Arabia, or Egypt: climates like those of Persia and Bokhara seeming alone suited for its production. It is the *Tereng jabim* of the Arabs, and is gathered by merely shaking the branches. Such is the importance of this plant as a food for cattle that the Afghans, who call it *Ka-ri-shutur*, or *Jaursa*, believe that the serious loss of those animals, experienced in the Afghan operations, arose from the want of this plant. Some writers are of opinion that this was the Manna on which the children of Israel were fed in the wilderness. A sweet quality is also found in *Astragalus glycyohyllus* and other species of that genus, in *Saintfoin* (*Onobrychis sativa*), in the leaves, root, and inner bark of *Robinia Pseudacacia*.

Well-marked purgative properties occur in *Coletea arboreseens* (Bladder Senna), whose leaves are used for adulterating the blunt-leaved Senna of the druggists, *Coronilla Emerus* (Scorpion Senna), and *C. varia*, which last is even poisonous; as well as in certain species of *Genista*, *Cytisus*, *Robinia*, *Clitoria*, *Anagyris foetida*, &c. A decoction of the young tops of *Cytisus scoparius* (Broom) is diuretic and cathartic; its seeds are said to be emetic; Mead and Cullen found them useful in dropsy. *Tephrosia Senna* is used as a purgative by the people of Popayan.

Many are tonics and astringents. The bark of *Agati grandiflora* is powerfully bitter and tonic. The root of *Ornithopus sennoides* is accounted in India tonic and stimulant. The root and seeds of *Sophora tomentosa* have been regarded as specifics in bilious sickness. African Kino is the produce of *Pterocarpus erinaceus*. Dr. Royle has proved that East Indian Kino is formed by *Pterocarpus marsupium*. Gum Dragon

Fig. CCLXXII — *Arachis hypogæa*

and Red Sandal-wood belong to *Pterocarpus Draco* and *Santalinus*, Gum Lac to *Erythrina monosperma*. The *Dalbergia monctaria* of Linnæus yields a resin very similar to Dragon's-blood. A similar juice is yielded by *Butea frondosa* and *superba*, hardening upon their branches into beautiful ruby-coloured astringent masses, called Gum *Butea*, and used by the natives of North-western India for precipitating their Indigo, and in tanning; English tanners, however, object to its use on account of the colour which it communicates to leather. *Euchresta Horsfieldia* is regarded by the Javanese as a specific against the poison of venomous animals, or even such as is taken into the stomach; it is supposed to act as an emetic, in large doses.—*Horsfield*. The pods are sold, according to Leschenault, for 5 or even as much as 10 sous French money each. The seed of *Psoralea corylifolia* is considered by the native practitioners of India stomachic and deobstruent. A strong infusion of the root of *Mucuna pruriens*, sweetened with honey, is used by the native practitioners of India in cases of cholera morbus. A decoction of the bitter root of *Tephrosia purpurea* is prescribed by the Indian doctors against dyspepsia, lentergy, and tympanitis. The powdered leaf of *Indigofera Anil* is used in hepatitis. The leaves of the *Phaseolus trilobus* (called *Sam*, or *Simbi*) are considered by the Indian practitioners cooling, sedative, antibilious, and tonic, and useful as an application to weak eyes. The roots and herbage of *Baptisia tinctoria* have been found to possess antiseptic and sub-astringent properties. They have also a cathartic and emetic effect. This emetic quality is also possessed by others. The root of *Clitoria Ternatea* is so, and similar properties will be found to exist among the tribe *Mimosæ*.

Others are diuretics, as the roots of Beans, *Genistas*, *Ononis*, and *Anthyllis Hermannire*.

A few produce gum; *Tragacanth* is yielded by *Astragalus verus* and similar spiny species; *A. creticus* (*ποττηριον*, *Diosc.*) and *A. aristatus* (*τραγακανθα*, *Diosc.*) furnish it in Greece, *A. gummifer* in Mount Lebanon and in Koordistan, and *A. strobiliferus* in the latter country.—*Bot. Reg.* 1840, *Misc.* p. 38.

Among dyes are Indigo, produced from various species of *Indigofera*, especially *tinctoria* and *cærulea*, which last is particularly extolled by Roxburgh for its excellence. In Nubia, *Tephrosia Apollinea* furnishes it, and in the countries bordering on the Niger *T. toxicaria* or some allied species.—*Gard. Chron.* 1842, p. 640. The flowers of *Butea frondosa* and *superba* discharge a beautiful yellow or orange dye, *Styphnolobium* (*Sophora*) *japonicum* yields the same colour from the austere pulp of its pods. *Baptisia tinctoria* produces Indigo of indifferent quality. *Genista tinctoria* affords a good yellow colour, and with woad a good green. Ray says the milk of cows feeding upon it is rendered bitter, which flavour is communicated to butter and cheese.

Several produce excellent timber. The *Robinia Pseudacacia* or *Locust tree* is hard and durable; *Laburnum* wood is light olive green, beautifully grained. The fragrant *Rosewood*, or *Bois de Palixandre*, of the cabinet-makers, has been ascertained to belong to 2 or 3 species of Brazilian *Triptolomeas*, and not to a *Physocalymma*, or *Mimosa*, as has been reported. *Pterocarpus dalbergiodes*, and several species of *Dalbergia*, especially *D. Sissoo*, are remarkable in India for the excellence of their wood. The *Itaka* wood of Guiana, remarkable for its black and brown streaks, on which account it is employed in cabinet work, is produced by *Machærium Schomburgkii*.

In a very large number of species narcotic properties have been recognised. The seeds of *Lathyrus Aphaca* have been already mentioned. Those of *Abrus precatorius*, whose scarlet seeds, with a black scar, are commonly used as beads, *Anagyris foetida*, and others, have a similar property. This, however, is positively denied, in the case of *Abrus*, by Dr. Macfadgen, who asserts them to be harmless, and merely indigestible. The leaves of *Arthrolobium scorpioides* are capable of being employed as vesicatories. The juice of *Coronilla varia* is poisonous. The roots of *Phaseolus radiatus* are narcotic, and so are those of *P. multiflorus*, the *Scarlet Running Kidney-bean*, which a year or two ago poisoned some children at Chelsea, who had partaken of them. Both the *Laburnums* (*Cytisus alpinus* and *Laburnum*) have caused serious accidents to children who have swallowed their venomous seeds: and *C. Weldenii* is reported to poison the milk of the Dalmatian goats that browse upon its foliage. The dye called Indigo is a formidable vegetable poison. Schomburgk states that the violet blossoms of *Sabinea florida* are dangerous. The seeds of *Ervum Ervilia*, the *Bitter Vetch*, mixed with flour and made into bread, produce weakness of the extremities, especially of the limbs, and render horses almost paralytic. *Andira inermis* and *retusa*, and some *Geoffreas*, especially *G. vermifuga* and *spinulosa*, have an anthelmintic bark, with a disagreeable smell and a sweet mucilaginous taste; the effects are drastic, emetic, purgative, and narcotic; poisonous in large doses, producing violent vomiting with fever and delirium. A few years since, hundreds of sheep perished in the Swan River Colony, in consequence of their cropping the leaves of some plant wild there; according to an official report, it

was a *Burtonia* that produced the mischief (*Gard. Chron.*), but according to Mr. Jas. Drummond the mischief was caused by a *Gompholobium*.—*Lond. Journ. Bot.* 1. 95. Nothing, however, more plainly indicates the venomous nature of Leguminous plants than their being used as fish poisons. The bark of the root of *Piscidia Erythrina*, a common Jamaica tree, is a very usual fish poison in Jamaica, and yields a most remarkably narcotic and diaphoretic tincture. Many *Tephrosias* are employed in the same way, especially *T. toxicaria*, the young branches of which, with the leaves pounded, and sometimes mixed with quick-lime, are thrown into a pool of some mountain stream, and have an almost immediate effect. The fish are observed to become stupefied, and as it were intoxicated, and to rise to the surface, floating there with their belly upwards, so as to be readily taken by the hand. It has been remarked that the larger fish recover gradually from the effects of the poison, but that the younger fry perish. It has been suggested that the action of the plant upon the human system would resemble that of *Digitalis*, and might prove, in a climate where that plant does not grow, a desirable substitute.

In addition to all these uses, there is a long catalogue of species employed for miscellaneous purposes. *Crotalaria juncea* (Sun, Shunum, Taag, Bengal Hemp) furnishes a coarse fibre called Bengal Hemp, from which bags and low-priced canvas is largely prepared in India. The volatile oil of *Dipterix odorata*, or Tonka Bean, a fragrant seed used by the perfumers and makers of snuff, has been ascertained to contain a peculiar principle called Coumarin. It may be found in a crystallised state between the skin and the kernel, and exists abundantly in the flowers of *Melilotus officinalis* and *cærulea*, the latter of which gives its peculiar odour to the *Chapziger cheese* in Switzerland, and is said to possess styptic properties, and to have relieved cases of bloody urine from inward contusions. It is also employed in the preparation of an oily remedy for bruises.—*Pharm. Journ.* 2. 128. A decoction of the root of *Indigofera tinctoria*, used as a lotion, effectually destroys vermin; the juice of the young branches mixed with honey is recommended for aphthæ of the mouth in children; and Indigo in powder, sprinkled on foul ulcers, is said to cleanse them. The disease in poultry, known in the West Indies by the name of yaws, is cured by the application of a solution of Indigo by means of a rag.—*Macjadj. Fl. Jam.* 1. 251. Indigo is also used in epilepsy and erysipelas.—*Med. Gaz.* xx. 172. The hairs of the pods of *Mucuna pruriens*, &c., constitute the substance called Cowitch, a mechanical anthelmintic. The seeds of *Astragalus bœticus* are employed in Germany as a substitute for Coffee. A good many species are emollient. The leaves of *Sesbania picta* are highly esteemed among the Hindoos, on account of the virtues they are said to possess in hastening suppuration when applied in the form of a poultice, that is, simply made warm, and moistened with a little castor oil. The root of *Pueraria tuberosa* peeled and bruised into a poultice is employed by the natives of the mountains where it grows to reduce swellings of the joints. A decoction of *Melilot* is emollient, and is occasionally used on the Continent in lotions and enemas. A decoction of the seeds of *Trigonella Fœnum Græcum* (Fenu-greek) is used as an emollient, and poultices are made with their flour, but only used in veterinary medicine.

CÆSALPINIÆ.

Purgative properties are the great character of this Sub-order. *Senna* is their most remarkable product. The *Senna* of the shops consists, according to Delile, of *Cassia acutifolia*, *Cassia Senna*, and *Cynanchum Argel*. He says the *Cassia lanceolata* of Arabia does not yield the *Senna* of commerce, but this statement is at variance with the positive testimony of Forskhal. For the various qualities of *Senna*, the reader is referred to the *Flora Medica* and other works in which the subject is treated specially; it will here be found that many species yield this useful drug, which, according to Pallas (*Pharm. Journ.* 3, 584.), is not an Egyptian product, as is usually supposed, the whole of the Alexandrian supply coming from Dongola. Purgative properties are also found in the fruit of *Cathartocarpus Fistula* and *Ceratonia Siliqua*, and also of the *Tamarind*, the prepared pulp of which is so well known as a delicious confection, and in the leaves of *Poiniana pulcherrima*.—*Martius*. Many cases of eatable fruit occur in this part of the order. *Dialium indicum*, also called the *Tamarind Plum*, has a pod formed with a delicate agreeable pulp, much less acid than the *Tamarind*. Two *Codariums* are called *brown* and *Velvet Tamarinds* in *Sierra Leone*. *Ceratonia Siliqua*, under the name of the *Carob-tree*, or *Algaroba-bean*, is consumed in the south of Spain by horses, and has been imported into this country, it is said with profit, as a substitute for oil-cake. The dry pulp in which the seeds are buried is very nutritious, and is supposed to have been the food of St. John in the wilderness, wherefore it is called *Locust-tree*, and St. John's bread. Singers are said to chew this fruit for the purpose of improving their voice.—*Pharm. Journ.* 3. 79. The seeds of the *Carob-tree* are said to have been the original

Carat weights of the jewellers. A similar fruit is borne by *Gleditsia triacanthia*, called in North America the Honey Locust. In the pods of *Hymenæa Courbaril*, the



Fig. CCCLXXIII.

West Indian Locust-tree, there is a mealy substance in which the seeds are embedded, sweet and pleasant, but apt to purge when recently gathered; it loses this property as it becomes old. A decoction of the pulp, allowed to ferment, forms an intoxicating drink resembling beer. The succulent drupes of *Detarium microcarpum* are said to be agreeable to the palate of the Negroes. Some are reported to produce powerfully bitter and tonic effects. The bark and seeds of *Guilandina Bonduc* are of this class; the latter are very bitter; when pounded small and mixed with castor oil, they form a valuable external application in incipient hydrocele; the leaves are a valuable discutient, fried with a little castor oil, in cases of *hernia lumoralis*. *Bowdichia major*, the roots of *Poinciana pulcherrima*, the wood of *Cæsalpinia echinata* in powder, are other instances of tonic qualities among these plants; and in the *Dividivi* or *Libidibi* pods, which are produced by *Cæsalpinia coriaria*, we have one of the most astringent of known substances. The native practitioners in India prescribe the dried buds and young flowers of *Bauhinia tomentosa* in certain dysenteric affections. The bark of *Bauhinia variegata*, and also of *Cassia auriculata*, are, according to Roxburgh, used by the natives in tanning and dyeing leather, as well as in medicine. The leaves of *Caulotretus microstachyus* and various *Bauhinias* are used in Brazil under the name of *Uula de Boy*, or *Oxhoof*, as unctilaginous remedies. *Panococco*-bark, obtained from *Swartzia tomentosa*, is a powerful sudorific; its wood is very hard and intensely bitter. The roots of *Cæsalpinia Nuga* and *Moringa* are diuretic. Among dyes are *Logwood*, the wood of *Hæmatoxylon campeachianum*, and the red dye yielded by several *Cæsalpinias*, especially *C. echinata*, which yields the *Brazil-wood*, or *Pernambuco*-wood of commerce. The *Bukkum* or *Sappan*-wood of India belongs to *Cæsalpinia Sappan*. *Camwood* or *Barwood* belongs to *Baphia nitida*; it yields a brilliant red colour, but it is not permanent; the dark-red seen in the English *Bandana* handkerchiefs is produced by it, rendered deeper by sulphate of iron. *Melanoxylon Braûna*, a large Brazilian tree, has a remarkable reddish-brown colouring matter in both its wood and bark. Several afford timber. The *Brazil-wood* of commerce is obtained from *Cæsalpinia Brasiliensis*. The timber of *Hymenæa Courbaril*, the *West-Indian Locust-tree*, is close-grained and tough; it is in request in England for tree-nails in planking vessels, and for the beams and planks of steam-engines. *Eperua falcata* is the *Wallaba-tree* of Guiana, according to Sir R. Schomburgk, who informs us that its wood is deep red, frequently variegated with whitish streaks, hard, heavy, shining, and impregnated with an oily resin, which makes it very durable. The bark is bitter, and is used by the *Arawak* Indians as an emetic. The *Purple Heart*, a Guiana timber tree of great toughness, whose timber is found invaluable for resisting the shock of artillery discharges, on which account it is employed for mortar beds, is the *Copaifera pubiflora* and *bracteata*. The balsam is said to gush out of the heart of these trees in large quantities when wounded.

The size of the timber is sometimes prodigious. The *Locust-trees* of the West have

long been celebrated for their gigantic stature, and other species are the Colossi of South American forests. Martius represents a scene in Brazil, where some trees of this kind occurred of such enormous dimensions, that fifteen Indians, with outstretched arms, could only just embrace one of them. At the bottom they were 84 feet in circumference, and 60 feet where the boles became cylindrical. By counting the concentric



Fig. CCLXXIV.

rings of such parts as were accessible, he arrived at the conclusion that they were of the age of Homer, and 332 years old in the days of Pythagoras; one estimate indeed, reduced their antiquity to 2052 years, while another carried it up to 4104; from which he argues that the trees cannot but date far beyond the time of our Saviour. Some Indian species also yield good timber; others, as *Bauhinia racemosa* and *parviflora*, have bark employed in making rope. An oil is expressed from the seeds of some, as *Cassalpinia oleosperma*; others exude a mild gum like the *Minoseae* and some other plants, which have at the same time an astringent bark. A brownish-coloured gum is said by Roxburgh to be afforded by his *Bauhinia retusa*; it is also collected from *B. emarginata*, in the Deyra Doon, and called *Sem-ke-gond*. *Pithecolobium gunniferum* yields a gum resembling Gum Senegal, in the province of Mines in Brazil.—*Martius*. The resin Anime is procured from *Hymenaea Conbaril*; the Copal of Mexico is supposed to be the produce of some plant allied to this. That of Madagascar, and probably of the East Indies generally, is furnished by *Hymenaea verrucosa*. Brazilian Copal flows from several species of *Hymenaea*, and from *Trachylobium Martianum*.—*Martius*. *Aloexylum Agallochum* produces one of the two sorts of Calambae, Eagle-wood, or

Lign-aloes, a fragrant substance, which Loureiro states consists of a concretion of the oily particles into a resin in the centre of the trunk; it is brought on by some disease, and the tree in time dies of it. Of all perfumes it is the most grateful to Oriental nations; "stimulant, corroborant, cephalic, cardiac." Its scent is used against vertigo and paralysis. Balsam of Copaiva, a valuable acrid oil, largely employed in gonorrhœa, flows from various species of *Copaifera*, probably from all; the different species, however, yield the drug of different qualities.—*Mart. Mad. Med. Bras.* 115. *Myrospermum peruiferum*, the Quinquino or Balsam of Peru plant, furnishes a fragrant resin, not much used in medicine now, but in request among perfumers and in the manufacture of pastiles; another species, the *M. toluiferum*, or Balsam of Tolu plant, yields a similar product; both are employed in the preparation of pectoral lozenges. The seeds of *Cassia Absus* are extremely bitter, somewhat aromatic, and mucilaginous; they are brought to Cairo from the interior of Africa, under the name of *Chichm* or *Cismatan*, and are regarded as the best of remedies for Egyptian ophthalmia.

I do not find many distinct traces of poisonous action among this division of Leguminous plants; but the seeds of *Detarium senegalense* are said to be venomous; those of the Nieker-tree (*Guilandina Bonduca*) are emetic; the inner bark of *Hymenaea Courbaril* is anthelmintic, according to Macfadgen; the seeds of *Swartzia triphylla* are excessively acrid; and these, taken with the frequency of a cathartic action, seem a sufficient indication of the presence among them of some principle which in a state of concentration would be venomous.

MIMOSEÆ.

Astringency in the bark, and the production of a sort of gum in the same part, is the great characteristic of this tribe.—Of gums, *Acacia Verek* and *Adansonii* yield gum senegal on the western coast of Africa; *A. nilotica* and *Seyal*, gum arabic in Nubia; something similar is produced in New Holland by *A. decurrens*, and the Silver and Black



Fig. CCCLXXV.

Wattles, (*A. mollissima* and *affinis*); and in India by *A. arabica* and *speciosa*, and *Vachellia Farnesiana*.—*Royle*. For an account of the gum forests, see *Pl. Seneg.* 1. 246. The gum of a species of *Acacia* is, to the natives of Swan River, an important article of their food.—*Hook. Journ.* 2. 359.—As an instance of pulse, the seeds of *Parkia africana* are roasted as we roast Coffee, then bruised, and allowed to ferment in water. When they begin to become putrid, they are well washed and pounded; the powder is made into cakes, somewhat in the fashion of our chocolate; they are an excellent sauce for all kinds of meat. The farinaceous matter surrounding the seeds forms a pleasant drink, and they also make it into a sweetmeat. The natives of Tasmania roast the ripening pods of *A. Sophora*, pick out the seeds and eat them.—*Backhouse*. The pulp of the pods of *Inga tetraphylla*, and others, is sweet and mucilaginous.—Tonic and astringent qualities are also present here. The bark of *A. arabica* is considered in India a powerful tonic; it is also extensively used in tanning leather. A decoction of

Fig. CCCLXXV.—*Acacia Verek*. 1. a flower magnified; 2. the pistil; 3. a section of the same; 4. half a seed.

its pods is used as a substitute for that of the seeds of *A. concinna* for washing. Its tonic powers are connected with the astringent and tanning properties of several others. Some of the Algarobas or Prosopises of the western part of South America bear fruit, the pericarp of which consists almost wholly of tannin. The bark of some of the species of *Acacia* abound to such a degree in tanning principles as to have become objects of commercial importance. In 1824 some tons of the extract of *Acacia* bark were imported from New South Wales for the use of tanners. The pods of *A. uilotica* are used in Nubia for tanning. The valuable astringent substance called Catechu, or Terra Japonica, is procured by boiling and evaporating the brown heart-wood of *A. Catechu*, or Khair-tree; it is obtained by simply boiling the chips in water until the inspissated juice has acquired a proper consistency; the liquor is then strained, and soon coagulates into a mass. The *Inga vera*, and *Unguis cati*, with *Stryphnodendron Barbatemas* and *Jurema*, are Brazilian astringents of a similar nature. The pods of *A. uilotica*, are used by the tanners of Egypt, who call them *Neb-neb*.—Others are emetics. According to Horsfield, the *Eutada Pursætha* of Java is emetic.—A few are purgatives. Properties of this kind exist in the pulp within the fruit of *Inga vera*. The same may be said of *I. faeculifera*, or the *Pois doux* of St. Domingo, that bears pods filled with a sweet pulp, which the natives use.—A small number are poisonous. The root of a *Mimosa* is accounted a poison in Brazil. That of *Mimosa sensitiva* and its allies emits a most offensive smell, resembling the odour of a sewer at the time of impending rain.—*Bot. Reg.* 1. 25. It is reported that the leaves and branches of *Prosopis juliflora* are poisonous to cattle. The bark of some, as of *Acacia ferruginea* and *lencophæa*, added to jagghery water, is distilled in India as an intoxicating liquor. A drink called *Chica*, much used in South America, is prepared from the sweet pods of *Prosopis Algaroba*. "It is said that old women are employed to chew these Algarobas, and the *Schinus*, and then to spit them into a vessel." Water is added, and the mixture fermented.—*Chem. Gaz.* 1844. 131.—Several afford very valuable timber. That of *A. arabica* and *Vachellia Farnesiana* is used in India for wheels and tent-pegs; that of other species attains a large size, as of *A. Kalkera* and *A. speciosa*; the latter is dark-coloured, and close enough grained for making furniture. *A. elata*, *xylocarpa*, *Sundra*, *odoratissima*, *stipulacea*, and *cinerea*, all yield it of good quality. The wood of the *Mora excelsa*, the most majestic tree of Guiana, according to its discoverer, Sir R. Schomburgk, is said to be equal to Oak of the finest quality.—Saponaceous qualities reside in some species. The legumes of *A. concinna* (*Mimosa saponaria*, *Rozeb.*) form a considerable article of commerce in India, and the large brown beans of *Eutada Pursætha*, called *Gela*, are used by the natives for washing their hair.—*Royle*.—A few are dyes. A deep red is yielded by the chips of *Adenauthera pavonina*, called in India *Rukta-chundun*, or Red Sandal-wood.—Lastly, the fragrant flowers of *Acacia Farnesiana* yield, by distillation, a delicious perfume, to which also potent virtues are ascribed.

GENERA.

[The following List was drawn up by Mr. Bentham, Aug. 16, 1845.]

Suborder I. PAPILIONACEÆ.—Petals papilionaceous, imbricated in æstivation, the upper exterior.	<i>Podalyria</i> , Lam. <i>Aphora</i> , Neck.	<i>Gastrolobium</i> , R. Br. <i>Euchilus</i> , R. Br. <i>Spadostyles</i> , Benth. <i>Pultenea</i> , Smith. <i>Sclerothamnus</i> , R. Br.	<i>Heudusa</i> , E. Mey. <i>Cœlidium</i> , Vog.
Tribe 1. Podalyrieæ.—Filaments all free. Legume continuous. Leaves simple or palmately compound.	§ 3. Australasian. <i>Brachysema</i> , R. Br. <i>Callistachys</i> , Vent. <i>Oxylobium</i> , Andr. <i>Podolobium</i> , R. Br. <i>Isotropis</i> , Benth. <i>Orthotropis</i> , Benth. <i>Chorozema</i> , Labill. <i>Gompholobium</i> , Smith.	Subtribe 3. MIRBELIEÆ. <i>Mirbelia</i> , Smith. <i>Dichosema</i> , Benth. <i>Leptosoma</i> , Benth.	Subtribe 2. GENISTEÆ. § 1. Hoveæ. <i>Hovea</i> , R. Br. <i>Poirétia</i> , Smith. <i>Physicarpos</i> , Poir. <i>Plagiolobium</i> , Sweet. <i>Lalage</i> , Lindl. <i>? Platychilum</i> , Delaun. <i>Platylobium</i> , Smith. <i>Cheilococca</i> , Salisb. <i>Bossicea</i> , Vent. <i>Goodia</i> , Salisb. <i>Templetonia</i> , R. Br. <i>Scottia</i> , R. Br.
Subtribe 1. EUPODALYRIEÆ.	Subtribe 2. PULTENEÆ.	Tribe 2. LOTÆÆ.—Filaments all or 9, connate. Legume continuous. Cotyledons becoming leafy.	§ 2. Borbonicæ. <i>Borbonia</i> , Linn. <i>Rafnia</i> , Thunb. <i>Edmannia</i> , Thunb. <i>Vasoa</i> , DC. <i>Pelecyathis</i> , E. Mey. <i>Euelhora</i> , Eckl. Zey. <i>Microtropis</i> , E. Mey. <i>Heylandia</i> , DC.
§ 1. Clisropical. <i>Anagyris</i> , Linn. <i>Piptanthus</i> , Don. <i>Thermopsis</i> , Br. <i>Thermia</i> , Nutt. <i>Scopolus</i> , Raf. <i>Baptisia</i> , Vent. <i>Crotalopsis</i> , Mich. <i>Pickeringia</i> , Nutt.	<i>Burtonia</i> , R. Br. <i>Jacksonia</i> , R. Br. <i>Daviesia</i> , Smith. <i>Viminaria</i> , Smith. <i>Sphærolobium</i> , Smith. <i>Rhea</i> , Hügel. <i>Phyllota</i> , DC. <i>Actus</i> , Smith. <i>Dillwynia</i> , Smith. <i>Xeropetalum</i> , R. Br. <i>Eutaxia</i> , R. Br.	Subtribe 1. LIPARIEÆ. <i>Liparia</i> , Linn. <i>Priestleya</i> , DC. <i>Xiphotheca</i> , Eckl. Zey. <i>Amphithalea</i> , Eckl. Zey. <i>Ingenhousia</i> , E. Mey. <i>Cryphiantha</i> , Eckl. Zey. <i>Epistemon</i> , Walp. <i>Lathriogyno</i> , Eckl. Zey.	

§ 3. Crotalariae.	<i>Paramecus</i> , Presl.	<i>Kranhia</i> , Raf.	articulated, with 1-seeded joints, usually separating and indichiscent.
<i>Lupinus</i> , Linn.	<i>Melilotus</i> , Tourn.	<i>Robinia</i> , Linn.	
<i>Crotalaria</i> , Linn.	<i>Pocockia</i> , Ser.	<i>Lenna</i> , L. K. O.	
<i>Chrysocalyx</i> , Guillem.	<i>Trigonella</i> , Linn.	<i>Sabinea</i> , DC.	
<i>Clavidium</i> , Desv.	<i>Fanungracum</i> , Trn.	<i>Poitæa</i> , DC.	
<i>Priotropis</i> , Wight et Arn.	<i>Duceras</i> , Mœnch.	<i>Coursetia</i> , DC.	
§ 4. Lotonoidiæ.	<i>Falcatula</i> , Forst.	<i>Tephrosia</i> , sct. Cracoides, DC.?	Subtribe 1. ARACHIDEÆ.
<i>Lotononis</i> , DC.	<i>Medicago</i> , Linn.	<i>Daubentonia</i> , DC	<i>Stylosanthus</i> , Linn.
<i>Leobordea</i> , Dcill.	<i>Diplopriou</i> , Vis.	<i>Glottidium</i> , Desv.	<i>Arachis</i> , Linn.
<i>Leptis</i> , Eck. Zeyh.	<i>Melissittis</i> , Mœnch.	<i>Sesbania</i> , Pers.	<i>Chapmania</i> , Torr. et Gr.
<i>Krebsia</i> , Eck. Zeyh.	<i>Botryolotus</i> , Jaub. et Sph.	<i>Herminiera</i> , Guill. Perc.	Subtribe 2. CORONILLEÆ.
<i>Polylobium</i> , Eck. Zeyh.	<i>Meristotropis</i> , Fisch. Mey.	<i>Agati</i> , Rheed.	<i>Scorpiurus</i> , Linn.
<i>Aulacanthus</i> , E. Mey.	<i>Hymenocarpus</i> , Savi.	<i>Diphysa</i> , Jacq.?	<i>Coronilla</i> , Linn.
<i>Telega</i> , E. Mey.	<i>Cornicina</i> , Boiss.	<i>Coryncella</i> , DC.	<i>Antopetala</i> , Rich.
<i>Lipozygis</i> , E. Mey.	<i>Physanthyllis</i> , Boiss.	<i>Corymitis</i> , Spr.	<i>Anthrobium</i> , Desc.
<i>Carpitis</i> , E. Mey.	<i>Anthyllis</i> , Linn.	<i>Clianthus</i> , Sol.	<i>Hammatalobium</i> , Fenzl.
<i>Maria-Antonia</i> , Parlat.	<i>Cytisopsis</i> , Jaub. et Sph.	<i>Streblorhiza</i> , Endl.	<i>Ornithopus</i> , Linn.
<i>Listia</i> , E. Mey.	<i>Ononis</i> , Linn.	<i>Sutherlandia</i> , Br.	<i>Hippocrepis</i> , Linn.
<i>Rothia</i> , Pers.	<i>Anonis</i> , Tourn.	<i>Psychosema</i> , Benth.	<i>Bonaveria</i> , Scop.
<i>Xerocarpus</i> , Guill. Perr.	<i>Hosackia</i> , Dougl.	<i>Sylitra</i> , E. Mey.	<i>Securigera</i> , DC.
<i>Argyrolobium</i> , Eck. Zeyh.	<i>Microlotus</i> , Benth.	<i>Lessertia</i> , DC.	Subtribe 3. HEDYSAREÆ.
<i>Chasmon</i> , E. Mey.	<i>Anisolotus</i> , Benth.	<i>Swainsonia</i> , Salisb.	<i>Diphaca</i> , Lour.
<i>Trichasma</i> , Walp.	<i>Drepanolobus</i> , Nutt.	<i>Colutea</i> , Linn.	<i>Pictetia</i> , DC.
<i>Gamochilum</i> , Walp.	<i>Syrmatium</i> , Vog.	<i>Halmimodendron</i> , Fisch.	<i>Brya</i> , Br.
<i>Diotolotus</i> , Tausch?	<i>Parochetus</i> , Ham.	<i>Halodendron</i> , DC.	<i>Ornocarpus</i> , Pers.
<i>Melolobium</i> , Eck. Zeyh.	<i>Podolotus</i> , Benth.	<i>Caragana</i> , Lam.	<i>Planaria</i> , Desv.
<i>Sphingium</i> , E. Mey.	<i>Goodia</i> , Salisb. †	<i>Erenosparton</i> , Fisch.	<i>Amicia</i> , Ktenth.
<i>Dichilus</i> , DC.	Subtribe 4. INNIGOFERÆ.	<i>Phyllolobium</i> , Fisch.	<i>Zugomeris</i> , Moc. Sess.
<i>Calycotome</i> , E. Mey.	<i>Cyamopsis</i> , DC.	<i>Chesneya</i> , Lindl.	<i>Poiretia</i> , Vent.
<i>Melinospermum</i> , Walp.	<i>Cordua</i> , Spreng.	<i>Crafordia</i> , Raf.?	<i>Turpinia</i> , Pers.
<i>Hypocalyptus</i> , Thunb.	<i>Amecarpus</i> , Benth.	<i>Philicoptera</i> , Fenzl.?	<i>Chaetocalyx</i> , DC.
<i>Loddigesia</i> , Sims.	<i>Indigofera senegalensis</i>	Subtribe 7. BRONGNIAR-TIÆ.	<i>Bonninghausenia</i> , Spr.
<i>Lebeckia</i> , Thunb.	<i>Indigofera</i> , Linn.	<i>Harpylce</i> , Moc. Sess.	<i>Rhadinocarpus</i> , Vog.
<i>Stiza</i> , E. Mey.	<i>Sphaeridlophorum</i> , Dev.	<i>Megastegia</i> , Dou.	<i>Nissolia</i> , Jacq.
<i>Sarcophyllum</i> , E. Mey.	<i>Oustropis</i> , Don.	<i>Brongniartia</i> , H. B. K.	Myriadenus, Desv.
<i>Acanthobotrya</i> , Eck.	<i>Hemispadon</i> , Eudl.	<i>Peraltea</i> , H. B. K.	<i>Geissaspis</i> , Wight. Arn.
<i>Catobota</i> , Eck. Zeyh.	<i>Diplomyx</i> , Raf.?	Subtribe 8. ASTRACALEÆ.	<i>Zornia</i> , Gmel.
<i>Vilorgia</i> , Thunb.	<i>Acanthototus</i> , Benth.	<i>Hololobus</i> , Nutt.	<i>Adesmia</i> , DC.
<i>Aspalathus</i> , Linn.	<i>Indigofera onobrychoides</i>	<i>Kentrophyta</i> , Nutt.	<i>Patagonium</i> , Schrank.
<i>Sarcophyllum</i> , Thunb.	<i>Carmichaelia</i> , Br.?	<i>Biserrula</i> , Linn.	<i>Loudonia</i> , Bert.
<i>Sarcocalyx</i> , Walp.	Subtribe 5. PISOALIEÆ.	<i>Pelcinus</i> , Tournef.	<i>Rathken</i> , Schum.
<i>Buohenredra</i> , Eck.	<i>Psoralea</i> , Linn.	<i>Astragalus</i> , Linn.	<i>Eschynomene</i> , Linn.
<i>Scaligeria</i> , Adams.	<i>Rutera</i> , Mœnch.	<i>Oxytropis</i> , DC.	<i>Isodesmia</i> , Gardn.
§ 5. Cytisac.*	<i>Poikadenia</i> , Ell.	<i>Spiesia</i> , Neck.	<i>Somuerlingia</i> , Mart.
<i>Flex</i> , Linn.	<i>Polytropia</i> , Presl.?	<i>Phaca</i> , Linn.	<i>Smithia</i> , Ait.
<i>Stauracanthus</i> , Link.	<i>Requienia</i> , DC.	<i>Guldenstedtia</i> , Fisch.	<i>Petagnaia</i> , Gmel.
<i>Adenocarpus</i> , DC.	<i>Amorpha</i> , Linn.	<i>Sphaerophysa</i> , DC.	<i>Kotschya</i> , Eudl.
<i>Erinacea</i> , Boiss.	<i>Donapedia</i> , Neck.	Tribes 3. VICIÆ.—Filaments all or 9, comate. Legume continuous. Cotyledons fleshy. Leaves generally cirrhose.	<i>Bremontiera</i> , DC.?
<i>Spartium</i> , Linn.	<i>Pysenhardtia</i> , H. B. K.	<i>Cicer</i> , Linn.	<i>Lourea</i> , Neck.
<i>Spartianthus</i> , Link.	<i>Dalea</i> , Linn.	<i>Pisum</i> , Linn.	<i>Christia</i> , Mœnch.
<i>Genista</i> , Linn.	<i>Parosella</i> , Cav.	<i>Ervum</i> , Linn.	<i>Alysicarpus</i> , Neck.
<i>Retama</i> , Boiss.	<i>Petalostemon</i> , Reich.	<i>Vicia</i> , Linn.	<i>Fabricia</i> , Scop.
<i>Sypson</i> , Griesb.	<i>Kuhnistera</i> , Lam.	<i>Faba</i> , Tourn.	<i>Hegetschweilera</i> , Heer.
<i>Calycotome</i> , Link.	<i>Cylipogon</i> , Raf.	<i>Wiggersia</i> , Fl. Wett.	<i>Eleotis</i> , DC.
<i>Sarothamnus</i> , Wimm.	Subtribe 6. GALEGÆÆ.	<i>Oxygogon</i> , Raf.	<i>Oxydium</i> , Benn.
<i>Lembotropis</i> , Griesb.	<i>Glycyrrhiza</i> , Linn.	<i>Lathyrus</i> , Linn.	<i>Phylacium</i> , Benn.
<i>Cytisus</i> , Linn.	<i>Liquiritia</i> , Mœnch.	<i>Aphaca</i> , Tourn.	<i>Mecopus</i> , Benn.
<i>Laburnum</i> , Griesb.	<i>Galega</i> , Tournef.	<i>Ochrus</i> , Tourn.	<i>Uraria</i> , Desv.
Subtribe 3. TRIFOLIÆÆ.	<i>Cabotropis</i> , Don.	<i>Clymen</i> , Tourn.	<i>Doodia</i> , Reichb.
<i>Dorycnium</i> , Tourn.	<i>Acorombona</i> , Endl.	<i>Nissolia</i> , Tourn.	<i>Nicholsonia</i> , DC.
<i>Dorycnopsis</i> , Boiss.	<i>Cyclogyne</i> , Benth.	<i>Cicercella</i> , Mœnch.	<i>Perrottetia</i> , DC.
<i>Lotus</i> , Linn.	<i>Ebenidium</i> , Jaub. et Sph.?	<i>Anurus</i> , E. Mey.	<i>Desmodium</i> , DC.
<i>Kroeria</i> , Mœnch.	<i>Pogonostigma</i> , Boiss.	<i>Astrophia</i> , Nutt.?	<i>Dendrolobium</i> , W. Arn.
<i>Tetragonolobus</i> , Scop.	<i>Tephrosia</i> , Pers.	<i>Orobus</i> , Tourn.	<i>Heteroloma</i> , Desv.
<i>Scandalida</i> , Neck.	<i>Peinera</i> , Mœnch.	<i>Platystegia</i> , Sweet.	<i>Ototropis</i> , Schauer.
<i>Boujeuia</i> , Reichb.	<i>Brissonia</i> , Neck.	Tribes 4. HEDYSAREÆ.—Filaments generally connate. Legume transversely	<i>Dollinera</i> , Endl.
<i>Trifolium</i> , Linn.	<i>Erebintus</i> , Mitch.		<i>Codoriocalyx</i> , Hassk.
<i>Calycomorphum</i> , Pres.	<i>Cræca</i> , Linn.		<i>Cyclomorium</i> , Walp.?
<i>Galearia</i> , Presl.	<i>Apodynomene</i> , E. Mey.		<i>Dicerma</i> , DC.
<i>Mistyllus</i> , Presl.	<i>Xiphocarpus</i> , Presl.		<i>Anartirosyne</i> , E. Mey.
<i>Lupinaster</i> , Mœnch.	<i>Necdhania</i> , Scop.		<i>Lepedeza</i> , Rich.
<i>Pentaphyllum</i> , Pers.	<i>Chndasia</i> , Boj.?		<i>Campylotropis</i> , Rudge.
<i>Dactyphyllum</i> , Raf.	<i>Wistaria</i> , Nutt.		<i>Oxyramphis</i> , Wall.
<i>Amoria</i> , Presl.	<i>Thyrpsanthus</i> , Ell.		<i>Halia</i> , Thunb.
<i>Micranthemum</i> , Presl.			<i>Alhagi</i> , Tourn.
<i>Amarenum</i> , Presl.			<i>Taverniera</i> , DC.
			<i>Eversuannia</i> , Bunge.

* "This § and sub-tribes 3 to 8 of Lotææ probably require considerable modification as to their circumscription when the genera here enumerated under each shall have been more accurately examined."—G. B.

Hedysarum, Linn.
Echinolobium, Desv.
Onobrychis, Tourm.

Tribe 5. PHASEOLEÆ.—
Filaments all or 9, connate. Legume continuous, divaricate. Cotyledons (always?) fleshy. Leaves usually pinnately trifoliate.

Subtribe 1. CLITORIÆÆ.

Amphicarpæa, Raf.
Sarcit, Raf.
Nyperus, Raf.
Cryptolobus, Spr.
Dumasia, DC.
Pueraria, DC.?
Coloanina, H. B. K.
Clitoria, Linn.
Nauclea, Desv.
Ternatea, Tourm.
Neurocarpum, Desv.
Rhombifolium, Rich.
Martia, Leandr.
Vexillaria, Benth.
Pilanthus, Poit.
Centrosema, DC.
Steganotropis, Lehmann.
Periandra, Mart.
Platysema, Benth.

Subtribe 2. KENNEDYÆÆ.

Kennedyia, Vent.
Caulinia, Mench.
Amphodus, Lindl.
Zichya, Hugel.
Physolobium, Benth.
Hardenbergia, Benth.
Leptocymus, Benth.
Leptolobium, Benth.

Subtribe 3. GLYCINÆÆ.

Johnia, W. et Arn.
Notonia, W. et Arn.
Stenolobium, Benth.
Cyanostremma, Benth.
Soja, Moench.
Glycine, Linn.
Teramnus, P. Br.
Bujacia, E. Mey.
Smuteria, W. et Arn.
Galactia, P. Br.
Suzetia, DC.
Bradburya, Raf.
Otonia, Bertol.
Grona, Lour.
Kiesera, Reinw.

Vilmorinia, DC.?
Betencourtia, St. Hil.?

Subtribe 4. DIOCLEÆÆ.

Collara, DC.
Camposema, H. et Arn.
Bimbia, Mart.
Cleobulia, Mart.
Cratylia, Mart.
Dioclea, H. B. K.
Hypenoxylon, Spr.
Crepidotropis, Walp.
Cymbosena, Benth.
Canavalia, DC.
Mallochius, Savi.
Clematosa, Cav.
Mondon, E. Mey.
Wendrothia, Scheidt.
Chloryllia, E. Mey.?

Subtribe 5. ERYTHRINÆÆ.

Muenna, Adans.
Stizolobium, Pers.

Homera, Neek.
Negretia, Ruiz. Pav.
Labradia, Swedimur.
Carpoposon, Roxb.
Macroceratides, Raddi.
Pillera, Endl.
Citta, Lour.
Erythrina, Linn.
Coralodendron, Tourm.
Strongyloclon, Vog.
Rudolphia, Willd.
Butea, Kthn.

Subtribe 6. EUPHASEOLEÆÆ.

Chaseolus, Linn.
Strophostylis, Ell.
Vigna, Savi.
Calleystus, Endl.
Seydalis, E. Mey.
Sphenostyles, E. Mey.?
Otoptera, DC.
Plectrotropis, Schum.
Dolichos, Linn.
Lalbab, Adans.
Pachyrhizus, Rich.
Cucara, Thouars.
Psophocarpus, Neek.
Boton, Adans.
Diesingia, Endl.
Dunbaria, W. Arn.
Teniocarpus, Desv.
Apios, Boerh.
Cystotropis, Wall.

Voandzeia, Thouars.

Subtribe 7. CAJANÆÆ.

Fagelia, Neek.
Cajanus, DC.
Atylosia, W. et Arn.
Cantharosperrum, W. et Arn.
Pseudartbaria, W. et Arn.?
Barbiera, DC.

Subtribe 8. RHYNCHOSIÆÆ.

Orthodanum, E. Mey.
Hidrosia, E. Mey.
Enosema, DC.
Euriosome, Desv.
Pyrrotichia, W. et A.
Fitcheria, Nutt.?
Rhynchosia, DC.
Copsisma, E. Mey.
Glycine, Nutt. Kunth.
Arcyphyllum, Ell.
Nomismia, W. et Arn.
Cyclista, Ait.
Cyanospermum, W. et Arn.
Chrysozias, E. Mey.
Flemingia, Roxb.
Ostrydium, Desv.
Lorrea, Jaum.
Moghatia, Jaum.
Pycnospora, Br.

Subtribe 9? ABRINÆÆ.

Abrus, Linn.
Doubtful Genera.
Macrauthus, Lour.
Calypogonium, Desv.
Cruadulum, Desv.

Tribe 6. Dalbergiææ.—

Filaments sarmenteliform, or disticheliform. Legume continuous, generally induricent. Cotyledons (always?) fleshy. Leaves usually pinnate.
Cyclobolium, Benth.
Americium, R. Br.

Corytholobium, Benth.
Hecastaphyllum, Kunth.
Acourou, Aubl.
Trakensteinia, Neek.

Moutonchia, Aubl.
Grieselinia, Neek.
Pterocarpus, Linn.
Santalaria, DC.
Echinodiscus, Benth.
Weinreichia, Reichb.
Centrolobium, Benth.
Ancylocalyx, Tulasne.
Amphyminium, H. B. K.
Apalatoa, Aubl.
Drepanocarpus, C.F. Mey.
Nephrosis, Rich.
Sommerfeldtia, Schum.
Macharium, Pers.
Nissolia, sp. DC.
Gomezium, DC.
Ateleia, Moq. et Sess.
Brachypterum, W. et Arn.
Derris, Lour.
Pongamia, Lour.
Galedupa, Lour.
Sphinctolobium, Vog.
Neuroscapha, Tulasne.
Lonchocarpus, Kunth.
Gliricidia, Kunth.
Milletia, W. et Arn.
Berberera, Hochst.?
Endospermum, Blum.
Dalbergia, Linn.
Solari, Adans.
Triptolemea, Mart.
Semeionotis, Schott.?
Miscolobium, Vog.
Platymiscium, Vog.
Platypodium, Vog.
Callisemaea, Vog.
Discolobium, Benth.

Piscidia, Linn.
Ichthyomethia, R. Br.
Pbellocarpus, Benth.
Müllera, Linn. fil.
Coublandia, Aubl.
Deguelia, Aubl.
Cylegonia, Neek.
Geoffroya, Jacq.
Andira, Lour.
Lumbricidia, Vell.
Youacoupa, Aubl.
Euchresta, Benn.
Dipteryx, Schreb.
Cumarouna, Aubl.
Taralea, Aubl.
Baryosma, Gärtn.
Heinzia, Scop.
Bolducia, Neek.
Pterodon, Vog.
Commilobium, Benth.

Apoplanesia, Presl.
Spatholobus, Hassk.
Vatairea, Aubl.

Tribe 7. Sophoreæ.—

Filaments distinct. Legume continuous. Leaves pinnate, with one or several leaflets.
Styphnolobium, Schott.
Edwardsia, Salisb.
Sophora, Linn.
Broussonetia, Ort.
Radusia, Reichb.
Cadia, Forsk.
Spananocca, Desf.
Punciatia, Meisn.
Ammodendron, Fisch.
Culpurnia, E. Mey.
Virgilia, Linn.
Cladrastis, Raf.

Bowdichia, H. B. K.
Schipira, Mut.
Gill.
Ormosia, Jacq.
Poullichira, Adans.
Dibrachion, Tulasne.
Alexandrina, Schomb.
Diplotropis, Benth.
Spirotropis, Tulasne.
Macrotropis, DC.
Layia, Hook et Arn.
Callerya, Endl.
Marquartia, Vog.
Myrosperrum, Jacq.
Calusia, Bert.
Myrozylon, Mut.
Toluifera, Linn.
Castanospermum, Cunn.?

Dalhousiea, Wall.
Delaria, Desv.
Carpobolii, sp. Don.

Suborder II. CÆSALPINIÆÆ.—

Petals in aestivation imbricated, the uppermost interior.

Tribe 1. Leptolobiææ.

Leptolobium, Vog.
Sclerolobium, Vog.
Acosmium, Schott.
Sweetia, Spreng.
Zuccania, Cas.
Hamatoxylon, Linn.
Poppigia, Presl.
Diptychandra, Tulasne.
Cenostigma, Tulasne.

Tribe 2. Eucæsalpinieæ.

Cercidium, Tulasne.
Parkinsonia, Plun.
Gymnocladus, Lam.
Guilandina, Linn.
Bonduc, Plum.
Poinciana, Linn.
Coulteria, H. B. K.
Adevocalyx, Bert.
Tara, Molin.
Cæsalpinia, Linn.
Cumpecia, Adans.
Tihante, Adans.
Erythrostemon, Lk.
Peltoporum, Vog.
Brasilletia, DC.
Schizolobium, Vog.
Mezoneuron, Desf.
Pterolobium, R. Br.
Quartinia, A. Rich.
Reichardia, Roth.
Colvillea, Boy.?
Cladotrichium, Vog.
Hoffmannseggia, Cav.
Pomaria, Cav.
Melanosticta, DC.
Burkia, Benth.

Tribe 3. Cassieææ.

Cassia, Linn.
Cathartocarpus, Pers.
Bacrytrilobium, Willd.
Baryxylon, Lour.
Chamaesiftula, G. Don.
Chamaerista, E. Mey.
Grimaldia, Schrank.
Senna, Tournef.
Lallichea, Gaud.
Dicorynea, Benth.

Tribe 4. Swartzieææ.

Moldenlhawera, Schott.
Dolichonema, Nees.
Martha, Benth.
Zollernia, Nees.
Acidandru, Mart.

Coquebertia, Brougn.
Swartzia, Willd.
Riveria, Humb. et Kun.
Touratea, Aubl.
Gynanthistrophe, Poit.
Possira, Aubl.
Pittera, Schreb.
Hoelzelia, Neck.
Aldina, Endl.
Allania, Benth.
Trischidium, Tulasne.
Swartzia sect. *Dithyria*, Benth.
Cordyla, Lour.
Calycandra, A. Rich.
 Tribe 5. Amherstieæ.
Thylacanthus, Tulasne.
Brownea, Jacq.
Hermesia, Loeffl.
Elizabetha, Schomb.
Heterostemon, Desf.
Amherstia, Wall.
Jonesia, Roxb.
Saraca, Burm.
Humboldtia, Vahl.
Batschia, Vahl.
Sehotia, Jacq.
Theodorca, Medik.
Afzelia, Sm.
Pancovia, Willd.?
Eperua, Aubl.
Rothmannia, Neck.
Panzeria, Willd.
Parivoa, Aubl.
Aderia, Neck.
Dimorpha, Willd.
Campsandra, Benth.

Tachigalla, Aubl.
Valentynia, Neck.
Tachia, Pers.
Exostyles, Schott.
Melanoxylon, Schott.
Perittium, Vog.
Tamarindus, Linn.
Phyllocarpus, Tulasne.
Ontea, Aubl.
Anthonota, Beauv.
Westia, Vahl?
Intsia, Thouars.
Vouapa, Aubl.
Macrolobium, Vahl.
Kruegeria, Neck.
Peltogyne, Vog.
Trachylobium, Hayne.
Hymeneæ, Linn.
Courbaril, Plum.
 Tribe 6. Bauhinieæ.
Casparea, Kunth.
Bauhinia, Linn.
Pauletia, Cav.
Phanera, Lour.
Schnella, Raddi.
Caulotretus, Rich.
Perlebia, Mart.?
Amaria, Mut.?
Etabella, Benth.
Cereis, Linn.
 Tribe 7. Cynometreæ.
Cynometra, Linn.
Hardwickia, Roxb.
Copuifera, Linn.
Dialium, Linn.

Arouna, Aubl.
Codarium, Soland.
Cleyria, Neck.
Apuleia, Mart.
Detarium, Juss.
Crudya, Willd.
Touchiroa, Aubl.
Apalatoa, Aubl.
Waldschmidtia, Neek.
Pterogyne, Tulasne.
Zenkeria, Arn.
 Tribe 8. Dimorphandereæ.
Mora, Benth.
Dimorphandra, Schott.
Gleditschia, Linn.
Ceratonia, Linn.
Aerocarpos, Arn.
Anoma, Lour.
Metrocynia, Thouars.
Baphia, Afz.
Palovea, Aubl.
Ginnammia, Scop.
Vatairea, Aubl.
Albexylon, Lour.
 Suborder III. MIMOSEÆ.
 —Corolla valvate in æstivation.
 Tribe I. Parkieæ.
Erythrophleum, Afz.
Fillea, Guillem. Perr.
Parkia Br.
Pentaclethra, Benth.

Tribe 2. Eumimoseæ.
Entada, Linn.
Plathymenia, Benth.
Stryphnodendron, Mart.
Adenanthera, Linn.
Elephantorhiza, Benth.
Tetrapleura, Benth.
Gagnebina, Neck.
Prosopis, Linn.
Lagonychium, Stephens.
Algarobia, Benth.
Dichrostachys, Benth.
Caillea, Guillen.
Neptunia, Lour.
Desmanthus, Willd.
Parlingtonia, DC.
Mimosa, Linn.
Schranckia, Willd.
Leptoglottis, DC.
Leneana, Benth.
Xylica, Benth.
 Tribe 3. Acaciæ.
Acacia, Willd.
Vachellia, Arn.
Farnesia, Gasp.
Lysiloma, Benth.
Albizia, Durazz.
Zygia, R. Br.
Calliandra, Benth.
Pithecolobium, Mart.
Enterolobium, Mart.
Serianthes, Benth.
Inga, Willd.
Afonsea, St. Hil.

NUMBERS estimated by Mr. Bentham, May, 1845.

	GEN.	Sp.
Papilionaceæ		
Podalyricæ	33	350
Lotææ	133	3000
Hedysarcæ	52	500
Phaseolææ	70	650
Dalbergiææ	41	250
Sophoreææ	21	50
Cesalpiniææ	88	700
Mimosæææ	29	1000
	467	6500

? *Moringaceæ*.

POSITION.—Rosaceæ.—FABACEÆ.—Chrysobalanaceæ.

ORDER CCX. DRUPACEÆ.—ALMONDWORTS.

Amygdaleæ, *Juss. Gen.* 340. a § of *Rosaceæ* (1789); *Endl. Gen.* cclxxiii.; *Wight Illustr.* 1. 201.—*Drupaceæ*, *DC. Fl. Française*, 4. 479. (1805); *Prodr.* 2. 529. a § of *Rosaceæ*.

DIAGNOSIS.—*Rosal Exogens*, with polypetalous regular flowers, a solitary carpel whose style proceeds from the apex, and a drupaceous fruit.

Trees or shrubs. Leaves simple, alternate, usually glandular towards the base; stipules simple, mostly glandular. Flowers white or pink, in umbels or single. Calyx

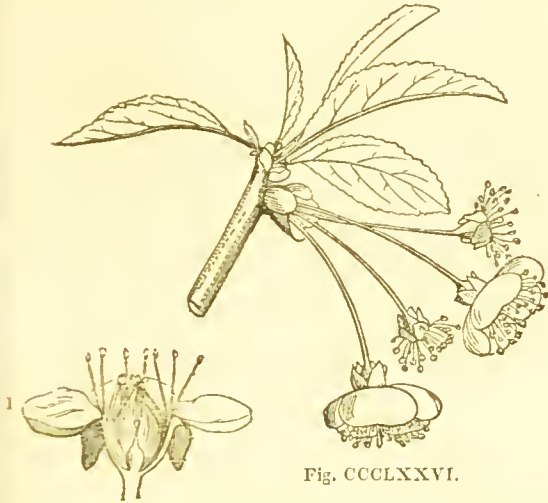


Fig. CCCLXXVI.



Fig. CCCLXXVII.

5-toothed, deciduous, lined with a disk; the fifth lobe next the axis. Petals 5, perigynous. Stamens 20, or thereabouts, arising from the throat of the calyx, in aestivation curved inwards; anthers innate, 2-celled, bursting longitudinally. Ovary superior, solitary, simple, 1-celled; ovules 2, suspended; styles terminal, with a furrow on one side, terminating in a reniform stigma; ovules anatropal. Fruit a drupe, with the putamen sometimes separating spontaneously from the sarco carp. Seeds mostly solitary, suspended. Embryo straight, with the radicle pointing to the hilum; cotyledons thick, plano-convex; albumen none.

This Order is distinguished from Roseworts and Appleworts by the pistil being a solitary, simple carpel, changing when ripe into a drupe, the bark yielding gum, and by the more general presence of hydrocyanic acid; from Leguminous plants by the latter character, and also by their regular petals and stamens, and especially by the odd segment of the 5-lobed calyx of that Order being inferior, not superior; from Chryso-balana, by the terminal styles and regular petals and stamens. I have seen a monstrous Plum with an indefinite number of ovaries arising irregularly from the tube of the calyx, and therefore exhibiting a tendency, on the part of this Order, to assume one of the distinguishing characters of Roseworts. It is not a little remarkable that here, where we have an approach to the structure of Mimoseæ in Leguminous plants, we have a resemblance to the property possessed by that Sub-order, of yielding gum in the bark; the peculiar astringency of some species is also analogous to that of *Acacia Catechu* and the like.

Natives exclusively of the northern hemisphere, where they are found in cold or temperate climates. One species, *Cerasus occidentalis*, is a native of the West Indies; some Plums occur in the woods of Brazil; a kind of Almond, *Amygdalus microphylla*,

Fig. CCCLXXVI.—*Cerasus communis*. 1. a section of its flower.

Fig. CCCLXXVII.—*Prunus domestica*. 1. a section of its drupe; 2. a section of the endocarp, showing the position of the seed.

inhabits hot arid plains in Mexico ; and another, *A. cochinchinensis*, is reputed to grow in the woods of Cochin-China.

The astringent febrifugal properties of Roseworts, with which Order this is usually combined, are also found here ; as in the bark of *Cerasus virginiana*, which is prescribed in the United States, of the *C. Capollim* of Mexico, and of others to be mentioned presently. They are, however, better known for yielding an abundance of prussic, or hydrocyanic acid, a deadly principle residing in the leaves and kernel ; in consequence of which some of the species are poisonous to cattle which feed upon them : as, for example, the *C. capricida*, which kills the goats of Nipal ; and the *C. virginiana*, which is known in North America to be dangerous. The oil of Bitter Almonds is extremely poisonous, and many fatal cases of death arising from taking them into the stomach are on record. They have, nevertheless, been recommended as a cure for intermittent fever. They produce urticaria, and are said to be an antidote to intoxication. The flowers and kernels of the Peach have similar qualities. Dr. Christison mentions a case of a gentleman who died in consequence of having swallowed a salad of the flower ; and another of a child which perished after taking a decoction of the flowers to destroy worms. The leaves, bark, and fruit of *C. Laurocerasus*, the common Laurel, and the oil obtained from them are virulent poisons ; even the vapour of the former will destroy insect life. Martius says that this secretion is greatly increased in Brazil. *C. Padus*, the Bird Cherry, has similar properties, but in a less degree. They all of them, also, yield a gum analogous to gum tragacanth. Notwithstanding, however, the poisonous principle that is present in them, their fruit is, in many cases, a favourite food ; that of the *Amygdalus* (Peach and Nectarine), *Prunus* (Plum), and *Cerasus* (Cherry), are among the most delicious with which we are acquainted ; the seed of *Amygdalus* is familiar to us under the name of Almonds, and its oil under the name of Oil of Almonds. The bark of the root of *C. Capollim* is used in Mexico against dysentery. The leaves of *Prunus spinosa* (Sloe), and *C. avium* (Wild Cherry), have been employed as a substitute for Tea. The former are well known to afford one of the means used in Europe for adulterating the black tea of China. *Prunus domestica*, or the common Plum, yields those fruits sold in the shops under the name of Prunes, which are chiefly prepared in France, from the varieties called the St. Catherine and the Green-gage ; and in Portugal from a sort which derives its name from the village of Guimaraens, where they are principally dried. They contain so large a quantity of sugar, that brandy is distilled from them when fermented ; and it has even been proposed to manufacture sugar from them. The kernel of *Prunus brigantia* yields a fixed oil, called Huile des Marmottes, which is used instead of olive or almond oil. The bark of *Prunus spinosa* is one of the substances that has been reported to resemble Jesuits' bark in its effects. *Prunus Coccomilia* yields a bark, the febrifugal properties of which are spoken of very highly. According to Tenore, it is a specific for the cure of the dangerous intermittent fevers of Calabria, where it grows. A variety of *Cerasus avium* is used, in the Vosges and Black Forest, for the preparation of the liqueur known under the name of Kirschenwasser. The flowers of *Amygdalus persica* (Peach), are gently laxative, and are used advantageously for children. The kernel of *Cerasus occidentalis* is used for flavouring the liqueur Noyau.

GENERA.

<i>Pygeum</i> , Gärtn.	<i>Amygdalophora</i> , Neck.	<i>Prunus</i> , Linn.	<i>Cerasophora</i> , Neck.
<i>Polydonta</i> , Blum.	<i>Persica</i> , Tournef.	<i>Armeniaca</i> , Tournef.	<i>Padus</i> , Endl.
<i>Polystorthia</i> , Blum.	<i>Trichocarpus</i> , Neck.	<i>Prunophora</i> , Neck.	<i>Laurocerasus</i> , Tournef.
<i>Amygdalus</i> , Linn.	<i>Ceracidos</i> , Zucc.	<i>Cerasus</i> , Juss.	

NUMBERS. GEN. 5. Sp. 110.

POSITION.—Rosaceæ.—DRUPACEÆ.—Fabaceæ ?
Thymelacææ.

ORDER CCXI. POMACEÆ.—APPLEWORKS.

Rosaceæ, § Pomaceæ, *Juss. Gen.* 334. (1789 ; *DC. Prodr.* 2. 626. (1825).—*Pomaceæ*, *Lindl. in Linn. Trans.* 13. 93. (1821) ; *Endl. Gen.* cclxx.

DIAGNOSIS.—*Rosul Exogens*, with *polypetalous regular flowers*, and *carpels adhering to the calyx by the back*.

Trees or shrubs. Leaves alternate, stipulate, simple, or compound. Flowers solitary, or in terminal cymes, white or pink. Calyx adherent, 5-toothed ; the odd segment posterior. Petals 5, unguiculate, inserted in the throat of the calyx ; the odd



Fig. CCLXXVIII. 1

one anterior. Stamens indefinite, inserted in a ring in the throat of the calyx. Disk thin, clothing the sides of the tube of the calyx. Ovaries from 1 to 5, adhering more or less to the sides of the calyx and each other ; ovules anatropal, usually 2, collateral, ascending, very rarely solitary, sometimes 00 ; styles from 1 to 5 ; stigmas simple. Fruit a pome, 1- to 5-celled, seldom spuriously 10-celled ; the endocarp either cartilaginous, spongy, or bony. Seeds ascending, solitary. Allmen none ; embryo erect, with flat cotyledons, or convolute ones in *Chamaemeles*, and a short inferior conical radicle.

Appleworks are closely allied to Roseworks, from which they differ in the adhesion of the carpels with the sides of the calyx, and more or less with each other. The fruit is always a pome ; that is, it is made up of a fleshy calyx adhering to fleshy or bony ovaries, containing a definite number of seeds. Appleworks are peculiarly distinguished by their ovules being in pairs, and side by side ; while Roseworks, when they have 2 or more ascending ovules, always have them placed one above the other. Cultivated

Fig. CCLXXVIII.—1. branch of *Pyrus communis* ; 2. its flower divided vertically ; 3. a cross section of its fruit. 1. perpendicular section of the fruit of *Pyrus Malus*.

plants of this Sub-order are very apt to produce monstrous flowers, which depart sometimes in a most remarkable degree from their normal state. No Order can be more instructively studied with a view to morphological inquiries; particularly the common Pear when in blossom. A remarkable permanent monster of this kind, with 14 styles, 14 ovaries, and a calyx with 10 divisions in two rows, is described in the *Revue Encyclopédique*, 43. 762.; it exhibits a tendency, on the part of Appleworts, to assume the indefinite ovaries and double calyx of Roseworts. I have seen a *Prunus* in a similar state. Almondworts are known by their superior solitary ovary and drupaceous fruit.

Found plentifully in Europe, Northern Asia, the mountains of India, and North America; rare in Mexico, unknown in Africa, except on its northern shore, and in Madeira, and entirely absent from the southern hemisphere; a solitary species is found in the Sandwich Islands.

The fruit as an article of the dessert, and the flowers for their beauty, are the chief peculiarities of this Order, which consists exclusively of trees and bushes, without any herbaceous plant. The Apple, the Pear, the Sorb, the Medlar, the Quince, the Service, the Rowan-tree or Mountain Ash, are all well known, either for their beauty or their use. The wood of the Pear is almost as hard as Box, for which it is even substituted by wood engravers; the timber of the Beam-tree (*Pyrus Aria*) is invaluable for axletrees. The bark of *Photinia dubia* is used in Nipal for dyeing scarlet. Malic acid is contained, in considerable quantity, in Apples; it is also almost the sole acidifying principle of the berries of the Mountain Ash (*Pyrus Aucuparia*). The mucilaginous seeds of the Quince are employed in medicine; its fragrant fruits are used in the preparation of a kind of wine analogous to Cider and Perry, obtained from Apples and Pears. Wöhler has found cyanthic ether in the rind of the Quince. Prussic acid occurs in their seeds, and is even abundant in *Cotoneaster Uva Ursi*, and *microphylla*. The flowers, bark, and root of *Pyrus Aucuparia* contain so much of the peculiar essential Oil of Almonds as to yield fully as much hydrocyanic acid as that procurable from an equal weight of Cherry-laurel leaves.—*Buchn. Rep.* 27. 238.

GENERA.

<i>Cydonia</i> , Tournef.	<i>Aria</i> , DC.	<i>Osteomeles</i> , Lindl.	<i>Hesperomeles</i> , Lindl.
<i>Chænomes</i> , Lindl.	<i>Torninaria</i> , DC.	<i>Mespilus</i> , Lindl.	<i>Eriobotrya</i> , Lindl.
<i>Pyrus</i> , Lindl.	<i>Eriolobus</i> , DC.	<i>Mespilophora</i> , Neck.	<i>Photinia</i> , Lindl.
<i>Pyrophorum</i> , Neck.	<i>Sorbus</i> , Liun.	<i>Amelanchier</i> , Medik.	<i>Myrtilmeles</i> , Lindl.
<i>Apyrophorum</i> , Neck.	<i>Aucuparia</i> , Medik.	<i>Petromesles</i> , Jacq. f.	<i>Chamæmesles</i> , Lindl.
<i>Lazarolus</i> , Medik.	<i>Adenorhachis</i> , DC.	<i>Peraphyllum</i> , Nutt.	<i>Rhaphiolepis</i> , Lindl.
<i>Halmia</i> , Medik.	<i>Aronia</i> , Pers.	<i>Cotoneaster</i> , Medik.	<i>Cratægus</i> , Linn.
<i>Malus</i> , Tournef.	<i>Chamemespilus</i> , DC.	<i>Nägelia</i> , Lindl.	<i>Stranvæsia</i> , Lindl.

NUMBERS. GEN. 16. Sp. 200.

Onagraceæ.

POSITION.—Rosaceæ.—POMACEÆ.—Друпацкѣ.

Myrtacæ.

ORDER CCXII. SANGUISORBACEÆ.—SANGUISORBS.

Rosaceæ, § Sanguisorbeæ, *Juss. Gen.* 336. (1789); *DC. Prodr.* 2 588.—Cliffortiaceæ, *Martius Conspectus*, 216; *Meisner*, p. 105.

DIAGNOSIS.—*Rosal Exogens*, with *apetalous flowers*, a solitary carpel, inclosed in a hardened calyx-tube forming a false pericarp.

Herbaceous plants or under-shrubs, occasionally spiny. Leaves simple and lobed, or compound, alternate, with stipules. Flowers small, often epitate. Often ♂ ♀ by

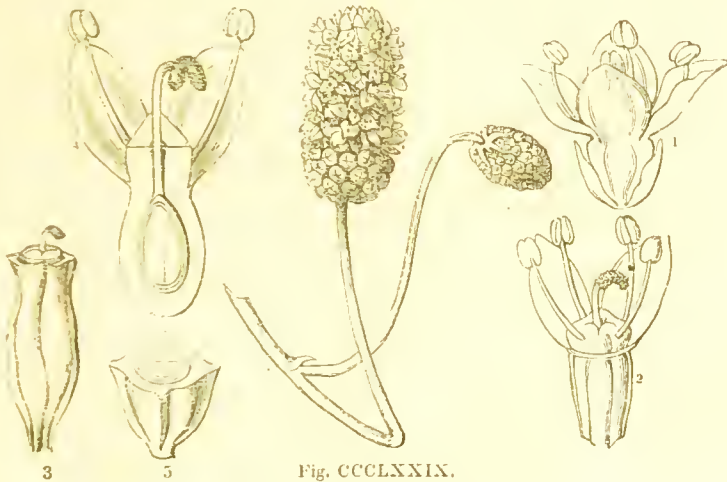


Fig. CCCLXXIX.

portion. Calyx with a thickened tube and a 3-4- or 5-lobed limb, its tube lined with disks. Petals none. Stamens definite, sometimes fewer than the segments of the calyx, with which they are then alternate, arising from the orifice of the calyx; anthers 2-celled, innate, bursting longitudinally, occasionally 1-celled, bursting transversely. Ovary solitary, simple, with a style proceeding from the apex or the base; ovule solitary, always attached to that part of the ovary which is next the base of the style; stigma compound or simple. Nut solitary, inclosed in the often indurated tube of the calyx. Seed solitary, suspended or ascending; embryo without albumen; radicle superior or inferior; cotyledons large, plano-convex.

This Order, usually combined with Roseworts, appears to demand a distinct station, on account of its constantly apetalous flowers, its hardened calyx, and the reduction of petals to one only; it is not, however, distinguishable by any other characters; and therefore Agrimonia, sometimes stationed here, must be preserved among Roseworts, on account of its petals. Its habit, indeed, is by no means that of Sanguisorbs. Usually the ovule is suspended, the style arising from below the apex of the carpel; but when the style proceeds from the base of the carpel, the ovule is ascending, in all cases adhering to the ovary immediately over against the origin of the style. Various kinds of adhesion between the leaves and the stipules take place in the genus Cliffortia, and have given rise to a number of errors; for an explanation of which, see De Candolle's marks in the *Annales des Sciences Naturelles*, 1. 447.

Natives of heaths, hedges, and exposed places in Europe, North and South America beyond the tropics, and the Cape of Good Hope; in which latter country they represent the Roseworts of Europe.

Their general character is astringency. A decoction of *Alechmilla vulgaris* is slightly astringent; and is asserted, by Frederick Hoffmann and others, to have the effect of restoring

Fig. CCCLXXIX.—*Sanguisorba officinalis*. 1. a flower with a pair of bracts; 2. the same with half calyx cut away; 3. a ripe fruit, from which the calyx has been removed; 4. a vertical section of fruit and calyx; 5. transverse section of a fruit.

ing the faded beauty of ladies to its earliest freshness. *Sanguisorba officinalis*, or common Burnet, is a useful fodder. The root of *Sanguisorba canadensis* is said to be bitter, astringent, nauseous, and emetic, and its fruit stupefying.—*Endl.* The leaves of *Acæna Sanguisorba* are said to be an excellent substitute for Tea. The plant is common everywhere in Tasmania, and is well known from the annoyance caused by its fruit hooking to the stockings and other parts of the dress of pedestrians.—*Backhouse.* The Peruvians employ a decoction of *Margaricarpus setosus*, a little needle-leaved bush with pearly succulent fruit, against hæmorrhoids.

GENERA.

<i>Alchemilla</i> , <i>Tournef.</i> <i>Aphanes</i> , <i>Linn.</i> <i>Adenostoma</i> , <i>Hook. et Arn.</i> <i>Acæna</i> , <i>Vahl.</i> <i>Ancistrum</i> , <i>Forst.</i>	<i>Ptilochæta</i> , <i>Turcz.</i> <i>Sanguisorba</i> , <i>Linn.</i> <i>Poterium</i> , <i>Linn.</i> <i>Bencomia</i> , <i>Webb.</i> <i>Leucosidea</i> , <i>Eckl. et Zeyh.</i>	<i>Tetraglochin</i> , <i>Pöpp.</i> <i>Polylepis</i> , <i>Ruiz et Pav.</i> <i>Margaricarpus</i> , <i>Ruiz et P.</i> <i>Cliffortia</i> , <i>Linn.</i> <i>Morilandia</i> , <i>Neck.</i>
---	---	--

NUMBERS. GEN. 12. Sp. 125.

POSITION.—*Scleranthaceæ.*
 —*Drupacææ.*—SANGUISORBACEÆ.—*Rosacææ.*
Nyctaginacææ.

ORDER CCXIII. ROSACEÆ.—ROSEWORTS.

Rosaceæ, *Juss. Gen.* 334. in part. (1789); *DC. Prodr.* 2. 525; *Endl. Gen.* cclxxii.; *Meisner Gen.* p. 101.—
 § Sanguisorbææ, *Juss. Gen.* 336. (1789); *DC. Prodr.* 2. 588; *Ed. Pr.* p. 148.—Cliffortiaceæ, *Martius*
Conspectus, No. 216.—Neuradeæ, *DC. Prodr.* 2. 548. (1825); *Martius Conspectus*, No. 314. (1835).—
 Griseleæ, *Sweet.*

DIAGNOSIS.—*Rosal Exogens*, with polypetalous flowers, and carpels both free from the calyx, and quite or nearly so from each other.

Herbaceous plants or shrubs. Leaves simple or compound, alternate, often with 2 stipules at their base, occasionally dotted. Flowers variously arranged, generally ♂,



1 Fig. CCCLXXX.

occasionally ♂ ♀ by abortion. Calyx 4- or 5-lobed, with a disk either lining the tube surrounding the orifice; the fifth lobe next the axis. Petals 5, perigynous, equal to 0. Stamens definite in number or 00, arising from the calyx, just within the petals, aestivation curved inwards; anthers innate, 2-celled, bursting longitudinally. Ovaries superior, either solitary or several, 1-celled, sometimes cohering into a plurilocular stipe; ovules 2 or more, anatropal, suspended, very rarely erect; styles lateral; stigmas usually simple, and emarginate on one side. Fruit either 1-seeded nuts, or uni-, or follicles containing several seeds. Seeds suspended, rarely ascending. Embryo straight, with a taper short radicle pointing to the hilum, and flat cotyledons. Placenta 0.

This Order furnishes the best of all analogies with the hypogynous sub-class, present-

Fig. CCCLXXX. 1 *Spiraea ulmaria*, 2, flower of *Fragaria vesca*, 3, a section of it; 4, section of a flower of a *Spiraea*.

ing many of the more important characters of Crowfoots, and in some measure their habits. It is, however, known by its perigynous stamens and exalbuminous seeds, whose embryo, though small, is amygdaloid. It differs from Appleworts in its ovary being superior, and from Almondworts in that organ being single and changing into a drupe. Saxifrages, which stand very near Roseworts, are readily known by their albuminous seeds, definite stamens, and partially combined, somewhat valvate carpelary leaves. Chrysobalans have a single carpel, but their style originates from the base, not the apex of the ovary. Sanguisorbs are apetalous, with the tube of the calyx hardened and changed into a false pericarp. That Roseworts have some intimate relationship with Myrtleblooms is proved by Appleworts; but a new evidence of this fact has lately been obtained in the form of Roses discovered in China by Mr. Fortune, which have faintly but distinctly transparent dots in the leaves.

Natives chiefly of the temperate or cold climates of the northern hemisphere; a very few are found on high land within the tropics, and an inconsiderable number in the southern hemisphere. Only one species occurs in the West Indies, viz. *Rubus jamaicensis*; several are natives of high land in the East Indies, within the tropics, especially *Potentilla* and *Rubi*; the South American species chiefly consist of a few kinds of *Rubus*, and plants belonging to the section *Quillaire* which are all South American. *Neuradæ* are found in the north of Africa and at the Cape of Good Hope, perhaps also in Mexico. An elaborate account of the geographical distribution of these plants has been given in the *Linnaea*, vol. xvii. p. 549, by Mr. Frankenheim.

The fruits of many species of *Fragaria* (Strawberry) and *Rubus* (Raspberry and Blackberry) are valuable articles of the dessert. No Roseworts are unwholesome; they are chiefly remarkable for the presence of an astringent principle, which has caused some of them to be reckoned febrifuges. The root of *Tormentilla* is used for taming in the Feroe Isles. *Potentilla anserina* has been employed in the same manner, and *P. reptans* as a febrifuge. *Geum urbanum* and *rivale*, *Comarum palustre* and *Sieversia montana* have been compared, for efficacy, to *Cinchona*. The leaves of *Rubus arcticus* and *Rosa rubiginosa* have been employed as substitutes for Tea. The root of *Spiræa filipendula* and *Ulmaria* has been used as a tonic. *Agrimonia Eupatoria* yields a decoction useful as a gargle, and has some celebrity as a vermifuge. Indian Chocolate-root, which is probably *Geum rivale*, is much employed in the United States in diseases of the bladder. The root of *Rubus villosus* is a popular astringent medicine in North America. Two or three tea-spoonfuls of the decoction, administered three or four times a day, has been found useful in cholera infantum. Mixed, however, with this astringency, is the presence of an emetic quality. The roots of *Gillenia trifoliata* and *stipulacea* are emetic, and perhaps tonic. They are used in the United States as *Ipecaeanaha*. One of the most powerful anthelmintics in the world belongs to this family. It is an Abyssinian plant, called *Cusso*, or *Cabotz*, and known to Botanists by the name of *Brayera anthelmintica*. Upon the authority of *Brayer*, after whom it is named, two or three doses of the infusion are sufficient to cure the most obstinate case of *tænia*. The various species of *Rosa* form some of the greatest beauties of the garden. The fruit of *R. canina* and other allied species is astringent, and employed in medicine against chronic diarrhœa and other maladies. The petals of *R. moschata* and *damascena* yield a highly fragrant essential oil, called *Attar of Roses*; those of *R. gallica* are astringent when dried with rapidity, and are sometimes found useful in cases of debility, such as leucorrhœa, diarrhœa, &c. The *Quillaire* are remarkable for their saponaceous secretions. *Quillaia saponaria* yields one of the barks called *Quillai*, used as a substitute for soap. "Two ounces of the bark are sufficient to wash a dress; it is also said to remove all kinds of spots and stains, and to impart a remarkable lustre to wool." It contains a substance which excites violent sneezing, and is closely allied to saponine.—*Chem. Gaz.* 1844, 216. According to *Martius* the *Quillaia brasiliensis* has the same property.



Fig. CCLXXXI.

GENERA.

I. ROSIDÆ. — Calyx tube fleshy, covering over the achænia.	II. POTENTILLIDÆ. — Calyx tube herbaceous. Fruit a heap of achænia.	<i>Fragaria</i> , Linn.	<i>Argentina</i> , Blackw.
<i>Rosa</i> , <i>Tournef.</i>		<i>Duchesnea</i> , Smith.	<i>Boottia</i> , Bigel.
<i>Lowea</i> , <i>Lindl.</i>		<i>Comarum</i> , Linn.	<i>Trichothalamus</i> , Lehmann.
<i>Hulthemia</i> , Dumort.		<i>Potentilla</i> , Linn.	<i>Horkelia</i> , Cham. et Schl.
<i>Rhodopsis</i> , Ledeb.	<i>Dalibarda</i> , Linn.	<i>Quinquefolium</i> , Tourn.	<i>Chamerhodos</i> , Bung.
	<i>Rubus</i> , Linn.	<i>Pentaphylloides</i> , Tour.	<i>Dryadanthë</i> , Endl.
	<i>♀ Cylactis</i> , Raf.	<i>Tormentilla</i> , Tourn.	<i>Sibbaldia</i> , Linn.

Fig. CCLXXXI.—Perpendicular section of a Rose-flower.

Agrimonia, Tourn.
Arenonia, Necker.
Agrimonioides, Tourn.
Spallanzania, Poll.
Purshia, DC.
Tigarea, Pursh.
Kunzea, Spreng.
Cercocarpus, H. B. K.
Waldsteinia, Willd.
Comaropsis, L. C. Rich.
Sieversia, Willd.
Adamsia, Fisch.
Buchhavaea, Reichenb.
Orygeum, Ser.
Fallugia, Endl.
Geum, Linn.
Caryophyllata, Tourm.

Stilipus, Raf.
Cowanina, Don.
Coluria, R. Br.
Luzmannia, Fisch.
Dryas, Linn.
 III. SPIRÆIDÆ.—Calyx
 tube herbaceous. Fruit
 a ring of follicles. Seeds
 unwinged.
Kernia, DC.
Spiræa, Linn.
Ulmaria, Tournef.
Filipendula, Tournef.
Barba capree, Tournef.
Physocarpus, Camb.
Chamaedryon, Ser.
Sorbaria, Ser.

Schizonotus, Lindl.
Aruncus, Ser.
Ulmaria, Mœuch.
Neillia, Don.
Gillenia, Mönch.
Nuttallia, Torr. et A. Gr.
Rhodotypos, Zucc.
Stephanandra, Zucc.
Brayera, Kunth.
Hagenia, Willd.
Casso, Bruce.
Banksia, Bruce.
 IV. QUILLAIÆ.—Calyx
 tube herbaceous. Fruit
 capsular. Seed winged.
Kageneckia, Ruiz. et Pav.

Lydea, Mol.
Quillaja, Mol.
Smegmadermos, Ruiz et
 Pav.
Fontenellea, St. Hil.
Vauquelinia, Corr.
Lindleya, H. B. K.
Euphronia, Mart. et Zucc.
 V. ? NEURADÆÆ.—Calyx
 adhering to a ring of 10
 carpels. Seeds pendu-
 lous.
Neurada, B. Juss.
Griellum, Linn.
Amoreuxia, Moc. et Sess.

NUMBERS. Gen. 38. Sp. 500.*

Myrtacæ.

POSITION.—Pomacææ.—ROSACEÆ.—Drupacææ.
Ranunculacææ.



Fig. CCCLXXXII.

* This number must be much higher if the spurious species of *Rubus* and *Rose* are included.

FIG. CCCLXXXII.—1, flower of *Spiræa Aruncus* cut open; 2, a section of one of its carpels; 3, pericarpular section of a flower of *Fragaria indica*; 4, the same section of its half ripe fruit, showing the ovary covered with carpels; 5, a single carpel of it; 6, one of its achania cut open to show the seed inside.

ALLIANCE XLIII. *SAXIFRAGALES*.—THE SAXIFRAGAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with monodichlamydeous flowers, consolidated carpels, sutural or axile placentæ, 00 seeds, a polypetalous corolla, if any is present, and a small taper embryo with a long radicle and little or no albumen.*

The transition from the Rosal to the Saxifragal Alliance has already (p. 539) been shown to take place by way of Roseworts and Saxifrages. To the Rhamnall Alliance Saxifragals pass by way of Brexiads, which are singularly like the genus *Elæodendron* among Spindle-trees. The resemblance of the Orders included in this Alliance is so great, that the first three are often regarded as mere forms of the Order of Saxifrages; Loosestrifes are less obviously similar, but if their herbaceous genera are compared with Saxifrages, or their shrubs with Brexiads, the affinity becomes sufficiently striking. Loosestrifes appear to furnish a lateral connection with Melastomads or Syringas.

NATURAL ORDERS OF SAXIFRAGALS.

<i>Styles distinct. Leaves alternate</i>	214.	SAXIFRAGACEÆ.
<i>Styles distinct. Leaves opposite, without stipules</i>	215.	HYDRANGEACEÆ.
<i>Styles distinct. Leaves opposite, with large interpetiolar stipules.</i>	216.	CUNONIACEÆ.
<i>Styles consolidated. Calyx many-leaved. Albumen 0. Leaves alternate</i>	} 217.	BREXIACEÆ.
<i>Styles consolidated. Calyx tubular, permanent, with the petals in the margin. Albumen 0. Leaves opposite</i>		
	218.	LYTHRACEÆ.

ORDER CCXIV. SAXIFRAGACEÆ.—SAXIFRAGES.

Saxifrage, *Juss. Gen.* 308. (1789); *Vent. Tabl.* 2. 277.—Saxifrageæ, *DC. and Duby*, 207. (1823).—Saxifragaceæ, *DC. Prodr.* 4. 1.; *Endl. Gen. clxx.*; *Meisner*, p. 136.

DIAGNOSIS.—*Saxifragal Exogens*, with distinct styles and alternate leaves.

Herbaceous plants, often growing in patches. Leaves either divided or entire, alternate, with or without stipules. Flower-stems simple, often naked. Calyx either superior or inferior, of 4 or 5 sepals, which cohere more or less at their base. Petals 5 or 0, inserted between the lobes of the calyx. Stamens 5-10, inserted either into the calyx, or beneath the ovary; anthers 2-celled, bursting longitudinally. Disk either hypogynous or perigynous, sometimes nearly obsolete, sometimes annular and notched, rarely consisting of 5 scales. Ovary inferior, or nearly superior, usually consisting of 2 carpels, cohering more or less by their face, but distinct and diverging at the apex; sometimes 2-celled with a central placenta; sometimes 1-celled with a double placenta adhering to the sutures. Styles none. Stigmas sessile on the tips of the lobes of the ovary. Fruit generally a membranous 1- or 2-celled capsule with the cells divaricating when ripe. Seeds numerous, very minute; usually with long hexagonal reticulations on the side of a transparent testa. Embryo taper, in the axis of fleshy albumen, with the radicle next the hilum.

So near is the affinity of Saxifrages and Roseworts

that in some cases it is difficult to distinguish the Orders. Nevertheless they appear to represent two distinct tendencies (*Nicus*), that of Saxifrages being towards the consolidation of the fruit, and the formation of albumen, while that of Roseworts is plainly towards a disunion of the carpels and the absorption of albumen. If compared with other Orders in their own Alliance, Saxifrages will be found to differ from Loosestrifes and Brexiads in their dis-

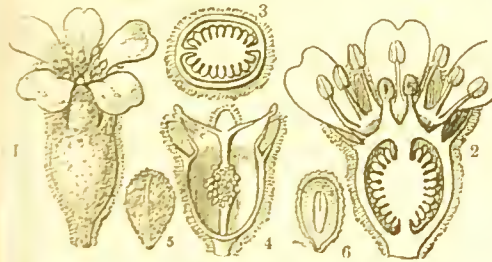


Fig. CCCLXXXIII.

nited styles, from Cunoniads and Hydrangeads in their alternate leaves.

More remote affinities have been indicated by authors. Thus they may be compared in some respects to Cloveworts, especially to the Alsineous division of that Order; but they differ in the insertion of the stamens, placentation, situation of the embryo, and otherwise. Purslanes, which may be compared with this Order, on account of the situation of the stamens, want of stipules, and albuminous seeds, differ essentially in the structure of the embryo, in the want of symmetry in the parts of the flower, and in placentation. Currantworts correspond in the general structure of the flower; but differ widely in the ovary being completely concrete and inferior, with two parietal placentae, in the seeds being attached to long umbilical cords, in the albumen being mucous, and the embryo extremely minute. De Candolle remarks that Saxifrages approach Houseleeks, differing in having a smaller number of carpels, which are partially united both with each other and the calyx, and in being destitute of glands at the base of the carpels.

Chrysosplenium is remarkable for the want of petals. *Drummondia* has the stamens

Fig. CCCLXXXIII.—*Saxifraga tridactylites*. 1. its flower; 2. a perpendicular section of it; 3. cross section of its ovary; 4. perpendicular section of a fruit; 5. a seed; 6. a section of a seed.

equal in number to the petals and opposite them, thus indicating some analogy with the monopetalous Primworts.

Little herbaceous plants, usually with white flowers, cæspitose leaves and glandular stems : some of the species have yellow flowers, others have red, but none blue. They are natives of mountainous tracts in Europe and the northern parts of the world, frequently forming the chief beauty of that rich turf which is found near the snow in high Alpine stations. Some grow on rocks and old walls, and in hedgerows, or near rivulets, or in groves. None are produced in tropical countries.

The whole Order is more or less astringent. The root of *Heuchera americana* is powerfully so, whence it is called in North America Alum-root. Otherwise the species possess no known properties ; for the old idea of their being lithontriptic appears to have been derived from their name rather than their virtues. Some pretend that *Saxifraga crassifolia* may be used as a substitute for Tea ; and *Chrysosplenium alternifolium* has had some small reputation, in former days, as a slight tonic. The glutinous exudation of a few of them is acrid.

GENERA.

<i>Eremosyne</i> , Endl.	<i>Porophyllum</i> , Gaud.	<i>Ligularia</i> , Duval.	<i>Heucherella</i> , Torr. et A. Gr.
<i>Donatia</i> , Forst.	<i>Dactyloides</i> , Tausch.	<i>Micropetalum</i> , Tausch.	Mitellopsis, Meisn.
<i>Vahlia</i> , Thunb.	<i>Saxifraga</i> , Haw.	<i>Colylea</i> , Haw.	<i>Tolmiea</i> , Torr. et A. Gr.
<i>Russelia</i> , Linn. f.	<i>Muscaria</i> , Haw.	<i>Lobaria</i> , Haw.	<i>Drummondia</i> , DC.
<i>Bistella</i> , D. A.	<i>Triplinerrium</i> , Gaud.	<i>Hirculus</i> , Tausch.	<i>Mitella</i> , Tournef.
<i>Nimmoia</i> , Wight.	<i>Bergenia</i> , Mönch.	<i>Kingstonia</i> , Gray.	<i>Tellima</i> , R. Br.
<i>Boykinia</i> , Nutt.	<i>Megasea</i> , Haw.	<i>Ciliaria</i> , Haw.	<i>Lithophragma</i> , Nutt.
<i>Zahlbrucknera</i> , Reichenb.	<i>Geryonia</i> , Schrank.	<i>Leptasea</i> , Haw.	<i>Lithophragmella</i> , Torr.
<i>Oreosplenium</i> , Zahlbr.	<i>Eropheron</i> , Tausch.	<i>Leptarrhena</i> , R. Br.	<i>Sullivania</i> , Torr.
<i>Saxifraga</i> , Linn.	<i>Micranthes</i> , Tausch.	Lütkea, Bong.	<i>Tiarella</i> , Linn.
<i>Porphyrium</i> , Tausch.	<i>Dermasea</i> , Haw.	<i>Eriogyne</i> , Hook.	<i>Blondia</i> , Neck.
<i>Antiphylla</i> , Haw.	<i>Arabidra</i> , Tausch.	<i>Lepuropetalum</i> , Ell.	<i>Anthonema</i> , Nutt.
<i>Caliphyltum</i> , Gaud.	<i>Spathularia</i> , Haw.	<i>Cryplopetalum</i> , Hook.	<i>Astilbe</i> , Hamilt.
<i>Aizoonia</i> , Tausch.	<i>Hydaticea</i> , Neck.	<i>Chrysosplenium</i> , Tourn.	<i>Holeia</i> , Morr. et Dec.
<i>Chondrosea</i> , Haw.	<i>Robertsonia</i> , Haw.	<i>Heuchera</i> , Linn.	<i>Orestrophe</i> , Bung.
<i>Colyledon</i> , Gaud.	<i>Anlaxis</i> , Haw.	<i>Holochtoa</i> , Nutt.	
<i>Trigonophyllum</i> , Gaud.	<i>Diptera</i> , Borkh.		

NUMBERS. GEN. 19. Sp. 310.

Crassulacæ.

Rosacæ.

POSITION.—*Cunoniaceæ.*—*SAXIFRAGACEÆ.*—*Lythracæ.*

Crassulacæ.

ORDER CCXV. HYDRANGEACEÆ.—HYDRANGEADS.

Hydrangeæ and Bauera, *DC. Prodr.* 3. 13. (1830); §§ of Saxifragaceæ, *Endl. Gen.* p. 820.—Hydrangeæ, *Siebold and Zuccarini, Fl. Jap.* 1. 102. in notis (1835).? —Bauera, *Ed. pr. No.* 40. (1830); *Martius Conspectus*, No. 226.

DIAGNOSIS.—*Saxifragal Ecogens, with distinct styles, and opposite leaves without stipules.*

Shrubs with perfectly opposite simple leaves, smooth or downy, with simple hairs; destitute of stipules; sometimes creeping and rooting like Ivy. Flowers usually in cymes, those in the centre ♂, the marginal often sterile and furnished with larger petals than the others. Calyx adhering more or less to the ovary, 4-6-toothed. Petals 4-6, inserted within the edge of the calyx, deciduous. Stamens 8-12 in 2 rows, or ∞, inserted in the orifice of the calyx, distinct, deciduous. Anthers oblong or roundish; pollen with 3 longitudinal furrows. Ovary more or less adherent to the calyx, consisting of from 2 to 5 carpels, adhering by their sides and forming an incompletely 2-5-celled cavity; placentæ distinct from each other, but touching, with many anatropal ascending or horizontal ovules; styles as many as the carpels, perfectly distinct, diverging, with simple reniform stigmas. Fruit a capsule crowned by the permanent diverging styles, 2-5-celled, with a number of minute seeds, sometimes indefinite, sometimes few, in consequence of the abortion of a part of the ovules. Pericarp thin, membranous, netted, occasionally expanded into a wing. Embryo orthotropal, in the axis of a small quantity of fleshy albumen.

The relationship between Hydrangeads and Saxifrages is admitted by all systematists, who have in general united them in the same order. The opposite leaves of the former, the tendency to a polygamous structure evinced in their radiant male flowers, and the general increase of carpels beyond two, seem to offer good grounds for separating them. Like Saxifrages, their styles are almost always distinct and very often divergent. In some the ovary is entirely adherent to the calyx; in others, as *Hydrangea virens*, it is more than half separated. *Schizophragma*, a curious Japanese genus, has the styles united, and thus furnishes a transition to *Capriopsis* on the one hand, and to *Henslowia* on the other. *Siebold and Zuccarini* place *Dentzia* here, and it may be regarded as a genus bringing the Philadelphia in contact. *Bauera* is anomalous in its whorled exstipulate leaves and porous anthers, but can hardly be separated, unless it be referred to Cunoniads, upon the supposition of Dougl., that its lateral leaves are modified stipules.

Siebold and Zuccarini remark that out of the species hitherto discovered, all of which inhabit the temperate parts of Asia and America, two only belong to the Southern hemisphere, and 23, or about one-half, to China and Japan. These authors do not, however, include *Bauera*, but they admit *Dentzia*. The species are found naturally in moist, shady places.



Fig. CCCLXXXIV.

Fig. CCCLXXXIV.—1. *Hydrangea virens* and its flower.—*Siebold*; 2. seed vessel of *H. hortensis*; 3. its seed; 4. a section of it.

None of these appear to be of much use to man. Hydrangeas have been cultivated as garden ornaments from the most ancient times in China and Japan. The leaves of *H. Thunbergii* are dried in Japan, and used as a kind of tea, which for its excellence they call Ama-tsjå, or Tea of Heaven. Another sort of tea is furnished by *Platycrater arguta*.—*Siebold*.

GENERA.

<i>Hydrangea</i> , L.	<i>Cardiandra</i> , S. et Z.	<i>Cornidia</i> , R. P.	<i>Adamia</i> , Wall.
<i>Hortensia</i> , Juss.	<i>Platycrater</i> , S. et Z.	<i>Sarcostyles</i> , Presl.	<i>Cyanitis</i> , Reinw.
<i>Peautia</i> , Coum.	<i>Schizophragma</i> , S. et Z.	<i>Broussaisia</i> , Gaud.	<i>Banera</i> , Sm.
<i>Primula</i> , Lour.	<i>Jamesia</i> , Torr. et Gr.		

NUMBERS. GEN. 9. Sp. 45.

Philadelphaceæ.

POSITION.—*Saxifragaceæ.*—*HYDRANGEACEÆ.*—*Cunoniaceæ.*

Caprifoliaceæ.

HENSLOVIAEÆ, (*Lindl. in Bot. Reg. 20. fol. 1686. (July 1834); Martius Conspetus, No. 77; Ed. pr. cxxiv.; Endl. Gen. p. 291*). Trees, with the habit and inflorescence of *Myrsine*. Leaves opposite, entire, without stipules. Wood regularly zoned, with very abundant vasiform tissue (dotted ducts). Flowers by abortion ♂ ♀ Calyx 5-parted, lined with a woolly disk, with a valvate aestivation. ♂ Stamens 5, alternate with the sepals, perigynous, long, exserted, inflexed in aestivation; anthers 2-celled, with a broad connective, the lobes oblique, bursting longitudinally. A rudiment of an ovary. ♀ Ovary superior, 2-celled, with very numerous ovules attached horizontally to a placenta in the axis; style cylindrical; stigma obsoletely 2-lobed; ovules with a large conspicuous foramen next the hilum. Fruit a capsule, bursting through the cells into 2 valves. Seeds 00, minute, scrobiform, with the skin drawn to a point and winged on one side, an oblong nucleus, and no albumen. Radicle next the hilum.—After vain attempts at settling the true place of the genus *Henslovia* in the Natural System (see the last edition, No. cxxiv.), some specimens with ripe fruit, for which I am indebted to Mr. Griffith, place the question nearly at rest. The habit of the plant was evidently that of *Viburnum*; but its superior ovary and indefinite ovules forbade any reference to *Caprifoliaceæ*. But *Hydrangeads* differ from that Order mainly in their indefinite seeds, small quantity of albumen, and constant tendency to produce a superior ovary. *Henslovia* agrees with them still further; the flowers are polygamous, the seeds are winged, which is also the case in *Hydrangea cordifolia* and others; and the albumen is wholly deficient. The chief distinction consists in the complete adhesion of the styles into one undivided cylinder; but among *Hydrangeads* we have the same peculiarity in *Schizophragma* and *Broussaisia*. On that account, however, *Henslovia* may be regarded as a relation of *Brexia*, but its decidedly opposite leaves are unfavourable to the union of the two in the same Order.—*Henslovia* consists of 3 or 4 species of trees inhabiting the tropical parts of India.—Only Genus. *Henslovia*, Wall.

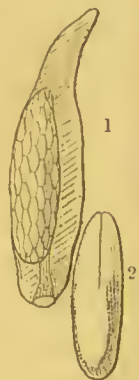


Fig. CCCLXXXV.

Fig. CCCLXXXV.—*Henslovia*. 1. its seed; 2. its embryo.

ORDER CCXVI. CUNONIACEÆ.—CUNONIADS.

Cunoniaceæ, *R. Br. in Hinders*, 548. (1814); *Don in Edinb. New Phil. Journ.* June 1830, in part; *Martius Conspectus*, No. 223.; *Endl. Gen.* p. 819.—Ochranthaceæ, *Ed. pr.* p. 78. (1836); *Endl. Gen.* p. 1035.

DIAGNOSIS.—*Saxifragal Exogens*, with distinct styles, and opposite leaves with large interpetiolar stipules.

Trees or shrubs. Leaves opposite, compound or simple, with stipules between the leafstalks, sometimes united and scale-like, sometimes separate and leafy. Calyx 4 or



Fig. CCCLXXXVII.

5-lobed, half superior or nearly inferior. Petals 4 or 5, occasionally wanting. Stamens perigynous, definite, or 00; anthers bursting longitudinally or by pores. Ovary 2-celled, the cells having 2 or many seeds; styles 2, sometimes combined. Fruit 2-celled, capsular or indehiscent. Embryo in the axis of fleshy albumen.

This Order is no doubt very distinct from that of Saxifragales, and yet it is more easily distinguished by the widely different habit than by any very important characters in the fructification. The shrubby way of growth and remarkable interpetiolar stipules are the principal character. Don supposed the Order to be strictly allied to Philadelphads. The genus *Ochranthe*, described in the *Botanical Register*, (Dec. 1835), agreeing with Tutsans in having imbricated sepals, hypogynous petals and stamens, partly disjoined carpels, and in some degree in habit, but differing in having definite stamens (5), stipules, and serrated leaves, but whose fruit is unknown, seems, upon the whole, to form a member of the Order of Cunoniads.

Natives of the Cape, South America, and the East Indies; common in Australasia.

A *Weinmannia* is used in Peru for tanning leather, and its astringent bark is employed to adulterate the Peruvian bark. The Indian *Weinmannias* appear to possess

Fig. CCCLXXXVI.—*Weinmannia Balbisiana*. Turpin. 1. its ovary.

Fig. CCCLXXXVII.—*Ochranthe arguta*. 1. grain of pollen, 2. perpendicular section of its pistil.

similar astringent qualities. Some of the Australasian plants of the Order have a gummy secretion. In general, the pretty appearance of their small white or pink flowers makes them gay objects.

GENERA.

<p>I. WEINMANNIÆ.</p> <p>Codia, <i>Forst.</i> Callicoma, <i>Andr.</i> Calycomis, <i>R. Br.</i> Aphanopetalum, <i>Endl.</i> Ceratopetalum, <i>Smith.</i> <i>Meridema</i>, <i>Don.</i> Schizomeria, <i>Don.</i></p>	<p>Platylophus, <i>Don.</i> Anodopetalum, <i>A. Cunn.</i> Weinmannia, <i>Linn.</i> <i>Windmannia</i>, <i>P. Br.</i> Leiospermum, <i>Don.</i> Ackama, <i>A. Cunn.</i> Pterophylla, <i>Don.</i> Arnoldia, <i>Blum.</i></p>	<p>Gumillea, <i>Ruiz et Pav.</i> Calcluvia, <i>Don.</i> <i>Dieterica</i>, <i>Ser.</i> Cunonia, <i>Linn.</i> <i>Osterdyckia</i>, <i>Burm.</i> Geissois, <i>Labill.</i> Adenilema, <i>Blum.</i> Pellacalyx, <i>Korth.</i></p>	<p>Ochranthe, <i>Lindl.</i></p> <p>II. BELANGEREÆ, <i>Gardn.</i></p> <p>Belangera, <i>Camb.</i> <i>Polystemon</i>, <i>Don.</i> <i>Lamanonia</i>, <i>Fl. Fl.</i> Raleighia, <i>Gardn.</i></p>
---	---	--	---

NUMBERS. GEN. 22. Sp. 100.

POSITION.—Hydrangeaceæ.—CUNONIACEÆ.—Saxifragaceæ.
Philadelphaceæ.

ORDER CCXVII. BREXIACEÆ.—BREXIADS.

Brexiceæ, *Ed. Prior*, No. 95. (1830); *Arnott in Edinb. Encycl.* 104. (1832); *Martius Conspectus*, No. 297. (1835); *Endl. Gen. p.* 823.—*Roussiceæ*, *DC. Prodr.* 7. 521; *Endl. Gen. p.* 823.

DIAGNOSIS.—*Saxifragal Exogens*, with consolidated styles, a many-leaved calyx, alternate leaves, and no albumen.

Trees, with nearly simple trunks. Leaves coriaceous, alternate, simple, not dotted, with deciduous minute stipules. Flowers green, in axillary umbels. Calyx inferior, small, persistent, 5-parted; aestivation imbricated. Petals 5, hypogynous, twisted in aestivation. Stamens 5, hypogynous, alternate with the petals, arising from a narrow cup, which is toothed between each stamen; anthers oval, innate, 2-celled, bursting longitudinally, fleshy at the apex; pollen triangular, cohering by means of fine threads. Ovary superior, 5-celled, with numerous ovules attached in two rows to placentæ in the axis; style 1, continuous; stigma simple. Fruit drupaceous, 5-cornered, "marked with numerous small scarcely elevated papillæ like the surface of an orange," 5-celled, many-seeded. Seeds indefinite, horizontal, smooth and shining, brown, ovate, slightly angular, about the size of those of a raisin, attached to the axis, with a double integument, the inner of which is membranous; cotyledons ovate, obtuse; radicle cylindrical, centripetal; (albumen fleshy, according to Thouars).



Fig. CCCLXXXVIII.

There exists in Madagascar a genus called *Brexia*, of which the above is a description, taken in part from the living plant, and in part from Dr. Wallich, in the *Flora Indica*, 2. 314.

The position which this plant ought to occupy in a natural classification is unsettled. Indeed, we are not certain whether or not the seeds have albumen; for although Thouars states it to be fleshy, Dr. Wallich is silent upon the subject, and no other Botanist seems to have examined the seeds. Its habit is that of some Ardisiads, especially of *Theophrasta*, from which it differs in being polypetalous, in the stamens being alternate with the petals, and in many other circumstances. With *Rhamnads* and *Spindle-trees* its relation is no doubt strong, but its seeds are indefinite. Some resemblance may be traced between it and *Anacards*, especially in the resinous appearances visible upon the young shoots, and also in habit; but its fructification is entirely at variance with that Order. With *Pittosporads* it agrees in its hypogynous definite stamens, its polyspermous fruit, its alternate undivided leaves, and habit; but it is probable that the embryo is not such as befits that Order. *Endlicher* places it at the end of *Saxifragæ*, combining with it *Ixerba* and *Argophyllum*, the latter a genus having the ovary adherent in some degree to the calyx. If this approximation is right,—and it certainly seems probable,—and if the seeds of *Brexia* should prove, when re-examined, to have albumen, as Thouars says, and the peculiar reticulated testa represented by *Gærtner*, then *Brexia* must be indeed a perigenous form, and may be looked upon as a genus of the *Saxifragal Alliance*, where it is perhaps best to place it for the present. Nor can I doubt that *Roussæa*, figured by *Endlicher* in his *Iconographia*, is of the same class, notwithstanding its opposite leaves. Its great disk is quite analogous to the toothed disk of *Brexia*.

GENERA.

<i>Ixerba</i> , <i>A. Cunn.</i>	<i>Venana</i> , <i>Lam.</i>	<i>Roussæa</i> , <i>Smith.</i>	<i>Roussæa</i> , <i>Röm. et Schlt.</i>
<i>Brexia</i> , <i>Thouars.</i>	<i>Argophyllum</i> , <i>Forst.</i>	<i>Roussæa</i> , <i>DC.</i>	<i>Roussæavia</i> , <i>Boj.</i>

NUMBERS. GEN. 4. Sp. 6.

Celastraceæ.

POSITION. ——— BREXIACEÆ.—*Cunoniaceæ.*

Myrsinaceæ.

Fig. CCCLXXXVIII.—1. *Brexia madagascariensis*, 2. section of its ovary; 3. seed of *Argophyllum*.

ORDER CCXVIII. LYTHRACEÆ.—LOOSESTRIFES.

Salicariæ, *Juss. Gen.* 330. (1789); *Lindl. Synops.* 71; *Aug. de St. H. Ann. Sc. Nat.* 2. ser. 1. p. 1, and 333.—Calycanthemæ, *Vent. Tabl.* 3. 298. (1799).—Salicariæ, *Link Enum.* 1. 142.—Lythriaræ, *Juss. Dict. Sc. Nat.* 27. 453; *DC. Prodr.* 3. 76; *Endl. Gen. cclxvii.*; *Meisner Gen.* p. 117.

DIAGNOSIS.—*Saxifragal Exogens*, with consolidated styles, a tubular permanent calyx with the petals in the margin, opposite leaves, and no albumen.

Herbs, rarely shrubs. Branches frequently 4-cornered. Leaves opposite, seldom alternate, entire, without either stipules or glands, sometimes with glandular dots.



Fig. CCCLXXXIX.

Flowers solitary or clustered, regular or irregular, axillary or in terminal spikes or racemes, in consequence of the depauperation of the upper leaves. Calyx monosepalous, tubular, ribbed, often oblique, the lobes with a valvate or separate aestivation, their sinuses sometimes lengthened into other lobes. Petals inserted between the outer lobes of the calyx, very deciduous, sometimes wanting. Stamens inserted into the tube of the calyx below the petals, to which they are sometimes equal in number; sometimes twice, or even four times as numerous; anthers adnate, 2-celled, opening longitudinally. Ovary superior, 2-6-celled, occasionally only 1-celled; ovules 00, rarely definite, ascending or horizontal, anatropal, attached to axile or dissepimental placentæ, having a central origin; style filiform; stigma usually capitate. Capsule membranous, covered by the calyx, dehiscent. Seeds numerous, small, without albumen, adhering to a central placenta; embryo straight; radicle turned towards the hilum; cotyledons roundish, flat, and leafy.

The true place of this Order has been the subject of much difference of opinion. A writer in the *Linnaea* (14. 254) refers it without any doubt to the vicinity of Houseleeks (*Crassulaceæ*). In some respects the Order resembles *Onagrad*, from which the superior ovary and many-ribbed calyx distinguish it; also *Melastomads*, from

which the superior ovary, the veining of the leaves, and the aestivation of the stamens divide it. With *Labiates* it has often a similarity in habit, but this goes no further. A resemblance to *Spindle-trees* is established by the genus *Adenaria*. Endlicher even

compares the Order with Waterpeppers (Elatinacæ), because of its simple style and the structure of its seeds.

It seems, however, to be with Saxifrages that the affinity is strongest. In fact, *Lythrum* is little more than a Saxifrage with united styles and scattered stamens; it even agrees with certain Saxifrages in the irregularity of the flowers. The *Lagerströmææ*, among which some resemblance to *Melastomads* is chiefly found, may be stationed by the side of *Cunoniads*, from which their consolidated carpels and want of stipules clearly, however, divide them.

The *Lagerströmææ* are all Indian or South American. The *Lythreæ* are European, North American, and natives of the tropics of both hemispheres. *Lythrum Salicaria*, a common European plant, is singular for being found in New Holland, and for also being the only species of that Order yet described from that country.

Astringency is a property of the *Lythrum Salicaria*, which is reputed to have been found useful in inveterate diarrhoeas: another species of the same genus is accounted in Mexico

astringent and vulnerary, a reputation which also belongs to other species of the genus. The flowers of *Grislea tomentosa* are employed in India, mixed with *Morinda*, for dyeing, under the name of *Dhaæ*. *Heimia salicifolia*, a plant remarkable in an Order with red or purple flowers, for its yellow corolla, is said to excite violent perspiration.

The Mexicans consider it a potent remedy for venereal diseases, and

call it *Hanchinol*. *Lawsonia inermis* is the plant from which the *Henné* of Egypt is obtained. Women in that country stain their fingers and feet of an orange colour with it. It is also used for dyeing skins and morocco leather reddish-yellow, and for many other purposes. It contains no tannin.—*Ed. P. J.* 12. 416. The bark and leaves of *Lagerströmia Regiæ* are accounted purgative and hydragogue, the seeds narcotic. The leaves of *Ammannia vesicatoria* have a strong muriatic smell; they are extremely acrid, and are used by the native practitioners of India to raise blisters in rheumatism, &c.: bruised and applied to the part intended to be blistered, they perform their office in half an hour, and most effectually. The herbage of *Nesaea verticillata* is said to destroy the young of cattle heavy with calf. Nevertheless, the leaves of *Pemphis acidula* are said to be a common potherb on the coast of the tropical parts of Asia. A decoction of *Cuphea Balsamona* is found useful in Brazil in intermittent fevers. The *Physocalymma floribunda* yields a beautiful Rose-coloured wood, called in German *Rosenholz*, and in Portuguese *Pão de rosa*.

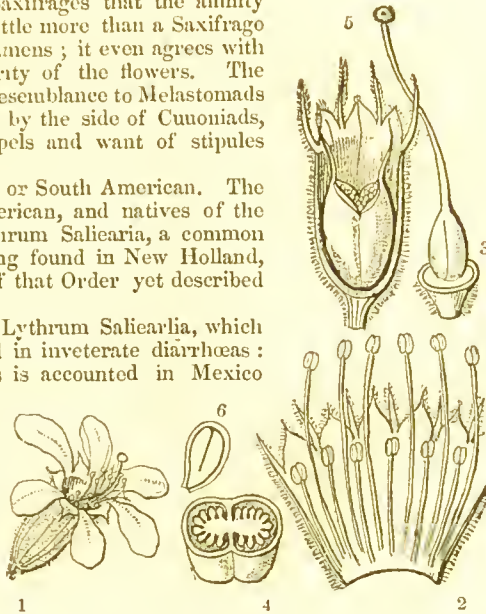


Fig. CCCXC.

GENERA.

LYTHRÆÆ. — Seeds wingless.

Cryptotheca, Blum.
Infrenia, Bellord.
Rotala, Linn.
Eubelia, R. Br.
Ippobrichia, M. G. Curt.
Ptilina, Nutt.
Didiplia, Raf.
Cepelis, Linn.
Portula, Dill.
Chabræa, Adans.
Quartinia, Ewll.
Rhynchochila, Hochst.
Ameletia, DC.
Hiddendorfla, Trautv.
Ammannia, Houtt.
Trithoea, Wight et Arn.
Diplostemon, Wight.

Cornelia, Ard.
Haplocarpea, Wight.
Dilheca, Wight et Arn.
Mircocæa, Wight et Arn.
Nesæa, Commers.
Tolypeuma, E. Mey.
Trotula, Comm.
Decodon, Gmel.
Heimia, Link et Otto.
Chrysoliga, Hoffmans.
Ginoria, Fl. Mex.
Pemphis, Forst.
Lythrum, Linn.
Salicaria, Tournef.
Byssopifolia, C. Bauh.
Pythagoræa, Raf.
Mozula, Raf.
Plantagotum, Forsk.
Ankotes, Lindl.
Plenophora, Don.

Cuphea, Jacq.
Melantron, P. Br.
Parsonia, P. Br.
Balsamona, Vand.
Melvilla, Anders.
Duvernaya, Desp.
Acisanthera, P. Br.
Crenea, Aubl.
Dodecæa, Linn.
Ginoria, Jacq.
Ginora, Linn.
Genoria, Pers.
Grislea, Hoffm.
Woodfordia, Salisb.
Adenaria, H. B. K.
Antheryllum, Rohr.
Lawsonia, Linn.
Alcanna, Gärtn.
Abatia, Ruiz et Pav.

II. LAGERSTRÖMÆÆ. — Seeds winged.

Diplusodon, Pohl.
Diplodon, Spreng.
Friedlandia, Cham.
Dubyæa, DC.
Lafloensis, Vandell.
Calyplectus, Ruiz et P.
Ptychodon, Klotzsch.
Physocalymma, Pohl.
Lagerströmia, Linn.
Sibia, DC.
Münchhausia, Linn.
Adamea, Linn.
Duabanga, Hamilt.
Fatoua, DC.
? *Symmetria*, Blum.
? *Physopodium*, Desv.
? *Psyloxylon*, Naud.

NUMBERS. GEN. 35. Sp. 300.

POSITION.—Saxifragaceæ. LYTHRACEÆ.—Cunoniaceæ.
Melastomaceæ.

Fig. CCCXC.—*Lythrum Salicaria*. 1. a flower; 2. the calyx spread open; 3. the pistil; 4. a cross-section of the ovary; 5. the capsule; 6. a section of a seed.

ALLIANCE XLIV. RHAMNALES.—THE RHAMNAL ALLIANCE.

DIAGNOSIS.—*Perigynous Ecogens, with monodichlamydeous flowers, consolidated carpels, axile placentæ, capsular, berried, or drupaceous fruit, definite seeds, and an amygdaloid embryo, with little or no albumen.*

It has already been stated that the only positive distinction between this Alliance and Daphnals consists in the compound ovary of Rhamnals. This may seem a trifling difference and quite artificial. But in reality it is connected with a higher evolution of all the parts, as is indicated by the general presence of a corolla, which even becomes monopetalous, and by its considerable development in many instances. Even in Sarcocollads, where the corolla is missing, the calyx acquires quite a petaloid condition.

Storaxworts pass directly into Ebenads, with which the next Alliance commences. In general the smallness of the embryo and the largeness of the albumen in the latter, completely divide them from Rhamnals; but some Ebenads have quite an intermediate structure, and are not very easy to distinguish from Storaxworts.

NATURAL ORDERS OF RHAMNALS.

- | | |
|--|------------------------|
| <i>Flowers apetalous. Ovary composed of 4 carpels. Calyx tubular, with definite divisions. Cotyledons consolidated . . .</i> | } 219. PENÆACEÆ. |
| <i>Flowers apetalous. Ovary composed of 2 carpels. Calyx tubular, with a definite number of divisions. Cotyledons amygdaloid . . .</i> | } 220. AQUILARIACEÆ. |
| <i>Flowers apetalous. Ovary composed of 2 carpels. Calyx imperfect, and irregularly divided at the edge. Cotyledons thin and leafy . . .</i> | } 221. ULMACEÆ. |
| <i>Flowers polypetalous. Calyx valvate. Stamens opposite petals. Seeds erect . . .</i> | } 222. RHAMNACEÆ. |
| <i>Flowers polypetalous. Calyx valvate. Stamens alternate with petals. Seeds pendulous . . .</i> | } 223. CHAILLETIACEÆ. |
| <i>Flowers polypetalous. Calyx imbricated. Stamens (3) monadelphous . . .</i> | } 224. HIPPOCRATEACEÆ. |
| <i>Flowers polypetalous. Calyx imbricated. Stamens (5) distinct . . .</i> | 225. CELASTRACEÆ. |
| <i>Flowers monopetalous. Stamens episepalous . . .</i> | 226. STACKHOUSIACEÆ. |
| <i>Flowers monopetalous. Stamens epipetalous. Ovules ascending. Radicle short. Cotyledons amygdaloid . . .</i> | } 227. SAPOTACEÆ. |
| <i>Flowers monopetalous. Stamens epipetalous. Ovules, in part at least, suspended. Radicle long. Cotyledons leafy . . .</i> | } 228. STYRACACEÆ. |

ORDER CCXIX. PENÆACEÆ.—SARCOCOLLADS.

Penæaceæ, *R. Broten*, verbally, (1820); *Guillemin in Dict. Class.* 13. 171. (1828); *Kunth in Linnaea*, v. 667. (1830); *Endl. Gen.* cxii.; *Meisner Gen.* p. 329.—Geissolomeæ, *Endl. Ench.* p. 214.

DIAGNOSIS.—*Rhamnial Exogens*, with apetalous flowers, an ovary composed of 4 carpels, a tubular calyx, with definite divisions, and 2 consolidated cotyledons.

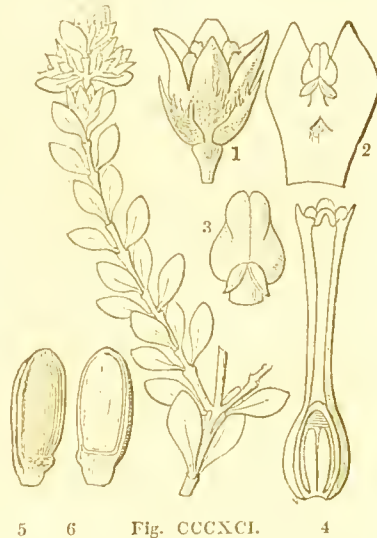
Shrubs. Leaves opposite, imbricated, without stipules. Flowers terminal and axillary, usually red. Calyx inferior, with 2 or more bracts at its base; hyocerateriform, with a 4-lobed limb, valvate or imbricated in æstivation. Stamens either 4, arising from below the recesses of the limb, with which they alternate, or 8, arising from near the base of the calyx; anthers 2-celled, turned inwards, usually with membranous valves lying on the face of a thick fleshy connective, sometimes with fleshy valves, and an obliterated connective. Ovary superior, 4-celled, with a simple style and 4 half-indusiate stigmas; ovules anatropal, either ascending, collateral, in pairs, or solitary and suspended. Fruit capsular, 4-celled, dehiscent or indehiscent? Seed erect or inverted; testa brittle; nucleus a solid fleshy mass, with no distinction of albumen or embryo; hilum fungous.

According to an observation of Jussieu, this Order is allied to Epacrids; but I confess myself unable to perceive on what account. To me it formerly appeared related to such apetalous dicotyledons as Proteads, with some of which the species agree in habit, and in the case of *Penæa fruticulosa* even in the thickened connective and the structure of the lobes of the stigma, each of which is strikingly like that of a *Grevillea*. To *Bruniads* they may be compared, notwithstanding the presence of petals in that Order, for the sake of *Linconia*, in which the pendulous ovule agrees with *Geissoloma*, and of the thickened connective of the anthers, which is common to several species, although not present in *Geissoloma*. The fungous hilum of the seed is similar to that of Milkworts, with which, however, *Penæads* have no other apparent relation. It is, probably, to *Rhamnads* that the Order claims the nearest station, for it corresponds with them in the important fact of the stamens being alternate with the valvate lobes of the calyx, when the stamens are of an equal number, and it differs from them principally in its peculiar anthers (and undivided embryo?). Its half-indusiate stigmas are like those of some *Heathworts*.

The Order exhibits a singular instance of two distinct kinds of æstivation and attachment of ovules among species which it seems unadvisable to separate from each other. In true *Penæa* the æstivation is valvate and the ovules ascending, while in *Geissoloma* the former is imbricate and the latter suspended. *Penæa* has also tetrandrous flowers, with peculiarly fleshy anthers, while *Geissoloma* has octandrous flowers, with no peculiar fleshiness in the anthers.

All are evergreen shrubs, natives of the Cape of Good Hope, and chiefly those to the eastward of the Hottentots Holland chain of mountains.

A sub-viscid, sweetish, somewhat nauseous gum-resin called *Sarcocol* (*Σαρκοκόλλα*, *Diosc.*) is said to be produced by various species. It was supposed by the Arabians to possess, as its name indicates, the power of agglutinating wounds, and contains a peculiar principle, named *Sarcocollin*, which has never been detected in any other vegetable matter, and which has the property of forming oxalic acid, being treated with nitric



5 6 Fig. CCCXCI. 4

Fig. CCCXCI.—*Penæa fruticulosa*. 1. a flower; 2. a portion of the calyx with a stamen attached; 3. an anther; 4. a pistil, with one of the cells cut open; 5. a seed; 6. a section of it.

acid. Endlicher, however, remarks that this drug is not likely to be a product of the present Order. Dioscorides says that it was obtained from a Persian tree; but whether that were so or not, the manifest relation of the drug called Sarcocoll to Galbanum and Sagapenum, renders it more likely to come from some Umbellifer.

GENERA.

Penæa, *L.*
Sarcocolla, *Kth.*
Geisoloma, *Lindl.*

NUMBERS. GEN. 3. Sp. 21.

POSITION. ————— *Burziacca.*
 ————— PENÆACEÆ. — *Rhamnaceæ.*
 ————— *Protaceæ.*

ORDER CCXX. AQUILARIACEÆ.—AQUILARIADS.

Aquilarinæ, *R. Brown Cong.* p. 25. (1818); *DC. Prodr.* 2. 59; *Royle Illustr.* 171; *Endl. Gen. ex.*; *Meisner Gen.* p. 73; *Decaisne Ann. Sc.* xix. 35.

DIAGNOSIS.—*Rhamnæ* *Exogens*, with apetalous flowers, an ovary composed of 2 carpels, a tubular calyx with a definite number of divisions, and amygdaloid cotyledons.

Trees. Branches smooth, with a tough bark. Leaves alternate or opposite, on short stalks, entire, without stipules. Calyx turbinate or tubular; limb 4- or 5-cleft; segments spreading, persistent, with an imbricated aestivation; the orifice usually furnished with scales (sterile stamens). Stamens 10, 8, or 5, in the latter case opposite the segments of the calyx; filaments inserted into the orifice of the calyx a little lower down than the scales. Anthers narrow, oblong, attached by their back below the middle, 2-celled, opening internally and lengthwise. Ovary superior, sessile or stipitate, downy, compressed, 2-celled; ovules two, anatropal, of which one is suspended from each side of the placenta, tapering downwards; style 0, or conical and thread-shaped; stigma large, simple. Capsule sessile or stipitate, 2-valved or drupaceous, and indehiscent. Seeds one on each placenta, or one sometimes abortive, pendulous; albumen 0; cotyledons thick, fleshy, hemispherical; radicle straight, superior.

De Candolle places this Order between Chailletads and Anacards, but with indications of doubt, and an erroneous character; and Brown seems willing to consider the Order a section of Chailletads, adding, that it would not be difficult to show its affinity to Daphnads. In this I fully concur; in fact, Aquilariads chiefly differ from Daphnads in their dehiscent fruit, composed of two carpels, not one. Both Orders have similar scale-like bodies at the orifice of the calyx, and no petals, both suspended ovules, a single style, and capitate stigma. This too is the view taken of their affinities by M. Decaisne, who indeed regards them as a mere section of Daphnads, observing that they really differ in nothing except their 2-celled ovary. I would, however, prefer leaving them here, as the group which, in the Rhamnæ Alliance, touches the Daphnal.

The species are confined to the tropical parts of Asia.

Aloes-wood, Agila-wood, or Eagle-wood, containing a fragrant resinous substance, of a dark colour, is the inside of the trunk of the *Aquilaria ovata* and *A. Agallochum*. It is considered a cordial by some Asiatic nations, and has been prescribed in Europe in gout and rheumatism. For a valuable account of this substance, see *Royle*, as above quoted.

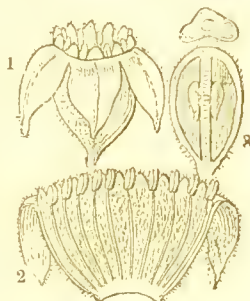


Fig. CCCXCII.

GENERA.

<i>Aquilaria</i> , Lam.	<i>Gyrinopsis</i> , Gertn.	<i>Phaleria</i> , Jack.	<i>Gyrinopsis</i> , Decaisne.
<i>Ophiospermum</i> , Lour.	<i>Drimyspermum</i> , Radd.	<i>Pseudals</i> , Decaisne.	

NUMBERS. GEN. 6. Sp. 10.

POSITION. PERICEEÆ. AQUILARIACEÆ.—Chailletaceæ,
Thymelacææ.

Fig. CCCXCII.—*Aquilaria Agallochum*. 1. a flower; 2. the same split open; 3. a section of the ovary.

ORDER CCXXI. ULMACEÆ.—ELMWORTS.

Ulmaceæ, *Mirbel Elem.* 905. (1815); *Lindl. Synops.* 225; *Endl. Gen.* xc.; *Meisn. Gen.* p. 351.—Celtideæ, *Rich., Gaudich. in Freyc. Voy.* 507. (1826); *Endl. Gen.* xci.; *Meisner Gen.* p. 348.

DIAGNOSIS.—*Rhamnul Exogens*, with apetalous flowers, an ovary composed of 2 carpels, an imperfect calyx irregularly divided at the edge, and thin and leafy cotyledons.

Trees or shrubs, with rough, alternate, usually deciduous leaves, each having a pair of deciduous stipules at its base. Flowers sometimes by abortion ♀ ♂, in loose clusters, never in catkins. Calyx membranous, imbricated, campanulate, inferior, irregular.



Fig. CCCXCIII.

Petals 0. Stamens definite, inserted into the base of the calyx, erect in æstivation. Ovary superior or 2-celled; ovules solitary, pendulous, anatropal, or amphitropal; stigmas 2, distinct. Fruit 1- or 2-celled, indehiscant, membranous or drupaceous. Seed solitary, pendulous; albumen none, or in very small quantity; embryo straight or curved, with foliaceous cotyledons; radicle superior.

The plants of which Elm trees are the representatives assume two appearances, which have led Botanists into the opinion that they constitute two distinct Natural Orders. Of these the Nettle-trees, or Celtæ, have a hard fleshy fruit composed of a single carpel and amphitropal ovules, while the true Elms or Ulmæ have a membranous fruit and anatropal ovules. They are, however, so much alike in most other circumstances, that it seems better to regard them as mere forms of one type, more especially since it seems, from the presence of two stigmas, that even the Celtæ themselves are really furnished with two carpels. It is very unusual to

place Elmworts at a distance from Nettletrees, but I confess that their affinity seems to be much stronger with Rhamnads, of which they have the exact seed.

Natives of the North of Asia, the mountains of India, China, North America, and Europe; in the latter of which countries they form valuable timber-trees.

The inner bark of the Elm is slightly bitter and astringent, demulcent, and diuretic; it has been used in some skin diseases, but it does not appear to possess any important quality. The substance which exudes spontaneously from it is called Ulmin; this is also found in the Oak, Chesnut, and other trees, and, according to Berzelius, is a constituent of most kinds of bark. Elm wood is soft, tough, and coarse, but useful for many rough purposes, especially for water-pipes buried in the ground. The wood of *Planera Abelicea*, the *Pseudosantalum ereticum* of the old Pharmacopœias, is aromatic. The young branches of *Celtis australis* are boiled, and the infusion is used against dysentery and blenorrhœa; the fruit is sweetish, and rather astringent; the kernel yields a useful oil. The drupes of *Celtis occidentalis*, the Nettle-tree or Sugar-berry, are administered in the United States in dysentery. The root, bark, and leaves of *Celtis orientalis* are somewhat aromatic, and are employed among eastern nations as a remedy for epilepsy.

GENERA.

<p>I. CELTÆÆ.—Ovary one-celled; ovules amphitropal.</p> <p><i>Celtis</i>, <i>Tournef.</i></p>	<p><i>Sponia</i>, <i>Commers.</i></p> <p><i>Solenostigma</i>, <i>Endl.</i></p> <p><i>Mertensia</i>, <i>H. B. K.</i></p> <p>? <i>Bosen</i>, <i>Linn.</i></p> <p><i>Yerva-Mora</i>, <i>Ludw.</i></p>	<p>II. ULMÆÆ.—Ovary two-celled; ovules anatropal.</p> <p><i>Planera</i>, <i>Gmel.</i></p>	<p><i>Abelicea</i>, <i>Hon. Belli.</i></p> <p><i>Zelkova</i>, <i>Spach.</i></p> <p><i>Euptelea</i>, <i>Zucc.</i></p> <p><i>Microptelea</i>, <i>Spach.</i></p> <p><i>Ulmus</i>, <i>Linn.</i></p>
---	--	---	---

NUMBERS. GEN. 9. Sp. 60.

Urticacæa.

POSITION.—Rhamnaceæ.—ULMACEÆ.—Penæacææ.

Thymelacæa.

Fig. CCCXCIII.—*Ulmus campestris*.—*Nees*. 1. its flower; 2. its pistil; 3. its fruit; 4. its embryo.

ORDER CCXXII. RHAMNACEÆ.—RHAMNADS.

Rhamnii, *Juss. Gen.* 376. (1789).—Rhamnæe, *DC. Prodr.* 2. 19. (1825); *Brongniart Mémoire sur les Rhamnées*; *Endl. Gen.* cccxxix.; *Meisner*, p. 70.

DIAGNOSIS.—*Rhamnial Exogens*, with polypetalous flowers, a valvate calyx, stamens opposite the petals, and erect seeds.

Trees or shrubs, often spiny. Leaves simple, alteruate, very seldom opposite; stipules, if any, minute. Flowers small, generally green, axillary or terminal, sometimes ♂ ♀ by abortion. Calyx 4-5-cleft, valvate. Petals distinct, eucullate, or



Fig. CCCXCIV.

convolute, inserted into the orifice of the calyx, occasionally 0. Stameus definite, opposite the petals. Disk fleshy. Ovary superior, or half superior, 2-3- or 4-celled; ovules solitary, erect, anatropal. Fruit fleshy and indehiscent, or dry and separating in 3 divisions. Seeds erect; albumen fleshy, seldom wanting; embryo almost as long as the seed, with large flat cotyledons, and a short inferior radicle.

Under this name have been confounded four Orders, very different in characters, and even in natural affinities, the peculiarities of three of which have been pointed out by Ad. Brongniart in his Memoir upon the subject, and a fourth has been distinguished by myself. These Orders are Rhamnads properly so called, Spindle-trees, Hollyworts, and Bladder-nuts the respective affinities of which will be found under each. Brongniart indicates the relation that Rhamnads bear, thus:—If we take the insertion of stamens as the most important distinction of plants, it will be found that among polypetalous Orders with perigynous stamens, Appleworts are those to which Rhamnads have the closest relation, agreeing with them in the ovary, the cells of which are determinate in number, in the ascending ovules, and in their alternate leaves usually having two stipules at their base; the number and position of their stamens, and the structure of their seeds, separate them widely. But if the insertion of the stamens is left out of consideration, they will be found to have many characters in common with Byttneriads; such as, the position of the calyx, the form of the petals, the position of the stamens in the front of those petals, the structure of the ovary and seeds in many important points; the principal differences between them are, in fact, the stamens being turned outwards in Byttneriads, the want in that Order of a disk, its hypogynous stamens, and 2 or more ovules. Spurgeworts are allied to Rhamnads; but the constant separation of sexes in the former Order, their hypogynous stamens and suspended ovules, are obvious marks of distinction. Hollyworts are monopetalous and

Fig. CCCXCIV.—*Zizyphus Jactei*. 1. a flower seen from above; 2. a fruit; 3. the same cut vertically; 4. a seed divided vertically.

have abundant albumen, and connect this Order of Rhamnads with Ebenads in the Gentianal Alliance.

It appears from the observations of Mr. Bennett (*Pl. Jav. rar.* 131), that in several genera the raphe of the anatropal seeds is thrown out of its original position next the placenta, by a twist in the cord by which it is attached to the placenta.

Found over nearly all the world, except in the arctic zone. The maximum of species is said to be dispersed through the hottest parts of the United States, the south of Europe, the north of Africa, Persia, and India in the northern hemisphere, and the Cape of Good Hope and New Holland in the southern. Some of the genera appear to be confined to particular countries, as all the true *Ceanothuses* to North America, *Phyllicas* to the Cape, *Cryptandra* and *Pomaderris* to New Holland.

The berries of various species of *Rhamnus* are violent purgatives, and have been highly spoken of in dropsy. They also yield a dye, varying in tint from yellow to green; the ripe berries of *R. catharticus*, mixed with gum-arabic and limewater, form the green colour known under the name of Bladder-green. The French Berries of the shops (*Graues d'Avignon, Fr.*) are the fruit of *R. infectorius*, *saxatilis*, and *amygdalinus*. Those of *R. infectorius*, when unripe, are used by the modern Greeks to dye morocco leather yellow. The fruit of *Zizyphus* is destitute of these purgative qualities, and on the contrary, is often wholesome and pleasant to eat, as in the case of the *Jujube*, *Zizyphus vulgaris* and *Jujuba*, the *Zizyphus Enochia* and *Z. Joazeiro*, whose drupes are used in Brazil as *Jujubes*. The *Lote-bush*, which gave its name to the Ancient *Lotophagi*, is to this day collected for food by the Arabs of Barbary, who call it *Sadr*, and its berries *Nabk*; it is the *Zizyphus Lotus* of Botanists. Many other species are also fit for food, among which, in Afghanistan, the *Maimunna* must be named. This is in some repute for its fruit, which is a sweetish black berry the size of a currant. Its genus has not been ascertained.—*Griffith*. The peduncles of *Hovenia dulcis* become extremely enlarged and succulent, and are in China a fruit in much esteem, resembling in flavour, as it is said, a ripe Pear. Some species are astringent. *Sageretia theezans* is used for tea by the poorer classes in China; an infusion of the twigs of *Ceanothus americanus* has been named as useful, on account of its astringency, to stop gonorrhœal discharges; antisyphilitic virtues are ascribed to the root of the same, and also of *Berchemia volubilis*; and it is said by *Rumphius*, that in the Moluccas the bark of *Zizyphus Jujuba* is employed as a remedy for diarrhœa. See *Royle's Illustrations*, p. 169. The Quina of Brazil is the *Discaria febrifuga*, whose acrid root is employed in the form of extract as a febrifuge and tonic. The bark of *Zizyphus Joazeiro* is bitter and astringent, with some acidity, and produces sickness.—*Martius*. Similar qualities have been recognised in various other species. The kernels of *Zizyphus saporiferus* are sedative, according to the Chinese, who employ them in their medicine. The negroes of the Gambia prepare a wine from the fermented berries of *Zizyphus orthacanthus*; but those of *Z. Baclei* are regarded as poisons. The bitter bark of *Colubrina Fermentum* is said to bring on violent fermentation in the liquors into which it is thrown. *Gouania domingensis* is stomachic; *Berchemia lineata* a hydragogue, according to Chinese authors. Finally, the root of *Zizyphus Napæca* is used as a remedy for windy colic.

GENERA.

Ventilago, <i>Gärtn.</i>	Scutia, <i>Commers.</i>	Ochetophila, <i>Pöpp.</i>	Trymalium, <i>Fenzl.</i>
Paliurus, <i>Tournef.</i>	<i>Sentis</i> , <i>Commers.</i>	Retanilla, <i>Brongn.</i>	Gouania, <i>Jacq.</i>
<i>Aspidocarpus</i> , <i>Neck.</i>	<i>Sarcophthalmus</i> , P. Br.	<i>Molinaa</i> , <i>Commers.</i>	<i>Retinaria</i> , <i>Gärt.</i>
? <i>Aubletia</i> , <i>Lour.</i>	<i>Noltea</i> , <i>Reichenb.</i>	<i>Talguenea</i> , <i>Miers.</i>	<i>Reissekia</i> , <i>Endl.</i>
<i>Zizyphus</i> , <i>Tournef.</i>	<i>Vilmannia</i> , <i>Wight.</i>	<i>Trevoa</i> , <i>Gill.</i>	<i>Helinus</i> , E. M.
<i>Condalia</i> , <i>Cav.</i>	<i>Willmetia</i> , <i>Brongn.</i>	<i>Walpersia</i> , <i>Reiss.</i>	<i>Willmetia</i> , E. Z.
<i>Berchemia</i> , <i>Neck.</i>	<i>Sarcophthaloides</i> , DC.	<i>Trichocephalus</i> , <i>Reiss.</i>	<i>Crumenaria</i> , <i>Mart.</i>
<i>Enochia</i> , <i>Schult.</i>	<i>Ceanothus</i> , <i>Linna.</i>	<i>Tylanthus</i> , <i>Reiss.</i>	? <i>Solenanthes</i> , G. Don.
<i>Sageretia</i> , <i>Brongn.</i>	<i>Forrestia</i> , <i>Raf.</i>	<i>Petalopogon</i> , <i>Reiss.</i>	? <i>Schæfferia</i> , <i>Jacq.</i>
<i>Hovenia</i> , <i>Thunb.</i>	<i>Cormoema</i> , <i>Reiss.</i>	<i>Phyllica</i> , <i>Linna.</i>	? <i>Strombosia</i> , <i>Blum.</i>
<i>Rhamnus</i> , <i>Juss.</i>	<i>Arrabidaea</i> , <i>Steud.</i>	<i>Tylanthus</i> , <i>Reiss.</i>	? <i>Samara</i> , <i>Linna.</i>
<i>Atalernus</i> , <i>Tournef.</i>	<i>Colubrina</i> , L. C. Rich.	<i>Soulangia</i> , <i>Brongn.</i>	? <i>Daphniphyllum</i> , <i>Blum.</i>
<i>Marcocrella</i> , <i>Neck.</i>	<i>Tubanthera</i> , <i>Commers.</i>	<i>Spyridium</i> , <i>Fenzl.</i>	? <i>Crypteronia</i> , <i>Blume.</i>
<i>Cervispina</i> , <i>Dill.</i>	<i>Alphitonia</i> , <i>Reiss.</i>	<i>Cryptandra</i> , <i>Smith.</i>	? <i>Galdicia</i> , <i>Neraud.</i>
<i>Cardiopsis</i> , <i>Raf.</i>	<i>Colletia</i> , <i>Commers.</i>	<i>Pomaderris</i> , <i>Labill.</i>	? <i>Quoia</i> , <i>Neraud.</i>
<i>Trangula</i> , <i>Tournef.</i>	<i>Discaria</i> , <i>Hook.</i>	<i>Pomaderris</i> , <i>Schult.</i>	? <i>Carolinia</i> , <i>Neraud.</i>
<i>Karwinskia</i> , <i>Zucc.</i>	<i>Adolphia</i> , <i>Metsn.</i>		

NUMBERS. GEN. 42. Sp. 250.

Aquifoliaceæ.

POSITION.—*Celastraceæ.*—*RHAMNACEÆ.*—*Chaillotiaceæ.*

Bythneriaceæ.

ORDER CCXXIII. CHAILLETIACEÆ.—CHAILLETIADS.

Chailletia, R. Brown *Cong.* p. 23. (1818).—Chailletiaceæ, DC. *Prodr.* 2. 57. (1825); *Endl. Gen.* cexl.DIAGNOSIS.—*Rhamnial Exogens, with polypetalous flowers, a valvate calyx, stamens alternate with the petals, and pendulous seeds.*

Trees or shrubs. Leaves alternate, with two stipules, deciduous, entire. Flowers small, axillary, fasciculate or corymbose, their peduncle often connate with the petiole.

Sepals 5, with an incurved valvate aestivation. Petals 5, alternate with the sepals, and arising from the base of the calyx, usually 2-lobed. Stamens 5, alternate with the petals, and combined with them at the base; anthers ovate, versatile. Glands usually 5, hypogynous, opposite the petals. Ovary superior, 2- or 3-celled; ovules twin, pendulous; style simple; stigma obsolete 2-lobed. Fruit drupaceous, rather dry, 1- 2- or 3-celled. Seeds solitary, pendulous, naked or arillate, without albumen; embryo thick, with a thick superior radicle and fleshy cotyledons.

Whether what are here called petals are not rather abortive stamens is doubted by Botanists, and hence the station of the Order is compared, on the one hand, with Anacards or Roseworts, and on the other, with Samyds and Mastworts. To me it seems that what appear to be petals are so; a fact which it is difficult to doubt, when it is remembered that both calyx and corolla are mere modifications of one common type, and that it is in position only that they differ. De Candolle stations the Order between Homaliads and Aquilariads; it agrees with the former in the presence of glands round the ovary, but differs in its superior ovary with the placenta in the axis, and many other characters. Rhamnads, with which it corresponds so much in habit, seem, however, upon the whole to claim the closest kindred with it, and it can hardly be regarded in any other light than as a member of the Rhamnial Alliance. It will then be stationed in the neighbourhood of Elmworts, which some Botanists are convinced is its true position. Its valvate calyx separates it from Hippocrateads; its pendulous ovules and stamens alternate with the petals, from Rhamnads.



Fig. CCCXCV.

Of the few known species belonging to this Order, 2 are found in Sierra Leone, 2 in Madagascar, 2 in equinoctial America, and 1 in Timor. The fruit of *Chailletia toxicaria* is said to be poisonous; it is called Ratsbane in Sierra Leone.

GENERA.

Moacurra, Rorb.	|	<i>Symphyllanthus</i> , Vahl.	|	<i>Dichapetalum</i> , Thouars	|	<i>Tapura</i> , Aubl.
<i>Wahlenbergia</i> , R. Br.		<i>Nestola</i> , Soland.		<i>Leucosia</i> , Thouars.		<i>Rohria</i> , Schreb.
<i>Chailletia</i> , DC.		<i>Patrisia</i> , Rohr.		<i>Plappertia</i> , Reichenb.		<i>Stephanopodium</i> , Pöpp.

NUMBERS. GEN. 4. Sp. 10.

Samylaceæ.

POSITION.—Ulmaceæ.—CHAILLETIACEÆ.—Rhamnaceæ.

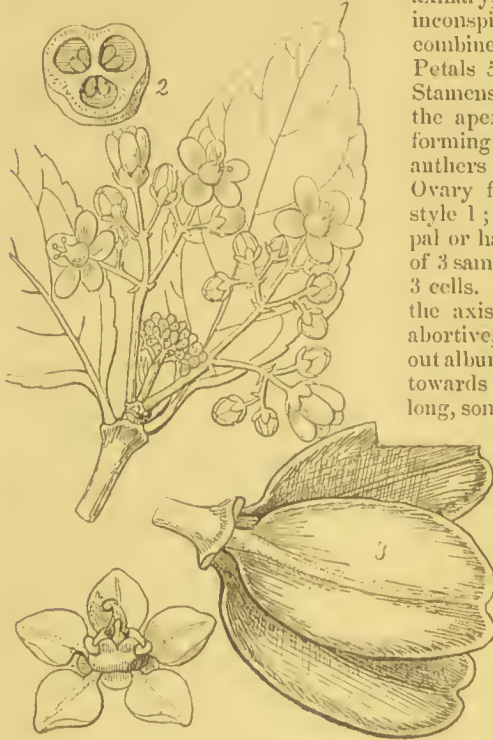
*Homaliaceæ.*Fig. CCCXCV.—*Chailletia pedunculata*.—Turpin. 1, a flower of *Moacurra gelonioides*; 2, a portion of it; 3, a stamen; 4, the pistil; 5, a vertical section of it; 6, ripe fruit; 7, a section of it; 8, an embryo.

ORDER CCXXIV. HIPPOCRATEACEÆ.—HIPPOCRATEADS.

Hippocrateaceæ, *Juss. Ann. Mus.* 18. 483. (1811).—Hippocrateaceæ, *Kunth in Humb. N. G. Am.* 5. 136. (1821); *DC. Prodr.* 1. 567; *Endl. Gen.* ccxxxvii.; *Meisner*, p. 56; *Wight Illustr.* 1. 132.

DIAGNOSIS.—*Rhamnif. Exogens*, with polypetalous flowers, an imbricated calyx, and 3 monadelphous stamens.

Arborescent or climbing shrubs, which are almost always smooth. Leaves opposite, simple, entire or toothed, somewhat coriaceous, with small deciduous stipules. Racemes axillary, in corymbs or fascicles. Flowers small, inconspicuous. Sepals 5, very small, imbricated, combined as far as the middle, persistent. Petals 5, somewhat imbricated in æstivation. Stamens 3; filaments cohering almost as far as the apex into a tube dilated at the base, and forming about the ovary a thick disk-like cup; anthers opening transversely at the apex. Ovary free, concealed by the tube, 3-celled; style 1; stigmas 1-3; ovules ascending, anatropal or half anatropal. Fruit either consisting of 3 samaroid carpels, or berried, with from 1 to 3 cells. Seeds in each cell definite, attached to the axis in pairs, some of them occasionally abortive, sometimes buried in pulp, erect, without albumen; embryo straight; radicle pointing towards the base; cotyledons flat, elliptical oblong, somewhat fleshy, cohering when dried.



1

Fig. CCCXCVI.

The ternary number of the stamens, combined with pentamerous petals and sepals, is the prominent characteristic of this Order, which was formerly included among Maples by Jussieu, which is placed between Erythoxyls and Marcgraaviads by De Candolle, but which is, to all appearance, much more nearly related to Spindle-trees, as Brown has remarked; for "the insertion of the ovules is either towards the base, or is central; the direction of the radicle is always inferior."—*Congo*, 427. In fact there seems to be nothing to divide Hippocrateads

from Spindle-trees except the cohesion of the filaments of the former into a cup. The samaroid fruit, which is so remarkable, and which connects the Order with Malpighiads, is not universal, but merely characteristic of certain genera. In Hippocratea ovata the testa and cotyledons are furnished with innumerable spiral threads; the same economy has been remarked by Du Petit Thouars in the pericarp of Calypso. According to Endlicher, the genera Elæodendron and Ptelidium among Spindle-trees, connect that Order with Hippocrateads.

The principal part are South American, about one-seventh are natives of Africa or the Mauritau Islands, and the same number has been recorded as East Indian.

The fruit of *Tontelea* (*Salacia*) *pyrifornis*, a native of Sierra Leone, is eatable. It is about the size of a Bergamot Pear; its flavour is rich and sweet. The nuts of *Hippocratea comosa* are oily and sweet; it is called, in the French West India Islands, *Amandier du Bois*. Martius reports that several species of *Tontelea*, called *Saputá* in Brazil, have a sweet mucilaginous fruit, which is eaten. I find no indication here of the emetic and nauseous quality recorded as being characteristic of Spindle-trees.

Fig. CCCXCVI.—*Hippocratea Arnottiana*.—*Wight*. 1, a flower; 2, a cross section of the ovary; 3, ripe fruit.

GENERA.

Hippocratea, Linn.
Coa, Plum.
Bejuco, Löffl.
Daphnikon, Pohl.
Pereskia, Fl. Flum.

Trigonothea, Hochst.
Tontelen, Aubl.
Tonsella, Schreb.
Sicelium, P. Br.
Anthodon, Ruiz et Pav.

Anthodiscus, Mart.
Raddisia, Leandr.
Clercia, Fl. Flum.
Salacia, Linn.
Calypto, Thouars.

Johnia, Roxb.
Diplosthes, Harv.
 ? *Lacepedea*, H. B. K.
Triceraia, Willd.

NUMBERS. GEN. 6. Sp. 86.

Malpighiaceæ.

POSITION.—*Chaillotiaceæ.*—HIPPOCRATEACEÆ.—*Celastraceæ.*

Aceraceæ.

ORDER CCXXV. CELASTRACEÆ.—SPINDLE-TREES.

Celastrineæ, *R. Brown in Flinders*, 22. (1814); *DC. Prodr.* 2. 2.; *Ad. Brongniart Mémoire sur les Rhamnées*, 16.; *Endl. Gen.* ccxxxvi.; *Meisner Gen.* p. 68.; *Wight Illustr.* 1. 174.; *Arn. in Ann. Nat. Hist.* 3. 153.

DIAGNOSIS.—*Rhamnall Exogens*, with *polypetalous flowers*, an *imbricated calyx*, and *stamens* (\checkmark) *distinct*.

Small trees or shrubs. Leaves alternate, seldom opposite, simple, with very small deciduous stipules. Flowers in axillary cymes, small, green, or white, or purple, occasionally ♂ ♀ by abortion.

Sepals 4 or 5, imbricated, inserted into the margin of an expanded disk. Petals inserted by a broad base, under the margin of the disk, with an imbricato æstivation; sometimes 0. Stamens alternate with the petals, inserted into the disk, either at the margin or within it; anthers imate. Disk large, expanded, flat, closely surrounding the ovary, covering the flat expanded calyx. Ovary immersed in the disk and adhering to it, with 2 to 5 cells; cells 1- or many-seeded; ovules ascending from the axis, anatropal, attached to a short funiculus. Fruit superior, 2- to 5-celled, either capsular or drupaceous. Seeds ascending, seldom inverted by resupination, either provided with an aril, or without one; albumen fleshy; embryo straight; cotyledons flat and thick, with a short inferior radicle.

Formerly confounded with Rhamnads, this Order was first separated by Brown, who distinguished it particularly by the relation which its stamens bear to the petals. It also differs in its imbricated calyx, and in its disk being hypogynous. According to Brongniart, Spindle-trees have more relation to several Orders with hypogynous stamens than to any with perigynous ones, especially to



Fig. CCCXCVII.

Malpighiads, to which they are related through Hippoerataeas; a considerable resemblance with such Spurgeworts as *Phyllanthus* may also be traced; and *Hollyworts* have been principally established upon dismemberments of the present Order. Nevertheless, the distinctions between it and both *Spurgeworts* and *Hollyworts* are easy to

Fig. CCCXCVII. — *Catha edulis*.

trace; for the former are constantly diclinous, and the latter monopetalous; besides which, the radicle of Spindle-trees is inferior, that of Spurgeworts superior; and the albumen of Hollyworts is extremely copious, while that of Spindle-trees is comparatively inconsiderable in quantity. The drupaceous genera, forming the Elæodendrous Sub-order, establish an affinity with Sapotads, which have, however, a monopetalous corolla and milky juice, and their stamens, when those which are fertile equal in number the segments of the corolla, are opposite to the latter. Endlicher finds a resemblance with Pittosporads, and justly adds that all the drupaceous genera are greatly in need of more careful examination.

According to M. Planchon, the arillus of *Euonymus* is a peculiar expansion of the exostome, and is not derived from the placenta.

The species are natives of the warmer parts of Europe, North America, and Asia, but far more abundant beyond the tropics than within them; a great number of species inhabit the Cape of Good Hope. Some are found in Chile and Pern, and a few in New Holland.

Royle mentions an acrid principle having been detected among the species, which acts with more or less activity; and that the seeds of several yield an oil which is useful for burning. That of *Celastrus nutans* or *paniculatus* is said in India to be of a stimulant nature, and to be used in medicine in the disease called *Berriberri*. The bark of *Euonymus tingens* is in the inside of a beautiful light-yellow colour, similar to that of some species of *Rhamnus*; it is used to mark the tika on the forehead of Hindoos, and might be employed as a dye. It is also considered useful in diseases of the eye. The leaves of *Catha edulis*, *Kat* or *Khât* of the Arabs, would appear to be of a stimulating nature. According to Forskâhl, the Arabs eat the green leaves with greediness, believing them to have the power of causing extreme watchfulness, so that a man may stand sentry all night long without drowsiness. They also regard it as an antidote to the plague, and assert that a person wearing a twig of it in his bosom, may go among the infected with impunity; they even believe that the plague cannot appear in places where the tree is cultivated.

Nevertheless, says Forskâhl, "the taste of the leaves does not seem to indicate such virtues." Botta also says that, when fresh, the *Khât* leaves are very intoxicating. The fresh bark of the root of *Elæodendron Roxburghii*, rubbed with plain water, is by the natives of India applied externally to almost every sort of swelling. It is a very strong astringent, possessing scarcely any other sensible quality.—*Rozb.* Similar qualities are attributed to *Maytenus chilensis*. The seeds of the European species of *Euonymus* are nauseous, and said to be purgative and emetic; sheep are said to be poisoned by them; an ointment was formerly prepared from them for the destruction of pediculi in the head. Similar qualities have been found in the bark of *Celastrus scandens* and *senegalensis*; while the spines of *Celastrus venenosus* are reported to inflict most painful wounds. The drupes of *Elæodendron Kuhn* are eaten by the colonists of the Cape of Good Hope.

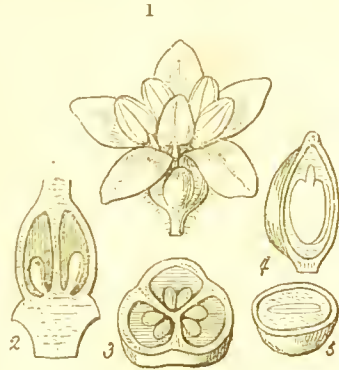


Fig. CCCXCVIII.

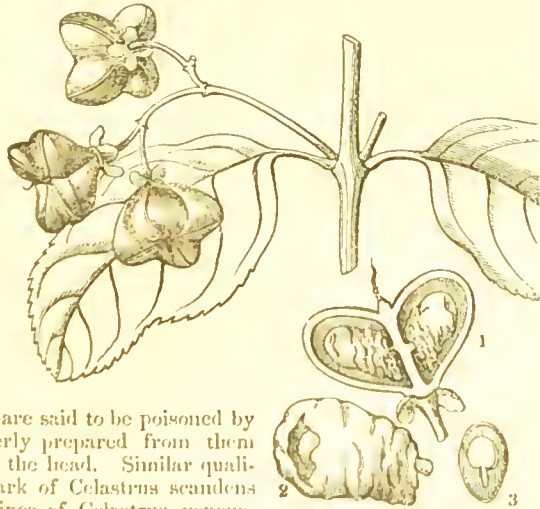


Fig. CCCXCIX.

Fig. CCCXCVIII.—*Celastrus paniculatus*. *Wight*. 1. a flower; 2. a perpendicular section of the ovary; 3. a cross section of the ovary; 4. a vertical section of a seed; 5. a cross section of it.

Fig. CCCXCIX.—*Euonymus europæa*. 1. a section of a fruit; 2. a seed enveloped in its aril; 3. a perpendicular section of a seed.

GENERA.

I. EUONYMEÆ. — Fruit capsular.	<i>Hænkeæ</i> , Ruiz. et Pav.	<i>Hartogia</i> , Thunb.	<i>Crossopetalum</i> , P. Br.
	<i>Microtropis</i> , Wall.	<i>Schreberia</i> , Thunb.	<i>Pachystima</i> , Raf.
	<i>Pterocelastrus</i> , Meisn.	<i>Elæodendron</i> , Jacq.	<i>Oreophila</i> , Nutt.
	<i>Asterocarpus</i> , Eckl. et Zeyh.	<i>Portenschlagia</i> , Tratt.	? <i>Bhesa</i> , Hamill.
		<i>Lamarckia</i> , Hort.	? <i>Kurrimia</i> , Wall.
		<i>Nerija</i> , Roxb.	? <i>Actegiton</i> , Blum.
		<i>Skytophyllum</i> , Eckl. et Zeyh.	? <i>Tralliana</i> , Lour.
		<i>Lauridia</i> , Eckl. et Zh.	? <i>Goupla</i> , Aubl.
		<i>Mystroxyton</i> , Ec. et Z.	<i>Gupia</i> , Jaume.
		<i>Crocoxyton</i> , Eckl. et Z.	<i>Glossopetalum</i> , Schb.
	<i>Parilla</i> , Dennst.	? <i>Perrottetia</i> , H. B. K.	
	<i>Myginda</i> , Jacq.	? <i>Alzatea</i> , Ruiz. et Pav.	
	<i>Rhacoma</i> , Linn.	<i>Alzintana</i> , Dietr.	
II. ELÆODENDREÆ. — Fruit drupaceous.			
	<i>Ptelidium</i> , Thouars.		
	<i>Seringia</i> , Spreng.		
	<i>Wimmeria</i> , Schlecht.		
	<i>Frauenhoferia</i> , Mart.		
	<i>Pleurostyliæ</i> , Wight et A.		

NUMBERS. GEN. 24. Sp. 260.

Aquifoliaceæ.

POSITION.—Sapotaceæ.—CELASTRACEÆ.—Hippocrateaceæ.

Euphorbiaceæ.

ORDER CCXXVI. STACKHOUSIACEÆ.—STACKHOUSIADS.

Stackhouseæ, *R. Br. in Flinders*, 555. (1814).—Stackhouseiaceæ, *Ed. Pr.* lxxxviii.; *Endl. Gen.* ccxlii.

DIAGNOSIS.—*Rhamnial Erogens*, with *monopetalous flowers*, and *episepalous stamens*.

Herbaceous plants, occasionally somewhat shrubby. Leaves simple, entire, alternate, sometimes minute. Stipules lateral, very minute. Spike terminal, each flower with 3 bracts. Calyx 1-leaved, 5-cleft, equal, with an inflated tube. Petals 5, equal, arising from the top of the tube of the calyx; their claws combined in a tube longer than the calyx; their limb narrow, stellate. Stamens 5, distinct, unequal (2 alternately shorter), arising from the throat of the calyx. Ovary superior, 3- or 5-celled, the cells partially separated, adhering to a central column, each with a single erect anatropal ovule; styles from 3 to 5, sometimes combined at the base; stigmas simple. Fruit of from 3 to 5 indehiscent, winged, or wingless pieces; column central, persistent. Embryo erect, in the axis of, and almost as long as, the fleshy albumen, with short obtuse cotyledons and an inferior radicle.

This Order should stand between Spindle-trees and Spurge-worts, according to Brown; from the latter of which it differs in the structure of the fruit, and in the position of the seeds, besides other characters; from the former in the presence of stipules, in the cohesion of the petals in a tube, in the deeply lobed ovary, and so on. The hermaphrodite flowers remove the Order, however, from Spurge-worts; its monopetalous flowers are much at variance with the structure of Spindle-trees. Nevertheless, the 3-celled ovary, in flowers otherwise pentamerous, is entirely that of Hippocrateads and Spindle-trees, and recalls the Sapindal Alliance, to which all those Orders would be referable if their stamens were not so distinctly perigynous.

A few New Holland shrubs compose all that is known. Their properties are unascertained.

GENERA.

Stackhousia, *Smith.* | Tripterococcus, *Endl.*

NUMBERS. GEN. 2. Sp. 10.

Sapindaceæ.

POSITION.—*Celastraceæ.*—*STACKHOUSIACEÆ.*—*Sapotaceæ.*
Euphorbiaceæ.



Fig. CCCC.

Fig. CCCC.—1. *Stackhousia*; 2. its corolla; 3. calyx, &c.; 4. part of the fruit of *Tripterococcus*; 5. one of its cells cut across; 6. an ovule.

ORDER CCXXVII. SAPOTACEÆ.—SAPOTADS.

Sapotæ, *Juss. Gen.* 151. (1789).—Sapoteæ, *R. Brown Prodr.* 528. (1810).—Sapotaceæ, *Endl. Prodr. Norf.* 48. (1833); *Gen. clviii.*; *Meisn. p.* 159; *Alph. DC. Prodr.* 3. 154.

DIAGNOSIS.—*Rhamnal Exogens, with monopetalous flowers, epipetalous stamens, ascending ovules, a short radicle, and amygdaloid cotyledons.*

Trees or shrubs, chiefly natives of the tropics, and often abounding in milky juice. Leaves alternate, or occasionally almost whorled, without stipules, entire, coriaceous. Inflorescence axillary. Flowers hermaphrodite. Calyx regular, persistent, in 5, or occasionally 4-8 divisious, which are either valvate or imbricate in æstivation. Corolla monopetalous, hypogynous, regular, deciduous, its segments usually equal in number to those of the calyx, seldom twice or thrice as many, imbricated in æstivation. Stamens arising from the corolla, in number definite, distinct, the fertile ones equal in number to the segments of the calyx, and opposite those segments of the corolla which alternate with the latter, seldom more; anthers usually turned outwards. The sterile stamens as numerous as the fertile ones, with which they alternate. Disk 0. Ovary superior, with several cells, in each of which is 1 ascending or pendulous anatropal ovule; style 1; stigma undivided, occasionally lobed. Fruit fleshy, with several 1-seeded cells, or by abortion with only 1. Seeds nut-like, sometimes cohering into a several-celled putamen. Testa bony, shining, with a very long scar on the inner face where it is opaque, and softer than the rest. Embryo erect, large, white, usually inclosed in fleshy albumen. Cotyledons, when albumen is present, foliaceous; when absent, fleshy and sometimes connate. Radicle short, straight, or a little curved, turned towards the hilum.

This Order is certainly near Ebenads, with which it agrees in habit, arborescent stem, alternate entire leaves, and axillary inflorescence; and, moreover, in its monopetalous regular hypogynous corolla, the absence of a hypogynous disk, an ovary with several cells, and definite ovules and stamens. The two Orders, however, differ in several points. Sapotads have usually a milky juice, and their wood is among the softer kinds; their flowers are always hermaphrodite; the segments of the calyx and corolla are often placed in a double row; their stamens are always in a single row, the fertile ones rarely more numerous than the segments of the calyx, and opposite the divisions of the corolla; their style is undivided; the cells of the ovary are always 1-seeded, with erect ovules; the testa is thick and bony; the embryo is large with respect to the fleshy albumen, which is sometimes deficient; the radicle is very short and inferior. In Ebenads there is no milk, and the wood is very hard; the flowers are often unisexual by abortion; the segments of the calyx and corolla are almost always in a single row; the stamens are usually doubled, and either twice or four times as numerous as the segments of the corolla, or, if equal to them, alternate with them; the style is generally divided, the cells of the ovary sometimes 2-seeded, the ovules always pendulous, the testa thin and soft, the embryo middle-sized or small in respect to the cartilaginous albumen, which is always present; the radicle is of middling length, or very long and superior. It is worth remarking, that the woody shell of the seed of Sapotads is certainly testa, and not putamen, as is proved by the presence of the micropyle upon it. They are also comparable with Ardisiads, whose abundant albumen and free central placenta render it necessary



Fig. CCCCI.

Fig. CCCCI.—1. flower of a Sapota; 2. its corolla; 3. the same cut open; 4. the pistil; 5. half a fruit of *Bassia longifolia*; 6. its seed, whole and cut across.

that they should be stationed at some distance. They differ from Storaxworts in their short radicle and amygdaloid embryo.

Chiefly natives of the tropics of India, Africa, and America; a few are found in the southern parts of North America, and at the Cape of Good Hope.

The fruit of many is esteemed in their native countries as an article of the dessert: such are the Sappodilla Plum (*Achras Sapota* and other species), the Star-apple (*Chrysophyllum Cainito*), the Marnalade (*Achras mammosa*), the Medlar of Surinam, the *Mimusops Elengi*, and others; they are described as being generally a sweet taste, with a little acidity. The Bully or Bullet-tree of Guiana is a species of *Mimusops* according to Sir R. Schomburgk. The fruit is described as being of the size of the Coffee-berry, and when quite ripe delicious; its wood is solid, heavy, close-grained, and durable. Besides these, various species of *Lucuma* and *Chrysophyllum* rank among dessert fruits, as do the *Imbricarias malabarica* and *maxima*, whose fruit is subacid, sweet, and like an Orange in appearance. The seeds of *Achras Sapota* are aperient and diuretic, but in over-doses they produce severe pain, and are even dangerous; the bark is a substitute for *Cinchona*; those of some others are filled with a concrete oil, which is used for domestic purposes. *Mimusops Kaki*, like many trees with astringent bark, yields a gum, while its fruit is of a sweetish taste, and much eaten by the natives of India. A kind of thick oil, like butter, is obtained from the fruit of *Bassia butyracea*, the Mahva or Madhuca-tree. The flowers of *B. latifolia* (the Mopha, Maddoodoomah), are employed extensively in the distillation of a kind of arrack, called Mowra; they are said to resemble in taste the dried seedless Grapes called Corinths. The *Bassia longifolia* is called the Illhpie-tree; its fruit, when pressed, yields a large quantity of oil used in India for lamps, soap-making, and also for food; it is employed medicinally to cure the itch, and other cutaneous disorders; the leaves boiled in water, as well as the milk of the green fruit and bark, are used in rheumatic affections. The Butter-tree of Mungo Park was also a species of *Bassia*. See *Royle's Illustrations*, p. 263, for further information concerning these *Bassias*. The bark of 4 species of *Achras* is so astringent and febrifugal as to have been substituted for *Quinquina*. The Cow-tree of Humboldt has been sometimes supposed to be referable to this Order; but there seems no reason now to doubt its belonging to *Artocarpads*. *Monesia bark*, a South American product, with a powerful bitter-sweet taste, lately employed successfully in France in diarrhœa, menorrhagia, leucorrhœa, and hæmoptysis, is said to belong to some plant of this Order.—*Pharm. Journ.* 3. 292. The bark of *Bumelia nigra* and others is bitter, astringent, and febrifugal, and the wood very hard. The fruit of *B. retusa* is said to be milky; that of *B. lycioides anstere*, with some sweetness, and useful in diarrhœa; while the flowers of *B. graveolens* have a heavy unpleasant odour. The flowers of *Mimusops Elengi*, on the contrary, are powerfully aromatic, and a fragrant water is distilled from them. The seeds of this plant yield an abundance of oil, in request for painters, and said to be useful in parturition; the leaves are said to produce an extraordinary noise when burnt.

GENERA.

<i>Chrysophyllum</i> , L.	<i>Guapeba</i> , Gom.	<i>Isonandra</i> , Wight.	<i>Imbricaria</i> , Comm.
<i>Nycteristion</i> , R. P.	<i>Vitellaria</i> , Gærtn.	<i>Dipholis</i> , A. DC.	<i>Binectaria</i> , Forsk.
<i>Cainito</i> , Tuss.	<i>Sapota</i> , Plum.	<i>Bumelia</i> , Sw.	<i>Mimusops</i> , L.
<i>Eclimusa</i> , Mart.	<i>Achras</i> , P. Br.	<i>Labourdonnaisia</i> , Bajer.	<i>Elengi</i> , Rheede.
<i>Pouteria</i> , Aubl.	<i>Hornogyne</i> , A. Cunn.	<i>Delastrea</i> , A. DC.	<i>Manilkara</i> , Rheede.
<i>Charoacarpus</i> , L.	<i>Sersalisia</i> , R. Br.	<i>Azaola</i> , Blanco.	? <i>Phecolithis</i> , Gærtn.
<i>Labatia</i> , Sw.	<i>Sideroxylon</i> , L.	<i>Payena</i> , A. DC.	<i>Synarrhena</i> , Fisch.
<i>Labatia</i> , Mart.	<i>Robertia</i> , Scop.	<i>Bassia</i> , König.	<i>Omphalocarpum</i> , Beauv.
<i>Lucuma</i> , Mol.	<i>Argania</i> , R. et Sch.	? <i>Palaquium</i> , Blanco.	? <i>Rostellaria</i> , Gærtn.

NUMBERS. GEN. 21. Sp. 212.

Ebenaceæ.

POSITION.—*Styracaceæ.*—*SAPOTACEÆ.*—*Celastraceæ.*

Myrsinaceæ.

ORDER CCXXVIII. STYRACACEÆ.—STORAXWORTS.

Styracææ, *Rich. Anal. du Fr.* (1808); *Von Martius, N. Gen. et Sp. Pl.* 2. 148.; *Endl. Gen.* p. 742; *Meisner, p.* 250.—*Symplocinææ, Don. Prodr. Ncp.* 144. (1825).—*Styracineæ, Rich. in Humb. N. G. et Sp.* 3. 256. (1818).—*Halesiaceæ, Don in Jameson's Journ.* (Dec. 1828); *Link Handb.* 1. 667.—*Styracaceæ, A. DC. Prodr.* 8. 244. (1844).

DIAGNOSIS.—*Rhamnal Exogens, with monopetalous flowers, epipetalous stamens, a part at least of the ovules suspended, a long radicle, and leafy cotyledons.*

Trees or shrubs. Leaves alternate, without stipules, usually toothed. Flowers axillary, either solitary or clustered, with scale-like bracts. The hairs often stellate.



Calyx inferior (or superior), with 5 (or 4) imbricated divisions, persistent. Corolla monopetalous, the number of its divisions frequently different from that of the calyx; with imbricated æstivation. Stamens definite or indefinite, arising from the tube of the corolla, of unequal length, cohering in various ways, but generally in a slight degree only; anthers innate, 2-celled, bursting inwardly. Pollen broadly elliptical, smooth. Ovary superior, or adhering to the calyx, with from 2 to 5 cells, which are opposite the lobes of the calyx when they are of the same number, the partitions sometimes scarcely adhering in the centre. Ovules anatropal, 2 or 00 in each cell, all pendulous or the upper ascending, the lower pendulous; style simple; stigma somewhat capitate. Fruit drupaceous, surmounted by or inclosed in the calyx, generally with all the cells abortive except one. Seeds ascending or suspended, 5-1, with the slender embryo lying in the midst of the albumen; radicle long, directed towards the hilum; cotyledons flat.

Those Botanists who attach paramount importance to the condition of the corolla, in deciding upon the relationship of plants, will object to the station now occupied by Storaxworts, which, because of a slight adhesion between the petals, are usually associated with Ebenads. But if a less value is assigned to that character and more to the presence of albumen, then the Storaxworts will fall into the ranks of a different Alliance, in which they will, however, present a distinct tendency towards the Ebenaceous structure. For this reason they are here placed among Rhamnals; while Ebenads are associated with Hollyworts and some other Orders in a neighbouring Alliance.

Such is my own opinion on this subject; the following is the view taken by others. Mr. Bentham would associate them with Ebenads and Humiriads; besides which

Fig. CCCII.—*Styx suberifolium*.—*Hooker*. 1. a flower; 2. corolla and stamens; 3. pistil.

Fig. CCCIII.—*Halesia tetraptera*.—1. its fruit; 2. a perpendicular; 3. a transverse, section of it.

he finds a resemblance to Citronworts and Olacads.—*Linn. Trans.* 16. 231. According to Alph. De Candolle, who adopts those views, (*Prodr.* 8. 245), they differ from Ebenads in their hermaphrodite cymose, not racemose flowers, in their fewer stamens, partly alternate with the lobes of the corolla, their longer filaments, their ovary partially inferior, and especially in the cells of the ovary being opposite the lobes of the calyx. Decaisne (*Travels of Jacquemont*, p. 104), thinks them nearer Alangiads. They must also be regarded as standing in close relation to Olacads, from which they hardly differ perhaps, except in their embryo being longer as respects the seed, and in their long radicle.

Storaxworts are sparingly distributed, for the most part through the tropical or subtropical regions of both hemispheres; a very few, among which are the Snowdrop-trees, (Halesia), find their way to cold latitudes. According to Alph. De Candolle, they are unknown in Australia, and exist in Africa in no instance except that of *Styrax guineense*, a doubtful plant.

Some of the genus *Symplocos* are used in dyeing yellow, as *S. tinctoria*, called Sweet-leaf in Carolina; its root is bitter and aromatic; others, as *S. Alstonia*, are employed as tea, on account of a slight astringency in their leaves. Storax and Benzoin, fragrant gum-resins, composed of resin, benzoic acid, and a peculiar aromatic principle, are the produce of two species of *Styrax*. Storax flows from wounds in *Styrax officinale*, a Syrian tree. Benzoin is derived from *S. Benzoin*, a native of the Malay archipelago. Both drugs are regarded as stimulating expectorants, producing an irritation of the mucous membrane of the air-passages. Benzoin is used in the preparation of Paregoric elixir, and of Court plaister, and also in the cosmetic called Virgin's Milk. A fragrant secretion of a similar nature is produced by *Styrax reticulata*, ferruginea and aurea, in Brazil; according to Martius, it is employed in the churches as frankincense. *Symplocos* (*Bobua*) *laurina* is celebrated in Bengal for its bark, which forms a mordant for red dyes.

GENERA.

<p>I. SYMPLOCÆÆ.—Corolla quincuncial. Anthers roundish.</p> <p><i>Symplocos</i>, Jacq.</p> <p><i>Eugenioides</i>, L.</p> <p><i>Bobua</i>, DC.</p> <p><i>Alstonia</i>, L.</p> <p><i>Hoyza</i>, L.</p>	<p><i>Ciponima</i>, Aubl.</p> <p><i>Siponima</i>, Aubl.</p> <p><i>Decadia</i>, Lour.</p> <p><i>Barberina</i>, Velloz.</p> <p><i>Stemmatosiphon</i>, Pohl</p> <p>♀ <i>Dicalyx</i>, Lour.</p> <p>♀ <i>Drupatris</i>, Lour.</p> <p><i>Papura</i>, Ham.</p>	<p>II. STYRACÆÆ.—Corolla twisted to the left, or somewhat valvate. Anthers long.</p> <p><i>Styrax</i>, Tournef.</p> <p><i>Strigilia</i>, Cav.</p> <p><i>Tremanthus</i>, Pers.</p> <p><i>Benzoin</i>, Hayne.</p> <p><i>Lithocarpus</i>, Bl.</p>	<p><i>Epigenia</i>, Vell.</p> <p><i>Cypellium</i>, Desv.</p> <p><i>Trichogamila</i>, P. Br.</p> <p><i>Pterostyrax</i>, Sieb. et Zucc.</p> <p>Halesia, Ellis.</p> <p>III. PAMPHILÆÆ. A.</p> <p>DC.—Corolla valvate.</p> <p><i>Pamphilia</i>, Mart.</p> <p><i>Poveolaria</i>, R. P.</p>
--	---	--	---

NUMBERS. GEN. 6. Sp. 115.

Ebenacææ.

POSITION.—Sapotacææ.—STYRACÆÆ.—————

Olacacææ.

ALLIANCE XLV. GENTIANALES.—THE GENTIANAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with dichlamydeous monopetalous flowers, axile or parietal placenta, and a minute embryo, or with the cotyledons much smaller than the radicle, lying in a large quantity of albumen.*

Here we find ourselves among the truly monopetalous Orders of the French school. Previously a monopetalous structure was an exception rather than a rule; but now a separation of petals forms the exception. Tendencies have assumed a new direction.

The Alliance differs from that of Solanals in having a minute embryo and much albumen, and from Cortusals in the placenta never being free and central. It touches Solanals at Nightshades themselves, which, if they had parietal placenta might often be mistaken for Gentianworts; and at Dogbanes, whose minute embryo offers one of the principal reasons for not associating them in the same Alliance as Aselepiads. With Cortusals Gentianals come in contact through Ebenads, which are very like Ardisiads, and Diapensiads, which may be compared to Primworts. To Bignoniales they are very closely allied through Broomrapes and Stilbids, which put on the peculiar aspect of that Alliance.

NATURAL ORDERS OF GENTIANALS.

<i>Stipules 0. Stigmas simple, sessile, radiating</i>	229.	EBENACEÆ.
<i>Stipules 0. Stigmas simple, at the end of a manifest style. Placenta axile. Seeds definite, pendulous. Corolla imbricated</i>	230.	AQUIFOLIACEÆ.
<i>Stipules 0. Stigmas collected into a massive head, expanded at the base in the form of a ring or membrane, and contracted in the middle. (Albumen sometimes 0)</i>	231.	APOCYNACEÆ.
<i>Leaves opposite, with intervening stipules</i>	232.	LOGANIACEÆ.
<i>Stipules 0. Stigmas simple, at the end of a manifest style. Placenta axile. Seeds indefinite, peltate. Stamens interpetalous</i>	233.	DIAPENSIACEÆ.
<i>Stipules 0. Stigmas simple, at the end of a manifest style. Placenta axile. Seeds definite, erect. Corolla valvate. Flowers unsymmetrical</i>	234.	STILBACEÆ.
<i>Stipules 0. Stigmas simple, at the end of a manifest style. Placenta parietal. Flowers didynamous</i>	235.	OROBANCHACEÆ.
<i>Stipules 0. Stigmas simple, at the end of a manifest style. Placenta parietal. Flowers regular</i>	236.	GENTIANACEÆ.

ORDER CCXXIX. EBENACEÆ.—EBENADS.

Guaiacane, *Juss. Gen.* 155. (1789) part of the first sect.—Ebenaceæ, *Vent. Tabl.* 443. (1799); *Brown Prodr.* 324.; *Endl. Gen.* clix.; *Miscn. Gen.* p. 250; *Alph. DC. Prodr.* 8. 209.—Erycibeæ, *Endl. Gen.* p. 653; *Alph. DC. Prodr.* 9. 463.

DIAGNOSIS.—*Gentianal Exogens, with no stipules, and a simple sessile radiating stigma.*

Trees or shrubs, without milk, and with heavy wood. Leaves alternate, without stipules, obsoletely articulated with the stem, entire, coriaceous. Inflorescence axillary. Flowers

by abortiou ♂ ♀, seldom ♂, the ♂ with the rudiment of an ovary, the ♀ usually with a few sterile stamens. Calyx in 3 to 7 divisions, nearly equal, persistent.

Corolla monopetalous, hypogynous, regular, deciduous, somewhat coriaceous, usually pubescent externally, and smooth internally; its limb with 3 to 7 divisions, imbricated in aestivation. Stamens definite, either arising from the corolla, or hypogynous; twice as many as the segments of the corolla, sometimes 4 times as many, or the same number, and then alternate with them, often inserted in pairs at the foot of the lobes of the corolla, and then neither opposite nor alternate with them;

filaments simple in the hermaphrodite species, generally doubled in the polygamous and diœcious ones, both their divisions bearing anthers, but the inner one generally smaller; anthers attached by their base, lanceolate, 2-celled, dehiscing lengthwise, sometimes bearded; pollen round, smooth. Ovary sessile, without any disk, several-celled, the cells each having 1 or 2 ovules pendulous from their apex; style divided, seldom simple; stigmas bifid, or simple. Fruit fleshy, round, or oval, by abortiou often few-seeded, its pericarp sometimes opening in a regular manner. Seed with a membranous testa of the same figure as the albumen, which is cartilaginous and white; embryo in the axis, or but little out of it, straight, white, generally more than half as long as the albumen; cotyledons foliaceous, somewhat veiny, lying close together, or occasionally slightly separate; radicle taper, of middling length or long, superior, turned towards the hilum.

Brown thinks these plants allied to Oliveworts, with which they agree in the placentation of the seeds and other points of structure; being distinguished by their alternate leaves, constantly axillary and usually unisexual flowers, the stamens of which are at least double the number of the lobes of the corolla; but that comparison by no means indicates their nearest affinity, which is certainly with Hollyworts on the one hand, and Dogbanes on the other. The nature of their distinction from the former is stated at p. 579; the latter are known by their peculiar stigma, frequently bifollicular fruit, and numerous seeds. Sapotads, to which they are also much allied, have a great amygdaloid embryo. In a large number of cases there is a strong tendency to polygamy, which might have been suspected to indicate some relation to the Dielinous Alliances; but no other resemblance can be traced, and in fact the separation of the sexes in the present Order is but partial: rudimentary stamens being uniformly present in the ♀ flowers.

Chiefly Indian and tropical; a very few are found northward as far as Switzerland in



FIG. CCCCIV.

FIG. CCCCIV.—*Malva elliptica*.—*Turpin.* 1, a flower, 2, a ♂ corolla cut open 3, a calyx and pistil, 4, fruit; 5, its section; 6, a perpendicular section of a seed.

Europe, and the state of New York in North America. A few occur at the Cape of Good Hope and in New Holland.

They are remarkable for little except the hardness of the wood of such species as *Diospyrus Ebenus*, *Ebenaster*, *melanoxyton*, *Mabolo*, *tomentosa* and *Roylei*, and for the eatable quality of the fruit. The timber, of a black colour, sometimes variegated with white or brown lines, is well known under the names of Ebony and Ironwood. The fruit is noted for extreme acerbity before arriving at maturity. That of *Diospyrus Kaki* is occasionally introduced from China as a dry sweetmeat; another species is believed to furnish a fruit called the Kau Apple by the settlers in the South of Africa. Some practitioners in the United States prescribe an infusion of the unripe fruit of *Diospyrus virginiana*, also called the Date Plum, whose bark had already been employed as a febrifuge with success in cases of cholera infantum, and the worst forms of Mississippi diarrhœa. The particulars as to the manner of applying it are to be found in Hay's *American Journal of Medical Science*, October, 1842.—See *Gard. Chron.* p. 844. 1843. This tree produces a kind of gum, and the fruit when changed by frost is eaten. The fruit of *Diospyrus glutinosa*, or *Embryopteris*, is so glutinous as to be used in Bengal for paying boats.

GENERA.

<i>Royena</i> , L.	<i>Rospidios</i> , A. DC.	<i>Paralea</i> , Aubl.	<i>Cargilia</i> , R. Br.
<i>Euclea</i> , L.	<i>Macreightia</i> , A. DC.	<i>Embryopteris</i> , Gærtn.	<i>Erycibe</i> , Roxb.
<i>Diplonema</i> , Don.	<i>Diospyros</i> , L.	<i>Cavanilla</i> , Lam.	<i>Catonia</i> , Vahl.
<i>Rymia</i> , Endl.	<i>Guaiacara</i> , Tourn.	<i>Maba</i> , Forst.	<i>Erimatalia</i> , R. et Sch.
<i>Gunisanthus</i> , A. DC.	<i>Hebenaster</i> , Rumph.	<i>Ferreola</i> , Roxb.	

NUMBERS. GEN. 9. Sp. 160.

Oleacea.

POSITION.——————EBENACEÆ.—Aquifoliaceæ.

Sapotacea.

ORDER CCXXX. AQUIFOLIACEÆ.—HOLLYWORTS.

Illicineæ, *Ad. Brongniart Mémoire sur les Rhamnées*, p. 16. (1826); *Endl. Gen.* cxxxviii. (1829).—Aquifoliaceæ, *DC. Théorie*, ed. 1. 217. (1813); a § of Celastrineæ, *Ib. Prodr.* 2. 11; *Ed. pr.* clxxiii.; *Meisner Gen.* p. 252.

DIAGNOSIS.—*Gentianal Exogens*, with no stipules, simple stigmas at the end of a manifest style, axile placentæ, definite pendulous seeds, and an imbricated corolla.

Evergreen trees or shrubs, whose branches are often angular. Leaves alternate or opposite, simple, leathery, without stipules. Flowers small, white or greenish, axillary, solitary or clustered, sometimes ♂ ♀ by abortion. Sepals 4 to 6, imbricated in aestivation. Corolla 4- to 6-parted, hypogynous, imbricated in aestivation. Stamens inserted into the corolla, alternate with its segments; filaments erect; anthers adnate, 2-celled, opening longitudinally. Disk none. Ovary fleshy, superior, somewhat truncate, with from 2 to 6 or more cells; ovules solitary, anatropal, pendulous, and often hanging from a cup-shaped funiculus; stigma subsessile, lobed. Fruit fleshy, indehiscent, with from 2 to 6 or more stoues. Seed suspended, nearly sessile; albumen large, fleshy; embryo small, 2-lobed, lying next the hilum, with minute cotyledons, and a superior radicle.

These bushes and trees were formerly included in Rhamnads by most Botanists, but have been well distinguished by Ad. Brongniart, who remarks that the suggestion of Jussieu, in his *Genera Plantarum*, that Hollyworts ought probably to be placed near Sapotads or Ebenads, will probably be adopted. From Spindletrees, with which the Order is combined in some modern works, it differs in the form of the calyx and corolla, in the disposition and insertion of the stamens, and especially in the structure of the ovary and fruit. In these respects Hollyworts are found by Brongniart to agree so completely with Ebenads, that that Order does not, in fact, differ essentially from Hollyworts, except in characters of a secondary order, such as the calyx and corolla being less deeply divided, the stamens often double the number of the segments of the corolla, the style sometimes divided, the cells of the ovary usually containing 2 collateral ovules, and, finally, in the cells of the fruit not becoming bony, as in most Hollyworts. Von Martius places them near Milkworts. Their true character resides in their monopetalous corolla, axile placentæ, pendulous definite seeds, and minute embryo, lying in the base of fleshy albumen. They differ from Loganiads in the want of stipules, from Dogbanes in their simple stigma, and from Ebenads in their long style, the stigmas of which never have a radiating appearance, in their want of the peculiar silky corolla with a twisted imbricated aestivation, in their stamens being constantly definite in number, and in the still more minute size of the embryo.

Found sparingly in various parts of the world, especially in the West Indies, South America, and the Cape of Good Hope. Several are found in North America; but 1, the common Holly, in Europe.

The bark and berries of *Prinos verticillatus* possess, in an eminent degree, the properties of vegetable, astringent, and tonic medicines, along with antiseptic powers which are highly spoken of by American practitioners; the berries are said to be tonic, but Bigelow asserts that they are emetic. A decoction or infusion of the root of *Myginda Uragoga* is a most powerful diuretic. It is asserted that the leaves of the common Holly (*Ilex aquifolium*), are equal to Peruvian Bark in the cure of intermittent



Fig. CCCCV.

Fig. CCCCV.—*Ilex microphylla*.—Hooker. 1. a flower; 2. the corolla laid open; 3. a section of a ripe fruit; 4. a section of a seed.

fever; the root and bark are said to be emollient, resolving, expectorant, and diuretic; Haller recommends the juice of the leaves in icterus; Reil also affirms that he has employed the bark successfully in cases of epidemic intermittent fever when Peruvian Bark had failed. The berries are purgative and emetic; six or eight will occasion violent vomiting. Birdlime is obtained from the bark, and the beautiful white wood is much esteemed by cabinet-makers for inlaying; a strong decoction of *Ilex vomitoria*, called Black drink, is used by the tribes of the Creek Indians at the opening of their councils. It acts as a mild emetic. Some species are employed as substitutes for tea, among which is the *Prinos glabra*, an ever-green North American bush. But the most celebrated is the *Ilex paraguayensis*, or Maté, whose leaves are very generally employed in Brazil and the adjoining South American governments; of this plant, called Paraguay Tea, a full account has been given in the *London Journal of Botany*, l. p. 30; Mr. Stenhouse has detected Theine in its leaves. Martius states that *Ilex Gongouha*, called also *Gongouha*, and *I. theezans* are also employed in Brazil in the same manner; he describes all three as being valuable diuretics and diaphoretics. According to the same author the leaves of *Ilex paraguayensis* and several others are used by dyers; the fruits of *Ilex Macoucoua*, when unripe, abound in tannin, and bruised in a ferruginous mud are employed in dyeing cotton fabrics; they act something like galls.—*Mat. Med. Br.* 126.

GENERA.

<i>Cassine</i> , Linn. <i>Maurocena</i> , Mill. <i>Ilex</i> , Linn. <i>Aquifolium</i> , Tournef. <i>Palloria</i> , Ruiz et Pav. <i>Macoucoua</i> , Aubl. <i>Labatia</i> , Scop.	<i>Burglaria</i> , Wendl. <i>Chomelia</i> , Fl. Flum. <i>Prinos</i> , Linn. <i>Zegeria</i> , Adans. <i>Winterlia</i> , Mouch. <i>Nemopanthes</i> , Raf. <i>Nuttallia</i> , DC.	<i>Ilicioides</i> , Dumort. <i>Byronia</i> , Endl. <i>Polystigma</i> , Meisn. <i>Siphonodon</i> , Griff. <i>Villaresia</i> , Ruiz et Pav. <i>Citronella</i> , Don. <i>Jodina</i> , Hook. et Arn.	<i>Monetia</i> , Herit. <i>Azima</i> , Lam. ?? <i>Skimmia</i> , Thunb. * <i>Rhaptostylum</i> , Humb. et Bonpl.
---	--	--	--

NUMBERS. GEN. 11. Sp. 110.

Rhamnaceæ.

POSITION.—AQUIFOLIACEÆ.—Ebenaceæ.

Sapotaceæ.

ORDER CCXXXI. APOCYNACEÆ.—DOGBANES.

Apocynæ, *Juss. Gen.* 143. (1789) *in part*; *R. Brown Prodr.* 465. (1810); *Royle's Illustrations*, 269.—*Apocynaceæ, Ed. pr.* cccxii. (1836); *Endl. Gen.* cxxxii.; *DC. Prodr.* 8. 317.; *Alph. DC. in Ann. Sc.* 3 ser. 1. 235.—*Contortæ, Linn.*—*Vincææ, DC. and Duby Bot. Gall.* 342. (1828), a § of Apocynææ.

DIAGNOSIS.—*Gentianal Exogens, with no stipules, and the stigmas collected into a massive head, expanded at the base in the form of a ring or membrane, and contracted in the middle.*

Trees or shrubs, usually milky. Leaves opposite, sometimes whorled, seldom scattered, quite entire, often having ciliæ or glands upon or between the petioles, but with no stipules properly so called. Inflorescence tending to corymbose. Calyx free, 5-parted, persistent. Corolla monopetalous, often having scales in its throat, hypogynous, regular, 5-lobed, with contorted aestivation, deciduous. Stamens 5, arising from the corolla, with whose segments they are alternate; filaments distinct; anthers adhering firmly to the stigma, 2-celled, opening lengthwise; pollen granular, globose, or 3-lobed, immediately applied to the stigma. Ovaries 2, or 1-2-celled, polyspermous; styles 2 or 1; stigma 1, contracted in the middle and assuming much the appearance of an hour-glass; ovules usually 00, amphitropal, or anatropal. Fruit a follicle, capsule, or drupe, or berry, double or single. Seeds with fleshy or cartilaginous albumen, usually pendulous; occasionally without albumen; testa simple; embryo foliaceous; plumule inconspicuous; radicle turned towards the hilum.

The singular stigma, more easy to represent by a drawing than to describe, is one of the best indications of this Order; it is generally expanded at the base into a circular membrane or inverted cup, and is contracted somewhere near the middle.

Bearing this in mind, the Loganiads, Gentianworts, and Cinchouads are distinguished with precision. In addition to this, the ovary is usually formed by the mere approximation of two carpels having little or no adhesion except at the point and along the styles and stigmas. In this respect it corresponds with Asclepiads, the economy of whose stamens, pollen, stigma, and seeds is in general such that the nature of the ovary seems an indication of analogy instead of affinity, as is commonly believed. An elaborate account of the peculiarities and affinities of the Order has been drawn up by M. Alph. De Candolle in the place above quoted, to which the reader is referred for further information.

The species are principally tropical, throwing out a few representatives only, such as *Vinea* and *Apocynum*, into northern countries. They appear to be most abundant in the hot parts of Asia, somewhat less common in the tropics of America, and by no means abundant in Africa.

Dogbanes are for the most part plants of considerable beauty, with large, showy, gay-coloured flowers. They are, however, in many cases venomous, and very generally to be suspected, although in some cases they are used medicinally, and in others have an eatable fruit. Among the true poisons *Tanghinia venenifera* stands foremost. The kernel of the fruit, although not larger than an Almond, is sufficient to destroy twenty people. It was used in Madagascar as an ordeal, but the practice is now discontinued.

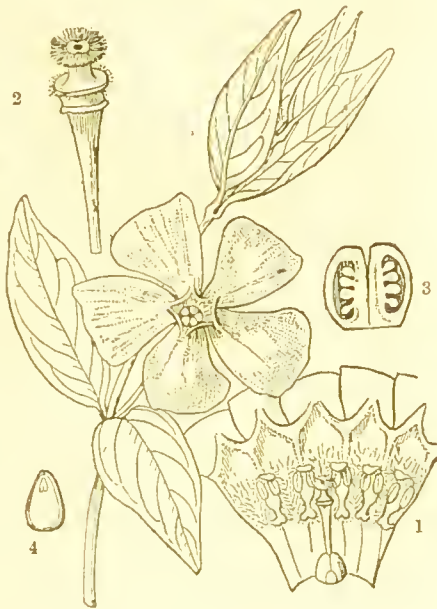


Fig. CCCCVI.

Fig. CCCCVI.—*Vinea minor*. 1. corolla opened; 2. style and stigma; 3. perpendicular section of the double ovary; 4. section of a seed.—*Gärtner*.

The kernels of *Cerbera manghas* are also emetic and poisonous; the milky sap is purgative; the leaves and bark are used in Java as a substitute for *Senna*. In *Thevetia arovai* the seeds are also poisonous; the bark and sap emetic and narcotic; and *Thevetia nerifolia* has a dangerous venomous milk; yet its bitter and cathartic bark is reported to be a powerful febrifuge, 2 grains only being affirmed to be equal to an ordinary dose of *Cinchona*. The wood of both these has a heavy repulsive odour, and is used, in the countries where they are wild, for poisoning fish. *Hasseltia arborea* must be classed among the poisons. In Java the milk obtained from the trunk by incision, mixed with honey, and reduced with boiling water, is employed as a powerful drastic for destroying the tape-worm; it is however apt to produce inflammation of the intestines, and is even in some cases fatal. The milk of the *Plumieras*, although said to be cathartic or drastic, is excessively corrosive; they are however employed by practitioners in tropical countries. *Cameraria latifolia* is named the Bastard Manchineel-tree, from its resemblance in quality to that formidable tree. From a species of *Echites* the Mandingoes are said to obtain a poison with which they smear their arrows. In general the genus is narcotic, or rather stupefying, but with considerable acrimony, whence the species are employed, especially their roots, as drastics and epispastics.—*Stadlmeyer, Echit.* p. 3. The common Oleander, *Nerium Oleander*, although little suspected, is a formidable poison. A decoction of its leaves forms a wash, employed in the south of Europe to destroy cutaneous vermin; and its powdered wood and bark constitute at Nice the basis of an efficacious rat poison. A few years ago, a child died from having eaten one morning a quantity of Oleander flowers; it was seized with violent colic, under which the child sunk at the end of two days. In 1809, when the French troops were lying before Madrid, some of the soldiers went marauding, every one bringing back such provisions as could be found. One soldier formed the unfortunate idea of cutting the branches of the Oleander for spits and skewers for the meat when roasting. This tree, it may be observed, is very common in Spain, where it attains considerable dimensions. The wood having been stripped of its bark, and brought in contact with the meat, was productive of most direful consequences, for of twelve soldiers who ate of the roast seven died, and the other five were dangerously ill.—*Gard. Chronicle*, 1844, p. 23. In like manner the root of *Nerium odoratum* is found to be a poison in India. When, however, these dangerous qualities are moderated, the species become useful medicinal agents, either as emetics or cathartics. The *Apocynums androsæmifolium* and *cannabinum* are emetic, diaphoretic, and diuretic, and in small doses tonic. An infusion of the leaves of *Allamanda cathartica* is considered a valuable cathartic medicine, in moderate doses, especially in the cure of painters' colic. In over doses it is violently emetic and purgative. The root of *Rauwolfia nitida* is used for similar purposes. Not a few species of the Order lose their acrimony either wholly or in a great degree, and then we find them applied as febrifuges or even aromatics. The root of *Ophioxylon serpentinum* is employed by the Telinga physicians of India as a febrifuge and alexipharmic, and also to promote delivery in tedious cases. The bark of *Alyxia stellata* is aromatic, with similar effects to those of *Canella alba* and *Drymis Winteri*, for which it may be substituted. It has been introduced into German practice as a remedy for chronic diarrhœa and nervous complaints; it has the odour of *Melilot*, and traces of Benzoic acid have been found in it. The *Conessi* bark, a valuable astrigent and febrifuge, called *Palapatta* in Malabar, is obtained from *Wrightia antidysenterica*. *Iclemocarpus frutescens* is sometimes used in India as a substitute for *Sarsaparilla*. The wood of *Alstonia scholaris*, and some Madagascar *Carissas*, is as bitter as *Gentian*. *Hancornia pubescens*, and several other Brazilian trees, are mentioned by *Martius* as possessing similar qualities. It is not a little remarkable, then, that in such an Order as this some species should occur which are absolutely inert; yet such appears to be the case in several instances. *Tabernaemontana utilis*, the *Hya Hya*, is one of those Cow-trees of equatorial America, which derive their name from pouring forth a copious stream of thick, sweet, innocuous milk. Even the *Cerberas Odollam, lactaria*, and *salutaris*, seem to possess none of the venom for which the species above mentioned are celebrated. *Caoutchouc*, or a substance analogous to it, is supplied by several plants of the Order. *Collophora utilis*, and *Cameraria latifolia* yield it in South America; *Vallea gummifera* in Madagascar; *Urceola elastica* and *Willughbeia edulis* in the East Indies, the former of fine, and the second of indifferent quality. Although some species bear fruit that is eatable, yet they do not appear to possess much merit. That of *Hancornia* is said by *Martius* to be sweet, sub-acid, and vinous. *Willughbeia edulis* derives its name from the use that is made of its fruit in India. *Carissa Carandas* furnishes a substitute for Red Currant Jelly; to these may be added the *Pishaminus* (*Carpodinus*) of Sierra Leone, *Melodinus monogyneus*, *Carissa edulis*, and a few more. Some are used for dyeing, the chief of which is *Wrightia tinctoria*, which yields *Indigo* of good quality. Little is known of their timber; that of *Wrightia coccinea* is light

and tough, and used for making Palanqueens ; of *Wrightia mollissima* is employed by turners. *Aspidosperma excelsum* is, according to Schomburgk, remarkable for its trunk growing at the lower part into tubular projections, forming cavities which serve the Indians as ready-made planks, and in the construction of their paddles. The trunk appears as if fluted, or rather as if it consisted of numerous slender trees, grown together along their whole length.

The sages of Ceylon having demonstrated, as they say, that Paradise was in that island, and having therefore found it necessary to point out the forbidden fruit of the garden of Eden, assure us that it was borne on a species of this genus, the *Divi Ladner* of their country, and probably *Tabernæmontana dichotoma*. The proof they find of this discovery consists in the beauty of the fruit, said to be tempting, in the fragrance of the flower, and in its still bearing the marks of the teeth of Eve. Till the offence was committed, which brought misery on man, we are assured that the fruit was delicious ; but from that time forward it became poisonous, as it now remains.—*Bot. Reg.* 1841. *sub. t.* 53.

GENERA.

<p>I. WILLUGHBEIÆ.—Placenta parietal.</p> <p>Allamanda, <i>L.</i> <i>Orelia</i>, <i>Aubl.</i> <i>Chilocarpus</i>, <i>Bl.</i> <i>? Landolfia</i>, <i>Pal.</i> <i>Willughbeia</i>, <i>Roxb.</i> <i>Ancylocladus</i>, <i>Wall.</i> <i>Couma</i>, <i>Aubl.</i> <i>? Collophora</i>, <i>Mart.</i> <i>? Pacouria</i>, <i>Aubl.</i></p> <p>II. CARISSEÆ.—Ovary single, 2-celled. Seeds naked.</p> <p><i>Craspidospermum</i>, <i>Boj.</i> <i>? Plectaneia</i>, <i>Thouars.</i> <i>Maycockia</i>, <i>A. DC.</i> <i>Hancornia</i>, <i>Gom.</i> <i>Mangōiba</i>, <i>Pis.</i> <i>Winchia</i>, <i>A. DC.</i> <i>Vahia</i>, <i>Lam.</i> <i>Ambelania</i>, <i>Aubl.</i> <i>Carpodinus</i>, <i>R. Br.</i> <i>Melodinus</i>, <i>Forsk.</i> <i>Bicorona</i>, <i>A. DC.</i> <i>Leuconotis</i>, <i>Jack.</i> <i>Carissa</i>, <i>L.</i> <i>Arduinia</i>, <i>L.</i> <i>Anura</i>, <i>Forsk.</i> <i>? Toxicophlœa</i>, <i>Harv.</i> <i>Rauwolfia</i>, <i>Plum.</i> <i>Ophioxylon</i>, <i>L.</i> <i>Tsioranna</i>, <i>Rheede.</i></p>	<p><i>Thevetia</i>, <i>L.</i> <i>Ahouai</i>, <i>Pl.</i></p> <p>III. PLUMIERIÆ.—Ovary double. Seeds naked.</p> <p><i>Alyxia</i>, <i>R. Br.</i> <i>Gynopogon</i>, <i>Forst.</i> <i>Vallesia</i>, <i>R. P.</i> <i>Hunteria</i>, <i>Roxb.</i> <i>Kopsia</i>, <i>Bl.</i> <i>Culpicarpum</i>, <i>Don.</i> <i>Cerbera</i>, <i>L.</i> <i>Manghas</i>, <i>Burm.</i> <i>Tinghinia</i>, <i>Thouars.</i> <i>Ochrosia</i>, <i>Juss.</i> <i>? Voacanga</i>, <i>Thouars.</i> <i>Piptolena</i>, <i>Harv.</i> <i>Orchipea</i>, <i>Bl.</i> <i>Urceola</i>, <i>Roxb.</i> <i>Bonafousia</i>, <i>A. DC.</i> <i>temmadenia</i>, <i>Benth.</i> <i>Odontadenia</i>, <i>Benth.</i> <i>Peschiera</i>, <i>A. DC.</i> <i>Tabernæmontana</i>, <i>Plum.</i> <i>Pandaca</i>, <i>Thouars.</i> <i>Rejous</i>, <i>Gaud.</i> <i>Reichardia</i>, <i>Dennst.</i> <i>? Conopharyngia</i>, <i>Don.</i> <i>Malouetia</i>, <i>A. DC.</i> <i>Condylocarpon</i>, <i>Desf.</i> <i>Vinca</i>, <i>L.</i> <i>Pervinca</i>, <i>Tourn.</i> <i>Catharanthus</i>, <i>Don.</i> <i>Lochnera</i>, <i>Rehb.</i> <i>Amsonia</i>, <i>Wall.</i> <i>Rhazya</i>, <i>Dec.</i></p>	<p><i>Thyranthus</i>, <i>Benth.</i> <i>Gonioma</i>, <i>E. Mey.</i> <i>Cameraria</i>, <i>Plum.</i> <i>Plumieria</i>, <i>Tourn.</i> <i>Anisolobus</i>, <i>A. DC.</i> <i>Aspidosperma</i>, <i>Mart.</i> <i>Macaglia</i>, <i>Vahl.</i></p> <p>IV. PANSONSEÆ.—Ovary single, 2-celled. Seeds comose.</p> <p><i>Vallaris</i>, <i>Burm.</i> <i>Emericia</i>, <i>R. et Sch.</i> <i>Peltanthera</i>, <i>Roth.</i> <i>Lyonsia</i>, <i>R. Br.</i> <i>Parsonsia</i>, <i>R. Br.</i> <i>Balfouria</i>, <i>R. Br.</i> <i>Beaumontia</i>, <i>Wall.</i></p> <p>V. WRIGHTIÆ.—Ovary double. Seeds comose.</p> <p><i>Wrightia</i>, <i>R. Br.</i> <i>Kixia</i>, <i>Bl.</i> <i>Hasseltia</i>, <i>Bl.</i> <i>Kibatatia</i>, <i>Don.</i> <i>Alstonia</i>, <i>R. Br.</i> <i>Blaberopus</i>, <i>A. DC.</i> <i>Adenium</i>, <i>R. Sch.</i> <i>Haplophyton</i>, <i>A. DC.</i> <i>Holarrhena</i>, <i>R. Br.</i> <i>? Alafia</i>, <i>Thouars.</i> <i>Isonema</i>, <i>R. Br.</i> <i>? Echaltium</i>, <i>Wight.</i> <i>? Christya</i>, <i>Ward.</i> <i>Strophanthus</i>, <i>DC.</i></p>	<p><i>Nerjum</i>, <i>L.</i> <i>Neriandra</i>, <i>A. DC.</i> <i>Motandra</i>, <i>A. DC.</i> <i>Pachypodium</i>, <i>Lindl.</i> <i>Belonites</i>, <i>E. Mey.</i> <i>Baissen</i>, <i>A. DC.</i> <i>? Heligme</i>, <i>Bl.</i> <i>Helygia</i>, <i>Bl.</i> <i>Thennrdia</i>, <i>Kth.</i> <i>Hæmadictyon</i>, <i>Lindl.</i> <i>Prestonia</i>, <i>R. Br.</i> <i>Chonemorpha</i>, <i>Don.</i> <i>Rynchospermum</i>, <i>A. DC.</i> <i>? Cercocoma</i>, <i>Wall.</i> <i>Aganosma</i>, <i>Don.</i> <i>Ichnocarpus</i>, <i>R. Br.</i> <i>Forsteronia</i>, <i>Meyer.</i> <i>Apocynum</i>, <i>Tourn.</i> <i>Pottsia</i>, <i>Hooker.</i> <i>Ecdysanthera</i>, <i>Hooker.</i> <i>Anodeudron</i>, <i>A. DC.</i> <i>Chavannesia</i>, <i>A. DC.</i> <i>Robbia</i>, <i>A. DC.</i> <i>Secoudatia</i>, <i>A. DC.</i> <i>Echites</i>, <i>P. Br.</i> <i>Erothostemon</i>, <i>Don.</i> <i>Mandevilla</i>, <i>Lindl.</i> <i>Laseguea</i>, <i>A. DC.</i> <i>Dipladenia</i>, <i>A. DC.</i> <i>Laubertia</i>, <i>A. DC.</i> <i>Mascarenhasia</i>, <i>A. DC.</i></p> <p><i>? Skytanthus</i>, <i>Meyen.</i> <i>? Tayotum</i>, <i>Blanco.</i> <i>? Pycnostelma</i>, <i>Bunge.</i> <i>? Syringosma</i>, <i>Marl.</i></p>
---	--	--	---

NUMBERS. GEN. 100. Sp. 566.

Asclepiadaceæ.

POSITION.—*Gentianaceæ.*—*APOCYNACEÆ.*—*Loganiaceæ.*

ORDER CCXXXII. LOGANIACEÆ.—LOGANIADS.

Loganiæ, *R. Brown in Flinders*, (1814); *Von Martius N. Gen. et Sp. Pl.* 2. 133; *Bartl. Ord. Nat.* 205; *Arnott in Edinb. Encycl.* 120.—Loganiaceæ, *Ed. Pr.* cxxiv.; *Endl. Gen.* cxxxi.; *DC. Prodr.* 9. 1.—Potaliaceæ, *Brown in Tuckey*, 449. (1819).—Potaliæ, *Martius N. G. et Sp.* 2. 91. and 133. (1828); *Royle Illustr.* 269.—Strychnaceæ, *Blume Bijdr.* 1018. (1826); *Link. Handb.* 1. 439.—Strychnæ, *DC. Théorie ed.* 1. 217. (1813). Spigeliaceæ, *Martius N. G. et Sp.* 2. 132. (1828); *Ed. pr.* cxxxi.; *Endl. Gen.* cxxxv.; *Meisner p.* 258.—Cælostylæ, *Endl. Ench.* cxxxiii.

DIAGNOSIS.—*Gentianal Exogens*, with opposite leaves and interveining stipules.

Shrubs, herbaceous plants, or trees. Leaves opposite, entire, usually with stipules, which adhere to the leafstalks or are combined in the form of interpetiolar sheaths. Flowers racemose, corymbose, or solitary. Calyx valvate or imbricated, inferior, 4-5-parted. Corolla regular or irregular, 4-5- or 10-cleft, with valvate or convolute æstivation. Stamens arising from the corolla, all placed upon the same line, and not always symmetrical with the divisions of the corolla; pollen with 3 bands. Ovary superior, 2-celled, (3, or spuriously 4-celled); style continuous; stigma simple; ovules 00 or solitary, peltate and amphitropal, or ascending and anatropal. Fruit either capsular and 2-celled with placentæ finally becoming loose; or drupaceous, with 1- or 2-seeded stones; or berried with the seeds immersed in pulp. Seeds sometimes winged, usually peltate; albumen fleshy or cartilaginous; embryo small, with the radicle turned towards the hilum or parallel with it.



Fig. CCCCVII.

It is not clear, from the remarks upon *Logania*, by Brown in his *Prodromus*, whether he intended to establish this Order or not. He states that he has placed *Logania* at the end of *Geniaworts*, on account of some affinity between it and *Exacum* and *Mitrasacme*, and also because it does not answer ill to the artificial character of that Order; adding that it, however, might have a still closer connection with *Dogbanes* and with *Usteria* among *Cinchonads*. He further points out the close relation of *Geniostoma* to *Logania*, and concludes by inquiring whether those 2 genera do not, with *Anasser*, *Fagraea*, and *Usteria*, form an Order intermediate between *Dogbanes* and *Cinchonads*. This view has been adopted by *Von Martins*, who however excludes *Fagraea*, which he places among his *Potaliaceæ*; he founds the distinction of that Order upon the want of symmetry between the parts of the calyx, corolla, and stamens, upon the æstivation of the corolla being convolute, not contorted, and in the presence of stipules combined in interpetiolar sheaths. Mr. *Arnott* remarked to me (letter, Dec. 1835) that the Order may be in some respects looked upon as consisting of *Cinchonads* with superior fruit. More recent examination of the genera has entirely confirmed this view, which, however, does not explain with any clearness how *Loganiads* differ from *Dogbanes*. Upon this subject I quote literally the words of M. *Alph. De Candolle*. "I must confess that I have sought in vain for a positive distinction, to which there shall be no exception, between *Dogbanes* and *Loganiads*. The position of the flower with respect to the axis appears to be the same, that is to say, a re-entering angle of the calyx stands next the axis. That of the cells of the fruit with respect to the axis varies among *Loganiads*, as does the æstivation of the corolla and many other characters. The grains of pollen are not very different, if we rely upon the exact but scanty observations of Mr. *Hassall*. The placentas of *Dogbanes* are more securely fastened to the edges of the carpellary leaves, and do not separate from them when the fruit is ripe, as generally happens more or less distinctly among *Loganiads*; but the placentas of *Strychnos* is exactly that of *Carissa*. *Dogbanes* have a milky juice; but exceptions to that are said to occur, as in *Echites* for instance. Finally, the only differences which I can point out are of a particular kind, not very satisfactory in practice, although of some value in botanical philosophy. These reside in the nature of the variations presented by *Dogbanes* and *Loganiads*. In the former the flowers are always isomerous in the calyx, corolla, and stamens, and the number is never more than 5; in the latter the corolla and stamens have

sometimes more pieces than the calyx, as in *Potalia*; the stamens are sometimes reduced to one, as in *Usteria*. The stamens of *Dogbanes* always alternate with the lobes of the corolla; those of *Loganiads* vary more or less from this position, and become opposite in *Potalia*. In *Dogbanes* the number 2 in the carpels is without exception; in *Loganiads*, one genus, *Labordia*, has 3 cells.—In *Dogbanes*, the revivification of the corolla is always twisted, except in *Mascarenhasia*, where it is induplicato-valvate with a torsion of the back of each lobe, which indicates the tendency of the Order; in *Loganiads* the revivification is very variable, and is often valvate in the strictest acceptation of the term.—*Dogbanes* often have hypogynous glands or a complete disk; *Loganiads* have not a trace of either. The first have often appendages inside of the corolla; the second never have any, unless we so consider the hairs which guard the orifice. The stigma is often of considerable size, and bears a peculiar kind of gland in *Dogbaues*; *Loganiads* have no such appearances." This last is the true distinguishing character.

All *Loganiads* are either tropical or inhabit countries near the tropics; a few outlying species in New Holland and America forming the only exceptions.

It would be difficult to name a more venomous Order than this, of whose qualities the celebrated *Nux Vomica* may be taken as the representative. This fatal drug consists of

the seeds of *Strychnos Nux Vomica*, an Indian tree, with small greenish-white flowers, ribbed leaves, and a beautiful orange-coloured round fruit, the size of a small Apple, having a brittle shell, and a white gelatinous pulp. The wood is exceedingly bitter, particularly that of the root, which is used to cure intermittent fevers, and the bites of venomous snakes. The seeds are employed in the distillation of country spirits, to render them more intoxicating. The pulp of the fruit seems perfectly innocent, as it is greedily eaten by many sorts of birds.—*Roxb.* The seeds are extremely poisonous, in large doses producing extraordinary rigidity and convulsive contraction of the muscles previous to death. In very small and repeated doses it promotes the appetite, assists the digestive process, increases the secretion of urine, and sometimes acts slightly upon the bowels. It is employed medicinally in paralysis, dyspepsia, dysentery, affections of



Fig. CCCCVIII.

of the nervous system, &c., and appears to be very active in removing impotence. Another virulent kind is the *Strychnos toxifera*, which forms the basis of a celebrated poison called *Wooraly* or *Ourari*. Dr. Hancock thinks it is the most potent sedative in nature. For an account of it by Sir R. Schonburgk, see *Ann. Nat. Hist.* vii. 411. From the bark of the root of *Strychnos Tienté* another frightful poison is prepared in Java, where it is called *Tjettek* and *Upas Radja*; it acts like *Nux Vomica*, but in a more intense and violent manner. Notwithstanding the active qualities of these formidable plants, others are used in medicine with advantage. *Strychnos lignastrina* is said by Blume to yield the genuine *Lignum colubrinum*, a drug once held in great estimation as a remedy for paralysis of the lower extremities; it is also said to be a valuable anthelmintic, and to be useful in blenorrhœa faucium et laryngis, diseases to which Europeans are subject in Java. Blume adds that several other species of the genus are brought into the market under the name of *Lignum colubrinum*. *Strychnos pseudoquina* is said to be the best febrifuge in Brazil; with the exception of the fruit, which is eaten by children without danger, all the parts, especially the bark, are extremely bitter and rather astringent. It is universally employed instead of *Cinchona*, and is asserted to be fully equal to *Peruvian Bark*, in the cure of the intermittents of Brazil. Vauquelin analysed the bark and could find in it neither brucine, nor strychnine, nor quinine. It is sold under the name of *Copalche bark*. The seeds of *Ignatia amara*, called *St. Ignatius's Beans*, are used successfully in India as a remedy for cholera, under the name of *Papeeta*, but gid-

Fig. CCCCVIII. *Strychnos ligustrina*. Adams. 1, a flower; 2, a section of the ovary; 3, fruit cut open; 4, seed; 5, the same magnified and divided.

diness and convulsions are known to follow their exhibition, if given in an over-dose. In India there is a nut called the Clearing Nut, of which the ripe seeds are dried, and sold in every market, to clear muddy water. The natives never drink clear well water, if they can get pond or river water, which is always more or less impure according to circumstances. One of the seeds is well rubbed for a minute or two round the inside of the vessel, generally an unglazed earthen one, containing the water, which is then left to settle; in a very short time the impurities fall to the bottom, leaving the water clear. The natives of India eat the pulp of the fruit when ripe; Dr. Roxburgh found it disagreeable. These nuts are produced by *Strychnos potatorum*. Bitter Almonds are said to be employed for the same purpose in Egypt, and those of the Kola, or *Sterculia*, in Sierra Leone. The *Spigelia* participate in the noxious properties of *Strychnos*. Both root and leaves of *Spigelia marilandica*, the Carolina Pink-root, and *S. anthelmia*, are active anthelmintics; their efficacy is much impaired by keeping. They are also purgative and narcotic in a slight degree, seem to be acrid narcotics, and are apt to produce very unpleasant symptoms after being exhibited; dimness of sight, giddiness, dilated pupil, spasms of the muscles of the eyes, and even convulsions are reported by Barton to have been brought on by them. *Spigelia glabrata* is reckoned by Martius among poisons; and Mr. Hartweg reports that a species of the same genus kills dogs in equatorial America. An infusion of the leaves of *Potalia resinifera* is slightly mucilaginous and astringent, and is used in Brazil as a lotion for inflamed eyes. *Potalia amara* is bitter like the *Gentians*, and acrid and emetic like *Dogbanes*.

GENERA.

I. SPIGELIÆ.

Spigelia, L.
Canata, Pohl.
Montira, Aubl.
Arapabaca, Plum.
Celostylis, Torr. et Gr.
Mitreola, L.
Mitrasceme, Lab.

II. STRYCHNÆ.

Strychnos, L.
Rouhamoa, Aubl.
Lastostoma, Schr.

Brechia, Harv.
Ignatia, L.
Pagouma, Aubl.
Gardneria, Wall.
Cyathospermum, Wall.
Antonia, Pohl.
Labordia, Gaud.
Usteria, B.
Monodynamis, Gmel.

III. LOGANIÆ.

Logania, R. Br.

Floussa, Andr.
Stomandra, R. Br.
Gelostoma, Forst.
Anasser, Juss.
Acemospermum, Bl.
Fagraea, Thunb.
Kuhlia, Reinw.
Utania, Doa.
Kentia, Steud.
Cyrtophyllum, Reinw.
Picrophloens, Bl.

Gaertnera, Lam.
Frulesca, DC.
Andersonia, Schl.
Sykesia, Arn.
Potalia, Aubl.
Nicandra, Schreb.
Anthoecleista, Afz.
 ? *Codoanathus*, G. Don.
 ? *Anabata*, W.
Sulzeria, R. et Sch.

NUMBERS, GEN. 22. Sp. 162.

Cinchonacæ.

POSITION.—*Apocynacæ.*—*LOGANIACEÆ.*—*Gentianacæ.*

Rhizophoracæ.

CASSIPOURÆÆ, (*Meisn. Gen. p. 119.*—*Legnotidæ*, *Barlt. Ord. Nat. Endl. Gen. 1186*). Trees or shrubs.



Fig. CCCCIX.

Fig. CCCCIX.—*Cassipourea elliptica*.—*Hooker*. 1. a flower; 2. stamens; 3. pistil; 4. cross section of the ovary.

Leaves opposite, nearly entire, with interpetiolar stipules. Flowers axillary, solitary, or clustered. Calyx campanulate, 4-5-cleft, valvate. Petals 4-5, fringed, inserted into the bottom of the calyx. Stamens 2 or 3 times as many as the petals, distinct, inserted into the bottom of the calyx or the back of a disk; filaments free; anthers 2-celled, turned inwards. Ovary superior, 3- to 5-celled; ovules 2 or many in each cell, pendulous or attached to the axis; style simple; stigma obtuse. Fruit berried or capsular. Embryo in the axis of fleshy albumen; radicle superior; cotyledons flat or half-cylindrical.—These are tropical shrubs, and are usually placed with *Mangroves*; but their seeds have albumen, and the ovary is perfectly distinct from the calyx. The points of resemblance consist in the fleshy valvate calyx, the fringed petals, which are like those of *Kandelia*, and the presence of stipules. Brown, after comparing this *Cassipourea* with the *Mangroves* called *Carallias*, was led to conclude that we have a series of structures connecting *Rhizophora*, on the one hand, with certain genera of *Loosestrifes*, particularly with *Antheryllum*, though that genus wants the intermediate stipules; and, on the other, with *Cunoniads*, especially with the simple-leaved species of *Ceratopetalum*.—*Congo*. 437. This is doubtless the fact, and *Cassipourea* may probably be regarded as one of those obscure groups whose relationship is nearly equal in several opposite directions. But upon the whole it seems to have more real affinity with *Loganiads* than with the Orders just mentioned. Its

valvate calyx, perigynous stamens, axile placentation, interpetiolar stipules and albuminous seeds are much the same as in the Loganiads; its main difference lies in its polypetalous corolla. I therefore station it here as a doubtful group, whose true value will be better estimated when its species have been more completely examined.

GENERA.

Drytopetalum, Arn.
Microtropis, Wull. part.
Cassipourea, Aubl.
Tita, Scop.
Lymotis, Swartz.
Richæia, Thouars.
Weilea, Spreng.

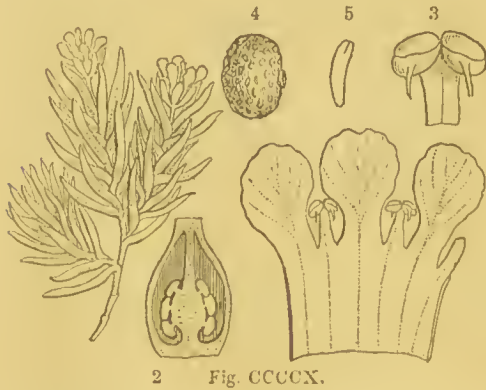
NUMBERS. GEN. 2. Sp. 7.

ORDER CCXXXIII. DIAPENSIACEÆ.—DIAPENSIADS.

Diapensiaceæ, *Link Handb.* 1. 595. (1829); a § of *Convolvulacæ*; *Ed. pr. No. clxxvii.* (1836); *Endl. Gen.* p. 760.; *Meisner Gen.* p. 272.

DIAGNOSIS.—*Gentianal Exogens, with no stipules, simple stigmas at the end of a manifest style, axile placentæ, indefinite peltate seeds, and interpetalous stamens.*

Prostrate under-shrubs, with small densely imbricated leaves which have scarcely any visible veins. Flowers solitary, terminal. Calyx composed of 5 sepals which form



2 Fig. CCCCX.

a broken whorl, are rather unequal, and much imbricated; scarcely distinguishable from the bracts which are closely imbricated round it. Corolla monopetalous, regular, with an imbricated aestivation. Stamens 5, equal; the filaments petaloid and arising from the margin of the sinus of the corolla; anthers 2-celled, with a broad connective, bursting transversely; in *Pyxidantha* awned on the lower valve. Disk 0. Ovary superior, 3-celled; each placenta with 7 ovules in *Pyxidantha*, with an indefinite number in *Diapensia*; style single, continuous with the ovary; stigma sessile, with 3 very short decurrent lobes. Capsule membranous or papery, surrounded with the permanent sepals, terminated by the rigid style or its base. Seeds with a brittle deeply pitted skin, peltate. Embryo very small, with a slender radicle and two very short cotyledons, lying across the hilum in a mass of fleshy albumen.

From the manner in which *Diapensia* was associated by Brown (*Prodromus*, 482), when he separated it along with *Hydroleaceæ* from Bindweeds, it has been generally supposed that this profound Botanist intended to refer *Diapensia* to the former spurious Order. But *Diapensia* is in reality nearer *Phloxworts* than *Hydroleaceæ*, and yet more nearly allied by its small embryo and copious albumen to *Hollyworts* and *Loganiads*. *Hydroleaceæ* themselves must merge in *Hydrophylys*, and the free central placentation of that Order forbids the association with it of *Diapensiads*. The chief resemblances consist in *Diapensia* having the filaments petaloid, and originating not from within the corolla but from the margin of the sinuses, so that the corolla might be described as 10-cleft, five of the divisions being broad and coloured, and the other five much narrower, and shorter, colourless, and having anthers; and in the embryo being filiform, slightly 2-lobed at one end. But both *Diapensia* and *Pyxidantha* disagree with *Hydrophylys* in having a calyx consisting of five unequal sepals forming a broken whorl; in having the anthers bursting transversely, and with a very broad connective; in having only one style instead of two; in being destitute of an hypogynous disk; and finally, in the embryo lying in the midst of fleshy albumen across the hilum. At least this is certainly the case in *Pyxidantha*, and I have no reason to doubt its being equally the case with *Diapensia*.

Let me add, that although the name of *Diapensiaceæ* originated with Link, yet that author in placing it among Bindweeds was obviously unacquainted with its real structure, and in assigning it for a character "*seminia membranâ inclusa*," seems to have assumed that in this respect it agrees with *Hydrophylys*, which is not the fact.

The species are mountain plants of the north of Europe and North America.

They are not known to possess any useful properties.

GENERA.

Diapensia, L.

| *Pyxidantha*, Michx.

NUMBERS. GEN. 2. Sp. 2.

Hydrophyllaceæ.

POSITION.—*Loganiaceæ.*—DIAPENSIACEÆ.—*Stilbaceæ.*

Fig. CCCCX.—*Pyxidantha barbulate*. 1. corolla cut open; 2. perpendicular section of the ovary; 3. anther; 4. seed; 5. embryo.

ORDER CCXXXIV. STILBACEÆ.—STILBIDS.

Stilbinea, Kunth in *verhandl. Konigl. Acad. Wissensch. Berol.* (March, 1831); *Martius Conspectus*, No. 109.; *Endl. Gen.* cxxviii.

DIAGNOSIS.—*Gentianal Exogens*, with no stipules, simple stigma at the end of a manifest style, axile placentæ, definite erect seeds, valvate corolla, and unsymmetrical flowers.

Cape shrubs, with the habit of a *Phyllica* or a *Fir*. Leaves whorled, close, narrow, entire, leathery, rigid, articulated at the base, without stipules. Flowers in dense spikes at the point of the branches, sessile, each with 3 bracts at the base, occasionally polygamous. Calyx tubular, campanulate, with a 5-cleft limb, the segments of which are equal; the two lower sometimes cut deeper; seldom 5-leaved or 2-valved; persistent. Corolla monopetalous, hypogynous; the tube enlarged upwards, with a ring of hairs in the throat; the limb valvate, 5-parted, spreading, somewhat 2-lipped, rarely 4-parted, and nearly regular. Stamens equal in number to the segments of the corolla, and alternate with them, inserted between the lobes, the upper one of five always rudimentary, or even obliterated; filaments free; anthers elliptical, oblong, attached by the back, 2-celled; opening longitudinally by their face. Ovary superior, sessile, 2-celled; cells with only one erect ovule; one cell sometimes smaller and empty; style terminal, filiform, exerted; stigma simple, emarginate. Disk 0. Fruit dry, 1-seeded, indehiscent, surrounded by the permanent calyx. [Seed erect, with a loose cellular testa. Embryo short, in the axis of very firm fleshy albumen, orthotropal; cotyledons scarcely distinct; radicle inferior.—*Endl.*]

This little Order has never yet been well examined, and no good figures of any of the species can be found in books. The seeds have been seen in only one or two cases, and the whole of the details require verification and re-examination. According to Kunth, they differ from *Selagids* in little except having 2-celled anthers, erect ovules, and no hypogynous disk, and he also compares them with *Globularia*, which I regard as a mere form of the *Selagids* themselves. *Endlicher* compares them to *Vervains*. All these comparisons have doubtless been influenced by the unsymmetrical flowers, which appear as if didynamous. But in truth they are not so, in such instances as I have been able to examine, namely *Stilbe pinastra* and *ericoides*, or *Campylostachys abbreviata* and *cernua*, with some others in the herbaria of Sir W. Hooker and Mr. Harvey; and what is more important, the stamens originate invariably from between the lobes of the corolla. In habit they may doubtless be compared to *Selagids* and some *Vervains*, but they are quite as much like *Diosmas*, or *Phyllicas*, or *Bruninds*. If to these circumstances we add the presence of a minute embryo with scarcely any cotyledons (which according to *Endlicher* is the structure), *Stilbids* can hardly be associated with any of the Orders hitherto suggested. To me they appear far more truly allied with the little Order of *Diapensiads*, of which they seem to be an unsymmetrical form. Their occasional tendency to polygamy in the original species of *Campylostachys* would be very



Fig. CCCXXI.

Fig. CCCXXI.—*Stilbe Pinastra*. 1. a flower; 2. the same cut open; 3. a perpendicular section of an ovary.

unusual in the Echia, but not at all in the Gentianal Alliance. They possibly bear the same relation to Diapensiads as Broomrapes to Gentianworts.

All are natives of the Cape of Good Hope.

Their uses are unknown. They are somewhat resinous shrubs.

GENERA.

Stilbe, *L.*

Luhea, *Schmidt.*

Campylostachys, *Kunth.*

Eurylobium, *Hochst.*

NUMBERS. GEN. 3. Sp. 7.

POSITION.———*Bruniaceæ.*
 STILBACEÆ.—*Diapensiaceæ.*
Selaginaceæ.

ORDER CCXXXV. OROBANCHACEÆ.—BROOMRAPES.

Orobanchæe, *Juss. Ann. Mus.* 12. 445. (1808); *Rich in Pers. Synops.* 2. 180.; *DC. and Duby Bol. Gall.* 348.; *Bartl. Ord. Nat.* 173; *Endl. Gen. cliv.*; *Walpers' Repert.* 3. 457.—Phelypæacæe, *Horanin, Pr. Lin.* p. 73.—Orobanchinæe, *Link Handb.* 1. 506. (1829) a § of Personatæe.

DIAGNOSIS.—*Gentianal Exogens, with no stipules, simple stigmas at the end of a manifest style, parietal placentæ, and didynamous flowers.*

Herbaceous leafless plants, growing parasitically upon the roots of other species. Stems covered with brown or colourless scales. Calyx divided, persistent, inferior. Corolla monopetalous, hypogynous, irregular, persistent, with an imbricated æstivation. Stamens 4, didynamous. Anthers occasionally 1-celled, but more generally 2-celled, the cells distinct, parallel, often mucronate, or bearded at the base. Ovary superior, 1-celled, seated in a fleshy disk, with 2 or more parietal polyspermous placentæ, the 2 carpels of which it consists placed right and left of the axis; style 1; stigma 2-lobed. Fruit capsular, inclosed within the withered corolla, 1-celled, 2-valved, each valve bearing 1 or 2 placentæ in the middle. Seeds indefinite, very minute; embryo minute, at the base of fleshy albumen.

Broomrapes are generally compared with Gesnerworts and Figworts, from both which they are very different in habit. They are distinguished from Gesnerworts by the important circumstance of their seeds having only a minute embryo lying in one end of fleshy albumen, and spherical pollen, while the embryo of Gesnerworts is cylindrical and erect, occupying the axis of a small quantity only of albumen, and the pollen elliptical, with a furrow on one side. In Gesnerworts the seeds are attached by rather long funiculi, while they are absolutely sessile in Broomrapes. Moreover, there is a tendency in the latter to become pentandrous, or even hexandrous; not only does no such tendency exist in the former, but the reverse takes place, in the occasional increased sterility of the stamens. There is scarcely any trace in Orobanchæ of the glandular processes of the disk of Gesnerworts, or at least nothing more than a thin glandular coating to the base of the ovary. From Figworts, to which their didynamous stamens have caused them to be compared, they are known by their 1-celled ovary and minute embryo; as well as by their habit and parasitical mode of growth. In this respect they resemble Fir-rapes, from which they differ in their ovary being composed of 2, not 5 carpels, and in their irregular unsymmetrical flowers, with epipetalous stamens. There can be little doubt, however, that the nearest affinity of Broomrapes is to Gentianworts, with some of which, as for example, *Voyria*, they even correspond in their leafless scaly habit, and moreover in their corolla adhering firmly to the base of the fruit which it covers when

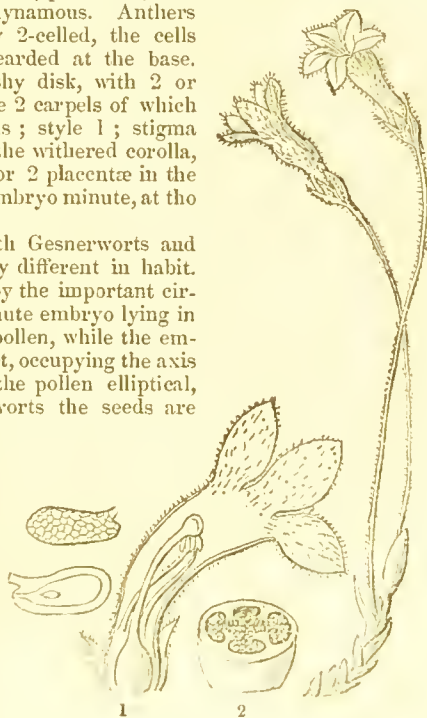


Fig. CCCCXII.

Fig. CCCCXII.—*Anoploanthus uniflorus*. 1. a flower cut open; 2. a section of the ovary; 3. a seed; 4. the section of it to show the embryo.

ripe. The great points of resemblance between Orobanche and Gesneriworts and Figworts consist in their monopetalous didynamous flowers and bicarpellary polyspermous fruit; and it is these which have led to the general opinion that all the Orders are closely allied. Such marks of agreement are doubtless important; but they may be overbalanced by circumstances of disagreement of more importance. One of these is the position of the carpels with respect to the axis of inflorescence. In the whole category of personate, labiate, or irregular plants forming the Bignonial Alliance, the carpels stand fore and aft with respect to the axis; while in Gentianiworts we have as universally the two carpels placed laterally. In this striking character Orobanche agrees with the latter. Now as a didynamous structure is not universal in Bignonials, while the position of carpels is constant through both series respectively, we must assign the greater importance to the latter character, and hence Orobanche would be removed from Bignonials to the series represented by Gentians; of which this genus would be a didynamous form, analogous to what frequently occurs among Bignonials. If to this we add the resemblance between Broomrapes and Gentians in the minuteness of their embryo as compared with the albumen, no doubt can, I think, remain as to the very near alliance between the two.

The peculiar placentation of this Order was mentioned by me some years ago, (*Taylor's Magazine*, Nov. 1837). That their capsule consists of two carpels standing right and left of the axis of inflorescence, and with the margins not inflected in the form of dissepiments, is incontestable. Yet in Orobanche and Phelypæa the capsule has four placentæ, placed equidistant in pairs upon the face of each valve or carpel, and considerably within the margin. In *Epiphegus* each carpel has two intramarginal placentæ, which diverge from the base upwards, and terminate before reaching the apex. In *Lathræa* there is to each valve but one placenta, which may be regarded as two confluent ones occupying the very face of the dorsal suture of the carpel. And finally in *Æginetia indica*, and I believe in *Æginetia abbreviata* also, the placenta is in like manner confined to the axis of the valve, occupying the same position upon the carpels as in *Lathræa*, but broken up into a number of parallel plates of unequal depth, over the whole surface of which multitudes of minute seeds are distributed.

According to the observations of Vaucher, of Geneva, the seeds of *Orobanche ramosa* will lie many years inert in the soil unless they come in contact with the roots of *Heup*, the plant upon which that species grows parasitically: when they immediately sprout. The manner in which the seeds of *Orobanche* attach themselves to the plants on which they grow has been observed by Schlauter. This writer states that they only seize seedlings, and are unable to attack roots of a stronger growth. When *Pieris hieracioides* is attacked, he found that the *Orobanche* seeds seize upon the points of the roots exclusively; the latter then swell and form an enlargement which serves for a base to the *Orobanche*.—*Ann. Sc. n. s.* 10. 318. Duchartre has studied with great diligence the development of *Clandestina*, in whose stem he finds neither medullary sheath nor medullary processes; and according to Messrs. de Mirbel, Richard, and Ad. Brongniart, the same remarkable structure occurs among Figworts in the case of *Melampyrum sylvaticum*.—*Ann. Sc. N. n. s.* xx. 145.

Broomrapes are not uncommon in Europe, particularly in the southern kingdoms, Barbary, the Cape of Good Hope, middle and northern Asia, and North America; they are very rare in India.

Orobanche major is a powerful, astringent, bitter plant, the infusion of which has been employed as a detergent application to foul sores, and internally to restrain alvine fluxes. *Epiphegus virginiana* is supposed to have formed, in conjunction with white oxide of arsenic, a famous cancer powder, which was known in North America under the name of Martin's Cancer Powder. It is thought to participate in the properties of *Orobanche major*. *Orobanche epithimum* is an old-fashioned bitter tonic, and vulnerary; and its fragrant flowers are used in spasmodic affections. *Lathræa Squamaria* roots were given in epilepsy, and *Clandestina* was supposed to counteract sterility in women: but these things are now forgotten. *Æginetia indica*, prepared with sugar and nutmeg, is considered an antiscorbutic. *Phelipæa lutea* dyes black the ropes that are prepared from the fibres of the Doom Palm of Thebes.



Fig. CCCXIII.

Fig. CCCXIII.—1. seed and embryo of *Conopholis americana*; 2. section of ovary of *Epiphegus americana*; 3. section of fruit of *Hyobanche sanguinea*.

GENERA.

<p>Epiphegus, Nutt. <i>Leptanthium</i>, Raf. <i>Mylanche</i>, Wallr. Phelipaea, Desf. <i>Trionychium</i>, Wallr. <i>Kopsia</i>, Dumort. <i>Cistanche</i>, Link.</p>	<p><i>Hæmodorum</i>, Wallr. Conopholis, Wallr. <i>Orobanchæ</i>, Linn. <i>Osproleon</i>, Wallr. <i>Boschniakia</i>, C. A. Mey. <i>Stellara</i>, Fisch. <i>Clandestina</i>, Tournef.</p>	<p><i>Lathræa</i>, Linn. <i>Squamaria</i>, Hall. <i>Anoplantus</i>, Endl. <i>Anopton</i>, Wallr. <i>Anblatum</i>, Tournef. <i>Æginetia</i>, Linn.</p>	<p><i>Hyobanche</i>, Thunb. ? <i>Centronota</i>, DC. <i>Centronia</i>, B. <i>Gaspariua</i>, Endl. <i>Tronicena</i>, Steud. <i>Obolaria</i>, L.</p>
---	---	--	---

NUMBERS. GEN. 12. Sp 116.

Monotropaceæ.

POSITION.—Gentianaceæ.—OROBANCHACEÆ.—

Gesneraceæ.

ORDER CCXXXVI. GENTIANACEÆ.—GENTIANWORTS.

Gentianeæ, *Juss. Gen.* 141. (1789); *R. Brown Prodr.* 449; *Von Martius Nov. Gen. &c.* 2. 132; *Bartl. Ord. Nat.* 199; *Royle's Illustrations*, 276; *Endl. Gen.* cxxxiv.; *Grisebach Monogr.* (1836); *Id. in Alph. DC. Prodr.* 9. 38.—Desfontaineæ, *Endl. Gen.* p. 669.

DIAGNOSIS.—*Gentianal Exogens*, with no stipules, simple stigmas at the end of a manifest style, parietal placentæ, and regular flowers.

Herbaceous plants, seldom shrubs, generally smooth, sometimes twining. Leaves opposite, entire, without stipules, sessile, or having their petioles confluent in a little



Fig. CCCCXIV.

sheath, in most cases 3-5-ribbed; very rarely brown and scale-like; sometimes alternate. Flowers terminal or axillary, regular, or very seldom irregular. Calyx divided, inferior, persistent. Corolla monopetalous, hypogynous, usually regular, and persistent; the limb regular, sometimes furnished with delicate fringes, its lobes of the same number as those of the calyx, generally 5, sometimes 4, 6, 8, or 10, occasionally extended at the base into a bag or spur, with a plaited, or folded, or imbricated twisted aestivation. Stamens inserted upon the corolla, all in the same line, equal in number to the segments, and alternate with them; some of them occasionally abortive. Ovary composed of 2 carpels, 1- or partly 2-celled, many-seeded. Style 1, continuous with the ovary; stigmas 2, right and left of the axis; ovules 00, anatropal, parietal. Capsule or berry many-seeded; when 2-valved, the margins of the valves turned inwards, and bearing the seeds. Seeds small; testa single; embryo minute in the axis of soft fleshy albumen; radicle next the hilum.

This Order is very near that of Dogbanes, from which it differs in the herbaceous habit, permanent corolla, entire ovary, parietal placentation, imbricated, not contorted aestivation, want of milk, and usually capsular fruit. The ribbed leaves too afford, in the majority of cases, a certain mark of distinction; to this may be added bitterness. Wherever the parietal placentæ can be found, and this is usually the case, the recognition of the Order is very easy; and in the anomalous genera, like *Sebæa*, in which a partially 2-celled ovary exists, a little examination shows that in reality the placentæ merely meet at the base. From Figworts, in particular, this circumstance distinctly cuts Gentians off, independently of their minute embryo and symmetrical flowers. Von Martius remarks that no Gentianworts except *Tachia* have a hypogynous disk; and the two carpellary leaves of which the fruit is formed are lateral, or right and left with respect to the common axis of the inflorescence, their placentæ being consequently anterior and

Fig CCCCXIV.—*Gentiana amarella*. 1. section of the ovary of *Chironia baccifera*; 2. section of the ripe fruit; 3. a seed; 4. a vertical section of it.

posterior ; while in Figworts, Gesnerworts, Bignoniads, Acanthads, and their allies, a hypogynous disk is very common in the shape of a fleshy ring, or of glands, or teeth, and the two carpellary leaves are anterior and posterior, the dissepiment being consequently in the same transverse line as that which separates the upper from the lower lip. Crawfordia seems to connect this Order with Bindweeds ; and Voyra, a parasitical, scaly, leafless genus offers a direct transition to Broomrapes.

A numerous Order of herbaceous plants, extending over almost all parts of the world, from the regions of perpetual snow upon the summits of the mountains of Europe, to the hottest sands of South America and India. They, however, do not appear in the Flora of Melville Island ; but they form part of that of the Straits of Magellan. The most common genus is Gentiana, concerning which and its allies, the following observations will be read with interest.

"Few genera display so full a series of colours in the flowers as this does ; red, blue, yellow and white, are all exhibited in it, with many of the intermediate compound tints. Yellow and white are rare in the regions of the Gentians, but almost invariably present ; the red species are nearly confined to the Andes of South America and New Zealand. Amongst Dr. Jameson's Botanical Notes on the Flora of the Andes of Peru and Colombia, I find the following interesting remark : Of sixteen species of Gentian with which I am acquainted, one half are red, four purple, two blue, one yellow, and one white.—*Bot. Journ.* vol. ii. p. 649. Their inferior limit under the line we find, from the same source, to be 7852 feet, and they ascend from thence nearly to the limits of perpetual snow on Cotopaxi ; they do not in South America descend to the level of the sea in a lower latitude than 54° or thereabouts, where however there are no Alpine species, though the snow line does not descend below 4000—3,500 feet. In the Himalaya, where the species are all blue-flowered, one species has been gathered by my friend Mr. Edgworth, near Ratha Kona, on the Mána Pass, at an elevation of 16,000 feet, near the limit of perpetual snow ; and another reaches, in lat. 31 N., the altitude of 12,689, according to Dr. Royle.—*Illust. Plant. Himal.* vol. i. pp. 22 and 273. In Ceylon a species has been gathered at between 6000 and 8000 feet of elevation. One species, *G. prostrata*, *H. B. K.*, has a most extraordinary range both in longitude and latitude ; in southern Europe it inhabits the Carinthian Alps, between 6000 and 9000 feet high ; in Asia it has been found on the Altai Mountains, about lat. N. 52°. Its American range is much more remarkable, it having been gathered on the tops of the rocky mountains in lat. 52° N. where they attain an elevation of 15,000—16,000 feet, and on the east side of the Andes of S. America, in 35° S. : it descends to the level of the sea at Cape Negro, in the Straits of Magellan in lat. 53° S. ; and at Cape Good Hope in Behring's Straits in lat. 68½° N.

"The fact of the occurrence, and the great number, of species of Gentiana inhabiting only the more elevated regions of the temperate and tropical zones, and there reaching the snow limit, renders it very remarkable that they should be so proportionally scarce in the higher latitudes both of the northern and southern hemispheres. Generally speaking, the inhabitants of these elevated and cold regions are species of such Natural Orders and Genera as compose the mass of Polar vegetation. It is so to a great extent with certain groups of Ranunculaceæ, Gramineæ, Caryophylleæ, Cruciferae, Ericaceæ, &c., but not with Gentianeæ ; the proportion which the species of the transition temperate zones bear to the other plants of those regions on the one hand, and to the tropical species on the other, is in both cases remarkably small. They are entirely unknown to the Floras of the Polar and American Islands ; very few inhabit Greenland, Iceland, or the Arctic Sea shores in the North, or Tasmania, New Zealand, Fuegia, or the Antarctic Islands in the South ; and again in other parts of N. Europe and America, or of Chili and Patagonia, they are infinitely less numerous than in the Alps of middle and south Europe, or the Andes of the equator."—*Jos. Hooker, Bot. of Antarctic Voyage*, p. 55.



Fig. CCCCXV.

The Order of Gentianworts is not more remarkable for the diversity of its colours than it is for the uniformity of the secretions which its various species exhibit. Bitterness in every part, root, leaves, flowers, fruit, in annuals, perennials, and shrubs, is so much their characteristic that the following account of the purposes to which they are applied is little more than a list of repetitions; with this exception, that they in some cases prove narcotic and emetic.

The common Gentian root of the druggists, a pure and intense bitter, is for the most part *Gentiana lutea*, an herbaceous plant, with axillary whorls of yellow flowers, common on the Alps of Europe. It is principally employed as a tonic, but sometimes relaxes the bowels, producing nausea and a kind of intoxication. *G. campestris* and *Amarella*, common on the heaths and hills of some parts of England, are domestic substitutes; as are *G. Catesbei* in the United States, *G. Kurroo* in the Himalayas, and *G. punctata*, *pannonica*, *purpurea*, and others, on the Continent of Europe. *G. cruciata* has been superstitiously believed to possess especial virtues because its leaves grow in the form of a cross, and it is one of the thousand panaceas for hydrophobia. *Agathotes Chirayta*, a Himalayan annual, is remarkable for the pureness of its bitter. The whole plant is pulled up at the time the flowers begin to decay, and dried for use. Its febrifugal properties are in high estimation with European practitioners in India, who use it instead of Cinchona when the latter is not to be procured. *Cicendia hyssopifolia*, a common Indian annual, *Erythraea Centaurium* (Centaury), a beautiful little wild plant, with pink flowers, *Chlora perfoliata*, various species of *Lisianthus*, *Tachia*, *Sabbatia*, *Coutoubea*, &c. &c., possess qualities very nearly of the same kind, varying principally in intensity, and are employed as substitutes for Gentian in different countries. The root of *Frasera Walteri*, a North American biennial, is a pure, powerful, and excellent bitter, destitute of aroma, and is fully equal to Gentian. When fresh it is reported to be emetic and cathartic. The roots have been imported into Europe as a sort of Calumba, and have acquired in consequence the name of American Calumba. *Menyanthes trifoliata*, a common bog plant, called Buck Bean (quasi Bach or Beck, *i. e.* Brook Bean) is intensely bitter. Its rhizome is reckoned one of the most valuable of known tonics; but large doses produce vomiting, and frequently powerful diaphoresis. It is recommended in intermittent and remittent fevers, gout, herpetic complaints, rheumatism, dropsy, scurvy, and worms. Withering says that it may be used as a substitute for Hops in making beer. *Villarsia nymphoides* acts in a similar way, but is weaker.

GENERA.

I. GENTIANEÆ.—Corolla imbricated.	<i>Agathotes</i> , Don. <i>Henricca</i> , Linn. Lis. <i>Frasera</i> , Walt. <i>Halenia</i> , Borkh. <i>Tetragonanthus</i> , Stell. <i>Chironia</i> , Linn. <i>Rastinia</i> , Mönch. <i>Plocandra</i> , E. Mey. <i>Gyrandra</i> , Gris. <i>Orplium</i> , E. Mey. <i>Valerandia</i> , Neck. <i>Excucum</i> , Linn. <i>Lapethea</i> , Gris. <i>Voyra</i> , Aubl. <i>Vohiria</i> , Juss. <i>Lila</i> , Schreb. <i>Humboldtia</i> , Neck. <i>Leiphaimos</i> , Schlecht. <i>Ixanthus</i> , Griseb. <i>Hippion</i> , Spreng. <i>Slevoglia</i> , Reichenb. <i>Cicendia</i> , Adans. <i>Microcata</i> , Link. et H. <i>Franquevillia</i> , Gray. <i>Hippocentaurea</i> , Schlt. <i>Centaurella</i> , L. C. Rich. <i>Centaurium</i> , Pers. <i>Bartonia</i> , Mühlenb. <i>Andrewsia</i> , Spreng. <i>Erythraea</i> , Ren. <i>Xantha</i> , Reichenb. <i>Zygotigma</i> , Griseb. <i>Causcora</i> , Lam. <i>Pladera</i> , Sol.	<i>Hoppea</i> , Willd. <i>Poolia</i> , Dussut. <i>Orthostemon</i> , R. Br. <i>Sabbatia</i> , Adans. <i>Chlora</i> , Linn. <i>Blackstonia</i> , Huds. <i>Xanthanthus</i> , Griseb. <i>Callopisma</i> , M. et Zucc. <i>Dejanira</i> , Cham. <i>Schultesia</i> , M. et Z. <i>Hockinia</i> , Gardn. <i>Anacolis</i> , Griseb. <i>Pagcea</i> , Griseb. <i>Petalostylis</i> , Griseb. <i>Omphalostigma</i> , Gris. <i>Lisianthus</i> , Aubl. <i>Lisianthus</i> , Linn. <i>Macrocarpaea</i> , Griseb. <i>Spharocarpaea</i> , Griseb. <i>Choriophyllum</i> , Gris. <i>Chelonanthus</i> , Griseb. <i>Irbachia</i> , Mart. et Zucc. <i>Helia</i> , Mart. et Zucc. <i>Eustoma</i> , Don. <i>Urananthus</i> , Griseb. <i>Leianthus</i> , Griseb. <i>Coutoubea</i> , Aubl. <i>Cutuba</i> , Mart. et Zucc. <i>Picirica</i> , Schreb. <i>Prepusa</i> , Mart. et Zucc. <i>Tachiadensus</i> , Griseb. <i>Symbolanthus</i> , Don. <i>Tachia</i> , Aubl. <i>Myrmecea</i> , Schreb.	<i>Leiothamnus</i> , Griseb. <i>Eudoxia</i> , Dou. <i>Crawfordia</i> , Wall. <i>Belmontia</i> , E. Mey. <i>Exochrenium</i> , Gris. <i>Sebæa</i> , Soland. <i>Lagenias</i> , E. Mey. <i>Schübleria</i> , Mart. <i>Curtia</i> , Cham. <i>Thurnheissera</i> , Pohl. <i>Apophragma</i> , Griseb. <i>Exadensus</i> , Griseb. <i>Desfontainia</i> , R. et S. <i>Linkia</i> , Pers. <i>? Henicostemma</i> , Blum. <i>? Tripterospermum</i> , Blum. <i>? Micraea</i> , Miers. <i>Glyphospermum</i> , Don.
<i>Gentiana</i> , Tournef. <i>Asterias</i> , Ren. <i>Calantha</i> , Fræcl. <i>Coilantha</i> , Borkh. <i>Dasystephana</i> , Ren. <i>Callera</i> , Raf. <i>Pneumonanthe</i> , Bung. <i>Dasycephala</i> , Borkh. <i>Ominalis</i> , Borkh. <i>Thylactes</i> , Ren. <i>Crossocephalum</i> , Fræcl. <i>Crossopetalum</i> , Roth. <i>Urananthe</i> , Gaud. <i>Gentianella</i> , Borkh. <i>Ericala</i> , Ren. <i>Ericoila</i> , Bork. <i>Calathiana</i> , Fræcl. <i>Chondrophyllum</i> , Bng. <i>Erihalla</i> , Bung. <i>Tetvorhiza</i> , Ren. <i>Endotricha</i> , Fræcl. <i>Eurythalia</i> , Ren. <i>Cyanea</i> , Ren. <i>Orophylax</i> , Endl. <i>Pleurogyne</i> , Eschsch. <i>Lomatogonium</i> , A. Br. <i>Trochantha</i> , Bung. <i>Swertia</i> , Linn. <i>Stellera</i> , Turcz. <i>Anagallidium</i> , Griseb. <i>Ophelia</i> , Don. <i>Monobolthrium</i> , Hochs.	II. MENYANTHEÆ.—Corolla induplicate. <i>Menyanthes</i> , Linn. <i>Menyanthes</i> , Haw. <i>Villarsia</i> , Vent. <i>Nymphæanthus</i> , Rchb. <i>Renalmia</i> , Houtt. <i>Trachysperma</i> , Raf. <i>Cumada</i> , Jon. <i>Limnanthemum</i> , Gmel. <i>Nymphoides</i> , Tournef. <i>Waldschmidia</i> , Wigg. <i>Schweyckheria</i> , Gmel. <i>? Mitreola</i> , Linn. <i>Cynoclonum</i> , Gmel.		

NUMBERS. GEN. 60. Sp. 450.

Cinchonaceæ.

POSITION.—Orobanchaceæ.—GENTIANACEÆ.—

Polcomniaceæ.

ALLIANCE XLVI. SOLANALES.—THE SOLANAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with dichlamydeous, monopetalous, symmetrical flowers, axile placentæ, 2-3-celled fruit, large embryo, lying in a small quantity of albumen.*

All these plants are clearly held together by the common character of a monopetalous corolla, axile placentæ, regular symmetrical flowers, and an inconsiderable quantity of albumen. It is the last circumstance, with the axile placentation, which divides them from the Gentianal Alliance. The free central placenta of Cortusals clearly distinguishes that Alliance.

Here and there anomalous genera occur, with no corolla, or separate petals, but they are rare, and do not seem to invalidate the Alliance, which joins Gentianals by Oliveworts, which are nearly allied to Ebenads and Hollyworts, and passes into Cortusals by the Polemoniads, which are so very near Hydrophylls that the two were once blended in the same Natural Order.

Lateral affinities are here very important. Nothing whatever except the symmetry of their flowers separates Nightshades from Figworts in the Bignonial Alliance; Oliveworts touch Jasmineworts among Echials; Asclepiads Dogbanes in Gentianals, and Bindweeds the Nolanads of the Echial Alliance.

NATURAL ORDERS OF SOLANALS.

<i>Stamens free, 2 or 4</i>	237. OLEACEÆ.
<i>Stamens free, 5. Placentæ axile. Embryo terete</i>	238. SOLANACEÆ.
<i>Anthers and stigma consolidated into a column</i>	239. ASCLEPIADACEÆ.
<i>Stamens free, 5. Placentæ axile. Cotyledons leafy, folded longitudinally</i>	} 240. CORDIACEÆ.
<i>Stamens free, 5. Placentæ basal. Cotyledons leafy, doubled up</i>	
<i>Stamens free, 5. Placentæ basal. Embryo filiform, spiral</i>	241. CONVULVULACEÆ.
<i>Stamens free, 5. Placentæ axile. Cotyledons straight, planoconvex</i>	} 243. POLEMONIACEÆ.

ORDER CCXXXVII. OLEACEÆ.—OLIVEWORTS.

Oleineæ, *Hoffmannsegg et Link Fl. Port.* (1806); *Brown Prodr.* 522.—Lilaceæ, *Vent. Tabl.* 1. 306. (1799).—Fraxineæ, *Martius Conspectus*, No. 209. (1835).—Oleaceæ, *Ed. pr.* cccxvi. (1836); *Endl. Gen.* cxxx.; *DC. Prodr.* 8. 273.

DIAGNOSIS.—*Solana Exogens*, with 2 or 4 free stamens.

Trees or shrubs. Branches usually dichotomous and ending abruptly by a conspicuous bud. Leaves opposite, simple, sometimes pinnated. Flowers in terminal or axillary racemes or panicles; the pedicels opposite, with single bracts. Flowers ♂ or ♀. Calyx divided, persistent, inferior. Corolla hypogynous, monopetalous, 4-cleft, occasionally of 4 petals connected in pairs by the intervection of the filaments, sometimes absent; aestivation somewhat valvate. Stamens 2 (in *Tessarandra* 4), alternate with the segments of the corolla, or with the petals; anthers 2-celled, opening longitudinally. Ovary simple, without any hypogynous disk, 2-celled; the cells 2-seeded; the ovules pendulous and collateral; style 1 or 0; stigma bifid or undivided. Fruit drupaceous, berried, or capsular, often by abortion 1-seeded. Seeds with dense, fleshy, abundant albumen; embryo about half its length, straight; cotyledons foliaceous; radicle superior; plumule inconspicuous.

These plants resemble *Jasmineworts* in many respects, and *Endlicher* even thinks them allied to that Order alone; indeed they are combined by *Ach. Richard.* *Reichenbach* thinks *Olive-worts* related to *Storaxworts*, because, according to *Hayne (Arzngw. xi. 23. edn. ult.)*, a sort of storax is yielded by *Olea europæa*. *De Candolle* suggests (*Essai Méd.* p. 204.) that the *Ash* is related to the *Maples*, and this view is lately

adopted by *Von Martius*; I also find in the same work the following very good observations upon this Order:—"However heterogeneous the *Olive-worts* may appear as at present limited, it is remarkable that the species will all graft upon each other; a fact which demonstrates the analogy of their juices and their fibres. Thus the *Lilac* will graft upon the *Ash*, the *Chionanthus*, and the *Fontanesia*, and I have even succeeded in making the *Persiau Lilac* live ten years on *Phillyrea latifolia*. The *Olive* will take on the *Phillyrea*, and even on the *Ash*: but we cannot graft the *Jasmine* on any plant of the *Olive* tribe: a circumstance which confirms the propriety of separating these two Orders." To me I confess that the unsymmetrical flowers of *Jasmineworts* offer a great difficulty in the way of placing them in even the same Alliance as *Olive-worts*, the more especially because that peculiarity is connected with a decidedly nucamentaceous fruit. The two stamens usually present in *Olive-worts* may be taken to show that the flowers of the Order are really ♂, which is confirmed by *Tessarandra*, which has 4 stamens; the two stamens of *Jasmineworts* are probably connected with a quinary type. The true affinity seems to be with *Nightshades*, as is indicated by the dicarpellary fruit, regular symmetrical monopetalous corolla, axile placenta, and undivided fruit of both Orders.

Natives chiefly of temperate latitudes, inclining towards the tropics, but scarcely known beyond 65° N. lat. The *Ash* is extremely abundant in North America; the *Phillyreas* and *Syriugas* are all European or Eastern plants. A few are found in New Holland and elsewhere within the tropics. One *Ash* is a native of Nipal.

From the pericarp of *Olea europæa*, the common *Olive*, is obtained by pressure the well-known substance called *Olive Oil*; the medical properties of which are demulcent,



Fig. CCCCXVI.

emollient, and laxative. It enters extensively into the preparation of plasters, liniments, cerates, ointments, and enemata. As an external application, accompanied by long-continued friction of the skin, it has been found beneficial in preventing the contagious influence of the plague. The bark is bitter and astringent, and has had a great reputation as a substitute for Ciuchona, according to De Candolle. It also yields a kind of gum, or rather a gum-like substance, once in repute as a vulnerary. Its wood is extremely durable and close-grained. The flowers are frequently slightly fragrant; those of *Olea fragrans* are employed in China for flavouring tea. The sweet, gentle purgative, called Manna, is a concrete discharge from the bark of several species of Ash, but especially from *Fraxinus rotundifolia*. The sweetness of this substance is not due to the presence of sugar, but to a distinct principle, called Mannite, which differs from sugar in not fermenting with water and yeast. *Fraxinus excelsior* (the common Ash) not only yields Manna, in the warm climate of the south of Europe, but is reported to have a tonic febrifugal bark, and leaves almost as cathartic as those of Senna, producing an unequivocal action upon the kidneys. The febrifugal qualities of the Lilac, *Syringa vulgaris* are undoubted. In that part of the province of Berri called Brenne, which is marshy and insalubrious to the last degree, the peasants employ no other remedy for the intermittent fever which prevails there. According to Meillet this quality is apparently owing to a principle which he calls Lilacine.—*Pharm. Journ.* 1. 557.

GENERA.

I. OLEÆ.—Fruit a drupe or berry.	<i>Boaria</i> , A. DC.	<i>Pachyderma</i> , Blum.	<i>Ornus</i> , Pers.
	<i>Noronhia</i> , Stadtm.	<i>Ligustrum</i> , Tournef.	<i>Fontanesia</i> , Labill.
<i>Chionanthus</i> , Linn.	<i>Olea</i> , Tourn.	<i>Myospyrum</i> , Bl.	<i>Desfontainesia</i> , Hoff.
<i>Linociera</i> , Swartz.	<i>Piceonia</i> , A. DC.	<i>Chondrospermum</i> , Wall.	<i>Syringa</i> , Linn.
<i>Thouinia</i> , Swartz.	<i>Visiania</i> , A. DC.	<i>Tetrapilus</i> , Lour.	<i>Lilac</i> , Tournef.
<i>Minutia</i> , Flor Flum.	<i>Phillyrea</i> , Tournef.		<i>Forsythia</i> , Vahl.
<i>Tessarandra</i> , Miers.	<i>Osmanthus</i> , Lour.	II. FRAXINÆÆ.—Fruit samaroid.	<i>Nathusia</i> , Hochst.
<i>Mayepea</i> , Aubl.	<i>Notelæa</i> , Vent.	<i>Fraxinus</i> , Tournef.	? <i>Tetrapilus</i> , Lour.
<i>Freyeria</i> , Scop.	<i>Rhysospermum</i> , Gärtn.		
<i>Ceranthus</i> , Schreb.	<i>Stereoderma</i> , Blum.		

NUMBERS. GEN. 24. Sp. 130.

POSITION.——————*Accræcæ.*
 OLEACEÆ.—*Solanacææ.*
Jasminacææ.

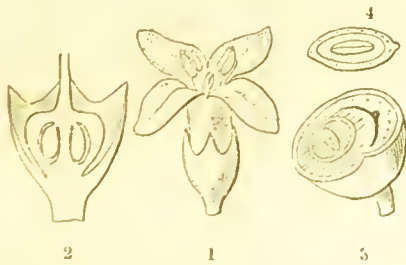


Fig. CCCCXVI.*

Fig. CCCCXVI.*—1. flower of *Ligustrum vulgare*; 2. perpendicular section of calyx and pistil; 3. cross section of fruit, showing an abortive cell; 4. cross section of a seed.

ORDER CCXXXVIII. SOLANACEÆ.—NIGHTSHADES.

Solanum, Juss. Gen. 124. (1789); *R. Brown Prodr.* 443; *Bartl. Ord. Nat.* 193; *Schlecht. in Linnæa*, 7. 66. (1832); *Nees v. Esenbeck in Linn. Trans.* 17. 37. (1834).—*Solanaceæ*, *Ed. Pr.* ccxviii. (1836); *Endl. Gen.* cxlviii.; *Meisner*, p. 272.—*Cestrinæ*, *Martius Conspectus*, No. 121. (1835).—*Cestraceæ*, *Ed. Pr.* ccxix.—*Retziaceæ*, *Bartl. Ord. Nat.* (1830); *Endl. Gen.* p. 669.

DIAGNOSIS.—*Solanum Exogens*, with 5 free stamens, axile placentæ, and a terete embryo.

Herbaceous plants or shrubs. Leaves alternate, undivided, or lobed, sometimes collateral; the floral ones sometimes double, and placed near each other. Inflorescence



Fig. CCCXVII.

variable, often out of the axil; the pedicels without bracts. Calyx 5-parted, seldom 4-parted, persistent, inferior. Corolla monopetalous, hypogynous; the limb 5-cleft, seldom 4-cleft, regular, or somewhat unequal, deciduous; the aestivation plaited or imbricated, or even valvate. Stamens inserted upon the corolla, as many as the segments of the limb, with which they are alternate; anthers bursting longitudinally, rarely by pores, at the apex. Ovary 2-celled, composed of a pair of carpels right and left of the axis, rarely 4- 5- or many-celled, with polyspermous placentæ; style continuous; stigma simple; ovules 00, amphitropal. Pericarp with 2, or 4, or many cells, either a capsule with a double dissepiment parallel with the valves, or a berry with the placentæ adhering to the dissepiment. Seeds 00; embryo straight or curved, often out of the centre, lying in fleshy albumen; radicle near the hilum.

The anthers of *Solanum* open by pores. *Nicotiana multivalvis* has many cells in the capsule, so has *Lycopersicon*; *Nicandra* is 5-celled, *Datura* 4-celled.

Brown remarks, that this Order is chiefly known from Figworts by the curved or spiral embryo, the plaited aestivation of the corolla, and the flowers being regular, with the same number of stamens as lobes. Hence the genera with a corolla not plaited, and at the same time a straight embryo, should, he thinks, either be excluded, or placed in a separate section, along with such as have an imbricated corolla, a slightly curved em-

Fig. CCCXVII.—*Petunia violacea*. 1. a cross section of the ovary; 2. ripe fruit of *Solanum Dulcamara*; 3. a section of one of its seeds; 4. flower of *Solanum Dulcamara*; 5. a section of its seed; 6. pistil of *Hyoscyamus*.

bryo, and didynamous stamens. It does not, however, appear necessary to separate the latter as a distinct Order, but it is better to understand them as genera passing into the condition of Figworts, which are in fact nothing but unsymmetrical Nightshades. In reality, the Nightshades are the equivalent, in the Solanal Alliance, of the Figworts among Bignonials; and these two Alliances are brought into direct contact by means of the Orders in question, although, in a linear arrangement, they may not follow each other. It is quite certain, I think, that no other distinction between Nightshades and Figworts exists, for the curved embryo of the former, although remarkable in many instances, is not at all to be depended upon, because the nature of the embryo varies in very nearly allied species. Thus in *Petunia nyctaginiflora* is found the common curved and twisted embryo of Nightshades; but in *Petunia violacea*, the seeds of which cannot be externally distinguished from those of the latter, not even when lying side by side upon the field of the microscope, the embryo is perfectly straight and much shorter; in *Salpiglossis straminea* the embryo is curved and partly spiral; yet in all other characters the genus agrees with Figworts: finally, in *Nicotiana persica*, which no one can doubt being a genuine species of Nightshade, the embryo is nearly straight. We therefore are obliged to conclude that a false importance has been given to this, as it certainly has to a great many other microscopic characters; a truth which has not escaped the acuteness of Fries. I do not, however, conceive that Figworts and Nightshades ought really to stand in the same Alliance, because the latter have a manifest tendency to lose the dicarpellary structure of the former, as is seen in *Nicandra*, which has 5 cells, and in the many-celled *Lycopersicous* and *Nicotianas*. No such tendency occurs in the Bignonial Alliance.

The most immediate affinity of Nightshades seems to be with Oliveworts and Bindweeds, to the latter of which their numerous twining species bring them very close, while the first division of the Order stands on the very threshold of Oliveworts. Compare, for instance, *Syringa* and *Cestrum*. At the same time several collateral affinities are extremely well marked. That of Figworts has already been mentioned. Bellworts are approached by *Trechonactes*, whose stamens are scarcely epipetalous. *Grabowskya*, of *Schlechtendahl*, is considered by that author to be a transition between Nightshades and Borageworts. He, however, regards its affinity to *Lyeium* undoubted, and points out its near relation to *Nolana*. (See *Linnaea*, 7. 71). Mr. Walker Aruott indicates its difference from Nightshades in the small number of its seeds.—*Linnaea*, 11. 486. *Nolanads* are also close to *Grabowskya*, and would very well stand in the Solanal Alliance if their fruit were not nucamentaceous.

Natives of most parts of the world without the arctic and antarctic circles, especially within the tropics, in which the mass of the Order exists, in the form of the genera *Solanum* and *Physalis*. The number of species of the former genus is very great in tropical America, and the whole amount to twice as many as all the other co-ordinates.

At first sight this Order seems to offer an exception to that general correspondence in structure and sensible qualities which is so characteristic of well defined Natural Orders, containing as it does the deadly Nightshade and Henbane, and the wholesome Potato and Tomato; but a little inquiry will explain this apparent anomaly. The leaves and berries of the Potato are narcotic; it is only its tubers that are wholesome when cooked. This is the case with other succulent underground stems in equally dangerous families, as the Cassava among Spurgeworts; besides which, as De Candolle justly observes—"Il ne faut pas perdre de vue que tous nos aliments renferment une petite dose d'un principe excitant, qui, s'il y était en plus grande quantité, pourrait être nuisible, mais qui est nécessaire pour leur servir de condiment naturel." The leaves of all are in fact narcotic and exciting, but in different degrees, from *Atropa Belladonna*, which causes vertigo, convulsions, and vomiting, Tobacco, which will frequently produce the first and last of these symptoms, Henbane and *Stramonium*, down to some *Solanums*, the leaves of which are used as kitchen herbs. The various species may be classed according as they are, 1, narcotic or otherwise poisonous; 2, tonic; 3, diuretic; 4, pungent; 5, bland or inert. 1. As to poisonous species, the worst of these is perhaps the *Acocanthera venenata*, a large bush with fragrant flowers, found at the Cape of Good Hope; a decoction of the bark, reduced to the thickness of jelly, is used by the Hottentots to envenom their weapons. It is said to be a fatal poison, and to be also used by the same people to destroy wild beasts, by impregnating baits of flesh with its juice. Similar qualities have been recognised in the *Cestrum macrophyllum* and *nocturnum*. Others, however, more familiar to Europeans, can hardly be regarded as inferior in virulence. The Thorn-apple (*Datura Stramonium*) is a violent narcotic when taken internally; in skilful hands it is a valuable medicine in mania, epilepsy, convulsions, tic-douloureux, &c; it palliates the distressing paroxysms of pure spasmodic asthma, when smoked. *Datura Tatula* and *Metel* have a similar action; the latter is used by Orientals as an opiate, the former is said to be much more energetic

than Stramonium; the seeds are the most powerful part of these plants, and are stated by some authors to have been used by the priests of the Delphic Temple, to produce those frenzied ravings which were called prophecies. Such a practice certainly obtains, or obtained, in the Temple of the Sun, in the city of Sagomozo, where the seeds of the Floripondio (*Datura sanguinea*) are used; the Peruvians also prepare from them an intoxicating beverage which stupefies if taken much diluted; but, when strong, brings on attacks of furious excitement. Henbane (*Hyoscyamus niger*), a common biennial weed, is a powerful narcotic at the time when its seeds are forming, though comparatively inert at an earlier period. Its capsules and seeds, as well as its leaves, are used extensively in medicine, and produce effects similar to those of Opium. But the former, when taken too freely, are apt to bring on temporary insanity. All the other species of *Hyoscyamus* have a similar action. In some parts of the Greek continent the stalks of *Hyoscyamus albus* are used against toothache. They are dried and employed in lieu of Tobacco, for smoking. In England the seeds of *H. niger* are occasionally employed for the same purpose, with useful effect.—*Ann. Ch.* 1. 249. *Atropa Belladonna* is another dangerous narcotic. Every part of the plant is poisonous; and children and the ignorant have often suffered from eating the berries, the beautiful appearance and sweet taste of which render them very alluring. The symptoms which they induce are those of intoxication, accompanied with fits of laughter and violent gestures; great thirst, difficulty of deglutition, nausea, dilatation of the pupil, with the eyelids drawn down; redness and tumefaction of the face, stupor or delirium, a low and feeble pulse, paralysis of the intestines, convulsions, and death. In medicine *Belladonna* is not only narcotic, but diaphoretic and diuretic. It is extensively employed, especially in producing a dilatation of the pupil, when its infusion is dropped into the eye. Among other properties it is said by Hahuemann and Koreff to protect the individual who takes it from the contagion of scarlatina. According to Mr. Pereira it is supposed to be the plant which produced such remarkable and fatal effects upon the Roman soldiers during their retreat from the Parthians (See *Plutarch's Life of Antony*). Buchanan relates that the Scots mixed the juice of *Belladonna* with the bread and drink which by their truce they were to supply the Danes, which so intoxicated them, that the Scots killed the greater part of Sweno's army while asleep.—*Rev. Scot. Hist.* lib. 7. "The insane root that takes the reason prisoner," mentioned by Shakspeare (*Macbeth*, I. iii.), is also thought to be this. Mandrake, formerly considered an *Atropa*, but now called *Mandragora officinalis*, has an action of a similar nature; it has had an exaggerated reputation as an aphrodisiac, was largely used in amorous incantations, and its forked root, which by a little contrivance is easily made to assume the human form (see *Flora Græca*), has led to the foolish stories of the plant shrieking when torn out of the ground. By the Arabs the plant is called *Tufah-al-Sheitan*, or Devil's Apple. The best commentators regard the Mandrake as the *Dudaim* of Scripture, in which Dr. Royle concurs (See *Biblical Cyclopædia*, p. 587). It is a little remarkable that although it is generally believed that the Mandrake does not possess any power of inciting the passion of love, yet a nearly allied plant, *Jaborosa* or *Himeranthus runcinatus*, is employed in the same manner among the South Americans. Tobacco, the use of which has now become to many persons as indispensable as bread, is the foliage of various species of *Nicotiana*; all the American Tobacco is furnished by *N. Tabacum* or its varieties, the Persian by *N. persica*, and the Syrian by *N. rustica*. It is a powerful stimulant narcotic, employed medicinally as a sedative, and in vapour to bring on nausea and fainting. When chewed it appears to impair the appetite and induce torpor of the gastric nerves. Although if smoked in moderate quantities it acts as a harmless excitant and sedative, yet it is a frequent cause of paralysis when the practice is indulged in to excess. Oil of Tobacco, which is inhaled and swallowed in the process of smoking, is one of the most violent of known poisons. The Hottentots are said to kill snakes by putting a drop of it on their tongues, and the death of these reptiles is said to take place as instantaneously as if by an electric shock; dangerous symptoms are reported to have followed the application of the ointment to scald heads. Solanums, although far less active than these dangerous plants, are by no means destitute of poisonous qualities in some species.

An extract of the leaves of the common Potato (*Solanum tuberosum*) is a powerful narcotic, ranking between *Belladonna* and *Conium*; according to Mr. Dyer it is particularly serviceable in chronic rheumatism, and painful affections of the stomach and uterus.—*Pharm. Journ.* 1. 590. *Solanum Dulcamara*, the Bittersweet, is a strong narcotic in its foliage, and its berries are by no means safe, although it does appear that in some cases they have been taken into the stomach without inconvenience. *Solanum nigrum*, a very common weed in all parts of the world except the coldest, is more active. A grain or two of the dried leaf has sometimes been given to promote various secretions, possibly by exciting a great, and rather dangerous, agitation in the viscera. It is

a narcotic, and, according to Orfila, its extract possesses nearly the same power as Lettuce-opium. In Brazil it is called Carachichu, or Erva Moura; and when bruised is applied either in poultices or baths to painful wounds. Finally, to close the long list of narcotics, it will be sufficient to mention *Physalis somnifera*. This plant is thought to have been the *Στρυχνος ὑπνωτικος* of Dioscorides. It is reputed to be narcotic, diuretic, and alexipharmic. The leaves steeped in oil are, in India, applied to inflammatory tumours; and they are used in a similar way in Egypt. Kunth recognised it in Egyptian mummies.

The tonics are comparatively few. The Quina of Brazil is the produce of *Solanum pseudoquina*, and is so powerful a bitter and febrifuge, that the Brazilians scarcely believe that it is not the genuine Jesuits' Bark. It has been analysed by Vauquelin, who found that it contained 1-50th of a bitter resinoid matter, slightly soluble in water, about 1-12th of a vegetable bitter, and a number of other principles in minute quantities. *Cestrum Hediunda*, *auriculatum*, *laurifolium*, and *Pseudoquina* have similar qualities. Martius thinks that the bitterness of these plants is owing to some peculiar principle residing in their bark. Several are found to have a diuretic action; among which may be named *Physalis pubescens*, *viscosa*, *angulata*, and *Alkekengi* (the Winter Cherry), *Nicandra physaloides*, *Solanum mammosum*, *paniculatum*, *nigrum*, and *guineense*, with many species of *Cestrum*, such as *euathes*, *lævigatum*, *corymbosum*, *Parqui* and *bracteatum*. The latter are generally at the same time emollient, and are applied in a fresh state in cleansing wounds and ulcers. We are told, moreover, that the bruised leaves and unripe fruits are much employed by the Brazilians in affections of the liver and in *catarrhus vesicæ*. A decoction of the flowers and leaves of *Solanum cernuum* is a powerful sudorific, and is very serviceable in syphilis, inveterate gonorrhœa, and similar complaints.

The cases of pungency are confined to the fruit of the genus *Capsicum*, of which numerous species are found in the tropics. The fruit and seeds are powerful stimulants. The well-known condiment called Cayenne Pepper consists principally of the ground seeds. It is employed in medicine, in combination with Cinchona, in intermitteuts and lethargic affections, and also in atonic gout, dyspepsia accompanied by flatulence, tympanitis, paralysis, &c. Its most valuable application appears, however, to be in eryanthe maligna and scarlatina maligna, used either as a gargle or administered internally. It is generally stated that *Capsicums* have no narcotic quality; but it would appear that some of the American species are an exception to that rule, as is the case with *Capsicum toxicarium*; this, however, requires confirmation. That some species have fruits which are neither narcotic nor pungent in any considerable degree, if at all, is most certain, for many of them are common articles of food or cookery. But it is stated that the poisonous species derive their properties from the presence of a pulpy matter which surrounds the seeds; and that the wholesome kinds are destitute of this pulp, the fruit consisting only of what Botanists call the sarco carp; that is to say, the centre of the rind, in a more or less succulent state. This is not, however, a point by any means well established. Tomatoes, the fruit of the *Lycopersicum*, commonly called Love Apples, in allusion to the supposed power which they possess of exciting tender feelings, are a common ingredient in sauces. Egg Apples, also called Brinjals, or Aubergines, are produced by *Solanum Melongena*; but they are uneatable till the viscid juice which they contain has been removed. Several are much esteemed in Peru; the berries of *Solanum muricatum* and *nemorense* are commonly eaten; and those of *S. quitoense* are called Quito Oranges (*Naranjitas de Quito*). Muriti assures us that Mandrake Apples are as harmless as they are beautiful and fragrant; and the Kangaroo Apple, produced by *Solanum laciniatum*, is a common food among the Tasmannians; Mr. Backhouse states, however, that although when perfectly ripe it may be eaten in any quantity with impunity, yet, while unripe, it is acrid and produces a burning sensation in the throat.

The common Potato, in a state of putrefaction, is said to give out a most vivid light, sufficient to read by. This was particularly remarked by an officer on guard at Strasburgh, who thought the barracks were on fire, in consequence of the light thus emitted from a cellar full of Potatoes.

GENERA.

I. PENTEMEREA.	<i>Sesam</i> , Ruiz et Pav.	<i>Nyctagella</i> , Reichb.	<i>Metternichia</i> , Mik.
<i>Cestrum</i> , Linn.	<i>Retzia</i> , L.	<i>Polydela</i> , Dou.	<i>Datura</i> , Linn.
<i>Lunaria</i> , H. B. K.		<i>Taberna</i> , Reichb.	<i>Stramonium</i> , Tournef.
<i>Dorobachia</i> , Spreng.	II. CILYMBERYÆ.	<i>Tabacina</i> , Reichb.	<i>Bryonia</i> , Pers.
<i>Habrochianum</i> , E. & H.	<i>Nierembergia</i> , Ruiz et P.	<i>Lehmannia</i> , Spreng.	<i>Datura</i> , Bernh.
<i>Megelia</i> , Schæubl.	<i>Pelunia</i> , Juss.	<i>actouzia</i> , H. B. K.	<i>Crotocaulis</i> , Berub.
<i>Jocroma</i> , Bernh.	<i>Nicotiana</i> , Tournef.	<i>Laureria</i> , Schlecht.	<i>Solandra</i> , Swartz.
<i>Acocanthera</i> , G. Don.	<i>Tabacum</i> , Monch.	<i>Marrken</i> , L. C. Rich.	<i>Suaertia</i> , Gmel.
<i>Vestia</i> , Willd.	<i>Codylis</i> , Raf.	<i>Lanarckea</i> , Pers.	<i>Hyoscyamus</i> , Tournef.
<i>Fabiana</i> , Ruiz et Pav.	<i>Sacranthus</i> , Don	<i>Anthroche</i> , Eull.	<i>Physalena</i> , G. Don.
		<i>Callibrachia</i> , Llav.	<i>Belenia</i> , Decaisn.

Anisodus, <i>Link.</i>	<i>Cyathostyles</i> , Schott.	Hebecladus, <i>Miers.</i>	<i>Lycium</i> , <i>Linn.</i>
<i>Whitleya</i> , Sweet.	<i>Capsicum</i> , <i>Tournef.</i>	<i>Atropa</i> , <i>Linn.</i>	<i>Lyciobatos</i> , <i>Endl.</i>
<i>Sopolia</i> , <i>Jacq.</i>	<i>Cyphomandra</i> , <i>Sandler.</i>	<i>Belladonna</i> , <i>Tournef.</i>	<i>Lyciothamnus</i> , <i>Endl.</i>
<i>Scopolina</i> , <i>Schult.</i>	<i>Pisonandra</i> , <i>Miers.</i>	<i>Busbeckia</i> , <i>Mart.</i>	<i>Chænesthes</i> , <i>Miers.</i>
<i>Nicanra</i> , <i>Adans.</i>	<i>Solanum</i> , <i>Linn.</i>	<i>Discopodium</i> , <i>Hochst.</i>	<i>Lycoplegium</i> , <i>Miers.</i>
<i>Calydermos</i> , <i>Ruiz et P.</i>	<i>Melongena</i> , <i>Tournef.</i>	<i>Withania</i> , <i>Pauq.</i>	<i>Acnistus</i> , <i>Schott.</i>
<i>Physalis</i> , <i>Linn.</i>	<i>Pseudocapsicum</i> , <i>Mön.</i>	<i>Mandragora</i> , <i>Tournef.</i>	Doubtful Genera.
<i>Alkekengi</i> , <i>Tournef.</i>	<i>Nycterium</i> , <i>Vent.</i>	<i>Himeranthus</i> , <i>Endl.</i>	<i>Cotylanthera</i> , <i>Blum.</i>
<i>Cucubus</i> , <i>Bernh.</i>	<i>Androcera</i> , <i>Nutt.</i>	<i>Thinogeton</i> , <i>Benth.</i>	<i>Isanthera</i> , <i>Nees.</i>
<i>Herschelia</i> , <i>Bowd.</i>	<i>Cerantha</i> , <i>Raf.</i>	<i>Jaborosa</i> , <i>Juss.</i>	<i>Dartus</i> , <i>Lour.</i>
<i>Pentaphiltrum</i> , <i>Rehb.</i>	<i>Acquartia</i> , <i>Jacq.</i>	<i>Dorysligna</i> , <i>Miers.</i>	<i>Hilsenbergia</i> , <i>Tausch.</i>
<i>Saracha</i> , <i>Ruiz et Pav.</i>	<i>Bassouria</i> , <i>Aubl.</i>	<i>Trechonates</i> , <i>Miers.</i>	<i>Dorrena</i> , <i>Thunb.</i>
<i>Bellinia</i> , <i>Röm. et Sch.</i>	<i>Lycopersicum</i> , <i>Tournef.</i>	<i>Juanulloa</i> , <i>Ruiz et Pav.</i>	<i>Triguera</i> , <i>Cav.</i>
<i>Jaltomata</i> , <i>Schlecht.</i>	<i>Psolanum</i> , <i>Neck.</i>	<i>Ulloa</i> , <i>Pers.</i>	<i>Stigmatococca</i> , <i>Willd.</i>
<i>Margaranthus</i> , <i>Schlecht.</i>	<i>Perizoma</i> , <i>Miers.</i>	<i>Grabowskya</i> , <i>Schl.</i>	
<i>Witheringia</i> , <i>Herit.</i>	<i>Salpichroa</i> , <i>Miers.</i>		

NUMBERS. GEN. 60. Sp. 900.

Scrophulariaceæ.

POSITION.—Oleaceæ.—SOLANACEÆ.—CONVOLVULACEÆ.

Nolanaceæ.

ORDER CCXXXIX. ASCLEPIADACEÆ.—ASCLEPIADS.

Apocynæ, *Juss. Gen.* 143. (1789) *in part.*—Asclepiadæ, *R. Brown in Fern. Trans.* 1. 12. (1809); *Prodr.* 458. (1810); *Royle Illustr.* 272. (1835); *Wight's Contributions to the Botany of India*, No. 2. p. 77. (1834); *Endl. Gen.* cxxiii.

DIAGNOSIS.—*Solanæ Exogens*, with the anthers and stigma consolidated into a column.

Shrubs, or occasionally herbaceous plants, almost always milky, and often twining. Leaves entire, opposite, sometimes alternate or whorled, having cilia between their petioles in lieu of stipules. Flowers somewhat umbelled, fascicled, or racemose, proceeding from between the petioles. Calyx 5-divided, persistent. Corolla monopetalous, hypogynous, 5-lobed, regular, with imbricated, very seldom valvular, æstivation, deciduous. Stamens 5, inserted into the base of the corolla, alternate with the segments of the limb. Filaments usually connate. Anthers 2-celled, sometimes almost 4-celled in consequence of their dissepiments being nearly complete. Pollen at the period of the dehiscence of the anther cohering in masses, either equal to the number of the cells, or occasionally cohering in pairs and sticking to 5 processes of the stigma either by twos, or fours, or singly. Ovaries 2; styles 2, closely approaching each other, often very short; Stigma common to both styles, dilated, 5-cornered, with corpusculiferous angles. Follicles 2, one of which is sometimes abortive. Placenta attached to the suture, finally separating. Seeds numerous, imbricated, pendulous, almost always comose at the hilum. Albumen thin. Embryo straight. Cotyledons foliaceous. Radicle superior. Plumule inconspicua.

For a long time the real structure of the present Order was misunderstood; but Brown, in a Dissertation in the *Transactions of the Wernerian Society*, placed its true nature beyond doubt. I subjoin the explanation given by this celebrated Botanist, who thus describes the flower of *Asclepias syriaca* :—

“The flower-bud of this plant I first examined while the unexpanded corolla was yet green and considerably shorter than the calyx. At this period the gland-like bodies

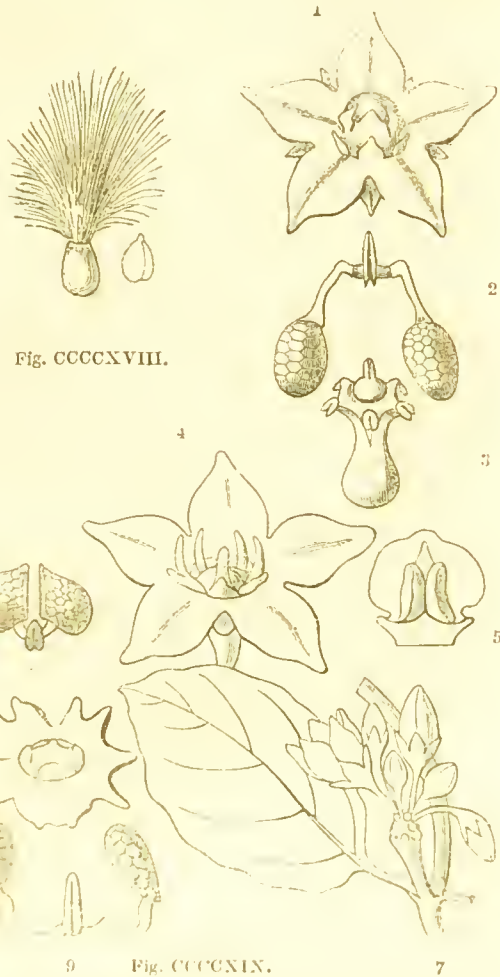


Fig. CCCCVIII.—Seed and embryo of *Vincetoxicum nigrum*.

Fig. CCCCVIII.—1. flower of *Cimanchum fruticosum*; 2. its pollen masses; 3. column of *Glossopetalum*; 4. flower of *Heterostemma acuminatum*; 5. one of its anthers; 6. its pollen masses; 7. *Asterostemma repandum*; 8. its coronet; 9. its pollen masses. *DeCairn*.

which afterwards occupy the angles of the stigma were absolutely invisible ; the furrows of its angles were extremely slight, and, like the body of the stigma, green ; the antheræ, however, were distinctly formed, easily separable from the stigma, and their cells, which were absolutely shut, were filled with a turbid fluid, the parts of which did not so cohere as to separate in a mass ; of the cuculli, which in the expanded flower are so remarkable, and constitute the essential character of the genus, there was no appearance.

“In the next stage submitted to examination, where the corolla nearly equalled the calyx in length, the gland-like bodies of the stigma were become visible, and consisted of 2 nearly filiform, light-brown, parallel, contiguous, and membranaceous substances, secreted by the sides of the furrow, which was now somewhat deeper. Instead of the filiform processes, a gelatinous matter occupied an obliquely descending depression proceeding from towards the base of each side of the angular furrow.

“In a somewhat more advanced stage, the membranes which afterwards become glands of the stigma were found to be linear, closely approximated, and to adhere at their upper extremity. At the same time the gelatinous substance in the oblique depression had acquired a nearly membranaceous texture and a light-brown colour ; and on separating the glands from its furrow, which was then practicable, this membrane followed it. At this period, too, the contents of each cell of the antheræ had acquired a certain degree of solidity, a determinate form, and were separable from the cell in one mass ; the cuculli were also observable, but still very small and green, nearly stelliform, having a central papilla, the rudiment of the future horn-like process. Immediately previous to the bursting of the cells of the antheræ, which takes place a little before the expansion of the corolla, the cuculli are completely formed, and between each, a pair of minute, light-green, fleshy teeth are observable, the single teeth of each pair being divided from each other by the descending axis of the antheræ. The glands of the stigma have acquired a form between elliptical and rhomboidal, a cartilaginous texture, and a brownish-black colour ; they are easily separable from the secreting furrow, and on their under surface there is no appearance of a suture, or any indication of their having originally consisted of two distinct parts ; along with them separate also the descending processes, which are compressed, membranaceous, and light-brown ; their extremity, which is still unconnected, being more gelatinous, but not perceptibly thickened. The pollen has acquired the yellow colour, and the degree of consistence which it afterwards retains. On the bursting of the cells, the gelatinous extremity of each descending process becomes firmly united with the upper attenuated end of the corresponding mass of pollen. The parts are then in that condition in which they have been commonly examined, and are exhibited in the figures of Jacquin, who, having seen them only in this state, naturally considered these plants as truly gynandrous, regarding the masses of pollen as the antheræ, originating in the glands of the stigma, and merely immersed in the open cells of the genuine antheræ, which he calls antheriferous sacs ; an opinion in which he has been followed by Rottbøll, Kœlreuter, Cavanilles, Smith, and Desfontaines. The conclusion to be drawn from the observations now detailed is sufficiently obvious ; but it is necessary to remark, that these observations do not entirely apply to all the plants which I have referred to the Asclepiadææ ; some of them, especially *Periploca*, having a granular pollen, applied in a very different manner to the glands of the stigma ; they all, however, agree in having pollen coalescing into masses, which are fixed or applied to processes of the stigma, in a determinate manner ; and this is, in fact, the essential character of the Order. Dr. Smith, in the second edition of his valuable *Introduction to Botany*, has noticed my opinion on this subject : but, probably from an indistinctness in the communication, which took place in conversation, has stated it in a manner somewhat different from what I intended to convey it to him ; for, according to his statement, the pollen is projected on the stigma. The term projection, however, seems to imply some degree of impetus, and at the same time presents the idea of something indeterminate respecting the part to which the body so projected may be applied. But nothing can be more constant than the manner in which the pollen is attached to the process of the stigma in each species.”

Brown, who first distinguished them, stated that they differed solely in the peculiar character of their sexual apparatus ; but this was of so unusual a kind in Asclepiads, as to justify a deviation from the general rule, that Orders cannot be established upon solitary characters. In *Dogbanes* the stamens are distinct, the pollen powdery (that is to say, in the ordinary state), the stigma capitate and thickened, but not particularly dilated, and all these parts distinct the one from the other. But in Asclepiads the whole of the sexual apparatus is consolidated into a single body, the centre of which is occupied by a broad disk-like stigma, and the grains of pollen cohere in the shape of waxy bodies attached finally to the 5 corners of this stigma, to which they adhere by the intervention of peculiar glands.

The Order is one of those which contain indifferently what are called succulent plants

and such as are in the usual state of other plants ; this excessive development of the cellular tissue of the stem, and reduction of that of the leaves, occurs in its greatest degree in *Stapelia* and *Ceropegia* ; is diminished in *Dischidia*, the succulence of which is confined to the leaves ; and almost disappears in *Hoya*, the stem of which is in the usual state, but the leaves between fleshy and leathery.

It has already been stated, under the Order of Dogbanes, that the resemblances found between that Order and Asclepiads seemed to be one of analogy rather than of real affinity ; for the economy of the flowers and seeds in the two Orders are widely different. The amygdaloid embryo of Asclepiads, with hardly a trace of albumen, is entirely different from that of Dogbanes, which is very small, and furnished most abundantly with albumen. The anthers and stigma of Dogbanes form no organic union, but they grow into one solid central mass in the Asclepiads, whence proceed other physiological and structural peculiarities.

Other Botanists do not attach the same importance to these circumstances, and continue to associate the two Orders, adopting the opinion of Brown, who considered that they differed solely in the nature of their stamens and stigma, the stamens of Dogbanes being distinct with powdery pollen, and those of Asclepiads adherent to the table-shaped stigma, the pollen being contained in bags, formed by the separation of the endothecium. And M. Alph. De Candolle has recently taken the same view of the matter.—*Ann. Sc. Nat.* 3. ser. 1. 255. He even shows that the distinction found in the stamens and pistil of Dogbanes and Asclepiads is not so positive as it is supposed to be, for there are Asclepiads with stamens free from their very base, and small stigmas, while on the other hand certain Dogbanes have filiform appendages at the end of their anthers, and great glandular stigmas to which the anthers adhere with force. He even thinks that the only precise distinction resides in the pollen, the grains of which are always separate in Dogbanes, always in waxy masses or bags in Asclepiads. The reason why these great Botanists attach small importance to the albumen as a distinction, is doubtless because in certain Dogbanes, such as *Cerbera*, that secretion is absent, although in the mass of the Order it is most abundant ; but it is, I think, evident that the tendency among Dogbanes is to form albumen in abundance, and that no such tendency exists among Asclepiads.

Africa must be considered as the great field of Asclepiads, especially its southern point, where vast numbers of the succulent species occupy the dry and sterile places of that remarkable country. In tropical India and New Holland, and in all the equinoctial parts of America, they also abound. Two genera only are found in northern latitudes, one of which, *Asclepias*, has many species, and is confined apparently to North America ; the other, *Cynanchum*, is remarkable for extending from 59° north latitude to 32° south latitude. A *Stapelia* is found in Sicily.

The roots are generally acrid and stimulating, whence some of them act as emetics, as *Tylophora asthmatica* and *Secamone emetica* ; others are diaphoretic and sudorific, as the purgative *Asclepias decumbens*, which has the singular property of exciting general perspiration without increasing in any perceptible degree the heat of the body ; it is constantly used in Virginia against pleurisy. Their milk is usually acrid and bitter, and is always to be suspected, although it probably participates in a slight degree only in the poisonous qualities of that of Dogbanes, if we can judge from the use of some species as articles of food. *Ceropegia ? edulis*, *Oxystelma esculentum*, and two *Sarcostemmas*, *Forskahlium*, and *stipitaceum*, are all reported to be eatable. The Cow Plant of Ceylon, or *Kiriaghuna* plant, *Gymnema lactiferum*, yields a milk of which the Cingalese make use for food ; its leaves are also used when boiled. But very little is known about the real qualities of such plants, and as to *Oxystelma esculentum*, Roxburgh says he did not find that the natives ever eat it, and Dr. Wight makes the same statement ; adding, however, that in decoction it is used as a gargle for aphthous affections of the mouth and fauces. The root and tender stalks of *Hoya viridiflora* sicken and excite expectation. *Asclepias tuberosa*, or Butterfly-wood, is a popular remedy in the United States for a variety of disorders ; its properties seem to be those of a mild cathartic, and of a certain diaphoretic attended with no inconsiderable expectorant effect. A decoction of *Asclepias emussavica*, or Wild Ipecacuanha of the West Indies is used by the Negroes as an emetic and purgative, and is said to be



Fig. CCCCXX.

efficacious in glects and fluor albus. The roots of *Tylophora asthmatica* are acrid, and used on the coast of Coromandel as a substitute for *Ipecacuanha*. Dr. Roxburgh found it to answer the same purpose as that drug, and had also very favourable reports of it from others. Dr. J. Anderson, Physician-General at Madras, confirms this; it was used with great success in a dysentery that was in his time epidemic in the British camp. No doubt it is one of the most valuable medicines in India. In large doses it is emetic; in smaller doses often repeated it acts as a cathartic. Burnett states it to be valuable as a sudorific, and to be peculiarly beneficial in humoral asthma. Similar qualities are possessed by *Sarcostemma glaucum*, the *Ipecacuanha* of Venezuela. The *Cynanchum acutum* and *Vincetoxicum officinale* are both drastics; the former produces a drug called Montpellier Scammony. The milk of *Periploca graeca* is very acrid, and has been employed by Orientals as a wolf-poison; *Gonolobus macrophyllus* is reputed to have furnished the North American Indians with a juice to poison their arrows. The root and bark, and especially the inspissated milk, of *Calotropis gigantea*, the Akund, Yercum, or Mudar plant of India, is a powerful alterative and purgative; it is especially in cases of leprosy, elephantiasis, intestinal worms, and venereal affections that it has been found important. The leaves of *Solenostemma Argel* are used in Egypt for adulterating Senna, but whether intentionally or from mere carelessness is uncertain. They form a large proportion of some samples of Alexandrian (Nubian) Senna; but they are more bitter than those of Senna, and according to Guibourt are unsafe to administer, in consequence of their irritating properties. It is said that *Gomphocarpus fruticosus*, also called Argel or Arghel in Syria, is employed for the same purpose. The roots of *Hemidesmus indicus*, from which Mr. Garden obtained Smilasperic acid, are largely employed in India as a substitute for Sarsaparilla. Its diuretic effect is remarkable. It also acts as a diaphoretic and tonic. An account of the *Hemidesmus* has been published by Mr. Bell, *Pharm. Journ.* 3. 239. It is administered in the form of a syrup; but an infusion and decoction have been used, the proportions being the same as those adopted in the decoction of Sarsaparilla; viz. two ounces of the root to a pint of water. It is more than probable that caoutchouc is contained in several, for *Cynanchum? ovalifolium*, according to Wallich, yields excellent caoutchouc at Penang; the tenacity of some species may be owing to its presence, as of *Marsdenia tenacissima*, employed for bowstrings by the mountaineers of Rajmahl; the fibre of this plant, and of *Urtica tenacissima*, was the strongest Roxburgh ever met with. *Orthanthera viminea*, attaining a height of 10 feet, is also remarkable for the length and tenacity of its fibre. Some species yield indigo of excellent quality, as *Marsdenia tinctoria*, found in Sylhet, and *Gymnema? tingens*. See *Royle's Illustrations*, p. 274, for much more interesting matter connected with the sensible properties of plants of this Order, and especially of the Mudar.

GENERA.

I. PERIPLOCEÆ.

Cryptostegia, R. Br.
Zucchellia, Dec.
Tacazzea, Dec.
Æhmolepis, Dec.
Gymnanthera, R. Br.
Campocarpus, Dec.
Finlaysonia, Wall.
Hemidesmus, R. Br.
Brachylepis, Wight et A.
Decalepis, Wight et Arn.
Streptocaulon, Wight et A.
Harpanema, Dec.
Atherandra, Dec.
Phyllanthera, Blume.
Lepistoma, Blume.
Leposma, Blum.
Periploca, L.
Campelepis, Falc.
Myriopteron, Griff.
Pentoretia, Dec.
Ectadium, E. Mey.

II. SECAMONEÆ.

Secamone, R. Br.
Gonlostemma, Wight.
Toxocarpus, Wight et A.

III. ASCLEPIADEÆ VERÆ.

Mitostigma, Dec.
Astephanus, R. Br.
Hæmax, E. Mey.

Hemipogon, Dec.
Nautonia, Dec.
Steinlicillia, Dec.
Microloma, R. Br.
Metaplexis, R. Br.
Urostemma, Bunge.
Parapodium, E. Mey.
Burjonia, Dec.
Pycnostemma, Dec.
Menastemma, R. Br.
Roulinia, Dec.
Ensenlia, Nutt.
Ampelanus, Raf.
Cordylogne, E. Mey.
Nysmalobium, R. Br.
Odontanthera, Wight.
Periglossum, Dec.
Glossostephanus, E. Mey.
Podostigma, Ell.
Stylandra, Nutt.
Anantheria, Nutt.
Acerates, Ell.
Polyothus, Nutt.
Vincetoxicum, Manch.
Pentagonium, Schauer.
Blyttia, W. Arn.
Haplostemma, Endl.
Oncinema, W. Arn.
Orthosia, Dec.
Cynoctonum, E. Mey.
Bunburia, Harv.
Pycnoneurum, Dec.
Holostemma, R. Br.

Solenostemma, Hayn.
Argelia, Dec.
Arauja, Brot.
Phylianthus, Mart.
Schubertia, Mart. et Zuc.
Calotropis, R. Br.
Eutropis, Falc.
Pentatropis, R. Br.
Kanalia, R. Br.
Sarcostemma, R. Br.
Oxystemma, R. Br.
Dæmia, R. Br.
Hockea, Endl.
Eustegia, R. Br.
Peplonia, Dec.
Decanema, Dec.
Endotropis, Endl.
Cynanchum, Linn.
Pentarrhinum, E. Mey.
Schizoglossum, E. Mey.
Glossonema, Dec.
Conomitra, Fenzl.
Aspidoglossum, E. Mey.
Lagaranthus, E. Mey.
Rhinotubium, W. Arn.
Gomphocarpus, R. Br.
Asclepias, L.
Apocynum, Tourn.
Ditassa, R. Br.
Tassadia, Dec.
Calostigma, Dec.
Oxypetalum, R. Br.
Gothofreda, Vent.

Schistogyne, Hook. et Arn.
Melina, Dec.
Brachylepis, Hk. et A.
Sonninia, Rehb.
Diplolepis, R. Br.
Morrenia, Lindl.
Turrigena, Dec.
Rhyssostemma, Dec.
Seutera, Reich.
Lyonia, Ell.

IV. GONOLOBÆ.

Matelea, Aubl.
Hostea, Willd.
Gonolobus, Michx.
Ibatia, Dec.
Macrosepis, H. B. K.
Fischeria, DC.
Lachmostoma, H. B. K.
Pherotrichis, Dec.
Polystemma, Dec.
Blepharodon, Dec.
Neplradenia, Dec.
Dietyanthus, Dec.
Chthamalia, Dec.

V. STAPELIÆ.

Ptycanthera, Dec.
Tennaris, E. Mey.
Tylophora, R. Br.
Hybanthera, Endl.

Asterostemma, *Dec.*
 Cosmostigma, *Wight.*
 Pervillaea, *Dec.*
 Marsdenia, *R. Br.*
Sicyocarpus, *Boj.*
Cionura, *Griseb.*
 Dregea, *E. Mey.*
 Pergularia, *L.*
 Stephanotis, *Thouars.*
 Gynnema, *R. Br.*
 Bidaria, *Endl.*
 Gongronema, *Endl.*
 Sarcobolus, *R. Br.*
 Trichosandra, *Dec.*

Rhyssolobium, *E. Mey.*
 Orthanthera, *Wight.*
 Macropetalum, *Burchell.*
 Pentasaeme, *Wall.*
 Leptadenia, *R. Br.*
 Barrowia, *Dec.*
 Heterostemma, *Woh. et A.*
 Conchophyllum, *Blume.*
 Dischidia, *R. Br.*
Colyris, *Vahl.*
Leptostemma, *Blume.*
 Pterostelma, *Wight.*
 Physostelma, *Wight.*
 Centrostemma, *Dec.*

Cyrtoceras, *Benmet.*
 Cystidianthus, *Hassk.*
 Hoya, *R. Br.*
Sperlingia, *Vahl.*
Pterygocarpus, *Hochst.*
 Riochreuxia, *Dec.*
 Ceropegia, *L.*
 Anisotoma, *Fenzl.*
 Eriopetalum, *Wight.*
 Brachystelma, *R. Br.*
 Caralluma, *R. Br.*
 Boucerosia, *Wight.*
Desmidorchis, *Ehrenb.*
Hutchinia, *Wight.*

Sisyranthus, *Ern. Mey.*
 Apteranthes, *Mik.*
 Piaranthus, *R. Br.*
 Huernia, *R. Br.*
 Stapelia, *L.*
 Hoodia, *Sweet.*
Monothylacium, *Don.*
Scytanthus, *Hook.*
 * * *
 Baxtera, *Rehb.*
Harrisonia, *Hook.*
 Apoxyanthera, *Hochst.*
Raphionacme, *Harv.*

NUMBERS. GEN. 141. Sp. 910.

POSITION.—Convulvaceæ.—ASCLEPIADACEÆ.—Solanaceæ.
Apocynaceæ.



Fig. CCCCXXI.

Fig. CCCCXXI.—*Schubertia multiflora*. 1. the anthers united to the stigma; 2. the ovary and stigma, from the latter of which the pollen masses have been removed; 3. a pair of pendulous pollen masses, with their gland; 4. the ripe follicles.

ORDER CCXL. CORDIACEÆ.—SEBESTENS.

R. Brown Prodr. 492. (1810); *Martius N. G. et Sp.* 2. 138, both without a name.—*Cordiaceæ, Link Handb.* 1. 569. (1829); *Endl. Gen.* cxlii.—*Arguziæ, Link.*—*Borraginæ Cordiæ, Alph. DC. Prodr.* 8. 467.

DIAGNOSIS.—*Solana Exogens, with 5 free stamens, axile placentæ, and leafy cotyledons, folded longitudinally.*

Trees. Leaves alternate, seabrous, without stipules, of a hard harsh texture. Flowers paniced, never gyrate, with minute braets. Calyx inferior, 4- 5-toothed, ribbed in most cases. Corolla monopetalous, 4- 5-cleft, regular, imbricated. Stamens alternate with the segments of the corolla, out of which they arise; anthers versatile. Ovary superior, 4- 8-celled, with 1 pendulous, anatropal ovule in each cell; style continuous; stigma 4- 8-cleft, with recurved segments. Fruit drupaceous, 4- 8-celled; part of the cells frequently abortive. Seed pendulous from the apex of the cells by a long funiculus, upon which it is turned back; embryo inverted, with the cotyledous plaited longitudinally; albumen 0; radicle superior.



Fig. CCCXXII.

The flesh of their fruit is succulent, mucilaginous, and emollient, as is seen in *Cordia Myxa* and *latifolia*. They are believed to have been the *Persea* of Dioscorides. The smell of their nuts when cut is heavy and disagreeable, the taste of the kernels like that of fresh filberts. They are the true *Sebestens* of the European *Materia Medica*, but according to Roxburgh, are not used in the Northern Circars of India, for any medicinal purpose. When ripe they are eaten by the natives, and also most greedily by several sorts of birds, being of a sweetish taste. *Cordia Rumphii* has a brown wood, beautifully veined with black, and smelling of musk. The timber of *C. Geraseanthus*, called *Bois de Chypre*, and Spanish Elm, is of some importance in the West Indies. The bark of

C. Myxa is a mild tonic, and is used in India for astringent gargles; its root is thought to be laxative. The wood is soft, and of little use except for fuel. It is reckoned one of the best kinds for kindling fire by friction, and is said to have furnished the wood from which the Egyptians constructed their mummy-cases.

GENERA.

Gynaion, <i>A. DC.</i>	Geraschanthus, <i>P. Br.</i>	Physoclada, <i>A. DC.</i>	Sebestena, <i>Gartn.</i>
Cordia, <i>Plum.</i>	<i>Cerdana</i> , <i>R. P.</i>	<i>Myxa</i> , <i>Endl.</i>	<i>Diacoria</i> , <i>Endl.</i>
<i>Borellia</i> , <i>Neck.</i>	<i>Rhabdocalyx</i> , <i>A. DC.</i>	<i>Varronia</i> , <i>DC.</i>	? <i>Sacellium</i> , <i>Kunth.</i>
<i>Firensia</i> , <i>Neck.</i>	<i>Pilocordia</i> , <i>A. DC.</i>		

NUMBERS. GEN. 11. Sp. 180.

POSITION. —————. — CORDIACEÆ. — Convolvulacææ.
Boraginacææ.

ORDER CCXLI. CONVOLVULACEÆ.—BINDWEEDS.

Convolvuli, *Juss. Gen.* 133. (1789).—Convolvulacæ, *R. Brown, Prodr.* 481. (1810); *Lindl. Synops.* 167. (1829); *Choisy in Mem. Soc. Phys. Genève.* (1834); *Alph. DC. Prodr.* 9. 323.

DIAGNOSIS.—*Solana* Exogens, with 5 free stamens, basal placenta, and leafy doubled up cotyledons.

Herbaceous plants or shrubs, usually twining and milky, smooth, or with a simple pubescence, sometimes erect bushes. Leaves alternate, undivided, or lobed, seldom



Fig. CCCCXIII.

pinnatifid, with no stipules. Inflorescence axillary or terminal; peduncles 1- or many-flowered, the partial ones generally with 2 bracts, which sometimes enlarge greatly after flowering. In *Mina* the inflorescence is a one-sided and almost scorpioid raceme. Calyx persistent, in 5 divisions, remarkably imbricated, as if in more whorls than one, often very unequal. Corolla monopetalous, hypogynous, regular, deciduous; the limb 5-lobed, plaited; the tube without scales. Stamens 5, inserted into the base of the corolla, and alternate with its segments. Ovary simple, with 2 or 4 cells, seldom with 1; sometimes in 2 or 4 distinct divisions; few-seeded; the ovules definite and erect, when more than 1 collateral; style 1, usually divided at the top, or as many as the divisions of the ovary, and arising from their base; stigmas obtuse or acute. Disk annular, hypogynous. Capsule with from 1 to 4 cells, succulent or capsular; the valves fitting, at their edges, to the angles of a loose dissepiment, bearing the seeds at its base. Seeds with a small quantity of mucilaginous albumen; embryo curved; cotyledons leafy, shrivelled; radicle inferior, next the hilum.

The plaited corolla, imbricated calyx, and climbing habit, are the *primâ facie* marks of this Order, which approaches *Sebestens* in its shrivelled cotyledons, and through that tribe *Borageworts*. *Mina* here, with its almost scorpioid inflorescence, and *Nolanads* among the *Echials*, would seem to establish even a more direct relationship between Bindweeds and that Order. *Phloxworts* are known by their more copious albumen, straight embryo, and loculicidal dehiscence, which in Bindweeds is always opposite the dissepiments. *Hydrophylls* are characterised by their parietal placenta, and taper embryo lying in the midst of fleshy albumen. *Nightshades* have a dicarpellary fruit, with axile placenta, and numerous seeds; otherwise, they are sometimes very like the shrubby erect species of Bindweed. The Order has been re-arranged by *Choisy* in *De Candolle's Prodromus*, but that author has been sharply criticised by *Bentham* (*London Journal of Botany*, May, 1845, p. 244), and with justice.

Fig. CCCCXIII.—*Ipomœa Batatoides*. 1. the pistil and annular disk; 2. a transverse section of the ovary; 3. a capsule of *Convolvulus tricolor*; 4. a vertical section of the seed of that species.

Very abundant in all parts of the tropics, but rare in cold climates, where a few only are found; they twine round other shrubs, or creep among the weeds of the sea-shore. In the coldest climates they are unknown.

Their roots abound in an acrid milky juice, which is strongly purgative; this quality depends upon a peculiar resin, which is the active principle of Jalap, Scammony, and others whose roots possess similar qualities. Scammony is exclusively furnished by *Convolvulus Scammonia*, a Syrian perennial; and a similar drastic substance is obtained from *Ipomœa tuberosa*, the Spanish Arbour Vine of Jamaica, *Pharbitis cathartica*, a St. Domingo plant, two Brazilian species called by Martins *Piptostegia Gomezii* and *Pisonis*, and others. Of Jalap the best sort is obtained from *Exogonium Purga*, a beautiful twiner with long crimson flowers; but other species are also collected under the same name. Mr. Hartweg ascertained that *Ipomœa Batatoides* is the *Purga Macho* or Male Jalap of Mestitlan. *Convolvulus Arvensis*, *Soldanella maritimus*, *macrocarpus*, and probably many others, may be used with nearly equal advantage. The root of *Ipomœa pandurata* is employed in the United States as Jalap; its operation is like that of Rhubarb; it is supposed to be also diuretic. The roots of *Rhodorhiza florida* and *scoparia*, and *Ipomœa Quamoclit*, are used as sternutatories; those of *Batatas edulis* and others are useful articles of food; the former is the common Sweet Potato of European gardens. *Convolvulus dissectus* abounds in prussic acid, and is one of the plants from which the liqueur Noyau is prepared.—*Bot. Mag.* 3141. The *Ipomœa sensitiva* of Turpin is remarkable for the irritability of its corolla. A sort of Jalap having the odour of Roses is described by Guibourt in the *Pharm. Journ.* 3. 331. It is not known from what species of this Order it has been obtained. *Ipomœa opereculata* yields a purgative drug, imported into Europe under the name of *Gomma da Batata*; and a long list might be made of other species whose purgative qualities have been ascertained. Among these, the following deserve principal mention: *Ipomœa pandurata*, or *Meehamek*, an American plant; *Ipomœa Turpethum*, common in the East Indies, Malayan Archipelago, New Holland, Timor, Otaheite, Friendly Islands, Marianne Islands, Timian, &c.; *Convolvulus althæoides*, a beautiful Mediterranean plant; and the *Calystegias sepium* and *Soldanella*, common in this country. Nevertheless, the purgative resin is hardly present in certain species, where it is replaced by starch or sugar; as in *Batatas edulis*, the common Sweet Potato, whose root is an important article of food in tropical countries, and *Batatas jalapa*, which was formerly called *Ipomœa macrorhiza*, and, notwithstanding the formidable name first quoted, is inert; it is a plant inhabiting the sandy soil of Georgia and Carolina, with white insipid farinaceous roots weighing from 40 to 50 lbs., and is asserted by Elliot (*Sketch* i. 253.), to possess no purgative properties whatever. Dr. Baldwin assured him that he had administered 6 drachms of the powdered root without effect, and that in fact it contains little or no resin, but like the *Batatas edulis* consists chiefly of saccharine and farinaceous matter. Of some the seeds partake in the purgative qualities of the roots. The seeds of the *Kaladana* or *Pharbitis cerulea* act as a quick, safe, and pleasant cathartic in doses of 30 to 40 grains. In some the leaves are emollient. A decoction of the leaves of *Argyreia bracteata* is used by the natives of India as a fomentation in cases of scrofulous enlargements of the joints; the boiled leaves being employed as a poultice at the same time. And the foliage of *Ipomœa maritima* is employed in Brazil in a similar manner. The species of *Rhodorhiza* yield by distillation an essential oil of a bitter balsamic flavour, called Oil of Rhodium; they are not, however, according to Mr. Barker Webb, the *ρῶδια ρίσα* of Dioscorides, which he thinks was certainly *Rhodiola rosea*. The wood when powdered has been recommended to promote sneezing, and forms an agreeable snuff; it is valued for fumigation, and when burned diffuses a delightful fragrance. According to a Dr. Uslar, of Oaxaca, the poison called in Mexico *Guaco* is a *Convolvulus*.

GENERA.

I. CONVOLVULACEÆ. — Carpels consolidated.	<i>Reinwardtia</i> , Spreng. <i>Calycobolus</i> , Willd. <i>Boumania</i> , Thunberg. <i>Neuropeltis</i> , Wall. <i>Porana</i> , Burm. <i>Dialium</i> , Sweet. <i>Duperroya</i> , Gaudich. <i>Palnia</i> , Endl. <i>Horsellia</i> , Wight. <i>Skimmeria</i> , Choisy. <i>Polyneria</i> , Linn. <i>Calystegia</i> , R. Br.	<i>Aniscia</i> , Choisy. <i>Convolvulus</i> , Linn. <i>Merremia</i> , Desmet. <i>Rhodorhiza</i> , Webb. <i>Jacquemontia</i> , Choisy. <i>Exogonium</i> , Choisy. <i>Lepistenon</i> , Blum. <i>Calonyction</i> , Choisy. <i>Baccharis</i> , Raf. <i>Ipomœa</i> , L. <i>Piptostegia</i> , Hoffm. <i>Leptocallis</i> , Don. <i>Flytristamma</i> , Boj.	<i>Mina</i> , Llav. <i>Quamoclit</i> , Tournef. <i>Calboa</i> , Cav. <i>Macrostema</i> , Pers. <i>Morenoa</i> , Llav. et Lex. <i>Batatas</i> , Choisy. <i>Operculina</i> , Manso. <i>Bombacoperrum</i> , Prt. <i>Spiranthera</i> , Boj. <i>Pharbitis</i> , Choisy. <i>Convolvuloides</i> , Monch. <i>Rivea</i> , Choisy. <i>Argyreia</i> , Lour.
--	---	---	--

Letsomia, Roxb.
Ptyxanthus, Don.
Samudra, Endl.
Humbertia, Chois.
Commerc.
Thouinia, Smith.
Smithia, Gmel.

Endrachim, Juss.
Endrach, Flacourt.
Moorcroftia, Chois.
Maripa, Aubl.
Legendrea, Webb.
Marcellia, Mart.

II. *DICHONDREÆ*.—*Car-*
pels distinct.
Dichondra, Forst.
Steripha, Banks et Sol.
Demidofia, Gmel.
 ? *Hygrocharis*, Hochst.
Falkia, Linn. fil.

Doubtful Genera.

Mouroucoa, Aubl.
Diplocalymna, Spreng.
Calibrachon, Llav.
 ? *Cervia*, Rodrig.

NUMBERS. GEN. 43. Sp. 660.

Boraginacææ.

POSITION.—*Solanacææ.*—*CONVOLVULACEÆ.*—*Polemoniacææ.*

Nolanacææ.



Fig. CCCXXIII. bis.

Fig. CCCXXIII. bis.—*Ipomoea scifolia*.

ORDER CCXLII. CUSCUTACEÆ.—DODDERS.

Cuscutææ. *J. S. Presl. Fl. Cech.* 1. 247; *Bartl. Ord. Nat.* 192. (1830); *Endl. Gen.* p. 655.—Cuscutinæ, *Link Handb.* 1. 594. (1829).—Cuscutaceæ, *Ed. Pr.* clxxvi.—Convolvulacææ, § Cuscutææ, *Choisy in DC. Prodr.* 8. 452.

DIAGNOSIS.—*Solanales Exogens, with 5 free stamens, basal placenta, and a filiform spiral embryo.*

Leafless climbing colourless parasites, with the flowers in dense clusters. Calyx persistent, inferior, persistent, 4-5-parted, with an imbricate aestivation. Corolla persistent, cut round at the base; the limb regular, 4-5-cleft, imbricated in aestivation. Scales alternating with the segments of the corolla, and adhering to them. Stamens equal to the segments of the corolla, and alternate with them; anthers 2-celled, opening longitudinally. Ovary 2-celled; ovules twin, collateral, erect; styles 2 or 0, sometimes connate; stigmas 2. Fruit capsular or baccate, 2-celled; cells 1-2-seeded. Seeds with a fleshy albumen, and a spiral, filiform, acotyledonous embryo; radicle inferior.

These parasites are said by Mr. Griffith to

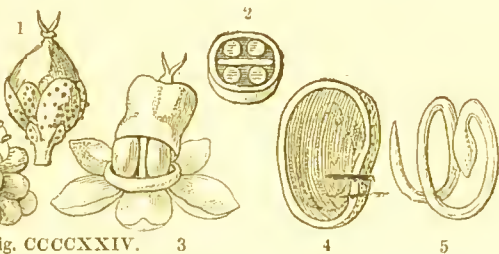
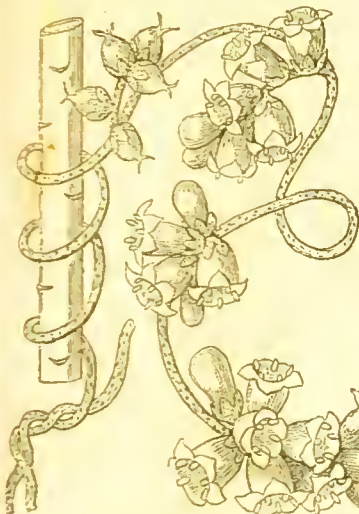


Fig. CCCXXIV. 3 4 5

differ little from Loranthi in their manner of attacking the branches on which they grow; "the suckers stop at the first completely formed wood, never penetrate further, and both the cortical and ligneous systems pass into the stock." There is this difference, however, that Dodders root in the earth in the first instance, and attack the branches of plants at a subsequent period of their existence, at which time they lose their attachment to the soil. Dodders differ from Bindweeds in having a thread-shaped embryo composed almost exclusively of radicle, and twisted spirally in a mass of fleshy albumen. They also have generally, perhaps always, scale-like bodies at the base of the stamens, and apparently alternating with the lobes of the corolla; it is, however, not improbable that these scales are really two-lobed bodies, opposite the petals, and adhering to each other at the edges; if so, they may be regarded as an inner row of stamens. M. Choisy objects altogether to the separation of Dodders from

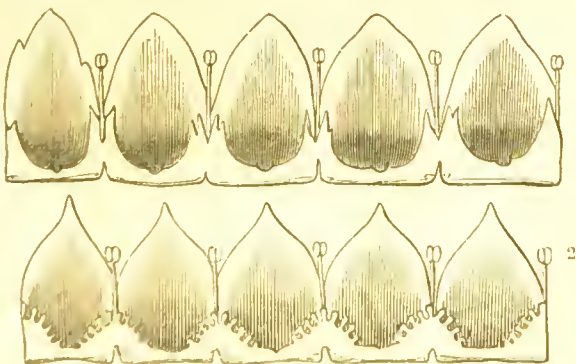


Fig. CCCXXV.

Fig. CCCXXIV.—*Cuscuta verrucosa*. 1. ovary and calyx; 2. section of do.; 3. its fruit (*Hooker*); 4. section of a seed of a *Cuscuta*; 5. its embryo pulled out.

Fig. CCCXXV.—Corolla, scales and stamens of, 1. *Cuscuta europæa*; 2. *C. Trifolii*.

Bindweeds, but he admits that under the name of *Cuscuta* are included species with a very variable structure, and which might constitute genera ; and he adds that they might have a claim to be regarded as a peculiar Order if as many as 200 species were known, instead of 50.

These parasites are found in the temperate parts of both hemispheres, twining round the branches of plants and sometimes producing great destruction among crops. They do not appear to occur much in the tropics, where their place is perhaps taken by *Cassyths*. Mr. Griffith speaks of a gigantic species in Afghanistan, which even preys upon itself ; one of its masses half covered a Willow tree 20 or 30 feet high.

Their herbage is aerid, and was formerly used as a purgative. *Cuscuta racemosa* and another or two, called *Sipo de Chumbo*, are articles of Brazilian pharmacy. The juice of the fresh plant is prescribed in sub-inflammatory complaints, hoarseness, and spitting of blood. The powder of the dried plant is strewed on fresh wounds, the healing of which it is said much to promote.

GENERA.

Cuscuta, *Tourn.*

Grammica, *Lour.*

Lepidanche, *Engelm.*

NUMBERS. GEN. 2 ? Sp. 50.

POSITION. ————— CUSCUTACEÆ.—Convulvaceæ.
Cassythaceæ.

ORDER CCXLIII. POLEMONIACEÆ.—PHLOXWORTS.

Polemonia, Juss. Gen. 136. (1789).—*Polemoniæ*, DC. and Duby, 329. (1828).—*Polemoniaceæ*, Lindl. Synops. 168. (1829); *Bentham in Bot. Reg.* 1622; *Endl. Gen.* cxlv.; *Meisner*, p. 273; *Alph. DC. Prodr.* S. 302.—*Cobæaceæ*, Don in *Edinb. Phil. Journ.* 10. 111. (1824); *Link. Handb.* 1. 822. (1829).

DIAGNOSIS.—*Solanal Ecogens*, with 5 free stamens, axile placentæ, and straight plano-convex cotyledons.

Herbaceous plants, with opposite, or occasionally alternate, compound, or simple leaves; stem occasionally climbing. Calyx inferior, generally prismatical, 5-parted, persistent, sometimes irregular. Corolla regular, or nearly so, 5-lobed. Stamens 5, inserted into the middle of the tube of the corolla, and alternate with its segments. Ovary superior, 3-celled, with few or many anatropal or amphitropal ovules; style simple; stigma trifid. Capsule 3-celled, 3-valved, few or many-seeded, with a loculicidal or septicidal dehiscence; the valves separating from the axis. Seeds angular or oval, or winged, often enveloped in mucus, in which spiral threads are entangled, ascending; embryo straight, in the axis of much horny albumen; radicle inferior, very short; cotyledons elliptical, foliaceous.

The ternary division of the ovary connected with the pentandrous corolla and 5-lobed calyx, bring this Order near Bindweeds, from which the habit, embryo, and corolla, distinguish it, but *Cobæa* has the habit of a Bindweed without the leaves; from *Gentianworts*, to which it also approaches, the 3-celled ovary divides it. To *Hydrophylls* it approaches very nearly, but the placentation is different; and therefore, *Phloxworts* are not placed in the *Cortusal Alliance*, but on the borders of it; to

which the large embryo also persuades us. It is remarkable for the blue colour of the pollen, which is usually of that hue, whatever may be the colour of the corolla. In *Collomia linearis* I have noticed (in *Botanical Register*, folio 1166) that the dilatation of the mucous matter in which the seeds are enveloped, and which, when they are thrown into water, forms around them like a cloud, depends upon the presence of an infinite multitude of exceedingly delicate and minute spiral vessels, lying coiled up, spire within spire, on the outside of the testa; when dry, these vessels are confined upon the surface of the seed by its mucus, without being able to manifest themselves; but the instant water is applied, the mucus dissolves and ceases to counteract the elasticity of the spiral threads, which then dart forward at right angles with the testa, each carrying with it a sheath of mucus, in which it for a long time remains enveloped as if in a membranous case. This singular phenomenon appears to be not uncommon in the Order. *Bromnia*, one of the plants referred to an imaginary Order, *Fouquieriaceæ*, is very like a *Cantua*, to which indeed it might have been referred if its calyx were not composed of distinct imbricated sepals. Is it really so?

Mr. Bentham observes that *Phloxworts* had, perhaps, be better placed between *Borrageworts* and *Nightshades*. They are, however, anomalous among *Corollifloral Orders* by the constancy (unless in accidentally abnormal flowers) of the tricarpellary ovary. They possess the contorted aestivation of *Dogbanes* and *Gentianworts*, the axile placentation of *Nightshades* and *Figworts*, with the inflorescence also, if not the habit, of some groups in the two latter Orders.—*London Journal of Botany*, 4. 242. I think, however, that the tricarpellary structure of the ovary forbids our placing *Phloxworts* in any Alli-

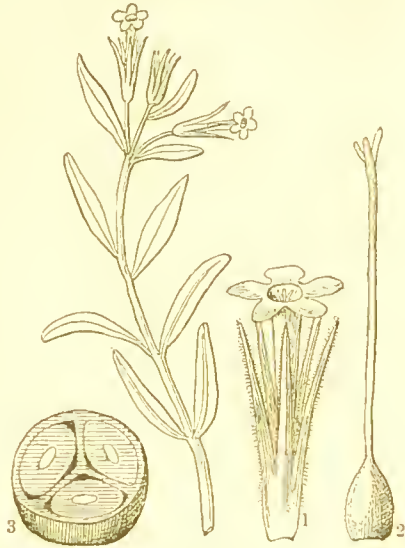


Fig. CCCXXVI.

Fig. CCCXXVI. *Collomia gracilis*. 1. calyx and corolla; 2. pistil; 3. cross section of a ripe seed.

ance of which either Borageworts, Gentianworts, Dogbanes, or Figworts form a part, and that in reality its most immediate affinities are with Bindweeds on the one hand, and Hydrophyls on the other.

Very abundant in both North and South America, in temperate latitudes, particularly on the north-west side. It is stated by Richardson, that the most northern limit in North America is 54°.—*Edin. Phil. Journ.* 12. 209. In Europe and Asia they are much more uncommon. They are unknown in tropical countries.

The Greek Valerian, *Polemonium cæruleum*, is a mucilaginous, nauseously bitter plant. In Siberia, poultices are prepared from its leaves, and thought serviceable in syphilitic sores. The Russians fancy that a decoction of it is useful in hydrophobia.

GENERA.

<i>Caldasia</i> , Willd.	<i>Welwitschia</i> , Reichenb.	<i>Dactylophyllum</i> , Benth.	<i>Laselia</i> , Linn.
<i>Thonplandia</i> , Cav.	<i>Curtloisia</i> , Reichenb.	<i>Ipomopsis</i> , L. C. Rich.	<i>Royena</i> , Houtt.
<i>Phlox</i> , Linn.	<i>Lianthus</i> , Benth.	<i>Ipomeria</i> , Nutt.	<i>Schizocodon</i> , Zucc.
<i>♀ Dupratia</i> , Raf.	<i>Leptosiphon</i> , Benth.	<i>Brickelia</i> , Raf.	<i>Cantua</i> , Juss.
<i>Collomia</i> , Nutt.	<i>Leptodactylon</i> , Hook.	<i>Navarretia</i> , Ruiz et Pav.	<i>Periphragmos</i> , R. et P.
<i>Gilia</i> , Ruiz et Pav.	<i>Dianthoides</i> , Endl.	<i>Ægocloa</i> , Benth.	? <i>Bronnia</i> , H. B. K.
<i>Collomioides</i> , Endl.	<i>Fenzlia</i> , Benth.	<i>Polemonium</i> , Tournef.	<i>Cobæa</i> , Cav.
<i>Hugelia</i> , Benth.	<i>Rossmæstlera</i> , Reichenb.	<i>Hoitzia</i> , Juss.	? <i>Cyananthus</i> , Wall.

NUMBERS. GEN. 17. Sp. 104.

Hydrophyllaceæ.

POSITION.—*Convolvulaceæ*.—*Polemoniaceæ*.—*Solanaceæ*.
Gentianaceæ.

ALLIANCE XLVII. *CORTUSALES*.—THE CORTUSAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with monodichlamydeous flowers, a free central placenta, and an embryo lying among a large quantity of albumen.*

The Cortusal Alliance is distinctly limited among Perigynous Exogens by its free central placenta, and an embryo lying in the *inside* of the albumen. By this last circumstance it is separated from the Ficoidal Alliance, which has also a free central placenta. There is this other essential difference, that the tendency of Ficoidals is towards a polypetalous or apetalous structure, while that of Cortusals is towards a monopetalous condition. In general, moreover, the albumen of the latter is extremely abundant and hard; but Leadworts have it insignificant in quantity, and mealy, in which latter respect they correspond with Ficoidals.

In a collateral way these plants may be brought in contact with Nightshades through Primworts, with Sapotads and Ebenads through Ardisiads, and with Phloxworts through Hydrophylys, which last offer the best transition to the Echial Alliance.

In Ribworts the placentation is less obviously central than in the other Orders, but it really is so, as is shown in speaking of those plants. In fact, the placenta of Hydrophylys and Ribworts is of quite the same nature.

NATURAL ORDERS OF CORTUSALS.

- | | | |
|---|---|----------------------|
| <i>Stamens alternate with the petals. Styles 2. Inflorescence circinate</i> | } | 244. HYDROPHYLLACEÆ. |
| <i>Stamens opposite the petals. Fruit membranous, one-seeded. Styles 5. Stem herbaceous</i> | | |
| <i>Stamens alternate with the petals. Style 1. Inflorescence straight.</i> | | 246. PLANTAGINACEÆ. |
| <i>Stamens opposite the petals. Fruit capsular, many-seeded. Style 1. Stem herbaceous</i> | } | 247. PRIMULACEÆ. |
| <i>Stamens opposite the petals. Fruit indehiscent, drupaceous. Style 1. Stem woody</i> | | |
| | | 248. MYRSINACEÆ. |

ORDER CCXLIV. HYDROPHYLLACEÆ.—HYDROPHYLIS.

R. Brown. Prodr. 1. 492. (1810), *without a name*.—Hydrophyllæ, *Von Martius N. G. et Sp.* 2. 138. (1828); *Bentham in Linn. Trans.* 17. 267. (1834); *Endl. Gen.* cxlvi.; *Alph. DC. Prodr.* 9. 287.—Hydroleaceæ, *R. Brown Prodr.* 482. (1810), *without a name*; *Id. in Congo, Kunth in Humb. N. G. et Sp.* 3. 125. (1818); *Bartl. Ord. Nat.* 189; *Choisy Descr. des Hydroleacées (no date)*; *Endl. Gen.* cxlvii.; *Meisner Gen.* p. 272; *A. DC. Prodr.* 564. *Note*; *Ed. pr. No.* cxxviii.

DIAGNOSIS.—*Cortusal Exogens*, with the stamens alternate with the sepals, 2 styles, and a circinate inflorescence.

Small trees, bushes, or herbaceous plants, often hispid. Leaves often lobed, alternate, or the lower ones opposite. Flowers arranged in gyrate racemes or unilateral spikes, or occasionally solitary and stalked in the axils of the leaves. Calyx inferior, persistent, deeply 5-cleft; the recesses usually augmented with reflexed appendages. Corolla monopetalous, hypogynous, regular, shortly 5-cleft, between campanulate and rotate, rarely funnel-shaped. Stamens 5, epipetalous, alternate with the segments of the corolla, inflected in æstivation; anthers versatilo, 2-celled, the cells parallel, dehiscing longitudinally. Ovary superior, simple, 1-2-celled; styles 2, long; stigmas 2, terminal; placentæ 2, free at their back or united to the shell of the ovary, with two or many amphitropal ovules on their inner face. Fruit capsular, 2-valved, sometimes 1-celled, with a large placenta filling the capsule, sometimes somewhat 2-celled, with the dissepiments incomplete. Seeds reticulated; albumen abundant, cartilaginous; embryo conical, with its radicle next the hilum.

The general aspect of these plants is that of Borageworts, which agree in the roughness of their leaves and in their peculiar gyrate, circinate or scorpioid inflorescence. They are, however, known by their undivided 1-celled ovary, terminal style or

styles, and ovules (if definite) attached to two stalked fungous placentæ, which arise from the base of the cell, having their ovules on their inner face, or (if indefinite) attached to parietal placentæ. They are further characterised by the presence, in many species, at the base of each lobe of the corolla, of 2 scales or lamellæ, the nature of which is unknown. In general appearance they are also sometimes similar to Polemoniaceæ (Phloxworts). But the large quantity of albumen, the indefinite seeds, the central fungous placentæ, are all circumstances that point to Primworts, with which it seems necessary to associate them; for the minute embryo of all the genera associated with Hydrophyllis, and their hard cartilaginous albumen, forbid their being regarded as more than analogous to either Phloxworts or Borageworts. For many years it has been customary to consider these plants distinct from Hydroleaceæ, but I quite agree with M. Alph. De Candolle that there are very slight differences between them. Indeed, upon comparing the distinctions hitherto relied upon, they really amount to this and no more: that in Hydrophyllis the ovary is 1-celled, and in Hydroleaceæ 2-celled; but in all cases among these plants the placentæ are a pair of fungous projections from the margin or base of the ovary, and it is their adhesion in various ways that determines whether the cavity has 1 or 2 cells. In the former edition I pointed out the near affinity of the two supposed Orders, and I now unite them, not seeing how even sectional characters can be found for them.

Trees or herbaceous plants, found either in the north or among the most southern of the southern provinces of America; not much known beyond that continent. Nama

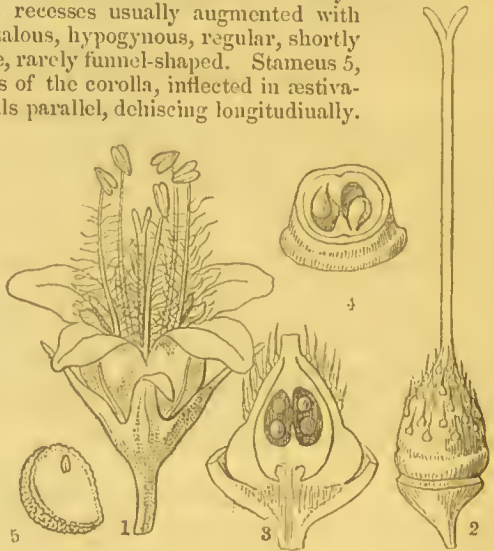


Fig. CCCXXVII.

Fig. CCCXXVII.—Hydrophyllum canadense. 1. a flower; 2. a pistil; 3. a perpendicular section of the ovary; 4. a cross section. 5. Section of seed of *H. virginianum*.—*Gartner*.

and *Hydrolea* occur, however, in the East Indies; *Codon* at the Cape of Good Hope; and *Romanzovia* in arctic America.

Some of the species are cultivated in gardens for the sake of their gay flowers; but none appear to possess useful qualities of any importance. In the United States a decoction of *Hydrophyllum canadense* is one of the endless remedies for snake-bites, and it is said to be found useful in the cases of erysipelatos eruptions produced by the venomous exhalations of *Rhus Toxicodendron*. *Hydrolea* is bitter; the leaves beaten into pulp and applied as a poultice are in India considered efficacious in cleaning and healing ill-conditioned ulcers.

GENERA.

<i>Hydrophyllum</i> , <i>Tournef.</i>	<i>Heteryta</i> , <i>Raf.</i>	<i>Emmenanthe</i> , <i>Benth.</i>	<i>Wigandia</i> , <i>Kunth.</i>
<i>Decemium</i> , <i>Raf.</i>	<i>Miltizia</i> , <i>A. DC.</i>	<i>Hydrolea</i> , <i>Linn.</i>	<i>Eriodictyon</i> , <i>Benth.</i>
<i>Ellisia</i> , <i>Linn.</i>	<i>Phacelia</i> , <i>Juss.</i>	<i>Steris</i> , <i>Burm.</i>	<i>Nama</i> , <i>Linn.</i>
<i>Nyctelea</i> , <i>Scop.</i>	<i>Aldea</i> , <i>Ruiz et Pav.</i>	<i>Sagonca</i> , <i>Aubl.</i>	<i>Romanzovia</i> , <i>Cham.</i>
<i>Microgenetes</i> , <i>A. DC.</i>	<i>Endiplus</i> , <i>Raf.</i>	<i>Reichelia</i> , <i>Schreb.</i>	? <i>Codon</i> , <i>Royen.</i>
<i>Nemophila</i> , <i>Bart.</i>	<i>Cosmanthus</i> , <i>Nolle.</i>	? <i>Hydrolia</i> <i>Thouars.</i>	? <i>Lonchostoma</i> , <i>Wikstr.</i>
<i>Eutoea</i> , <i>R. Br.</i>			

NUMBERS. GEN. 16. Sp. 75.

Polemoniaceæ.

POSITION.—*Plumbaginaceæ.*—HYDROPHYLLACEÆ.—*Primulaceæ.*

Boraginaceæ.

ORDER CXXLV. PLUMBAGINACEÆ.—LEADWORTS.

Plumbaginæ, *Juss. Gen.* 92. (1789).—Plumbaginæ, *R. Brown, Prodr.* 425. (1810); *Ebel de Armeria Gen. Prodr.*; *Endl. Gen.* cxvii.; *Meisner Gen.* p. 315; *Barnéoud Mémoire, sur les Plumbaginées.*

DIAGNOSIS.—*Cortusal Exogens*, with the stamens opposite the petals, membranous one-seeded fruit, 5 styles, and a herbaceous stem.

Herbaceous plants or under-shrubs, variable in appearance. Leaves alternate or clustered, undivided, somewhat sheathing at the base, but without stipules, sometimes marked with transparent dots. Flowers either loosely paniced, or contracted into heads, flowering irregularly. Calyx tubular, plaited, persistent, sometimes coloured. Corolla of very thin texture, monopetalous, with a narrow angular tube, or of 5 petals, which have a long narrow claw. Stamens definite, opposite the petals, in the monopetalous species hypogynous! in the polypetalous arising from the petals! ovary superior, composed of 5 (or 3 or 4) valvate carpels, 1-celled, 1-seeded; ovule anatropal, pendulous from the point of an umbilical cord, arising from the bottom of the cavity; styles 5! seldom 3 or 4; stigmas the same number. Fruit a nearly indehiscent utricle. Seed inverted, with a rather small quantity of mealy albumen; testa simple; embryo straight; radicle superior.



Fig. CCCXXVIII.

Distinguished from all monopetalous Orders by their plaited calyx and solitary ovule, suspended from the apex of a cord which arises from the base of a 1-celled ovary, with several stigmas. They are nearly related to Primworts, in their habit, if *Armeria* is compared with *Androsace*, and as is indicated by the opposition of the stamens to the lobes of the corolla; but they have less albumen and a larger embryo than properly belongs to the *Cortusal Alliance*, of which they must be looked upon as one of the most outlying Orders. The economy of the ovule is highly curious; before feundation it is suspended from the apex of a cord, or rather strap, which lies over the foramen or orifice through which the vivifying influence of the pollen has to be introduced; this foramen is presented to the summit of the cell immediately below the origin of the stigmas, but has no communication with that part of the cell, from contact with which it is further cut off by the overlying strap; but as soon as the pollen exercises its influence upon the stigmas, the strap slips aside from above the foramen, which is entered by an extension of the apex of the cell, and thus a direct communication is established between the pollen and the inside of the ovule. This phenomenon is obscurely hinted at by several writers, but was first distinctly shown me by Dr. Brown, and has since been beautifully illustrated by Mirbel, *Nouvelles Recherches sur l'Ovule*, tab. 4. According to Koeh, the singular sheath which in *Armeria* invests the top of the scape, and which Ray supposed to be of the nature of a calyptra, is nothing more than the base of the involueral leaves, in a state of adhesion.

Many are inhabitants of the salt marshes and sea-coasts of the temperate parts of the world, particularly of the basin of the Mediterranean, the southern provinces of the Russian empire, and especially of Afghanistan. The *Koollah-i-Huzareh*, which forms a large part of the fuel of Cabul, consists of various species of *Statice*. Others grow from Greenland and the mountains of Europe, to the sterile volcanic regions of Cape Horn. A few are found within the tropics; of these *Plumbago zeylanica* extends from Ceylon to Port Jackson, and *Ægialitis* grows among the Mangroves of northern Australasia. *Vogelia* is from the Cape of Good Hope, and *Ceratostigma* from China.

Fig. CCCXXVIII.—*Armeria vulgaris*. 1. calyx and stamens; 2. section of corolla; 3. pistil; 4. ovule; 5. embryo.

The Order contains plants of very different qualities; part are tonic and astringent, and part acrid and caustic in the highest degree. The root of *Statice caroliniana* is one of the most powerful astringents in the vegetable materia medica. The bruised fresh bark of the root of *Plumbago zeylanica* acts as a vesicatory, and is applied in India to buboes in their incipient state. *Plumbago europæa* is employed by beggars to raise ulcers upon their bodies to excite pity; its root is so acrid that it is used in Roumelia for causing issues, and even as a vesicant.—*Ann. Ch.* l. 249. But Sauvage de la Croix says that a young woman, who had it applied, affirmed that the pain it occasioned was intolerable, and that she felt as if being flayed alive. Administered internally in small doses it is said to be as effectual an emetic as *Ipecacuanha*. It is said by Duroques to have been used with considerable advantage in cases of cancer, for which purpose the ulcers were dressed twice daily with olive oil in which the leaves had been infused. *Plumbago scandens* is called *Herbe du Diable* in St. Domingo. Its root is said by Martius to be the most active part, and to be a most energetic blistering agent when fresh. It is applied in pains of the ears, and administered internally in hepatic obstructions, &c. *Plumbago rosea* is usually believed to be the *Radix vesicatoria* of Rumphius, which being sliced and applied to the skin produces blisters, but less rapidly and effectually than *Cantharides*. *Armeria vulgaris* is regarded in Germany as an active diuretic. From two drachms to an ounce of the flowers freshly gathered and quickly dried should be gently boiled and the patient allowed to drink of the decoction *ad libitum*. Some aromatic, as Anise or Cinnamon, is added to the decoction. The remedy appears to cause the excretion of urine in a direct manner.—*Med. Gaz.* xx. 144. As garden plants, nearly the whole Order is much prized for beauty, particularly the *Statices*, many of which are among the most lovely herbaceous plants we know.

GENERA.

<p>I. <i>STATICEÆ</i>.—Petals and styles distinct.</p> <p><i>Armeria</i>, Willd. <i>Statice</i>, L. <i>Eurychiton</i>, Nimmo.</p>	<p><i>Limonium</i>, Tournef. <i>Taxanthema</i>, Neck. <i>Armeriastrum</i>, Jaub. <i>Ægialitis</i>, R. Br.</p>	<p>II. <i>PLUMBAGINÆÆ</i>.—Petals and styles adherent.</p> <p><i>Plumbago</i>, Tournef.</p>	<p>? <i>Thela</i>, Lour. <i>Ceratostigma</i>, Bunge. <i>Vogelia</i>, Lam. <i>Valoradia</i>, Hochst.</p>
---	---	---	---

NUMBERS. GEN. 8. Sp. 160.

POSITION.—*Primulaceæ*.—*PLUMBAGINACEÆ*.—*Plantaginaceæ*.

ORDER CCXLVI. PLANTAGINACEÆ.—RIBWORTS.

Plantagines, *Juss. Gen.* 89. (1789).—Plantaginee, *R. Brown Prodr.* 423. (1810); *Endl. Gen.* cxvi.; *Meisner, p.* 315; *Leydolt, die Plantagineen*; *Barnéoud Recherches sur le Développement, &c., des Plantaginées.*

DIAGNOSIS.—*Cortusal Exogens, with stamens alternate with the petals, 1 style, and a straight inflorescence.*

Herbaceous plants, usually stemless, occasionally with a stem. Leaves forming rosettes, or in the caulescent species both alternate and opposite; flat and ribbed or taper and fleshy. Flowers in spikes, rarely solitary, usually ♂, seldom by abortion ♂ ♀.

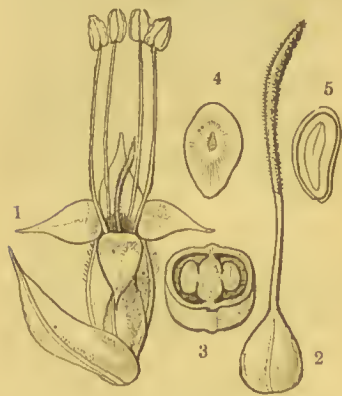


Fig. CCCXXIX.

This is a group regarding whose affinities the opinions of Botanists are unsettled. By Jussieu it was considered apetalous, and placed near Amaranths and Chenopods, the calyx being called bracts, and the corolla calyx; but this is scarcely an admissible explanation of the structure. I formerly stationed it near Leadworts, to which it must be regarded as nearly allied; but I was certainly wrong in associating it with composite plants and their allies. Don was, I think, the first to suggest that it might be connected with Primworts by means of Glaux, an apetalous genus belonging to that Order. Latterly M. Barnéoud, who has particularly studied the subject, has suggested that the supposed corolla is nothing more than a series of abortive stamens analogous to the membranous cup of Gomphrenas and other Amaranths; and he adopts the opinion of Jussieu that the Orders of Amaranths and Chenopods are those with which Ribworts ought to be associated. In this opinion I cannot concur. There is nothing to distinguish the corolla of Ribworts from the part so called in other plants, except its thinness and want of vascular texture; all corollas must, in a morphological sense, be regarded as barren stamens; and, moreover, the embryo and seed of Ribworts are totally different from anything known in the Chenopodal Alliance. It appears to me that Don's idea was correct, and that upon the whole the Order is a near ally of the Primworts.

The ovary of *Plantago* does not present distinctly the appearance of a free central placenta. But in reality the placenta is at first quite free, although eventually it is pressed close to the sides of the ovary, and thus divides the cavity into 2 or more cells. This is, however, only a temporary contact, for long before the seeds are ripe the placenta shrinks so much as to lose its adhesion with the sides of the ovary, and then it becomes truly free. In *Plantago arborescens* it is, when ripe, *continuous with the stigma*, and the two become loose and may be removed together, leaving the sides of the ovary undisturbed.

The tendency to dichinism is very striking in the genus *Littorella*, and also occurs in *Bougueria*; it is not, however, perfect, for the male *Littorellas* have the rudiment of an ovary.

The species are scattered over the whole world, in almost every quarter of which

Fig. CCCXXIX.—*Plantago lanceolata*. 1. flower and bract; 2. pistil; 3. ovary cut across; 4. seed; 5. section of it.

they are found in one situation or another. They are chiefly, however, produced in cool or temperate latitudes.

Their herbage is slightly bitter and astringent, and they have even been reckoned febrifuges. Their seeds are covered with mucus. According to De Caudolle, those of *Plantago arenaria* are exported in considerable quantities from Nismes and Montpellier to the north of Europe, and are supposed to be consumed in the completion of the manufacture of muslins. The seeds of *Plantago Ispaghula* are of a very cooling nature, and, like those of *Plantago Psyllium*, form, with boiling water, a rich mucilage, which is much used in India in catarrh, gonorrhœa, and nephritic affections. The seeds of *P. Psyllium*, *arenaria*, and *Cynops*, have been made into demulcent drinks, as a good substitute for Linseed or Marshmallows. *P. Coronopus*, formerly thought an antidote to hydrophobia, is said to be a diuretic. Soda is obtained in Egypt from the ashes of *P. squarrosa*.

GENERA.

<i>Littorella</i> , L.	|	<i>Psyllium</i> , Tournef.
<i>Bougueria</i> , DeCaisne.	|	<i>Coronopus</i> , Tournef.
<i>Plantago</i> , L.	|	<i>Arnoglosson</i> , Endl.

NUMBERS. GEN. 3. Sp. 120.

POSITION.—*Plumbaginaceæ*.—*PLANTAGINACEÆ*.—*Primulaceæ*.
Amarantaceæ.

ORDER CCXLVII. PRIMULACEÆ.—PRIMWORTS.

Lysimachiæ, *Juss. Gen.* 95. (1789).—Primulaceæ, *Vent. Tabl.* 2. 285. (1799); *R. Brown Prodr.* 427; *A. de St. Hilaire, Ann. Sc. Nat. n. s. v. 30. xl.* 85.; *Endl. Gen.* clvi.; *Meisner Gen.* p. 254; *DC. Prodr.* 8. 33; *Duby in Mém. Soc. Phys. Genève.* 10. 395.—Anagalleidæ, *Baudo in Ann. Sc. Nat. n. s. xx.* 344. (1843).

DIAGNOSIS.—*Cortusal Exogens, with stamens opposite the petals, a capsular many-seeded fruit, 1 style, and a herbaceous stem.*

Annual or perennial herbaceous plants, sometimes almost shrubby. Leaves usually radical; otherwise both whorled and opposite or alteruate. Stipules 0. Flowers either on radical scapes and in umbels, or variously arranged in the axils of the leaves. Calyx

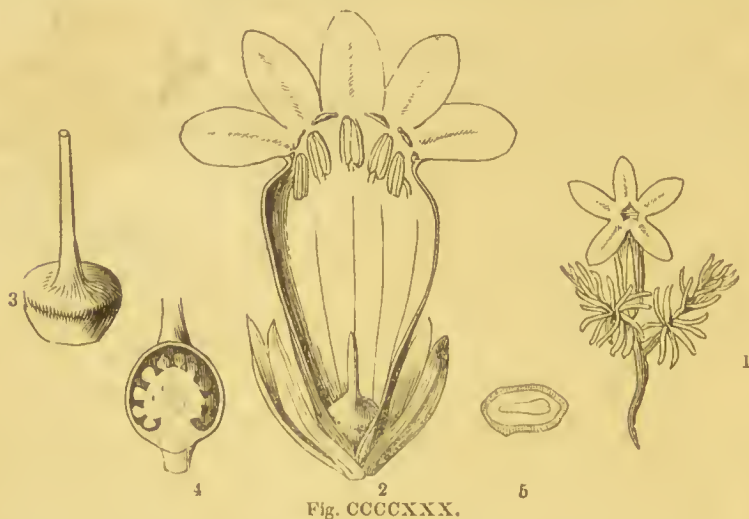


Fig. CCCCXXX.

5-cleft, seldom 4-cleft, inferior, or half superior, regular, persistent. Corolla monopetalous, hypogynous, regular; the limb 5-cleft, seldom 4-cleft; very rarely 0. Stamens inserted upon the corolla, equal in number to its segments, and opposite them. Ovary 1-celled; style 1; stigma capitate; ovules usually amphitropal, rarely anatropal. Capsule opening with valves; placenta central, distinct. Seeds numerous, peltate; embryo included within fleshy albumen, and lying across the hilum; radicle with no determinate direction.

The monopetalous corolla having the stamens opposite its lobes, the composite nature of the ovary, whose placenta is free and central, and the position of the embryo across the hilum, afford ample means for recognising the Order of Primworts, unless they are compared with Ardisiads; from which it is so impossible to distinguish them by any very good character, that Mr. Bentham has proposed to unite the two Orders, adding that, in fact, *Primula* and *Myrsine* are not more different than *Viola* and *Alsodeia*. Nevertheless, all systematic authors distinguish them, chiefly, as it seems, because no good transition can be found from the herbaceous growth of Primworts to the arborescent or woody structure of Ardisiads. Dunal, one of the later writers on the subject, says that Primworts are, 1, capsular; 2, have seeds placed on the surface of the placenta; 3, are herbs; and 4, are uniformly ♂; while on the other hand Ardisiads are, 1, drupaceous; 2, have seeds sunk in sockets of the placenta; 3, are woody; and 4, are very frequently polygamous; and these are doubtless the best distinctions that can be found. But a somewhat succulent fruit occurs in *Lubinia*, and a partially alveolate placenta in



Fig. CCCCXXXI.

Fig. CCCCXXX.—1. *Aretia Vitaliana*; 2. a flower cut open; 3. the pistil; 4. a vertical section of the latter, showing the free central placenta; 5. a section of a seed.

Fig. CCCCXXXI.—Section of half-ripe fruit of *Anagallis arvensis*.

Coris and Anagallis, all genera of Primworts; so that the distinctive characters cannot be absolutely relied upon. I think, however, that the two Orders really are different, and that Coris and Lubinia are but the usual instances of loss of character, such as are to be found in almost all Natural Orders. M. Dnby also points out a relation to Purslane-worts, found in a supposed genus of that Order called Cypselea; but that plant is certainly no Purslane-wort, for it has 5 sepals; and the resemblance traced between it and Primworts is very indistinct. The collateral affinities of Primworts are much greater with Nightshades and Diapensiads, to both which they are similar in habit.

Many cases of anomalous structure occur among these plants. Samolus is remarkable for having an inferior ovary, and barren stamens alternating with the lobes of the corolla. Similar stamens are present in *Lysimachia ciliata*, *hybrida*, and others. Apochoris and Pelletiera have the petals distinct, and they are hardly united in even Asterolinon and Naumburgia. Glaux is remarkable for being absolutely apetalous. A frequent peculiarity among the genera is to have that kind of fruit which Botanists call a Pyxis.

Common in the northern and colder parts of the globe, growing in marshes, hedges, and groves, by fountains and rivulets, and even among the snow of cloud-clapped mountains. The genus *Douglasia* was found by the traveller whose name it bears, blossoming while covered with snow, on the Rocky Mountains of America. Primworts are uncommon within the tropics, where they usually occupy either the sea shore or the summits of the most lofty hills. The genus *Samolus* is common in New Holland.

As beautiful objects of culture, these rank among those which are most highly prized, both on account of their bright but modest-looking flowers, the earliest harbingers of spring, and also for the sake of their fragrance. Some of them have powerful active principles. The flowers of the Cowslip, *Primula veris*, possess well-marked, sedative and diaphoretic properties, and make a pleasant soporific wine; its fresh root has a smell resembling Anise, and was formerly employed as a tonic nervine, and also as a diuretic. The leaves of *Primula Auricula* are used in the Alps as a remedy for coughs. *Soldanella* are slightly purgative. *Samolus Valerandi* is bitter. *Cyclamens* are called Sowbreads, because they are the favourite food of the wild boars of Sicily; yet they are very acrid plants, especially the root, whose acrimony is not much perceived at the first tasting, but soon becomes intolerable.—*Smith*. It has been used medicinally, its action being that of a drastic purgative, and formerly it was much esteemed as an emmenagogue; but whether its reputation was owing to its actual powers or to its placentiform root is doubtful. *Sibthorp* tells us that the modern Greeks use the bruised root of *Cyclamen persicum* as a means of driving the *Sepia octopodia* out of its holes. It is said that these roots, notwithstanding their acridity, are eatable and innoxious when dried or roasted. *Anagallis arvensis* and *cerulea*, the Mouron of the French, have had some reputation in cases of madness. They appear to possess energetic powers, for Orfila destroyed a dog by making him swallow 3 drachms of the extract; it was found to have inflamed the mucous membrane of the stomach. A similar result was obtained by Grenier. It has been prescribed in epilepsy and dropsy. *Coris monspeliensis* was employed in the medicine of the Spanish monastic orders as a most efficacious vulnerary, when dried and reduced to powder.—*Bot. Reg.* vii. 536. It has also been prescribed in syphilitic cases.

GENERA.

I. PRIMULACEÆ.	<i>Primula</i> , Linn.	<i>Pelletiera</i> , St. Hil.	<i>Lerouxia</i> , Merat.
<i>Douglasia</i> , Linnl.	<i>Auricula</i> , Eadl.	<i>Asterolinon</i> , Link et Hfs.	<i>Godinella</i> , Lestib.
<i>Androsace</i> , Tournef.	<i>Aleuritia</i> , Eadl.	<i>Naumburgia</i> , Mönch.	<i>Ephemerum</i> , Reichenb.
<i>Aretia</i> , Linn.	<i>Agathosus</i> , Link.	<i>Thysanthus</i> , Schrank.	<i>Apochoris</i> , Dnby.
<i>Androsat</i> , Dnby.	<i>Cortusa</i> , Linn.	<i>Lysimachia</i> , Mönch.	<i>Stelocnemis</i> , Raf.
<i>Macrosyphonia</i> , Dnby.	<i>Cyclamen</i> , Tournef.	<i>Eusepale</i> , Bando.	<i>Amguzanthe</i> , Bando.
<i>Gregoria</i> , Dnby.	<i>Dodecatheon</i> , Linn.	<i>Neolyta</i> , Bando.	<i>Trilentalis</i> , Linn.
<i>Aretia</i> , Gandin.	<i>Meadia</i> , Catesb.	<i>Bernardina</i> , Bando.	<i>Goxia</i> , Eudl.
<i>Vitaliana</i> , Sessl.	<i>Soldanella</i> , Tournef.	<i>Alaga</i> , Bando.	<i>Lubinia</i> , Link et Otto.
<i>Dionysia</i> , Fenzl.	<i>Glaux</i> , Tournef.	<i>Palladia</i> , Mönch.	<i>Lubinia</i> , Vent.



Fig. CCCCXXXII.

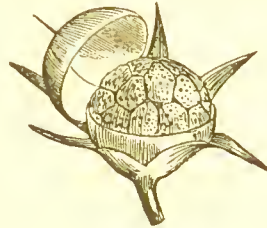


Fig. CCCCXXXIII.

Fig. CCCCXXXII.—Section of the flower of *Samolus Valerandi*.

Fig. CCCCXXXIII.—Pyxis of *Anagallis arvensis*.

Coris, *Tournef.*

II. ANAGALLIDÆ.

Centunculus, *Linn.*
Anagallis, *Tournef.*
Euparea, *Banks.**Jirasekia*, *Schn.*
Stenogyra, *Baudo.*
Micropyxis, *Duby.*

III. HOTTONIDÆ.

Hottonia, *Linn.**Stratiotes*, *Vaill.*

IV. SAMOLIDÆ.

Samolus, *Tournef.*
Sheffieldia, *Forst.**Samodia*, *Baudo.*

Little known Genera.

Manelia, *Boed.*
Findlaya, *Bowd.*

NUMBERS. GEN. 29. Sp. 215.

*Solanaceæ.*POSITION.—*Myrsinaceæ.*—PRIMULACEÆ.—*Plumbaginaceæ.**Diapensiaceæ.*

ORDER CCXLVIII. MYRSINACEÆ.—ARDISIADS.

Ophiosperma, *Vent. Jard. Cels.* 86. (1800).—Myrsinæe, *R. Brown, Prodr.* 532. (1810); *Aug. de St. Hilaire, Ann. Sc. Nat. n. s. v.* 193; *Endl. Gen. clvii.*; *Meisner, p.* 252.—Ardisiaceæ, *Juss. Ann. Mus. XV.* 350. (1810); *Bartl. Ord. Nat.* 163; *Alph. DC. in Linn. Trans.* 17. 100.—Myrsinaceæ, *Ed. Pr.* clix. (1836); *Alph. DC. Prodr.* 8. 75.—Theophrastaceæ, *Alph. DC. Prodr.* 8. 144.

DIAGNOSIS.—*Cortusal Exogens*, with stamens opposite the petals, indehiscent drupaceous fruit, and woody stem.

Trees or shrubs. Leaves alternate, undivided, serrated or entire, coriaceous, smooth; stipules 0; sometimes under-shrubs, with opposite or ternate leaves. Inflorescence in umbels, corymbs, or panicles, axillary, seldom terminal. Flowers small, white or red, often marked with sunken dots or glandular lines. Flowers ♂ or occasionally ♀. Calyx 4- or 5-lobed, persistent. Corolla monopetalous, hypogynous, 4-5-cleft, equal. Stamens 4-5, opposite the segments of the corolla, into the bases of which they are inserted; filaments distinct, rarely connate, sometimes wanting, sometimes 5 sterile petaloid alternate ones; anthers attached by their emarginate base, with 2 cells, dehiscing longitudinally. Ovary



Fig. CCCCXXXIV.

free, or partially adherent, with a single cell and a free central placenta, in which is immersed a definite or indefinite number of campulitropal ovules; style 1, often very short; stigma lobed or undivided. Fruit fleshy, mostly 1-seeded, sometimes 2-00-seeded. Seeds angular or roundish, with a hollow hilum and a simple integument; albumen abundant, horny, of the same shape as the seed; embryo taper, usually curved, lying across the hilum when the seed is solitary or inferior, and touching the foramen when the seeds are numerous and lateral; cotyledons short.

The arborescent habit, fleshy fruit, and socketted placenta are the only circumstances to be relied upon in distinguishing this Order from Primworts, and even the latter is not of great value, as is shown at p. 644. Brown remarks that the Order is related to Sapotads through *Jacquinia*, and to Primworts through *Bladhia*. *Labisia* is a very remarkable plant, with the habit of a *Pothos*, and an induplicato-valvate corolla. *Embelieæ* are polypetalous. *Mæsa* is to other Ardisiads what *Samolus* is to other Primworts. Mr. Arnott remarks to me that in some genera he finds dots of different shapes mixed as in *Samyds*.

Ardisiads "are for the most part inhabitants of climates whose temperature is equable, and they particularly abound in insular localities, as the Islands of the Indian Ocean, Mauritius, Bourbon, and Madagascar. Their utmost northern limit in the Old World seems to be the Azores, lat. 39° N., Madeira lat. 32°, and Teneriffe; but in no part of the adjacent continent of Africa do they cross the Northern tropic; in Europe they are entirely wanting, and in Asia extend only to Japan in north lat. 40°. The Order is very rare in N. America, and especially to the northward of Mexico, only one species inhabiting the United States, the *M. floridana*, *A. De C.*, and that is confined to the southern state, whose name it bears, lat. 30° N. In the southern hemisphere they nowhere (except in New Zealand), are found to the southward of the 36th parallel, and there in S. Brazil only. In Africa they reach the 33rd, and in Australia the 34th. Their extension into the 53rd degree in the South Pacific Ocean, is hence a remarkable circumstance, and probably in some measure to be accounted for by the uniform temperature which the New Zealand Islands possess; further, they there bear a larger proportion to the other dicotyledonous vegetation than they do in any other part of the

Fig. CCCCXXXIV.—1. *Mæsa ovata*; 2. *Ardisia odontophylla*; 3. *Hymenandra Walllichiana*; 4. seed of *Mæsa argentea*.—*A. DC.*

globe. I have alluded to the *Suttonia divaricata* having a considerable range in latitude, a circumstance not without parallel in the Order to which it belongs. Of this, *Myrsine africana* is an extreme instance, that plant being found both at the Cape of Good Hope, in Abyssinia, and in the Azores. The species of the Natural Order are, however, as M. A. De Candolle well remarks (*Linn. Trans.* vol. xvii. p. 99), very confined as regards their geographical limits, Melastomaceæ and Myrtaceæ being two of the very few groups containing about the same or a greater number of species which are more so.—*Jos. Hooker, Bot. of Antarctic Voyage*, p. 52.

Their properties are little known. Many are handsome shrubs, with fine evergreen leaves. Bread is said to be prepared from the pounded seeds of *Theophrasta Jussiei* in St. Domingo, where it is called *Le Petit Coco*. A slight degree of pungency exists in the berries of *Embelia Ribes*, and some others; cathartic properties are ascribed to those of *E. robusta* and *Myrsine bifaria*. The bark of *Cybianthus detergens* is both gummy and astringent, and is used in baths and as a lotion by the Brazilians, against impetiginous affections. The seeds of *Wallenia laurifolia* are peppery. According to Mr. Griffith, the fruit of the *Reptonia* (*Edgeworthia*) *buxifolia*, or *Goorgoora*, is commonly sold in the bazaars of Cabul. It is roundish and succulent, about the size of a marble, and is considered heating by the Affghans.—*Ann. Nat. Hist.* x. 193. The leaves and branches of some *Jacquinias* are said to be poisonous to fish, as is their fruit to man; but this statement requires confirmation. The fruit of *Clavija* is pleasant to eat; the root emetic. Many have resinous cysts in their wood, fruit, and flowers.

GENERA.

<p>I. MÆSEÆ.</p> <p><i>Mæsa</i>, <i>Forst.</i> <i>Bæobotrys</i>, <i>Forst.</i> <i>Sibouratia</i>, <i>Thouars.</i></p> <p>II. EMBELIÆ.</p> <p><i>Embelia</i>, <i>Juss.</i> <i>Ribesiodes</i>, <i>Linn.</i> <i>Ribes</i>, <i>Burm.</i> <i>Choripetalum</i>, <i>A. DC.</i> ? <i>Othera</i>, <i>Thunb.</i> ? <i>Orixa</i>, <i>Thunb.</i></p> <p>III. ARDISIÆ.</p> <p><i>Oneostemum</i>, <i>Adr. Juss.</i> <i>Amblyanthus</i>, <i>A. DC.</i> <i>Hyuenandra</i>, <i>A. DC.</i></p>	<p><i>Antistrophe</i>, <i>A. DC.</i> <i>Pleomeris</i>, <i>A. DC.</i> <i>Ileberdenia</i>, <i>Banks.</i> <i>Pinnelandra</i>, <i>A. DC.</i> <i>Myrsine</i>, <i>Linn.</i> <i>Plotia</i>, <i>Adans.</i> <i>Rapanea</i>, <i>Aubl.</i> <i>Mangliilla</i>, <i>Juss.</i> <i>Caballeria</i>, <i>R.P.</i> <i>Sanara</i>, <i>Swartz.</i> <i>Scleroxylon</i>, <i>Willd.</i> <i>Athruphyllum</i>, <i>Lour.</i> <i>Hosta</i>, <i>Fl. Flum.</i> <i>Peckia</i>, <i>Fl. Flum.</i> <i>Zacyntha</i>, <i>Fl. Flum.</i> <i>Suttonia</i>, <i>A. Rich.</i> <i>Lahisia</i>, <i>Liendl.</i> <i>Badula</i>, <i>Juss.</i> <i>Barthesia</i>, <i>Comm.</i></p>	<p><i>Cephalogyne</i>, <i>A. DC.</i> <i>Discocalyx</i>, <i>A. DC.</i> <i>Isostylis</i>, <i>A. DC.</i> <i>Acephala</i>, <i>A. DC.</i> <i>Hemigync</i>, <i>A. DC.</i> <i>Astrophe</i>, <i>A. DC.</i> <i>Stylogyne</i>, <i>A. DC.</i> <i>Monoporus</i>, <i>A. DC.</i> <i>Wallenia</i>, <i>Swartz.</i> <i>Petesiodes</i>, <i>Jacq.</i> <i>Conomorpha</i>, <i>A. DC.</i> <i>Conostylus</i>, <i>Pohl.</i> <i>Weigeltia</i>, <i>A. DC.</i> <i>Cybianthus</i>, <i>Mart.</i> <i>Icacorea</i>, <i>Aubl.</i> <i>Ardisia</i>, <i>Swartz.</i> <i>Pyrgus</i>, <i>Loir.</i> <i>Niara</i>, <i>Dennst.</i> <i>Bladhia</i>, <i>Thunb.</i></p>	<p><i>Micranthera</i>, <i>A. DC.</i> <i>Tyrbaea</i>, <i>A. DC.</i> <i>Pickeringia</i>, <i>Nutt.</i> ? <i>Purklingia</i>, <i>Presl.</i></p> <p>IV. THEOPHRASTÆ.</p> <p><i>Jacquinia</i>, <i>Linn.</i> <i>Bouellia</i>, <i>Berter.</i> <i>Theophrasta</i>, <i>Juss.</i> <i>Clavija</i>, <i>Ruiz et Pav.</i> <i>Theophrasta</i>, <i>Linn.</i> <i>Eresia</i>, <i>Plum.</i> ? <i>Oncinus</i>, <i>Lour.</i> <i>Monothea</i>, <i>A. DC.</i> <i>Reptonia</i>, <i>A. DC.</i> <i>Edgeworthia</i>, <i>Falc.</i> ? <i>Corynocarpus</i>, <i>Forst.</i></p>
--	--	---	---

NUMBERS. GEN. 30. Sp. 320.

POSITION.—Primulaceæ.—*Sapotaceæ.*
MYRSINACEÆ.—*Ebenaceæ.*

ÆGICEERÆ, *Blume in Ann. Sc. Nat. n. s. 2. 97. Alph. De Cand. Prodr.* 8. 141. Under this name is included the genus *Ægiceras* of Gartner, a group of shore plants inhabiting the tropics, and rooting out of their seed-vessels into the mud, like Mangroves. It differs in nothing from *Ardisiads* beyond this, that the fruit, when ripe, becomes a follicle, the seed has no albumen, and the anther-cells are cut transversely; to which *Alph. De Candolle* adds that the stalk of their central placenta is very much lengthened during the period of ripening, and from being very short is finally converted into a long and false funiculus. It does not, however, appear to me advisable to distinguish the genus from *Ardisiads*, for it may be conjectured that the absence of albumen, which is one of the most important marks of distinction, is owing to the peculiar circumstances under which *Ægiceras* germinates; its embryo is always developed in an atmosphere charged with moisture, and hardly requires that any special preparation should be made for sustaining it in its infant state. The only genus known is

Ægiceras, *Gertn.*
Malaspinaea, *Presl.*

of which 5 species are on record, whereof one is doubtful.

ALLIANCE XLVIII. *ECHIALES*.—THE ECHIAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with dichlamydeous, monopetalous, symmetrical, or unsymmetrical flowers; nucamentaceous fruit, consisting of one-seeded nuts, or of clusters of them separate or separable, and a large embryo with little or no albumen.*

About the close affinity of all the Orders here collected into the same Alliance, no one seems to entertain a doubt, with three exceptions, to be alluded to presently. They might in fact be in part referred to Solanals and in part to Echials, but their nut-like, or deeply-lobed fruit, offers a good mark of distinction. Echials may indeed be regarded as a group so intermediate between Solanals and Bignonials, that part might be referred to the one and part to the other, the regular-flowered Orders joining the former, the irregular-flowered the latter. Perhaps it would not be advisable to distinguish the first half from Solanals if it were not for their want of albumen; but this, although not a universal character among them, yet is so common as to show the important tendency.

The Orders least certainly stationed are Jasminiworts, Salvadorads, and Bruoniads; but no better position seems discoverable for them. The tendency to irregularity and the deeply-lobed ovary seem to determine the place of Jasminiworts, especially when the minute quantity of albumen present in their seeds is taken into account; as to Salvadorads they seem to approach Ehretiads as much as anything; and Bruoniads may be as well compared with the close-headed Borageworts as with Bellworts or Goodeniads, from both which they deviate so entirely in the nature of their fruit.

The true position of the Echial Orders with respect to each other, according to these views, may be represented thus:—

- Oleaceæ.—Jasminaceæ.
- Salvadoraceæ.
- Ehretiaceæ.—Nolanaceæ.—Solanaceæ.
- Boraginaceæ.—Brunoniaceæ.—Goodeniaceæ.
- Lamiaceæ.
- Verbenaceæ.
- Myoporaceæ.
- Selaginaceæ.—————Pedaliaceæ.

NATURAL ORDERS OF ECHIALS.

* *Regular-flowered Orders, passing from Solanals.*

- Flowers regular, \surd , unsymmetrical. Stamens 2. Fruit 2-lobed. Stigma naked } 249. JASMINACEÆ.
- Flowers regular, symmetrical. Stamens 4. Fruit simple. Stigma naked } 250. SALVADORACEÆ.
- Flowers regular, symmetrical. Stamens 5. Stigma naked. Nuts 4, confluent. Inflorescence circinate } 251. EHRETIACEÆ.
- Flowers regular, symmetrical. Stamens 5. Nuts 5 or \surd . Stigma naked. Inflorescence straight } 252. NOLANACEÆ.
- Flowers regular, symmetrical. Stamens 5. Nuts 4 or \surd . Stigma naked. Inflorescence circinate } 253. BORAGINACEÆ.
- Flowers regular, symmetrical. Nut solitary. Stigma induriate. (Stamens hypogynous 1) } 254. BRUNONIACEÆ.

** *Irregular-flowered Orders, passing into Bignonials.*

- Flowers irregular, unsymmetrical. Nuts 4. Ovule erect } 255. LAMIACEÆ.
- Flowers irregular, unsymmetrical. Nuts confluent. Ovules erect. } 256. VERBENACEÆ.
- Flowers irregular, unsymmetrical. Nuts confluent. Ovules pendulous. Anthers 2-celled } 257. MYOPORACEÆ.
- Flowers irregular, unsymmetrical. Nuts confluent. Ovules pendulous. Anthers 1-celled } 258. SELAGINACEÆ.

ORDER CCXLIX. JASMINACEÆ.—JASMINWORTS.

Jasminæ, *Juss. Gen. Plant.* 104. (1789) in part; *R. Brown Prodr.* 520; *Endl. Gen.* cxxix.; *Alph. DC. Prodr.* 8. 300.—*Boliviariæ, Griseb. Gen.* 20.; *Endl. Gen. Suppl.* 2. 55.

DIAGNOSIS.—*Echial Exogens*, with 2 distinct lobes to the fruit, 2 stamens, a naked stigma, and regular unsymmetrical flowers.

Shrubs, often having twining stems. Leaves opposite or alternate, mostly compound, ternate or pinnate, with an odd one; sometimes simple, the petiole almost always



Fig. CCCCXXXV.

having an articulation. Flowers opposite, in corymbs, white or yellow, often sweet-scented. Calyx with 5 to 8 divisions or teeth, persistent. Corolla monopetalous, hypogynous, regular, hypocrateriform, with from 5 to 8 divisions, which lie laterally upon each other, and are twisted or valvate in æstivation. Stamens 2, arising from the corolla, inclosed within its tube. Ovary destitute of an hypogynous disk, 2-celled, 2-lobed, with from 1 to 4 erect anatropal ovules in each cell; style 1; stigma 2-lobed. Fruit either a double berry or capsule. Seeds either with no albumen or very little, their skin tumid or membranous; embryo straight; radicle inferior.

Jasminworts were formerly combined with Oliveworts, from which Brown distinguished them by their ovules being erect, their seed with no, or very little, albumen, by the æstivation of the corolla being imbricate, not valvate, and by the number of its divisions being five or more, and consequently not regularly

a multiple of the stamens, instead of 4, which is a multiple of them. Aeh. Richard endeavours to show that these differences are insufficient. He states, that the ovules of Jasminworts are originally pendulous, as in Oliveworts, but that they subsequently become erect in consequence of the growth of the ovary, whose apex does not elongate, while its sides extend considerably during the growth of the fruit. He says, upon the authority of his father, that albumen does exist in *Jasminum* and *Nyctanthus*; a fact which had been previously mentioned by Brown in defining the Orders, but to which that distinguished Botanist attached no importance, because only a small quantity was found by him to exist, while it is abundant in Oliveworts; and he probably conceived, as I certainly do, that it is the difference of its quantity only which gives the albumen value as a mark of ordinal distinction. But it does not appear to me that Jasminworts have any real connection with Oliveworts; on the contrary, their unsymmetrical flowers and deeply-lobed fruit suggest a very different affinity, and seem to point distinctly to those monopetalous Orders in which the number of stamens is different from that of the divisions of the corolla, such as Labiates and Verbenes, but particularly the latter, which sometimes resemble Jasminworts in their fruit, as happens in *Clerodendron*. Brown stations them between Pedaliads and Oliveworts; De Candolle between Oliveworts and Loganiads. Endlicher indicates an approach to Dogbanes. To me they seem to be the connecting point between the Cortusal and *Echial* Alliances, touching the former at *Ardisiads* and the latter at *Verbenes* or *Labiates*.

Chiefly inhabitants of tropical India, in all parts of which they abound. One *Jasminum* only is mentioned from South America, but there are at least 3 species of *Boliviaria* on that continent; a few are natives of Africa and the adjoining islands; New Holland contains several; and, finally, 2 extend into the southern climates of Europe.

Of some species the oil produced by the flowers is deliciously fragrant. The genuine

Fig. CCCCXXXV.—*Jasminum ligustrifolium*. 1. a corolla cut open; 2. vertical section of the ovary; 3. section of a seed of *Nyctanthus*.—*Gartner*.

essential oil of Jasmine of the shops is obtained from *Jasminum officinale* and *grandiflorum*; but a similar perfume is also procured from *Jasminum Sambac*. The leaves of *Jasminum undulatum* are slightly bitter. The bitter root of *Jasminum angustifolium*, ground small and mixed with powdered *Acorus Calamus* root, is considered in India as a valuable external application in cases of ringworm. In the East Indies the tube of the corolla of *Nyctanthes Arbor tristis* is used as an orange dye. This plant, the Hursinghar of India, scents the gardens with its delicious perfume only during the night, covering the ground in the morning with its short-lived flowers, which being collected like those of the Chumbelee (*Jasminum grandiflorum*) are strung on threads and worn as necklaces, or entwined in the hair of the native women. The root of *J. pubescens* is thought to be alexiteric.

GENERA.

<i>Jasminum</i> , L.	<i>Scabrita</i> , L.	<i>Bolivaria</i> , Cham.	<i>Menodora</i> , H. B. K.
<i>Mogorium</i> , Juss.	<i>Parilium</i> , Gærtn.	<i>Calyptrospermum</i> , Diet.	<i>Balangué</i> , Gærtn.
<i>Nyctanthes</i> , Juss.			

NUMBERS. GEN. 5. Sp. 100.

Oleaceæ.

POSITION.—*Verbenaceæ.*—JASMINACEÆ.—*Salvadoraceæ* ?
Myrsinaceæ.

ORDER CCL. SALVADORACEÆ —SALVADORADS.

Salvadoraceæ, *Ed. pr. No. cxcix.* (1836); *Endl. Gen. p. 349.*

DIAGNOSIS.—*Echial Exogens*, with regular symmetrical flowers, a solitary fruit, and naked stigma.

Small trees or shrubs, with the stem slightly tumid at the articulations. Leaves opposite, leathery, entire, very obscurely veined. Flowers minute, in loose panicles. Calyx inferior, 4-leaved, minute. Corolla membranous, monopetalous, 4-parted. Stamens 4, connecting the petals into a monopetalous corolla; anthers round, 2-celled, bursting longitudinally. Ovary superior, 1-celled, with a single sessile stigma; ovule solitary, erect. Pericarp berried; 1-celled, indehiscent. Seed solitary, erect. Embryo amygdaloid, without albumen; cotyledons fleshy, plano-convex, fixed a little below their middle to a long axis, the radicle of which is inclosed within their bases.



Fig. CCCXXXVI.

pericarp. In habit it agrees with *Galenia*, and this has probably been the cause of its having found its way to *Chenopods*. It seems however possible, upon the whole, that it should be considered an ally of *Ehretiads* or *Verbenes*, having but one carpel and symmetrical tetrandrous flowers.

The species are found in India, Syria, and North Africa.

Salvadora persica, the Mustard-tree of Scripture, as has been demonstrated by Dr. Royle, has a succulent fruit which has a strong aromatic smell, and tastes like Garden-cress. The bark of the root is remarkably acrid; bruised and applied to the skin it soon raises blisters, for which the natives of India often use it. As a stimulant it promises to be a medicine of considerable power. The leaves of *S. indica* are purgative; the fruit is said to be eatable.

GENUS.

Salvadora, L.

NUMBERS. GEN. 1. Sp. 2.

*Plumbaginaceæ?*POSITION.—*Ehretiaceæ?*—SALVADORACEÆ.—*Verbenaceæ?**Oleaceæ?*

ORDER CCLI. EHRETIACEÆ.—EHRETIADS.

Ehretiaceæ, *Martius N. G. et Sp. 2.* 136. (1828); *Martius Conspectus*, No. 126.; *Endl. Gen. p.* 645.—*Heliotropiceæ*, *Id.* 2. 75. et 138. (1828).—*Asperifoliceæ*, b. *Heliotropiceæ*, *Id. Conspectus*, No. 118. (1835).—*Borragineæ*, *Ehreticeæ*, and *Heliotropeæ*, *Alph. DC. Prodr.* 9. 467.

DIAGNOSIS.—*Echial Exogens*, with regular symmetrical flowers, 5 stamens, 4 confluent nuts, a naked stigma, and circinate inflorescence.

Trees or shrubs, or herbaceous plants, with a harsh pubescence. Leaves simple, alternate, without stipules. Flowers gyrate. Calyx inferior, 5-parted, imbricated in æstivation. Corolla monopetalous, tubular, with as many segments of its limb as the calyx, with an imbricated æstivation. Stamens alternate with the segments of the corolla, and equal to them in number, arising from the bottom of the tube; anthers innate. Ovary seated in an annular disk, 2- or more-celled; style terminal; stigma simple, 2-lobed; ovules suspended. Fruit drupaceous, with as many seeds as there are true cells of the ovary. Seed suspended, solitary; testa simple, thin; embryo in the midst of thin fleshy albumen, or without any; radicle superior; cotyledons plano-convex.

A branch of the old *Borragineæ*, distinguished by a terminal style proceeding from the apex of a perfectly concrete ovary of 4 cells, a baccate fruit, and seeds furnished with thin fleshy albumen. The Order is re-combined with *Borageworts* by *Alph. De Candolle*, but it seems sufficiently characterised by its concrete carpels, and the presence of a small quantity of albumen. The separate, not separable, nuts of *Borageworts* are so peculiar, notwithstanding that *Cerinth* has them combined in pairs, that a real objection seems to exist to the disregard of so good a mark, by the combination with them of these concrete-fruited *Ehretiads*.

Most of them are tropical trees or shrubs, natives of either hemisphere. A few occur in the south of Europe and the southern States of America; but none appear further to the north than the parallel of 45°.

The root of *Ehretia buxifolia* is reckoned in India one of those medicines which assist in altering and purifying the habit in cases of cachexia and venereal affections of long standing. *Tiaridium indicum* is represented to be an astringent, and is used to cleanse ulcers, or to allay inflammation, *Martius* says with undoubted advantage; *Tournefortia umbellata* has a similar application in Mexico, where it is even regarded as a febrifuge; and it is to be observed that the leaves of *Heliotropium europeum* were formerly used in the same way as *Tiaridium*. Some *Ehretias* bear eatable drupes. The delicious odour of the Peruvian *Heliotrope* is known to everybody.



Fig. CCCCXXXVII.

GENERA.

I. TOURNEFORTIÆ.—
Seeds with albumen.

- Ehretia*, Linn.
- Beurrieria*, Jacq.
- Bourreria*, P. Br.
- Carmona*, Cav.
- Eurostylis*, Don.
- Mennis*, Loefl.
- Cortesia*, Cav.
- Amerina*, DC.
- Rhabdia*, Mart.
- Tournefortia*, R. Br.
- Messerschmidia*, L.
- Argusia*, Aimm.
- Pittonia*, Knuth.
- Rotala*, Lour.

- Coldenia*, Linn.
- Tigulia*, Pers.
- Halgania*, Gaudich.

- Heliotropium*, Linn.
- Piptoclaina*, Don.
- Tiaridium*, Lchm.
- Heliophytum*, DG.
- Schobera*, Scop.
- Pentacarya*, DC.
- Emploca*, Nutt.

II. HELIOTROPEÆ.—
Seeds without albumen.

- Schleidenia*, Endl.
- Prelea*, Mart.

NUMBERS. GEN. 14. Sp. 297.

Cordiaceæ.

POSITION.—*Borragineæ*.—*Ehretiaceæ*.—*Verbenaceæ*.

FIG. CCCCXXXVII.—*Rhabdia lychoides*.—*Martius*. 1. Its flower; 2. the corolla opened; 3. a cross section of the ovary; 4. a perpendicular section of a seed.

ORDER CCLII. NOLANACEÆ.—NOLANADS.

Nolanaceæ, *Lindl. Nivus Pl.* 18. (1833); *Martius Conspectus*, No 119; *Endl. Gen.* p. 655; *Lindl. in Bot. Reg.* 1844. t. 46.

DIAGNOSIS.—*Echial Exogens*, with regular symmetrical flowers, 5 stamens, 5 or more nuts, distinct or partly confluent, a naked stigma, and straight inflorescence.

Prostrate or erect, herbaceous or suffruticose plants. Leaves alternate, without stipules. Flowers usually showy. Calyx 5-parted, valvate in æstivation. Corolla monopetalous, with a plaited æstivation, usually thickened in the tube. Stamens 5, equal, inserted into the tube, alternate with the segments of the corolla; anthers oblong, 2-celled, bursting longitudinally. Pistil composed of several carpels, either distinct with a single style, or partially combined into several sets with a single style seated on a succulent disk. Stigma somewhat capitate. Fruit inclosed in the permanent calyx, constructed like the pistil; pericarp woody, often a little succulent; seeds ascending, solitary; embryo curved, with either straight or doubled cotyledons, in the midst of a small quantity of albumen; radicle next the hilum.

The genus *Nolana*, sometimes referred to Borageworts, sometimes to Bindweeds, has been erected into a distinct Order, on account, on the one hand, of its regular plaited corolla and valvate calyx, and, on the other, of its separate carpels though united styles. Among the regular-flowered *Echials* *Nolanads* can only be compared to Borageworts, from which they are certainly distinguished by their pentamerous fruit and straight inflorescence. There is some doubt whether

the genera *Falkia* or *Dichondra* belong to Bindweeds or to *Nolanads*. With the latter those genera agree in their separate ovaries, with the former in the structure of their embryo; with both they disagree in the entire separation of their styles. If we attend to the embryo, they will stand among Bindweeds; if to the carpels, among *Nolanads*; but as their separate styles are nearly paralleled by those of *Evolvulus* and others, it seems upon the whole better to refer them to Bindweeds. *Schlechtendahl* suggests (*Linnaea*, 7. 72) that *Nolana* may be referred to Nightshades, on account of its affinity with *Grabowskia boerhaaveifolia*, in which the fruit contains two bilocular menospermous stones; and it must be confessed that some of the shrubby *Nolanads* have much the habit of *Lycium*.

This little Order is remarkable for the various modes in which its carpels are disposed without ever being consolidated. In one genus there are but 5, and they are distinct; in another there are 20 combined in fours; in a third the combination is irregular though the number remains 20; and in others they are all wholly distinct. The late Professor *Don* thought that *Triguera* must be referred here.

The species are all South American, and chiefly Chilian.

Their uses are unknown.

GENERA.

<i>Nolana</i> , <i>Linn.</i>	<i>Teganium</i> , <i>Schmidt.</i>	<i>Dolia</i> , <i>Lindl.</i>	<i>Sorema</i> , <i>Lindl.</i>
<i>Walkeria</i> , <i>Ehret.</i>	<i>Neudorffia</i> , <i>Adans.</i>	<i>Alibrexia</i> , <i>Miers.</i>	<i>Aplocarya</i> , <i>Lindl.</i>
<i>Zwingera</i> , <i>Hofer.</i>	<i>Alona</i> , <i>Lindl.</i>		

NUMBERS. GEN. 6. Sp. 35.

Convolvulacæ.

POSITION.—Boraginacæ.—NOLANACEÆ.—

Solanacæ.



Fig. CCCXXXVIII.

Fig. CCCXXXVIII.—1. *Alona cælestis*; 2. its pistil; 3. a transverse section of it; 4. section of seed of *Nolana prostrata*; 5. part of the fruit of *Aplocarya divaricata*.

ORDER CCLIII. BORAGINACEÆ.—BORAGEWORTS.

Boraginæ, *Juss. Gen.* 143. (1789); *R. Brown Prodr.* 492; *Bartl. Ord. Nat.* 196. (1830).—*Asperifolia*, *Linn. Martius Conspectus*, No. 118. (1835); *Endl. Gen.* cxliii.

DIAGNOSIS.—*Echial Exogens*, with regular symmetrical flowers, 5 stamens, 4 nuts or two pairs, a naked stigma, and circinate inflorescence.

Herbaceous plants or shrubs. Stems round. Leaves alternate, often covered with papillæ consisting of hairs proceeding from an indurated enlarged base. Flowers in



Fig. CCCCXXXIX.

1-sided gyrate spikes or racemes, or panicles, sometimes solitary and axillary. Calyx persistent, with 4 or 5 divisions. Corolla hypogynous, monopetalous, generally regular, 5-cleft, sometimes 4-cleft, with an imbricated aestivation. Stamens inserted upon the corolla, equal to the number of its lobes and alternate with them. Ovary 4-parted, 4-seeded, or 2-parted, 4-celled; ovules attached to the lowest point of the cavity, amphitropal; style simple, arising from the base of the lobes of the ovary; stigma simple or bifid. Nuts 2 or 4, distinct. Seed separable from the pericarp, destitute of albumen. Embryo with a superior radicle; cotyledons parallel with the axis, plano-convex, sometimes 4! in *Amsinckia*.

The plants of this Order are nearly allied to Labiales, from which they are essentially distinguished by the regularity of the corolla, the presence of 5 fertile stamens, the absence of resinous dots in the foliage, a round (not square) figure of the stem, a gyrate

Fig. CCCCXXXIX.—1. *Symphytum officinale*; 2. a diagram of its flower; 3. its pistil; 4. the calyx opened, with two of the nuts remaining; 5. a vertical section of a nut.

inflorescence, and scabrous alternate leaves. On account of this last character, they are sometimes called *Asperifoliæ*. From Nolanads they are distinguished by their inflorescence being gyrate, their radicle superior, and their embryo exalbuminous and straight. From all other Orders of this Alliance they are known by the 4 deep lobes of the ovary, called by Linnæan Botanists naked seeds.

Among the more remarkable points of structure met with in this Order is the very general presence of scales or tubercles, standing on the corolla between the stamens. At first sight such scales might be taken for mere folds of the corolla, but their peculiar appearance in *Symphytum* and *Borago* leads to the suspicion that they are really a series of abortive stamens.

Natives principally of the temperate countries of the northern hemisphere; extremely abundant in all the southern parts of Europe, the Levant, and middle Asia; less frequent as we approach the arctic circle, and almost disappearing within the tropics. A few species only are found in such latitudes. In North America they are less abundant than in Europe. Pursh reckons but 22 species in the whole of his Flora; while the little island of Sicily alone contains 35, according to Presl.

Soft, mucilaginous, emollient properties, are the usual characteristics of this Order; some are also said to contain nitre, a proof of which is shown by their frequent decrepitation when thrown on the fire. *Borago officinalis* gives a coolness to beverage in which its leaves are steeped. The whole plant has an odour approaching to Cucumber and Burnet; but its supposed exhilarating qualities, which caused *Borago* to be reckoned one of the four cordial flowers, along with Alkanet, Roses, and Violets, may justly be doubted.—*Smith*. It was once esteemed as a pectoral medicine, and a decoction of its leaves mixed with honey makes a good ptisau. Its young leaves make a pickle in some esteem. *Echium plantagineum*, naturalised in Brazil, is used in that country for the same purpose. The roots of *Anchusa tinctoria*, or Alkanet, of *Lithospermum tinctorium*, *Onosma echinoides*, *Echium rubrum*, and *Anchusa virginica*, contain a reddish-brown substance used by dyers. This matter is thought to be a peculiar chemical principle, approaching the resins. The species of *Trichodesma* are considered diuretic, and are one of the cures for snake bites in India.—*Royle*. Some say that *Cynoglossum officinale* is narcotic; its leaves are bitterish and produce a fat strong-scented oil. Comfrey, *Symphytum officinale*, was formerly regarded as a vulnerary; if gathered while tender its leaves are a substitute for Spinage, and the young shoots, blached by being forced to grow through heaps of earth, are eaten like Asparagus; it is not, however, valued by persons of refined taste. Its roots abound in mucilage, and are sweetish with some astringency.

GENERA.

<p>I. ANCHUSINÆ.</p> <p>Cerinthæ, Linn. <i>Ceranthæ</i>, Reichenb. Onosma, Linn. Onosmodium, L. C. Rich. <i>Osmodium</i>, Raf. <i>Purshia</i>, Spreng. Moltkia, Lehm. <i>Echium</i>, Tournef. Macrotomia, DC. <i>Echloclilon</i>, Desf. <i>Chillectum</i>, Raf. <i>Bessera</i>, Schult. Pulmonaria, Tournef. <i>Cerinthoides</i>, Boerh. <i>Hippoglossum</i>, Hartm. <i>Mertensia</i>, Roth. <i>Casselia</i>, Dumort. ? <i>Platynema</i>, Schrad. <i>Lithospermum</i>, Tournef. <i>Rhytispermum</i>, Link. <i>Egonychton</i>, Gray. <i>Balschia</i>, Gmel.</p>	<p><i>Cyphorima</i>, Raf. <i>Margarospermum</i>, Rehb. ? <i>Arnebia</i>, Forsk. <i>Amsinckia</i>, Lehm. <i>Benthamia</i>, Lindl. <i>Oreocharis</i>, Decaisne. <i>Gymnorea</i>, Decaisne. <i>Macromeria</i>, Don. <i>Philonomia</i>, DC. <i>Craniospermum</i>, Lehm. <i>Colsmannia</i>, Lehm. <i>Nonea</i>, Medik. <i>Lycopsis</i>, Lehm. <i>Meneghinia</i>, Endl. <i>Dioclea</i>, Spreng. <i>Strobila</i>, Don. <i>Stenosolenium</i>, Turcz. <i>Lycopsis</i>, Linn. <i>Caryolopha</i>, Fisch. et Trtt. <i>Pentaglottis</i>, Tausch. <i>Anchusa</i>, Linn. <i>Buglossum</i>, Tournef. <i>Baphorhiza</i>, Link. <i>Alkana</i>, Tausch.</p>	<p><i>Oscampia</i>, Mönch. ? <i>Campylocaryum</i>, DC. <i>Moritzia</i>, DC. <i>Antiphytum</i>, DC. <i>Plagiobothrys</i>, Fisch. et M. <i>Britrichlum</i>, Schrad. <i>Bothriospermum</i>, Bung. <i>Myosotis</i>, Linn. <i>Echitoides</i>, Mönch. <i>Endogonia</i>, Turcz. <i>Strophlostoma</i>, Turcz. <i>Exarrhena</i>, R. Br. <i>Lobostemon</i>, Lehm. <i>Echiopsis</i>, Reichenb. <i>Stomatichium</i>, Lehm. <i>Symphytum</i>, Linn. <i>Trachystemon</i>, Don. <i>Psilostemon</i>, DC. <i>Borago</i>, Tournef.</p>	<p><i>Streblanthera</i>, Steud. <i>Pollichia</i>, Medik. <i>Friedrichsthalia</i>, Fenzl. <i>Omphalodes</i>, Tournef. <i>Picotia</i>, Rom. et Sch. <i>Omphalium</i>, Roth. <i>Rindera</i>, Pall. <i>Mattia</i>, Schult. <i>Solenanthus</i>, Ledeb. <i>Cynoglossum</i>, Linn. <i>Pectocarya</i>, DC. ? <i>Cryptantha</i>, Lehm. <i>Ctenospermum</i>, Lehm. <i>Suchtelenia</i>, Karcl. <i>Caccinia</i>, Sav. <i>Anisanthera</i>, Raf. <i>Asperugo</i>, Tournef. <i>Echinospermum</i>, Swartz. <i>Lappula</i>, Mönch. <i>Rochelia</i>, Rom. et Sch. <i>Kryuitzkia</i>, Fisch. ? <i>Rochelia</i>, Reichenb. <i>Messerschmidia</i>, Ass.</p>
---	---	--	--

NUMBERS. GEN. 53. Sp. 600 ?

Hydrophyllaceæ.

POSITION.—Lamiaceæ.—BORAGINACEÆ.—Nolanaceæ.

Cordiaceæ.

ORDER CCLIV. BRUNONIACEÆ.—BRUNONIADS.

Goodenoviæ, § 2. R. Brown Prodr. 589. (1810).—Brunoniaceæ, Ed. pr. cxcvii. (1836); Endl. Gen. cxvii.; Meisner, p. 238.

DIAGNOSIS.—*Echial Exogens*, with regular symmetrical flowers, a solitary nut, and indusiate stigma.

Herbaceous plants, without stems, and with simple glandless hairs. Leaves radical, entire, with no stipules. Flowers on scapes, collected in heads, surrounded by enlarged bracts, blue. Calyx free, in 5 divisions, with bracts at the base. Corolla monopetalous, almost regular, 5-parted, inferior, withering. Stamens definite, hypogynous, alternate with the segments of the corolla; anthers turned inwards, 2-celled, collateral, slightly cohering. Ovary 1-celled, with a single erect anatropal ovule; style single; stigma inclosed in a 2-valved cup. Fruit a membranous utricle inclosed within the hardened tube of the calyx. Seed solitary, erect, without albumen; embryo with plano-convex fleshy cotyledons, and a minute inferior radicle.

2 The solitary genus forming this Order was regarded by Brown as a section of Goodeniads, from which it differs essentially in the superior 1-celled ovary and capitate flowers, thus approaching certain Teazelworts, but differing in the want of an involucrel, in the erect ovule, superior ovary, and peculiar stigma. With reference to this, Brown says: "Brunonia agrees with Goodenoviæ in the remarkable indusium of the stigma, in the structure and connection of the antheræ, in the seed being erect, and essentially in the æstivation of the corolla. It differs from them in having both calyx and

corolla distinct from the ovarium, in the disposition of vessels in the corolla, in the filaments being jointed at the top, in the seed being without albumen, and in its remarkable inflorescence, compatible, indeed, with the nature of the irregularity in the corolla of Goodenovia, but which can hardly co-exist with that characterising Lobeliaceæ. With Compositæ it agrees essentially in inflorescence, in the æstivation of the corolla, in the remarkable joint or change of texture in the apex of its filaments, and in the structure of the ovarium and seed. It differs from them in having ovarium liberum or superum, in the want of a glandular disk, in the immediately hypogynous insertion of the filaments, in the indusium of the stigma, and in the vascular structure of the corolla, whose tube has five nerves only, and these continued through the axes of the laciniæ, either terminating simply (as is at least

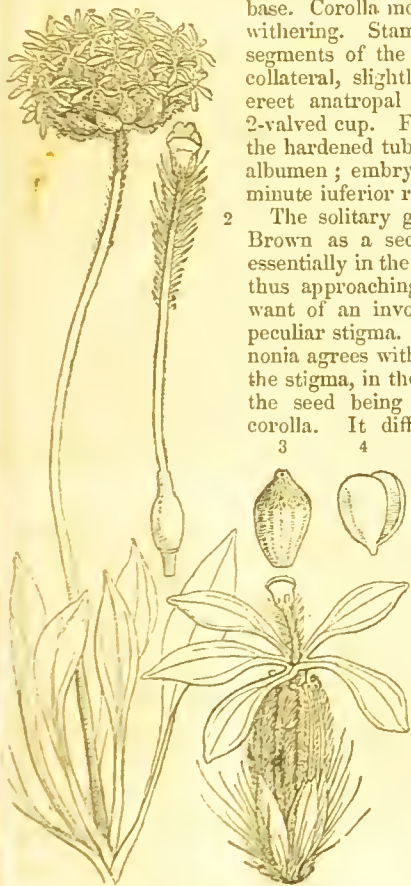


Fig. CCCCXL. 1

requently the case in Brunonia sericea), or (as in B. australis) dividing at top into two recurrent branches, forming lateral nerves, at first sight resembling those of Compositæ, which hardly reach to the base of the laciniæ. It is a curious circumstance that Brunonia should so completely differ from Compositæ in the disposition of vessels of the corolla, while both Orders agree in the no less remarkable structure of the jointed filament; a character which had been observed in a very few Composite only, before the publication of M. Cassini's second Dissertation, where it is proved to be nearly universal in the Order. In the opposite parietes of the ovarium of Brunonia two nerves

Fig. CCCCXL.—Brunonia sericea.—P. Bauer. 1. a complete flower; 2. the pistil; 3. a ripe fruit; 4. embryo.

or vascular cords are observable, which are continued into the style, where they become approximated and parallel. This structure, so nearly resembling that of Compositæ, seems to strengthen the analogical argument in favour of the hypothesis of the compound nature of the pistillum in that Order, and of its type in phænogamous plants generally; Brunonia having an obvious and near affinity to Goodenoviæ, in the greater part of whose genera the ovarium has actually two cells with one or an indefinite number of ovula in each; while in a few genera of the same Order, as Dampiera, Diaspasis, and certain species of Scævola, it is equally reduced to one cell and a single ovulum." The habit of the Order is much that of Globularia. But its most immediate affinity seems to be collaterally with Nolanads, which it appears to combine with such genera as Phyteuma among Bellworts. Its hypogynous stamens are, however, so peculiar that we may well doubt whether the true affinity of the plant can yet be demonstrated.

Natives of New Holland.

Their properties are unknown.

GENUS.

Brunonia, Sm.

NUMBERS. GEN. 1. Sp. 2.

Goodeniaceæ.

POSITION.—*Nolanaceæ.*—BRUNONIACEÆ.—

Campanulaceæ.

ORDER CCLV. LAMIACEÆ.—LABIATES.

Labiatae, Juss. Gen. 110. (1789); R. Brown Prodr. 499; Mirbel in Ann. Mus. 15. 213.; Bentham in Bot. Rey. (1829); Id. Gen. et Sp. Labiatarum, (1832—1836); Endl. Gen. cxxxvi.; Meisner Gen. p. 282; Walpers' Repertorium, 3. 483.—Oxereæ, Fenzl.

DIAGNOSIS.—*Echial Exogens, irregular unsymmetrical flowers, and 4 distinct nuts.*

Herbaceous plants or under-shrubs. Stem 4-cornered, with opposite ramifications. Leaves opposite, divided or undivided, without stipules, replete with receptacles of

aromatic oil. Flowers in opposite, nearly sessile, axillary cymes, resembling whorls; sometimes solitary or as if capitate. Calyx tubular, inferior, persistent, the odd tooth being next the axis; regular 5- or 10-toothed, or irregular bilabiate or 3- to 10-toothed. Corolla monopetalous, hypogynous, bilabiate; the upper lip undivided or bifid, overlapping the lower, which is larger and 3-lobed. Stamens 4, didynamous, inserted upon the corolla, alternately with the lobes of the lower lip, the 2 upper sometimes wanting; anthers 2-celled; sometimes apparently unilocular in consequence of the confluence of the cells at the apex; sometimes 1 cell altogether obsolete, or the 2 cells separated by a bifurcation of the connective. Ovary deeply 4-lobed, seated in a fleshy hypogynous disk; the lobes each containing 1 erect ovule; style 1, proceeding from the base of the lobes of the ovary; stigma bifid, usually acute. Fruit 1 to 4 small

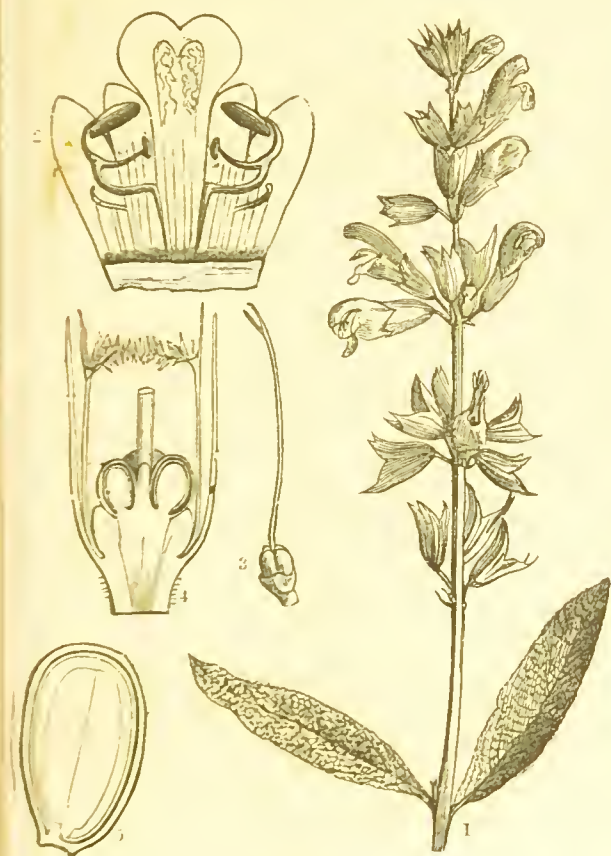


Fig. CCCCXLI.

nuts, inclosed within the persistent calyx. Seeds erect, with little or no albumen; embryo erect; cotyledons flat.

The 4-lobed ovary, with a solitary style arising from the base of the lobes, has no parallel among monopetalous didynamous Orders. The closest relation of Labiates is with Verbenes, which chiefly differ in their undivided ovary. From Borageworts they differ both in having an irregular corolla, and not more than 2 or 4 stamens, while the lobes of the corolla are 5, square stems and opposite leaves; circumstances in which Labiates resemble some Figworts. From all Borageworts they are known, in the absence of fructification, by their square stem and the numerous reservoirs of oil in their leaves. According to Grisebich, these reservoirs are not analogous to those of

Fig. CCCCXLI.—1. *Salvia officinalis*; 2 its corolla laid open; 3. its pistil; 4. the pistil and lower part of the flower cut open; 5. perpendicular section of a nut.

Oranges and other plants, but are little utricules having an open orifice ; and hence he calls them pores. For some good remarks upon the anatomy of the stem of Labiates, see Mirbel in the *Annales du Muséum*, vol. 15. p. 223. The æstivation of the corolla of this Order, first well pointed out by Brown, is an important consideration in determining whether a flower is resupinate or not. Prostanthera is remarkable for the remains of albumen existing in the ripe seeds of several of its species. Oxera of La Billardière has been lately re-examined by M. Fenzl, who finds that its structure was, as I suspected, entirely misunderstood, and that the lobes of its ovary contain each a conical, solitary, fleshy placenta, from the apex of which one ovule hangs down. He refers the plant to Verbenes ; but its lobed ovary is an objection, and the pendulous position of the ovules, being due to the unusual extension of their placenta, in consequence of which they cannot be erect, need not, under such circumstances, be taken into account.

Natives of temperate regions, in greater abundance than elsewhere, their maximum probably existing between the parallels of 40° and 50° N. latitude. They are found in abundance in hot, dry, exposed situations, in meadows, hedgerows, and groves ; not commonly in marshes. In France they form 1-24th of the Flora ; in Germany, 1-26th ; in Lapland, 1-40th ; the proportion is the same in the United States of North America, and within the tropics of the New World (*Humboldt*) ; in Sicily they are 1-21 of flowering plants (*Presl.*) ; in the Balearic islands, 1-19th. About 200 species are mentioned in Wallich's *Catalogue of the Indian Flora*, a large proportion of which is from the northern provinces. They were not found in Melville Island.

Labiates are in all cases destitute of any deleterious secretions ; for the most part they are fragrant and aromatic, have been used as tonics, and are valuable as kitchen herbs, for sauces, and flavouring cooked dishes ; some are employed by perfumers, many are admired for their beauty, especially species of Sage ; some furnish a substance resembling Camphor in its nature ; a small number are simply astringent, and a very few are eatable, though perhaps not worth eating, such as the roots of *Stachys palustris*, which is the Panax Coloni of old writers, and some species related to *Ocimum*, whose tubers are reported to be a common esculent in Madagascar. Without pretending to make a list of all the uses to which these common plants have been applied, a small number of cases will be found a sufficient indication of them.

Among the mere aromatics the most celebrated is the Patchouli, or Puchapat, some unknown species of *Plectranthus* or *Coleus*, a plant of which large quantities are exported from Penang, for stuffing mattresses and pillows. Its strong-smelling leaves are supposed to keep off contagion.—*Pharm. Journ.* iv. 81. It is used in this country as an article of perfumery. Next to this comes Lavender, the *Lavandula vera* of De Candolle. The flowers of this plant contain a fragrant volatile oil in great abundance, together with a bitter principle. They are carminative, stimulant, and tonic, but are more employed in perfumery than in medicine ; the leaves and flowers have been used as sternutatories. Oil of Lavender is obtained by distillation, and is sometimes given in hysteria and nervous headache ; it enters into the composition of Eau de Cologne and the Vinaigre aux quatre voleurs. French Lavender, *Lavandula Spica* of De Candolle, is less fragrant, and not employed medicinally. It yields what is called Oil of Spike, which is used by painters on porcelain, and in the preparation of varnishes for artists. The oil of *Mentha citrata* is extremely fragrant, with much the odour of oil of Bergamot.

These fragrant and aromatic qualities render many valuable as stimulating medicines. Mint, for example (*Mentha viridis*), is not merely used as a sauce, but as an aromatic and carminative, in the form of oil of Spearmint and Spearmint water. Pennyroyal, the *Mentha Pulegium*, and the *Menthas rotundifolia*, *aquatica*, and *arvensis* have similar qualities, but the most useful among them is Peppermint, an aromatic stimulant, and the most pleasant of all the Mints. It is employed in medicine for several purposes, principally to expel flatus, to cover the unpleasant taste of other medicines, and to relieve nausea and griping pains of the alimentary canal. The volatile oil is sometimes taken as an antispasmodic ; it is what gives their flavour to Peppermint lozenges.—*Peppera*. *Hedeoma pulegioides*, the Pennyroyal of the North Americans, has a great popular reputation as an emmenagogue. *Cunila mariana* is beneficially employed in infusion in slight fevers and colds, with a view to excite perspiration. *Leonotis nepetifolia*, *Leucas martinicensis*, *Marsypianthus hyptoides*, are all employed in Brazil for medicating baths prescribed for rheumatic attacks. Some are diuretics and diaphoretics, such as *Æollanthus suavis*, used in Brazil in spasmodic strangury, *Glechon spathulatus*, *Ocimum incanescens*, *Peltodon radicans*, and many kinds of *Hyptis*. As carminatives and antispasmodics we have all the culinary species, such as Mint (*Mentha viridis*), Basil (various species of *Ocimum*), Marjoram (of *Origanum*), Savories (of *Satureia*), *Lavandula Stœchas*, used in Arabia as an antispasmodic, Sago (*Salvia officinalis* and *grandiflora*), *Meriandra benghalensis*, the Sage of Bengal, Thyme, Hyssop, &c. &c.

It is well known that Horchound (*Marrubium vulgare*) is a popular remedy for

coughs, in the form of infusion or of bitter-sweet lozenges ; it certainly proves useful in the more severe forms of cold, restoring the tone of the stomach, and subduing irritation when other remedies fail.—*Dr. Kittoe, in the Chemist.* *Cunila microcephala* is used in the same way in Brazil. As pectoral medicines we find *Nepeta Glechoma*, or Ground Ivy, which is largely employed by country people in this country, *Galeopsis ochroleuca*, *Leonurus Cardiaea*, *Balm* (*Melissa officinalis*), and *Calamin* (*Melissa Calamintha*), &c., &c. Some are used as febrifuges, among which may be mentioned *Ocimum febrifugum* of Sierra Leone, *Prunella vulgaris* or Self-heal, *Lycopus europæus*, which also yields a good black dye, and is said to help the gypsies to stain their faces, *Monarda fistulosa*, a fragrant North American herb, and *Origanum Dietamnus*, or Dittany of Crete. One of the styptic plants, called *Matico*, is said by *Martins* to be a species of *Phlomis*.

A Stearoptine resembling Camphor is to be obtained from various species. Sage, Lavender, Savory, and Hyssop, and *Monarda punctata*, have been found to yield it, but the plant which is reputed to furnish the most is *Rosemary* (*Rosmarinus officinalis*). This plant has a great reputation otherwise ; a strong decoction of the foliage is employed to allay the heat of the skin in erysipelas ; it has been employed as a cephalic medicine, relieving headache and exciting the mind to vigorous action. It is also remarkable for its undoubted power of encouraging the growth of hair and curing baldness ; it is in fact what causes the green colour of the best pomatums used for that purpose ; an infusion of it prevents the hair from uncurling in damp weather ; it is, moreover, one of the plants employed in the manufacture of Hungary water, the French Vinaigre aux quatre voleurs, and Eau de Cologne. The admired flavour of Narbonne honey is ascribed to the bees feeding on the flowers of this plant.

Betony leaves (*Stachys Betonica*), when powdered, produce sneezing, but the action is believed to be merely mechanical, and owing to the minute stiff hairs with which they are covered. The statement that the root of the plant is purgative and emetic requires confirmation.

GENERA.

<p>I. OCIMEÆ.</p> <p>1. Moschosmidæ.</p> <p><i>Ocimum</i>, Linn. <i>Becium</i>, Lindl. <i>Geniosporum</i>, Wall. <i>Platostoma</i>, Palis. <i>Mesona</i>, Blum. <i>Acrocephalus</i>, Benth. <i>Moschosma</i>, Reich. <i>Lumnitzera</i>, Jacq. fil. <i>Orthosiphon</i>, Benth. <i>Rabdosia</i>, Hassk.</p> <p>2. Plectranthidæ.</p> <p><i>Plectranthus</i>, Herit. <i>Germanea</i>, Lam. <i>Zenia</i>, Lour. <i>Isodon</i>, Schrad. <i>Coleus</i>, Lour. <i>Solenostemon</i>, Schum. <i>Mitca</i>, Chap. <i>Anisochilus</i>, Wall. <i>Eollanthus</i>, Mart. <i>Wreza</i>, Wendl. <i>Orobanchus</i>, E. Mey. <i>Hypothromia</i>, Schrank. <i>Pycnostachya</i>, Hook. <i>Echinostachya</i>, E. Mey. <i>Hoslundia</i>, Vahl. <i>Syncolestemon</i>, E. Mey.</p> <p>3. Hyptidæ.</p> <p><i>Peltodon</i>, Pohl. <i>Marysianthus</i>, Mart. <i>Hyptis</i>, Jacq. <i>Gymnia</i>, Benth. <i>Spicaria</i>, Benth. <i>Apodates</i>, Benth. <i>Plagiotis</i>, Benth. <i>Cyrtis</i>, Benth. <i>Cyanocephalus</i>, Pohl. <i>Eriostachya</i>, Benth. <i>Ooccephalus</i>, Benth. <i>Trichostachya</i>, Benth.</p>	<p><i>Xanthiophœa</i>, Mart. <i>Rhaphidodon</i>, Schaur. <i>Polydesmia</i>, Benth. <i>Mesosphœria</i>, Benth. <i>Schaueria</i>, Hassk. <i>Pectinaria</i>, Benth. <i>Brotera</i>, Spreng. <i>Mintidium</i>, Benth. <i>Buddleioides</i>, Benth. <i>Umbellaria</i>, Benth. <i>Siagonarrhen</i>, Mart. <i>Hyptia</i>, Mart. <i>Eriope</i>, Humb. et Bonpl.</p> <p>4. Nepetidæ.</p> <p><i>Lavandula</i>, Linn. <i>Stachys</i>, Tournef. <i>Fabricia</i>, Adans. <i>Phorostachys</i>, Ging. <i>Chalostachys</i>, Benth.</p> <p>II. MENTHÆ.</p> <p>1. Pogostemidæ.</p> <p><i>Pogostemon</i>, Desf. <i>Dyaophylla</i>, Blum. <i>Choleckia</i>, Opitz. et Cord.</p> <p>2. Elsholtziidæ.</p> <p><i>Elsholtzia</i>, Willd. <i>Aphanochilus</i>, Benth. <i>Cyrtostegia</i>, Benth. <i>Tetradenia</i>, Benth.</p> <p>3. Menthidæ.</p> <p><i>Colebrookia</i>, Smith. <i>Perilla</i>, Linn. <i>Isanthus</i>, L. C. Rich. <i>Preslia</i>, Opitz. <i>Mentha</i>, Linn. <i>Lycopus</i>, Linn.</p> <p>4. Merlandridæ.</p> <p><i>Meriandra</i>, Benth.</p>	<p>III. MONARDEÆ.</p> <p>1. Salvidæ.</p> <p><i>Salvia</i>, Linn. <i>Horminum</i>, Tournef. <i>Sclarea</i>, Tournef. <i>Zethiopsis</i>, Tournef. <i>Schraderia</i>, Mönch. <i>Jungia</i>, Mönch. <i>Leonia</i>, Llav. et Lex. <i>Audibertia</i>, Benth.</p> <p>2. Rosmarinidæ.</p> <p><i>Rosmarinus</i>, Linn. <i>Monarda</i>, Linn. <i>Cheilyctis</i>, Raf. <i>Coryanthus</i>, Nutt. <i>Blephilia</i>, Raf. <i>Zizyphora</i>, Linn. <i>Faldermannia</i>, Bung.</p> <p>3. Horminidæ.</p> <p><i>Horminum</i>, Linn.</p> <p>IV. SATURÆÆ.</p> <p>1. Origanidæ.</p> <p><i>Zataria</i>, Boiss. <i>Bystropogon</i>, Herit. <i>Minthostachys</i>, Benth. <i>Pycnanthemum</i>, Benth. <i>Tullia</i>, Leaven. <i>Brachystemum</i>, Rich. <i>Kortia</i>, Mönch. <i>Monardella</i>, Benth. <i>Amaracus</i>, Mönch. <i>Origanum</i>, Linn. <i>Majorana</i>, Mönch. <i>Thymus</i>, Linn. <i>Satureia</i>, Linn.</p> <p>2. Hyssopidæ.</p> <p><i>Hyssopus</i>, Linn.</p> <p>3. Cunillidæ.</p> <p><i>Collinaonia</i>, Linn. <i>Cunila</i>, Linn.</p>	<p>V. MELISSEÆ.</p> <p><i>Hedeoma</i>, Pers. <i>Mosla</i>, Hamilt. <i>Micromeria</i>, Benth. <i>Piperella</i>, Presl. <i>Xenopoma</i>, Willd. <i>Zygis</i>, Desv. <i>Melissa</i>, Benth. <i>Calamintha</i>, Mönch. <i>Acinos</i>, Mönch. <i>Clinopodium</i>, Linn. <i>Gardoquia</i>, Ruiz et Pav. <i>Rizoa</i>, Cav. <i>Glechon</i>, Spreng. <i>Keithia</i>, Benth. <i>Thymra</i>, Linn. <i>Dicerandra</i>, Benth. <i>Ceranthera</i>, Ell. <i>Pogogyne</i>, Benth.</p> <p>VI. SCUTELLARÆÆ.</p> <p><i>Prunella</i>, Linn. <i>Brunella</i>, Mönch. <i>Cleonia</i>, Linn. <i>Scutellaria</i>, Linn. <i>Cassida</i>, Tournef. <i>Perilomia</i>, H. B. K.</p> <p>VII. PROSTANTHERÆÆ.</p> <p><i>Chilodia</i>, R. Br. <i>Cryphia</i>, R. Br. <i>Prostanthera</i>, Labill. <i>Hemiantra</i>, R. Br. <i>Colobandra</i>, Bartl. <i>Hemigenia</i>, R. Br. <i>Atelandra</i>, Lindl. <i>Westralgia</i>, Smith. <i>Aulsandra</i>, Bartl. <i>Microcorys</i>, R. Br.</p> <p>VIII. NEPETÆÆ.</p> <p><i>Perovska</i>, Karel. <i>Lophanthus</i>, Benth. <i>Fleckia</i>, Raf.</p>
---	--	---	--

Nepeta, <i>Benth.</i>	Lagochilus <i>Bung.</i>	<i>Hcsiodia</i> , Mönch.	<i>Achyrospermum</i> , <i>Blum.</i>
<i>Saussurea</i> , Mönch.	<i>Yernolofia</i> , <i>Belang.</i>	<i>Burgsdorffia</i> , Mönch.	<i>Siphotoxys</i> , <i>Boj.</i>
<i>Cataria</i> , Mönch.	Leonurus, <i>Linn.</i>	Acrotome, <i>Benth.</i>	<i>Lamprostachys</i> , <i>Boj.</i>
<i>Glechoma</i> , <i>Linn.</i>	<i>Cardiaca</i> , Mönch.	Marrubium, <i>Linn.</i>	<i>Colquhounia</i> , <i>Wall.</i>
<i>Chamæclena</i> , Mönch.	<i>Chaiturus</i> , Mönch.	<i>Lagopsis</i> , <i>Bung.</i>	<i>Sestinia</i> , <i>Boiss.</i>
Marmoritis, <i>Benth.</i>	<i>Panzeria</i> , Mönch.		
Dracocephalum, <i>Linn.</i>	Galeopsis, <i>Linn.</i>	4. Ballotidæ.	X. PRASIEÆ.
<i>Moldavica</i> , Mönch.	<i>Tetrahit</i> , Mönch.	Ballota, <i>Linn.</i>	Gomphostemma, <i>Wall.</i>
<i>Zornia</i> , Mönch.	Anisomeles, <i>R. Br.</i>	<i>Beringeria</i> , <i>Neck.</i>	Phyllostegia, <i>Benth.</i>
<i>Ruschiana</i> , <i>Mill.</i>	Stachys, <i>Benth.</i>	<i>Pseudodictamnus</i> , <i>Möu.</i>	Stenogyne, <i>Benth.</i>
Lalleuantia, <i>Fis. et Mey.</i>	<i>Betonica</i> , <i>Linn.</i>	<i>Acanthoprasium</i> , <i>Bth.</i>	Prasium, <i>Linn.</i>
Cedronella, <i>Mönch.</i>	<i>Eriostachys</i> , <i>Reich.</i>	Lasiocorys, <i>Benth.</i>	
Chamæsphacos, <i>Schrenk.</i>	<i>Eriostomum</i> , <i>Liuk. et Hoffms.</i>	Roylea, <i>Wall.</i>	XI. AJUGÆÆ.
	<i>Campanistrum</i> , <i>Reich.</i>	Otostegia, <i>Benth.</i>	Amethystea, <i>Linn.</i>
IX. STACHEÆ.	<i>Trixago</i> , <i>Link et Hoff.</i>	Leucas, <i>R. Br.</i>	Trichostemma, <i>Linn.</i>
I. Melittidæ.	<i>Chamæsideritis</i> , <i>Reich.</i>	<i>Hemistoma</i> , <i>Ehrenb.</i>	Teucrium, <i>Linn.</i>
Melittis, <i>Linn.</i>	<i>Aspasia</i> , <i>E. Mey.</i>	Leonotis, <i>Pers.</i>	<i>Chamædryis</i> , <i>Tournef.</i>
Physostegia, <i>Benth.</i>	<i>Zietenia</i> , <i>Gled.</i>	Phlomis, <i>Linn.</i>	<i>Scorodonia</i> , <i>Tournef.</i>
Macbridea, <i>Ell.</i>	Sphacele, <i>Benth.</i>	<i>Phlomisoides</i> , Mönch.	<i>Scordium</i> , <i>Tournef.</i>
Synandra, <i>Nutt.</i>	<i>Phytoxys</i> , <i>Mol.</i>	<i>Phlomidopsis</i> , <i>Link.</i>	<i>Polium</i> , <i>Tournef.</i>
	Cuminia, <i>Colla.</i>	Notochaete, <i>Benth.</i>	<i>Leucosceptrum</i> , <i>Smith.</i>
2. Lamidæ.	Lepechinia, <i>Willd.</i>	<i>Eremostachys</i> , <i>Bung.</i>	<i>Teucropsis</i> , <i>Ging.</i>
Wiedemannia, <i>F. et M.</i>		Eriophyton, <i>Benth.</i>	Ajuga, <i>Linn.</i>
Lamium, <i>Linn.</i>	3. Marruhidæ.	Moluccella, <i>Linn.</i>	<i>Bugula</i> , <i>Tournef.</i>
<i>Orvala</i> , <i>Linn.</i>	Craniotome, <i>Reich.</i>	<i>Molucca</i> , <i>Tournef.</i>	<i>Chamæpitys</i> , <i>Tournef.</i>
<i>Lamiopsis</i> , <i>Dumort.</i>	Leucophæa, <i>Webb.</i>	<i>Chasmona</i> , <i>Presl.</i>	<i>Phleboanthe</i> , <i>Tausch.</i>
<i>Erianthera</i> , <i>Benth.</i>	Sideritis, <i>Linn.</i>	Hymenocrater, <i>F. et M.</i>	<i>Cymaria</i> , <i>Benth.</i>
<i>Galeobdolon</i> , Mönch.	<i>Empedoctea</i> , <i>Raf.</i>	Holmskioldia, <i>Retz.</i>	
<i>Pollichia</i> , <i>Willd.</i>	<i>Navicularia</i> , <i>Fabric.</i>	<i>Hastingsia</i> , <i>Smith.</i>	XII. OXERÆÆ, <i>Fenzl.</i>
<i>Cardiaca</i> , <i>Lam.</i>		<i>Platanium</i> , <i>Juss.</i>	<i>Oxera</i> , <i>Labill.</i>

NUMBERS. GEN. 125. Sp. 2350.

POSITION.—BORAGINACEÆ.—LAMIACEÆ.—VERBENACEÆ.
Scrophulariaceæ.

ORDER CCLVI. VERBENACEÆ.—VERBENES.

Vitices, *Juss. Gen.* 106. (1789).—*Verbenaceæ*, *Juss. in Ann. Mus.* 7. 63. (1806); *R. Brown Prodr.* 510; *Barth. Ord. Nat.* 179; *Endl. Gen.* cxxvii.; *Meisner Gen.* p. 290.

DIAGNOSIS.—*Echial Exogens*, with irregular unsymmetrical flowers, confluent nuts, and erect ovules.

Trees or shrubs, sometimes herbaceous plants. Leaves generally opposite, simple or compound, without stipules. Flowers in opposite corymbs, or spiked alternately; sometimes in dense heads; very seldom axillary and solitary. Calyx tubular, persistent, inferior. Corolla hypogynous, monopetalous, tubular, deciduous, generally with an irregular limb. The æstivation of both imbricated. Stamens usually 4, didynamous, seldom equal, occasionally 2. Ovary 2- or 4-celled; ovules erect or ascending, anatropal or amphitropal, solitary or twin; style 1; stigma bifid or undivided. Fruit nucamentaceous, sometimes berried, composed of 2 or 4 nucules in a state of adhesion. Seeds erect or ascending; albumen none, or fleshy; embryo always erect; radicle inferior.

The difference between these plants and Labiates consists in the concrete carpels of Verbenes, their terminal style, and the usual absence of reservoirs of oil from their leaves, as contrasted with the deeply 4-lobed ovary and aromatic leaves of the latter. There are, however, particular species of Labiates which approach Verbenes very closely; so that Brown has remarked that it has been difficult to distinguish the two Orders. Verbenes differ from Myoporads and Selagids in the position of the radicle, which in the former points to the base, and in the two latter to the apex of the fruit. Acanthads and Figworts differ in not being nucamentaceous. Brown states, that although all the genera of Verbenes have an embryo whose radicle points towards the base of the fruit, yet many of them have pendulous seeds, and consequently a radicle remote from the umbilicus. Ang. de St. Hilaire asserts that all, except *Avicennia*, have a sessile erect ovule arising from the base of each cell. Brown, however, places *Avicennia* in Myoporads. Possibly Mr. Bentham is right in suggesting that Verbenes and Myoporads are not really distinct, and would be better re-united.

The species of the Order are rare in Europe, northeru Asia, and North America; common in the tropics of both hemispheres, and in the temperate districts of South America. In the tropics they become shrubs, or even gigantic timber, but in colder latitudes they are mere herbs.

The properties of Verbenes are much the same as those of Labiates; but they are not of importance in a medicinal or economical point of view. *Callicarpa lanata* bark has a peculiar subaromatic and slightly bitter taste, and is chewed by the Cingalese when they cannot obtain Betel leaves; the Malays reckon the plant diuretic. *Stachytarpheta jamaicensis* is a plant to which the Brazilians attach the same false notions of powerful action as Europeans formerly did to the common Vervain. Its leaves are sometimes used to adulterate Chinese Tea, and are sold in the Austrian dominions under the name of Brazilian Tea. The expressed juice of the leaves is given in Tortola, as a cooling purgative to children, in doses of 1 or 2 table-spoonfuls. In the French West India Islands it is employed in decoction for clysters, and also as an anthelmintic. It has, moreover, some reputation for promoting the menstrual discharge. In Brazil the fresh leaves bruised are applied to ulcers; it is then called *Urgeráo*, or *Jarbáo*. Auguste de St. Hilaire speaks in terms of high praise of the agreeable properties of the aromatic *Lantana pseudo-thea*, used in infusion as tea. It is highly esteemed in Brazil, where



Fig. CCCXLII.

Fig. CCCXLII. *Callicarpa longifolia*. 1. flower opened longitudinally (*Hooker*); 2. part of fruit of *C. americana* (*Gartner*); 3. its seed.

it is vulgarly called Capitaô do matto, or Cha de pedreste. Martius mentions several other Lantanas whose aromatic leaves and flowers are employed in coughs, and in medicating baths, and for rheumatism. He adds that Lippia citrata is also aromatic, and may be compared to Sage or Thyme. The bark of Vitex Taruma is used in South Brazil, under the name of Taruma, against syphilitic affections. The leaves of Patagonula vulneraria or Ipébranco, are asserted by Martius to be valuable in abating inflammatory action; it would seem to act like Gmelina parviflora, which has the power of rendering water mucilaginous, which is employed as a ptisau for the cure of ardor urinæ. Congea villosa, whose leaves have a strong heavy disagreeable smell, is another plant of the Order, used by the natives of India in fomentations. In India a decoction of the aromatic leaves of Vitex Negundo helps to form the warm bath for women after delivery; bruised they are applied to the temples for headache; pillows stuffed with them are put under the head to remove a catarrh and the headache attending. The leaves of Vitex trifolia are a powerful disemetic, and employed by the Malays to remove the boss. The leaves are given in decoction and infusion, and formed into a cataplasm which is applied to the enlarged spleen. The root of Premna integrifolia is cordial and stomachic in decoction. Volkameria inermis, Linn., and some others, have been occasionally employed in medicine, on account of their slightly bitter and subastringent qualities, but they do not appear to be of any importance. As to common Vervain, its virtues, great as their reputation has been, are apparently imaginary. The drupaceous fruits of some species are eatable, as for example those of Lantanas, and Premna esculenta. But others are very acrid. Those of Vitex trifolia are called in India Filfil burree, or Wild Pepper; those of Vitex Negundo resemble them, and Vitex Agnus castus, Linn., has similar acrid fruit. According to Forskahl, the seeds are repented at Smyrna to be a certain remedy against colic, if powdered and strewed over half an Onion applied to the stomach. By far the most interesting plant, however, belonging to the Order of Verbenes is the Teak, Tectona grandis. This is an enormous tree, with deciduous leaves, covered with rough points. It inhabits the forests of the mountainous parts of Malabar, Pegu, and other districts in the East Indies. Its timber abounds in particles of silex, and has no rival in Asia for durability. With much the appearance of coarse mahogany it is lighter, and very strong. For ship-building it is perhaps the best in the world. Roxburgh says that its wood is the only useful part of it; but Endlicher states that its flowers are diuretic, that its foliage supplies a red dye, and that a decoction of it is employed by the Malays in cholera, &c.

GENERA.

[This Order is much in want of a thorough revision.]

Buchia, H. B. K.	Castelia, Cav.	? Chrysomallum, Thou.	Ellisia, P. Br.
Cryptocalyx, Benth.	Tortula, Roxb.	Psilogyne, DC.	Castorea, Plum.
Lippia, Linn.	Streptium, Roxb.	Premna, Linn.	Petrea, Houst.
Zapania, Juss.	Chloanthes, R. Br.	Cornutia, N. L. Burm.	Amasonia, Linn.
Platonia, Raf.	Caryopteris, Bung.	Baldingera, Bennst.	Taligalca, Anbl.
Bertonia, Raf.	Peronema, Jack.	Gumira, Rumph.	Callicarpa, Linn.
Ricdelia, Cham.	Spielmannia, Med.	Holoclioloma, Hochst.	Burchardia, Duham.
Dipterocalyx, Cham.	Ostia, Adans.	Pityrodia, R. Br.	Johnsonia, Catesb.
Obletia, Roz.	Mallophora, Endl.	Tectona, Linn. fil.	Sphondylococcum, Mit.
? Phyla, Lour.	Lantana, Linn.	Theka, Rheed.	Porphyra, Lour.
Aloysia, Ort.	Camara, Cham.	Jatus, Rumph.	Ægiphilla, Jacq.
Verbena, Linn.	Myrobatindum, Vaill.	Gmelina, Linn.	Manabea, Aubl.
Glandularia, Gmel.	Charachera, Forsk.	Michelia, Amman.	Omphalococca, Willd.
Billardiera, Mönch.	Calliocras, Cham.	Petitia, Jacq.	Scleröon, Lindl.
Aubletia, Jacq.	Tamorea, Aubl.	Citharexylon, Linn.	Cornutia, Plum.
Stachytarpheta, Vahl.	Ghinia, Schreb.	Rauwolfia, Rz. et Pav.	Agnanthus, Vaill.
Cymburus, Salisb.	Leptocarpus, Willd.	Pöppigia, Bert.	Conga, Roxb.
Abena, Neck.	Kempferia, Houst.	Hemigymnia, Griff.	Rosöca, Roxb.
Bouchea, Cham.	? Ischnia, DC.	Volkameria, Linn.	Sphenodesime, Jack.
Melastanthus, Pohl.	Hosta, Jacq.	Duglussia, Amm.	Symphorema, Roxb.
Uwarovia, Bunge.	Hostana, Pers.	Clerodendron, L.	? Anactetis, Vahl.
Shuttleworthia, Meisn.	Cornulia, Gmel.	Volkameria, Linn.	Geunsia, Blum.
Monochilus, Fisch. et M.	Pystoma, C. F. W. Mey.	Siphonanthus, Linn.	Dissolena, Lour.
Chascanum, E. Mey.	Wallrothia, Roth.	Ovida, Linn.	Patagonula, L.
Casselia, Nees et Mart.	Casarettoa, Walpers.	Agricola, Schrank.	Quoya, Gaudich.
Dipprena, Hook.	Vitex, Linn.	Torreya, Spreng.	Mastacanthus, Endl.
Wilsonia, Hook.	Ephialtis, Sol.	Cornacchnia, Savi.	Barbuta, Lour.
Priva, Adans.	Agnus Castus, Endl.	Cyclonema, Hochst.	? Hymenopyramis, Wall.
Blairia, Houst.	Limia, Vand.	Spiromema, Hochst.	? Glossocarya, Wall.
Phryma, Linn.	Nephrandra, Coth.	Duranta, Linn.	Cochrauea, Miers.
Leplostachya, Mitch.			

NUMBERS. GEN. 56. Sp. 610.

Oleaceæ.

POSITION.—Lamiaceæ.—VERBENACEÆ.—Myoporaceæ.

Scrophulariaceæ.

ORDER CCLVII. MYOPORACEÆ.—MYOPORADS.

Myoporinæ, *R. Brown Prodr.* 514. (1810); *Bartl. Ord. Nat.* 176; *Endl. Gen. cxi.*; *Melsu. Gen.* p. 292.—*Avicennia*, *Endl. Gen.* 638.

DIAGNOSIS.—*Echial Exogens*, with irregular, unsymmetrical flowers, confluent nuts, pendulous ovules, and 2-celled anthers.

Shrubs, with scarcely any pubescence. Leaves simple, without stipules, alternate or opposite, sometimes thickly occupied by transparent cysts. Flowers axillary, without bracts. Calyx 5-parted, persistent. Corolla monopetalous, hypogynous, nearly equal or 2-lipped. Stamens 4, didymous, with sometimes the rudiment of a fifth one, which occasionally bears pollen. Ovary 2- or 4-celled, the cells 1- or 2-seeded, with pendulous ovules; style 1; stigma scarcely divided. Fruit a drupe, with a 2- or 4-celled putamen, the cells of which are 1- or 2-seeded. Seeds pendulous; embryo taper, in the axis of a small quantity of albumen, or without any; radicle superior.

The principal characters in the fructification of this Order, by which it is distinguished from Verbenes, are the presence of albumen in the ripe seed, and the direction of the embryo, whose radicle always points towards the apex of the fruit. The first of these characters is, however, not absolute, and neither of them can be ascertained before the ripening of the seed.—*R. Brown in Flinders*, 557. Mr. Bentham is disposed to unite the two.

This Order, with the exception of *Bontia*, a genus of equinoctial America, and of the species of *Myoporum*, found in the Sandwich Islands, has hitherto been observed only in the southern hemisphere, and yet neither in South Africa nor in South America beyond the tropics. Its maximum is evidently in the principal parallel of Terra Australis, in every part of which it exists; in the more southern parts of New Holland, and even in Van Diemens Island, it is more frequent than within the tropics.—*R. Brown in Flinders*, 567. The *Avicennias* are shore trees living like Mangroves in

salt swamps. Their creeping roots, often curving for the space of six feet above the mud before they stick into it, and the naked Asparagus-like suckers which they throw up, have a singular appearance.

The bark of *Avicennia tomentosa*, the White Mangrove of Brazil, is in great use at Rio Janeiro for tanning. It exudes a kind of green aromatic resin, which furnishes a miserable food to the barbarous natives of New Zealand, who call it Manawa. Arabian writers believe that its saline mucilaginous root is an aphrodisiac. The unripe seeds are used in India for poultices; and, when ripe, are boiled and eaten by the poor.

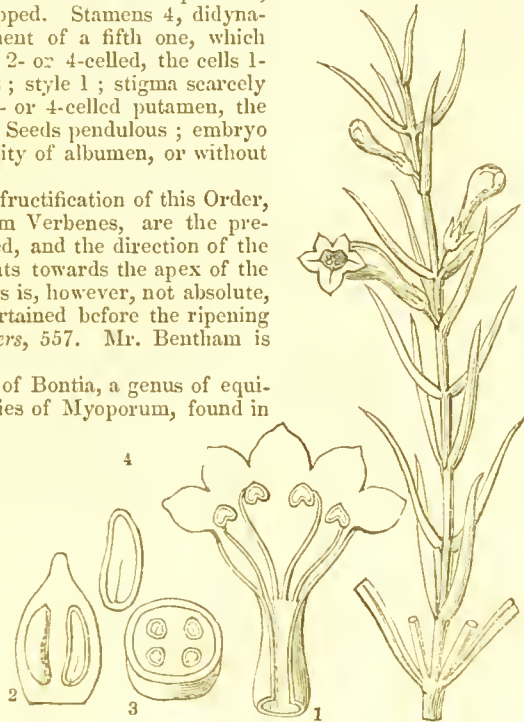


Fig. CCCCXLIII.

GENERA.

<i>Myoporum</i> , <i>Danks et Sol.</i>	<i>Spartothamnus</i> , <i>A. Cunn.</i>	<i>Avicennia</i> , <i>Linn.</i>	<i>Rack</i> , <i>Bruce.</i>
<i>Pogonia</i> , <i>Andr.</i>	<i>Eremophilla</i> , <i>R. Br.</i>	<i>Donatia</i> , <i>L'öfl.</i>	<i>Apata</i> , <i>Adans.</i>
<i>Androsia</i> , <i>Vent.</i>	<i>Eremodendron</i> , <i>DC.</i>	<i>Secura</i> , <i>Forsk.</i>	<i>Racka</i> , <i>Gmel.</i>
<i>Bertolonia</i> , <i>Spin.</i>	<i>Stenochilus</i> , <i>R. Br.</i>	<i>Halodendron</i> , <i>Thours.</i>	♀ <i>Quapira</i> , <i>Aubl.</i>
<i>Dasymalla</i> , <i>Endl.</i>	<i>Bontia</i> , <i>Phen.</i>	<i>Opata</i> , <i>Rheed.</i>	<i>Gynastrum</i> , <i>Neck.</i>
<i>Pholidia</i> , <i>R. Br.</i>			

NUMBERS. GEN. 9. Sp. 42.

Oleaceæ.

POSITION.—*Verbenaceæ.*—*MYOPORACEÆ.*—*Selaginæeæ.*

Fig. CCCCXLIII.—*Pholidia scoparia*. 1. a corolla opened: 2. perpendicular section of ripe fruit; 3. cross section of it, 4. longitudinal section of a seed.

ORDER CCLVIII. SELAGINACEÆ.—SELAGIDS.

Selagineæ, *Juss. Ann. Mus.* 7. 71. (1806); *Richard in Pers. Synops.* 2. 146; *Choisy Mémoire*, (1823); *Barth. Ord. Nat.* 177; *Endl. Gen.* cxl.; *E. Meyer, Comment. pl. Afr. Austr.* 245; *Meisner Gen.* p. 292.—Globularineæ, *DC. Fl. Fr.* 3. 427. (1815); *Cambessédes in Ann. des Sciences*, 9. 15; *Endl. Gen.* cxxxix.; *Link Handb.* 1. 675; *Meisner*, p. 315.

DIAGNOSIS.—*Eclial Exogens*, with irregular unsymmetrical flowers, confluent nuts, pendulous ovules, and 1-celled anthers.

Herbaceous plants, or small branched shrubs. Leaves alternate, generally sessile, toothed, or entire, without stipules, usually in clusters. Flowers sessile, spiked, with large bracts. Calyx spatheaceous, or tubular, persistent, with a definite number of teeth or divisions, rarely consisting of two sepals. Corolla tubular, hypogynous, more or less irregular, with 5 lobes, imbricated in aestivation. Stamens 4, usually didynamous, arising from the top of the tube of the corolla, seldom 2; anthers 1-celled, usually adnate to the dilated top of the filament, rarely versatile. Ovary superior; style 1, filiform; stigma nearly capitate; ovules solitary, pendulous, anatropal. Disk hypogynous, fleshy. Fruit 2-celled; the cells

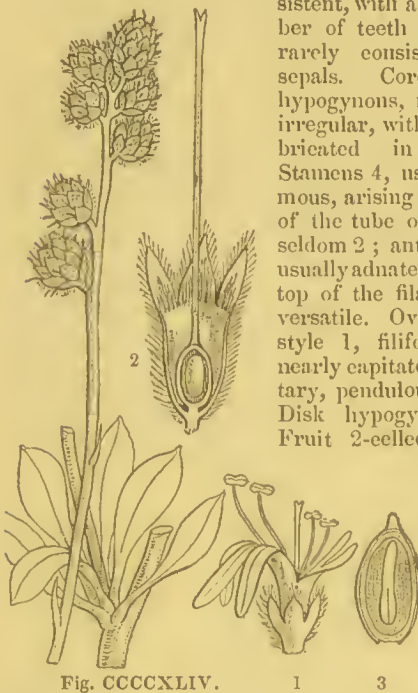


Fig. CCCCXLIV.



Fig. CCCCXLV.

either separable or inseparable, 1-seeded, membranous. Seed solitary, pendulous; embryo in the axis of a little fleshy albumen; radicle superior.

The very small group collected under the name of Selagids is nearly allied on the one hand to Verbenes, and the other to Myoporads, from both which it is known by having 1-celled anthers. It also differs from Verbenes in having pendulous ovules. Globularia, which has been regarded as the type of a particular Order, does not seem to differ in anything more than having a solitary carpel; for its anthers are 1-celled. The resemblance of that genus to Primworts is very inconsiderable; but it may be regarded as being more like a form of Teazelworts (Dipsacaceæ), with a superior ovary. The genus Globularia is moreover in some respects analogous to Brunonia, which however differs abundantly in having hypogynous stamens, symmetrical flowers, and no albumen.

The principal part of this Order comes from the Cape of Good Hope; Gynandra is however Siberian, and the Globularias European, chiefly inhabiting the southern kingdoms and the basin of the Mediterranean.

The species seem to be of small importance. Some are sweet-scented; Hebenstretia dentata is said to be scentless in the morning, strong-smelling at mid-day, and sweet in the evening. Globularia Alypum is a bitter, drastic purgative, once supposed to be

Fig. CCCCXLIV.—*Globularia orientalis*. 1. a flower; 2. section of calyx and ovary; 3. section of fruit.
Fig. CCCCXLV.—*Selago distans*. 1. a flower; 2. an anther; 3. a perpendicular section of an ovary; 4. section of seed of *Microdon ovatum*.

the ἄλυπον of Dioscorides, and hence called *Frutex terribilis*. The *Alypum* however had the σπέρμα ὡς ἐπιθύουον, and was therefore in all probability some *Euphorbia*. *Globularia vulgaris* has similar qualities ; both are emetic.

GENERA.

Polycentia, *Chois.*
Hebenstreitia, *Linn.*
Dischisma, *Chois.*
Agathelpis, *Chois.*

Microdon, *Chois.*
Dalea, *Gartn.*
Selago, *Linn.*
Noltea, *Eckl.*

Maeria, *E. Mey.*
Walafridin, *E. Mey.*
Gymnandra, *Pall.*

Globularia, *L.*
Alypum, *Tourn.*
Abolaria, *Adans.*

NUMBERS. GEN. 10. Sp. 120.

Dipsacaceæ.

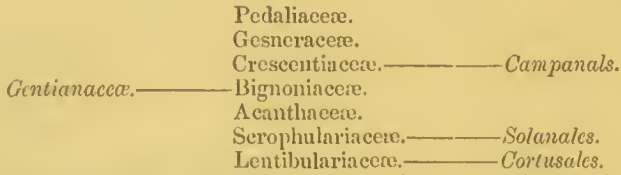
POSITION.—*Myoporaceæ.*—SELAGINACEÆ.—*Verbenaceæ.*

Pedaliaceæ.

ALLIANCE XLIX. *BIGNONIALES*.—THE BIGNONIAL ALLIANCE.

DIAGNOSIS.—*Perigynous Exogens, with dichlamydeous, monopetalous, unsymmetrical flowers, capsular or berried fruit, having its carpels quite consolidated, parietal free central or axile placenta, and an embryo with little or no albumen.*

With Bignonials the series of Perigynous Alliances closes, Gesnerworts passing as directly into Bellworts among Campanals as Figworts also pass into the Nightshades among Solanals. The two are parallel instances. Nevertheless, it does not seem expedient to place Gesnerworts at the end of the Bignonial Alliance, because it is impossible to separate them from Bignoniads and Crescentiads, or from Pedaliads, whose hard bony fruit presents the nearest approach in this Alliance to the nuts of Echials. We must, therefore, regard the passage of Bignonials into Campanals as being altogether from the side of the series and not from its extremity. Another lateral affinity presents itself between Butterworts and Primworts, in the Cortusal Alliance. The following will, therefore, express the bearing of Bignonials and other Alliances, better than a lineal position :—



The Bignonial Alliance may be regarded, then, as the centre of a particular portion of Exogens, round which several others are stationed in nearly equal degrees of contiguity.

NATURAL ORDERS OF BIGNONIALS.

- | | | |
|--|---|-----------------------|
| <i>Placentæ parietal. Fruit bony or capsular. Embryo amygdaloid. Radicle short</i> | } | 259. PEDALIACEÆ. |
| <i>Placentæ parietal. Fruit capsular or baccate. Embryo with minute cotyledons. Radicle long</i> | } | 260. GESNERACEÆ. |
| <i>Placentæ parietal. Fruit succulent, hard-shelled. Embryo amygdaloid. Radicle short</i> | } | 261. CRESCENTIACEÆ. |
| <i>Placentæ axile. Seeds winged, sessile, without albumen. Cotyledons large, leafy</i> | } | 262. BIGNONIACEÆ. |
| <i>Placentæ axile. Seeds wingless, attached to hard placental processes, without albumen. Cotyledons large, fleshy</i> | } | 263. ACANTHACEÆ. |
| <i>Placentæ axile. Seeds albuminous. Cotyledons scarcely larger than, or not so large as, the radicle</i> | } | 264. SCROPHULARIACEÆ. |
| <i>Placenta free, central. Seeds minute, without albumen. Cotyledons much smaller than the radicle</i> | } | 265. LENTIBULARIACEÆ. |

ORDER CCLIX. PEDALIACEÆ.—PEDALIADS.

Pedaliæ, *R. Broen Prodr.* 519. (1810); *Lindley in Botan. Register*, 9. 934. (1825); *Endl. Gen. clif.* —*Sesameæ*, *Kunth Synops.* 2. 251. (1823); *Barth. Ord. Nat.* 175; *Endlicher in Linnæa*, VII. 1.; *Alph. DC. Prodr.* 9. 249; *Bernhardi in Ann. Sc. Nat. n. s.* 18. 365.—*Martyniæ*, *Link Handb.* 1. 504. (1829).

DIAGNOSIS.—*Bignonial Exogens*, with parietal placenta, bony or capsular fruit, an amygdaloid embryo, and short radicle.

Herbaceous plants, often with a soft texture, and heavy smell, covered with glandular hairs, or quaternary vesicles. Leaves opposite or alternate, undivided, angular, or lobed, without stipules. Flowers axillary, solitary, or clustered, usually large, and furnished in many cases with conspicuous bracts. Calyx divided into 5 nearly equal pieces. Corolla monopetalous, hypogynous, irregular; the throat ventricose, the limb bilabiate, the lobes somewhat valvate in restivation. Disk hypogynous, fleshy, sometimes glandular. Stamens didynamous, included within the tube, together with a rudiment of a fifth. Anthers 2-celled; the connective articulated with the filament, a little prolonged beyond the cells, terminated by a gland. Ovary seated in a glandular disk, 1-celled, formed of two carpellary leaves, anterior and posterior as regards the axis, sometimes divided into 4 or 6 spurious cells by the splitting of two placentas and the divergence of their lobes; ovules anatropal, either erect, or pendulous, or horizontal, solitary, or 2, or several; style 1; stigma divided. Fruit drupaceous or capsular, valvular, or indehiscent, with from 2 to 6 cells, which are usually few-seeded when numerous, and many-seeded only when two. Seeds with a papery testa, wingless; albumen none; embryo straight; cotyledons large, plano-convex; radicle short, next the hilum.

The only real differences that can be found between these plants and Bignoniads consist in the parietal placenta of the former, their wingless or nearly wingless seeds, which are in most cases definite, and sometimes in their woody lobed placenta, which spread and divide variously in the inside of the pericarp, so as to produce an apparently 4- or 6-celled fruit out of a 1-celled ovary. *Sesamum* may be considered a transition from the one to the other. From *Gesneriworts* they are readily known by the texture of their fruit, their large seeds, plano-convex cotyledons, and very short radicle. Calabashes are distinguished by their great succulent fruit and almond-like seeds. *Endlicher* rightly observes that *Brown* in forming his *Pedaliæ* (*Prodr.* 519.), does not combine with them *Sesamum*; neither, however, does he explain how they are to be distinguished; but as usual, the extreme and studied conciseness of this learned man leaves his readers almost as much in the dark as if the name of *Sesamum* had not been mentioned.

It is not a little remarkable that such observers as *De Caudolle* (*Prodr.* 8. 249.) and *Endlicher* (*Linnæa*, vii. p. 3.) should suppose the fruit of this Order to be formed out of 5 or 4 carpels, a statement entirely opposed to both theory and fact. It is really composed of two anterior and posterior carpels, exactly as that of the other Orders in the present Alliance. It is doubtless true that *Martynia* has been described as having



Fig. CCCXLVI.



Fig. CCCXLVII.

Fig. CCCXLVI.—*Sesamum indicum*. 1. a ripe fruit; 2. one of its halves; 3. a seed; 4. a cross section of it.

Fig. CCCXLVII.—*Martynia lutea*. 1. a flower; 2. the plait; 3. a section of its ovary.

4 cells ; but so long since as December, 1825 (*Bot. Reg. t. 934*), I explained the true nature of this structure in the following words:—"Upon a careful examination of the ovarium, it will be found that the fruit, in that stage, is neither 4-celled nor even 2-celled, but consists of only one cell, traversed by two projecting, parietal placenta, each of which is 2-lobed ; the lobes divided at right angles from their point of separation, and bearing on their edges a few horizontal ovula, of which part project into the open centre of the ovarium, and the others into the cavity between the placenta and the lining of the ovarium. Now the capsule differs from the ovarium in no essential point of structure, but the following changes take place : the pericarpium and the placentas become woody and rigid, the inner faces of the latter become pressed together so as to destroy the ovula which were placed between them, and to exhibit the appearance of a bilamellar dissepiment, and the remaining ovula become pendulous, and reduced in number, and exist in the form of large apterous seeds between the inner edge of the lateral lobes of the placenta and the endocarpium."

A not less singular in appearance, but unreal deviation, occurs in *Pretrea zanguibarica*, whose two carpels turn their edges inwards, right and left, until they touch the sides of the ovary, and form on each side a little pouch for the reception of the seeds ; at the same time, in consequence of the inflected plates not touching each other, two seedless cavities are also formed next the ventral and dorsal sutures, and thus a six-celled fruit is constructed out of a pair of carpels. The accompanying cut explains this singular structure.

The species of *Pedaliads* occur in all parts of the tropics, in small numbers, but Africa is supposed to be the principal field over which they are spread.

The leaves of *Sesamum* are emollient. Its seeds contain an abundance of a fixed oil, as tasteless as that of Olive Oil, for which it might be substituted, and which is expressed in Egypt in great quantities. It is sometimes called Gingilie Oil, and, if of very good quality, is employed for adulterating Oil of Almonds. It is, however, apt to become rancid. The fresh leaf of *Pedaliium Murex*, when agitated in water, renders it mucilaginous, in which state it is prescribed by Indian doctors in cases of dysuria and gonorrhœa. The meal of the seeds of both these plants is used in India for poultices. *Uncaria procumbens*, called the Grapple Plant at the Cape of Good Hope, has a fruit covered with hooked spines, which lay hold of the clothes of travellers, and the pair of long hooked horns of *Martynia proboscidea*, called in Italy the Testa di Quaglia, is notorious for the same propensity. The fleshy sweet root of *Craniolaria annua* is preserved in sugar by the Creoles as a delicacy ; in a dry state it is said to be a bitter cooling medicine.



Fig. CCCCXLVIII.

GENERA.

<p>I. PEDALÆÆ.</p> <p><i>Craniolaria</i>, Linn. <i>Holoromyia</i>, Nees. <i>Neonedia</i>, Schrad. <i>Martynia</i>, Linn. <i>Proboscidea</i>, Schmidt. <i>Carpoceras</i>, A. Rich.</p>	<p><i>Pedaliium</i>, Royen. <i>Cacatali</i>, Adans. <i>Ichnia</i>, DC. <i>Harpagophytum</i>, DC. <i>Uncaria</i>, Burch. <i>Rogeria</i>, Gay. <i>Pretrea</i>, Gay.</p>	<p><i>Dicercocaryum</i>, Boj. <i>Josephinia</i>, Vent. <i>Pterodiscus</i>, Hooker.</p>	<p><i>Digitalis</i>, Tournef. <i>Dysosmon</i>, Raf. <i>Ceratotheca</i>, Endl. <i>Sesamopteris</i>, Endl. <i>Gongyla</i>, Bernh. <i>Sporiedera</i>, Bernh.</p>
		<p>II. SESAMEÆ.</p> <p><i>Sesamum</i>, Linn.</p>	

NUMBERS. GEN. 14. Sp. 25. ?

Myoporaceæ.

POSITION.—*Bignoniaceæ.*—*PEDALIACEÆ.*—*Gesneraceæ.*

Selaginaceæ.

Fig. CCCCXLVIII.—*Pretrea zanguibarica* ; a cross section of its fruit.

ORDER CCLX. GESNERACEÆ.—GESNERWORTS.

Gesneriæ, *Rich. et Juss. Ann. Mus.* 5. 428. (1804); *Kunth in Humb. N. G. et Sp.* 2. 392; *Lindley in Bot. Rep.* 1110.—Gesneriæ, *Link Hand.* 1. 504. (1829); *DC. Prodr.* 7. 523.—Gesneriæ, *Von Martius Nov. Gen. Bras.* 3. 68. (1829); *Bartl. Ord. Nat.* 174.—Gesneraceæ, *Ed. pr. ccxv.* (1836); *Endl. Gen. cli.*—Cyrtrandraceæ, *Jack in Linn. Trans.* 14. 23. (read 1822, in May); *Alph. DC. Prodr.* 9. 253; *Ed. pr. ccxii.*—Didymocarpeæ, *Don in Edin. Phil. Trans.* 7. 82. (1822, July).

DIAGNOSIS.—*Bignonial Exogens, with parietal placentæ, capsular or baccate fruit, an embryo with minute cotyledons, and a long radicle.*

Soft-wooded, somewhat fleshy, herbs or shrubs, occasionally having a climbing or creeping manner of growth, and frequently springing from scaly tubers. Leaves rugose, without stipules, generally opposite or whorled. Flowers showy, in racemes or panicles, rarely solitary, yellow, scarlet, violet, or white. Calyx half adherent, 5-parted, with a valvate or open æstivation. Corolla monopetalous, tubular, more or less irregular, 5-lobed, with an imbricated æstivation. Stamens 2, or 4, didynamous; anthers often cohering, 2-celled, innate, with a thick tumid connective; the rudiment of a fifth stamen is present. Ovary half superior, 1-celled, with 2 fleshy 2-lobed parietal polyspermons placentæ, placed right and left of the axis; surrounded at its base by glands or a fleshy ring; style continuous with the ovary; stigma capitate, concave; ovules 00, anatropal. Fruit capsular or succulent, superior, 1-celled, with 2 opposite lateral placentæ, each consisting of 2 plates. Seeds very numerous, minute; embryo erect, in the axis of fleshy albumen, with the cotyledons much shorter than the radicle; testa thin, with very close fine oblique veins, sometimes extended into long hairs, or even flattened into a wing.

These little plants (for they seldom rise above the stature of bushes, and are generally mere herbs) have somewhat the appearance of Figworts, or of diminutive Bignoniads, and have been even referred to those Orders. They, however, differ from all the present Alliance in the very small size of their cotyledons as compared with their long radicle, and their absolutely parietal placentation; in addition to which they have a great tendency to form an inferior ovary, and thus lead towards the Campanal Alliance in another part of the series. To *Eceremocarpus*, a genus of Bignoniads, they approach nearly, as will be seen by referring to p. 675; but in that plant the winged seeds and large leafy cotyledons point too plainly to Bignoniads to be mistaken. Gesnerworts also approach Broomrapes in their parietal placentation.

The Suborder *Cyrtrandreæ*, usually regarded as a distinct group, has been removed to Gesnerworts by Dr. Brown, and with justice, there being no sufficient distinction between them. (See *Horsfield's Plantæ Javanicæ*, p. 105). It is chiefly remarkable for the long threads that terminate the seeds of certain genera, for their double revolute placentæ, and in some cases for their long, slender, siliquose capsules. They pass into Bignoniads through *Incarvillea*.

The two Sub-orders have a very different geographical distribution. Gesneriæ, which are common in our gardens, are exclusively inhabitants of the tropical or warmer parts of America. The *Cyrtrandreæ*, on the contrary, are spread over many parts of the world, although chiefly confined to the eastern parts. Some occur in Europe, as *Ramondia* and *Haberlea*; others grow in the cooler parts of Asia; such are *Brea* and *Rehmannia*. *Klugia* is Mexican, *Streptocarpus* is from the Cape of Good Hope; but it is in the warm valleys of the Himalayas, and in the damp regions of the Indian Archipelago, that they are most abundant, under the forms of *Chirita*, *Calosneme*, *Æschynanthus*, and *Didymocarpus*. *Fieldia* is from New Holland, and several *Cyrtrandras* from the Sandwich Islands.

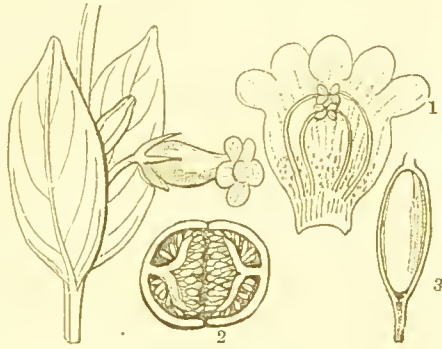


Fig. CCCCXLIX.

Fig. CCCCXLIX.—*Hypocyrrta gracilis*—Martius. 1. section of a flower; 2. cross section of a fruit; 3. seed with its embryo exposed to view.

They are generally plants of considerable beauty, often growing on trees and leading a quasi-parasitical life; but they can scarcely be said to have any useful qualities. The succulent fruits of some Gesneræe are mucilaginous, sweetish, and eatable; and a dye is obtained from the calyxes and fruit of others, for staining cotton, straw-work, and domestic utensils. *Columnea scandens* is called by the French colonists *Liane à sirop*, because its flowers secrete a large quantity of honey, and *Sarmienta repens* is used as an emollient in Chili. Some *Didymocarps* would appear to be aromatic; and *Picria*, a Cochin-China plant, is so bitter as to be called *Fel Terræ*; it is, however, very doubtful whether that plant belongs to this Order. It is possibly a *Gentianwort*.

GENERA.

I. GESNERÆÆ. — Seeds with a small quantity of albumen. Fruit partially adherent.	<i>Episcia</i> , Mart.	<i>Tromsdorffia</i> , Blum.	<i>Napeanthus</i> , Gardn.
<i>Sarmienta</i> , Ruiz et Pav.	<i>Gesnera</i> , Mart.	<i>Babactes</i> , DC.	<i>Rehmannia</i> , Liboschitz.
<i>Urceolaria</i> , Feuill.	<i>Prasanthea</i> , DC.	<i>Æschynanthus</i> , Jack.	<i>Klugia</i> , Schlecht.
<i>Mitraria</i> , Cav.	<i>Niplæa</i> , Lindl.	<i>Trichosporum</i> , Don.	<i>Glossanthus</i> , Klein.
?? <i>Picria</i> , Lour.	<i>Achimenes</i> , P. Br.	<i>Lysionotus</i> , Bl.	<i>Loxonia</i> , Jack.
<i>Columnea</i> , Plum.	<i>Trevirana</i> , W.	<i>Agalmyla</i> , Bl.	<i>Rhabdothermus</i> , A. Cunn.
<i>Besleria</i> , Plum.	<i>Cyrilla</i> , Herit.	<i>Orithalia</i> , Bl.	<i>Loxocarpus</i> , R. Br.
<i>Eriphia</i> , P. Br.	<i>Gloxinia</i> , Herit.	<i>Lysionotus</i> , D. Don.	<i>Craterostigma</i> , Hochst.
<i>Tussaca</i> , Rehb.	<i>Paliavana</i> , Velloz.	<i>Didymocarpus</i> , Wall.	<i>Quintilia</i> , Endl.
<i>Hypocyrtia</i> , Mart.	<i>Sinningia</i> , Nees.	<i>Henckelia</i> , Spr.	<i>Miquelia</i> , Bl.
<i>Codonanthe</i> , Mart.	<i>Hemiloba</i> , DC.	<i>Chirita</i> , Ham.	<i>Anomorphegia</i> , Meisn.
<i>Oncogastra</i> , Mart.	<i>Solenophora</i> , Benth.	<i>Calosacme</i> , Wall.	<i>Stauranthera</i> , Benth.
<i>Drymonia</i> , Mart.	<i>Rhytidophyllum</i> , Mart.	<i>Streptocarpus</i> , Lindl.	<i>Epithema</i> , Bl.
<i>Klugia</i> , Schlecht.	<i>Codonophora</i> , Lindl.	<i>Cardiophorus</i> , Griff.	<i>Aikinia</i> , R. Br.
<i>Tapeinotes</i> , DC.	<i>Conradia</i> , Mart.	<i>Bæa</i> , Comm.	<i>Platystemma</i> , Wall.
<i>Tapina</i> , Mart.	<i>Pentarrhaphia</i> , Lindl.	<i>Dorcoceras</i> , Bunge.	<i>Isanthera</i> , Nees.
<i>Nematanthus</i> , Schrad.	<i>Bellouia</i> , Blum.	<i>Ramondia</i> , Rieh.	2. CYTANDRÆÆ; baccate.
<i>Alloplectus</i> , Mart.	<i>Diastemma</i> , Benth.	<i>Myconia</i> , Lap.	<i>Cyrtandra</i> , Forst.
<i>Crantzia</i> , Scop.	<i>Trichantha</i> , Hooker.	<i>Chairia</i> , Lap.	<i>Whitia</i> , Bl.
<i>Dalbergaria</i> , Tuss.	II. CYTANDRÆÆ. — Seeds with no albumen. Fruit wholly free.	<i>Haberlea</i> , Friwaldsk.	<i>Rhynchotecom</i> , Bl.
<i>Tussacio</i> , Reicheub.	I. DIDYMOCARPIDÆ; capsular.	<i>Conandron</i> , Sieb. Zucc.	<i>Corisanthera</i> , Wall.
<i>Lophia</i> , Desv.	<i>Liebigia</i> , Endl.	? <i>Monophyllæa</i> , R. Br.	<i>Cheilosandra</i> , Griff.
<i>Virya</i> , Raf.		<i>Rhynchoglossum</i> , Bl.	<i>Fieldia</i> , A. Cunn.
		<i>Loxotis</i> , R. Br.	
		<i>Antonia</i> , R. Br.	

NUMBERS. GEN. 54. Sp. 260.

Orobanchaceæ.

POSITION.—Bignoniaceæ.—GESNERACEÆ.—Scrophulariaceæ.

Campanulaceæ.



Fig. CCCCL.

Fig. CCCCL.—*Streptocarpus Rexil*.

ORDER CCLXI. CRESCENTIACEÆ.—CRESCENTIADS.

Crescentiaceæ, Gardner in Hook. Journ. 2. 423. (1840).—Crescentineæ, DC. Rev. Bign. p. 7. (1838); Endl. Gen. p. 723; Miquel in Bot. Zeit. (1844), p. 801; Alph. DC. Prodr. 9. 240.

DIAGNOSIS.—*Bignonial Exogens, with parietal placentæ, succulent hard-shelled fruit, and an amygdaloid embryo with a short radicle.*

Trees of small size, with alternate or clustered simple leaves without stipules. Flowers growing out of the old stems or branches. Calyx free, undivided, eventually splitting into irregular pieces. Corolla monopetalous, irregular, somewhat 2-lipped, with an imbricated æstivation. Stamens 4, growing on the corolla, didynamous, with the rudiment of a fifth between the posterior pair, which are the longest; anthers 2-lobed, bursting longitudinally. Ovary free, surrounded by a yellow annular disk, 1-celled, composed of an anterior and posterior carpellary leaf, with 2 or 4 equidistant parietal placentæ, which sometimes meet and produce additional cells; ovules 00, horizontal; style 1; stigma of two plates. Fruit woody, not splitting, containing a multitude of large amygdaloid seeds buried in the pulp of the placentæ; skin leathery, loose. Embryo straight, without albumen, with plano-convex fleshy cotyledons,



Fig. CCCCLII.

and a thick short radicle next the hilum.

These plants have been generally associated either with Nightshades, which they are quite unlike, or with Bignonids, from which they differ in their succulent fruit, parietal placentæ, and wingless seeds. In the two latter circumstances they resemble Pedaliads; but their succulent fruit and large almond-like seeds are dissimilar. Gesnerworts lie doubtless on their borders, for they too have sometimes succulent fruit; but it seems impossible to associate trees with a great almond-like embryo and herbs or half-herbaceous bushes, whose minute embryo consists principally of radicle.

Mr. Gardner thus speaks of the fruit of *Crescentia*:—"In the economy of its fruit, *Crescentia* is more closely related to *Cyrtandra* than to *Bignoniceæ*, but differs essentially from it in

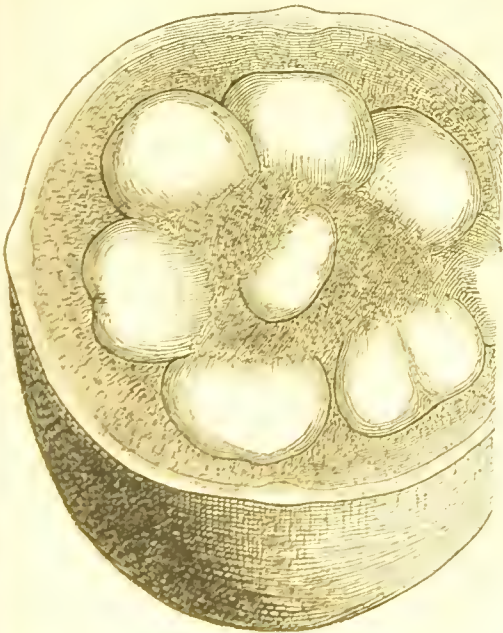


Fig. CCCCLIII.

the structure of its calyx, in its four distinct placentæ, horizontal, not suspended ovules,

Fig. CCCCLII.—*Crescentia obovata*. 1. a cross section of its ovary.

Fig. CCCCLIII.—Cross section of fruit of *Crescentia cucurbitina*.

and particularly in habit. The same observations apply to Pedaliaceæ, which are also 1-celled; for although the ripe fruit of both them and Cyrtandraceæ possesses apparently more than one cell, as if produced by the spreading and dividing of their parietal placentæ, the ovary of both, according to Bentham, is always unilocular if examined before the development occasioned by fecundation.

"To all the other Orders of the dicarpous group, Crescentia is of course more or less related, but is abundantly distinct from every one. Thus, it is distinguished from Acanthaceæ by its simple calyx, 1-celled ovary, unsuspended seeds, and in habit; from Lentibulariæ by its parietal, not free central placentation; and from Scrophulariaceæ and Solanaceæ and their allies by its want of albumen."—*Hooker's Journ.* 2. 424.

Inhabitants of the tropics of Asia, Africa, and America, but most especially abundant in the Mauritius and Madagascar.

The principal plant of this Order is the Calabash tree, *Crescentia Cujete*, a tree inhabiting the tropical parts of America, and bearing a great gourd-like fruit, filled with a sub-acid pulp which is eaten by the Negroes, and from which poultices are also prepared; its hard shell is used for holding fluids, in the room of bottles. The pulp of *Tanaccium Jarowa* is applied to the same purposes. *Parmentiera edulis* has fruit like a Cucumber, and affords food to the Mexicans.—*DC.*

GENERA.

Crescentia, L.
Cujete, Plum.
Kigella, DC.
Tripinnaria, Pers.

Tripinna, Lour.
Sotor, Fenzl.
Schlegelia, Miq.
Parmentiera, DC.

Tanaccium, Stez.
Jaroba, Maregr.
Schlegelia, Miq.
Colea, Bojer.

Periblema, DC.
Boutonia, DC.
Phyllarthron, DC.
Arthrophyllum, Boj.

NUMBERS. GEN. 11. Sp. 34.

Solanaceæ?

POSITION.—GESNERACEÆ. — CRESCENTIACEÆ. — BIGNONIACEÆ.



Fig. CCCCLIV.

Fig. CCCCLIV. — *Crescentia cucurbitina*.

ORDER CCLXII. BIGNONIACEÆ.—BIGNONIADS.

Bignoniacæ, § 2. *Juss. Gen.* 137. (1789).—Bignoniacæ, *R. Brown Prodr.* 470. (1810); *Bartl. Ord. Nat.* 185; *Endl. Gen. et.*; *Alph. DC. Prodr.* 9. 142.

DIAGNOSIS.—*Bignonial Exogens, with axile placenta, winged sessile seeds without albumen, and large leafy cotyledons.*

Trees, shrubs, or occasionally herbs, often twining or climbing. Leaves opposite, very rarely alternate, compound or occasionally simple, without stipules. Inflorescence terminal, somewhat panicle.

Calyx divided or entire, sometimes spathaceous. Corolla monopetalous, hypogynous, usually irregular, 4-5-lobed. Stamens 5, unequal: always 1 sterile, sometimes 3; anthers 2-celled, formed normally. Ovary seated in a disk, 2-celled,

with the carpels anterior and posterior, or spuriously 4-celled, polyspermous; style 1; stigma of 2 plates; ovules 00, attached to a solid axile placenta. Capsule 2-valved, 2-celled, often long and compressed, sometimes spuriously 4-celled. Dissepiment formed from the placenta, which when it is undivided cuts the cavity of the ovary into 2 cells, or when it is 2-lobed, as is sometimes the case, assumes the appearance of being parietal and forms a 1-celled ovary, either parallel with the valves, or contrary to them, finally becoming separate, and bearing the seeds. Seeds transverse, compressed, winged; albumen 0; embryo straight, foliaceous; radicle centrifugal, much smaller than the broad cotyledons.

In the mere form of their flower there is nothing to distinguish Bignoniacs from the kindred Orders. The distinction lies entirely in the seeds, which are winged, sessile, destitute of albumen, and furnished with a large leafy embryo, whose radicle is small and inconspicuous. They differ from Figworts in their leafy cotyledons and want of albumen; and from Acanthads, whose embryo is similar, in their winged seeds not attached to hard processes of the placenta. Besides which, their calyx is by no means so much imbricated as in Acanthads.

The central or axile position of the placenta, is an indispensable character of this Natural Order. The genus *Eccremocarpus*, however, appears to be

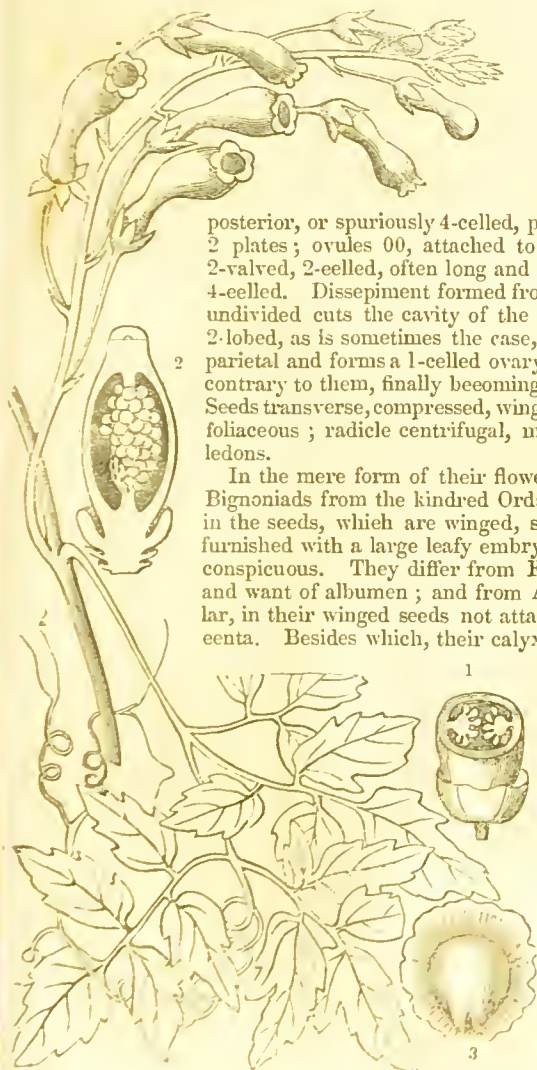


Fig. CCCCLV.

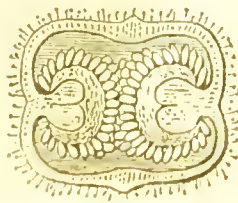


Fig. CCCCLVI.

an exception, its placenta being strictly parietal at the time of the expansion of the

Fig. CCCCLV.—*Eccremocarpus scaber*. 1. cross section of its ovary; 2. longitudinal section of it; 3. seed.

Fig. CCCCLVI.—Cross section of the same ovary, much more magnified and very young.

x x 2

flower. I, however, stated long since (*Bot. Reg.* 939, *Dec.* 1825,) that the placentation of *Eccremocarpus scaber* and *Bignonia radicans* are originally of the same nature, the difference between them consisting in the two placentæ of the latter meeting in the axis and uniting there, while in *Eccremocarpus* the two placentæ never touch in the middle, but exclusively adhere to the edges of the carpels.

Their wood is occasionally subdivided into 4 cruciform lobes. This is very conspicuous in *Bignonia capreolata*, and seems to be general in the woody species. M. Gaudichaud assures us that in Guayaquil these twiners have at first only 4 divisions of their woody system, but afterwards acquire 8, then 16, and probably 32, the divisions regularly following this mathematical progression. He also finds some indication of the tendency in the old stems of *Bignonia capreolata*. See his *Recherches Générales sur l'Organographie*, &c. p. 129, and the figures accompanying the statement.

The tropics of either hemisphere are the chief station of this noble-looking Order, whose trumpet-shaped flowers are the glory of the places which the species inhabit. The Order extends northwards in North America as far as Pennsylvania, and southwards into the southern provinces of Chile. In Europe it is unknown in a wild state.

The species are best known for the great beauty of the flowers, which from their large size, gay colours, and great abundance, are often among the most striking

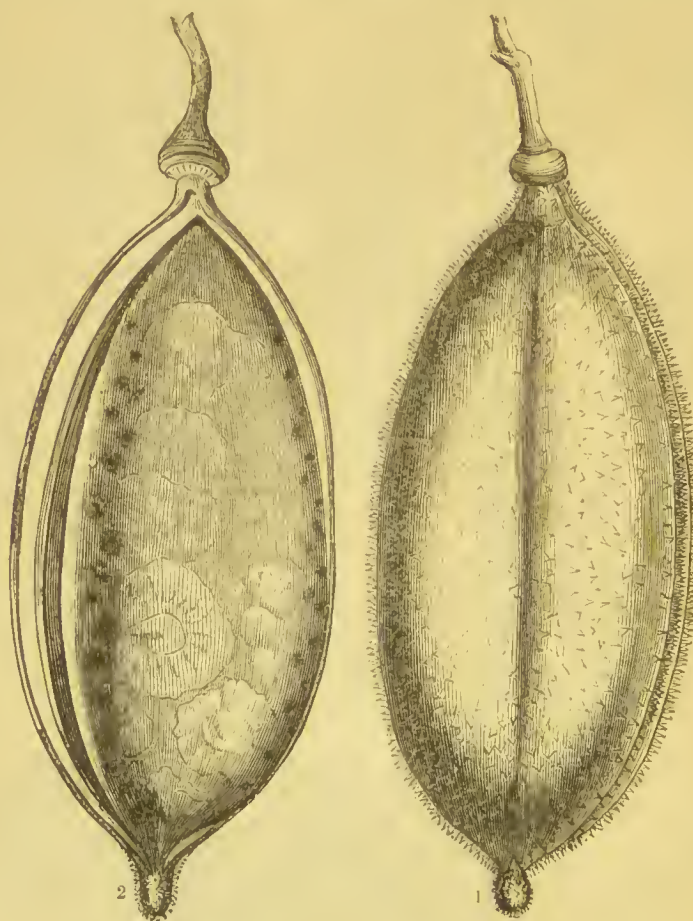


Fig. CCCCLVII.

objects in a tropical forest. Chica (called also Carajuru) is a red feculent substance obtained by boiling the leaves of *Bignonia Chica* in water; the Chica is quickly precipitated by adding some pieces of the bark of an unknown tree, called Arayana; the

Fig. CCCCLVII.—1. capsule of *Bignonia echinata*; 2. the same with the valves removed and the placenta remaining covered with seeds.

Indians use it for painting their bodies red ; it is also an article of importance to dyers ; in nature it approaches the resins, but contains some peculiar properties ; it gives an orange-red to cotton. The tough shoots of *B. Cherere* are woven into wicker-work. A decoction of the pods of *Catalpa syringifolia* is used in Italy as a remedy for catarrhal dyspnoea and coughs.—*Gard. Mag.* xiii. 524. According to Kæmpfer a nearly allied species, or perhaps the same, found in Japan, has extremely bitter leaves and bark, and a decoction of the pods is employed in asthmatic complaints; the leaves are also used for fomentations. The bark of the younger branches of *B. antisiphilitica* is considered in Brazil one of the most powerful remedies against syphilitic swellings of a malignant character. The decoction is chiefly used, and also the bark dried and pounded, externally. The roots of some are venomous and bitter ; that of *Tecoma stans* is diuretic. The bark of *B. leucoxylo* is regarded as an antidote to the poison of the Manchineeal tree. The branches of *B. echinata* are said to be employed in adulterating Sarsaparilla. *Tecoma imperiginosa* abounds in tannin ; its bark is bitter and mucilaginous, and is used in lotions, baths, &c. in inflammations of the joints and debility. *Tecoma Ipe* has similar qualities, and is prescribed by the Brazilians as a gargle in ulcers of the mouth ; the leaves are milder and are sometimes used in ophthalmic affections. The leaves of *Sparattosperma lithontriptica* are bitter, acrid, and diuretic, and have a Brazilian reputation in calculus, in which indeed Martius testifies to their efficacy. *Jacaranda procera* and other species of that genus are employed in syphilitic affections. *Tecoma speciosa* is said to be a useful diuretic and cathartic. Several kinds of *Bignonia* form large trees in the forests of Brazil, where they are felled for the sake of their timber ; that called *Ipe-tabaco* furnishes durable ship-timber ; the *Ipeuna*, another species, is the hardest wood in Brazil. Another, called the *Pao d'arco*, supplies one of the best kinds of wood used for bows by the Brazilian savages, especially the *Botocudos* of the *Rio Grande de Behmtonde*, and the *Patachos* of the *Rio do Prado*.

GENERA.

<i>Bignonia</i> , L.	<i>Arrabidaea</i> , DC.	<i>Stereospermum</i> , Cham.	<i>Icaranda</i> , Pers.
<i>Stenolobium</i> , Don.	<i>Vasconcella</i> , Mart.	<i>Zeyhera</i> , Mart.	<i>Catophractes</i> , D. Don.
<i>Tennocordia</i> , Mart.	<i>Anemopaegma</i> , Mart.	? <i>Chasmia</i> , Schott.	? <i>Platycarpum</i> , H. B. K.
<i>Alcocordia</i> , Mart.	<i>Distictis</i> , DC.	<i>Callichlamys</i> , Miq.	<i>Rhigozum</i> , Burch.
<i>Batocordia</i> , Mart.	<i>Haplophium</i> , Endl.	<i>Tabebuia</i> , Gom.	<i>Argyllia</i> , D. Don.
<i>Pachyptera</i> , DC.	<i>Aptolophium</i> , Cham.	<i>Couratia</i> , Splitg.	<i>Touretia</i> , Juss.
<i>Fridericia</i> , Mart.	<i>Amphilophium</i> , Kth.	<i>Crateritecoma</i> , Mart.	<i>Dombeya</i> , Lher.
<i>Astianthus</i> , D. Don.	<i>Pithecoctenium</i> , Mart.	<i>Phænicocirsus</i> , Mart.	<i>Incarvillea</i> , Juss.
<i>Calosanthus</i> , Bl.	<i>Delostoma</i> , D. Don.	<i>Tecoma</i> , Juss.	<i>Amphicomia</i> , R. Br.
<i>Oroxyllum</i> , Vent.	<i>Cybistax</i> , Mart.	<i>Campsis</i> , Lour.	<i>Eccremocarpus</i> , R. P.
<i>Cuspidaria</i> , DC.	<i>Phryganocordia</i> , Mart.	<i>Tecomaria</i> , Fenzl.	<i>Calampelis</i> , Don.
<i>Lechmocordia</i> , Mart.	<i>Adenocalymna</i> , Mart.	<i>Catalpa</i> , Scop.	* * *
<i>Macfadyena</i> , A. DC.	<i>Sparattosperma</i> , Mart.	<i>Chilopsis</i> , D. Don.	<i>Pteropodium</i> , DC.
<i>Luudia</i> , DC.	<i>Spathodea</i> , Beauv.	<i>Pajanelia</i> , DC.	<i>Dipterosperma</i> , Hassk.
<i>Mansoa</i> , DC.	<i>Dolichandra</i> , Cham.	<i>Jacaranda</i> , Juss.	<i>Bravaisia</i> , DC.
<i>Millingtonia</i> , L.	<i>Heterophragma</i> , DC.	<i>Korddestris</i> , Arrud.	? <i>Trigonocarpus</i> , Wall.

NUMBERS. GEN. 44. Sp. 450.

POSITION.—GESNERACEÆ.—BIGNONIACEÆ.—CROSCENTIACEÆ.

ORDER CCLXIII. ACANTHACEÆ.—ACANTHADS.

Acanthi, *Juss. Gen.* 102. (1789).—*Acanthaceæ*, *R. Br. Prodr.* 472; *Nees ab. Escnb. in Wall. pl. as. rar.* 3. 70; *Endl. Gen. cl.*; *Meisner Gen.* p. 293.

DIAGNOSIS.—*Bignonial Exogens, with axile placentæ, wingless exalbuminous seeds attached to hard placental processes, and large fleshy cotyledons.*

Herbaceous plants or shrubs, chiefly tropical; their hairs, if they have any, simple, occasionally capitate, very rarely stellate. Leaves opposite, rarely in fours, without stipules, simple, undivided, entire, or serrated; rarely sinuated, or having a tendency to become lobed, sometimes in unequal pairs. Inflorescence terminal, or axillary, in spikes, racemes, fascicles, or panicles; the flowers sometimes even solitary. Flowers usually opposite in the spikes, sometimes alternate, with three bracts, of which the lateral are now and then deficient; these bracts sometimes large and leafy, and inclosing a diminished calyx, which is occasionally obsolete. Calyx 4- or 5-divided, usually 5-leaved, equal or unequal, generally very much imbricated, occasionally cut into many pieces, or entire and obsolete, persistent. Corolla monopetalous, hypogynous, bearing the stamens, mostly irregular; the limb ringent or 2-lipped (the lower lip overlapping the upper in æstivation), occasionally 1-lipped, sometimes nearly equal, deciduous. Stamens mostly 2, both bearing anthers; sometimes 4, didynamous, the shorter ones being sometimes sterile; anthers either 2-celled,



Fig. CCCCLVIII.

their cells being inserted equally or unequally, or 1-celled, opening lengthwise. Ovary seated in a disk, 2-celled, composed of 2 carpels placed in front and back as regards the axis, and bearing the placentæ on their edges, the cells either 2- or many-seeded; placentæ parietal, although adhering in the axis; style 1; stigma 2-lobed, rarely undivided; ovules amphitropal or campulitropal. Capsule 2-celled, the cells 2- or many-seeded, often contracted into a stalk by the abortion of the base, and sometimes even 1-seeded, bursting elastically with 2 valves. Dissepiment opposite the valves, separating into two pieces through the axis (the middle being sometimes open); these pieces attached to the valves, sometimes separating from them with elasticity; entire, or occasionally spontaneously splitting in two, their inner edge bearing the seeds. Seeds roundish, hanging by hard, cup-shaped, or usually hooked ascending processes of the placenta; testa loose; albumen 0; embryo curved or straight; cotyledons large, roundish; radicle taper, descending, and at the same time centripetal, curved, or straight.

In a majority of cases these plants are to be recognised by the presence of large leafy bracts, in the axils of which the flowers are concealed, and also by their calyx being composed of deeply imbricated sepals forming quite a broken whorl. But their most exact difference from the other Orders of the Alliance consists in the singular structure of their placenta, which expands into hard woody processes, which are most commonly hooked. In the form of their embryo they agree with Bignoniads, but the cotyledons are more fleshy, and their seeds are never winged. From Figworts they are absolutely divided by the absence of albumen, as well as by their placental processes and large fleshy cotyledons. A singular want of development occurs in the calyx of the genera *Thunbergia*, *Mendozia*, and *Clistax*, in which that organ is sometimes reduced to a mere obsolete ring, its place being supplied by bracts. *Mendozia* is also remarkable for its fruit being a 1-seeded drupe, with crumpled chrysaloid cotyledons. Mr. Bentham states that the placental processes are sometimes absent; in such cases the embryo can be alone relied upon.

An elaborate account of this Order has been published by Professor Nees v. Esenbeck, in his Dissertation upon the Indian species of Dr. Wallich's Herbarium, in the work above quoted. It is there that the mass of genera was first revised, their limits investigated, and a natural arrangement of them proposed. This eminent Botanist adopts the opinion of Dr. Brown, that among Acanthads the most valuable of all characters resides in the placental processes, and accordingly his three great tribes are defined thus:—I. *Thunbergiæ*: Processes expanded into a horny cup and adnate to the seed, which they support. II. *Nelsoniæ*: Processes contracted into a papilla which bears (not carries) the seed. Seeds small and pitted. III. *Echmatacanthi*: Seeds supported by hooked processes. The subordinate divisions are formed upon considerations connected with the form of the corolla, the number of stamens, the condition of the anther, &c.; and here he differs widely from Dr. Brown in his estimate of the relative value of characters. A second arrangement has been since proposed by Professor Meisner, who attaches less importance to the placental processes, and adds two tribes called *Russeggereæ* and *Mendoziæ*. He truly observes that there are few natural Orders which now demand, in so eminent a degree, a searching investigation as that of Acanthads. Professor Nees v. Esenbeck chiefly occupied himself with Indian species: but the crowds of Africans and Americans which load the shelves of all large herbaria, attest how small a proportion the former bear to the whole of the Order.

Professor Nees v. Esenbeck entertains the opinion that the fruit of Acanthads consists of 4 carpels, alternate with the sepals, a fifth, answering to the space between the two lower sepals, being constantly deficient. He says that their union may be easily discovered when they are very young, and that each has its own midrib and three wavy veins at its base; he compares these carpels to the bractlet of *Adhatoda Betonica*, and he states that the placenta of the upper edge of the upper carpillary leaves, and of the lower edge of the lower, are constantly imperfect.—*Wallich Pl. As. Rar.* iii. p. 73.

Acanthads are almost entirely tropical, and in such regions extremely common, constituting in fact a large part of the weedy herbage. It is only in some rare instances that they advance far to the north, as in the genus *Acauthus* found in Greece, and in a few species inhabiting the United States.

They are of very slender importance to man. The greater part are mere weeds; many, however, are plants of great beauty, especially the species of *Justicia*, *Aphelandra*, and *Ruellia*. For the most part they are mucilaginous and slightly bitter; occasionally the bitterness increases, and they become pectoral medicines; some are dyers' plants. The genuine Acanths, formerly called *Brancaurines*, whose beautifully-lobed and sinuated leaves furnished the noble ornament of the Corinthian capital, are emollients; so is *Justicia biflora*, an Egyptian plant. The flowers, leaves, and fruits of *Adhatoda* are bitterish, s aromatic, and said to be antispasmodic. *Justicia pectoralis*, boiled in sugar, yields a sweet-scented syrup, which is considered in Jamaica a stomachic. The leaves and stalks of *Gendarussa vulgaris* have, when rubbed, a strong and not unpleasant smell, and are, after being roasted, prescribed in India in cases of chronic rheumatism, attended with swelling in the joints. The basis of a famous French bitter tincture, called *Droque amère*, highly valued for its stomachic and tonic properties, is the *Justicia paniculata*, called *Creyat* in India. The leaves of *Ruellia strepens* are subacrid. *Justicia Eebolium* is one of the diuretics. A valuable deep-blue dye, called *Room*, is obtained in Assam from a species of *Ruellia*.—*Griffith in Journ. As. Soc., May, 1837*, p. 326.

GENERA.

I. THUNBERGÆÆ.	<i>Nomaphila</i> , <i>Bum.</i>	<i>Echmanthera</i> , <i>Nees.</i>	<i>Dilivaria</i> , <i>Juss.</i>
<i>Thunbergia</i> , <i>Linn.</i>	<i>Polyechma</i> , <i>Hochst.</i>	<i>Goldfussia</i> , <i>Nees.</i>	♀ <i>Cheilopsis</i> , <i>Moq.</i>
<i>Diplocalymma</i> , <i>Spreng.</i>		<i>Asystasia</i> , <i>Bum.</i>	<i>Blepharacanthus</i> , <i>Nees.</i>
<i>Flemingia</i> , <i>Ham.</i>	RUELLIDÆ.	<i>Cryphiacanthus</i> , <i>Nees.</i>	<i>Acanthus</i> , <i>Tournef.</i>
<i>Meyenia</i> , <i>Nees.</i>	<i>Dyschoriste</i> , <i>Nees.</i>	<i>Echinacanthus</i> , <i>Nees.</i>	<i>Acanthodium</i> , <i>Del.</i>
<i>Hexacentris</i> , <i>Nees.</i>	<i>Chaetacanthus</i> , <i>Nees.</i>	<i>Leptacanthus</i> , <i>Nees.</i>	<i>Monechma</i> , <i>Hochst.</i>
<i>Mendozia</i> , <i>Velloz.</i>	<i>Dipteracanthus</i> , <i>Nees.</i>	<i>Trichanthera</i> , <i>Kunth.</i>	<i>Russeggera</i> , <i>Endl.</i>
<i>Mendoncia</i> , <i>Vell.</i>	<i>Dizygandra</i> , <i>Meisner.</i>		<i>Schwabea</i> , <i>Endl.</i>
	<i>Aphragmia</i> , <i>Nees.</i>	BARLEIDÆ.	<i>Athlianthus</i> , <i>Endl.</i>
II. NELSONÆÆ.	<i>Petalidium</i> , <i>Nees.</i>	<i>Asteracantha</i> , <i>Nees.</i>	JUSTICIADÆ.
<i>Elytraria</i> , <i>Vahl.</i>	<i>Calophanes</i> , <i>Don.</i>	<i>Tenoria</i> , <i>Denh.</i>	<i>Crossandra</i> , <i>Salisb.</i>
<i>Nelsonia</i> , <i>H. Br.</i>	<i>Mieria</i> , <i>Miers.</i>	<i>Barleria</i> , <i>Linn.</i>	<i>Harrachia</i> , <i>Jacq. I.</i>
<i>Adenosma</i> , <i>R. Br.</i>	<i>Salpicanthus</i> , <i>Hooker.</i>	<i>Crabbea</i> , <i>Horn.</i>	<i>Aphelandra</i> , <i>R. Br.</i>
<i>Ebermeyera</i> , <i>Nees.</i>	<i>Ruellia</i> , <i>Linn.</i>	<i>Lophostachys</i> , <i>Pohl.</i>	<i>Synandra</i> , <i>Schrad.</i>
<i>Erythracanthus</i> , <i>Nees.</i>	<i>Phlebophyllum</i> , <i>Nees.</i>	<i>Attilisma</i> , <i>R. Br.</i>	<i>Hemitome</i> , <i>Nees.</i>
<i>Gymnacanthus</i> , <i>Nees.</i>	<i>Butarea</i> , <i>Nees.</i>	<i>Whittleldia</i> , <i>Hooker.</i>	<i>Strobilrachis</i> , <i>Rt.</i>
	<i>Adenacanthus</i> , <i>Nees.</i>	<i>Geisomeria</i> , <i>Lindl.</i>	<i>Porphyrocoma</i> , <i>Hooker.</i>
III. ECHMATACAN-	<i>Stephanophysum</i> , <i>Pohl.</i>	<i>Lepidantha</i> , <i>Willd.</i>	<i>Endopozon</i> , <i>Nees.</i>
THI.	<i>Stenosphonum</i> , <i>Nees.</i>	<i>Aplopia</i> , <i>Bl.</i>	<i>Loxanthus</i> , <i>Nees.</i>
HYGROPHILIDÆ.	<i>Strobilanthes</i> , <i>Bum.</i>	<i>Neuracanthus</i> , <i>Nees.</i>	<i>Phlogacanthus</i> , <i>Nees.</i>
<i>Hemidelpsis</i> , <i>Nees.</i>	<i>Phoracanthus</i> , <i>Nees.</i>	<i>Corythacanthus</i> , <i>Nees.</i>	<i>Cryptopragmium</i> , <i>Nees.</i>
<i>Physiculus</i> , <i>Nees.</i>	<i>Apogonia</i> , <i>Bl.</i>		<i>Haplanthera</i> , <i>Hochst.</i>
<i>Hygrophila</i> , <i>R. Br.</i>	<i>Symplocia</i> , <i>Nees.</i>	ACANTHIDÆ.	<i>Rostellularia</i> , <i>Reichenb.</i>
	<i>Stenandrium</i> , <i>Nees.</i>	<i>Blepharis</i> , <i>Juss.</i>	

Rostellaria, Nees.
Hemichoriste, Wall.
Odontonema, Nees.
Graptophyllum, Nees.
Beloperone, Nees.
Schaueria, Nees.
Tyloglossa, Hochst.
Gendarussa, Nees.
Adhatoda, Herm.
Rhytiglossa, Nees.
Leptostachya, Nees.
Gymnostachyum, Nees.
Erauthemum, R. Br.

Chameranthemum, Nees.
Justicia, Nees.
Rhinacanthus, Nees.
Hypbastes, Soland.
Micranthus, Wendl.
Phaylopsis, Willd.
Rhaphidospora, Nees.
Monothecium, Hochst.

DICTYPTERIDÆ.

Blechnum, P. Br.
Rungia, Nees.
Dicliptera, Juss.
Dianthera, Soland.
Ampliscopia, Nees.
Peristrophe, Nees.
Sautiera, Decaisne.

ANDROGRAPHIDÆ.

Erianthera, Nees.
Haplanthus, Nees.
Andrographis, Wall.
 * * *
 ? *Clistax*, Mart.

? *Struogyne*, Wall.
 ? *Brillantaisia*, Palis.
 ? *Banjolea*, Bowd.
 ? *Meissarrhena*, R. Br.
 ? *Hydromestus*, Scheidw.
 ? *Neowiedia*, Schr.
Fabria, E. M.
Ramusia, E. M.
Duvernoia, E. M.
Campylostemon, E. M.
Anthocometes, E. M.
 ? *Heptas*, Meisn.
Septas, Lour.

NUMBERS. GEN. 105. Sp. 750 ?

Verbenaccæ.

POSITION.—BIGNONIACEÆ.—ACANTHACEÆ.—SCROPHULARIACEÆ.



Fig. CCCCLIX.

Fig. CCCCLIX.—*Aphelandra cristata*.—Paxton.

ORDER CCLXIV. SCROPHULARIACEÆ.—FIGWORTS.

Scrophulariæ, *Juss. Gen.* 117. (1789).—Scrophularinæ, *R. Brown Prodr.* 433. (1810); *Bartl. Ord. Nat.* 169. (1830); *Benth. in Bot. Register*, June (1835); *Scrophular. Ind.* (1835); *Don in Ed. Phil. Journ.*, (July, 1835); *Endl. Gen.* p. 670.—Pediculares, *Juss. Gen.* 99. (1789) *in part.*—Personatæ, *DC. Fl. Fr.* 3. 573. (1815); *Don in Edinb. Phil. Journ.*, (July, 1835).—Antirrhinæ, *DC. and Duby*, 342. (1828).—Halleriæ, *Link Handb.* 1. 506. (1829) a § of Personatæ.—Scopariæ, *ib.* 822. *the same.*—Erinæ, *ib.* 510. *the same.*—Cheloneæ, Aragonæ, Sibtorpiæ, *Don in Edinb. Phil. Journ.*, (July, 1835).—Melampyræ, *Rich. Anal. du Fruit.* (1808).—Rhinanthæ, *DC. Fl. Fr.* 3. 454. (1815).—Pediculares, *Juss. Gen.* 99. (1789) *in part.*; *Duvau in Ann. des Sc. Nat.* 8. 180. (1826).

DIAGNOSIS.—*Bignonial Ecogens, with axile placenta, albuminous seeds, and cotyledons scarcely larger, or not so large as the radicle.*

Herbs, under-shrubs, or sometimes shrubs, usually scentless, but sometimes foetid, rarely aromatic. Leaves opposite, whorled, or alternate. Flowers axillary, or racemose, rarely spiked. Peduncles opposite or alternate; sometimes simple and 1-flowered, sometimes many-flowered in dichotomous cymes. Calyx inferior, persistent, pentamerous, or by abortion tetramerous, the sepals sometimes united almost to the point, sometimes only at their base, sometimes altogether distinct and imbricated, often unequal, the upper one being largest, the two lowest smaller, the lateral ones smallest. Corolla monopetalous, pentamerous, or the upper petals being united to their points, tetramerous; tube short or long; limb flat or erect, nearly equally divided or bilabiate, imbricated in aestivation. Stamens in a single series opposite the sepals; the uppermost altogether deficient, or sterile, or very rarely fertile, and shorter than the others; the two lateral equal, antheriferous or very rarely sterile and abortive; the lower equal, sometimes fertile and equal to the lateral ones or longer, often sterile or deficient; anthers 2-celled, or, by growing together or half-disappearing, one-celled, opening longitudinally. Ovary superior, 2-celled, many-seeded; style simple or rarely shortly bifid; stigmatic surface terminal when the style is entire, either very thin and punctiform, or more or less pulvinate or capitate, entire or emarginate; when the style is bifid the stigmatic surface either lines the inner surface of the lobes, or their margins, or rarely forms a

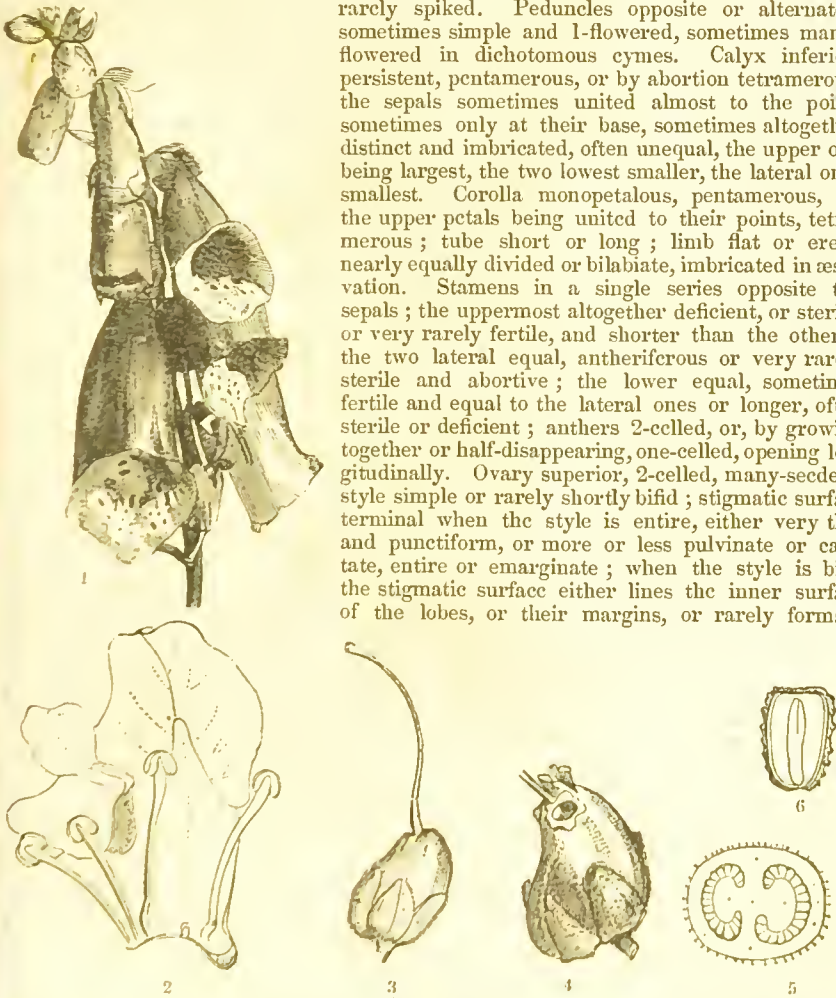


Fig. CCCCLX.

Fig. CCCCLX.—1. *Digitalis purpurea*, 2. corolla of *Antirrhinum majus* cut open; 3. its pistil; 4. its ripe fruit; 5. cross section of its ovary; 6. section of its seed.

pulvinate mass in the fork. Fruit capsular, seldom berried, dicarpellary, 2-celled sometimes with 2 entire or bifid valves, sometimes with 4 entire ones, sometimes opening by pores or lids, very rarely almost indehiscient; dissepiment parallel or opposite to the valves, finally loose in the centre, or altogether. Placentæ adhering to the dissepiment, sometimes when mature separate and forming 1-2 central columns. Seeds indefinite, rarely definite, albuminous; embryo orthotropical, heterotropical, or antitropical, but slightly curved.—*Bentham*.

The capsular monopetalous genera of Dicotyledons, with a superior ovary, albuminous seeds, and irregular diandrous or didynamous stamens, were separated by Jussieu into two Orders, which he called Scrophulariæ and Pedicularæ, distinguished from each other by the dehiscence of their fruit: the former being septicial, and the latter loculicidal. Brown, in his *Prodromus*, pointed out the insufficiency of this character, which is often not even of generic value, and he combined the Orders of Jussieu under the common name of Scrophularinæ (Figworts). This opinion has been adopted by subsequent writers, with the exception of De Candolle, who, in Duby's *Botanicon Gallicon* (1828) adheres to the old division of Jussieu, the names being changed into Antirrhinæ and Rhinanthæ. Notwithstanding the almost universal assent to the identity of the two Orders of Jussieu, some separations have been made upon different principles from those of that learned Botanist. Thus Broomrapes have been distinguished by himself; Gesnerworts by Nees Von Esenbeck; and Melampyrææ by Richard. The two former are adopted by all Botanists; the latter group has not been generally received. I formerly admitted it, upon the ground of its definite ascending seeds and inverted embryo; but subsequent observation led me to think that by excluding from the character all consideration of the number and direction of the seeds, an Order would be formed, agreeing in a peculiar habit, and in the radicle of the embryo not being presented to the hilum, to which the name of Rhinanthis might conveniently be retained. According to this view of the subject, Figworts would include no genus the embryo of which is not orthotropical, and in Rhinanthis it could be antitropical or heterotropical. But although the attachment of the seeds of Rhinanthis is generally lateral, yet sometimes the radicle points to the hilum; but it is more generally removed from it. The ovules are never fewer than 2 in each cell, often numerous, and there are sometimes, though rarely, 2 ovules only in the ovary of some of the tribes of Figworts. And therefore the ground for separating Rhinanthis from Figworts sinks from under us.

The number of synonymous names above quoted, shows into how many more supposed Orders the old Scrophulariæ have been broken by one author or another. The whole matter has, however, been investigated by Mr. Bentham, who has treated the question in both a philosophical and practical way, and who concludes that in fact all the supposed Orders are really sections of one great Natural Order.

Mr. Bentham remarks that the nearest Order to Figworts is undoubtedly that of Nightshades, through the medium of Salpiglossids; so that it becomes necessary to separate them by a purely artificial distinction, considering as Nightshades such genera as have a plaited corolla and 5 stamens, and as Figworts all those in which either the fifth stamen is wanting, or the æstivation of the corolla imbricated. The line would thus be drawn between *Petunia* and *Salpiglossis*, two genera closely allied in habit. In the first, however, the decidedly plicate corolla and 5 stamens show it to be a true Nightshade, whilst the slight irregularity of the corolla and the declinate very unequal stamens, indicate an approach to *Salpiglossis*, which, being always didynamous, with an imbricately æstivating, or obscurely plicate corolla, is a genuine Figwort. Among Verbascæ the genus *Verbascum* which is pentandrous, and *Celsia*, because it cannot be separated from *Verbascum*, have usually been referred to Nightshades, although no plants nearly allied to *Verbascum* occur in the latter Order; but the æstivation of the corolla, besides the general habit, leave no doubt that Bartling and others are right in classing these genera among Figworts. A better reason seems to me to be furnished by the manifest tendency to lose a part of the stamens, which occurs in *Verbascum*.

From the other Orders of this Alliance the Figworts are sufficiently well distinguished. They differ from Pedaliads, Gesnerworts, and Crescentiads in their placentæ never being parietal; from Bignoniads and Acanthiads in their albuminous seeds and small cotyledons; from Butterworts in their axile, not free central placentæ.

Some Figworts approach Broomrapes in the peculiar habit of that Order, especially the *Buchneræ*, among which most, if not all, the *Strigas* are parasitical, and *Buchnera hydrabadensis* is actually leafless like a Broomrape.

The two tribes of *Mitrasæmæ* and *Buddleæ* approach *Loganiads* in their leaves being connected by a transverse line, which occasionally expands in the form of stipules; but they differ in their flowers being irregular, at least in æstivation, one lateral lobe being outermost, whilst the upper one is innermost. In all *Loganiads* which I have examined, the æstivation is either regularly convolute or valvate. The irre-

gularity of the corolla sometimes assumes a very peculiar appearance, owing to its tendency to form pouches or spurs. This is particularly striking in the genera *Linaria* and *Antirrhinum*, in which the corolla takes a direction upwards, so as to form a convexity on the under side of the limb, the result of which is that form of corolla called riuigent; and also a direction downwards, which produces a long spur. In the genus *Calceolaria* it causes the anterior face to assume quite the appearance of a slipper. On the other hand, in the genus *Veronica*, both irregularity and want of symmetry almost wholly disappear.

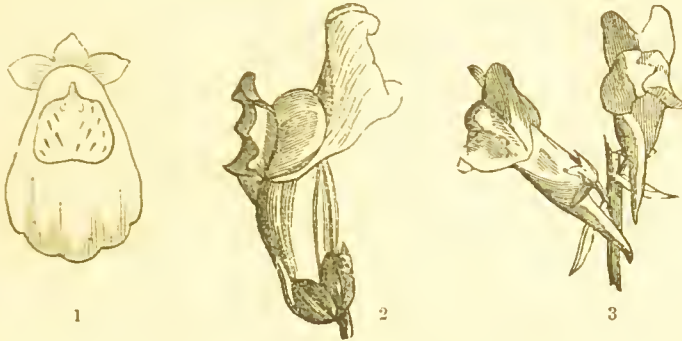


Fig. CCCLXI.

In this Order many species have a stigma composed of two highly irritable plates, one placed next the back and the other next the front of the flower. When the corolla first expands, these plates stand apart and are even turned back a little; but when touched they collapse suddenly and with some force. This phenomenon has been described by Mr. Henderson in the *Annals of Nat. Hist.* vol. 6. p. 51.

A curious genus, called *Schwenkia*, with clavate glands growing from the edge of its corolla, usually referred to this Order, was formerly rejected at my instance, the stamens having appeared to me to be opposite the lobes of the corolla. It is more than twenty years since I had an opportunity of examining it, and Mr. Bentham now assures me that the real petals are the aforesaid glands with which the stamens alternate, and that it is a genuine member of the Order of Figworts.

These plants are found in abundance in all parts of the world, from the coldest regions in which the vegetation of flowering plants takes place, to the hottest places within the tropics. One species is found in Melville Island; in the middle of Europe they form about a 26th of the flowering plants, and in North America about a 36th. In all India, New Holland, and South America they are common; and, finally, the sterile shores of Tierra del Fuego are ornamented with several genera.

The species are generally acrid, bitterish, and suspected. The leaves and roots of *Scrophularia aquatica*, and perhaps *nodosa*, some species of *Calceolaria*, and many others, act as purgatives, or even as emetics. In *Digitalis purpurea*, *ochroleuca*, *lævigata*, *feruginea* and other species, this quality is so much increased, that its effects become highly dangerous; the powdered leaves, or an extract of them, produce vomiting, dejection, and vertigo, increase the secretion of the saliva and urine, lower the pulse, and even cause death. The Mulleins approach *Digitalis* in this respect; the seeds of *Verbascum Thapsus* and *nigrum* are used by poachers to poison fish, and the flowers of *V. Lychnitis* are sometimes used to destroy mice; the foliage of these plants is acrid and bitterish. The leaves of *Mimulus guttatus* are eatable as salad. The juice of the leaves of *Torenia asiatica* are considered, on the Malabar coast, a cure for gonorrhœa. An infusion of *Scoparia dulcis* is used by the Indians of Spanish America to cure agues, and in Brazil against hæmorrhoidal affections. *Euphrasia officinalis* is slightly bitter and aromatic, and has been employed with success by Kranichfeld in catarrhal inflammations of the eye; he has also found it beneficial in cough, hoarseness, carache and headache, which have supervened in catarrhal affections.—*Med. Gaz.* xx. 528. Cows are said to be fond of *Melampyrum pratense*; and Linnaeus says the best and yellowest butter is made where it abounds. The *Pedicularids* are acrid, but are eaten by goats. Nearly all that tribe turn black in drying. *Herpestes amara*, an Indian herb, is intensely bitter; but its properties have not been investigated. *Picrorhiza* derives its name from the bitterness of its roots; it is used on that account in the native medicine of India. *Vandellia diffusa* is said to be of great value in Guayana as an antibilious emetic

Fig. CCCLXI.—1. slipper-shaped corolla of *Calceolaria*; 2. riuigent corolla of *Antirrhinum*; 3. riuigent and spurred corolla of *Linaria*.

and febrifuge, and a most efficacious remedy in malignant fevers and dysentery, especially in cases depending on a disordered state of the liver. It is called Hainarada by the Arowak Indians, and Bitter Blain by the Dutch Creoles. *Linaria vulgaris* is reputed to be purgative and diuretic. It is bitter. Its flowers have been recommended in decoction as a wash for chronic diseases of the skin; and that it would not be an inactive lotion seems probable from the fact that in London the plant is occasionally boiled in milk for the purpose of destroying flies. *Linaria cybalaria* has a warm cross-like flavour, and has been recommended as an antiscorbutic. Hamilton says that in India it is given with sugar in cure of diabetes, and from the report of its influence over that disorder, it well deserves to be tried by the European practitioner. It is, however, probable that Dr. Hamilton's remarks apply to *L. ramosissima*. *Linaria Elatine* is said to be bitter and purgative. *Gratiola officinalis* was formerly called *Gratia Dei*, on account of its efficiency as a medicine. It is extremely bitter, acts violently both as a purgative and emetic, and has been said to be the basis of the famous gout medicine called *Eau médicinale*, which, as its active principle appears to be of the nature of *Veratria*, is not improbable. *Gratiola* is said to have been found serviceable in cases of hypochondriasis. In overdoses it is a violent poison, and according to Haller, it renders by its abundance some of the Swiss meadows useless as pastures. *G. peruviana*, *Linn.*, has purgative and emetic leaves and roots. *Bramia serrata* is employed in Brazil in the preparation of baths for rheumatic patients; it has a strong penetrating odour.—*Martius, Choix des pl.* p. 12.

The whole plant of *Franciscea uniflora*, and especially its large root, is called Manacá in Brazil, and is found of great value in exciting the lymphatic system; in consequence of its large use in syphilis it is called by the Portuguese *Mercurio vegetal*; the inner bark and all the herbaceous parts are nauseously bitter; it is regarded as a purgative, emetic, emmenagogue, and alexipharmic; in over-doses it is found an acrid poison.—*Martius, Mat. Med. Bras.* p. 67.

One or two species are named as dyers' plants. The flowers of *Linaria vulgaris* are employed in some places to give a yellow colour; and the roots of *Calceolaria arachnoidea* are largely collected in Chili, under the name of *Relbun*, for dyeing woollen cloths crimson.—*Bot. Mag.* t. 2915.

GENERA.

[For which I am indebted to Mr. Bentham's kindness, Sept., 1845.]

<p>Suborder 1. SALPIGLOSSIDÆ.—<i>Benth.</i>—Inflorescence entirely centrifugal. Aestivation of the corolla either altogether plaited, or plaited-imbriate, the two upper segments being external.—<i>G. B.</i></p> <p>Duboisia, <i>Br.</i> Anthoeris, <i>Lab.</i> Schwenkia, <i>L.</i> <i>Chaetochilus</i>, <i>Vahl.</i> <i>Mathea</i>, <i>Vell.?</i> <i>Leptoglossis</i>, <i>Benth.</i> <i>Heteranthis</i>, <i>Nees et Mrt.</i> <i>Vrolikia</i>, <i>Spreng.</i> <i>Browallia</i>, <i>L.</i> <i>Brunfelsia</i>, <i>Plum.</i> <i>Franciscea</i>, <i>Pohl.</i> <i>Salpiglossis</i>, <i>Ruiz et Pav.</i> <i>Schizanthus</i>, <i>Ruiz et Pav.</i></p> <p>Suborder 2. ANTIRRHINIDÆ.—<i>Benth.</i>—Inflorescence entirely centripetal or compound, (i. e., general inflorescence or primary inflorescence centripetal, partial inflorescence centrifugal.) Aestivation of the corolla bilabiate imbricated, the two upper segments being external.—<i>G. B.</i></p> <p>Tribe 1. Calceolarææ. Calceolaria, <i>Fenill.</i></p>	<p><i>Jovellana</i>, <i>Ruiz et Pav.</i> <i>Bava</i>, <i>Pers.</i> not Com.</p> <p>Tribe 2. Verbascææ. <i>Verbascum</i>, <i>L.</i> <i>Ianthe</i>, <i>Griseb.</i> <i>Celsia</i>, <i>L.</i> <i>Ditaxia</i>, <i>Rafin.</i> <i>Neglea</i>, <i>Benth.</i> <i>Thapsandra</i>, <i>Griseb.</i> <i>Staurophragma</i>, <i>Fisch. et Mey.</i></p> <p>Tribe 3. Hememeridææ. <i>Alonsoa</i>, <i>Ruiz et Pav.</i> <i>Schistanthe</i>, <i>Kunze.</i> <i>Angelonia</i>, <i>Humb. et Bp.</i> <i>Physidium</i>, <i>Schrad.</i> <i>Schelveria</i>, <i>Nees.</i> <i>Thylacantha</i>, <i>Nees.</i> <i>Hemimeris</i>, <i>L.</i> <i>Diascin</i>, <i>Link et Otto.</i> <i>Colpasia</i>, <i>E. Mey.</i> <i>Nemesia</i>, <i>Vent.</i> <i>Diclis</i>, <i>Benth.</i></p> <p>Tribe 4. Antirrhinææ. <i>Linaria</i>, <i>Tourn.</i> <i>Elatine</i>, <i>Mœnch.</i> <i>Cymbalaria</i>, <i>Kicksia</i>, <i>Dumort.</i> <i>Auarthium</i>, <i>Desf.</i> <i>Cardiotheca</i>, <i>Ehrenb.</i> <i>Simbleta</i>, <i>Forsk.</i> <i>Antirrhinum</i>, <i>L.</i> <i>Orontium</i>, <i>Pers.</i> <i>Maurandia</i>, <i>Ort.</i> <i>Usteria</i>, <i>Chav.</i> <i>Galvezia</i>, <i>Pomb.</i></p>	<p><i>Agassizia</i>, <i>Chav.</i> <i>Lophospermum</i>, <i>Don.</i> <i>Rhodochitou</i>, <i>Zucc.</i></p> <p>Tribe 5. Cheloneææ. <i>Phygelius</i>, <i>E. Mey.</i> <i>Pawlownia</i>, <i>Zucc.</i> <i>Wightia</i>, <i>Wall.</i> <i>Diplanthera</i>, <i>Banks et Soland.</i></p> <p><i>Halleria</i>, <i>L.</i> <i>Scrophularia</i>, <i>Tourn.</i> <i>Collinsia</i>, <i>Nutt.</i> <i>Chelone</i>, <i>L.</i> <i>Pentstemon</i>, <i>Lhr.</i> <i>Elnigeria</i>, <i>Rehb.</i> <i>Dasanthera</i>, <i>Raf.</i> <i>Chionophila</i>, <i>Benth.</i> <i>Tetranema</i>, <i>Benth.</i> <i>Russelia</i>, <i>Jacq.</i> <i>Freylinia</i>, <i>Colla.</i> <i>Anastrabe</i>, <i>E. Mey.</i> <i>Teedia</i>, <i>Rud.</i> <i>Borkhausenia</i>, <i>Roth.</i> <i>Ixianthes</i>, <i>Benth.</i> <i>Leucocarpus</i>, <i>Don.</i> <i>Hemichama</i>, <i>Benth.</i></p> <p>Tribe 6. Escobedææ. <i>Escobedia</i>, <i>Ruiz et Pav.</i> <i>Sibia</i>, <i>Vell.</i> <i>Physocalyx</i>, <i>Pohl.</i> <i>Melasma</i>, <i>Berg.</i> <i>Nigrina</i>, <i>Linn.</i> <i>Lyncea</i>, <i>Cham. et Sclit.</i> <i>Gastromeria</i>, <i>Don.</i> <i>Alectra</i>, <i>Thunb.</i> <i>Starbia</i>, <i>Dup.Thou.</i> <i>Glossostylis</i>, <i>Cham.</i></p>	<p>Tribe 7. Gratiolææ. Subtribe 1. Aptosimeææ. <i>Leucophyllum</i>, <i>H. B. K.</i> <i>Aptosimum</i>, <i>Burch.</i> <i>Ohlendorfia</i>, <i>Lehm.</i> <i>Chilostigma</i>, <i>Hochst.</i> <i>Pellostomum</i>, <i>E. Mey.</i> <i>Anticharis</i>, <i>Endl.</i> <i>Acissarrhena</i>, <i>Br.</i> <i>Doratauthera</i>, <i>Benth.</i></p> <p>Subtribe 2. Manuleææ. <i>Nycternia</i>, <i>Don.</i> <i>Zaluzianskya</i>, <i>J. W. Schlm.</i> <i>Polycarena</i>, <i>Benth.</i> <i>Phyllopodium</i>, <i>Benth.</i> <i>Sphenandra</i>, <i>Benth.</i> <i>Chænostoma</i>, <i>Benth.</i> <i>Lyperia</i>, <i>Benth.</i> <i>Sutera</i>, <i>Roth.</i> <i>Manulea</i>, <i>L.</i> <i>Nemua</i>, <i>Berg.</i></p> <p>Subtribe 3. Eugratiolæææ. <i>Diplacus</i>, <i>Nutt.</i> <i>Mimulus</i>, <i>L.</i> <i>Erythranthe</i>, <i>Spach.</i> <i>Uvedalia</i>, <i>Br.</i> <i>Eunanus</i>, <i>Benth.</i> <i>Melosperma</i>, <i>Benth.</i> <i>Mazus</i>, <i>Lour.</i> <i>Hornemannia</i>, <i>Rehb.</i> <i>Dodartia</i>, <i>Linn.</i> <i>Lindenbergia</i>, <i>Link et Ot.</i> <i>Brachygoris</i>, <i>Schrad.</i> <i>Bovca</i>, <i>Decaisne.</i> <i>Beyrichia</i>, <i>Cham.</i></p>
---	---	---	---

Achetaria, Cham.
Matourea, Vahl?
Tetraulacium, Turcz.
Pterostigma, Benth.
Stemodia, L.
Adenosia, Br.
Unanuea, Ruiz et Pav.
Matourea, Aubl.?
Morgania, Br.
Limnophila, Br.
Hydropityon, Gærtn.
Cybanthera, Ham.
Ambulia, Lam.
Conohea, Aubl.
Leucospora, Nutt.
Sphaerotherca, Cham.
Lafuentea, Lag.
Durieuia, Mérat.
Schistopragma, Benth.
Herpestis, Gærtn.
Mecardonia, Mart.
Caenapea, Cham.
Ranaria, Cham.
Bramia, Lam.
Monniera, R. Br.
Calytriplex, R. P.
Septas, Lour.
Mela, Vand.
Heinzelmannia, Neck.
Batopa, Aubl.
Geochorda, Cham.
Ildefonsia, Gardn.
Gratiola, L.
Sophonanthe, Benth.
Nibora, Raf.
Dopatrium, Ham.
 Enthribe 4. *Lindernia*.
Curanga, Juss.
Synphyllum, Griff.
Artanema, Don.
Achimenes, Vahl.
Diceros, Pers.
Torenia, L.
Nortenia, Thou.
Craterostigma, Hochst.
Dranalia, R. Br.
Vandellia, L.
Tiltmannia, Rehb.
Hyogeton, Endl.
Elobum, Blum.?
Duceros, Blum.?
Vriesia, Haask.

Liuderuia, All.
Ilysanthes, Raf.
Bonnaya, Link et Otto.
Peplidium, Del.
Micranthemum, Mich.
Pinarda, Vell.
Globifera, Gmel.
Hemianthus, Nutt.

Suborder 3. RHINANTHIDEÆ.—Benth.—Inflorescence entirely centripetal or compound, (except perhaps a few Buddleiæ). Estivation quincuncial or irregularly imbricated, one of the lateral segments being generally external, while the two upper are always internal.—G. B.

Tribe 1. Sibthorpeæ.

Amphianthus, Torr.
Hydrantheium, H. B. K.
Willichia, Spr. non L.
Glossostigma, Arn.
Tricholoma, Benth.
Limosella, L.
Sibthorpia, L.
Disandra, L.
Willichia, L.?
Hornemannia, Benth.
Mazus pinnatus, Wall.
Hemiphragma, Wall.
Capraria, L.
Xuarazia, Ruiz et Pav.
Pogostoma, Schrad.
Camptoloma, Benth.
Scoparia, L.

Tribe 2. Buddleæ.

Microcarpæa, Br.
Bryodes, Benth.
Polypremum, L.
Gomphostigma, Turcz.
Nuxia, Vent.
Chilianthus, Burch.
Lachnopylis, Hochst.
Psiloxylon, Dup. Thou.
Buddlea, L.

Tribe 3. Digitalææ.
Isoplexis, Lindl.
Digitalis, L.

Eriurus, L.
Picrorhiza, Royle.
Wulfenia, Jacq.
Synthyris, Benth.
Calorhabdos, Benth.

Tribe 4. Veroniceæ.

Pæderota, Linn.
Veronica, Linn.
Hebe, Juss.
Leptandra, Nutt.
Callistachya, Raf.
Eustachya, Raf.
Aidelus, Spr.
Cochlidiospermum, Rh.
Diplophyllum, Lehm.
Omphalospora, Besser.
Aragoa, H. B. K.
Ourisia, Comm.
Dichroma, Cav.

Tribe 5. Buchnerææ.

Buchnera, Linn.
Piripea, Auhl.
Striga, Lour.
Campuleia, Dup. Thou.
Rhamphicarpa, Benth.
Macrosiphon, Hochst.
Cycnium, E. Mey.
Hyohanche, Thunb.

Tribe 6. Gerardieæ.

Hydrotriche, Zucc.?
Campanthanthus, Roth.?
Radamaea, Benth.
Rhaphispermum, Benth.
Micargeria, Benth.
Leptorhabdos, Schrenck.
Dargeria, Decaisne.
Seymeria, Pers.
Azelia, Gmel.
Otophylla, Benth.
Sylvia, Benth.
Buddlea, L.
Macranthera, Torrey.
Esterhazyia, Mikán.
Gerardia, Linn.

Virgularia, Ruiz Pav.
Dasytouna, Raf.
Pagesia, Raf.

Graderia, Benth.
Sopubia, Ham.
Rhaphidophyllum, Hbs.
Aulaya, Harv.
Harveya, Hook.
Centranthera, Br.
Razumovia, Spr.
Parshia, Dennst.

Tribe 7. Euphrasieæ.

Castilleja, Linn. fl.
Euchroma, Nutt.
Orthocarpus, Nutt.
Triphysaria, Fisch.
Oncorrhynchus, Lehm.
Adenostegia, Benth.
Schwalbea, Linn.
Siphonostegia, Benth.
Synnema, Benth.
Phtheirospermum, Bge.
Lamourouxia, H. B. K.
Enfragia, Col.
Trixago, Stev.
Bellardia, All.
Lasiopera, Hoffm.
Bartsia, Linn.
Stachelina, Hall.
Odontites, Hall.
Euphrasia, Linn.
Cymbaria, Linn.
Bungea, C. A. Mey.
Rhinanthus, Linn.
Alectoroloptus, Bieb.
Rhynchosocorys, Griseb.
Elephas, Tourn.
Rhinanthus, Bieb.
Pedicularis, Linn.
Melampyrum, Linn.
Tozzia, Linn.

Genera insufficiently known.

Diceros, Lour.
Gomara, Ruiz et Pav.
Picria, Lour.
Poarium, Desv.
Sanchezia, Ruiz et Pav.
Tala, Blanco.
Parentucellia, Vis.
Nicodemia, Tenor.

NUMBERS. GEN. 176. Sp. 1814.—Walpers.

Verbenacæ.

POSITION.—BIGNONIAEÆ.—SCROPHULARIACEÆ.—Lentibulariaceæ.

ORDER CCLXV. LENTIBULARIACEÆ.—BUTTERWORTS.

Lentibulariæ, *Richard in Flor. Paris*, p. 26. (1808).—Utriculinæ, *Hoffmannsegg et Link. Fl. Port.* (1806).—Lentibulariæ, *R. Brown Prodr.* 429. (1810); *Aug. de St. Hilaire, Ann. Sc. Nat.* 2 ser. xi. 149.—Utriculariæ, *Endl. Gen. clv.*; *Meisn. Gen.* p. 314; *DC. Prodr.* 8. 2.

DIAGNOSIS.—*Bignonial Exogens, with a free central placenta, minute seeds without albumen, and cotyledons much smaller than the radicle.*

Herbaceous plants, living in water or marshes. Leaves radical, undivided; or compound, resembling roots, and bearing little vesicles. Scapes either with minute stipule-like scales, or naked; sometimes with whorled vesicles; generally undivided. Flowers single, or in spikes, or in many-flowered racemes; with a single bract, rarely without bracts. Calyx divided, persistent, inferior. Corolla monopetalous, hypogynous, irregular, bilabiate. Stamens 2, included within the corolla, and inserted into its base; anthers 1-celled, sometimes contracted in the middle. Ovary composed of 2 valvate carpellary leaves, and therefore 1-celled; style 1, very short; stigma bilabiate; ovules 00, anatropal, placed on a free central placenta. Capsule 1-celled, many-seeded, with a large central placenta. Seeds minute, without albumen; embryo sometimes undivided. Radicle next the hilum.

The central free placenta and minute exalbuminous seeds are the principal points of distinction between these and Figworts, to which their habit approximates them. They are known from Primworts by their irregular flowers, exalbuminous embryo, and didynamous or unsymmetrical stamens, alternate with the segments of the corolla.

Mr. Bentham has remarked that they are very closely allied to Figworts, "having the same calyx, corolla, stamens and bivalve capsule, but distinguished solely by their really unilocular fruit, and the minuteness of their embryo. In respect

of the former character, they come very near to *Limosella*, *Lindernia*, and other *Gratioleæ*, with parallel dissepiments and entire valves; for in these plants the dissepiment is very thin, and usually detaches itself from the valves before maturity, so that being concealed by the seeds, which fill nearly the whole capsule, it often escapes observation, and many of these genera have frequently been described as having a unilocular fruit."

Natives of marshes, or rivulets, or fountains, in all parts of the world, especially within the tropics. The *Geuliseas* are exclusively Brazilian.

Pinguicula vulgaris has the property of giving consistence to milk, and of preventing its separating into either whey or cream. It is pretended that its leaves rot sheep; when fresh they are slightly purgative and vulnerary. *Linnæus* says that the solid milk of the Laplanders is prepared by pouring it warm and fresh from the cow over a strainer on which fresh leaves of *Pinguicula* have been laid. The milk, after passing among them, is left for a day or two to stand, until it begins to turn sour; it throws up no cream, but becomes compact and tenacious, and most delicious in taste. It is not necessary, that fresh leaves should be used after the milk is once turned: on the contrary, a small portion of this solid milk will act upon that which is fresh, in the manner of yeast.

GENERA.

Utricularia, *Linn.*
Lentibularia, *Vaill.*
Genlisca, *St. Hil.*

Pinguicula, *Tournef.*
Brandonia, *Reichenb.*
Polypompholyx, *Lehm.*
Tetralobus, *A. DC.*

NUMBERS. GEN. 4. Sp. 175.

Fig. CCCCLXII.—*Pinguicula vulgaris*—*Nees*. 1. calyx, &c.; 2. stamen; 3. pistil; 4. longitudinal section of it; 5. half a fruit; 6. seeds, natural size; 7. embryo very much magnified.



Fig. CCCCLXII.

SUB-CLASS IV. EPIGYNOUS EXOGENS.

IN general the complete adhesion of the tube of the calyx to the ovary through its whole length, and the bisexual flowers, afford a positive mark of distinction for this Sub-Class, which is undoubtedly composed of Orders which form perfectly Natural Alliances, closely related to each other, but indicating very strong lateral affinity for other parts of the system. Thus Campanals approach both Bignonials, in which Gesnerworts have a half-inferior ovary, and Solanals, among which Jaborosa has the stamens almost free from the corolla; Myrtals lean towards Rosals, whose flowers are furnished with a half-inferior ovary in the Order of Appleworts; the frontier of Grossals joins that of Saxifragals, the Currantworts of the one very nearly agreeing with the Cuuoniads of the other; Umbellals are completely imitated by Thalictrum among the Crowfoots of the Ranal Alliance, and by Vitaceæ among Berberals; and finally, the Asaral Alliance has its analogy in Helwingiads among the Dichinous Garryal Alliance, not to name many other similar cases. So that the Epigynous Sub-Class may be likened to a great kingdom lying in the midst of many others, just as Germany is bordered by France, Holland, Denmark, Poland, Hungary, Turkey, Italy, and Switzerland.

In the two previous Sub-Classes the Epigynous character occasionally breaks out, and sometimes in a very unexpected way; as when the genus *Eupomatia* appears in the hypogynous Raul Alliance; and in many of the Saxifragals. In like manner, both Myrtleblooms and Melastomads have species in which the calyx has but little union with the ovary; these are, however, beyond all question, exceptional instances.

It is here assumed that the inferior ovary is always formed by an adhesion of the calyx to its sides. There may, however, in some cases, be justice in the assertion of Schleiden, that the real inferior ovary is caused by a hollowing out of the peduncle, analogous to what takes place in the common Fig. (*Ann. Sc. 2 ser. XII. 374.*) Possibly such is its origin in Loranth, Cucurbits, Sandalworts, and others in which no calyx-veins are to be found on the surface of the fruit; and *Eschscholtzia* may be considered to offer an obvious explanation of this, its peduncle forming, round the base of the ovary, a cup which evidently has nothing to do with the calyx. If that is so, then the structure of Calycanths, the Rose, and many more will bear a similar interpretation. But it is impossible to admit that such is the origin of all the ovaries with a superior calyx. Melastomads, for instance, have evidently a true calyx tube; and even in Umbellifers the presence of an adherent calyx tube is demonstrated by those monsters of the wild Carrot which are sometimes found in fields with their 2 carpels in the condition of ordinary leaves; in such instances these carpellary leaves spring from the central axis, and are surrounded by the tubular but non-adherent calyx.

Whatever may be the true theory of the inferior ovary, it seems to be a very important point of structure, collecting together species having more resemblance to one another than to anything else, and therefore of great value for natural classification.

ALLIANCE L. *CAMPANALES*.—THE CAMPANAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with dichlamydeous monopetalous flowers, and an embryo with little or no albumen.*

This, which is probably the most extensive of all the groups, in this Work called Alliances, consists of Orders held together in the strictest bond of union. They form two sets, of which the one has the ovary with more than one cell, and the other with one only; but they probably have, in all cases, more than one carpel; and Valerian-worts, with one perfect and two seedless cells, completely joins the groups. In what way they pass into Myrtals will be shown when speaking of that Alliance. From the perigynous series they branch off by way of Gesnerworts, which have a half-superior ovary, to Nightshades, among which there are genera, which like Jaborosa, are Bellworts in most respects, except not having an inferior ovary.

NATURAL ORDERS OF CAMPANALES.

Ovary 2- or more celled. Anthers free, or half united. Stigma naked. Corolla valvate, regular	} 266. CAMPANULACEÆ.
Ovary 2- or more celled. Anthers syngenesious. Stigma surrounded by hairs. Corolla valvate, irregular	} 267. LOBELIACEÆ.
Ovary 2- or more celled. Anthers syngenesious or free. Stigma indusiate. Corolla induplicate	} 268. GOODENIACEÆ.
Ovary 2- or more celled. Stamens and style united into a column. Corolla imbricated	} 269. STYLIDIACEÆ.
Ovary 1-celled. Corolla imbricated. Anthers free. Ovule pendulous. Albumen none	} 270. VALERIANACEÆ.
Ovary 1-celled. Corolla imbricated. Anthers free. Ovule pendulous. Seeds albuminous	} 271. DIPSACACEÆ.
Ovary 1-celled. Corolla valvate. Anthers syngenesious. Ovule pendulous. Seeds albuminous	} 272. CALYCERACEÆ.
Ovary 1-celled. Corolla valvate. Anthers syngenesious. Ovule erect. Albumen none	} 273. ASTERACEÆ.

ORDER CCLXVI. CAMPANULACEÆ.—BELLWORTS.

Campanulæ, *Juss. Gen.* 163. (1789) in part.—Campanulaceæ, *R. Brown Prodr.* 559. (1810); *Endl. Gen.* cxxv.; *DC. Prodr.* 7. 414.—Cyphiaceæ, *DC. Prodr.* 7. 497.—Sphenocleaceæ, *Martius Couspect.* 162. (1835); *Ed. pr.* p. 238; *DC. Prodr.* 7. 548.—Pongatieæ, *Endl. Gen.* p. 519.—Campanulææ, *Alph. DC. Monogr.* (1830).

DIAGNOSIS.—*Campanal Exogens, with a 2- or more-celled ovary, free or half- united anthers, naked stigma, and valvate regular corolla.*

Herbaceous plants or under-shrubs, yielding a white milk. Leaves almost always alternate, simple, or deeply divided, without stipules. Flowers single, in racemes,

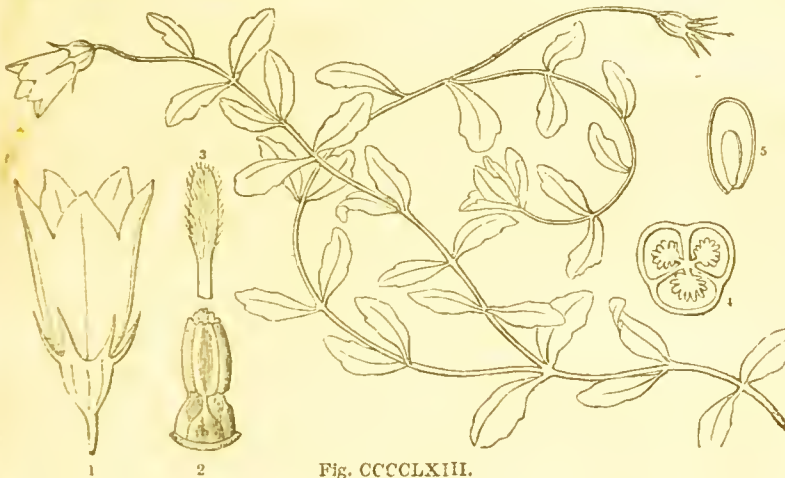
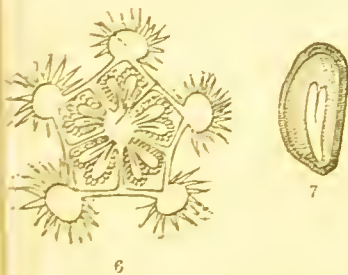


Fig. CCCCLXIII.



spikes, or panicles, or in heads, usually blue or white, very rarely yellow. Calyx superior, usually 5-lobed (3-8), persistent. Corolla monopetalous, inserted into the top of the calyx, usually 5-lobed (3-8), withering on the fruit, regular; its aestivation valvate. Stamens inserted into the calyx alternately with the lobes of the corolla, to which they are equal in number. Anthers 2-celled, distinct. Pollen spherical. Ovary inferior, with 2 or more polyspermous cells opposite the stamens, or alternate with them; style simple, covered with collecting hairs; stigma naked, simple, or with as many

lobes as there are cells. Fruit dry, crowned by the withered calyx and corolla, dehiscing by lateral irregular apertures or by valves at the apex, always loculeicidal. Seeds numerous, attached to a placenta in the axis; embryo straight, in the axis of fleshy albumen; radicle next the hilum, longer than the cotyledons.

This Order has been very carefully examined by M. Alphonse De Candolle, the substance of whose observations as to the more important facts connected with it is included in the following remarks:—He considers that Bellworts differ from Lobeliads chiefly in their regular corolla, their stamens being almost always distinct, their pollen spherical (not oval), their stigmas generally long and velvety externally, in the abundance of collecting hairs on the style, and finally in their capsule usually opening laterally. "It is not only in the form," he proceeds, "but also in the number of the parts, that the order of Bellworts is more regular than that of Lobeliads. Thus, in several Campa-

Fig. CCCCLXIII.—*Wahlenbergia procumbens*. 1. an entire flower; 2. stamens; 3. a stigma; 4. transverse section of the ovary; 5. a vertical section of a seed, showing the embryo; 6. transverse section of ovary of *Campanula Medium*; 7. interior of its seed.

nulas the cells of the ovary are equal in number to the stamens and the divisions of the corolla and calyx, which points out the natural symmetry of the flower. In Lobeliads abortion is more frequent. In both groups the innermost organs are abortive more frequently than the outermost. Thus, the number of cells is often smaller (never greater) than that of the stamens; the number of stamens is sometimes smaller (but never larger) than that of the lobes of the corolla; and the same is true of the lobes of the corolla with respect to the calyx. Finally, Lobeliads have sometimes a corolla of a fine bright-red, a colour unknown among Bellworts; nine-tenths of the species of the latter have blue flowers; and those in which the colour varies, and into which a little red enters (as *Canarina*), are far from having the brilliancy of *Lobelia cardinalis* for instance. After Lobeliads, the Natural Orders with which Bellworts have the most relation are, no doubt, Goodeniads and Styleworts, which formed part of the Campanulæ of Jussieu. The regular corolla of Bellworts distinguishes them, at first sight, from both those Orders, as well as from Lobeliads. Besides, Campanulas have not the fringed indusium which terminates the style of Goodeniads and surrounds their stigma. Although this organisation approaches that of Lobeliads, and so of Bellworts, it is not less true that it affords an important mark of distinction, and that it is connected with essential differences in the mode of fecundation. Brown has also remarked, that the corolla of Goodeniads is sometimes polypetalous, which it never is in Bellworts or Lobeliads; that the æstivation of the corolla is induplicate, not valvate; that its principal veins are lateral, or alternate with the lobes, as in Composites; that in the species of Goodeniads with dehiscent fruit, the dehiscence is usually septical, while in the two other groups it is always loculicidal; finally, that Goodeniads have not the milky juice that characterises Bellworts and Lobeliads." Notwithstanding the polyspermous fruit and different inflorescence, this Order approaches very closely to Composites; the milky juice is the same as that of the tribe called Cichoraceæ; the species have, in many cases, the flowers crowded in heads; the stigma is similar to that of many Composites; there are the same collecting hairs on the style, in both cases intended to clear out the pollen from the cells of the anthers; and, finally, the habit is very like. These collecting hairs, which clothe the style of Bellworts in a most remarkable manner, arranging themselves in lines having a direct relation to the number and



Fig. CCCCLXIV.

position of the anthers, have been the subject of special examination by several observers, especially by Adolphe Brongniart. This Botanist ascertained that such hairs are not, as had been supposed, deciduous, but that they are retractile, like the hairs of certain annelides or the tentacula of snails. It appears that, at the time of the expansion of the flower, the hairs, which had previously projected and swept out the pollen from the anthers, are drawn back into certain cavities lying at their base, the upper half sheathing itself in the lower half as it is by degrees withdrawn. M. Brongniart is of opinion that there is no ground for supposing that this singular phenomenon is connected with the fertilising process. (See *Ann. des Sc. Nat.* 2 Ser. 12. 244). But Mr. Hassall disputes this statement, which he declares is "wholly opposed to the result of his investigations."—*Ann. Nat. Hist.* viii. 86.

It has been remarked in the *Botanical Register* (1842, t. 3.), that the genus *Glossocomia* brings the Orders of Nightshades and Bellworts into close contact.

With respect to the singular genus *Sphenoclea*, erected into an Order by Martius, although it cannot be regarded as a genuine species of Bellwort, because of the absence of collecting hairs from its styles, the round sub-sessile anthers, the stamens distinctly inserted upon the corolla, and the peculiar habit of the only known species, yet it seems to have more affinity to this Order than to any other, and may very well be stationed at the end, as a genus waiting for the discovery of companions which may be better suited to indicate its true station.

Chiefly natives of the north of Asia, Europe, and North America, and scarcely known in the hot regions of the world. In the meadows, fields, and forests of the countries they inhabit, they constitute the most striking ornament. Some curious species are found in the Canaries, St. Helena, and Juan Fernandez. Alphonse De Candolle remarks, that "it is within 36° and 47° N. lat. that in our hemisphere the greatest number of species is found; the chain of the Alps, Italy, Greece, Caucasus, the Altai range, are their true country. In whatever direction we leave these limits, the number of species rapidly decreases. In the southern hemisphere, the Cape of Good Hope (lat. 34° S.) is another centre of habitation, containing not fewer than 63 species. This

Fig. CCCCLXIV.—Stamen and pistil of *Campanula Medium*.

locality has a climate so different from that of our mountains, that it may be easily imagined in the species capable of living there differ materially from those of our own hemisphere : in fact, they belong to other genera." Of 300 species only 19 are found within the tropics. The same Botanist remarks that, with only a single exception, all the species belonging to genera that open their capsule by lateral pores are found in the northeru hemisphere ; while those whose capsules dehiscce at the apex chiefly inhabit the southeru hemisphere.

The milky juice is rather acrid, but nevertheless the roots and young shoots of some species, particularly of *Campanula Rapunculus*, or *Rampion*, of *Phyteuma spicatum*, of *Canarina Campanula*, &c., are an occasional article of food. The chief value of the Order, however, is its beauty. The roots of *Phyteumas* are said to be antisiphilitic ; that of *Campanula glauca* is held by the Japanese to be a tonic, and scarcely inferior to *Ginseng*. The *Specularias Speculum* and *pentagonia* have been used in salads ; the flowering plant of *Wahlenbergia graminifolia* is used by the mountaineers of the South of Europe against epilepsy. *Wahlenbergia linarioides* is employed in Chili in tormina. The half-fleshy fruit of *Canarina Campanula* is said to be eatable. The tuberous root of *Cyphia digitata* is said to be eaten by *Hottentots*.

GENERA.

<p>I. JASIONEÆ.</p> <p>Jasione, L.</p> <p><i>Aphyllanthes</i>, Dale- champ.</p> <p><i>Ovella</i>, Adans.</p> <p>II. LIGHTFOOTEÆ.</p> <p><i>Lightfootia</i>, Herit.</p> <p><i>Cephalostigma</i>, Alph. DC.</p> <p><i>Tritamidium</i>, Endl.</p> <p><i>Campannimeæ</i>, Blume.</p> <p><i>Codonopsis</i>, Wall.</p> <p><i>Glossocomia</i>, D. Don.</p> <p><i>Megasanthes</i>, G. Don.</p> <p><i>Canarina</i>, Juss.</p> <p><i>Canaria</i>, Linn.</p> <p><i>Pernetia</i>, Scop.</p> <p><i>Platyodon</i>, Alph. DC.</p> <p><i>Microodon</i>, Alph. DC.</p>	<p><i>Calotheca</i>, Alph. DC.</p> <p><i>Wahlenbergia</i>, Schrad.</p> <p><i>Codonia</i>, Spr.</p> <p><i>Aikinia</i>, Salisb.</p> <p><i>Schultesia</i>, Roth.</p> <p><i>Campanopsis</i>, R. Br.</p> <p><i>Nesophila</i>, Alph. DC.</p> <p><i>Cervicina</i>, Del.</p> <p><i>Heterochænia</i>, Alph. DC.</p> <p>III. PRISMATOCARPEÆ.</p> <p><i>Prismatocarpus</i>, Al. DC.</p> <p><i>Röbella</i>, L.</p> <p><i>Aculeosa</i>, Plukn.</p> <p><i>Edraianthus</i>, Alph. DC.</p> <p>IV. CAMPANULÆÆ.</p> <p><i>Phyteuma</i>, L.</p>	<p><i>Rapunculus</i>, Tournef.</p> <p><i>Rapuntium</i>, Lobel.</p> <p><i>Physoplexis</i>, Eudl.</p> <p><i>Synotoma</i>, G. Don.</p> <p><i>Petromarula</i>, Alph. DC.</p> <p><i>Michauxia</i>, Herit.</p> <p><i>Mindium</i>, Adans.</p> <p><i>Campanula</i>, L.</p> <p><i>Depierrea</i>, Schl.</p> <p><i>Medium</i>, Tournef.</p> <p><i>Marianthemum</i>, Schnk.</p> <p><i>Rapuntium</i>, Chev.</p> <p><i>Roucella</i>, Dumort.</p> <p><i>Erinia</i>, Noul.</p> <p><i>Specularia</i>, Heist.</p> <p><i>Prismatocarpus</i>, Herit.</p> <p><i>Apenula</i>, Neck.</p> <p><i>Legouzia</i>, Durand.</p>	<p><i>Dysmicodon</i>, Endl.</p> <p><i>Triodallus</i>, Raf.</p> <p><i>Trachelium</i>, L.</p> <p><i>Adenophora</i>, Fisch.</p> <p><i>Flörkea</i>, Spr.</p> <p><i>Symphyandra</i>, Alph. DC.</p> <p><i>Musschia</i>, Dumort.</p> <p><i>Rhigiophyllum</i>, Hochst.</p> <p><i>Cyphia</i>, L.</p> <p><i>Cyphium</i>, Gmel.</p> <p>Anomalous Genera.</p> <p><i>Merciera</i>, Alph. DC.</p> <p><i>Pentaphragma</i>, Wall.</p> <p><i>Sphenoclea</i>, Gærtn.</p> <p><i>Pongatium</i>, Juss.</p> <p><i>Gertnera</i>, Retz.</p> <p><i>Rapinia</i>, Lour.</p>
---	--	---	--

NUMBERS. GEN. 28. Sp. 500.

Solanaceæ.

POSITION.—*Asteraceæ.*—*CAMPANULACEÆ.*—*Lobeliaceæ.*

Vacciniaceæ.

ORDER CCLXVII. LOBELIACEÆ.—LOBELIADS.

Campanulacæ, § 2. *R. Brown Prodr.* 562. (1810).—Lobeliacæ, *Juss. Ann. Mus.* 18. 1. (1811); *Endl. Gen.* cxxiv.; *DC. Prodr.* 7. 339; *Prest. Monogr. Lobel.*; *Alph. DC. in Ann. Sc.* 2. Ser. xii. 149.

DIAGNOSIS.—*Campanal Exogens, with a 2- or more-celled ovary, syngenesious anthers, a stigma surrounded by hairs, and a valvate irregular corolla.*

Herbaceous plants or shrubs, with milky juice. Leaves alternate, without stipules. Flowers axillary or terminal. Calyx superior, 5-lobed or entire. Corolla monopetalous,



1

Fig. CCCCLXV.

4

5

2

in æstivation somewhat valvate, irregular, inserted in the calyx, 5-lobed or deeply 5-left. Stamens 5, inserted into the calyx alternately with the lobes of the corolla; anthers cohering; pollen oval. Ovary inferior, with from 1 to 3 cells; ovules very numerous, either attached to the axis, or parietal; style simple, stigma surrounded by a eup-like fringe. Fruit capsular, 1- or more-celled, many-seeded, dehiscing at the apex. Seeds attached either to the lining or the axis of the pericarp; embryo straight, in the axis of fleshy albumen; radicle longer than the cotyledons, pointing to the hilum.

The plants of this Order at first sight appear to be very different from Composites, but they in fact participate in all the analogies of Bellworts, and perhaps are yet more nearly related to Composites even than that Order, especially in their syngenesious anthers and in the irregularity of their corolla, which is split so that the segments cohere on one side like the 5 segments which make up the ligulate floret of a Composite. The stigma is surrounded by hairs, which are probably analogous to the collectors of Bellworts, to which Lobeliads approach closely, as well as to Goodeniads, whose indusium and induplicate corolla offer the main features of distinction. The Clintonæ are remarkable for a one-celled ovary with parietal placentæ; a few species have polypetalous flowers, and one species of *Lobelia* is said to be diœcious!

Unlike Bellworts, these seem to prefer countries within or upon the border of the tropics to such as have a colder character. We find them abounding in the West Indies, Brazil, the Himalayan region, the Cape of Good Hope, and the Sandwich Islands; and they are not uncommon in Chile and New Holland.

All the species are dangerous or suspicious, in consequence of the excessive acridity of their milk. *Siphocampylus Caoutelouc* is so named by the inhabitants of Popayan from the tenacity of its juice. *Tupa Feuillæi* yields a dangerous poison in Chile. The most active article of the North American *Materia Medica* is said to be the *Lobelia inflata*; it possesses an emetic, sudorific, and powerful expectorant effect; when given with a view to empty the stomach it operates vehemently and speedily; producing, however, great relaxation, debility, and perspiration, and even death, if given in over-doses. The anti-syphilitic virtues ascribed to *Lobelia siphilitica* are supposed to have resided in its diuretic property; they are, however, generally discredited. *Isotoma longiflora*, a native of some of the West India Islands, is one of the most venomous of plants; the Spanish Americans call it *Prebenta Cavallos*, because it proves fatal to horses that eat it, swelling them until they burst; taken internally, it acts as a violent cathartic, the effects of which no remedy can assuage, and which end in death; the leaves are active vesi-

Fig. CCCCLXV.—*Lobelia siphilitica*. 1. an entire flower; 2. the stamens; 3. perpendicular section of the ovary; 4 and 5 stigmas.

cauts. *Lobelia cardinalis* is an acrid plant, and reckoned anthelmintic. *Lobelia urens*, a rare European plant, derives its name from its blistering quality. Nevertheless, it is alleged that the succulent fruit of *Centropogon surinamensis* is eatable.

GENERA.

I. CLINTONEÆ.
Grammatotheca, Presl.
Clintonia, Dougl.
Lysipoma, H. B. K.
Hypsela, Presl.

II. LOBELEÆ.
Metzlera, Presl.
Parastranthus, G. Don.
Xanthomeria, Presl.
Dombrowskya, Presl.
Monopsis, Salisb.

Holostigma, Don.
Isotobus, Alph. DC.
Sclerotheca, Alph. DC.
Trimeris, Presl.
Lobelia, Linn.
Rapuntium, Tournef.
Stenotium, Presl.
Dortmannia, Rudd.
Sphærangium, Presl.
Homochilus, Alph. DC.
Tupa, G. Don.
Tylomium, Presl.

Siphocampylus Pohl.
Lobelia, Presl.
Canonanthus, Dou.
Laurentia, Neck.
Solenopsis, Presl.
Enchysia, Presl.
Isotoma, R. Br.
Solenanthis, Kunth.
Hippobroma, G. Don.
Vlamingia, Vriese.
Byrsanthes, Presl.
Heterotoma, Zuccar.
Myopsia, Presl.

III. DELISSEÆ.
Pratia, Gaudich.
Piddingtonia, Alph. DC.
Bernonia, Endl.
Delissea, Gaudich.
Kittelia, Reichenb.
Cyanea, Gaudich.
Macrochilus, Presl.
Rollandia, Gaudich.
Clermontia, Gaudich.
Centropogon, Presl.
 *
Rhynchopetalum, Fres.

NUMBERS. GEN. 27. Sp. 375.

POSITION.—Compositæ.—LOBELIACEÆ.—Campanulacæ.

ORDER CCLXVIII. GOODENIACEÆ.—GOODENIADS.

Campanula, Juss. Gen. 163. (1789) in part.—*Goodenovite*, R. Brown Prodr. 573. (1810); *Barth. Ord. Nat.* 148. (1830); *DC. Prodr.* 7. 502.—*Goodeniaceæ*, Ed. pr. clxxxiv. (1836); *Endl. Gen.* cxliii.—*Scævoleæ*, Ed. pr. clxxviii. (1830).—*Scævoleaceæ*, Ed. pr. clxxxv. (1836).

DIAGNOSIS.—*Campanal Exogens*, with a 2- or more-celled ovary, syngenesious or free anthers, an indusiate stigma, and induplicate corolla.

Herbaceous plants, rarely shrubs, without milk, with simple or glandular hairs, if any are present. Leaves scattered, often lobed, without stipules, very rarely opposite.



Fig. CCCCLXVI.

Inflorescence terminal, variable. Flowers distinct, never capitate, usually yellow, or blue, or pink. Calyx usually superior, rarely inferior, equal or unequal, in from 3 to 5 divisions. Corolla always more or less superior, monopetalous, more or less irregular, withering; its tube split at the back, and sometimes capable of being separated into 5 pieces, when the calyx only coheres with the base of the ovary; its limb 5-parted, with 1 or 2 lips, the edges of the segments being thinner than the middle, and folded inwards in aestivation. Stamens 5, distinct, alternate with the segments of the corolla; anthers distinct or cohering, 2-celled, bursting longitudinally. Pollen simple or in fours. Ovary 1-2-celled, rarely 4-celled, with definite or 00 ovules, having sometimes a gland at its base between the two anterior filaments; placenta free, central, or only adhering slightly to the dissepiments; style 1, simple, very rarely divided; stigma fleshy, undivided, or 2-lobed, surrounded by a membranous cup. Fruit a 1-2- or 4-celled capsule with many solitary or numerous seeds, attached to the axis of the dissepiment, which is usually parallel with the valves, rarely opposite to them. Seeds usually with a thickened testa, which is sometimes nut-like; albumen fleshy, in-

cluding an erect embryo; cotyledons foliaceous; plumule inconspicuous.

The great peculiarity of this Order resides in the stigma, which is seated at the bottom of a cup or covering called an indusium, unknown in Bellworts or Lobeliads, to which the genera might otherwise be referred. It is of the same nature as what is found in Brunoniads and Styleworts, and is to be regarded as nothing more than a remarkable exaggeration of the rim which surrounds the stigmatic surface of Heathworts, and of the plates which cover the style of Cranesbills and Balsams. It is, in fact, the upper free extremity of the carpellary leaves, distinct from that prolongation of the placenta which is named style and stigma. Brown, however, has offered a very different explanation of its nature, as will be seen by the following extract:—

“Is this remarkable covering of the stigma in these families merely a process of the apex of the style? or is it a part of distinct origin, though intimately cohering with the pistillum? On the latter supposition, may it not be considered as analogous to the glandular disk surrounding or crowning the ovarium in many other families? And, in adopting the hypothesis I have formerly advanced respecting the nature of this disk in certain families,—namely, that it is composed of a series of modified stamina,—has not the part in question a considerable resemblance, in apparent origin and division, to the stamina of the nearly-related family Stylidiaceæ? To render this supposition somewhat less paradoxical, let the comparison be made especially between the indusium of *Brunonia* and the imperfect antheræ in the female flowers of *Forstera*. Lastly, con-

Fig. CCCCLXVI.—*Leschenaultia formosa*. 1. stamens and style; 2. cross section of ovary; 3. longitudinal section of ovary; 4. stigma and indusium.

nected with this view, it becomes of importance to ascertain whether the stamina of Stylidiaceæ are opposite to the segments of calyx or of corolla. The latter disposition would be in favour of the hypothesis. This, however, is a point which will not be very easily determined, the stamina being lateral. In the mean time, the existence and division of the corona faucis in Stylidinn render it not altogether improbable that they are opposite to the segments of the corolla."

In the revivation of the corolla the Goodeniads are also remarkable, the edges of its segments being doubled inwards, so as to assume the appearance of wings belonging to a triangular back. *Cyphia*, referred hither by Endlicher, wants that character, and seems to be merely an irregular Bellwort with the collecting hairs of the style arranged in a ring beneath the stigma.

These plants belong to Australia and the islands of the Southern Ocean, or only advance into India in the form of a *Scaevola*, which even spreads into Africa, and it is said, the West Indies, and of *Selliera*, which inhabits the southern part of South America.

The leaves of *Scaevola Taccada* when young are eaten as potherbs, and some superstitious qualities are ascribed to its berries; the pith, which is soft and spongy, is fashioned by the Malays into artificial flowers and other nicknacks. *Scaevola Bela Modogam* appears to be emollient, and is used in India to bring tumours to a head.—*Linn. Trans.* 12. 134.

GENERA.

<p>I. <i>Scaevoleæ</i>.—Fruit a drupe or nut.</p> <p><i>Scaevola</i>, L. <i>Lobelia</i>, Plum. <i>Cerbera</i>, Lour. <i>Glypha</i>, Lour. <i>Pogonandra</i>, A. DC. <i>Pogonantha</i>, G. Don.</p>	<p><i>Crossotoma</i>, Don. <i>Pogonetes</i>, Lindl. <i>Diaspasis</i>, R. Br. <i>Dampiera</i>, R. Br.</p>	<p>Goodenia, Sm. <i>Collema</i>, Anders. <i>Ochrosanthus</i>, Don. <i>Tetrathylax</i>, Don. <i>Porphyranthus</i>, Don. <i>Monochila</i>, Don. <i>Amphichila</i>, A. DC. <i>Calogyne</i>, R. Br.</p>	<p><i>Distylis</i>, Gaudich. <i>Euthales</i>, R. Br. <i>Velleja</i>, Smith. <i>Menoceras</i>, R. Br. <i>Leschenaultia</i>, R. Br. <i>Latouria</i>, Endl. <i>Anthotium</i>, R. Br.</p>
<p>II. <i>Goodeniææ</i>.—Fruit a capsule.</p> <p><i>Selliera</i>, Cav.</p>			

NUMBERS. GEN. 14. Sp. 150?

Brunoniaceæ.

POSITION.—*Lobeliaceæ*.—*GOODENIACEÆ*.—*Stylidiaceæ*.

ORDER CCLXIX. STYLIDIACEÆ.—STYLEWORTS.

Stylidæ, R. Brown *Prodr.* 565. (1810); *Endl. Gen.* cxxvi.; *DC. Prodr.* 7. 331.

DIAGNOSIS.—*Campanul Exogens*, with a 2- or more-celled ovary, stamens and style united into a column, and imbricated corolla.

Herbaceous plants or under-shrubs, without milk, having a stem or scape; their hair, when they have any, simple, acute, or headed with a gland. Leaves scattered, sometimes whorled, entire, their margins naked or ciliated, the radical ones clustered in the species with scapes. Stipules 0. Flowers in spikes, racemes, or corymbs, or solitary, terminal, rarely axillary, the pedicels usually with three bracts. Calyx adherent, with from 2 to 6 divisions, bilabiate or regular, persistent. Corolla monopetalous, falling off late; its limb irregular, rarely regular, with from 5 to 6 divisions, imbricated in æstivation. Stamens 2; filaments connate with the style into a longitudinal column; anthers twin, sometimes simple, lying over the stigma; pollen globose, simple, sometimes angular. Ovary 2-celled, many-seeded, sometimes 1-celled, in consequence of the contraction of the dissepiment; often surmounted with a single gland in front, or two opposite ones; style 1; stigma entire or bifid; ovules anatropal. Capsule with 2 valves and 2 cells, the dissepiment between which being sometimes either contracted or separable from the inflexed margins of the valves, the capsule becomes as it were 1-celled. Seeds small, erect, sometimes stalked, attached to the axis of the dissepiment; embryo scarcely known; said to be minute, inclosed within a fleshy, somewhat oily albumen.



Fig. CCCCLXVII.

These are very curious little plants, nearly allied to Bellworts and Goodeniads, from both which they are distinguished by their gynandrous structure, and from the latter by the want of an indusium to the stigma. The structure of the column, into which the stamens and style are blended, is highly curious, and scarcely analogous to anything else in the Vegetable Kingdom, except in Orchids: the stigma lies in a cavity at the apex of the column, surrounded and concealed by the anthers. This column is extremely irritable; in *Stylidium* it hangs down on one side of the flower until it is touched, when it suddenly springs up and shifts instantly to the opposite side. A singular error was committed by Labillardière, who mistook an epigynous gland for the stigma; and another by L. C. Richard, who considered

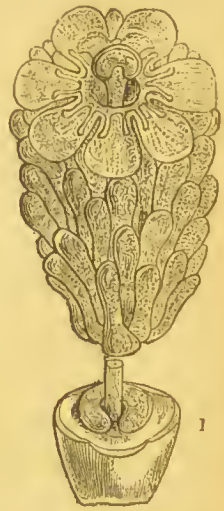


Fig. CCLXVIII.

the labellum to be the female organ of this genus.

The species are chiefly found in New Holland swamps. One however occurs in Ceylon, another in Malabar, and a third in Sylhet. The *Forsteras* live on the summit of mountains in the South of New Zealand, or in the morasses of the Straits of Magellan.

Nothing is known of any use to which they are applied.

GENERA.

Stylidium, Sw.
Ventenatia, Smith.
Candollea, Labill.

Andersonia, König
Coleostylis, Sonder.
Forsteropsis, Sonder.

Levenhookia, R. Br.
Gynocampus, Lescl.
Forsteria, Linn. f.

Phyllachne, Forst.
Stibas, Commers.

NUMBERS. GEN. 5. Sp. 121.

POSITION.—Lobeliaceæ.—STYLIDIACEÆ.—Goodeniaceæ.

Fig. CCCCLXVII.—*Stylidium encastratum*.—*F. Bauer.* 1. anthers and stigma, forming the point of the column; 2. capsule split open; 3. seed.

Fig. CCCCLXVIII.—*Forsteria clavigera*—*Hooker fil.* 1. the epigynous gland.

ORDER CCLXX. VALERIANACEÆ.—VALERIANWORTS.

Valerianeæ, DC. *Fl. Fr. ed. 3. v. 4. p. 232.* (1815); *Dufr. Valer. Monogr. 56.* (1811); *DC. Prodr. 4. 623.* (1830); *Royle's Illustrations, 241.* (1835); *Endl. Gen. cxviii.*; *Meisn. p. 173*; *Woods in Linn. Trans. 17. 421.*

DIAGNOSIS.—*Campanal Exogens, with a 1-celled ovary, an imbricated corolla, free anthers, pendulous ovule, and no albumen.*

Annual or perennial herbs, occasionally twining, and usually either strong-scented or aromatic. Leaves collected in rosettes at the root, or distributed upon the stem,

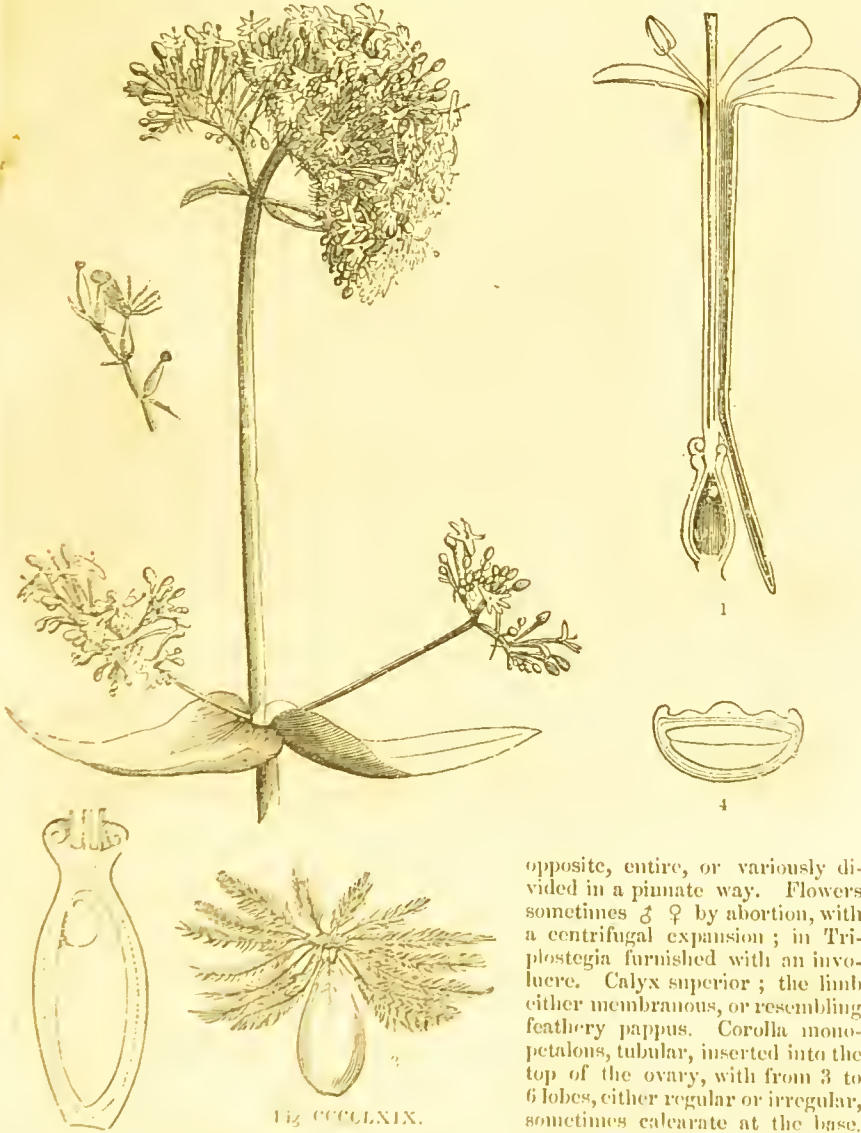


Fig. CCLXIX.

opposite, entire, or variously divided in a pinnate way. Flowers sometimes ♂ ♀ by abortion, with a centrifugal expansion; in *Triplotegia* furnished with an involucre. Calyx superior; the limb either membranous, or resembling feathery pappus. Corolla monopetalous, tubular, inserted into the top of the ovary, with from 3 to 6 lobes, either regular or irregular, sometimes ciliate at the base. Stamens from 1 to 5, inserted

into the tube of the corolla, and alternate with its lobes. Ovary inferior, with 1 cell,

Fig. CCLXIX. *Centranthus ruber*. 1. a corolla; 2. section of ovary; 3. ripe fruit, with its pappus; 4. cross section of a seed.

and sometimes 2 other abortive ones ; ovule solitary, pendulous ; style simple ; stigmas from 1 to 3. Fruit dry, indehiscent, with 1 fertile cell and 2 empty ones. Seed solitary, pendulous ; embryo straight, destitute of albumen ; radicle superior.

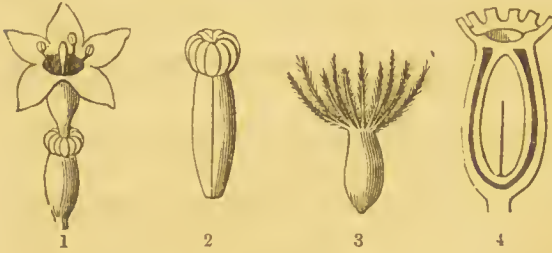


Fig. CCCCLXX.

higher degree of composition in the central apparatus. M. Bunge has observed manifest traces of ovules in the two abortive cells of Patriniia ; the same author considers Valerianworts connected with Caprifolds on the one hand by Triplostegia, and on the other by Linnæa.—*Ann. Sc. ser. 2. v. 6. 60.*

They are natives of most temperate climates ; sometimes at considerable elevations. They are abundant in the north of India, Europe, and South America, but uncommon in Africa and North America.

The roots of *Valeriana officinalis*, *Phu*, and *celtica*, are tonic, bitter, aromatic, anti-spasmodic, and vermifugal ; they are even said to be febrifugal. They are strong-smelling, especially in *V. Dioscoridis*, which, according to Sibthorp, is the real *Phu* of Dioscorides, act as powerful stimulants, and produce a specific influence over the cerebro-spinal system, bringing on, as is well known, a kind of intoxication in cats, and in large doses occasioning in man scintillations, agitation, and even convulsions. The Russians regard the *Valeriana sitchensis*, a native of North-West America, as the most energetic of all the species. The scent of these roots is not agreeable to a European ; and yet some are highly esteemed as perfumes. Eastern nations procure from the mountains of Austria the *Valeriana celtica* and *Salunca* to aromatise their baths. Their roots are grubbed up with danger and difficulty by the peasants of Styria and Carinthia, from rocks on the borders of eternal snow, are tied in bundles and sold at a very low price to merchants, who send them by way of Trieste to Turkey and Egypt, where they are vended at a great profit, and passed onwards to the nations of India and Ethiopia.—*Endl.* The *Nardostachys Jatamansi*, or true Spikenard of the ancients, is valued in India, not only for its scent, but also as a remedy in hysteria and epilepsy. The young leaves of the species of *Valerianella* are eaten as salad, under the French name of *Mâche*, or the English one of *Lamb's Lettuce*. Red Valerian is also eaten in the same way in Sicily. *Astrephias* are used as vulneraries in Peru. See *Royle*, p. 242, for an elaborate dissertation upon the Nard of the ancients.

GENERA.

<i>Patriniia</i> , Juss.	<i>Polyppremum</i> , Adans.	<i>Mitrophora</i> , Neck.	<i>Arctiastrum</i> , DC.
<i>Gylonanthus</i> , Rafin.	<i>Odontocarpa</i> , Neck.	<i>Plectritis</i> , DC.	<i>Phu</i> , DC.
<i>Fedîa</i> , Adans.	<i>Astrephia</i> , DC.	<i>Centranthus</i> , DC.	<i>Betckeia</i> , DC.
<i>Nardostachys</i> , DC.	<i>Hemesotria</i> , Rafin.	<i>Kentranthus</i> , Neck.	<i>Triplostegia</i> , Wall.
<i>Dufresnea</i> , DC.	<i>Oligœcoc</i> , Willd.	<i>Valeriana</i> , Neck.	? <i>Axia</i> , Lour.
<i>Valerianella</i> , Mönch.	<i>Fedîa</i> , Mönch.	<i>Phyllactis</i> , Pers.	

NUMBERS. GEN. 12. Sp. 185.

Caprifoliaceæ.

POSITION.—*Asteraceæ.*—*VALERIANACEÆ.*—*Dipsacaceæ.*

Fig. CCCCLXX.—*Valeriana celtica*. 1. entire flower magnified ; 2. the ovary and young calyx ; 3. the fruit, with the pappose full-grown calyx ; 4. a vertical section of fruit and seed

ORDER CCLXXI. DIPSACACEÆ.—TEAZELWORTS.

Dipsacæ, *Juss. Gen.* 194. (1789) ; *Coulter Mem. in Act. Genev.* 2. 13. (1823) ; *DC. Prodr.* 4. 643. (1830) ; *Endl. Gen.* cxix.

DIAGNOSIS.—*Campanal Exogens, with a 1-celled ovary, imbricated corolla, free anthers, pendulous ovule, and albuminous seeds.*

Herbaceous plants or under-shrubs. Leaves opposite or whorled. Flowers collected upon a common receptacle, and surrounded by a many-leaved involucre.

Calyx adherent, membranous, resembling pappus ; surrounded by a scarios involucre. Corolla monopetalous, tubular, inserted in the calyx ; limb oblique, 4- or 5-lobed, with an imbricated aestivation. Stamens 4, alternate with the lobes of the corolla, sometimes half-sterile ; anthers distinct. Ovary inferior, 1-celled, with a single pendulous anatropal ovule ; style 1 ; stigma simple. Fruit dry, indehiscent, 1-celled, crowned by the pappus-like calyx ; embryo straight, in the axis of a small quantity of fleshy albumen ; radicle superior.

The relation of this family is obviously in the first degree with Composites, from which it differs in its distinct stamens and its pendulous albuminous seeds ; and next with Calycers, which have united anthers and alternate leaves. The same character of the capitate flowers, and the presence of albumen, forms the distinction between Teazelworts and Valerianworts. What is called the involucre is a curious organ, resembling an external calyx, and is to each particular flower of the head of Teazelworts what the partial involucre of Umbellifers is to each partial umbel ; and, accordingly, we ought to expect to find instances of more flowers than one being inclosed within this involucre ; and this is said by Coulter actually to take place in the genus *Gundelia*. This is, however, not the only peculiarity of the Order. Brown has the following remarks:—

“M. Auguste de Saint Hilaire, in his excellent Memoir on Primulaceæ, while he admits the correctness of M. De Candolle’s account with respect to great part of Dipsacæ, has at the same time well observed, that in several species of *Scabiosa* the ovarium is entirely united with the tube of the calyx. But neither of these authors has remarked the curious, and I believe peculiar, circumstance of the base of the stylo cohering with the narrow apex of the tube of the calyx, even in those species of the Order in which the dilated part of the

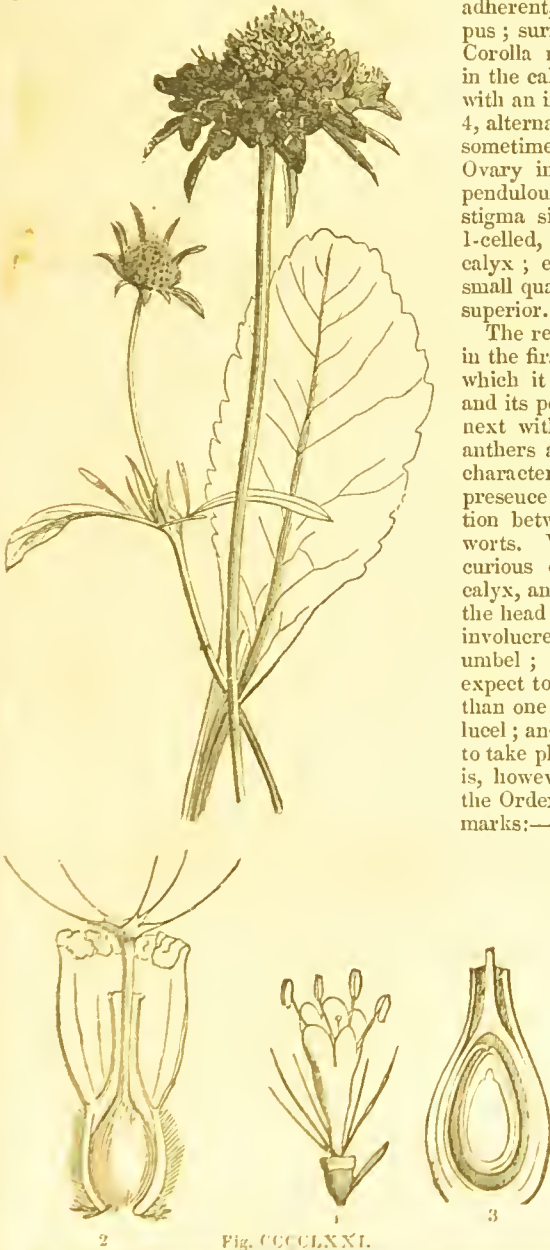


Fig. CCCCLXXI.

Fig. CCCCLXXI.—*Scabiosa atropurpurea*. 1, a flower, 2, the involucre opened to show the ovary and calyx ; 3, perpendicular section of fruit.

tube is entirely distinct from the ovarium. This kind of partial cohesion between pistillum and calyx is directly opposite to what usually takes place, namely, the base of the ovarium being coherent, while its upper is distinct. It equally, however, determines the apparent origin or insertion of corolla and stamina, producing the unexpected combination of 'flos superus' with 'ovarium liberum.'—*Linn. Trans.* 12. 138.

The species are chiefly natives of the south of Europe, Barbary, the Levant, and the Cape of Good Hope; not affecting particular stations in any striking degree, except that they generally shun cold, and do not attain much elevation above the sea.

Their properties are unimportant. The Teazel used by fullers in dressing cloth is the dried head of *Dipsacus Fullonum*, bristling with hard, stiff, spiny bracts. Some of the species are reputed febrifugal. *Scabiosa succisa* is said to yield a green dye, and also to be astringent enough to deserve the attention of tanners. The leaves of the common Teazel are united at their base so as to form round the stem a hollow in which water collects; hence the plant was called *Δψακος* or thirsty, and also obtained the name of Venus' Bath; and the superstitious fancied that the water thus collected from rains and dews was good for bleared eyes.

GENERA.

Morina, Tournef.
Diotrothea, Vaill.
Asaphes, Spreng.
Dipsacus, Tournef.
Galedragon, Gray.

Cephalaria, Schrad.
Lepicephalus, Lagasc.
Cerionanthus, Schott.
Succisa, Vaill.
Pycnocomon, Wallr.

Knautia, L.
Trichera, Schrad.
Pterocephalus, Vaill.
Scabiosa, Röm et Schult.
Astercephalus, Vaill.

Sclerostemma, Schott.
Spongostemma, Rehb.
Succisa, Coult.
Columbaria, Thuill.

NUMBERS. GEN. 6. Sp. 150.

POSITION.—Asteraceæ.—DIPSACACEÆ.—Valerianaceæ.

ORDER CCLXXII. CALYCERACEÆ.—CALYCERS.

Calyceræ, *R. Brown in Linn. Trans.* 12. 132. (1816); *Rich. in Mém. Mus.* 6. 76. (1820); *DC. Prodr.* v. 1; *Endl. Gen.* cxxi.—Boopideæ, *Cassini in Dict. des Sc.* 5. 26. *Supp.* (1817).

DIAGNOSIS.—*Campanal Exogens, with a 1-celled ovary, valvate corolla, syngenesious anthers, pendulous ovule, and albuminous seeds.*

Herbaceous plants. Leaves alternate, without stipules. Flowers collected in heads, which are either terminal or opposite the leaves, surrounded by an involucre. Florets sessile, hermaphrodite, or neuter. Calyx superior, of 5 unequal pieces. Corolla regular, valvate, funnel-shaped, with a long slender tube and 5 segments, each of which has 3 principal veins; glandular spaces below the stamens and alternate with them. Stamens 5, monadelphous; anthers combined by their lower half in a cylinder. Ovary inferior, 1-celled; ovule solitary, pendulous; style simple, smooth; stigma capitate. Fruit an indehiscent pericarp, usually crowned by the rigid spiny segments of the calyx. Seed solitary, pendulous, sessile; embryo in the axis of fleshy albumen; radicle superior, longer than the plano-convex cotyledons.



Fig. CCCCLXXII. 2 1

A very small and curious Order, differing from Composites in nothing but their albumen, pendulous ovule, and half-distinct anthers, and from Teazelworts in their filaments being monadelphous and their anthers partly connate. They may therefore be considered to hold a middle station between those two Orders.

Such species as are known inhabit South America, rarely occurring in the tropical districts, but more plentiful in South Chile. They are, however, not common anywhere. They are described as ascending from the sea coast to considerable altitudes on the Andes.

They are not mentioned as possessing any useful quality.

GENERA.

<i>Gamocarpha</i> , DC.	<i>Calycera</i> , Cav.	<i>Cryptocarpha</i> , R. Br.	<i>Acanthosperma</i> , Arrab.
<i>Boopis</i> , Juss.	<i>Acicarpha</i> , Juss.	<i>Sommea</i> , Bory.	<i>Echinolema</i> , Jacq. f.
<i>Nastanthus</i> , Miers.			

NUMBERS. GEN. 5. Sp. 10.

POSITION.—Asteraceæ.—CALYCERACEÆ.—DIPSACACEÆ.

Fig. CCCCLXXII.—*Acicarpha spathulata*.—Richard. 1. section of an entire flower; 2. perpendicular section of ripe fruit.

ORDER CCLXXIII. ASTERACEÆ.—COMPOSITES.

Compositæ, *Adans. Fam.* 2. 103. (1763); *Kunth in Humb. N. G. et Sp. vol. 4; Lessing, Synops. Compos.; Royle's Illustr.* 245; *DC. Prodr. vol. 5, &c.; Endl. Gen. exx.; Meisner, p. 174.—Synanthereæ, Rich. Anal.* (1808); *Cassini Dict. Sc. N. 10. 131. (1818); ibid. 60. 563. (1830).—Corymbiferae, Cynarocephala, and Cichoraceæ, Juss. Gen.* (1789).

DIAGNOSIS.—*Campanal Exogens, with a 1-celled ovary, valvate corolla, syngenesious anthers, erect ovule, and no albumen.*



Herbaceous plants or shrubs. Leaves alternate or opposite, without stipules, usually simple, but commonly much divided. Flowers (called florets) unisexual or hermaphrodite, collected in dense heads upon a common receptacle, surrounded by an involucre. Braets either present or absent; when present, stationed at the base of the florets, and called paleæ of the receptacle. Calyx superior, closely adhering to the ovary, and undistinguishable from it; its limb either wanting or membranous, divided into bristles, paleæ, hairs, or feathers, and called pappus. Corolla monopetalous, superior, usually deciduous, either ligulate or funnel-shaped; in the latter case, 4- or 5-toothed, with a valvate æstivation. Stamens equal in number to the teeth of the corolla, and alternate with them; the anthers cohering into a cylinder. Ovary inferior, 1-celled, with a single erect ovule; style simple; stigmas 3, either distinct or united. Fruit a small, indehiscent, dry pericarp, crowned with the limb of the calyx. Seed solitary, erect; embryo with a taper inferior radicle; albumen none.

This is one of the most natural and extensive families of the vegetable kingdom, at all times recognised by its inferior 1-celled ovary, with an erect ovule, syngenesious stamens, and epitate flowers. Calycers and Teazelworts, neighbour-

Fig. CCCCLXXIII.—*Centaurea Cyanus*. 1. a floret; 2. the anthers; 3. perpendicular section of young fruit; 4. ripe fruit; 5. floret of *Taraxacum Dens Leonis*.

ing Orders, also with the flowers in heads, are readily distinguished by their pendulous ovule, and the anthers being either wholly or partially distinct.

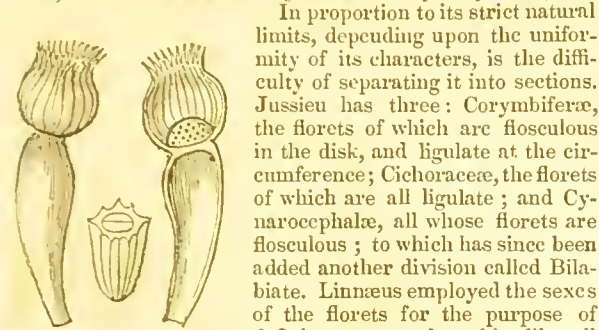


Fig. CCCCLXXIV.

In proportion to its strict natural limits, depending upon the uniformity of its characters, is the difficulty of separating it into sections. Jussieu has three: Corymbiferae, the florets of which are flosculus in the disk, and ligulate at the circumference; Cichoraceae, the florets of which are all ligulate; and Cynaroccephalae, all whose florets are flosculus; to which has since been added another division called Bilabiate. Linnæus employed the sexes of the florets for the purpose of defining groups, but this, like all other parts of the great Swedish Naturalist's Botanical System, is now abandoned; and yet it was not without much merit. The condition of the Order bad at one time,—thanks to the neglect of Linnean Botanists and the unmethodical improvements of more careful observers,—become a chaos, the like of which had not been seen since the days of the Bauhins; but in 1830 an arrangement of much merit was proposed by the German Botanist Lessing, and at a later period De Candolle the elder applied his acute and logical mind to the elucidation of the Order. At the present day the method of the latter, essentially founded on that of Lessing, is universally followed. De Candolle himself stated it thus:—

Suborder I. TUBULIFLORE; that is to say, those in which the hermaphrodite florets, which alone can be regarded as normal, are tubular, with 5, or rarely 4, equal teeth. Of these the following are distinguished by their stigmas:—

1. Vernoniaceae. Style cylindrical, its arms generally long and subulate, occasionally short and blunt, always covered all over with bristles.
2. Eupatoriaceae. Style cylindrical; its arms long and clavate, with a papillose surface on the outside near the end.
3. Asteroideae. Style cylindrical; its arms linear, flat on the outside, equally and finely downy on the inside.
4. Senecioidae. Style cylindrical; its arms linear, fringed at the point, generally truncate, but sometimes extended beyond the fringe into a cone or appendage of some sort.
5. Cynareae. Style thickened upwards, and often fringed at the tumour.

Suborder II. LABIATIFLORE; that is to say, those in which the hermaphrodite florets, or at least the unisexual ones, are divided into two lips. Of these the following are distinguished by their stigmas:—

6. Mutisiaceae. Style cylindrical or somewhat tumid; its arms usually blunt, or truncate, very convex on the outside, and covered at the upper part by a fine uniform hairiness, or absolutely bald.
7. Nassauviaceae. Style never tumid; the branches long, linear, truncate, fringed only at the point.

Suborder III. LIGULIFLORE; that is to say, those whose corollas are slit or ligulate, viz.

8. Cichoraceae.

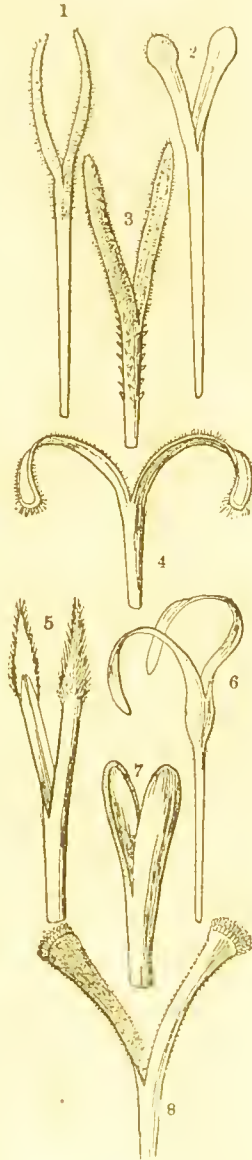


Fig. CCCCLXXV.

Fig. CCCCLXXIV.—Involucre, receptacle, and half fruit of *Arnoseris pusilla*.—*Cartn.*
 Fig. CCCCLXXV.—Stigmas of Compositae, illustrating De Candolle's tribes (after *Heyland*). 1. *Alberthia erythropappa* (Vernoniaceae); 2. *Anisocheta mikanioides* (Eupatoriaceae); 3. *Blumea senecioides* (Asteroideae); 4. *Menziesia bicolor* (Senecioidae); 5. *Lipochista umbellata* (Senecioidae); 6. *Aplotaxis nepalensis* (Cynareae); 7. *Leucomeris spectabilis* (Mutisiaceae); 8. *Leucera tenuis* (Nassauviaceae).

But although it must be admitted that the divisions of Lessing, so nearly followed by De Candolle, are ingenious, and often founded on striking characters, yet Botanists will also allow that they are far from satisfying the mind, and that they can only at the best



Fig. CCCCLXXVI.

be looked upon as temporary devices for dealing with a most unmanageable and difficult subject. The Composite Order alone comprehends at the present day more species than Linnæus knew as belonging to the whole vegetable kingdom, and the time will come when this huge Order will be classified upon different principles. There can be no doubt that the genera are needlessly multiplied; a very little practice tells us that the genera collected under the signs above given do not in all cases exhibit those signs, as is evident from the figures executed under the eye of De Candolle himself; and we know that, in fact, genera find their place by considerations apart from those ostensibly put forward by De Candolle. In the meanwhile, the old Jussieuan Sub-orders Corymbiferae, Cynaraceae, and Cichoraceae, are unimpaired, and with the Bilabiate division, of the existence of which Jussieu was ignorant, constitute the immutable foundation of whatever future ingenuity may propose.

The Composite Order stands, as has been already stated, in most immediate affinity with Calycers and Teazelworts; but it is also closely allied to Bellworts and the rest of the Campanal Alliance. If the ovary were furnished with more than one cell, and there were many seeds in each cell, there would be little distinction from Lobeliads; and if Bellworts had syngenesious anthers and the latter characters in addition, they too would be almost identical. Indeed, the milky fluids of Bellworts and Lobeliads are of the same nature as in Cichoraceae.

Among the peculiarities of the Order is the presence of a marginal vein to each petal, of which the corolla is composed; this vein passes up the edge, reaches the point, and then turns down again, so as to form a line running down through the axis of each petal; so that a Composite corolla may have five veins opposite the re-entering angles, or ten opposite them in pairs, or fifteen, when, in addition to the last circumstance, the axile vein of each petal is completed in the way described. There may even be ten veins, or indeed twenty, by variations of this peculiarity, as a little reflection will make evident.

Decaisne has made some curious remarks upon the hairs of plants of this Order. In *Ruekeria* the pericarp is covered with papillae; on placing one of these papillae in water, it immediately separates into 2 lips, and thence emits 2 mucilaginous tubes, which issue forth like wires, spirally unrolling themselves, and finally much exceed the papillae from which they proceed. These tubes are apparently formed by a very considerable number of threads, placed one upon the other in the manner of a skein of thread. Various

Fig. CCCCLXXVI.—1. Tubular floret of *Webbia aristata*, with double pappus (Vernoniaceae, DC.); 2. tubular floret and stigma of *Anisochaeta mikanioides*, with pappus of 4 setae (Eupatoriaceae, DC.); 3. tubular floret of *Berthelotia lanceolata*, with silky pappus (Asteroideae, DC.); 4. Stigma of *Blumea senecioides* (Asteroideae, DC.); 5. ligulate floret and stigma of *Lipochaeta umbellata*; pappus of two unequal winged paleae (Senecionideae, DC.); 6. stigma of *Dunantia achyranthes* (Senecionideae, DC.); 7. tubular floret with ventricose throat and the stigma of *Aplotaxis nepalensis* (Cynareae, DC.); 8. ligulate bilabiate floret of *Oreoseris lanuginosa* (Mutisiaceae, DC.); 9. ligulate floret of *Brachyrhynchus obtusus* (Cichoraceae, DC.)

other plants of the Labiatifloræ and Senecionidæ have been found to bear similar hairs, and among them the common Groundsel, *Senecio vulgaris*, whose achenia are clothed with them.—*Ann. Nat. Hist.* 6. 258.

All parts of the world contain Composites, but in very different proportions. According to the calculations of Humboldt, they constitute $\frac{1}{4}$ of the phaenogamous plants of France, $\frac{1}{3}$ of Germany, $\frac{1}{15}$ of Lapland; in North America $\frac{1}{6}$, within the tropics of America $\frac{1}{3}$; upon the authority of Brown, they only form $\frac{1}{10}$ of the Flora of the north of New Holland, and did not exceed $\frac{1}{20}$ in the collection of plants formed by Smith upon the western coast of Africa in Congo.—*Congo*, 445. In Sicily they constitute rather more than $\frac{1}{2}$ (*Presl.*); the same proportion exists in the Balearic Islands (*Cambessèles*); but in Melville Island they are rather more than $\frac{1}{10}$ (*Brown*), a proportion nearly the same as that of the tropical parts of New Holland. It does not, therefore, appear that Composites, as an Order, are subject to any very fixed ratio of increase or decrease corresponding with latitude. But much remains to be learned upon this subject. It is certain that Cichoraceæ are most abundant in cold regions, and Corymbifere in hot ones; and that while in the northern parts of the world Composites are universally herbaceous plants, they become gradually frutescent, or even arborescent, as we approach the equator; most of those of Chile are bushes, and the Composites of St. Helena are chiefly trees. The Bilabiate genera are almost entirely American, and from the southern provinces beyond the tropics.

De Candolle gives the following as the result of his examination of the natural habit of Composites:—Out of 8523 of which he had any knowledge 1229 were annuals, 243 biennials, 2491 perennials, 2264 under-shrubs from 1 to 3 feet high, 366 shrubs from 4 to 15 feet high, 72 small trees, 4 large trees above 25 feet high, 81 woody plants of which nothing further was known, 126 twiners or climbers, and 1201 about which nothing certain could be ascertained. These were distributed as follows: 347 in the South Sea Islands, 2224 in Africa, 1827 in Asia, 1042 in Europe, and 3590 in America; of these the Cape of Good Hope possessed 1540, Mexico 725, Brazil 722, United States and Canada 678, the Levant 610, the Continent of India 681, north and middle Europe 447, Europe at the Mediterranean 595, Australia 294.—See this author's *Collection des Mémoires*, No. X.

M. Lasègue estimates (*Musée Delessert*, 1845) the number of Composite plants at 9500, and remarks "that they have steadily continued to constitute about $\frac{1}{10}$ of all described plants, in proportion as our knowledge of species has advanced. Thus Linnæus had 785 Composites out of 8500 species; in 1809 the proportion was 2800 to 27,000; De Candolle described 8523 in the year 1838, which was again a tenth; and now that the estimate of species has risen to 95,000, Composite plants amount to 9500."

The uses to which Composites have been applied are as numerous as their forms; but the species have considerable resemblance in the nature of their action. In former editions the statement made by De Candolle in his celebrated *Essai sur les Propriétés des Plantes*, was taken as the basis of an enumeration of them; it has however been much improved by others, and especially by Endlicher, whose account in the *Enchiridion* is here followed with some additions and alterations.

A bitter matter, combined with astrigeny, an acrid resinous substance, and some ethereal oil, to which in certain species is superadded starch in the roots, are the usual characteristics of Tubulifloræ, some of which are tonics, others stimulants, others astringents, according to the peculiar manner in which those substances are combined.

Among tonic, bitter, aromatic medicines the Artemisias are more especially deserving of notice, the various species having been employed in medicine from the most remote antiquity. Of these, Wormwoods are the most celebrated; they derive their English name from their employment as vermifuges, and are included in the species *A. Absinthium* and *pontica*; Southernwood, a fragrant plant, used on the Continent in making beer, is the *A. Abrotanum*; Tarragon, celebrated for its excellence in pickles, and in the medication of vinegar, is the *A. Dracunculis*; *A. Mutellina*, an Alpine plant, is intermediate in quality between Tarragon and Wormwood; it and *A. spicata*, another Alpine species, furnish between them the bitter aromatic liqueur called Crème d'Absinthe; *A. acetica*, a Persian species, is reported to have the odour of strong vinegar. *A. chinensis* and other species yield the Moxa of China, a substance which is used as a caustic, by burning it upon parts affected with gout and rheumatism. The leaves of *A. maderaspatana* are esteemed by the Indian doctors a valuable stomachic medicine; they are also sometimes used in antiseptic and anodyne fomentations. *A. indica* is considered in India a powerful deobstruent and antispasmodic. The flower-heads of many species of *Artemisia* constitute the drugs called *Semen contra*, or *Semen Cinc*, vermifuges of much activity. Those which form the principal part of this substance, are *A. Sieberi*, *Lerchiana*, *Contra* and *pauciflora*. The flower-heads of *A. Vahlina* also furnish one of the

kinds of Wormseed called *Semen Cincæ levantium*, or *Semen cincæ in granis*. It is collected in the North-east of Persia. The *A. alba*, and other species, serve as nourishment to the herds of the Kirghese and Calmucks.—*Annales de Chem.* 1. 49. The flower-heads of *A. cærulescens*, a Mediterranean plant, are the anthelmintic known under the name of *Semen Seriphii*, or *Barbotine*; *A. camphorata* has a similar action, as also has *A. gallica*, called in France *Sangucrié* or *Sanguerite*. The nature of *Tansy*, *Tanacetum vulgare*, is not very different.

The *Achilleas*, or *Milfoils*, have an ethereal oil and a bitter, resinous, astringent matter in their foliage. *Achillea millefolium* is highly astringent, and the Highlanders are said to make of it an ointment, which dries and heals wounds.—*Hooker Brit. Fl.* p. 368. The *Achilleas setacea*, *nobilis*, and others, are slightly stimulating and tonic. *A. Ageratium*, a South of Europe species, is a very powerful stimulant; the French regard it as a vulnerary, and call it *Herbe au Charpentier*. The *Parnicæ*, formerly considered *Achilleas*, are similar in their action. The heads of *P. uana*, *atrata* and *moschata*, are used in the Swiss Alps as tea; *P. moschata* is the basis of the aromatic liqueur called *Esprit d'Iva*; of *P. vulgaris*, the whole plant is pungent, provoking a flow of saliva; its dried leaves produce sneezing, but this is thought to be owing to their sharp marginal teeth; the root is aromatic.

The ethereal oil, so abundant in these plants, is sometimes acrid, sometimes bitter; it is more especially secreted in the flower-heads of many species, which are in that form employed for various purposes. First among them ranks *Chamomile* (*Anthemis nobilis*), a plant abounding on commons and similar wild places, where it is closely cropped by cattle: it is a well known stimulating tonic, and its warm infusion is employed to excite vomiting. The flower-heads of *Santolina fragrantissima* are extremely fragrant when dry,

and are sold in the shops of Cairo as a substitute for *Chamomile*, under the name of *Babouny* or *Zeysouni*. Forskahl says the fresh juice of the plant is applied in affections of the eyes. *Matricaria Chamomilla* and *Pyrethrum Parthenium* (*Feverfew*) have a similar action, but are not in general use; the smell of the latter is said to be peculiarly offensive to bees, which, it is added, may be easily kept at a distance by carrying a handful of the flower-heads.

Others seem to be offensive to other animals. We are assured by Prof. Cantraine that *Chrysanthemum Leucanthemum* is a certain remedy against fleas. The Bosnians place the plant in the bed of domestic animals, and the fleas are destroyed in a very short time.—*Bull. Ac. r. Brux.* viii. 234. In some cases the stimulating action is so much increased as to assume an acrid form. *Maruta fœtida* is a weed, every part of which is fœtid and acrid, blistering the skin when much handled; its decoction is a strong and active bitter, in the dose of a tea-cupful producing copious vomiting and sweating. With this may be associated *Anthemis tinctoria* and *Santolina Chamæcyparissus*, both obsolete remedies. In some instances this same ethereal oil acquires a remarkable pungency, as in *Anaelyus Pyrethrum*, the *Pellitory of Spain*, whose fleshy root when fresh produces on the



Fig. CCCCLXXVII.

hands of those who gather it a sensation of extreme cold, followed by a burning heat; its taste is hot, acrid, and permanent, and it is used as a powerful rubefacient and stimulant, especially as a masticatory in rheumatic affections of the mouth; in a mitigated form, this same action is found to exist in various species of Spilanthes, and in *Bidens*, *Pyrethrum*, *Tauacetum*, and others, which thus excite salivation powerfully.

In some instances the oily secretion of Composites assumes a dangerous form. The most remarkable instance of this occurs in *Arnica montana*, a Swiss herb, called in our gardeus Mountain Tobacco; it is a virulent plant, acting as a powerful narcotico-acrid agent; it is said, however, that this activity has been exaggerated. It has been recommended in the cure of putrid fever, ague, palsy, amanosis, &c. &c.; and on the Continent has obtained the name of *Paracea lapsorum*. It has been stated by Dr. Thomson that its flowers contain an igasurate of strychnine; but this is positively denied by Versmann, who asserts that the activity of the plant does not depend upon any alkaloid, but upon an extremely acrid, resinous matter.—*Pharm. Journ.* iv. 239. It seems that properties analogous to those of *Arnica* occur in *Doronicum Pardalianches*, and various species of the genus *Iuula* or those allied to it. Of these the most remarkable is *Elecampane* (*Iuula Helenium*), an aromatic plant whose root contains a white starchy powder called Inuline, a volatile oil, a soft acrid resin, and a bitter extractive; it is regarded as a tonic, diuretic, and diaphoretic, and has been used in dyspepsia, pulmonary affections, and other diseases. It furnishes the *Vin d'Auluée* of the French.

Eupatorium and its allies, in addition to the qualities just mentioned, or as a substitute for them, are astringent in some cases, emetic and purgative in others. The latter is the action of *Eupatorium cannabinum*, a common European marsh plant; *E. Ayapania* is a powerful sudorific, and is said to be found a valuable repellent of the poison of venomous snakes. For this purpose it is used in Brazil. A quantity of the bruised leaves, which are to be frequently changed, is laid on the scarified wound, and some spoonfuls of the expressed juice are from time to time administered to the patient, till he is found to be free from the symptoms, particularly the dreadful anxiety which follows the wounds of venomous reptiles. *E. perfoliatum* has a very similar action. *Mikania opifera* is employed in the same way as the *Ayapaua*; *M. officinalis* acts like *Cascarilla*. The famous vulnerary called *Matico*, and said to be derived from *Artanthe elongata* (see p. 518), is really, according to Mr. Hartweg, the *Eupatorium glutinosum*.* *Mikania Guaco* has been stated by Humboldt to be called *Vijuco del Guaco*, and to be much esteemed in Spanish America as a valuable antidote against the bite of serpents. But the power of this *Mikania* is denied in the most positive terms by Hancock, who suspects that the real *Guaco* antidote is some kind of *Aristolochia*.

To these might be added a long list of plants belonging to the genera *Baccharis*, *Acanthospermum*, *Ageratum*, *Pluchea*, *Couoclinium*, *Tagetes*, *Conyza*, *Elephantopus*, *Blumea*, &c., the uses of which may be found in special works on the virtues of plants.

A few of these plants are employed as dyes. A beautiful carmine is obtained from the corolla of the *Dahlia*; *Eclipta erecta* stains black the hair of women in Brazil.

Ceradia furcata, a half-succulent plant, inhabiting the most sterile regions of S. W. Africa, yields in some abundance a brittle resinoid substance, which is rather fragrant when burnt, and has been called *African Bdellium*.

A bland oil abounds in the seeds of many species. Of these the most remarkable are *Guizotia oleifera* (formerly *Verbesina sativa*), extensively cultivated in India under the name of *Ram-til*; *Helianthus annuus* (the Sunflower), whose large, sweet, nut-like seeds are very palatable and wholesome; and *Madia sativa*, a Chilean plant lately introduced with success into the agriculture of the drier parts of Europe. *Madia* oil, expressed without heat, is described as transparent, yellow, scentless, &c., and fit for salads; its cake is said to be good for cattle; it produces, in dry climates, as much oil per acre as Poppy; in comparison with *Colza* as 32 to 23, *Linseed* as 32 to 21, and *Olives* as 32 to 16.—*Pasquier*.

In general the *Cynareous* genera are characterised by intense bitterness; some are stimulating, diaphoretic, and diuretic; others have flowers and leaves used for dyeing;

* I have the following memorandum on this subject, from Mr. Hartweg: "*Matico* is the vernacular name applied by the inhabitants of Quito to *Eupatorium glutinosum*, or the *Chussalonga*, in the Quichua language. It forms a shrub 3-5 feet high, and is common in the higher parts of the Quichuan Andes, where its properties have been discovered some years back by a soldier called *Mateo*, better known under his nick-name *Matico* (little Matthew), who, when wounded in action, applied accidentally the leaves of some shrub to his wound, which had the immediate effect of stopping the bleeding. This shrub happened to be the *Chussalonga*, which has since been called, in honour of its discoverer, *Matico*. That it is the true *Matico* of the inhabitants of Quito and *Itobamba*, I have not the slightest doubt; both leaves and specimens have been gathered by myself, and upon comparing the latter with Kunth's description, I found them to agree exactly with his *Eupatorium glutinosum*.

"I have also a small quantity of powdered leaves of some shrub possessing the same virtues as the *Matico*, collected in Bolivia, where it is known under the name of *Moxo-moxo*. From bits of square stems which I find in the parcel, I suspect this to belong to some *Labiata*."

of some the root abounds in gum, and in many the seeds are oily and purgative, without a trace of the aroma so generally prevalent in the Order.

Centaurea Calcitrapa, and especially *Cnicus Benedictus*, have been used as febrifuges, and it is asserted, with great success, though they are now banished from general practice. Similar qualities have been assigned to many others, especially to the *Bar-danas* or *Burdocks*, *Lappa minor* and *major*; of these plants the root is reckoned tonic, aperient, sudorific, and diuretic; it has been used in the form of decoction in rheumatism and diseases of the skin; Sir Robert Walpole praised it as a gout medicine, and others have considered it an excellent substitute for *Sarsaparilla*; the fruit, which is bitter and slightly acrid, has been used as a diuretic.

Carlina acaulis, a meadow plant with a very short stem and large flower-heads, conspicuous for the long-rays of the shining involucre, was formerly used in magical incantations; its bark abounds in resinous matter, and a strong-scented, bitter, caustic oil, which acts as a drastic purgative. Another species, *Carlina gummifera*, the *ἰξία* or *ἰξίλη* of the ancients, has from time immemorial been employed as an anthelmintic; its great fleshy root and its flower-heads also yield a gum which hardens into tears like *Mastic*; when fresh, the root is said to be noxious to both man and beast, but the fleshy receptacles are preserved with honey or sugar, and eaten. Similar qualities are found in an Arabian plant, supposed to be allied to *Cardopatum corymbosum*, whose roots are sold in the shops of the continental nations, under the name of *Costus*. But Dr. Falconer has ascertained that the *Costus* of the ancients is the root of his *Aucklandia Costus*, a plant inhabiting the moist open slopes surrounding the valley of Cashmere, at an elevation of 8000 or 9000 feet above the level of the sea. The roots have a strong aromatic pungent odour, are regarded as aphrodisiacs, and are burnt as incense in the temples. In Cashmere the plant is not held in repute as a medicine, but is chiefly employed for protecting bales of shawls from the attacks of moths. The modern Arabians consider the root of the *Artichoke* (*Cynara Scolymus*) an aperient: they call the gum of it *Kunkirzced*, and place it among their emetics. Some of this race are used by dyers. *Safflower*, employed to produce a beautiful pink dye, and in the preparation of rouge, is the dried flowers of *Carthamus tinctorius*; its seeds are purgative, and have been used in dropsical cases. *Serratula tinctoria* also furnishes a yellow or green dye. The flowers of *Calendula officinalis*, or *Pot Marigold*, are used to adulterate *Saffron*; it was formerly cultivated as an aperient and sudorific, but is now forgotten. We learn from Col. Sykes that the seeds of *Carthamus persicus* produce a useful oil, edible when fresh; that they are eaten whole as food in times of scarcity, and also the leaves as greens; the oil-cake of this plant is said, on the same authority, to be highly nourishing to milch cattle.

Few of the *Labiatifloral* Sub-order appear to be of any importance. The leaves of *Prinzia aromatica* are used at the Cape of Good Hope as a substitute for tea; those of *Anandria discoidea* are mucilaginous and bitter, and are employed in China in dyspnoea, as those of *Tussilago Farfara* have been in Europe; *Trixis brasiliensis* is taken in decoction as a remedy for excessive menstruation; *Moscharia pinnatifida* smells of musk, and *Flotovia diacanthoides* forms a small tree with a hard white wood.

The *Ligulifloral* genera are of far more importance. In all cases they abound in a milky, bitter, astringent, or narcotic juice. Among the bitters the most useful is *Chicory*, *Cichorium Intybus*, whose tap roots are cultivated as a substitute for *Coffee*, which they certainly improve when torrefied and added in small quantities.

Taraxacum Deus Leonis, the common *Dandelion* (*Dent de Lion*), appears to be of considerable medicinal importance as an anodyne, deobstruent, aperient, and diuretic; in cases of chronic diarrhoea it has been found very useful, according to Mr. Houlton. *M. Poley* has obtained from it *Taraxacine* in arborescent or star-shaped crystals.—*Pharm. Journ.* 1. 425. *Nabalus serpentaria* and *albus* are two North American plants, whose bitter milky roots are held in repute as a remedy for Rattlesnake bites; *Mulgedium floridanum* is called, because of its bitterness, *Gall of the Earth*. The *Lettuces*, *Lactuca*, are all narcotic; *Lactuca virosa*, *Scariola*, and *sylvestris* yield an extract resembling opium in its qualities; the garden Lettuce, *L. sativa*, furnishes the narcotic drug called *Lactucarium*. But, according to *Aubergier*, the best *Lactucarium* is obtained from *Lactuca altissima*.—*Comptes R.* xv. 923. A similar gum, which they call *κολλα*, is obtained in Lemnos from *Chondrilla juncea*. In a few species the juice is acrid. *Zacyntha verrucosa* is used in the Mediterranean as a phagedenic, and *Crepis lacera* is held in the kingdom of Naples to be a venomous plant.

In a small number of species of this Order nutritive matter is collected in sufficient abundance to render them worthy of notice as esculents. The most important in that way are *Cardoons*, the blanched leaf-stalks and stems of *Cynara Cardunculus*; *Artichokes* obtained from the succulent receptacles of *Cynara Scolymus*; *Scorzoner* and *Salsafy*, the roots of *Scorzoner* *hispanica* and *Tragopogon porrifolius*; *Endive*, the blanched leaves of *Cichorium Endivia*; *Succory*, a similar preparation of *Cichorium Intybus*;

and above all, Lettuces and Jerusalem Artichokes : the former the leaves of *Lactuca sativa*, the latter the tubers of *Helianthus tuberosus*. To these some have added the roots of the Dahlia, but their strong turpentine taste renders them unfit for food. Among the less known esculents are *Helminthia celioides*, whose leaves are boiled and pickled in Greece.—*Sibth.* *Scorzonera glastifolia* has roots whose quality is similar to that of *S. hispanica*; *S. deliciosa* is the species most cultivated as an esculent at Palermo; the gummy root of *Scorzonera tuberosa* is eaten by the Calmucks, and the young roots of *Myscolus* (*Scolymus*) *hispanicus* are esculent when young, but they are diuretic. The leaves of *Cichorium lutybus* have been found to dye blue when prepared in the same manner as Woad.—*Chem. Gaz.* 1845, p. 340.

GENERA.

Suh-order I. TUBULIFLORÆ.

I. VERNONIACEÆ.

ETHULIÆÆ.

Adenocyclus, Less.
Odontoloma, H. B. K.
Oiospermum, Less.
Sparanophorus, Vaill.
Strachium, P. Br.
Xiphochæta, Pöpp.
Ethulia, Cass.
Kuhiria, Forsk.
Leighia, Scop.
Herderia, Cass.

HETEROCOMEÆ.

Pacourina, Aubl.
Pacourinopsis, Cass.
Misteria, Scop.
Haynea, Willd.
Heterocoma, DC.
Vernonia, Schreb.
Acilepis, Don.
Hololepis, DC.
Proteopsis, Mart.
Leptospermoides, DC.
Vanillosma, Less.
Carpophobus, Schott.
Strobilalyx, Blume.
Triantha, DC.
Pollalesta, Kunth.
Oliganthes, Cass.
Tephrodes, DC.
Isomeria, Don.
Lepidolapha, Cass.
Asarivida, Less.
Centrapalus, Cass.
Buccaroides, L.
Decaneurum, DC.
Phyllocephalum, Blum.
Wightia, Spreng.
Rojankia, Zenker.
Gynnanthemum, Cass.
Cyanopsis, Blume.
Cyanthidium, Blume.
Isomena, Cass.
Centratherum, Cass.
Ampherephis, Kunth.
Spiria, Schrank.
Bechium, DC.
Stokesia, Herb.
Carteria, Cass.
Platycarpha, Less.
Cynara, Thunb.
Odontocarpa, DC.
Webbia, DC.
Hoplophyllum, DC.
Piptocoma, Cass.
Distephanna, Cass.
Strophopappus, DC.
Blanchetia, DC.
Symblomeria, Nutt.
Stilpnopappus, Mart.
Dialesta, H. B. K.
Monosia, DC.
? Turjania, Llv. et Lex.
Shawia, Forst.
Haplostephium, Mart.

Lychnophora, Mart.

Alhertiuia, Spreng.
Eremanthus, Less.
Pycnocephalum, DC.
Chresta, Arrab.
Lychnocephalus, Mart.
Chronopappus, DC.
Pithecoseris, Mart.
Leucopholis, Gardn.
Stachyanthus, DC.

ELEPHANTOPEÆ.

Elephantopus, L.
Elephantosis, Less.
Pseudoelephantopus, R.
Distreptus, Cass.
Matamoria, Llv. et Lx.

ROLANDREÆ.

Gundelia, Tournef.
Gundelshemera, Cass.
Corymbium, L.
Contarena, Adans.
Solandra, Rottb.
Spiracantha, H. B. K.
Acosta, DC.
Trichospira, H. B. K.
Lagascea, Cav.
Noccea, Cass.

BOJERIEÆ.

Synchodendron, Boj.
Centauropsis, Boj.
Tecmarsis, DC.
Bojeria, DC.

LLABEÆ.

Xanthisma, DC.
Sinclairia, Hook.
Hectorea, DC.
Andromachia, H. B. K.
Oligactis, Cass.
Pleionactis, DC.
Viciania, Willd.
Platypleura, DC.
Platylopsis, Less.
Paranephelium, Pöpp.
Llabum, Adans.
Chrysanthinum, Kunth.
Surkea, Willd.
Andromachia, Cass.
Alibum, Less.
Cucumia, H. B. K.
Xantholepis, Willd.
Clairvillea, DC.

PECTIDEÆ.

Pectidopsis, DC.
Pectidium, Less.
Pectis, Linn.
Lorentea, Lagasc.
Chthonia, Cass.
Lorentea, Less.
Cryptopetalum, Cass.
Stammarium, Willd.

II. EUPATORIACEÆ

ALOMIÆÆ.

Orsiuia, Bertol.
Piqueria, Cav.
Alomia, H. B. K.
Phalacraea, DC.
Gymnocoronis, DC.
Isocarpha, R. Br.

AGERATEÆ.

Cœlestinia, Cass.
Ageratum, L.
Pectinellum, DC.
Anisochæta, DC.
Adenostemma, Forst.
Lavenia, Swartz.
Sclerolepis, Cass.
Phania, DC.
Orylobus, Moç.
Stevia, Cav.
Palafoxia, Lagasc.
Paleolaria, Cass.
Polypteris, Nuttall.
Carelia, Less.
Agrianthus, Mart.
Helogyne, Nutt.

ADENOSTYLEÆ.

Kuhnia, L.
Strigia, DC.
Critonia, Gärtn.
Trichogonia, DC.
Leigonia, DC.
Carminatia, Moc.
Disynaphin, DC.
Clavigera, DC.
Liatris, Schreb.
Suprago, Gärtn.
Trilisa, Cass.
Carphephorus, Cass.
Decachæta, DC.
Chromolæna, DC.
Goelidium, DC.
? Praeclis, Cass.
Conoclinium, DC.
Hebeclinium, DC.
Lophoclinium, Ewll.
Campyloclinium, DC.
Bulbostylis, DC.
Coleosanthus, Cass.
Critonia, P. Br.
Wickstrœmia, Spr.
Eupatorium, Tournef.
Trayantha, Wuhl.
Nothites, Cass.
Mihania, Willd.
Adenostyles, Cass.
Brickellia, EU.

PETASITEÆ.

Houogyne, Cass.
Nardosmia, Cass.
Petasites, Tournef.
Adenocaulon, Hook.

EUTUSSILAGINEÆ.

Tussilago, Tournef.
Alciope, DC.
Brachyglottis, Forst.

III. ASTEROIDEÆ.

AMELLEÆ.

Amellus, Cass.
Corethrogyne, DC.
Chiliotrichum, Cass.
Tropidolepis, Tausch.

HETEROTHALAMEÆ.

Heterothalamus, Less.

ASTEREÆ.

Mairia, DC.
Pteropappus, Less.
Zyrphelis, Cass.
Felicia, DC.
Polyarrhena, Cass.
Munychia, Cass.
Agatheia, Cass.
Detridium, Nees.
Detris, Adans.
Bellidiastrum, Mischl.
Margarita, Gaud.
Aster, Nees.
Amellus, Adans.
Symphotrichum, Nees.
Tripolium, Nees.
Galatella, Cass.
Galatea, Cass.
Monoptilon, T. et Gr.
Turczanowia, DC.
Townsendia, Hook.
Calineris, Cass.
Xylorrhiza, Nutt.
Eurybiopsis, DC.
Podocoma, Cass.
? Podopappus, Hook.
Asteropsis, Less.
Arctogeron, DC.
Scricocarpus, Nees.
Eucephalus, Nutt.
Lagata, Nutt.
Machverantlicra, Nees.
Tetranolopium, Nees.
Henricia, Cass.
Döllingeria, Nees.
Helenstrum, DC.
Biotia, DC.
Enrybia, Cass.
Symphotrichum, Nees.

DIPLOPAPPEÆ.

Olenria, Münch.
Hartonia, Cnely.
Diplostephium, Cass.
Callistephus, Cass.
Callistemma, Cass.
? Poloa, DC.

Diplopappus, *DC.*
Zeterosperma, Less.
 Rhinactina, *Less.*
 Notiastrium, *DC.*
 Distasis, *DC.*

ERIGEREÆ.

Melanodendron, *DC.*
 Leptocoma, *Less.*
 Vittadinia, *A. Rich.*
 Fullartonia, *DC.*
 Polyactidium, *DC.*
Polyactis, Less.
Stenactis, Cass.
 Iteirochaeta, *DC.*
 Therogeron, *DC.*
 Erigeron, *DC.*
Leptostictina, Don.
Terranea, Colla.
Trimorphica, Cass.
 Rhynchospermum, *Rnw.*
 Microgyne, *Less.*

HETEROPAPPEÆ.

Simbloeline, *DC.*
 Heteropappus, *Less.*
 Phalacrocoma, *Cass.*
 Minuria, *DC.*
 Stenactis, *Nees.*
 Gynuostephium, *Less.*
 Clurris, *Cass.*
Kaulfussia, Nees.
 Chatopappus, *DC.*
Chelophora, Nutt.
 Boltonia, *Herit.*
 Perityle, *Benth.*
 Sommerfeltia, *Less.*

BELLIEÆ.

Calotis, *R. Br.*
 Hunefeldia, *Walp.*
 Asteromeca, *Blume.*
 Bellium, *L.*

BELLIDEÆ.

Bellis, *L.*
Kyberia, Neck.
 Senbertia, *Wats.*
 Brachycome, *Cass.*
Braehystephium, Less.
 Paquertia, *Cass.*
 Lageophora, *Cass.*
Lagenifera, Cass.
Microcalia, *A. Rich.*
 Ixauchenus, *Cass.*
Myriactis, Less.
Botryadenia, Fisch.
 Garuleum, *Cass.*
 Keerlia, *DC.*
 Aphanostephus, *DC.*

GYMNOSPERMEÆ.

Xanthocoma, *H. B. K.*
 Xerothermus, *DC.*
 Anaglypha, *DC.*
 Gymnosperma, *Less.*
 Selloa, *Spreng.*

ACHYRIDEÆ.

Brachyris, *Nutt.*
Brachyachyris, Spreng.
 Amphipappus, *T. et Gr.*
 Hemtachyris, *DC.*
 Lepidophyllum, *Cass.*
 Grindelia, *Willd.*
Demetria, Lagase.
 Donia, *R. Br.*
Aurelia, Cass.
 Centauridium, *Torrey.*

HETEROTHECEÆ.

Heterotheca, *Cass.*
Calycium, Ell.
Diplocoma, 1 on.
 Bradburia, *Torrey.*
 Dieteria, *Nutt.*
Sideranthus, Nutt.
 Pappochroma, *Nutt.*

PSIADIEÆ.

Erato, *DC.*
 Woodvillea, *DC.*
 Psiadia, *Jacq.*
Elphegea, Cass.
Thouarsia, Vent.
Aliz, Commers.
Glutinaria, Commers.
 Frivaldia, *Enll.*
Microglossa, DC.
 Nidorella, *Cass.*
 Houochroma, *DC.*
 Neja, *D. Don.*

CHRYSOPSISIDÆ.

Chrysopsis, *Nutt.*
Pipigon, Rafin.
 Pityopsis, *Nutt.*
 Preseuia, *DC.*

SOLIDAGINEÆ.

Bigelowia, *DC.*
 Chrysochaeta, *Torrey.*
 Chrysuma, *Nutt.*
 Chrysothamnus, *Nutt.*
 Solidago, *L.*
Virga-aurea, Tournef.
 Doria, *Adans.*
 Euthamia, *DC.*
 Amphirapis, *DC.*
 Isopappus, *Torrey.*
 Homopappus, *Nutt.*
Myrianthus, Nutt.
Actinophora, Nutt.
 Stenotus, *Nutt.*
 Commidendruu, *Burch.*
 Steirnetis, *DC.*
 Rochonia, *DC.*
 Prionopsis, *Nutt.*
 Haplopappus, *Cass.*
Aplopappus, Cass.
Diplopappus, Less.
 ? *Hoorbeckia*, Cornelis.
 ? *Sideranthus*, Fraser.

Ericameria, *Nutt.*
 Pyrrocoma, *Hook.*
 Chromochaeta, *DC.*
 Macrocnema, *Nutt.*
 Lessingia, *Cham.*
 Isocoma, *Nutt.*
 Linosyris, *Lobel.*
Crimitaria, Less.
Crinita, Mönch.
 Chrysocoma, *Cass.*
 Ammodia, *Nutt.*
 Eriocarpum, *Nutt.*
 Pteronia, *L.*
Scepimia, DC.
 Henanthus, *Less.*
Pachyderris, DC.
Pterophorus, DC.
Pterophora, Neck.
 Pentaachaeta, *Nutt.*

SOLNOCYNEÆ.

Duhalden, *DC.*
 Microtrichia, *DC.*
 Nolletia, *Cass.*
 Sarcanthemum, *Cass.*
 Leptothamnus, *DC.*
 Chroilema, *Beruh.*
 Solenogyne, *Cass.*

SPHERANTHEÆ.

Blepharispermum, *Wight.*
 Leucoblepharis, *Arn.*
 Athroisma, *DC.*
 Sphaeranthus, *Vaill.*
Cuspidella, DC.
 Polycyphalos, *DC.*
 Oligolepis, *Cass.*

GRANGEINEÆ.

Dielrocephala, *DC.*
Centipeda, Less.
 Grangea, *Adans.*
Leptoderris, DC.
 Pyrada, *DC.*
 Cyathocline, *Cass.*
 Lestadin, *Kunth.*
 Gymnarrhena, *Desf.*
Gymnarhea, Steud.
 Frankia, *Steud.*

CONYZEÆ.

Thespis, *DC.*
 Karelinia, *Less.*
 Berthelotia, *DC.*
 Lænnezia, *Cass.*
 Conyza, *Less.*
Dimorphanthus, Cass.
Eschenbachia, Mönch.
Finbrillaria, Cass.
 Leucopodium, *Gardn.*
 Pingualon, *Cass.*
 Chionoloma, *DC.*
 Elachothamnus, *DC.*
 Parastrephia, *Nutt.*

BACCHARIDEÆ.

Polypappus, *Less.*
 Baccharis, *L.*
 Molina, *Ruiz et Pav.*
 Sergillus, *Gärtn.*
 Pinguava, *Cass.*
 Turseua, *Cass.*
 Arrheneuche, *Cass.*
 Stephananthus, *Lehm.*

TARCHONANTHEÆ.

Brachylama, *R. Br.*
 Oligocarpha, *Cass.*
 Tarchonanthus, *Linn.*
 Menotogyne, *DC.*

PLUCHEINEÆ.

Blumen, *DC.*
 Pluchen, *Cass.*
Stylimnus, Rafin.
 Gynnema, *Rafin.*
 Leptogyne, *Ell.*
 Chlenobolus, *Cass.*
 ? *Placus*, Lour.
 Hecphora, *DC.*
 Pterocaulon, *Ell.*
 Monenteles, *Labill.*
 Tessaria, *Ruiz et Pav.*
Gyrkhetaria, Willd.
 Gynetaria, *Spr.*
 ? *Phalacrocnemum*, Cas.
 Monarrhenus, *Cass.*
 Mahometa, *DC.*
 Cylindrocline, *Cass.*
 Lepidopogon, *Tausch.*
 Evax, *Gärtn.*
 Filago, *Willd.*
 Gnaphalium, *Vaill.*
 Filaginopsis, *Torr.*
 Diaperia, *Nutt.*
 Stylocline, *Nutt.*
 Micropsis, *DC.*
 Calymnandra, *Torr.*
 Micropus, *L.*
Gnaphalodes, Tournef.
 Psilocarpha, *Nutt.*

Epaltes, *Cass.*
Ethalia, Gärtn.
 Denekia, *Thunb.*
 Dipterocome, *F. et M.*

INULEAÆ.

Rhanterium, *Desf.*
 Rhodnocephalum, *Fenzl.*
 Iuulu, *Gärtn.*
Corrisartia, DC.
 Babonium, *DC.*
 Emula, *Duby.*
 Cappa, *DC.*
 Limbarda, *DC.*
 Erithis, *Gray.*
 Schizogyne, *Cass.*
 Varthemia, *DC.*
 Vicoa, *Cass.*
 Pentanema, *Cass.*
 Francoeuria, *Cass.*
Duchesnea, Cass.
 Asteridea, *Lindl.*
 Iphiona, *DC.*
 Jasonia, *Cass.*
Chiliadenus, Cass.
Myriadenus, Cass.
Allagopappus, Cass.
 Vierrea, *Webb.*
 Pulicaria, *Gärtn.*
 Tubilum, *Cass.*
 Strabonia, *DC.*
 Pegoletia, *Cass.*
 Minyrothamnus, *DC.*
 Cypselodontia, *DC.*
 Geigeria, *Griess.*
Zeyheria, Spreng.
 Dizonium, *Willd.*
 Hochstetteria, *DC.*

CÆSULINEÆ.

Casulia, *Roxb.*

BUPHTHALMEÆ.

Buphtthalmum, *Neek.*
 Telekia, *Baumg.*
 Molpadia, *Cass.*
 Astericus, *Mönch.*
 Nauplius, *Cass.*
 Pallenis, *Cass.*
Athalbum, Neek.
 Arnvillea, *DC.*
 Crnana, *Forsk.*
 Cryptadia, *Lindl.*

ECLIPTEÆ.

Borrichia, *Adans.*
 Diomedea, *Cass.*
 ? *Odontospermum*, Nk.
 Eelipta, *Linn.*
Microlium, Forsk.
 Blainvillen, *Cass.*
 Uvacea, *Cass.*
 Salmen, *DC.*
Hopkirria, Spreng.
 Dahlia, *Cav.*
Georgia, Willd.
 Georgia, *Spreng.*
 Leptocarpha, *DC.*
 Siegesbeckia, *Linn.*
 Schukria, *Mönch.*
 Sabnzia, *Cass.*
 Cryphiospermum, *Patis.*
 Wahlenbergia, *Schum.*

IV. SRNECIONIDEÆ.

EUXENIEÆ.

Euxenia, *Cham.*
 Ogiera, *Spreng.*
 Podantia, *R. Br.*

Petrobium, R. Br.
Lacmannia, Forst.
Dryniphyllum, Burch.
Astemma, Less.

MILLERIEÆ.

Elvira, DC.
Meratia, Cass.
Delilia, Spreng.
Eugamelia, Fl. Mex.
Milleria, Cass.
Riencourtia, Cass.
Tetrantha, Poit.
Garcilassa, Pöpp.
Latreillea, DC.
Ichthyothere, Mart.
Clibadium, Linn.
Oswalda, Cass.
Baillieria, Less.
Trixis, Swartz.
Trixidium, DC.
Picrothamnus, Nutt.
Unxia, L.
Hennosperma, L.
Apatus, DC.
Fronacron, Cass.
Aiolothea, DC.
Trigonospermum, Less.
Xenismia, DC.
Scolospermum, Less.
Baltinora, L.
Fougerouzia, DC.
Nieuharia, Scop.
Fougeria, Münch.
Chrysogonum, L.
Diostotephus, Cass.

SILPHIEÆ.

Guardiola, H. B. K.
Guandiola, Ste.
Hidalgoa, Less.
Silphium, L.
Polymnia, L.
Credalia, DC.
Alygnia, Neck.
Polymniastrum, Lam.
Espeletia, Nutt.
Berlandiera, DC.
Angelandra, Endl.
Engelmamia, Torrey.

MELAMPODIEÆ.

Melampodium, L.
Zurabellia, Cass.
Iryosium, L. C. Rich.
Alana, Cav.
Camulia, Bonat.
? Hualgoa, Llav. et Lex
Acaothospermum, Schr.
Centrospermum, Knth.
Echinostema, Poirat.
Ceratostema, DC.
Tolocarpus, Hook et Arn.

AMBROSIEÆ.

Xanthium, Tournef.
Franseria, Cav.
Xanthopsis, DC.
Centroleuca, DC.
Ambrosia, Tournef.

IVEÆ.

Pinelliosa, Ossa.
Tetranthus, Swartz.
Iva, L.
Denira, Adans.
Euphosyne, DC.
? Cyclachena, Fresen.
Euphosinia, Rehb.
Gymnogyne, Steetz.

PARTHENIEÆ.

Coniothele, DC.
Leptosyne, DC.
Parthenium, L.
Partheniastrum, Niss.
Hysterochorus, Vaill.
Trichospermum, Palis.
Bolophyta, Nutt.
Argyrochaeta, Cav.
Villanova, Orteg.
Tragoceras, Less.
Moomia, Arnott.

HELIOPSIDEÆ.

Philactis, Schrad.
Zinnia, L.
Lejcia, Hill.
Crassina, Scop.
Helicta, Cass.
Alarqonia, DC.
Wyethia, Nutt.
Trachina, Endl.
Wedelia, Jacq.
Stemmodontia, Cass.
? Trichostenma, Cass.
Trichostephus, Cass.
Trichostephium, Cass.
Nieuharia, Neck.
Aglossa, DC.
Jageria, H. B. K.
Lipotriche, R. Br.
Melanthera, Rohr.
Ogiera, Cass.
Chalarium, Poit.
Monactis, H. B. K.
Wollastonia, DC.
Thlesia, F. W. Mey.
Pascalia, Orteg.
Rumfordia, DC.
Heliopsis, Pers.
? Helepta, Rafin.
Kallias, DC.
Ralsamorrhiza, DC.
Guizotia, Cass.
Rumtilia, DC.
Vestigia, Vis.
Tetragonotheca, Dillen.
Halea, Torr. et Gray.
Engelmannia, Torrey.
Ferdinanda, Lagasc.
Chrysophania, Kunth.
Zaluzania, Pers.
Chiliophyllum, DC.
Hybridella, Cass.
Scaleia, Arnott.

RUDECKIEÆ.

Echinacea, Münch.
Branneria, Neck.
Bobartia, Petiv.
Helicthroa, Rafin.
Echinomeria, Nutt.
Rudbeckia, Linn.
Obeliscothea, Vaill.
Heliophthalum, Rafin
Dracopis, Cass.
Obeliscaria, Cass.
Lepachys, Less.
Ratibida, Rafin.
Andrieuxia, DC.
Anonostephium, DC.
Asplia, Thourat.
Gynostopsis, DC.
Gyanobomia, Kunth.
? Abbaia, Llav. et Lex.
Wulffia, Neck.
Chakiatella, Cass.
Chilostia, Rich.
Gyanolima, Ker.
Cordispermum, Poit.
Montanana, DC.
Eriocoma, Kunth.
Mohnana, Llav. et Lex.
Eriosepala, Cass.

Sclerocarpus, Jacq.
Encelia, Adans.
Pallasia, Herit.
Philoglossa, DC.
Chrysostemum, Less.
Calliopsis, Rehb.
Diploastrum, Tausch.
? Peramibus, Rafin.

COREOPSIDEÆ.

Agarista, DC.
Epilepsis, Benth.
Coreopsis, L.
Diodonta, Nutt.
Medusa, Nutt.
Heterodonta, Nutt.
Cosmidium, Gray.
Acispermum, Neck.
Lechea, Cass.
Chrysmela, Tausch.
Tuckermannia, Nutt.
Actinomeris, Nutt.
Ridan, Adans.
Pterophyton, Cass.
Actimeris, Rafin.
Armania, Berter.
Oyedaa, DC.
Simsia, Pers.
Viguiera, H. B. K.
Leighia, Cass.
Harpalium, Cass.
Tithonia, Desf.
Helianthus, L.
Chrysis, Renealm.
Corona Solis, Tournef.
Yocasan, Adans.
Discomela, Rafin.
Flourensia, DC.

BIDENTIDEÆ.

Campylothea, Cass.
Bidens, L.
Kerneria, Münch.
Pluridens, Neck.
Edwardia, Neck.
Ceratoccephalus, Vaill.
Cosmos, Cav.
Cosmea, Willd.
Adenolepis, Less.
Microdonta, Nutt.

VERBESINEÆ.

Lasianthea, DC.
Lasianthus, Zuccar.
Perymenium, Schrad.
Schistocarpha, Less.
Psathurochata, DC.
Lipocheata, DC.
Lipotriche, Less.
? Zexmenia, Llav. et Lex.
Microcheta, Nutt.
Aphanopappus, Endl.
Schizophyllum, Nutt.
Diplothrix, DC.
Selloa, H. B. K.
Fera, Spreng.
Verbesina, Less.
Locheria, Neck.
Siegesbeckia, Gronov.
Pharusa, Gurtin.
Hannulua, DC.
Platypteris, DC.
Aconia, Benth.
Coreocarpus, Benth.
Mendezia, DC.
Ditrachum, Cass.
Micractis, DC.
Splanthes, Jacq.
Cercuchis, Gurtin.
Arnalia, DC.
Atronia, Neck.
Salicaria, DC.
Dunantia, DC.
Ximenesia, Cav.

Sanvitalia, Juss.
Lorentea, Orteg.
Anatis, DC.
Oligogyne, DC.
Harpephora, Endl.
Synedrella, Gurtin.
Calyptrocarpus, Less.
Electra, DC.
Chromolepis, Benth.
Chrysanthellum, Rich.
Chrysanthellina, Cass.
Sebastiania, Bertol.
Collaea, Spreng.
Neuractis, Cass.
Glossocardia, Cass.
Heterospermum, Willd.
Heterosperma, Cav.
Glossogyne, Cass.
Delucia, DC.
Narvalina, Cass.
Needhamia, Cass.
Thelesperma, Less.
Isostigma, Less.

FLAVERIEÆ.

Flaveria, Juss.
Vermifuga, Ruiz et P.
Broteroa, DC.
Brotera, Spreng.
Nauenburgia, Willd.
Enhydra, Loureir.
Meyera, Schreb.
Sobrya, Pers.
Hingchia, Roxb.
Tetractis, Reinw.

TAGETEÆ.

Adenophyllum, Pers.
Willdenoua, Cav.
Schlechtendalia, Willd.
Lebetina, Cass.
Bobera, Less.
Dissodia, Willd.
Dysodia, Cav.
Gymnolena, DC.
Aciphylla, DC.
Clomenocoma, Cass.
Bartolina, Adans.
Hymenatherum, Cass.
Riddellia, Nutt.
Solenotheca, Nutt.
Tagetes, Tournef.
Diglossus, Cass.
Eualcida, Cass.
Thymophylla, Lagasc.
Adenopappus, Benth.
Syncephalanthia, Bartl.

POROPHYLLEÆ.

Porophyllum, Vaill.
Klebina, Jacq.
Tsinoma, Hernand.
Hantaria, Fl. mex.
Cusimbua, DC.
Kugaia, DC.
Chethymenia, H. et A.

GAILLARDIEÆ.

Gaillardia, Foug.
Galardia, Linn.
Colomea, Inchoz.
Virgilia, Herit.
Galordia, Reuschel.
Balduina, Nutt.
Endorina, Raf.
Actinospermum, Ell.
Leptopoda, Nutt.
Leptocarpha, Raf.
Achyrachea, Schaner.
Lepidostephanus, Hbl.

HULENIEÆ.

Hutierrezia, Lagasc.

Achyropappus, *H. B. K.*
Chanarstephanum, *W.*
 Schkuhria, *Roth.*
Tetracarpum, *Mönch.*
Meria, *Llav. et Lex.*
 Amblyopappus, *Hooker.*
 Florestina, *Cass.*
Lepidopappus, *Fl. mex.*
 Actinolepis, *DC.*
 Balia, *DC.*
Eriophyllum, *Lagasc.*
Trichophyllum, *Nutt.*
Thialis, *Spreng.*
 Richteria, *Karclm.*
 Oxyleris, *Benth.*
 Macrocephalus, *Nutt.*
Macrocarphus, *Nutt.*
 Hymenopappus, *Herit.*
Rothia, *Lam.*
 Chænectis, *DC.*
 Polypteris, *Nutt.*
 Espejoa, *DC.*
 Cercostylos, *Less.*
 Polypteris, *Less.*
Güntheria, *Spreng.*
 Hopkirkia, *DC.*
 Hymenoxis, *Cass.*
 Stylesia, *Nutt.*
 Cephalophora, *Cav.*
Grænna, *Hook.*
 Actinella, *DC.*
 Actinea, *Cass.*
Dugaldca, *Cass.*
Pilepida, *Raf.*
 Cancrinia, *Karcl.*
 Jaunea, *Pers.*
Kleinia, *Juss.*
 Burriella, *DC.*
 Ptilomeris, *Nutt.*
 Dichæta, *Nutt.*
 Pteradenia, *Hook.*
 Helenium, *L.*
Helenia, *L.*
Brassavola, *Adans.*
Tetrodus, *DC.*
Mesodetra, *Rafin.*
 Amblyolepis, *DC.*
 Rosilla, *Less.*
 Trinclinettia, *Endl.*
Schomburgkia, *DC.*
 Hecubæa, *DC.*
 Bæria, *Fisch. et Mey.*
Callichroa, *Fisch. et Mey.*
Calliachylris, *Torr. et Gr.*
 Oxyopappus, *Benth.*
 Rancagua, *Poepp. et Endl.*
Lasthenia, *Cass.*
 Argyroxiphium, *DC.*
Argyrophyton, *Hook.*
 Pleurophyllum, *Hook. fil.*

GALINSOGEÆ.

Lemmatium, *DC.*
Calceate, *Less.*
 Calydemos, *Lagasc.*
Calabrachys, *DC.*
 Meyeria, *DC.*
 Callilepis, *DC.*
 Calen, *R. Br.*
Calceate, *DC.*
Mopina, *Lagasc.*
Leopthalimum, *Less.*
 Allocarpus, *H. B. K.*
Alloispermum, *Willd.*
 Vargasia, *DC.*
 Galinsoga, *Ruiz et Pav.*
Galinsogœa, *Zuccar.*
Wiborgia, *Roth.*
 Sogaligina, *Cass.*
Galinsogœa, *Less.*
Sogaligina, *Steud.*
 Ptilostephium, *H. B. K.*
 Tridax, *L.*
 Hlepharipappus, *Hook.*
Pilonella, *Nutt.*

Eriopappus, *Arn.*
 Marschallia, *Schreb.*
Persoonia, *Michx.*
Trattinnickia, *Pers.*
Athanasia, *Walt.*
Phytocnopsis, *Juss.*
 Dubautia, *Gaudich.*

SPHENOGYNEÆ.

Sphenogyne, *R. Br.*
Oligacria, *Cass.*
Spermophylla, *Neck.*
Thelythamnus, *Less.*
Xerolepis, *DC.*
 Ursinia, *Gærtm.*
 Amida, *Nutt.*
 Lagophylla, *Nutt.*
 Harpæcarpus, *Nutt.*
 Madia, *Molin.*
Madarella, *Nutt.*
Biotia, *Cass.*
 Silphiosperma, *Steetz.*
 Madaria, *DC.*
Madiopsis, *Nutt.*
 Hemizonia, *DC.*
 Anauria, *Benth.*
 Tollatia, *Endl.*
Oxyura, *DC.*
 Hartmannia, *DC.*
 Madaroglossa, *DC.*
Lugia, *Hook. et Arn.*
 Lepidostephanus, *Bartl.*
 Anisocarpus, *Nutt.*
 Osmadenia, *Nutt.*
 Calycadenia, *DC.*

ANTHEMIDEÆ.

Œdera, *DC.*
 Eumorphia, *DC.*
 Aganippea, *DC.*
 Hellogenes, *Benth.*
 Epallage, *DC.*
 Anthemis, *DC.*
Chamaemelum, *DC.*
Mareclia, *Cass.*
 Maruta, *Cass.*
Periderma, *Webb.*
 Lugoa, *DC.*
 Lyouettia, *Cass.*
 Anæcyclus, *Pers.*
Hiorthis, *Neck.*
 Cyrtolepis, *Less.*
 Ormenis, *Cass.*
 Clandanthus, *Cass.*
 Lepidophorum, *Neck.*
 Parmica, *Tournef.*
 Achillea, *Neck.*
 Diotis, *Desf.*
Gnaphalium, *Tournef.*
Otanthus, *Link.*
 Santolina, *Tournef.*
Chamaecyparissus, *DC.*
Babounga, *DC.*
 Nablounum, *Cass.*
 Lasiospermum, *Lagasc.*
 Lanipila, *DC.*
 Mataca, *Spreng.*

CHIRYSANTHEMEÆ.

Steiroglossa, *DC.*
 Lidbeckia, *Berg.*
 Gamolepis, *Less.*
 Lasthenia, *DC.*
Hologymnæ, *Bartl.*
 Psilothamnus, *DC.*
Jacquemontia, *Belang.*
 Spiridanthus, *Fenzl.*
 Coinogyne, *Less.*
 Egletes, *Less.*
Xerobius, *Cass.*
Egletia, *Rehb.*
 Venegasia, *DC.*
 Lencopsidium, *DC.*

Xanthocephalum, *Willd.*
 Phymaspermum, *Less.*
 Hlisntua, *DC.*
 Brachanthemum, *DC.*
 Nananthea, *DC.*
 Leucanthemum, *Tournef.*
Phalacrodiscus, *Less.*
Phalacroglossum, *DC.*
Diabasis, *DC.*
Enuchoglossum, *DC.*
Phalacrocarpum, *DC.*
 Prolongoa, *Boiss.*
 Adenachæna, *DC.*
 Matricaria, *L.*
 Pyrethrum, *Gærtm.*
Gymnocline, *Cass.*
Xanthoglossa, *DC.*
Coleostephus, *Cass.*
Tridactylina, *DC.*
Dendranthema, *DC.*
 Allardia, *Decaisne.*
 Chrysanthemum, *DC.*
Ismelia, *Cass.*
Pinardia, *Cass.*
Glebionis, *Cass.*
Pinardia, *DC.*
Centrospermum, *Sprn.*
Heteranthemis, *Schott.*
Centrachæna, *Schott.*
Spermoptera, *DC.*
Miyarsa, *DC.*
 Pœnanxia, *C. H. Schultz.*
 Monoptera, *C. H. Schultz.*
 Stigmatotheca, *C. H. S.*
 Argyranthemum, *Webb.*
 Dimorphotheca, *Vaill.*
Meteorina, *DC.*
Gattenhofia, *Neck.*
Cardispermum, *Traut.*
Lestibodia, *DC.*
Barium, *DC.*
Castalis, *DC.*
Rulidocarpœa, *DC.*
Arnoldia, *DC.*
Triplocarpœa, *DC.*
 Acanthotheca, *DC.*
 Monolopia, *DC.*
 Steirodiscus, *Less.*
 Schistostephium, *Krebs.*
 Chlamysperma, *Less.*
 Villanova, *Lagasc.*
 Brachymeris, *DC.*
Brachystylis, *E. M.*
 Jacosta, *E. Mey.*

COTULÆ.

Lapeyrousia, *Thunb.*
Peyrousia, *DC.*
 Otochlamys, *DC.*
 Cotula, *Gærtm.*
Baldingyria, *Neck.*
 Cenocline, *Koch.*
 Strongylosperma, *Less.*
 Cenia, *Commers.*
Lancisia, *Gærtm.*
 Homalotes, *DC.*
 Aromia, *Nutt.*

ATHANASIEÆ.

Lonas, *Adans.*
 Gonospermum, *Less.*
 Metagnanthus, *Endl.*
Hymenolepis, *Cass.*
 Holophyllum, *Less.*
Pristocarpa, *E. Mey.*
 Bembecodium, *Kunz.*
 Athanasia, *Cass.*
 Saintmorsia, *Endl.*
 Morysia, *Cass.*

ARTEMISIEÆ.

Stilpnophyllum, *Less.*
Mesocitrus, *DC.*
 Lepidotheca, *Nutt.*

Artemisia, *L.*
Dracunculus, *Bess.*
Oligosporus, *Cass.*
Scriphidium, *Bess.*
Scriphida, *Less.*
Abrotanum, *Tournef.*
Absinthium, *Tournef.*
 Crossostephium, *Cass.*
 Tanacetum, *Linn.*
Psanacetum, *Neck.*
Brocchia, *DC.*
Hippioides, *DC.*
 Sphaeromeria, *Nutt.*
 Plagius, *Herit.*
Balsanita, *Less.*
 Adenosolen, *DC.*
 Marasinodes, *DC.*
 Pentzia, *Thunb.*
 Chlamydothora, *Ehrenb.*
 Myriogyne, *Less.*
 Sphaeromorphæa, *DC.*
 Machlis, *DC.*

HIPPIEÆ.

Abrotanella, *Cass.*
 Trineuron, *Hook. fil.*
 Ceratella, *Hook. fil.*
 Leptinella, *Cass.*
 Plagiophilus, *Arnott.*
 Soliva, *Ruiz et Pav.*
Gymnostyles, *Juss.*
Solvaca, *Cass.*
 Hippia, *L.*

ERIOCEPHALEÆ.

Eriocephalus, *L.*
Mouckhæna, *Cass.*
 Cryptogyne, *Cass.*

ANGIANTHEÆ.

Styloneurus, *Labill.*
Ocyrostylus, *Cass.*
 Actinobole, *Endl.*
 Hylalepis, *DC.*
 Phylloclymna, *Benth.*
 Angianthus, *Wendl.*
Cassimia, *R. Br.*
Hirniclia, *Cass.*
Cylindrosurus, *Benth.*
 Skirrhophorus, *DC.*
Eriocladium, *Lindl.*
 Pogonolepis, *Steetz.*
 Myriocephalus, *Benth.*
 Gnephosis, *Cass.*
 Pachysurus, *Steetz.*
 Calcephalus, *R. Br.*
 Leucophyta, *R. Br.*
 Craspedia, *Forst.*
Riehca, *Labill.*
 Pycnosorus, *Benth.*
 Chrysocoryne, *Endl.*
Crossolepis, *Benth.*

CASSINIEÆ.

Ammobium, *R. Br.*
 Ixodia, *R. Br.*
 Rhynea, *DC.*
 Cassinia, *R. Br.*
Chromochiton, *Cass.*
Achromolana, *Cass.*
 Chthonocephalus, *Steetz.*

HELICHRYSÆÆ.

Humea, *Smith.*
 Calomeria, *Vent.*
 Agathomeris, *Delau.*
 Razumovia, *Spreng.*
 Crossolepis, *Less.*
 Pithocarpa, *Lindl.*
 Quinetia, *Cass.*
 Rintidosia, *DC.*
 Anisolepis, *Steetz.*

Rhodanthe, Lindl.
Lawrencella, Lindl.
Nyridanthe, Lindl.
Podotheca, Cass.
Podosperma, Labill.
Phænopoda, Cnss.
Leptorhynchus, Less.
Rhytidanthe, Benth.
Waiztia, Benth.
Vraya, Gaudich.
Morna, Lindl.
Millotia, Cass.
Pterochaeta, Steetz.
Ixiolana, Benth.
Chrysodiscus, Steetz.
Pauaetia, Cass.
Podolepis, Labill.
Scolioipsis, Walp.
Scalia, Sims.
Stylolepis, Lehm.
Doratolepis, Benth.
Siemssenia, Steetz.
Swammerdamia, DC.
Ozothamnus, R. Br.
Faustula, DC.
Petaloipsis, DC.
Chrysocephalum, Walp.
Eriosphera, Less.
Leontonyx, Cass.
Spiralepis, Dou.
Helichrysium, DC.
Anaceton, Gærtin.
Argyrocome, Gærtin.
Hebelena, DC.
Xerolena, DC.
Blapharolepis, DC.
Turostiche, DC.
Lepidine, Cass.
Eriocophyllum, Less.
Chinosemma, DC.
Leucostemma, Don.
Helipterum, DC.
Leucochrysium, DC.
Leichrysium, DC.
Sericophorum, DC.
Pachypterum, Steetz.
Aetelna, Less.
Damironia, Cass.
Synacra, DC.
Edmondia, Cass.
Hyalosperma, Steetz.
Aphelaxis, Boj.
Freemania, Boj.
Stenocline, DC.
Achyrocline, DC.
Gnaphalium, Don.
Gnaphalodes, DC.
Euchiton, DC.
Homalotheca, Cass.
Cladochaeta, DC.
Pteropogon, DC.
Schaenia, Steetz.
Laslopogon, Cass.
Amphidloxa, DC.
Demidium, DC.
Filago, Tournef.
Gifia, Cass.
Impia, Dodon.
Ogylia, Less.
Lojia, Cass.
Achariterium, Bl. et Fg.
Xerottum, Bluff. et Fing.
Metastasia, H. Br.
Eudolena, Cass.
Erythropogon, DC.
Lachnospermum Willd.
Carpholoma, Don.
Pachyrhynchus, DC.
Elytropappus, Cass.
Disparago, Gærtin.
Amphiglossa, DC.

SERIPHIEÆ.

Stoebe, Less.
Seriphium, Less.

Eremanthis, Cass.
Pleurcephalum, Cass.
Aerocephalum, Cass.
Perotriche, Cass.
Gymnachaena, Rehb.
ANTENNARIEÆ.
Trichogyne, Less.
Istya, Cass.
Phanocornum, Don.
Petalacte, Don.
Petalolepis, Less.
Annaxeton, Cass.
Antennaria, R. Br.
Dismanthus, Rafin.
Anaphalis, DC.
Leontopodium, R. Br.

LEYSSEREÆ.

Athrixia, Ker.
Asteropsis, Less.
Antithrixia, DC.
Leyssera, L.
Asteropterus, Vaill.
Callicornia, Burm.
Longchampia, Willd.
Leptophytus, Cass.
Pterothrix, DC.
Rosenia, Thunb.

RELHANTIEÆ.

Carpesium, L.
Amhylocarpum, F. et Mey.
Syncephalum, DC.
Oligodora, DC.
Nestlera, Spreng.
Stephanopappus, Les.
Columella, Jacq.
Polychaeta, Less.
Relhania, Herit.
Eclapas, Gærtin.
Odontophyllum, DC.
Rhigiophyllum, Less.
Rhychnopsidium, DC.
Rhychnocarpus, Less.
Osmites, Cass.
Bellidiastrum, Vaill.
Spanotrichum, E. Mey.
Osmitopsis, Cass.

NEUROLÆNEÆ.

Neurolena, R. Br.
Cava, Gærtin.
Faujasia, Cass.
Eriothrix, Less.
Stilpnogyne, DC.
Erechtites, Raf.
Neocelis, Cass.
Microderis, DC.
Tylosidicus, DC.
? Plagiotome, DC.
Ceradia, Lindl.
Cremoccephalum, Cass.
Crassocephalum, Mön.

SENECIONEÆ.

Gynura, Cass.
Emilia, Cass.
Asterosperma, Less.
Oligothrix, Cass.
Mesogramma, DC.
Cineraria, Less.
Xenocarpus, Cass.
Senecillis, Gærtin.
Ligularia, Cass.
Hoppa, Rehb.
Arnica, L.
Aronicum, Neck.
Grannathron, Cass.
Doranicum, L.
Werneria, H. B. K.
Cresigonia, Willd.
Culeitium, H. B. K.
Gynoxia, Cass.

Cacalia, DC.
Aulacophora, DC.
Delairea, Lemaire.
Cissampelopsis, Lemaire.
Psacalia, DC.
Pentacalia, Cass.
Lopholæna, DC.
Kleinia, L.
Cacalia, Cass.
Cacalianthemum, Dilln.
Acleia, DC.
Senecio, Less.
Anecio, Neck.
Aspelia, Neck.
Seneciotypus, Dumort.
Objacia, Cass.
Herbichia, Zawadsky.
Farobca, Schrank.
Eudorus, Cass.
Habertia, Bory.
Pithosillum, Cass.
Smarthrum, Cass.
Sclerobasis, Cass.
Cardiera, Cass.
Pericallis, Don.
Bethencourtia, Choix.
Danaa, Colla.
Heterolepis, Bert.
Adenotrichia, Lindl.
Scribcaria, Cass.
Ætheotana, Cass.
Dorobca, Cass.
Roldana, Llav. et Lex.
Brachyrhynchus, Less.
Trachycarpus, DC.
Crocidium, Hook.
Madnactis, DC.
Tetradymia, DC.
Lagothamnus, Nutt.
Raillarda, Gaudich.
Bedfordia, DC.
Nothonia, DC.
Lachanodes, DC.
Pladarozylon, Endl.
Euryops, Cass.
? Hertia, Neck.
Enantiotrichum, E. My.
Balbisia, DC.
Ingenhouzia, Berter.
Robinsonia, DC.

V. CYNAREÆ.

CALENDULEÆ.

Calendula, Neck.
Oligocarpus, Less.
Tripteris, Less.

OSTEOSPERMEÆ.

Osteospermum, L.
Eriocline, Cass.

OTHONNEÆ.

Heteractis, DC.
Gymnodiscus, Less.
Othonna, L.
Aristotela, Adans.
Doria, Less.
Hertia, Less.
Ruckeria, DC.
Harpocarpus, Endl.
Acanthocephalus, Ka.

ARCTOTEÆ.

Arctotis, Gærtin.
Arctotheca, Vaill.
Odontoptera, Cass.
Steganotus, Cass.
Gymbonotus, Cass.
Venidium, Less.
Cebithria, Schrad.
Haplocephala, Less.
Aloiozonium, Ker.
Landtia, Less.

Arctotheca, Benth.
Cryptostouma, R. Br.
Cymotis, Hoffmannsegg.
Microstephium, Less.
Heteromorphus, Cass.
Heteromorpha, Cass.

GORTERIEÆ.

Stephanocoma, Less.
Cullumia, R. Br.
Gorteria, Gærtin.
Personaria, Lau.
Hirpicium, Cass.
Didelia, Less.
Choristea, DC.
Favonium, Gærtin.
Bretenillia, Bueholz.
Cuspidia, Gærtin.
Aspidalis, Gærtin.
Berkheya, Ehrh.
Crocodylodes, Adans.
Basteria, Houtt.
Agriphyllum, Juss.
Rohricum, Vahl.
Gorteria, Lam.
Zarabellia, Neck.
Evopsis, Cass.
Agriphyllum, Less.
Basteria, DC.
Trichodes, DC.
Trichocoma, DC.
Gazania, Gærtin.
Musinia, Willd.
Mœhnia, Neck.
Melanchrysium, Cass.
Leptomorpha, DC.
Stobæa, Thunb.
Apuleia, Gærtin.
? Arelina, Neck.

ECHINOPSIDEÆ.

Echiopus, L.
Echinopus, Tournef.
Echinanthus, Neck.
Acantholepis, Less.

CARDOPATEÆ.

Cardopatum, Juss.
Brotera, Willd.
Chamaelon, C. Bauh

XERANTHEMEÆ.

Xeranthemum, Tournef.
Xeroloma, Cass.
Harrisonia, Neck.
Chardinia, Desf.
Siebera, Gay.

CARLINEÆ.

Saussurea, DC.
Heterotrichum, Bieb.
Benuetia, Gray.
Lagrostemon, Cass.
Cyathidium, Cass.
Lagranthera, C.A.M.
Theodora, DC.
Eriostemon, Less.
Aucklandin, Falc.
Haplotaxis, DC.
Erolvia, Ledeb.
? Hemistephia, Runge.
Eriocoryne, Willd.
Dolonileca, DC.
Arctium, Lam.
Arctio, Lam.
Arction, Cass.
Villarsia, Guettard.
Bernardia, Vill.
Stechmannin, DC.
Stachelina, DC.
Köchlen, Endl.
Carlina, Tournef.
Hercanthis, DC.
Mitina, DC.

Chameleon, DC.
Carlowizia, DC.
Atractylis, L.
Crocodylodes, Vaill.
Aarna, Cass.
Anactis, Cass.
Cirsellium, DC.
Spadactis, Cass.
Thevenotia, DC.
Cousinia, Cass.
Aneathia, DC.
Auchern, DC.
Polytaxis, Bunge.

CENTAURIEÆ.

Amberboa, Pers.
Chrysis, Less.
Gonioacaulon, DC.
Cyanopsis, Cass.
Cyanastrum, Cass.
Cyanopsis, Cass.
Lacellia, DC.
Voluntaria, Cass.
Volutarella, Cass.
Chrysis, Cass.
Pararhysis, DC.
Phaeopappus, DC.
Psephellus, Fisch.
Amhyopogon, Fisch.
Xanthopsis, DC.
Zaegen, L.
Microlonchus, DC.
Mantisalea, Cass.
Uralepis, DC.
Tricholepis, DC.
Achiropappus, Bieb.
Ochanopappus, Endl.
Ataphantias, Endl.

VI. MUTISIACEÆ.

BARNADESIEÆ.

Schlechtendalia, Less.
Dicaeutha, Less.
Barnadesia, Linn. f.
Bacuzia, Ruiz et Pav.
Penthea, Don.
Dasyphyllum, H. B. K.
Fulcaldea, Poir.
Turpinia, H. B. K.
Voigtia, Spr.
Dolichostylis, Cass.
Flotovia, Spreng.
Piptocarpha, Hook.
Nardophyllum, Hook.
Seris, Less.
Lycoseris, Cass.
? Diazeuris, Don.
Langsdorfia, Willd.
Chaetachlæna, Don.
Chuquiragua, Juss.
Johannia, Willd.
Joannesia, Pers.
Joannea, Spr.
Moquinia, DC.
Spadonia, Less.
Gochnatia, H. B. K.
Cyclolepis, Don.
Cyclolepis, Guillem.
Anastraphia, Don.
Pentaphorus, Don.
Hedraiophyllum, Less.
Augusta, Leandro.
Stiffia, Mik.
Sankhalaria, Leandr.
Mocina, DC.
Mutisia, L. fl.
Guariruma, Cass.
Holophyllum, Less.
Haplophyllum, Less.
Proustia, Lagasc.
Leucorhynch, Endl.

Tomanthea, DC.
Crupina, Cass.
Centaurea, Less.
Crocodyllum, DC.
Calcitrapa, DC.
Cyamus, DC.
Centaurium, DC.
Phrygia, Gray.
Hypochaestum, Gr.
Polyacantha, Gr.
Leucantha, Gray.
Hyalea, DC.
Microlophus, Cass.
Piptoceras, Cass.
Chartolepis, Cass.
Phalolepis, Cass.
Callicephalus, C. A. M.
Ptylophus, Cass.
Jacea, Cass.
Pterolophus, Cass.
Lepteranthis, DC.
Stenolophus, Cass.
Zethopappus, DC.
Stizolophus, DC.
Plectrocephalus, DC.
Psephellus, Cass.
Heterolophus, Cass.
Cheirolophus, DC.
Melanotoma, Cass.
Odonotolophus, Cass.
Lopholoma, Cass.
Spilacron, Cass.
Acrolophus, Cass.
Acrocentron, Cass.
Hymnocentron, Cass.
Verutina, Cass.
Mesocentron, Cass.
Triplacentron, Cass.

Sub-order II. LABIATIFLORÆ.

Thelecarpea, DC.
Harmodia, Don.
Calopappus, Meyen.
Ilyalis, Don.
Brachyclados, Don.
Chaetanthera, Ruiz et P.
Bichenia, Don.
Cherina, Cass.
Euthrixia, Don.
Proscelia, Don.
Prionotophyllum, Less.
Tylloma, Don.
Pachylæna, Don.
Trichocline, Cass.
Amblyserma, Benth.
Onoseris, DC.
Cladoseris, Less.
Chaetachlæna, Don.
Isotypus, H. B. K.
Seris, Willd.
Hilaria, DC.
Oldenburgia, Less.
Seytala, E. Mey.
Leucomeris, Don.
Myriopsis, Bunge.
Ainsliea, DC.
Chionoptera, DC.
Carmelita, Cl. Gay.
Gerbera, Gronov.
Aphyllacaulon, Lag.
Leptica, E. Mey.
Piloselloides, Less.
Oreoseris, DC.
Berniera, DC.
Dicoma, Cass.
Leucophyton, Less.
Xeropappus, Wall.
Micromoma, DC.
Rhigiobammus, Less.
Macladum, Cass.
Nitellum, Cass.
Pterocoma, DC.
Printzia, Cass.
? Lloydia, Neck.

Corethrospis, DC.
Podia, Neck.
Philostizus, Cass.
Pectinastrium, Cass.
Alophium, Cass.
Cnicus, Vaill.
Carbeni, Adans.
Tetramorphaea, DC.
CARTHAMEÆ.
Kentrophyllum, Neck.
Hohenwarta, West.
Heracantha, Lk.
Atractylis, Vaill.
Odonotragia, DC.
Thammacantha, DC.
Carthamus, Tournef.
Onobroma, DC.
Carduncellus, Adans.

SILYBEÆ.

Silybum, Vaill.
Galactites, Mönch.
Tyrimmus, Cass.

CARDUINEÆ.

Onopordon, Vaill.
Acavos, Adans.
Cynara, Vaill.
Spaniopyllon, Less.
Carduus, Gaertn.
Clavna, DC.
Picnomen, Lobel.
Acurna, Vaill.
Picnocomon, Dalech.
Cirsium, Tournef.
Cnicus, Schreb.

Breca, Less.
Lopholepis, Cass.
Odonolepis, Boiss.
Eriolepis, Cass.
Epytrachys, DC.
Orthocentrum, Cass.
Corymtrichum, DC.
Cephalonoplos, Neck.
Onotrophe, Cass.
Erythrolana, Sweet.
Chamaepeuce, Alpin.
Cirsium, Less.
Ptilostemon, Cass.
Lamyra, Cass.
Platypharium, Cass.
Notobasis, Cass.
Echenais, Cass.
Lappa, Tournef.

SERRATULEÆ.

Acroptilon, Cass.
Rhaponticum, DC.
Hookia, Neck.
Centaurium, Hall.
Stemmacantha, Cass.
Costrinus, Cass.
Leuzca, DC.
Rhacoma, DC.
Fornicum, Cass.
Mulacocephalus, Tsch.
Alfredia, DC.
Serratula, DC.
Sarreta, DC.
Mastrutum, Cass.
Percyphora, Hoffmann.
Klasea, Cass.
Oligochaeta, DC.
Jurinea, Cass.

Perdicium, Lagasc.
Pardisium, Burm.
Leiocarpum, DC.
Anandria, Siegesb.
Leibnitzia, Cass.
Oriastrum, Pöpp.

LERIEÆ.

Chaptalia, Vent.
Cursoria, Nutt.
Lieberkuhnia, Cass.
Oxydon, Less.
Loxodon, Cass.
Chevreuilia, Cass.

FACELIDEÆ.

Lucilia, Cass.
Oligandra, Less.
Facelis, Cass.

VII. NASSAVIACEÆ.

POLYACHYRIDEÆ.

Polyachyrus, Lagasc.
Bridgesia, Hook.
Diaphoranthus, Mey.
Cephaloseris, Pöpp.

NASSAVIEÆ.

Nassavia, Commers.
Nassoria, Pers.
Mastigophorus, Cass.
Trinacine, Cass.
Triptilion, Ruiz et Pav.
Acanthophyllum, Hook
 et Arn.
Panargyrum, Lagasc.
Pentanthus, Less.
Piptostemma, Don.

Caloptilium, Lagasc.
Sphaerocephalus, Lag.
Portalesia, Meyen.

TRIXIDEÆ.

Pamphalen, Lagasc.
Ceratolepis, Cass.
Cephalopappus, Nees et
 Mart.
Pleocarphus, Don.
Pentanthus, Hook et Arn.
Jungia, L. fl.
Trinacte, Gaertn.
Rhinactina, Willd.
Martrasia, Lagasc.
Moscharia, Ruiz et Pav.
Moschifera, Molina.
Mosigia, Spreng.
Gastrocarpha, Don.
Leucaria, Lagasc.
Leucharia, Less.
Macrobotrys, DC.
Lasiorrhiza, Lagasc.
Chabraa, DC.
Bertoloidea, DC.
Frageria, DC.
Muclovia, DC.
Cassiopea, Don.
Bowmannia, Gardn.
Ptilurus, Don.
Dumerilia, Less.
Trixis, P. Br.
Ceanthes, Don.
Platychilus, Cass.
Holochilus, Cass.
Oligophyllum, Less.
Polyphyllum, Less.
Prionanthes, Schrank.
Tenoria, Berter.
Alcithoë, Don.
Dolichlasium, Lagasc.
Perezia, Lagasc.
Chaetanthera, H. B. K.

Homoianthus, Bonpl.
Homanthis, Kunth.
Clarionea, DC.

Clarionella, DC.
Drozia, Cass.
Stenophyllum, Less.

Asteroseris, Endl.
Scolymanthus, Willd.
Isanthus, DC.

Acourtia, Don.
? Pogonura, DC.
Caloseris, Benth.

Sub-order III. LIGULIFLORÆ.

VIII. CICHORACEÆ.
SCOLYMEÆ.

Scolymus, Cass.
Myscolus, Cass.
Diplostemma, Hochst. et Steud.

LAMPANEÆ.

Lampasana, Vaill.
Lapsana, Tournef.
Soldevilla, Lagasc.
Hispidella, Barnades.
Apogon, Elliot.
Rhagadiolus, Tournef.
Kolpinia, Pall.

HYOSERIDEÆ.

Arnoseris, Gærtm.
Hedynois, Tournef.
Hyoseris, L.
Achyrastrum, Neck.
Calodontia, Nutt.
Aposeris, Neck.
Catananche, Tournef.
Hænselera, Boiss.
Acanthophyton, Less.
Cichorium, Tournef.
Calais, DC.
Hymenonema, Hook.
Tropappus, Nutt.
Scorzonella, Nutt.
Tolpis, Adans.
Drepania, Juss.
Swertia, Ludew.
Chatelania, Neck.
Schmidia, Monch.
Æthionia, Don.
Polychoria, Tausch.
Krizia, Schreb.
Troximon, Gærtm.
Cynthia, Don.
Adopogon, Neck.
Luthera, C. H. Schult.
Microseris, Don.
Lepilonema, Fisch. et Mey.
Fichtea, C. H. Schultz.
Bellardia, Colla.

Achyrophorus, Scop.
Porcellites, (partim), Cass.

Seriola, Gærtm.
Achyrophorus, Vaill.
Rodigia, Spr.
Piptopogon, Cass.
Agenora, Dou.
Porcellites, (partim), Cass.

Rohertia, DC.
Metathasis, DC.
Phalacroderis, DC.

SCORZONEREÆ.

Thrinicia, Roth.
Colobium, Roth.
Streckeria, Schultz.
Leontodon, L.
Virea, Adans.
Autodon, Neck.
Argaria, Less.
Asterothrix, Cass.
? Fidelia, Schultz.
Oporinia, Don.

Phyllopappus, Walp.
Milinia, Cass.
Geropogon, L.
Podospermum, DC.
Richardia, Roth.
Urospermum, Juss.
Arnopogon, Willd.
Tragopogon, L.
Hymenonema, Cass.
Rafinesquia, Nutt.
Scorzonera, L.
Lusiospora, Cass.
Lusiospermum, Fisch.
? Fleischeria, Steud.
Anisocoma, Torrey.
Galasia, Cass.
Microderis, DC.
Picris, L.
Medicaria, Monch.
Spatzella, Schultz.
Beckera, Schultz.
Helminthia, Juss.
Kalbfussia, Schultz.

LACTUCEÆ.

Picridium, Desf.
Richardia, Roth.
Zollikofera, DC.
Sonchus, Linn.
Leptosaris, Nutt.

Trachodes, Don.
Heteracheua, Fresch.
Malacothrix, DC.
Youngia, Cass.
Prenanthes, Gærtm.
Erythermia, Nutt.
Pleiacanthus, Nutt.
Nabalus, Cass.
Harpalycæ, Don.
Esopon, Raf.
Lygodesmia, Don.
Atalanthus, Dou.
Chorisma, Don.
Chorisis, DC.
Phænixopus, Koch.
Mycelis, Cass.
Phænopus, DC.
Melanoseris, Decaisn.
Brachyrhamphus, DC.
Lactuca, L.

Scariola, Endl.
? Rhabdothecca, Cass.
Cyanoseris, Koch.
Choudrilla, Tournef.
Crinissa, Don.
Pyrrhopappus, DC.
Taraxacum, Juss.
Leontodon, Adans.
Willemetia, Neck.
Calycosorus, Schmidt.
Wibelia, Hoppe.
Peltidium, Zollikof.
Aspidicum, Zollikof.
Zollikofera, Nees.
Ixeris, Cass.
Zacyutha, Tournef.
Nemauchenus, Cass.
Endoptera, b. DC.
Catyna, Cass.
Endoptera, a. DC.
Lomatolepis, Cass.
Rhabdothecca, Cass.
Microthyrius, Less.
Ammoseris, Endl.
Lavnea, Cass.
Trochosaris, Pöpp. et En.
Macrorhynchus, Less.
Macrorhynchium, Rchb.
Kymapleura, Nutt.
Cryptopleura, Nutt.
Stylopappus, Nutt.
Troximeria, Nutt.
Lagosaris, Bieb.
Pterotheca, Cass.
Trichocrepis, Vis.
Crepinia, Rchb.
Intybellia, Cass.

Myoseris, Lk.
Pachylepis, Less.
Sclerolepis, Mounier.
Barkhausia, Monch.
Borkhausia, Boehm.
Barkhusenia, Hopp.
Hostia, Monch.
Deloderium, Cass.
? Closiospermum, Nk.
Rodigia, Spr.
Ammogeton, Schrad.
Crepis, L.
Psilachenia, Nutt.
Intybus, Fr.
Intybellia, Monnier.
Ethorkhiza, Cass.
Calliopea, Dou.
? Troximon, Don.
Berinia, Brign.
Brachyderea, Cass.
Phacasium, Cass.
Homalocline, Endl.
Omalocline, Cass.
Crepidium, Nutt.

HERACIÆ.

Rothia, Schreb.
Voigtia, Roth.
Heteracia, Fisch. et Mey.
Andryala, L.
Eriophorus, Vaill.
Leucoseris, Nutt.
Apargidium, Torr.
Hieracium, Tournef.
Miegia, Neck.
Plancia, Neck.
Aracium, Neck.
Stenotheca, Monnier.
Dubysa, DC.
Lasiopus, Don.
Mulgedium, Cass.
Agathyrus, Don.
Galathenium, Nutt.
Anisoramphus, DC.
Soyeria, Monnier.
Catonia, Monch.
Lepicaune, Lapeyr.
Hapalostephium, Don.
Pierosia, Don.
Malacomeris, Nutt.
Agoseris, Raf.
Troximon, Nutt.
Pinaropappus, Less.
Dendroseris, Don.
Rhea, Berter.

DOUBTFUL GENERA.

Anisopappus, Hook et An.
Argosmithia, DC.
Cadiscus, E. Mey.

Dollichogyne, DC.
Elachia, DC.
Gnaphalopus, DC.

Ptilostrophe, DC.
Trimetra, Moq.
Odontotrichum, Zucc.

Ophryosporus, Meyen.
Metazanthus, Meyen.
Piptocarpha, R. Br.

LITTLE KNOWN GENERA.

Apatanthus, Viriani.
Abazolca, Dan. et Lex.
Allendea, Dan. et Lex.
Galcaana, Dan. et Lex.
Rosalesia, Dan. et Lex.

Mnesitoeon, Rafin.
Mlerospermum, Lagasc.
Platzia, Ruiz et Pav.
Placus, Lour.
Galophthalum, Nees.

Dumatrix, Cass.
Dimerostemma, Cass.
Glyphia, Cass.
Glycidaras, Cass.
Gibbaria, Cass.

Munnozla, Ruiz et Pav.
Hysteronica, Willd.
Glyphia, Cass.
Onopix, Raf.
Serinia, Raf.

UNDESCRIBED GENERA.

Bracheilema, R. Br.
Gomesia, Dav.

Oteiza, Don.
Keanophyllum, Acaud.

Lasiocophalus, Schlecht.

Trichostemma, R. Br.

NUMBERS. GEN. 1005. Sp. 9000!

POSITION. Calyceraceæ — ASTERACEÆ. — Dipsacaceæ.

ALLIANCE LI. MYRTALES.—THE MYRTAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with polypetalous dichlamydeous flowers, axile placenta, and embryo with little or no albumen.*

It may at first sight appear paradoxical to bring into close contact Orders usually so widely separated as Composites, Fringe-myrtles and Myrobalans; and it must be confessed that if the monopetalous corolla did deserve the value usually assigned to it, the measure would be incapable of justification. But if, as it is one of the objects of this book to show, we should neglect that circumstance, the relationship of all the plants now mentioned will be less problematical. It is the capitate inflorescence of Composites that gives them one of their most striking peculiarities; but that disappears in Valerianworts, about whose near relation to Composites no one entertains a doubt; and among the Myrobalans and Fringe-myrtles the tendency to a capitate condition is unusually great; as, for example, in *Combretum* and *Conocarpus* in the one, and in four-fifths of the species in the other. The relation of Myrobalans to Fringe-myrtles is not likely to be disputed; now the inflorescence of many genera differs in no respect from that of Composites, and on the other hand, numerous Composites agree entirely with Fringe-myrtles in their glandular leaves. Moreover, the calyx of the latter has often as great a claim to the designation of pappus as that of any Composites whatever. It must be confessed, however, that we have not at present among Composites any such tendency to a separation of the petals as would lead to the expectation of finding a polypetalous genus, which would render the assumed connection between Fringe-myrtles and Composites more evident.

But the example of *Phyteuma* among Bellworts leads to the anticipation of such a possibility; or if not, the tendency to unite the petals or stamens, which is so common in Myrtleblooms, may be expected to result in a monopetalous corolla among the Fringe-myrtles.

These remarks are not, however, introduced to show that Composites and Myrtles ought to stand in the same Alliance. That would certainly be an unnatural association. But they seem to show conclusively that they belong to Alliances standing extremely near each other.

NATURAL ORDERS OF MYRTALS.

- | | |
|---|------------------------|
| <i>Ovary 1-celled. Ovules pendulous. Leaves dotless. Seeds without albumen. Cotyledons convolute</i> | } 274. COMBRETACEÆ. |
| <i>Ovary 1-celled. Ovules pendulous. Leaves dotless. Seeds albuminous. Cotyledons flat</i> | } 275. ALANGIACEÆ. |
| <i>Ovary 1-celled. Ovules ascending. Leaves dotted. Embryo fused into a solid mass</i> | } 276. CHAMÆLAUCIACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous or apetalous. Calyx open, minute. Stamens definite. Ovules pendulous. Cotyledons minute. (Occasionally one-celled).</i> | } 277. HALORAOACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous or apetalous. Calyx valvate. Stamens definite. Ovules horizontal or ascending. Cotyledons flat, much larger than the radicle</i> | } 278. ONAGRACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous. Calyx valvate. Stamens indefinite. Cotyledons flat, much shorter than the radicle, which germinates before the fruit falls</i> | } 279. RHIZOPHORACEÆ. |
| <i>Ovary with more than one cell. Flowers monopetalous coronated. Calyx valvate. Stamens indefinite, monadelphous. Cotyledons amygdaloid</i> | } 280. BELVISIACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous. Calyx imbricated. Stamens definite. Anthers rostrate. Leaves usually dotless</i> | } 281. MELASTOMACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous or apetalous (or valvate). Calyx imbricated. Stamens 00. Anthers oblong. Leaves usually dotted</i> | } 282. MYRTACEÆ. |
| <i>Ovary with more than one cell. Flowers polypetalous. Calyx valvate or imbricated. Stamens 00, in part collected into a fleshy hood. Anthers oblong. Leaves dotless</i> | } 283. LECYTHIDACEÆ. |

ORDER CCLXXIV. COMBRETACEÆ.—MYROBALANS.

Combretaceæ, *R. Brown Prodr.* 351. (1810) in *Flinders*, 2, 548. (1814); *A. Rich. Dict. Class* 4. 353; *DC. Prod.* 3. 9; *Mémoire* (1828); *Bartl. Ord. Nat.* p. 322. (1830); *Endl. Gen. cclxi.*; *Meisner Gen.* 110; *Wight Illustr.* 1. p. 211.—Terminaliaceæ, *Jaume St. Hil. Exp. Fam. Nat.* 1. 178.—Illigeraceæ, *Ed. pr. cl.—Illigereæ, Blume in Ann. Sc. N. S.* 2. 95. (1834); *Martius Conspectus*, No. 83. (1835).—Gyrocarpeæ, *Nees ab Esenb. Laurin. Expositio* 20. (1833); *Endl. Gen.* p. 324.—Myrobalaneæ, *Juss. Dict. Sc. Nat.* 31. 458. (1824).

DIAGNOSIS.—*Myrtal Exogens*, with a 1-celled ovary, pendulous ovules, dotless leaves, seeds without albumen, and convolute cotyledons.

Trees or shrubs. Leaves alternate or opposite, without stipules, entire. The petiole often with 2 glands at the end. Spikes axillary or terminal. Flowers ♂, or



Fig. CCCCLXXVIII.

by abortion ♂ ♀. Calyx adherent, with a 4- or 5-lobed deciduous limb. Petals arising from the orifice of the calyx, alternate with the lobes; often wanting. Stamens arising from the same part, twice as many as the segments of the calyx, very rarely equal to them in number, or three times as many; filaments distinct, subulate; anthers 2-celled, bursting longitudinally, or by recurved valves. Ovary 1-celled, with from 2 to 4 ovules, hanging by cords from the apex of the cavity; style 1; stigma simple. Fruit drupaceous, baccate, or nut-like, 1-celled, by abortion 1-seeded, indehiscent, often winged. Seed pendulous, without albumen; embryo with the radicle turned towards the hilum; plumule inconspicuous; cotyledons leafy, usually convolute, occasionally plaited.

It cannot be doubted that Myrobalans have a near relationship to Myrtleblooms, and especially to *Punica*, of which they possess the convolute embryo. But although their connection with the Myrtal Alliance seems beyond contradiction, yet the absolute simplicity of their ovary renders it necessary to station them nearest other Orders. Their inferior fruit, with a single cavity, and often with a single ovule, and the great tendency that exists among them to collect their flowers in heads, furnish reasons for regarding them as standing in close relation to Composites, and as presenting a higher form of development of that well-known Order. The great frequency of an apetalous structure among them is one of their more remarkable features, and indicates a tendency to assume the condition of Sandalwoods or Oleasters, from both which however they are separated by other considerations. *Gyrocarpus* and *Illigera*, sometimes separated under the name of *Gyrocarpeæ* or *Illigeraceæ*, are in no respect essentially distinguishable except

Fig. CCCCLXXVIII.—*Combretum* (or *Polyura*) *purpureum*. 1. a flower cut open, 2. a section of the ovary; 3. fruit of *Terminalia*? (*Wight*); 4. cross section of the embryo.

by their recurved anther-valves, in which they singularly correspond with Laurels. While, however, these seem to be the most immediate affinities of Myrobalans, we must not overlook their more distant kinship. To Myrtleblooms and Melastomads they are related through Memecylon, and especially to the former, by Punica, with which they agree in the structure of their embryo. In the latter respect they also accord with Mangroves and Voehyads; and with Alangiads and Onagrads in the general structure of the flower.

All natives of the tropics of Asia, Africa, and America. No species is extra-tropical. Mostly astringents. Bueida Buceras yields a bark used for tanning. The bark of Conocarpus racemosa, one of the plants called Mangroves in Brazil, is used greatly at Rio Janeiro for the same purpose. The fruit of the Terminalia belerica, or the Beleric Myrobalan, is an astringent, tonic, and attenuant. The kernels are eaten in India, and reckoned intoxicating. The bark abounds in a gum, resembling Gum Arabia, soluble in water, burning away in the flame of a candle; a similar gum exudes from Combretum alternifolium. The bark of Terminalia alata is astringent and antifebrile. The fruit of Terminalia Chebula, as well as the galls of the same plant, are very astringent, and highly valued by dyers; with alum they give a durable yellow, and with a ferruginous mud an excellent black. The root of *T. latifolia* is given in Jamaica in diarrhœa. Species of Terminalia, Conocarpus, and Pentaptera, yield excellent timber. The kernels of *T. Catappa*, &c., are eaten as almonds, and are very palatable; those of *T. citrina* are a common article in Hindoo materia medica, being employed as a gentle purgative. A milky juice is described as flowing from *T. Benzoin*, which being fragrant on drying, and resembling Benzoin, is used in churches in the Mauritius as a kind of incense. Martius informs us that Terminalia argentea, called in Brazil Caxapora do Gentio, yields a resin of a drastic quality.

GENERA.

I. TERMINALIEÆ.—Corolla usually 0. Cotyledons convolute.	<i>Calycopteris</i> , Lam.	<i>Guiera</i> , Adans.	<i>Quisqualis</i> , Rumph.
<i>Bucida</i> , Linn.	<i>Chuacoa</i> , Pav.	<i>Polvrea</i> , Commers.	<i>Spalanthus</i> , Jack.
<i>Buceras</i> , P. Br.	<i>Gimbernatia</i> , R. et P.	<i>Cristaria</i> , Somner.	? <i>Chrysostachys</i> , Pohl.
<i>Hudsonia</i> , Robins.	<i>Ramatnella</i> , H. B. K.	<i>Conocarpus</i> , Hamilt.	? <i>Agathisanthes</i> , Blum.
<i>Terminalia</i> , Linn.	<i>Conocarpus</i> , Gärtn.	II. COMBRETÆÆ.—Corolla present. Cotyledons plaited.	? <i>Ceratostachys</i> , Blum.
<i>Catappa</i> , Gärtn.	<i>Rudbeckia</i> , Adans.	<i>Combretum</i> , Löffl.	? <i>Bigamea</i> , Kön.
<i>Tanibouca</i> , Aubl.	<i>Anogeissus</i> , Wall.	<i>Actia</i> , Adans.	<i>Wormia</i> , Vahl.
<i>Adamaram</i> , Adans.	<i>Andersonia</i> , Roxb.	<i>Forsgardia</i> , Fl. Fl.	III. GYROCARPEÆ.—Corolla wanting. Cotyledons convolute. Anthers bursting by recurved valves.
<i>Myrobalanus</i> , Gärtn.	<i>Laguucularia</i> , Gärtn.	<i>Caconcia</i> , Aubl.	<i>Gyrocarpus</i> , Jacq.
<i>Badamia</i> , Gärtn.	<i>Sphenoacarpus</i> , Rich.	<i>Schousboea</i> , Willd.	<i>Hiligeria</i> , Bl.
<i>Fatrea</i> , Thouars.	<i>Horan</i> , Adans.	<i>Hambergera</i> , Scop.	
<i>Pentaptera</i> , Roxb.	<i>Lummitzera</i> , Willd.	<i>Hambergia</i> , Neck.	
<i>Getonia</i> , Roxb.	<i>Pyrrhanthus</i> , Jack.		
	<i>Petaloma</i> , Roxb.		
	<i>Bruguiera</i> , Thouars.		
	<i>Funkia</i> , Dennst.		

NUMBERS. GEN. 22. Sp. 200.

Myrtaceæ.

POSITION.—Alangiaceæ.—COMBRETACEÆ.—Chamælauciaceæ.

Lauraceæ.

ORDER CCLXXV. ALANGIACEÆ.—ALANGIADS.

Alangiæ, DC. *Prodr.* 3. 203. (1828); *Bartl. Ord. Nat. p.* 424. (1830); *Endl. Gen. cclxii.*; *Wight Illustr.* 2. Nyssaceæ, *Juss. in Dict. Sc.* 35. 267. (1825); *Endl. Gen. p.* 328.

DIAGNOSIS.—*Myrtal Exogens*, with a 1-celled ovary, pendulous ovules, dotless leaves, albuminous seeds, and flat cotyledons.

Large trees or shrubs. Branches often spiny. Leaves alternate, without stipules, entire, without dots. Flowers fascicled, axillary. Calyx adherent, 5-10-toothed.

Petals 5-10, inserted into a fleshy adherent disk, linear, reflexed. Stamens long, exserted, 2 or 4 times as numerous as the petals, or equal to them in number; filaments distinct, villous at the base; anthers adnate, linear, 2-celled, turned inwards, often empty. Ovary 1-2-celled; style filiform, simple; ovules solitary, pendulous, anatropal. Drupe oval, somewhat crowned by the calyx, fleshy, slightly ribbed, and downy; nucleus 1-celled, bony, with a foramen at the apex. Seed 1, inverted; albumen fleshy, brittle; embryo straight; radicle long, superior; cotyledons flat, large, leafy.

According to De Candolle, who founded this small Order, it differs from Myrtleblooms in its more numerous petals, adnate anthers, 1-celled fruit, and pendulous albuminous seeds. It agrees with Myrobalans in the contracted



1

Fig. CCCCLXXIX.



3

CCCCLXXX.

tube of the calyx, 1-celled fruit, and pendulous seeds; but differs in the number of the petals, adnate anthers, albuminous seeds, and flat cotyledons. The Order disagrees entirely with Melastomads and Onagrads, in the form of the anthers, and 1-celled fruit. It in some measure approaches Hippurids in the structure of the seed, but recedes from them in habit, 1-celled fruit, and single style. Its most immediate relationship, next to Myrobalans, is with Cornels, to which *Marlea* approximates, and with Witch Hazels, whose long narrow petals are strikingly similar to those of Alangiads.

But notwithstanding the near relation between these groups, the large leafy cotyledons and small quantity of albumen seem to indicate a closer relation between Myrobalans and Alangiads than between the latter and the Umbellal Alliance; and the Alangiads may be best regarded as the representative of the Cornal tendency in the Combretal Alliance. I think there can be little doubt that *Nyssa* is a genus of this Order, as Ad. Brongniart has partly suggested (*Enum.* xxx.), and principally remarkable for the want of petals. Mr. Bennett states that the ovary of *Marlea* is 2-celled, as in *Cornus*, but that does not correspond with my observations upon the fresh plant.

Fig. CCCCLXXIX.—*Marlea bonifolia*. 1. perpendicular section of the pistil.

Fig. CCCCLXXX.—*Nyssa montana*—*Gartner*. 1. fruit; 2. cross section of it; 3. embryo.

Common in the southern parts of India, whence they extend along the Malayan Peninsula to Cochin China, northward along the forest-clad base of the Himalaya. The Nyssas are natives of the United States.

Alangium decapetalum and *hexapetalum* are said by the Malays to have a purgative hydragogue property. Their roots are aromatic. They are said to afford good wood and edible fruit.—*Royle*. Dr. Wight says that the fruit of the *Alangiums* is eatable, but not palatable, being mucilaginous and insipid. That of *Nyssa capitata* or *candicans* is subacid, the size of the Olive, and sometimes called the Ogechee Lime, because it is used occasionally as a substitute for Lime fruits. The timber of the *Nyssas*, called *Tupelo* trees, is difficult to split, in consequence of the fibres of its wood being much interwoven, but it is of little value.

GENERA.

<i>Alangium</i> , Lam. <i>Angolan</i> , Adans. <i>Angolamia</i> , Scop.	<i>Marlea</i> , Roxb. <i>Stylidium</i> , Lour. <i>Stylis</i> , Poir.	<i>Pautsavia</i> , Juss. <i>Diaceecarpium</i> , Bl.	<i>Nyssa</i> , Gronov. <i>Tupelo</i> , Adans.
---	--	--	--

NUMBERS. GEN. 3. Sp. 8.

Cornaceæ.

POSITION.—*Combretaceæ.*—ALANGIACEÆ.—*Chamælauciaceæ.*

Myrtaceæ.

ORDER CCLXXVI. CHAMÆLAUCIACEÆ—FRINGE MYRTLES.

Chamælauciæ, DC. in *Dict. Class* xi. (1826); *Prodr.* 3. 208; *Bartling Ord. Nat.* 331; *Ed. prior.* 2. 45; *Endl. Gen.* p. 1224; *Meisner Gen.* 107; *Schauer in Nov. Act. xix. Suppl.* 157.

DIAGNOSIS.—*Myrtal Exogens*, with a 1-celled ovary, ascending ovules, dotted leaves, and the embryo fused into a solid mass.

Small bushes, often resembling Heaths, with all their parts abounding in glandular oily cysts. Leaves evergreen, acerose, or flat. Flowers ♂, in racemes, corymbs, or heads, yellow, red, violet, or white. Calyx adhering to the ovary, with 4-5 lobes, which are either herbaceous and scaly, or thin, membranous, and broken up into fringes or extended into bristles, as in the pappus of Composites. Petals as numerous as the divisions of the calyx, entire, or fringed, or feathery, often of a dry texture. Stamens definite or ∞, stationed in one or more whorls on a fleshy disk, epigynous, or adhering to the sides of the tube of the calyx; often partially sterile and seale-like, ligulate or petaloid; filaments subulate, occasionally forked; connective thick, fleshy, of various forms, continuous with the filament, and carrying the cells upon its inner face; cells opening longitudinally or by pores. Ovary 1-celled,

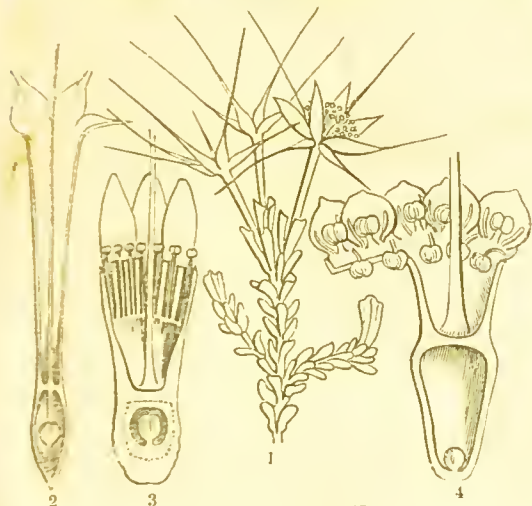


Fig. CCCCLXXXI.

style simple; stigma simple; ovules anatropal, 2 or more, or as many as 10, inserted laterally, and either ascending or attached to the side of the cavity. Fruit a dry indehiscent pericarp. [Seed without albumen; embryo orthotropal, homogeneous, with no distinction of cotyledons, radicle, and plumule.—*Schauer.*]

Up to the present time these have been regarded as a section of the Order of Myrtleblooms; and there can be no doubt of their close relation. But it appears advisable to distinguish them on account of their very peculiar aspect, which resembles nothing among Myrtleblooms except some *Bæekias*, their remarkable abortive stamens, their simple ovary, which never indicates a trace of being formed by the adhesion of more carpels than one, and their pappose calyx. The latter character brings them extremely near Composites, notwithstanding their dissimilar petals and anthers. The relation that has been found between Myrobalans and Myrtleblooms more especially applies to these plants.

They are beautiful little bushes, abounding in many parts of New Holland, but in only a very few instances reaching the northern coast.

They participate in the fragrance of Myrtleblooms: but nothing is recorded of their uses.

GENERA

<i>Calytrix</i> , Labill.	<i>Verticordia</i> , DC.	<i>Homoranthus</i> , A. Cunn.	<i>Hedaroma</i> , Lindl.
<i>Calyctothrix</i> , Labill.	<i>Calymmanthus</i> , Sch.	<i>Fuscaanthus</i> , A. Cunn.	<i>Francisia</i> , Endl.
Lhotskya, Schauer.	<i>Diplazone</i> , R. Br.	<i>Darwinia</i> , Rudg.	<i>Actinodium</i> , Schauer.
<i>Thryptomene</i> , Endl.	<i>Chrysorrhoe</i> , Lindl.	<i>Polyzone</i> , Endl.	<i>Tripelicia</i> , R. Br.
<i>Pileanthus</i> , Labill.	<i>Chamaelaucium</i> , Desf.	<i>Genetyllis</i> , DC.	?? <i>Bartlingia</i> , Bronn.

NUMBERS. GEN. 15. Sp. 50.

Myrtaceæ.

POSITION.—Asteraceæ.—CHAMÆLAUCIACEÆ.—Combretaceæ.

Fig. CCCCLXXXI.—1. *Calytrix*; 2. a section of its flower; 3. of *Genetyllis*; 4. of *Darwinia*.

ORDER CCLXXVII. HALORAGACEÆ.—HIPPURIDS.

Haloragææ, *R. Brown in Flinders*, 17. (1814); *DC. Prodr.* 3. 65; *Barthl. Ord. Nat.* 314.; *Endl. Gen.* cclxvi.; *Wight Illustr.* 2. 23.—Hydrobiææ, *Rich. Anal. Fr.* (1808).—Hippuridææ, *Link. Enum.* 1. 5. (1821).—Cercodiææ, *Juss. Dict. Sc. Nat.* (1817).—Hydrocaryes, *Link Enum. Hort. Ber.* 1. 141. (1821).—Onagrariæ, § Hydrocaryes, *DC. Prodr.* 3. 63. (1828).

DIAGNOSIS.—*Myrtal Exogens*, with a plurilocular ovary, polypetalous or apetalous flowers, an open minute calyx, definite stamens, pendulous ovules, and minute cotyledons.

Herbaceous plants or under-shrubs, often growing in wet places. Leaves either alternate, opposite, or whorled. Flowers axillary, small, either in terminal panicles or



Fig. CCCCLXXXII.

which may be added an evident tendency on the part of Hippurids to lose their petals altogether. In Hippuris itself the flower is in the simplest possible form; for it is reduced to a calyx of the smallest size, it has no petals, but one stamen and but one carpel. It therefore furnishes an instance of the approach of Myrtals to the Asteral Alliance. This reduction of the fruit to one carpel only, seems however to be very different in Hippuris from that of Fringe-myrtles; for the latter have a multiplication and excessive development of every other organ, to which the pistil forms the exception; but in Hippuris

sessile, occasionally monœcious or diœcious by abortion. Calyx adherent, with a minute limb, which is 2-4-toothed, or perfectly undivided. Petals inserted into the summit of the calyx, or 0. Stamens inserted in the same place, equal in number to the petals, or occasionally fewer. Ovary adhering inseparably to the calyx, with 1 or more cells; style none; stigmas equal in number to the cells, papulose, or pencil-formed; ovules pendulous, anatropal. Fruit dry, indehiscient, membranous, or bony, with 1 or more cells. Seeds solitary, pendulous; albumen fleshy or 0; embryo straight; radicle superior, large; cotyledons much smaller.

These plants may be regarded either as a distinct Order, or as a mere degeneration or imperfect form of Onagrads, from which their minute calyx and solitary pendulous seeds distinguish them; to

the solitary carpel is only a portion of the degraded structure which is proper to all the other organs. In *Hippuris* and *Myriophyllum* the stem consists of a curious arrangement of necklace-shaped cellular tissue, which radiates from the centre, leaving large air-cavities between its rows. In the centre is a cylinder of very fine woody tubes, which inclose a confused mass of cellular tissue and spiral vessels. It was probably this which led Prof. Link to regard *Hippurids* as *Endogens*.

Damp places, ditches, and slow streams, in Europe, North America, Southern Africa, Japan, China, New Holland, and the South Sea Islands, are the resort of this Order.

They are in general of no importance. *Haloragis citriodora*, the Piri-Jiri of the New Zealanders, derives its specific name from its fragrant odour. *Trapa*, a plant with horned fruit, and great amygdaloid seeds, one of whose cotyledons is much smaller than the others, has eatable kernels. *Trapa natans* is called Marron d'Eau, or Water Chestnut by the French; and is said to have furnished a large part of their food to the ancient Thracians, in the same manner as *T. bispinosa*, or the Singhara Nut does at the present day to the inhabitants of Cashmere, and *T. bicornis* to

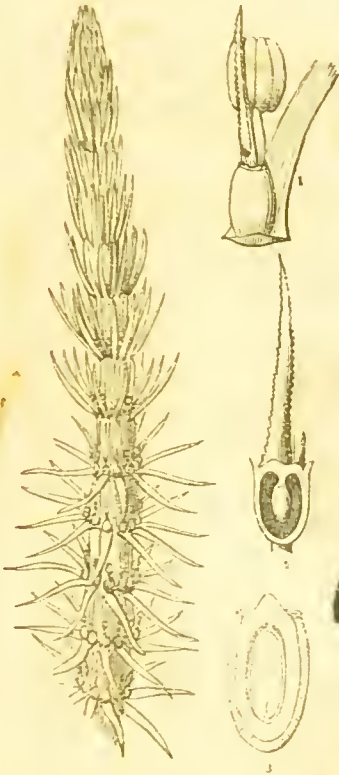


Fig. CCCCLXXXIII.



Fig. CCCCLXXXIV.

the Chinese. It is mentioned by Dr. Royle that the former yielded as much as 12,000*l.* a year of revenue to the government of Runjeet Singh, the tax being levied upon from 96,000 to 123,000 ass-loads from the great lake of Ooller.

GENERA.

<p>I. HALORAGÆÆ.</p> <p><i>Hippuris</i>, Linn. <i>Limnospice</i>, Vaill. <i>Pinastella</i>, Dillen. <i>Myriophyllum</i>, Vaill. <i>Sphondylophyllum</i>, Torrey et Gray.</p>	<p><i>Pentapteris</i>, Hall. <i>Sphondyliastrum</i>, Torr. <i>Ptilophyllum</i>, Nutt. <i>Purshia</i>, Raf. <i>Hylas</i>, Bigel. <i>Serpicula</i>, Linn. <i>Laurembergia</i>, Berg.</p>	<p><i>Proserpinaca</i>, Linn. <i>Trixis</i>, Mitch. <i>Meioneetes</i>, R. Br. <i>Haloragis</i>, Forst. <i>Cercodia</i>, Murr. <i>Cercodea</i>, Lam. <i>Gonocarpus</i>, Thunb. <i>Gonotocarpus</i>, Willd.</p>	<p><i>Gonicarpus</i>, Kön. <i>Loudonia</i>, Lindl. <i>Glichrocaryon</i>, Endl.</p> <p>II. TRAPEÆÆ, Endl.</p> <p><i>Trapa</i>, L. <i>Tribuloides</i>, Tourn.</p>
--	--	---	---

NUMBERS. GEN. 8. Sp. 70.

Cumbretaceæ.

POSITION.—Onagraceæ.—HALORAGACEÆ.—

Fig. CCCCLXXXIII.—*Hippuris vulgaris*. 1. a complete flower; 2. a section of the pistil, showing the position of the ovule; 3. a section of the ripe fruit and seed.
Fig. CCCCLXXXIV.—Fruit of *Trapa bicornis*.

ORDER CCLXXVIII. ONAGRACEÆ.—ONAGRADS.

Onagra, Juss. Gen. 317. (1789); Spach. in Ann. Sc. N. 2 Ser. iv. 161.—*Epilobiaceæ*, Vent. Tabl. 3. 307. (1799).—(*Onagrarie*, Juss. Ann. Mus. 3. 315. (1804) in part.; DC. Prodr. 3. 35. (1828); Bartl. Ord. Nat. 318; Wight Illustr. 2. 21.—*Enothereæ*, Endl. Gen. cclxv.—*Circæaceæ*, Lindl. Synops. p. 109. (1829).

DIAGNOSIS.—*Myrtal Exogens*, with a plurilocular ovary, polypetalous or apetalous flowers, valvate calyx, definite stamens, horizontal or ascending ovules, and flat cotyledons, much larger than the radicle.

Herbaceous plants or shrubs. Leaves alternate or opposite, simple, entire, or toothed. Flowers red, purple, white, blue, or yellow, axillary or terminal. Calyx superior,



Fig. CCCCLXXXV.

tubular, with the limb 4-lobed; the lobes cohering in various degrees, with a valvate aestivation. Petals generally equal in number to the lobes of the calyx, into the throat of which they are inserted, regular, with a twisted aestivation. Stamens (1) 4 or 8, inserted into the calyx; filaments distinct; pollen triangular, usually cohering by threads. Ovary of 2 or 4 cells, generally crowned by a disk; style filiform; stigma either capitate or 4-lobed; ovules anatropal, horizontal, ascending, or peltate. Fruit baccate or capsular, many-seeded, with 2-4 cells. Seeds numerous, without albumen; embryo straight; radicle long and taper; cotyledons shorter.

The Onagradæ, thus limited, are in general tetramerous, the number 4 prevailing through every one of the floral organs. In *Circæa*, however, the number is halved, there being but two sepals, petals, &c., and in *Lopezia* the customary number seems to be still further interfered with, for that genus shows but one stamen; in reality, however, there are two stamens, one of them perfect and bearing an anther; the other sterile and in the form of a spoon-shaped petal. Although the petals are in general of large size and in a high state of development, yet there is a tendency among the species to lose them; I have seen an entire plant of *Clarkia pulchella* with every flower apetalous, and *Skinnera* is always so. From Myrtleblooms Onagradæ are known by the absence of pellucid dots and their definite stamens; the Orders approach each other by the genus *Fuchsia*, which has succulent fruit.

They are chiefly natives of the temperate parts of the world, and especially of America: a good many are found in India, and a large number in Europe; in Africa they are scarcer, being mostly confined to the Cape, and to a few *Jussiaeas* inhabiting other parts of that continent.

Their properties are few, or trifling. *Enothera biennis*, and some other species less commonly known, are cultivated for the sake of their eatable roots; and the leaves of

Fig. CCCCLXXXV.—*Ludwigia Jussiaeoides*. 1. a flower with two sepals and all the petals cut off; 2. a calyx and inferior ovary; 3. a transverse section of the ovary; 4. a seed with the distinct raphe; 5. an embryo extracted.

Jussiaea peruviana form an emollient poultice. Indeed, the Order may be regarded as being in general mucilaginous. The *Montinias*, however, are aerid, and the root of *Isnardia alternifolia* is said to be emetic. Some are astringent, and have been employed in dyeing black, as, for instance, the *Jussiaeas* *Caparosa* and *scabra*, in Brazil. The wood of *Fuchsias* is reported to be employed in the same way in Chile, and *Jussiaea pilosa* as a yellow dye in Brazil.—*Martius*. Several of the *Fuchsias* bear fruits which are subacid and tolerably good to eat. Many of the genus *Enothera* expand their flowers only in the evening, and hence, being yellow, have been called Evening Primroses.

GENERA.

I. JUSSIEÆ.	<i>Enothera</i> , Linn.	<i>Phacostoma</i> , Spach.	<i>Thilco</i> , Feuill.
<i>Prieurea</i> , DC.	<i>Onogra</i> , Tournef.	<i>Eucharidium</i> , F. et Mey.	<i>Nahusia</i> , Schneev.
<i>Jussiaea</i> , Linn.	<i>Anogra</i> , Spach.	<i>Chamænerion</i> , Tourn.	<i>Quelusia</i> , Vaud.
<i>Cubospermum</i> , Lour.	<i>Baumannia</i> , Spach.	<i>Epilobium</i> , Linn.	<i>Schuffa</i> , Spach.
<i>Vigiera</i> , Fl. FL.	<i>Allochroa</i> , Fisch. et M.	<i>Lysimachion</i> , Tausch.	<i>Skinnera</i> , Forst.
<i>Ludwigia</i> , Roxb.	<i>Megapterium</i> , Spach.	<i>Crossostigma</i> , Spach.	
<i>Isnardia</i> , L.	<i>Pleurostemon</i> , Raf.	<i>Zauschneria</i> , Presl.	V. CIRCEÆ.
<i>Ludicigia</i> , L.	<i>Pleurantra</i> , Raf.		<i>Semeiandra</i> , Hook et Arn.
<i>Dantia</i> , Thouars.	<i>Pachylophis</i> , Spach.	III. MONTINÆÆ.	<i>Riesenbachia</i> , Presl.
<i>Ludicigiaria</i> , DC.	<i>Lavauxia</i> , Spach.	<i>Montinia</i> , Linn.	<i>Diplandra</i> , Hook et Arn.
	<i>Hartmannia</i> , Spach.	<i>Hauya</i> , Moç. et Sess.	<i>Lopezia</i> , Cav.
	<i>Kneiffia</i> , Spach.	IV. FUCHSÆÆ.	<i>Pisaura</i> , Bonat.
II. EPILOBÆÆ.	<i>Blennoderma</i> , Spach.	<i>Fuchsia</i> , Plum.	<i>Circeæa</i> , Tournef.
<i>Gayophytum</i> , Adr. Juss.	<i>Xylopleurum</i> , Spach.	<i>Dorvalia</i> , Commers.	VI. GAURÆÆ.
<i>Sphaerostigma</i> , Sering.	<i>Godetia</i> , Spach.	<i>Encliantra</i> , Zucc.	<i>Gaura</i> , Linn.
<i>Onosuris</i> , Raf.	<i>Cratericarpium</i> , Spach.	<i>Brebissonia</i> , Spach.	<i>Gauridium</i> , Spach.
<i>Chamissonia</i> , Link.	<i>Boisduvalia</i> , Spach.	<i>Lyciopsis</i> , Spach.	<i>Gongylocarpus</i> , Schied.
<i>Heterostemum</i> , Nutt.	<i>Dictyopetalum</i> , F. et M.	<i>Kierschleyeria</i> , Spach.	et Depp.
<i>Agassizia</i> , Spach.	<i>Pachydium</i> , F. et Mey.	<i>Spachia</i> , Lilja.	<i>Schizocarya</i> , Spach.
<i>Holostigma</i> , Spach.	<i>Eulobus</i> , Nutt.	<i>Ellobum</i> , Lilja.	<i>Stenosphon</i> , Spach.
<i>Merolix</i> , Raf.	<i>Clarkia</i> , Pursh.		
<i>Calylophis</i> , Spach.	<i>Opsianthus</i> , Lilja.		

NUMBERS. GEN. 28. Sp. 450.

POSITION.—Haloragaceæ.—ONAGRACEÆ.—Myrtaceæ.
Columelliaceæ.

ORDER CCLXXIX. RHIZOPHORACEÆ.—MANGROVES.

Rhizophoreæ, *R. Brown Gen. Rem. in Flinders, p. 17. (1814); in Congo, p. 18. (1818); DC. Prodr. 3. 31. (1828); Bartl. Ord. Nat. 320. (1830); Endl. Gen. cclxxiii.; Meisn. p. 119; Wight Illustr. 1. 207; Arnott in Ann. Nat. Hist. 1. 359.—Paleyviers, Savigny in Lam. Dict. 4. 696. (1796).*

DIAGNOSIS.—*Myrtal Exogens, with a plurilocular ovary, polypetalous flowers, valvate calyx, indefinite stamens, and flat cotyledons much shorter than the radicle, which germinates before the fruit falls.*

Coast trees or shrubs. Leaves simple, opposite, occasionally dotted, entire or toothed, with convolute deciduous stipules between the petioles. Peduncles axillary or terminal. Calyx adherent, often surrounded at the base by a cup-shaped bract, with the lobes valvate and varying in number from 4 to 12, occasionally all cohering in a calyptra. Petals arising from the calyx, alternate with the lobes, and equal to them in number. Stamens arising from the same point as the petals, and twice or thrice their number, or in *Kandelia* indefinite; filaments distinct; anthers erect, imate. Ovary 2-3-4-celled, each cell containing 2 or more ovules hanging from the apex of the central angle, anatropal. Fruit indehiscant, crowned by the calyx, 1-celled, 1-seeded. Seed pendulous, without albumen; radicle very long, piercing the fruit and rapidly extending downwards in germination; cotyledons 2, flat.

Mangroves are readily known from every Order to which they can be usefully compared, by their very curious habit of germinating while the seeds are still attached to the branch that bears the fruit. The radicle and club-shaped crown of the root gradually lengthen until they enter the soft muddy soil, or if too high, drop, and fixing themselves in the muddy bottom, immediately strike root at one end, while leaves unfold at the other.—*Wight.* In *Carallia*, however, the seeds do not germinate in the pericarp. That the species belong to the *Myrtal Alliance* there can be no doubt; as indeed is indicated, not only by their structure but by the leaves of some species of *Carallia* having pellucid dots. At the same time they seem to be connected with the *Gentianal Alliance* through *Cassipourea*, which comes very close to *Loganiads*. The Order also agrees with *Cunoniads* in its opposite leaves and intermediate stipules, and with great part of them in the aestivation of its calyx, and in the structure and cohesion of ovary. *De Candolle* points out its relation to *Voehyads* and *Myrobalans*, and even to *Melastomads*, through the genus *Olisbea*. The genera were comprehended in *Loranthis* by *Jussieu*. *Mr. Griffith* has explained with his usual skill the nature of the anther in *Rhizophora*. In the plants belonging to that genus the anther is alveolar, the sockets being filled with pollen, and in this circumstance it resembles *Viscum*; but in its younger state the anther is oblong, compressed laterally, and uninterrupted on its surface; when it is mature its two faces fall away, and leave behind a solid centre, in cavities of which the pollen has been generated. See *Transactions of Med. and Phys. Soc., Calcutta.*



Fig. CCCCLXXXVI.

Fig. CCCCLXXXVI.—1. *Kandelia Rheedii* (*Wight*); 2. its flower spread open; 3. a perpendicular section of its ovary; 4. the germinating seed; 5. the anther of *Rhizophora macrohriza*. (*Griffith*.)

Natives of the shores of the tropics, where they root in the mud, and form a close thicket down to the verge of the ocean. Such thickets are so dense that they entirely intercept the rays of the sun, and, preventing the exhalation of putrid miasmata, become the most unhealthy places in a tropical climate. The species generally send down roots from the branches, and thus like the Banyan tree, rapidly spread over considerable spaces. Such roots assume an arched form with the convexity upwards, and gradually raise the main trunk (in *Rhizophora*) high above its original level.

The bark is usually astringent; that of *Bruguiera gymnorhiza* is used in India for dyeing black. The wood of several is described as being hard and durable. The fruit of *Rhizophora Mangle* is said to be sweet and edible, and the juice when fermented forms a light wine.—*Wight*.

GENERA.

<i>Rhizophora</i> , Lam. <i>Aërope</i> , Endl. <i>Ceriops</i> , Arn. <i>Kandelia</i> , <i>Wight et Arn.</i>	<i>Bruguiera</i> , Lam. <i>Falsetuvertia</i> , Thouars. <i>Carallia</i> , Roxb.	<i>Baraldea</i> , Thouars. <i>Bauraultia</i> , Steud. <i>Diatoma</i> , Lour.	<i>Petaloma</i> , DC. <i>Catalium</i> , Hamilt. <i>Demiclofia</i> , Dennst.
--	---	--	---

NUMBERS. GEN. 5. Sp. 20.

Loganiaceæ.

POSITION.—*Melastomacæ.*—RHIZOPHORACEÆ.—*Myrtacæ.*

Cunoniaceæ.

ORDER CCLXXX. BELVISIACEÆ.—NAPOLEONWORTS.

Belvisiæ, R. Brown in *Linn. Trans.* 13. 222. (1820); *Ed. Pr.* No. clxxxi.; Meisner *Gen. Napoleonææ*, Endl. *Gen.* p. 745. (1839).

DIAGNOSIS.—*Myrtal Exogens*, with a plurilocular ovary, monopetalous coronetted flowers, valvate calyx, indefinite monadelphous stamens, and amygdaloid cotyledons.

Smooth-leaved bushes, about as large as a *Camellia*. The wood is soft, whitish, with large

medullary rays, and an abundance of dotted vessels, intermingled with brittle acicular tubes of woody tissue, very like what is found in the germinating radicle of a Mangrove. The leaves are alternate, leathery, narrowed at the base into a thick channelled petiole; there is no trace of stipules. The flowers grow in threes, sessile in the axil of the leaves, and are surrounded at their base by several round imbricated scales. The calyx is a thick leathery cup, divided into five ovate segments, having a perfectly valvate aestivation. Within this is placed the corolla, which consists of 3 distinct rings, each of which is monopetalous. The first ring is divided into five lobes, each of which has seven stiff ribs, between which the texture is membranous; the lobes have seven broad teeth, corresponding with the points of the ribs, and much curled and crumpled. By means of the ribs and intervening membrane, this part of the corolla is strongly plaited both before and after expansion; when fully blown, it turns quite back over the calyx, so as to hide it completely. The second ring is very small and thin; it is, in fact, a narrow membrane, stationed at the foot of the first ring, and cut into an indefinite number of fine narrow sharp-pointed segments. This ring was overlooked by De Beauvois. The third ring is membranous, but erect, and assuming the form of a cup, whose edge is cut into

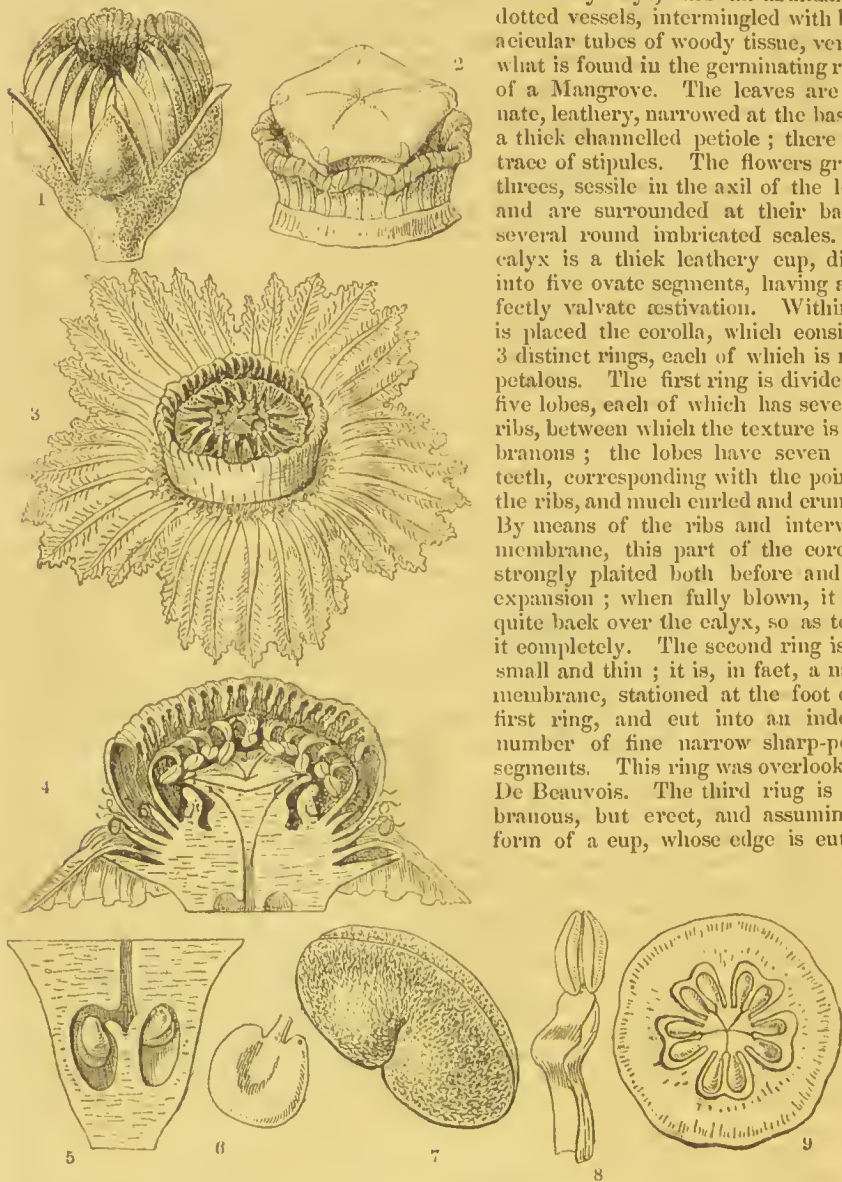


Fig. CCCCLXXXVII.

Fig. CCCCLXXXVII.—*Napoleonæa imperialis*. 1. a flower-bud just expanding; 2. the fleshy cup, and table-shaped stigma; 3. an expanded flower of the natural size; 4. a perpendicular section of the same. (In this the artist has carelessly added a fourth ring to the corolla on the outside of the stamens; no such ring exists); 5. a perpendicular section of the ovary; 6. an ovule; 7. a ripe seed; 8. a stamen; 9. a transverse section of the ovary.

many fine segments, turned downwards, so as not to be at all conspicuous. The stamens are 20, standing erect in the form of another cup, and unequally united at their base; they have linear-lanceolate filaments, which are much thinner next the anthers, and are there turned inwards; the nuthel itself is oblong, 2-celled, and erect. Next the stamens comes a deep fleshy cup or disk, standing as high as the stigma, and having ten sides, of which the narrowest are alternate with the lobes of the stigma, and 2-ribbed in the inside. The ovary is buried beneath the mass formed by the base of the corolla, stamens, and disk; it has five cells, in each of which two ovules hang from the top of an axile placenta, which is so attached to the partitions that there is a clear opening from the hollow centre of the style, over the ovules, into the cells of the ovary: the ovules are oblong, with a depression in the middle on each side, and a foramen next the base, the nucleus being curved like a horse-shoe, so that its base and apex are both nearly in contact; the style is 5-angled, or rather 5-winged, and terminated by a table-shaped stigma, with five sides, five rays, and a small elevation at each angle, which elevations are perhaps the true stigmatic surfaces. The fruit is a soft spherical berry, surmounted by the calyx, as large as a Pomegranate, and very like one, containing a mucilaginous pulp which is eatable, and a rind so full of tannin, that the natives make an ink from it. The seeds are large amygdaloid bodies, kidney-shaped, and as much as $1\frac{1}{4}$ inch long; at their contraction the plano-convex cotyledons hold together by an axis whose radicle and plumule are both immersed in the substance of the cotyledons.

In the total absence of all correct information as to the real structure of this curious genus, Botanists were unable to arrive at any satisfactory conclusion as to its affinities. All that they had been able to settle was its not belonging to any known Natural Order. Palisot De Beauvois stated (1807) that, in the opinion of Jussieu, it constituted a new Order between Cucurbits and Passionflowers; a view that was probably taken in consequence of the double-ringed corolla, which is analogous to the coronet of the Passionflowers, and the plaited corolla with an inferior ovary, which brings to mind the flowers of Cucurbits. Desfontaines, on the contrary (1820), referred it, and another genus which he calls *Asteranthus*, without any doubt to *Symplocaceæ*, because of its monopetalous perigynous corolla, its stamens inserted in the base of the corolla, its oblong two-celled anthers, single style, inferior ovary, axillary solitary flowers, shrubby stem, and alternate leaves. Him followed Dr. Robert Brown (1822), who formed it and *Asteranthus* into an Order called *Belvisiæ*, without, however, attempting to settle its position in the Natural System. He objected to approximating it to *Symplocaceæ*, doubted its affinity to *Passionflowers*, and compared its structure with that of *Rafflesia*. Latterly no one seems to have attempted to suggest anything new as to its relationship. Endlicher puts it next to *Symplocaceæ*; Meisner next *Passionflowers*, adding to what had been previously known of it, that its seeds are arillate, a mistake (!) that probably originated in De Beauvois's description of them, "Semina in pulpâ carnosâ nidulantia." Finally, I myself, feeling that these could not be its true affinities, placed it in the Campanal Alliance, with marks of great doubt. But I was enabled, a few months since, by the kindness of the Earl of Derby, to examine good specimens collected by Mr. Whitfield, from which the foregoing description and succeeding remarks were written for the *Botanical Register*.

It is obvious that *Napoleona* has nothing to do with any of the Orders to which it has been referred. From *Cucurbits* it differs utterly its hermaphrodite flowers, axile placentation, highly developed corolla, and whole habit; it has in fact no resemblance to that Order. *Passionflowers* seem at first sight to claim a much nearer relationship, because of the triple-rowed corolla of *Napoleona*, which much resembles the coronet of those plants; but there the resemblance ceases. The tendrils, parietal placenta, free ovary, distinct styles, polypetalous corolla, imbricated calyx of *Passionflowers*, are all most essentially at variance with the genus. *Symplocaceæ* were a far better guess, for the monopetalous corolla, indefinite epipetalous stamens, axile placenta, adherent calyx, and definite seeds of *Napoleona* find there a parallel; but the ovary of that genus is wholly adherent, with a great epigynous disk, the calyx is valvate, and the seeds have no albumen, to say nothing of the lacerated condition of the corolla, which is not to be wholly disregarded in a consideration of this kind. Upon the whole it appears that the true affinity is in the neighbourhood of the Mangroves (*Rhizophoraceæ*), for the following reasons:—The ovary is in both inferior, few-seeded, with axile placenta; both have a coriaceous valvate calyx; both have large amygdaloid seeds without albumen. The placenta of *Kandelia* is almost the same as that of *Napoleona*, and in the former genus the petals are broken up into numerous fringes quite analogous to those of the genus in question. To this may be added the great resemblance that exists between the wood of *Napoleona* and of young *Rhizophora*, in consequence of both consisting in part of slender acicular tubes, which give the wood, when broken across, the appearance of containing slender bristles. Finally, the ribbing, which is so conspicuous in the outer

corolla of *Napoleona*, is repeated in the calyx of *Bruguiera gymnorhiza*. It is true that the one genus is monopetalous and the other polypetalous, but I cannot attribute importance to that character in a case where the stamens adhere so slightly to the corolla. While, however, there is this reason to believe that Mangroves are most nearly related to Napoleonworts, the affinity of the Order to some Myrtal plants is not to be overlooked; as, for example, to *Careya*, whose fruit has a very similar structure, and to *Barringtonia*, to which *Napoleona* is even similar in foliage; but these affinities are less striking than that of the Mangrove tribe. They show, however, pretty clearly that *Belvisiaceæ*—for so it is most convenient to call the Order of which *Napoleona* is the most conspicuous member—belongs to the great Myrtal Alliance. At the very moment when these remarks were published in England, M. Adrien de Jussieu described another species of *Napoleona* (in the *Annales des Sciences*, vol. ii. p. 222, third series), and adopted the views which Desfontaines had taken as to its affinities. I do not, however, see any cause to alter the opinion I had myself formed on the subject.

The Order is wholly African and tropical. It is in the wilds of that little-examined part of the world that additions must be expected to it. The statement made by Desfontaines that the genus *Asterauthus* is Brazilian, has been doubted by Eudlicher and negated by Adrien de Jussieu.

Nothing is known of the uses of the plants, except what is above mentioned.

GENERA.

Asteranthos, Desf.
Napoleona, Palis.
Belvisia, Desv.

NUMBERS. GEN. 2. Sp. 4.

Styracacæ.

POSITION.—*Myrtacæ.*—BELVISIACEÆ.—*Rhizophoracæ.*
Passifloracæ.

ORDER CCLXXXI. MELASTOMACEÆ.—MELASTOMADS.

Melastoma, Juss. Gen. p. 328. (1789).—Melastomaceæ, Don. in Mem. Wern. Soc. 4. 281. (1823); DC. Prodr. 3. 99. (1828); Memoire. (1828); Blume in Botanisch. Zeit. (1833); Endl. Gen. cclxviii.—Meneceyæ, DC. Prodr. 35. (1828); Opatowski Dissertatio.—Meneceyaceæ, Ed. Pr. xxvi.—Mouririaceæ, Gardn. in Hook. Journ. 2. 23.—Myrrhineæ or Olinieæ, Arnott in Ann. Nat. Hist. 3. 154.

DIAGNOSIS.—*Myrtal Exogens*, with a plurilocular ovary, polypetalous flowers, an imbricated calyx, definite stamens, rostrate anthers, and usually dotless leaves.

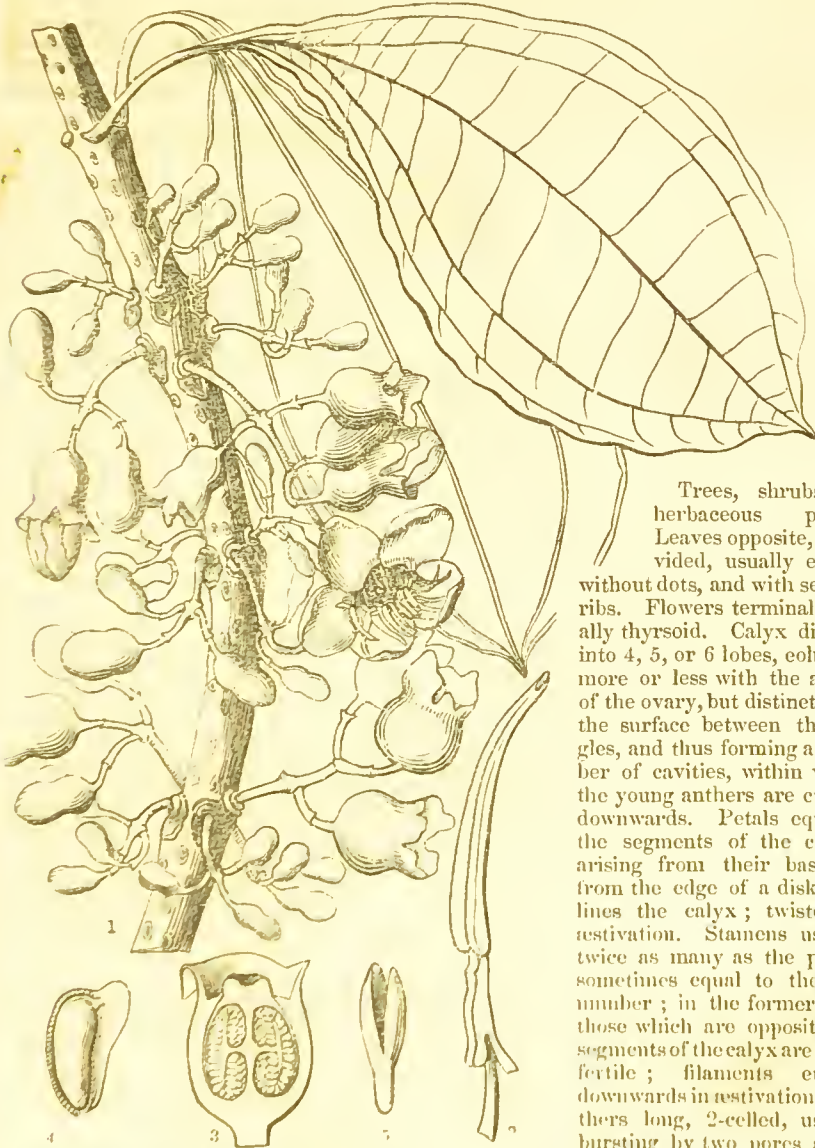


Fig. CCLXXXVIII.

Fig. CCLXXXVIII.—1. *Medinilla macrocarpa*, (Blume); 2. stamens of *M. radicans*; 3. a perpendicular section of its ovary; 4. a section of its seed; 5. embryo.

Trees, shrubs, or herbaceous plants. Leaves opposite, undivided, usually entire, without dots, and with several ribs. Flowers terminal, usually thyrsoid. Calyx divided into 4, 5, or 6 lobes, cohering more or less with the angles of the ovary, but distinct from the surface between the angles, and thus forming a number of cavities, within which the young anthers are curved downwards. Petals equal to the segments of the calyx; arising from their base, or from the edge of a disk that lines the calyx; twisted in aestivation. Stamens usually twice as many as the petals, sometimes equal to them in number; in the former case, those which are opposite the segments of the calyx are alone fertile; filaments curved downwards in aestivation; anthers long, 2-celled, usually bursting by two pores at the apex, and lengthened in va-

rious ways beyond the insertion of the filament; sometimes bursting longitudinally; before flowering, contained within the cases between the ovary and sides of the calyx. Ovary more or less coherent with the calyx, with several cells, and definite or indefinite ovules; style 1; stigma simple, either capitate or minute; a cup often present upon the apex of the ovary, surrounding the style.

Pericarp either dry and distinct from the calyx, or succulent and combined with the calyx, with several cells; if dehiscent, bursting through the valves, which therefore bear the septa in the middle; placentæ attached to a central column. Seeds innumerable, minute, with a brittle testa and no albumen; usually with appendages of some kind; embryo straight, or curved, with equal or unequal flat or convolute cotyledons.

"The Order of Melastomads," remarks De Candolle, in an excellent Memoir upon the subject, "although composed entirely of exotic plants, and established at a period when but few species were known, is so well characterised, that no one has ever thought of putting any part of it in any other group, or even introducing into it genera that do not rightly belong to it." These distinct characters are, the opposite leaves, with several great veins or ribs running from the base to the apex, and the long beaked anthers. Good, however, in most cases, as these characters undoubtedly are, yet the cause of no uncertainty having been yet found in fixing the limits of the Order, is rather to be attributed to the small



Fig. CCCCLXXXIX.

number of species that have been examined, than to the want of connecting links: thus *Diplogenea* has traces of the dots of *Myrtles*, which were not known to exist in *Melastomads* until that genus was described. *Mouriria* has no ribs, and its leaves are very distinctly dotted; the *Memeceyls* are ribless, and so is *Sonerila*.

The greatest affinity of *Melastomads* is on the one hand with *Lythrad*s, on the other with *Myrtleblooms* and their allies; from the former they differ in the aestivation of their calyx not being valvate, from the latter in having the petals twisted before expansion, and no dots on the leaves, and from both, and all others to which they can be compared, in their long anthers bent down parallel to the filaments in the flower, and lying in niches between the calyx and ovary; with the exception of *Memeceyls*, in which the union between the calyx and ovary is complete, and which have leaves destitute of the lateral ribs that so strongly point out *Melastomads*. The structure of the seeds of *Memeceyls* is also peculiar, the cotyledons being convolute as in *Myrobalans*, to which the *Myrtleblooms* approach at this point. It was for these reasons that the *Memeceyls* were regarded as the type of a peculiar Order, but it seems on the whole more advisable to retain them as a section of *Melastomads*. That the convolute cotyledons are of no moment is proved by the genus *Chamæmelcs*, which differs from other *Apple-works* in the same manner. Mr. Gardner makes *Mouriria* the type of an Order, because its leaves are dotted and ribless, its ovary perfectly adherent, and its ovules solitary. Sir W. Hooker, however, finds 3 erect ovules in each cell. It is doubtless a genus connecting the *Myrtleblooms* and *Melastomads*, and belonging almost as much to one as to the other Order, as Brown long ago stated. As to the *Oliniacæ*, Mr. Arnott regards them as being nearer *Myrtleblooms* than *Melastomads*; but they can hardly be separated from *Memeceyls*.

Found neither in Europe nor in Africa north of the desert of Zahara, nor south of Brazil in South America, nor in extra-tropical Africa to the south. Beyond the tropics, 8 are found in the United States, a few in China and the northern provinces of India, and 3 in New Holland. Of the remainder, it appears that 78 are described from India

Fig. CCCCLXXXIX.—*Stenodon suberosus*. 1. flower seen from above; 2. a stamen; 3. cross section of nearly ripe fruit; 4. ripe fruit splitting; 5. seed.

or the Indian Archipelago, 12 from Africa and the adjacent islands, and 620 from America, according to De Candoile; but this computation now requires correction.

A slight degree of astringency is the prevailing character of the Order, which although one of the most extensive known, is entirely destitute of any unwholesome species. The succulent fruit of many is eatable; that of some dyes the mouth black, whence the name of Melastoma. *Blakea tripluvialis* produces a pleasant and eatable yellow fruit in the woods of Guiana. The fruit of *Lasiandra argentea* and some others is used in Brazil for dyeing black. *Osbeckia Prineipis* and *Miconia lougifolia* are employed in the same manner. The leaves of *Memeceylon edule* form an ingredient in the dyes of Coromandel. The ripe berries, though somewhat astringent, are eaten by the natives.—*Royle*. The juice of *Toecia guianensis* is used in Demerara as ink. *Cremanium reclinatun* and *tinctorium*, and *Miconia tuetoria*, like the *Memeceyls*, dye yellow; *Blakea parasitica* and many others red. The flowers of *Guildingia psidioides* are fœtid, the berries nauseous, the seeds with the flavour of Filberts. The berries of *Myrrhinium atropurpureum* are eatable. Some are mentioned in medical books. The leaves of *Melastoma malabathrica* are used in diarrhœa, dysentery, &c. The bark of *Medinilla* is emollient, and is prepared for poultices, as are the leaves of *Osbeckia chinensis*. *Astronia papetaria* (*Ubat papeda*) and some others have sub-acid leaves, which in the Malay Archipelago are cooked as a sauce to fish; the wood of that plant is hard, and used for door-posts. The berries of *Tristemma virusanum* are given in the Mauritius as a cure for syphilis. A few are aromatic, others vulnerary; but none of any moment.

GENERA.

I. MELASTOMEÆ. <i>LAVOISIEREÆ.</i>	<i>Jaravaa</i> , Scop. part. <i>Uranthera</i> , <i>Naud.</i> <i>Chetostoma</i> , <i>Naud.</i> <i>Fritzschia</i> , <i>Cham.</i> <i>Ernestia</i> , <i>DC.</i> <i>Rhexia</i> , <i>R. Br.</i> <i>Leiostegia</i> , <i>Benth.</i> <i>Heteronoma</i> , <i>DC.</i> <i>Pachyloma</i> , <i>DC.</i> <i>Heterocentron</i> , <i>Hook. et Arn.</i>	<i>Chaetolepis</i> , <i>DC.</i> <i>Microlepis</i> , <i>DC.</i> <i>Actotis</i> , <i>Don.</i>	<i>Marumia</i> , <i>Blum.</i> <i>Creochiton</i> , <i>Blum.</i> <i>Phyllagathis</i> , <i>Blum.</i> <i>Decarhaphæ</i> , <i>Miq.</i> <i>Miconia</i> , <i>Ruiz et Pav.</i> <i>Hypocanthus</i> , <i>Rich.</i> <i>Oxymiris</i> , <i>DC.</i> <i>Hartigia</i> , <i>Miq.</i> <i>Cremanium</i> , <i>Don.</i> <i>Cyathanthera</i> , <i>Pohl.</i> <i>Blakea</i> , <i>Linn.</i> <i>Topabea</i> , <i>Auhl.</i> <i>Valdesia</i> , <i>Ruiz et Pav.</i> <i>Bellucia</i> , <i>Neck.</i> <i>Drepanandrum</i> , <i>Neck.</i> <i>Apatitia</i> , <i>Desv.</i> <i>Sarcopyramis</i> , <i>W'all.</i>
	<i>Oxyspora</i> , <i>DC.</i> <i>Tricentron</i> , <i>DC.</i> <i>Marectia</i> , <i>DC.</i> <i>Trembleya</i> , <i>DC.</i> <i>Jacobia</i> , <i>DC.</i> <i>Abrahamia</i> , <i>DC.</i> <i>Eriolema</i> , <i>DC.</i> <i>Adelohotrys</i> , <i>DC.</i>	<i>MICONIÆÆ.</i> <i>Rousseauxia</i> , <i>DC.</i> <i>Dichætanthera</i> , <i>Endl.</i> <i>Leandra</i> , <i>Radd.</i> <i>Clidemia</i> , <i>Don.</i> <i>Tchudya</i> , <i>DC.</i> <i>Jucunda</i> , <i>Cham.</i> <i>Graffenrieda</i> , <i>Mart.</i> <i>Myriaspora</i> , <i>DC.</i> <i>Hamasiris</i> , <i>Mart.</i> <i>Tococa</i> , <i>Aubl.</i> <i>Myrmidone</i> , <i>Mart.</i> <i>Majeta</i> , <i>Aubl.</i> <i>Calophysa</i> , <i>DC.</i> <i>Medinilla</i> , <i>Gaudich.</i> <i>Gallaria</i> , <i>Schrank.</i> <i>Hypenanthæ</i> , <i>Blum.</i> <i>Dactyliota</i> , <i>Blum.</i> <i>Triplettrum</i> , <i>Don.</i> <i>Pachycentria</i> , <i>Blum.</i> <i>Pogonanthera</i> , <i>Blum.</i> <i>Allomorpha</i> , <i>Blum.</i> <i>Calycogonium</i> , <i>DC.</i> <i>Calycopteris</i> , <i>Rich.</i> <i>Ossæa</i> , <i>DC.</i> <i>Sagraa</i> , <i>DC.</i> <i>Tetrazygia</i> , <i>Rich.</i> <i>Heterotrichum</i> , <i>DC.</i> <i>Dissochaeta</i> , <i>Blum.</i> <i>Diplectria</i> , <i>Blum.</i> <i>Aplectrum</i> , <i>Blum.</i> <i>Conostegia</i> , <i>Don.</i> <i>Calycotomus</i> , <i>Rich.</i> <i>Bruguiera</i> , <i>Rich.</i> <i>Eriostegia</i> , <i>DC.</i> <i>Diplogenea</i> , <i>Lindl.</i> <i>Diplochiton</i> , <i>Spreng.</i> <i>Diplochita</i> , <i>DC.</i> <i>Chitonis</i> , <i>Don.</i> <i>Fothergilla</i> , <i>Aubl.</i> <i>Leonicenia</i> , <i>Scop.</i> <i>Phyllopus</i> , <i>DC.</i> <i>Henrietta</i> , <i>DC.</i> <i>Loraya</i> , <i>DC.</i>	<i>II. CHARIANTHÆÆ.</i> <i>Charianthus</i> , <i>Don.</i> <i>Chenanthera</i> , <i>Rich.</i> <i>Tetrazygos</i> , <i>Rich.</i> <i>Chrenopleura</i> , <i>Rich.</i> <i>Kihessia</i> , <i>DC.</i> <i>Pternandra</i> , <i>Jack.</i> <i>Ewyckia</i> , <i>Blum.</i> <i>Astronia</i> , <i>Blum.</i> <i>Spathandra</i> , <i>Gaill. et Perrot.</i>
	<i>OSBECKIÆÆ.</i> <i>Lasiandra</i> , <i>DC.</i> <i>Macairea</i> , <i>DC.</i> <i>Chatogastra</i> , <i>DC.</i> <i>Monocentra</i> , <i>DC.</i> <i>Diolanthera</i> , <i>DC.</i> <i>Bractearia</i> , <i>DC.</i> <i>Brachyandra</i> , <i>Naud.</i> <i>Arthrostemma</i> , <i>Pav.</i> <i>Melanium</i> , <i>Rich.</i> <i>Chatopetalum</i> , <i>DC.</i> <i>Brachyotum</i> , <i>DC.</i> <i>Ladanopsis</i> , <i>DC.</i> <i>Trifarcarium</i> , <i>DC.</i> <i>Monochartum</i> , <i>DC.</i> <i>Heeria</i> , <i>Schlecht.</i> <i>Syltramia</i> , <i>Cham.</i> <i>Tibouchina</i> , <i>Aubl.</i> <i>Savatania</i> , <i>Neck.</i> <i>Diphlostegium</i> , <i>Don.</i> <i>Tristemma</i> , <i>Juss.</i> <i>Pleroma</i> , <i>Don.</i> <i>Lachnopusium</i> , <i>Blum.</i> <i>Melastoma</i> , <i>Burm.</i> <i>Acinodendron</i> , <i>Linn.</i> <i>Otanthera</i> , <i>Blum.</i> <i>Osbeckia</i> , <i>Linn.</i> <i>Pterolepis</i> , <i>DC.</i>	<i>III. MEMECEYLÆÆ.</i> <i>Memeceylon</i> , <i>Linn.</i> <i>Fatikaha</i> , <i>Adaus.</i> <i>Scutula</i> , <i>Lour.</i> <i>Mouriria</i> , <i>Juss.</i> <i>Mouriri</i> , <i>Aubl.</i> <i>Petaloma</i> , <i>Swartz.</i> <i>Guildingia</i> , <i>Hook.</i> <i>Olisba</i> , <i>DC.</i>	
<i>RHEXIÆÆ.</i>			<i>IV. OLINIÆÆ.</i> <i>Olinia</i> , <i>Thunb.</i> <i>Cremastostemon</i> , <i>Hort.</i> <i>Myrrhinium</i> , <i>Schott.</i> <i>Feliciana</i> , <i>Cambess.</i> <i>Tetrestemon</i> , <i>Hook.</i> <i>Fenzlia</i> , <i>Endl.</i>

NUMBERS. GEN. 118. Sp. 1200.

POSITION — *Combretaceæ.*
— MELASTOMACEÆ. — *Myrtaceæ.*
Lythraceæ.

ORDER CCLXXXII. MYRTACEÆ.—MYRTLEBLOOMS.

Myrti, *Juss. Gen.* 323. (1789).—Myrteæ, *Juss. Dict. Sc. Nat.* 34. 94. (1825).—Myrtoideæ, *Vent. Tab.* 4. (1799).—Myrtineæ, *DC. Théorie, Flem.* (1819).—Myrtaceæ, *R. Brown in Flinders, p.* 14. (1814); *DC. Dict. Class v.* 11; *Prodr.* 3. 207; *Endl. Gen.* cclxix.; *Schauer in Linnaea, xvii.* 235; *Wight Illustr.* 2. 6.—Granateæ, *Don. in Ed. Phil. Journ.* p. 134. (1826); *DC. Prodr.* 3. 3; *Von Martius H. Reg. Monac.* (1829); *Endl. Gen.* p. 1223; *Wight Illustr.* 2. 2.

DIAGNOSIS.—*Myrtal Exogens, with a plurilocular ovary, polypetalous or apetalous flowers, an imbricated calyx, 00 stamens, oblong anthers, and usually dotted leaves.*

Trees or shrubs. Leaves opposite or alternate, entire, usually with transparent dots and a vein running parallel with their margin. Inflorescence variable, usually axillary.



Fig. CCCCXC.

Flowers red, white, occasionally yellow, never blue. Calyx adherent, valvate, 4- or 5-cleft, sometimes falling off like a cap, in consequence of the cohesion of the apex. Petals equal in number to the segments of the calyx, with a quincuncial æstivation; rarely none. Stamens either twice as many as the petals, or 00, rarely equal to them in number; filaments either all distinct or connected in several parcels, curved inwards before flowering; anthers ovate, 2-celled, small, bursting lengthwise. Ovary inferior, 1-2-4-5- or 6-celled; style simple, derived immediately from the placenta; ovules usually pendulous, or erect and anatropal; occasionally peltate and amphitropal, always inserted into a central or axile placenta. Fruit either dry or fleshy, dehiscent or indehiscent. Seeds usually indefinite, variable in form; embryo without albumen, straight or curved, with its cotyledons and radicle distinguishable or blended into a solid mass.

A species of *Sonneratia* is apetalous. Some dotted leaves are alternate.

One of the most natural among the tribes of plants, and the most easily recognised. Opposite exstipulate dotted entire leaves with a marginal vein, are a certain indication of it; and even where the leaves are alternate the intramarginal vein is usually discoverable. This alternation is in some species uniform, but in other instances it is accidental, as in *Myrtus communis*, which usually has opposite leaves, though, if the plant is killed to the ground by frost they are mostly alternate on the shoots that spring up again. It is closely allied to Roseworts, *Lythrad*s, *Onagrads*, *Myrobalans*, and *Melastomads*, but cannot well be confounded either with them or any other Order. It offers a singular instance of the facility with which the calyx and corolla can take upon themselves the same functions and transformations. In *Eucalyptus* the sepals are consolidated into a cup-like lid, called the operculum, and in *Eudesmia*, a nearly-

Fig. CCCCXC.—*Eugenia tuberculata*. 1. a flower; 2. the same divided vertically; 3. a stamen; 4. a ripe fruit; 5. a leaf with the dots upon it.

related genus, the calyx remains in its normal state, while the petals are consolidated into an operculum. *Babingtonia* offers the curious structure of a style and stigma, derived immediately and wholly from the placenta, a circumstance not without a parallel in this Order; and *Bæckia micrantha*, DC., has parietal placentæ!

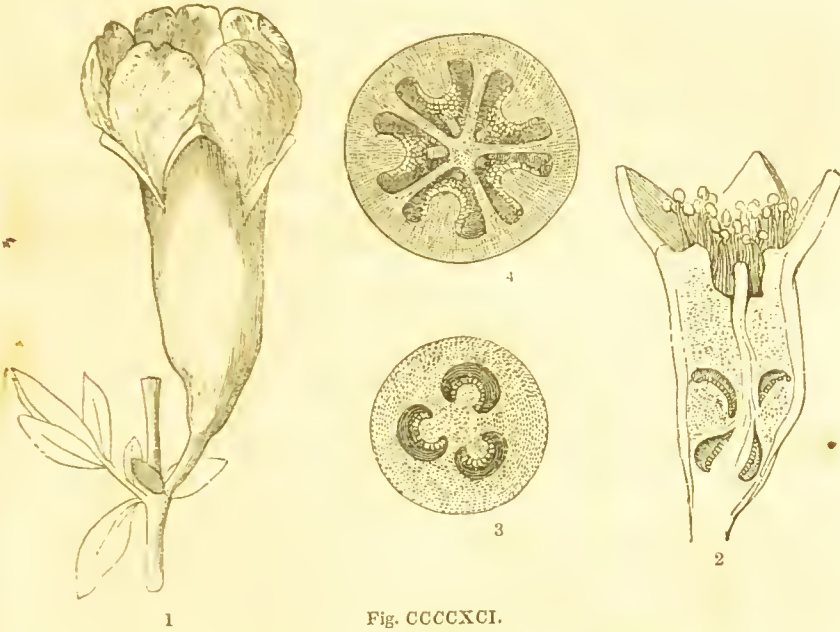


Fig. CCCXCI.

Punica has been considered the type of a particular Order (*Granatæ*) by Don, in which he is supported by the high authority of De Candolle, Von Martius, and Wight. The fruit of *Punica Granatum*, the Pomegranate, is described by Gaertner and De Candolle as being divided into two unequal divisions by a horizontal diaphragm, the upper half of which consists of from 5 to 9 cells, and the lower of three; the cells of both being separated by membranous dissepiments; the placentæ of the upper half proceeding from the back to the centre, and of the lower irregularly from their bottom; and by Don as a fleshy receptacle formed by the tube of the calyx into a unilocular berry, filled with a spongy placenta, which is hollowed out into a number of irregular cells. In fact, if a Pomegranate is examined, it will be found to agree more or less perfectly with both these descriptions. But it is clear that a fruit as thus described is at variance with the ordinary laws upon which compound fruits are formed. A section of the ovary of the Pomegranate in various directions, if made about the time of the expansion of the flowers before impregnation takes place, shows that it is in fact composed of two rows of carpels, of which three or four surround the axis, and are placed in the bottom of the tube of the calyx, and a number, varying from five to ten, surround these, and adhere to the upper part of the tube of the calyx. The placentæ of these carpels contract an irregular adhesion with the back and front of their cells, and thus give to the position ultimately acquired by the seeds that anomalous appearance which it assumes in the ripe fruit. If this view of the structure of the Pomegranate be correct, its peculiarity consists in this, that, in an Order the carpels of which occupy but a single row around the axis, it possesses carpels in two rows, the one placed above



Fig. CCCXCII.

Fig. CCCXCI.—1. *Punica Granatum*; 2. perpendicular section of the ovary; 3. cross section of it near the base; 4. near the base.

Fig. CCCXCII.—Monstrous Apple, mentioned in the next page.

the other, in consequence of the contraction of the tube of the calyx, from which they arise. Now, there are many instances of a similar anomaly among genera of the same Order, and they exist even among species of the same genus. Examples of the latter are, *Nicotiana multivalvis* and *Nolana paradoxa*, and of the former *Malope* among *Malvaceæ*, polycarpous *Crowfoots* as compared with *Nigella*, and polycarpous *Roseworts* as compared with *Spiræa*. In *Prunus* I have seen a monstrous flower producing a number of carpels around the central one, and also, in consequence of the situation, upon the calyx above it; and finally, in the *Revue Encyclopédique* (43. 762), a permanent variety of the Apple is described, which is exactly to *Appelworts* what *Punica* is to *Myrtleblooms*. This plant has regularly 14 styles and 14 cells, arranged in two horizontal parallel planes, namely, 5 in the middle, and 9 on the outside, smaller and nearer the top; a circumstance which is evidently to be explained by the presence of an outer series of carpels. Dr. Wight proposes a modification of these views (*Illustrations of Indian Botany*, ii. 5), but I do not see in what respect his opinion materially differs from mine. The anomaly of the structure of the fruit of *Punica* being thus explained, nothing remains to distinguish it from *Myrtleblooms* but its leaves without a marginal vein, its convolute cotyledons, and pulpy seeds. There are, however, distinct traces of dots in the leaves, and the union of the venæ arcuata, which gives the appearance of a marginal vein to *Myrtleblooms*, takes place, although less regularly, in *Punica*; the convolute cotyledons of *Punica* are only in *Myrtleblooms* what those of *Chamaæcles* are in *Appelworts*, a curious but unimportant exception to the general structure; and the solitary character of the pulpy coat of the seeds will hardly be deemed by itself sufficient to characterise *Granatææ*. The place of *Punica* in the Order will be probably near *Sonneratia*.

There is no instance of a blue flower in this Order. The fruit varies from succulent to dry in different genera, and in some cases is nearly superior. According to Auguste de St. Hilaire, a passage is formed from *Myrtleblooms* to *Onagrads* through the genus *Feliciana*.

Natives of hot countries both within and without the tropics; great numbers are found in South America and the East Indies, not many in Africa, and a considerable proportion of the Order in New Holland and the South Sea Islands; but the genera of those countries are mostly peculiar to them. *Myrtus communis*, the most northern species of the Order, is a native of (Persia, but has become naturalised in) the south of Europe. *Metrosideros lucida*, a beautiful tree of this Order, occurs as far to the south as Lord Auckland's Islands, in lat. 50½ S.—*J. Hooker*.

De Caudolle remarks, that although they all, without exception, have a woody texture, yet that they vary prodigiously in stature, from the little *Myrtus nummularia* which spreads over the soil in the Falkland Islands, as *Thyme* does in Europe, to the immense Gum-trees (*Eucalypti*) of New Holland, which are among the most gigantic trees of Australasia. There are all sorts of intermediate sizes, but the common *Myrtle-bush* gives a tolerably good idea of the appearance of the majority. Mr. Backhouse speaks of some of the Gum-trees as rising to about 200 feet in height, with straight trunks clear of branches for from 100 to 150 feet, and resembling an assemblage of elegant columns, so irregularly placed as to intercept the view at the distance of a few hundred yards. These are elegantly crowned with branching tops of light willow-like foliage. Some of what are called *Stringy bark Gum-trees*, "rise nearly as high as the Monument without branching!" The *Aki*, a New Zealand plant of this Order, the *Metrosideros buxifolia*, of Allan Cunningham, is described by that Botanist as being a rambling shrub, adhering to trees, and by its lateral roots climbing to the summit of the loftiest timber in the forests of Wangaroa, Bay of Islands, &c.

The pellucid dotting of the leaves and other parts indicates the presence of a fragrant aromatic or pungent volatile oil, which gives the principal quality to the produce of the Order. To this are due the grateful perfume of the *Guava* fruit, the powerful aroma of the flower-buds of *Caryophyllus aromaticus*, called by the English *Cloves*, and the balsamic odour of those eastern fruits, the *Jamrosade* and the *Rose Apple*. Along with this is frequently mixed an astringent principle, which sometimes predominates, to the suppression of any other property. The *Guavas* are pulpy fruits inhabiting the western world, whence they have been carried to the eastern; the principal are *Psidium pyrifera* and *pomifera*, the latter of which is much more acid than the other. They make with sugar a cooling and rather astringent conserve. The berries of other species of *Psidium*, which grow plentifully on the campos of S. Paulo, and are distinguished by the name of *Guabinoba*, are used in a similar manner. The young bark and leaves are employed as astringents, and the latter for medicated baths, which are very customary in Brazil; other species, especially *P. Cattleyanum*, also bear a fruit of excellent quality. *Eugenia cauliflora*, the *Jaboticaba* or *Jaboticaburas*, is one of the most agreeable fruits in Brazil, and the taste will be improved by further culture. Very good

wine, syrup, &c., are made of it. The Jabuti, *Psidium albidum*, and *Eugenia dysenterica*, *Micheli*, and *brasilensis*, called respectively *Araça*, *Pitanga*, *Grumixaneira*, *Cambuy*, *Uvalha*, *Pitangueira*, &c., are all spoken of by Martius as excellent dessert fruits. Even the berries of the common Myrtle are esteemed in the Greek Archipelago, especially a sort with white fruit. The Rose Apples of the East, produced by *Eugenia malaccensis*, *aquea*, *Jambos*, and others, are all in esteem in the countries where they grow.

As a spice, every one is acquainted with *Caryophyllus aromaticus*, whose oil is a common remedy for toothache, and whose dried flower-buds are the Cloves of the shops. Those of *Calyptanthus aromatica* may be advantageously substituted. The Pepper called Allspice or Pimento, is the dried fruit of *Eugenia aeris* and Pimento; all the plant, especially the unripe fruit, abounds in an essential oil, which is a powerful irritant, and is often used to allay toothache. The bruised berries are carminative, stimulating the stomach, promoting digestion, and relieving flatuleuy. The fruit of *Eugenia Caryophyllus* is used in the same way in Brazil, and of *Myrtus Tabasco* in Cumana. Myrtle buds and berries (*Myrtus communis*) were eaten as spices by the ancients, and are still used in Tuscany instead of pepper. The Tuscans also prepare a sort of Myrtle wine, which they call *Myrtidanum*. The distilled water of Myrtle flowers is that very agreeable perfume known in France under the name of *Eau d'Ange*. The leaves of *Syzygium terebinthaceum* are used in Madagascar to aromatise baths; Mr. Cooper found both sides of its leaves covered with very minute glandular hairs, having at their apex a knob of brownish matter.—*Ann. N. Hist.* x. 154. The volatile, green, irritating, or stimulant oil of *Cajeputi* is distilled from the leaves of *Melaleuca Cajeputi*, and is well known as a powerful sudorific, and useful external application in chronic rheumatism. It is considered carminative, cephalic, and emmenagogue, and is, no doubt, a highly diffusible stimulant, antispasmodic and diaphoretic. It has also the power of dissolving caoutchouc, and possesses a great reputation as a remedy in cholera.

As simple astringents several deserve notice. A kind of gum Kino is yielded by *Eucalyptus resinifera*, which is occasionally sold in the medicine bazaars of India. Other species of *Eucalyptus* yield a large quantity of tannin, which has been even extracted from the trees in New Holland, and sent to the English market. The leaves of the common Myrtle, dried in a stove and powdered, have been substituted for the Sumac of Sicily; those of *Eugenia depauperata* and *variabilis* are used as astringents in Brazil. The Pomegranate, *Punica Granatum*, commonly cultivated in the warmer parts of Europe, and forming entire woods in Persia, has long been celebrated in medicine; a decoction of the bark of the root is a powerful anthelmintic; the flowers are tonic and astringent, as is the bark of the fruit, which is used in leucorrhœa, chronic dysentery, &c.; the acid juice of the seeds is found useful in bilious fevers.

Some species secrete a sweet manna-like gum. *Eucalyptus robusta* contains large cavities in its stem, between the annual concentric circles of wood, filled with a most beautiful red or rich vermilion-coloured gum, and *E. mannifera*, in New Holland, exudes a saccharine mucous substance resembling Manna in action and appearance, but less nauseous. It is not produced by insects, and only appears in the dry season. Other species yield a similar secretion at Moreton Bay and in Van Diemens Land. Mr. Backhouse says it coagulates and drops from the leaves in particles often as large as an almond. *Eucalyptus Gunii*, when wounded, furnishes the inhabitants of Tasmania with a copious supply of a cool, refreshing, slightly aperient liquid, which ferments and acquires the properties of beer.—*Lond. Journ. Bot.* 3. 500. The leaves of *Glaphyria nitida*, called by the Malays the Tree of Long Life (*Kayo Umur Panjang*), "probably from its maintaining itself at elevations where the other denizens of the forest have ceased to exist," afford at Bencoolen a substitute for tea; and it is known to the natives by the name of the Tea Plant; and various species of *Leptospermum* and *Melaleuca* bear the same name in the Australasian colonies.

The wood of Myrtleblooms is said by De Candolle to be generally white and compact; but the heavy, hard, dark-brown timber, which furnishes the South Sea Islanders with their clubs and other weapons, is said to come from *Metrosideros polymorpha*, or some allied species. The Aki, or *Lignum vite* of New Zealand, the Rata, and the Pohutu Kawa of the same country, are all hard-wooded trees belonging to the genus *Metrosideros*.

GENERA.

I. LEPTOSPERMÆ. — Capsular.	<i>Baudinia</i> , Loesche.	<i>Asteromyrtus</i> , Schauer.	<i>Glaphyranthus</i> , Endl.
<i>Astartea</i> , DC.	<i>Billiottia</i> , Colla.	<i>Symphomyrtus</i> , Schr.	<i>Kunzea</i> , Reichenb.
<i>Tristania</i> , R. Br.	<i>Beaufortia</i> , R. Br.	<i>Eucalyptus</i> , Herit.	<i>Eremzea</i> , Lindl.
<i>Syncarpia</i> , Troncz.	<i>Schizopileura</i> , Lindl.	<i>Angophora</i> , Cav.	<i>Billottia</i> , R. Br.
<i>Kampzia</i> , Nees.	<i>Mangleira</i> , Lindl.	<i>Callistemon</i> , R. Br.	<i>Agavia</i> , DC.
<i>Lophosternon</i> , Schott.	<i>Conothamnus</i> , Lindl.	<i>Pratagonaster</i> , Klthsh.	<i>Hypocalymma</i> , Endl.
<i>Lamarchea</i> , Gandich.	<i>Melaleuca</i> , Linn.	<i>Metrosideros</i> , R. Br.	<i>Pericalymma</i> , Endl.
<i>Calothamnus</i> , Labill.	<i>Cajuputi</i> , Adams.	<i>Nani</i> , Adams.	<i>Salsola</i> , Lindl.
	<i>Eudesmia</i> , R. Br.	<i>Agalmanthus</i> , Endl.	<i>Leptospermum</i> , Forst.

Fabricia, Gärtn.
Bæcken, Linn.
Imbricaria, Smith.
Jungia, Gärtn.
Mollia, Gmel.
Cedrela, Lour.
Babingtonia, Lindl.

II. MYRTEÆ.—Baccate.

Sonneratia, Linn. f.
Aubletia, Gärtn.
Pagapate, Sonner.
Blatti, Rheed.
Punica, Linn.

Nelitris, Gärtn.
Decaspermum, Forst.
Campananthesia, R. et P.
Psidium, Linn.
Guaiava, Tournef.
Burchardia, Neck.
Rhodamnia, Jack.
Monozora, Wight?
Glaphyria, Jack.
Pimenta, Lindl.
Myrtus, Tournef.
Leucomyrtus, DC.
Myrtilus, Endl.

Leantria, Soland.
Jossinia, Comm.
Rhodomyrtus, DC.
Myrcia, DC.
Syllisium, Schauer.
Marlierea, St. Hil.
Calyptranthes, Swartz.
Chytraculia, P. Br.
Zuzygium, P. Br.
Chytralia, Adans.
Calyptranthus, Juss.
Syzygium, Gärtn.
Opa, Lour.

Calyptranthus, Blun.
Jambolifera, Auct.
Caryophyllus, Tournef.
Acmena, DC.
Eugenia, Michel.
Plinia, Linn.
Guapurium, Juss.
Olinthia, Lindl.
Greggia, Gärtn.
Jambosa, Rumph.
Jambos, Adans.
Cerocarpus, Hssk.

NUMBERS. GEN. 45. Sp. 1300.

POSITION.—Melastomaceæ.—MYRTACEÆ.—Onagraceæ.
Pomaceæ.

Fig. CCCCXIII.

Fig. CCCCXIII.—1. twig of *Myrtus communis*; 2. a flower divided perpendicularly.

ORDER CCLXXXIII. LECYTHIDACEÆ.—LECYTHIS.

Lecythideæ, Richard, MSS. Poiteau Mem. Mus. 13. 141. (1825); DC. Prodr. 3. 290; a sect. of Myrtaceæ. Ach. Richard in Ann. des Sc. 1. 321; Barlt. Ord. Nat. 332; Martius Conspec. No. 320. (1835); Endl. Gen. p. 1284; Meisner, 109.

DIAGNOSIS.—*Myrtal Exogens*, with a plurilocular ovary, polypetalous flowers, a valvate or imbricated calyx, 00 stamens in part collected into a fleshy hood, oblong anthers, and dotless leaves.

Large trees, with alternate entire or toothed leaves, minute deciduous stipules, and no pellucid dots. Flowers large, showy, terminal, solitary, or racemose. Calyx superior,

2- to 6-leaved, or urceolate, with a divided limb; æstivation valvate or imbricated. Corolla consisting of 6 petals sometimes cohering at the base, with an imbricated æstivation. Stamens indefinite, epigynous; a portion of them connected into a single petaloid cucullate unilateral body, which is sometimes quite destitute of anthers. Ovary inferior, 2- to 6-celled; ovules definite or indefinite, attached to the axis; stigma simple. Fruit a woody capsule, either opening with a lid or remaining closed. Seeds several, covered by a thick integument; embryo without albumen, either undivided, or with two large plaited leafy or fleshy cotyledons, sometimes folded upon the radicle, which is next the hilum.

Combined by De Candolle and others with Myrtleblooms, from which they differ in their great almond-like seeds and alternate, often serrated leaves, without pellucid dots.

For an account of the germination of *Lecythis*, see *Du Petit Thouars, Ess.* 3. 32. They agree with *Barringtoniads* in many respects, but they have stipules, and their singular hooded plate of sterile or additional stamens is most remarkable. They are distinguished from *Mangroves* by their seeds having no power to germinate in the seed-vessel, in addition to the peculiarity of their stamens.

Among other attributes is that of often forming a large woody fruit in the form of an urn, from which the top spontaneously separates in the form of a lid.

Natives of the hottest parts of South America, especially of Guiana.

Fig. CCCCXCIV.—*Lecythis ovata*.—*Aug. de St. Hilaire*. 1. a flower divided perpendicularly; 2. a stamen



The fruit of *Couroupita guianensis*, or the Cannon-ball tree, called *Abriect sauvage* in Cayenne, is vinous and pleasant when fresh, but in decay emits an insupportably offensive odour. The lacerated parts of its flowers become blue upon exposure to the air. The shells are used, like the calabash, for domestic purposes. The most gigantic tree in the ancient forests of Brazil is that called the *Sapucaya*. It is the *Lecythis ollaria*, the seeds of which are large and eatable, as are those of all the species of *Lecythis*, but they leave a bitter unpleasant after-taste in the mouth. A milky emulsion, prepared from the seeds of *L. grandiflora*, is used in Brazil in catarrhs. The bark of *L. ollaria* is easily separable, by beating the liber into a number of fine distinct layers, which divide so neatly from each other, that, when separated, they have the appearance of thin satiny paper. Poiteau says he has counted as many as 110 of these coatings. The Indians cut them in pieces, as wrappers for their cigars. The well-known Brazil nuts of the shops of London are the seeds of *Bertholletia exelsa*. The great woody pericarps of *Lecythis* serve as drinking-vessels.

GENERA.

<i>Couratari</i> , <i>Aubl.</i>	<i>Lecythis</i> , <i>Löfl.</i>	<i>Tonca</i> , <i>Rich.</i>	<i>Elsholtzia</i> , <i>Rich.</i>
<i>Lecythopsis</i> , <i>Schrank.</i>	<i>Eschweilera</i> , <i>Mart.</i>	<i>Couroupita</i> , <i>Aubl.</i>	? <i>Crossostylis</i> , <i>Forst.</i>
<i>Cariniana</i> , <i>Casar.</i>	<i>Bertholletia</i> , <i>Hb. et Bpl.</i>	<i>Pontoppidana</i> , <i>Scop.</i>	

NUMBERS. GEN. 7. Sp. 38.

POSITION.—Myrtaceæ.—LECYTHIDACEÆ.—Rhizophoraceæ.
Cactaceæ?

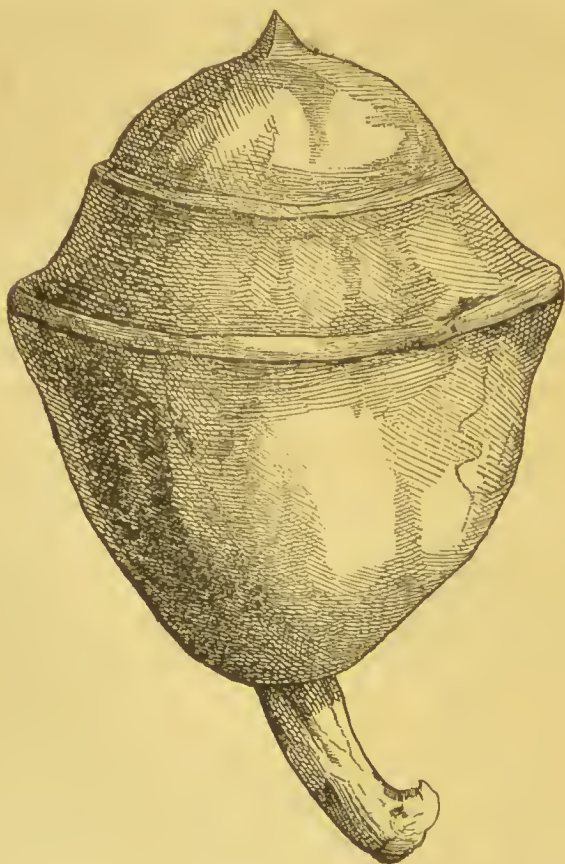


Fig. CCCCXCV.

Fig. CCCCXCV.—Fruit of *Lecythis grandiflora*.—*Aubl.*

ALLIANCE LII. CACTALES.—THE CACTAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with dichlamydeous polypetalous flowers, parietal placentæ, and an embryo with little or no albumen.*

Their parietal placentation separates Cactals from all Epigynous Orders except the Grossal, and the latter is known by the minute embryo and copious firm albumen.

The Orders at first sight appear very different : but if we omit from consideration the succulence of Indian Figs, their dissimilarity disappears. For *Bartonia* among Loasads is much like an Epiphyllum in its flowers, and the difference between *Homalium* and *Mentzelia* or *Acrolasia* is inconsiderable. In fact, the glands on the calyx of Homaliads may be regarded as another form of the secondary petals of some Loasads.

The Alliance touches Cucurbits by way of such Loasads as *Blumenbachia*, *Onagrads* through *Bartonia*, *Ficoids* (*Mesembryaceæ*) through Indian Figs, and Passionflowers through such plants as the Homaliad *Blackwellia*.

NATURAL ORDERS OF CACTALS.

- | | |
|---|--------------------|
| <i>Sepals and petals distinct. Stamens opposite the petals. Styles separate. Ovules pendulous</i> | } 284. HOMALIACEÆ. |
| <i>Sepals and petals distinct. Stamens scattered. Styles confluent. Ovules pendulous. Seeds albuminous</i> | } 285. LOASACEÆ. |
| <i>Sepals and petals numerous, undistinguishable. Stamens scattered. Styles confluent. Ovules horizontal. Seeds without albumen . . .</i> | } 286. CACTACEÆ. |

ORDER CCLXXXIV. HOMALIACEÆ.—HOMALIADS.

Homalinææ, *R. Brown in Congo*, (1818); *DC. Prodr.* 2. 53. (1825); *Endl. Gen. exxvi.*; *Meisner*, p. 73.

DIAGNOSIS.—*Cactal Exogens*, with distinct sepals and petals, stamens opposite the petals, separate styles, and pendulous ovules.

Trees or shrubs. Leaves alternate, with deciduous stipules, or 0, toothed or entire. Flowers in spikes, racemes, or panicles, without bracts. Calyx funnel-shaped, adherent, with from 5 to 15 divisions. Petals alternate with the segments of the calyx, and equal to them in number. Glands present in front of the segments of the calyx. Stamens arising from the base of the petals, either singly or in threes or sixes; anthers 2-celled, opening longitudinally. Ovary adherent, 1-celled, with numerous anatropal pendulous ovules attached to 2, 3, or 5 parietal placentæ; styles from 3 to 5, simple, filiform, or subulate. Fruit berried or capsular. Seeds small, ovate, or angular, with an embryo in the middle of a little fleshy albumen, and a thick superior radicle.



Fig. CCCCXCVI.

cannot be denied that links are wanting to render the connection between those genera complete, yet enough of resemblance exists to warrant this sort of comparison. In fact, the glands of *Homalium* are probably an altered form of the abortive stamina of *Loasa*.

According to Brown, Homaliads are related to Passionflowers, especially to *Smacanthamnia*, from which their inferior ovary distinguishes them, to say nothing of their want of stipules and glands on the leaves, of the presence of glands at the base of the floral envelopes, and of their erect and very different habit. De Candolle places them between *Samyds* and *Chaillatiads*, describing them as apetalous, but classing them with his *Dichlamyds*; Brown also understands them as without petals; but I confess I cannot comprehend what petals are, if the inner series of the floral envelopes of these plants be not so; an opinion which their supposed affinity with Passionflowers would confirm, if analogy could be admitted as evidence in cases which can be decided without it. The statement of De Candolle, that the stamens are opposite the sepals, is inaccurate; they are, as Brown describes them, opposite the petals.

The species are all tropical, and chiefly African or Indian. Four or five are described from the West Indies and South America.

The root of some American species of *Homalium* is astringent, and employed against blennorrhœa.

Fig. CCCCXCVI.—*Byrsanthus Brownii*.—*Delessert*. 1. diagram of the flower; 2. section of a flower; 3. section across the ovary; 4. section of a seed.

GENERA.

Homalium, Jacq.
 Acoma, Adans.
 Napimoga, Aubl.
 Taltia, Scop.
 Escoubea, Aubl.

Lagunczia, Scop.
 Blackwellia, Commers.
 Vermontea, Commers.
 Asteranthus, Lour.
 Pythagorea, Lour.

Anetia, Endl.
 Byrsanthus, Guillem.
 Eriodaphnus, Nees.
 Trimeria, Harv.

Myriantheia, Thouars.
 Nisa, Noronh.
 Asteropeia, Thouars.

NUMBERS. GEN. 8. Sp. 30.

Passifloraceæ.

Cucurbitaceæ.

POSITION.—Loasaceæ.—HOMALIACEÆ.—Cactaceæ.

Onagraceæ.

ORDER CCLXXXV. LOASACEÆ.—LOASADS.

Loasacæ, *Juss. Ann. Mus.* 5. 18. (1804); *Dict. Sc. Nat.* 27. 93. (1823); *Kunth in Nov. Gen. et Sp.* 6. 115. (1823); *DC. Prodr.* 3. 339. (1828); *Endl. Gen.* cxcix.; *Meisner*, p. 125.—*Gronoviacæ*, *Endl. Gen.* p. 940.

DIAGNOSIS.—*Cactal Exogens*, with distinct sepals and petals, scattered stamens, confluent pendulous ovules, and albuminous seeds.

Herbaceous plants, hispid, with pungent hairs secreting an acrid juice. Leaves opposite or alternate, without stipules, usually more or less divided. Peduncles axillary, 1-flowered. Calyx adherent, 4-5-parted, persistent, imbricated, and spreading in æstivation. Petals 5 or 10, in two rows, often hooded, with an inflexed, valvate, or contorted æstivation; the interior often, when present, much smaller than the outer, and truncate at the apex. Stamens ∞, in several rows, arising from within the petals, either distinct or adhering in bundles before each petal, within the cavity of which they lie in æstivation; filaments subulate, unequal, the outer ones frequently destitute of anthers. Ovary inferior, 1-celled, with several parietal placentæ, or one only in the centre; style single; stigma 1, or several. Ovules anatropal, pendulous, rarely 1. Fruit capsular or succulent, inferior, 1-celled, with parietal placentæ originating at the sutures. Seeds without aril; embryo lying in the axis of fleshy albumen, with the radicle pointing to the hilum, and flat small cotyledons.

The relationship of this Order seems to be almost equally divided between Indian Figs and Onagrads, and hence it must stand on the limits of the Myrtal and Cactal Alliances. From the former,

however, it differs most, in consequence of its parietal placentation and 1-celled ovary. It is through *Pereskia* that it passes into Indian Figs, for that genus, if it were to lose its succulence, would almost belong to Loasads; the species of *Rhipsalis* too, in which there is a clear distinction between the calyx and corolla, offer another easy transition from Indian Figs to this Order, by way of *Bartonia*. But while such may be regarded as the most immediate affinity of Loasads, there are others so little remote as to show that among the Epigynous class we have distinct traces of a near parallelism with both the hypogynous and diclinous sub-classes. The first is indicated by the similarity in habit of *Blumenbachia*, &c., to Passionflowers, in connection with the great tendency which such genera exhibit to convert their stamens into petaloid processes; and, as *Eudlicher* remarks, there is also a plain approach to *Turnerads* and *Crownworts*, two other Orders of the Violal Alliance. The relation to diclinous Endogens consists in the resemblance between Loasads and Cucurbits; a similarity so great, that little serves to distinguish them, except the diclinous flowers and short sinuous anthers of the latter; in fact, the genus *Sphenautha*, referred to Cucurbits, is probably a Loasad if it belongs to either the one Order or the other. *Gymnotheca* is a very anomalous plant, with neither calyx nor corolla; *Decaisne* refers it to *Saururads*, p. 251.

All the species are American, and chiefly from the more temperate regions, or the tropics, of either hemisphere.

Fig. CCCXC VII.—*Bartonia albicaulis*. 1. a flower; 2. ring of stamens; 3. cross section of seed-vessel; 4. seeds.



Except the stinging property which resides in the hairs of some species, little is known of the qualities of these plants. *Mentzelia hispida*, a Mexican herb, is said to have a purgative root.

GENERA.

I. LOASEÆ.
Acrolasia, Presl.
Mentzelia, Linn.
Crotobus, Lilja.
Chrysostoma, Lilja.
Trachyphytum, Nutt.

Bartonia, Sims.
Klaprothia, H. B. K.
Sclerothrix, Presl.
Grammatocarpus, Presl.
Scyphanthus, Don.
Loasa, Adans.

Cajophora, Presl.
Raphisanthe, Lilja.
Blumenbachia, Schrad.
 ? *Gymnotheca*, Decaisne.
 ? *Sphenantha*, Schr.

II. GRONOVIEÆ.
Cevallia, Lagasc.
Petalanthera, Torr.
Mackaya, Arn.
Gronovia, L.
Fissenia, R. Br.

NUMBERS. GEN. 15. Sp. 70.

Cucurbitacææ.

POSITION.—Homaliacææ.—LOASACEÆ.—Cactacææ.

Onagracææ.



Fig. CCCXC VII.°

Fig. CCCXC VII — *Loasa Pentlandica*

ORDER CCLXXXVI. CACTACEÆ.—INDIAN FIGS.

Cacti, *Juss. Gen.* 310. (1789) *in part*.—Cactoidæ, *Vent. Tabl.* 3. 289. (1799).—Opuntiaceæ, *Juss. Dct. Sc.* 144. (1825) *in part*; *Kunth. Nov. G. et Sp.* 6. 65.—Nopalæx, *DC. Théorie Elém.* 216. (1819).—Cactæx, *DC. Prodr.* 3. 457; *Revue des Cactées Mem. Mus.* (1829). *Link and Otto in Verhand. des ver. Gart. Preuss.* vol. iii. p. 412. *Martius in Act. Acad. Nat. Cur. XVI.*; *Lemaire Cact. Hort. Monv.* (1838); *Id. Cactearum Gen. Nov.*; *Miquel in Bull. Sc. Phys. en Neerlande*, 1839. p. 89. 118; *Pfeiffer, Emom. Cact.*; *Walpers Repertorium*, 2. 269; *Salrn. Dyck. Hortus Dyckensis*, 1842; *Endl. Gen. cciv.*; *Wight. Illustr.* 2. t. 114.; *Schleiden Beiträge zur Anatomie der Cacteen*; *Miquel in Ann. Sc. Nat.* 19. 165.

DIAGNOSIS.—*Cactal Exogens*, with the sepals and petals numerous and undistinguishable, scattered stamens, confluent styles, horizontal ovules, and seeds without albumen.

Succulent shrubs, very variable in form. Stems usually angular, or two-edged, or leafy. Wood either arranged in a ring of wedges separated by wide medullary passages, or consisting of fibres loosely interlacing, and only collecting in compact zones when old. Leaves almost always wanting; when present, fleshy, smooth, and entire, or spine-like. Flowers either showy or minute, usually lasting only one day or night, always sessile. Sepals numerous, sometimes 4, but usually indefinite, and confounded with the petals, either crowning the ovary, or covering its whole surface. Petals 4 or more, commonly numerous, usually indefinite,

arising from the orifice of the calyx, sometimes irregular. Stamens indefinite, more or less cohering with the petals and sepals; filaments long, filiform; anthers ovate, versatile. Ovary fleshy, inferior, 1-celled, with numerous ovules arranged upon parietal placenta, equal in number to the lobes of the stigma; style filiform; stigmas numerous, collected in a cluster. Fruit succulent, 1-celled, many-seeded, either smooth, or covered with scales, sears, or tubercles. Seeds parietal, or, having lost their adhesion, nestling in pulp, ovate or obovate, without albumen; embryo either straight, curved, or spiral, with a short thick radicle next the hilum; cotyledons flat, thick, foliaceous, sometimes almost obsolete in the leafless species.

That remarkable distension or increase of the cellular tissue of plants, from which the name of succulent is derived, is no indication of natural affinity, but is rather to be

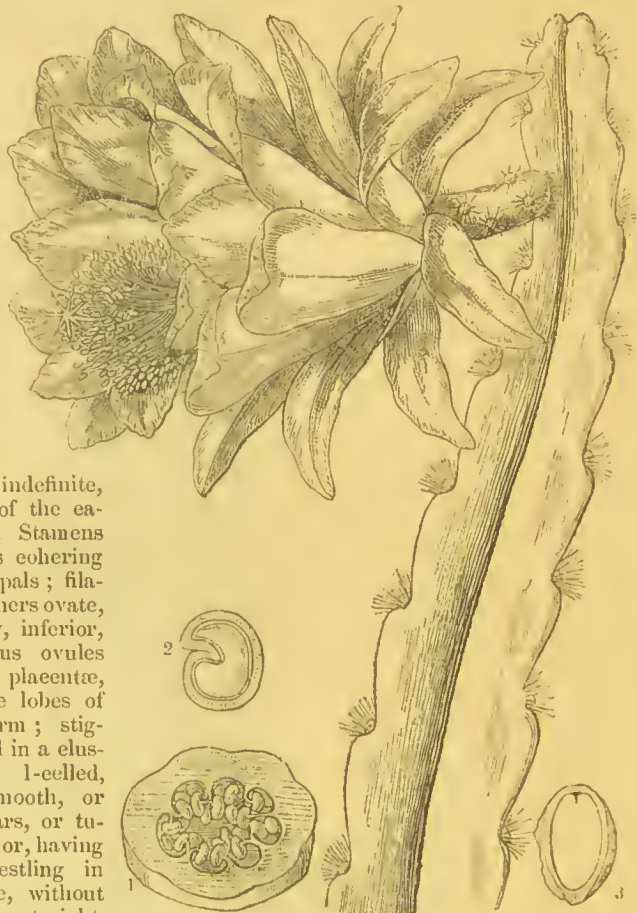


Fig. CCCCXCVIII.

Fig. CCCCXCVIII.—*Cereus speciosissimus*. 1. section of the fruit of *Opuntia Dillenii*; 2. of the seed, (*Gartner*); 3. section of seed of *Mammillaria*.

considered a modification of structure common to all Orders. Hence the immediate relationship of Indian Figs is neither with Spurge-worts, nor Cassys, nor Asclepiads, nor Asphodels, all of which contain a greater or less number of succulent genera. Through Rhipsalis, which is said to have a central placenta, they seem connected with Purslanes, to which also the curved embryo of the section of Opuntias probably indicates an approach. De Candolle further traces an affinity between these plants and Ficoids (Meseubryaceæ), which correspond in their numerous petals, habit, annular embryo, and somewhat in placentation; but which have a many-celled fruit, belonging to the perigynous rather than the epigynous category. The anatomy of Indian Figs has engaged the especial attention of Schleiden, Miquel, and others, whose observations will be found in the places above quoted. One of the most curious circumstances connected with it is that their spiral vessels are extremely short, and are formed with a spiral plate of considerable breadth and thickness, instead of a thread. For an elaborate account of this Order, see Schleiden's Memoir above quoted. Currant-worts, with which Indian Figs were formerly combined, manifestly differ in a large number of points, and especially in their abundant albumen.

In this country we scarcely know the Indian Figs except as succulent ugly shrubs without leaves, but the Pereskias have leaves of a sufficiently ordinary description, and when old the columnar species form wood of considerable strength. Indeed, according to Mr. Hinds (*Ann. Nat. Hist.* xv. 100), Humboldt speaks of a forest of such plants, not mere herbaceous species, but tall trees with stems yielding wood suitable for domestic purposes. It has been well observed by Dr. Walpers (*Repertorium Botanices Systematicæ*, vol. 1. p. 269) that the confusion of species and names, in the Order of Indian Figs, is without a parallel, owing to the negligence or bad descriptions at once of writers, cultivators, and travellers, and that the so-called species are in many cases distinguished by characters of the most trifling nature.



CCCCXCIX.

America is the exclusive station of the Order, no species appearing to be native of any other part of the world. In that country they are abundant in the tropics, extending a short distance beyond them, both to the north and the south. De Candolle states that 32° or 33° north latitude is the northern limit of the Order; but it is certain that a species is either wild or naturalised in Long Island, in latitude 42° north, and that there is another somewhere about 49°, in the Rocky Mountains. Those which are said to be wild or naturalised in Europe, Mauritius, Arabia, and China, are either species of succulent Spurges, &c., or, if really Indian Figs, have been introduced from America, and having found themselves in situations suitable to their habits, have taken possession of the soil like actual natives; in Europe this does not extend beyond the town of Finale, in 44° north latitude. There is no reason for supposing that the modern *Opuntia* is described in Theophrastus, as Sprengel asserts; the account of the former writer, as far as it applies to anything now known, rather suits some tree like *Ficus religiosa*. Hot, dry, exposed places are the favourite stations of Indian Figs, for which they are peculiarly adapted, in consequence of the imperfect evaporating pores of their skin; a circumstance which, as De Candolle has shown, accounts for the excessively succulent state of their tissue. For geographical observations see *Martius in Ann. Sc. 2. ser. 2. 110*.

The fruit is very similar in its properties to that of Currants, in some being refreshing and agreeable to the taste, in others mucilaginous and insipid. Many are valued as palliatives of intermittent and bilious fevers, in consequence of their refreshing subacid juice. The fruit of *Opuntia vulgaris* has the property of staining red the urine of those who eat it. That of *O. Tuna* is of the richest carmine, and forms a valuable pigment, employed at Naples as a water-colour. The juice of *Mammillaria* is remarkable for being slightly milky, and at the same time sweet and insipid. *Rhipsalis pachyptera* has not only the succulent fruit of the Order, but is bruised and used as a fomentation for ill-conditioned ulcers.—*Martius*. The fruit of *Pereskia aculeata* is pleasant and expectorant. The great fleshy stems of some Mexican species are eaten by cattle; a very remarkable specimen of this kind is described by Sir. W. Hooker, in the *Gardeners' Chronicle*, 1845, p. 132. Mr. Darwin found that a species of Cactus was one of the principal kinds of food of the land-tortoises in the Gallapagos.

Fig. CCCCXCIX.—Flat-threaded spiral vessels of Indian Figs.

GENERA.

I. MELOCACTIDÆ.	II. ECHINOCACTIDÆ.	Cereus, <i>Haworth.</i>	<i>Hariota</i> , <i>Lemaire.</i>
Melocactus, <i>C. Bauhin.</i>	Echinocactus, <i>L. et O.</i>		<i>Lepismium</i> , <i>Pfiffer.</i>
Discocactus, <i>Pfiffer.</i>	<i>Astrophytum</i> , <i>Lem.</i>	IV. PHYLLANTHIDÆ.	
Anhalonium, <i>Lemaire.</i>	<i>Pelecypora</i> , <i>C. Ehrenb.</i>	<i>Phyllocactus</i> , <i>Link.</i>	VI. OPUNTIDÆ.
<i>Ariocarpus</i> , <i>Sch.</i>		<i>Epiphyllum</i> , <i>Pfiffer.</i>	<i>Opuntia</i> , <i>Tournefort.</i>
<i>Mammillaria</i> , <i>Haworth.</i>	III. CEREIDÆ.	<i>Disocactus</i> , <i>Lindley.</i>	
	<i>Echinopsis</i> , <i>Zuccarini.</i>	V. RHIPSIDÆ.	VII. PERESKIDÆ.
	<i>Pilocereus</i> , <i>Lemaire.</i>	<i>Rhipsalis</i> , <i>Gærtner.</i>	<i>Pereskia</i> , <i>Plumier.</i>

NUMBERS. GEN. 16. Sp. 800 ??

Mesembryaceæ.

POSITION. ———— —CACTACEÆ.—Loasaceæ.

Grossulariaceæ.

ALLIANCE LIII. GROSSALES.—THE GROSSAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with dichlamydeous polypetalous flowers, numerous minute seeds, and a small embryo lying in a large quantity of albumen.*

This group evidently touches the last, where Indian Figs are so like Currantworts that they used to be considered the same Order; and it passes into the next through Escalloniads, whose fruit would be that of Cranberries if it were fleshy, or through Syringas, which may be compared with Columelliads.

The Order of Barringtoniads exhibits the Alliance in its highest state of development, and effects a union with the wide frontier of Myrtals.

At the same time the Escalloniads and Currantworts extend towards the Saxifragal Alliance, especially to Hydrangeads, to which a part of the Syringas is sometimes referred.

NATURAL ORDERS OF GROSSALS.

<i>Fruit pulpy. Placentæ parietal</i>	287.	GROSSULARIACEÆ.
<i>Fruit capsular. Placentæ axile. Style and stamens definite. } Calyx imbricated</i>	288.	ESCALLONIACEÆ.
<i>Fruit capsular. Placentæ axile. Styles disunited. Stamens } 00. Calyx valvate</i>	289.	PHILADELPHACEÆ.
<i>Fruit pulpy or fibrous. Placentæ axile. Style 1. Stamens } 00. Calyx imbricated</i>	290.	BARRINGTONIACEÆ.

ORDER CCLXXXVII. GROSSULARIACEÆ.—CURRANTWORTS.

Grossulariæ, DC. *Fl. Fr.* 4. 406. (1804); *Kunth Nov. G. et Sp.* 6. 58.; DC. *Prodr.* 3. 477. (1828); *Spach in Ann. Sc. ser. 2. tom. 4. p. 16.*—Ribesiæ, *Ach. Rich. Bot. Med.* 2. 487. (1823).—Grossulaceæ, *Mirb. Elem.* 2. 897. (1815).—Ribesiaceæ, *Endl. Gen. clxxi.* (1839).

DIAGNOSIS.—*Grossal Exogens, with pulpy fruit and parietal placenta.*

Shrubs, either unarmed or spiny. Leaves alternate, lobed, with a plaited vernation, often with a membranous edge to the base of the petioles. Flowers in axillary racemes, with bracts at their base, rarely unisexual by abortion. Calyx superior, 4- or 5-parted, regular, coloured, imbricated, or somewhat valvate in aestivation. Petals 5, minute, inserted in the throat of the calyx. Stamens 5, inserted alternately with the petals, very short. Ovary 1-celled, with 2 opposite parietal placenta; ovules numerous, on short stalks, anatropal; stylo 2-3-4-cleft. Berry crowned with the remains of the flower, 1-celled; the cell filled with pulp. Seeds numerous, suspended among the pulp by long filiform cords; testa externally gelatinous, adhering firmly to the albumen, which is horny; embryo minute, with the radicle next the hilum.

Notwithstanding the great dissimilarity in the appearance of these plants and Indian Figs, the two Orders were formerly confounded, and are still accounted by many writers conterminous, chiefly on account of their both having inferior pulpy fruit and parietal placenta. Von Martius, however, (*Conspectus*, No. 222,) abandons this view, and stations them somewhere between Saxifragæ and Onagradæ. In consequence of their copious albumen, polypetalous flowers, and definite stamens, I was formerly disposed to bring them into the neighbourhood of Berberries and their allies; but the strictly epigynous structure of the flowers weakens this resemblance. That they stand near Escalloniads seems undoubted, and therefore they form a transition to Cranberries, another Order in close contact with Escalloniads, but stationed in the Cinchonalliance because of its monopetalous corolla. The close alliance between Currantworts and Escalloniads is most distinctly shown by the genus *Polyosma*, which agrees with the former in its two polyspermous parietal placenta, and with the latter in the high development of its corolla. Mr. Bennett even places it among Escalloniads.

They are natives of the mountains, hills, woods, and thickets of the temperate parts of Europe, Asia, and America, but unknown in Africa. In North America they are particularly abundant, and on the mountains of Northern India they contribute to give a European character to that remarkable region. In the tropics of Asia and the South Sea Islands they occur in the form of *Polyosma*, a genus which derives its name from the excessive fragrance of its flowers.

The properties of the Gooseberry and Currant are those of the generality of the Order, except that in other species a mawkish or extremely acid taste is substituted for the refreshing and agreeable flavour of the former. Some are said to be emetic and intoxicating (*R. inebrians*), but this statement rests on no good authority. The black



Fig. D.

Fig. D.—*Ribes rubrum*. 1. perpendicular section of a flower; 2. cross section of the ovary; 3. seed; 4. a perpendicular section of it.

Currant, which is tonic and stimulant, has fragrant glands upon its leaves and flowers ; these reservoirs are also found upon some other species. Malic acid exists in Currants and Gooseberries.—*Turner*, 634.

GENERA.

Ribes, Linn.	Coreosma, Spach.	Ribes, Spach.	Chrysobotrya, Spach.
Grossularia, Tournef.	Botryocarpum, Spach.	Siphocalyx, DC.	Robsonia, Berland.
Botryocarpum, A. Rich.	Cerophyllum, Spach	Symphocalyx, Berland.	Polyosma, Bl.
Calobotrya, Spach.			

NUMBERS. GEN. 2? Sp. 95.

Vacciniaceæ.

POSITION.—Philadelphaceæ.—GROSSULARIACEÆ.—Escalloniaceæ.

Cactaceæ.

ORDER CCLXXXVIII. ESCALLONIACEÆ.—ESCALLONIADS.

Escalloniæ, *R. Brown in Franklin's Voyage*, 766. (1824); *Aug. de St. H. Fl. Bras.* 3. 92. (1833.—Saxifragaceæ, § 1. Escalloniæ, *DC. Prodr.* 4. 2. (1830); *Endl. Gen.* p. 822.—Carpodeteæ, *Fenzl. in Regensb. Denkschr.* iii. 155. t. 1.

DIAGNOSIS.—*Grossal Exogens, with capsular fruit, axile placenta, definite style and stamens, and imbricated calyx.*

Shrubs, with alternate, toothed, resinously glandular, exstipulate leaves, and axillary conspicuous flowers.

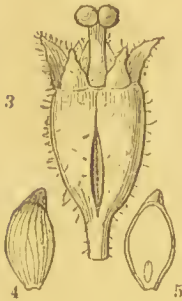


Fig. DI.

Calyx superior, 5-toothed. Corolla consisting of 5 petals, alternate with the segments of the calyx, from within which they arise, sometimes forming by their cohesion a tube, but finally separating; aestivation imbricated. Stamens arising from the calyx, alternate with the petals; anthers bursting longitudinally. Disk conical, epigynous, plaited, surrounding the base of the style. Ovary inferior, 2-5-celled, with a large polyspermous placenta in the axis; style simple; stigma 2-5-lobed. Fruit capsular or baccate, surmounted by the persistent style and calyx. Seeds very numerous and minute, with a transparent membranous integument; embryo minute, in a mass of oily albumen, its radicle opposite the hilum.

By De Candolle and others, these plants are either considered a section of Saxifragæ, or are placed in the immediate vicinity of that Order; an opinion founded upon their polyspermous fruit, composed of two carpels, their polypetalous flowers with a small number of stamens, and some similarity in their habit as compared with Cunoniads, which are also often referred to Saxifragæ. By other writers they are contrasted with Heathworts and Cranberries, and upon the whole they seem most closely akin to the latter of those Orders, of which they have also the habit, and almost the monopetalous corolla. A trace of resemblance to Melastomads may even be perceived in the remarkable cup-shaped epigynous disk of Escallonia. Brown, however, long since demonstrated the necessity of considering them closely allied to Currantworts, from which, indeed, they are hardly known, except by their oily albumen, dry fruit, and occasionally cohering petals; for some of them have almost parietal placenta, as Anopterus. Of that Order they must therefore of necessity follow the station. From Bruniads they are known, firstly, by their broad leaves, lax inflorescence and larger flowers; and secondly, by their many-seeded fruit. Indeed Bruniads may, in one point of view, be regarded

as a less developed form of Escalloniads.

It is said that Escallonia canescens has an embryo nearly as long as the albumen; this, if true, will be a great anomaly in the Order, and requires re-examination.

All found in the temperate parts of the world, especially South America. In countries near the equator belonging to the west side of America, Escalloniads grow at the considerable elevation of 6600 to 14,760 feet, and there, with Oaks and Drymids, they form a vegetable region. They are even found as far southward as the Straits of Magellan. A few species of the Order occur in the Isle of Bourbon, the Malay Islands, and the southern parts of Australia and New Zealand.

Their properties are unknown. All are shrubs, with evergreen leaves, which have often a powerful odour.

GENERA.

Escallonia, <i>Mutis.</i>	Choristylis, <i>Harv.</i>	Anopterus, <i>Labill.</i>	Cedrela, <i>Lour.</i>
Stereocorylum, <i>R. et P.</i>	Forgesia, <i>Comm.</i>	Itea, <i>L.</i>	Carpodetus, <i>Forst.</i>
Quintinia, <i>A. DC.</i>	Deforgia, <i>Lam.</i>	Diconangia, <i>Mitch.</i>	? Pseuditea, <i>Hassk.</i>

NUMBERS. GEN. 7. Sp. 60.

Saxifragaceæ.

POSITION.—Grossulariaceæ.—ESCALLONIACEÆ.—Vacciniaceæ.

Bruniaceæ.

Fig. DI.—*Escallonia pulverulenta*. 1. a flower; 2. a cross section of the ovary; 3. fruit; 4. seed; 5. its perpendicular section.

ORDER CULXXXIX. PHILADELPHACEÆ.—SYRINGAS.

Philadelphææ, *Don in Jameson's Journal*, 133. (April, 1826); *DC. Prodr.* 3. 205. (1828);
Endl. Gen. cclxiv.

DIAGNOSIS.—*Grossal Exogens*, with capsular fruit, axile placentæ, disunited styles, 00 stamens, and valvate calyx.

Shrubs. Leaves deciduous, opposite, toothed, without dots or stipules. Peduncles axillary or terminal, in trichotomous cymes. Flowers white or pink. Fruit sometimes a little scurfy. Calyx adherent, with a persistent limb, having from 4 to 10 valvate divisions. Petals alternate with the segments of the calyx, and equal to them in number, with a convolute-imbricate aestivation. Stamens 00, arising in one or two rows from the orifice of the calyx. Styles either distinct or consolidated into one; stigmas several; ovules 00, attached to an axile placenta. Capsule half inferior, with from 4 to 10 cells, many-seeded. Seeds scobiform, subulate, smooth, heaped in the angles of the cells upon an angular placenta, with a loose membranous skin. Albumen fleshy; embryo about as long as the albumen; cotyledons oval, obtuse, flatish; radicle longer than the cotyledons, straight, obtuse, superior or inferior, next the hilum.

No doubt can exist that these plants have a near relation to Myrtleblooms, although they may not have such a resemblance as will justify their being stationed in the very same Alliance; for they correspond in their inferior fruit, opposite leaves, polypetalous flowers, and indefinite stamens. Some Botanists, however, because of their seeds being lodged in albumen, would rather refer them to Saxifrages, with which, no doubt, there is some collateral relationship. They are, however, evidently a portion of the Grossal Alliance, standing nearly allied to Escalloniads. Among that Alliance they are readily known by their valvate calyx, indefinite stamens, and disunited styles. Moreover, their minute seeds cut them off from Barringtoniads, and their axile placentæ, with a capsular fruit, from Currantworts.

The species are found sparingly in the south of Europe, North America, Japan, and India.

Little can be said of their uses. The rough leaves of *Deutzia scabra* are used in Japan by polishers, and its inner bark for poultices. *Philadelphus coronarius*, whose flowers have a sweet but very peculiar smell, and whose leaves taste like Cucumber, was once considered a tonic, and the oil of its flowers was used for adulterating oil of Jasmine.



Fig. DII.

GENERA.

Philadelphus, Linn.
Syringa, Tournef.
Decumaria, Linn.
Forsythia, Walt.
Deutzia, Thumb.

NUMBERS. GEN. 3. Sp. 25.

Myrtaceæ.

POSITION.—*Grossulaceæ*.—*PHILADELPHACEÆ*.—*Escalloniaceæ*.
Saxifragaceæ.

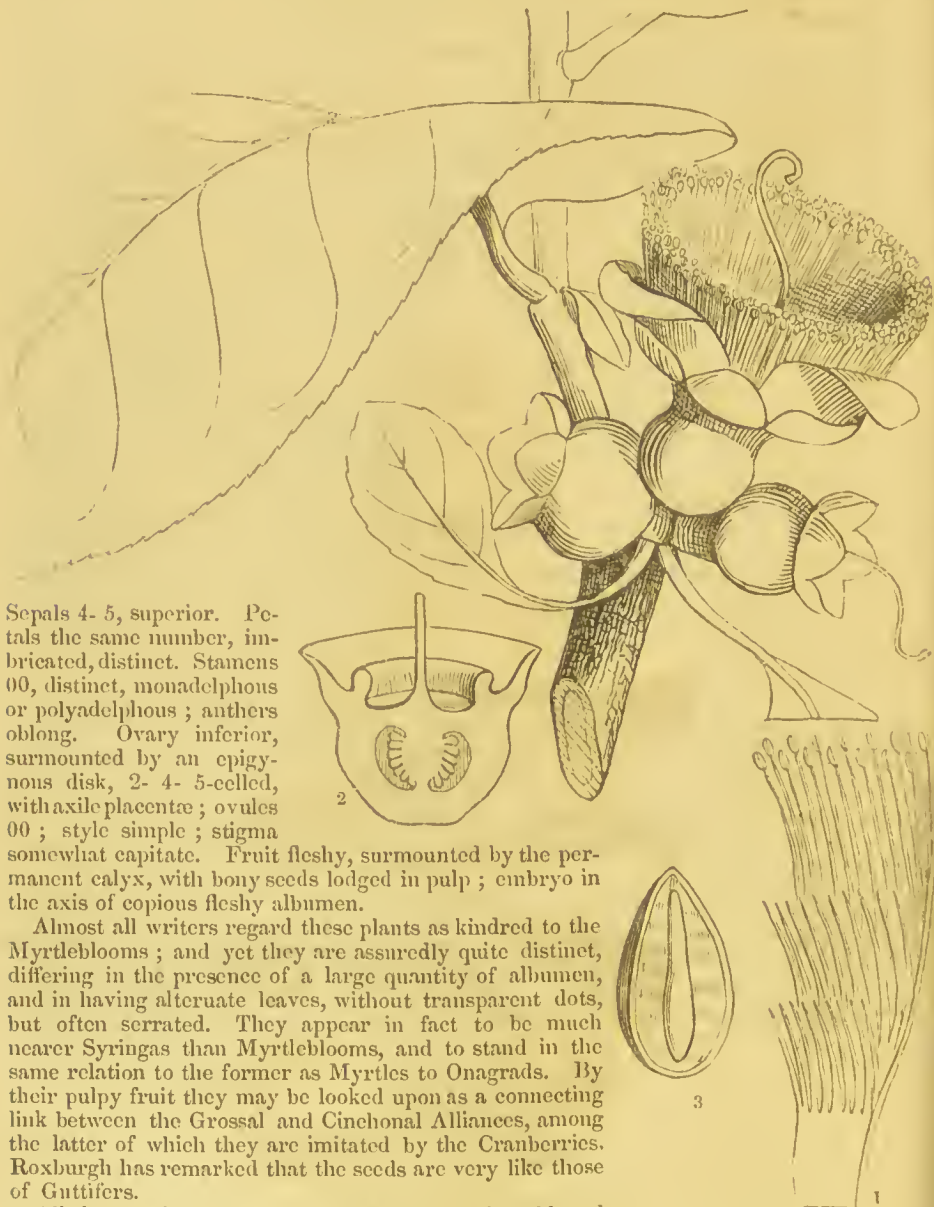
Fig. DII.—*Deutzia coronata*.—*Schöbld.* 1. a flower with the petals removed; 2. a fruit; 3. a portion of the same, showing the placentation; 4. section of a seed very highly magnified.

ORDER CCXC. BARRINGTONIACEÆ.—BARRINGTONIADS.

Myrtaceæ, § Barringtoniæ, DC. *Prodr.* 3, 288. (1828) ; *Bartl. Ord. Nat.* 322. (1830).—Barringtoniæ, DC. *Dict. Class.* v. XI. not. (1826) ; *Martius Conspectus*, No. 319 (1835) ; *Wight Illustr.* 2. 19.

DIAGNOSIS.—*Grossal Exogens*, with pulpy or fibrous fruit, axile placentæ, 1 style, 00 stamens, and an imbricated calyx.

Trees or shrubs, with alternate, often serrated leaves, destitute of transparent dots.



Sepals 4-5, superior. Petals the same number, imbricated, distinct. Stamens 00, distinct, monadelphous or polyadelphous ; anthers oblong. Ovary inferior, surmounted by an epigynous disk, 2-4-5-celled, with axile placentæ ; ovules 00 ; style simple ; stigma somewhat capitate. Fruit fleshy, surmounted by the permanent calyx, with bony seeds lodged in pulp ; embryo in the axis of copious fleshy albumen.

Almost all writers regard these plants as kindred to the Myrtleblooms ; and yet they are assuredly quite distinct, differing in the presence of a large quantity of albumen, and in having alternate leaves, without transparent dots, but often serrated. They appear in fact to be much nearer Syringas than Myrtleblooms, and to stand in the same relation to the former as Myrtles to Onagrads. By their pulpy fruit they may be looked upon as a connecting link between the Grossal and Cinchonal Alliances, among the latter of which they are imitated by the Cranberries. Roxburgh has remarked that the seeds are very like those of Guttifers.

All that are known inhabit the tropics of the old and new world, some of them occurring in low moist ground.

The root of *Stravadium racemosum* has a slightly bitter but not unpleasant taste. It is considered by the Hindoo Doctors valuable on account of its aperient, deobstruent,

Fig. DIII.

Fig. DIII.—*Careya arborea*. 1, one of the bundles of stamens ; 2, a perpendicular section of the ovary ; 3, section of the seed.—*Wight*.

and cooling qualities ; the bark is supposed to possess properties similar to those of Cinchona. The wood of *Gustavia nrecolata* is called Bois puant, because it soon becomes, after exposure to the air, exceedingly fetid. The effect upon the constitution, produced by the fruit of *Gustavia speciosa*, is very singular. According to Humboldt and Bonpland, children are very fond of the fruit, and become quite yellow after eating it, but in 24 to 48 hours they regain their natural colour without any remedy. Martius states that the fruit of *Gustavia brasiliensis* is emetic and intoxicates fish ; the root is acrid, aromatic, and bitter ; the leaves have a heavy unpleasant smell, and are employed in cases of indurated liver, and for bringing ulcers to a head. Endlicher says that although the fruit of *Careya arborea* is eaten, yet the seeds are suspicious.

GENERA.

Barringtonia, Forsk.
Butonica, Lam.
Commersonia, Sonner.
Mitraria, Gmel.
Huttum, Adans.
Stravadium, Juss.

Stravadia, Pers.
Meteorus, Lour.
Menichea, Sonner.
Careya, Roxb.
Cambea, Hamilt.
Gustavia, Linn.

Pirigara, Aubl.
Spallanzania, Neck.
Teichmeyeria, Scop.
Fœtidia, Commers.
Catinga, Aubl.

? *Coupoi*, Aubl.
? *Mongesia*, Fl. Fl.
? *Grias*, L.
? *Petalotoma*, DC.
? *Diatoma*, Lour.

NUMBERS. GEN. 10. Sp. 28.

Olusiacca.

POSITION.—Escalloniaceæ.—BARRINGTONIACEÆ.—Philadelphaceæ.

Vacciniacca.

Fig. DIII.

Fig. DIII. *—*Barringtonia speciosa*.—Parlon.

ALLIANCE LIV. CINCHONALES.—THE CINCHONAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with dichlamydeous monopetalous flowers, and a minute embryo lying in a large quantity of albumen.*

This Alliance is known from Campanals and Myrtals by its large quantity of albumen and small embryo, from Cactals, Grossals, and Umbellals by its monopetalous corolla, from Asarals by its dichlamydeous flowers. The Orders of it are closely allied, the three last in the following enumeration being indeed separated by no very strong characters. Cranberries and Columeliads, although not usually brought up to this point, are, nevertheless, hardly separable from the Alliance; the former are a lateral tendency to Ericals.

Cinchonals are distinguishable from Umbellals by little except their monopetalous corolla, especially if Caprifolds and Cornels are compared, and therefore must participate in the undoubted affinity of the latter Alliance to Ranals; a circumstance not to be lightly esteemed in mapping out the position which the various groups of the Natural system occupy with respect to each other.

A very strong approach is shown to the diclinous sub-class, on the part of Caprifolds, among which *Viburnum*, minus a corolla and with an amentaceous inflorescence, would almost be a Garryad. Indeed, even a tendency to missexuality occurs among Caprifolds, when, as in *Viburnum*, &c., some or all the flowers become neuter or male. And here again we have exactly the same tendency as manifests itself in so many genera of Umbellifers, which, as in *Heracleum*, &c., form radiant male or neuter flowers.

NATURAL ORDERS OF CINCHONALS.

<i>Stamens epigynous; anthers opening by pores</i>	291. VACCINIACEÆ.
<i>Stamens epipetalous, bursting longitudinally; anthers sinuous.</i>	} 292. COLUMELLIACEÆ.
<i>Flowers unsymmetrical</i>	
<i>Stamens epipetalous, bursting longitudinally; anthers straight.</i>	} 293. CINCHONACEÆ.
<i>Leaves with interpetiolar stipules</i>	
<i>Stamens epipetalous, bursting longitudinally; anthers straight.</i>	} 294. CAPRIFOLIACEÆ.
<i>Fruit consolidated. Leaves without stipules</i>	
<i>Stamens epipetalous, bursting longitudinally; anthers straight.</i>	} 295. GALIACEÆ.
<i>Fruit didymous. Leaves verticillate, without stipules</i>	

ORDER CCXCI. VACCINIACEÆ.—CRANBERRIES.

Vaccinieæ, DC. *Théor. Élém.* 216. (1813); *Endl. Gen.* p. 757; *DC. Prodr.* 7. 553.

DIAGNOSIS.—*Cinchonal Exogens*, with *epigynous stamens and anthers opening by pores*.

Much branched shrubs or small trees, frequently evergreen, and occasionally epiphytes. Leaves alternate, undivided, without stipules, often with glandular notches. Flowers solitary or in racemes. Calyx superior, entire, or with from 4 to 6 lobes. Corolla imbricated in æstivation, monopetalous, lobed as often as the calyx. Stamens distinct, double the number of the lobes of the corolla, inserted into an epigynous disk; anthers with 2 horns and 2 cells, bursting by pores. Ovary inferior, 4- to 10-celled; style simple; stigma simple. Berry crowned by the persistent limb of the calyx, succulent, 4- to 10-celled; cells 1- or many-seeded. Seeds minute, pendulous when solitary; embryo straight, in the axis of fleshy albumen; cotyledons very short; radicle long, inferior.

It is usual to station these plants with Heathworts, to which they bear much resemblance, and of which they are no doubt the representative in the Epigynous Sub-class. They are, however, to all appearance closely allied to Cinchonads in their monopetalous flowers, inferior ovary, and albuminous seeds, and also to Escalloniads, which are chiefly known by being polypetalous. The want of adhesion between their stamens and corolla is analogous to what occurs among Columelliads. Myrtleblooms, with their dotted leaves and indefinite stamens, are very different; but they too sometimes

correspond in their anthers bursting by pores. Upon the whole, Cranberries may be considered as an Order standing on the borders of the Epigynous and Hypogynous Sub-classes, and of the Cinchonad and Grossal Alliances.

The species abound in the temperate parts of the world, especially in swampy or sub-alpine countries. Some are from the moors and marshes of Europe, others from the mountains of central Asia, many from North America, and not a few from the highlands of Peru. Some of the Peruvian species are said to be parasites.

They are chiefly known as garden shrubs. Their bark and leaves are astringent, slightly tonic and stimulating; their berries sub-acid and pleasant to the taste. Bilberries are the fruit of *Vaccinium Myrtillus*, Whortleberries of *V. uliginosum*, Cranberries of *V. Vitis idæa* and the *Oxycoccus palustris* and *macrocarpa*. Many American species are substitutes for them. The people of Pasta make wine from the fruit of *Thibaudia macrophylla*; that of our *Vaccinium uliginosum* is said to be narcotic, and to be sometimes put into beer and other liquors to make them heady; when fermented it yields an intoxicating liquor. From the flowers of *Thibaudia Quereme* an aromatic tincture is prepared in Peru as a remedy for toothache.



Fig. DIV.

Fig. DIV. *Vaccinium angustum*. 1 a flower; 2 a perpendicular section of it without the corolla; 3 a cross section of an ovary; 4 an anther; 5, half a seed.

GENERA.

Gaylussacia, H. B. K.	<i>Vitis Idæa</i> , Tournef.	<i>Choupalon</i> , Adans.	<i>Oreanthes</i> , Benth.
<i>Lussacia</i> , Spreng.	? <i>Adenaria</i> , Raf.	<i>Symphysia</i> , Presl.	<i>Cavendishia</i> , Lindl.
Spherospermum, Pöpp. et Endl.	<i>Decachreua</i> , Torr. et Gr.	<i>Tauschia</i> , Presl.	<i>Macleannia</i> , Hook.
Oxycoccus, Tournef.	<i>Thibaudia</i> , Pav.	<i>Andrewsia</i> , DuRoi.	<i>Anthopterus</i> , Hook.
<i>Schollera</i> , Roth.	<i>Agaptes</i> , Don.	<i>Peyrusa</i> , Rich.	? <i>Brossæa</i> , Plum.
<i>Vaccinium</i> , Linn.	<i>Cavinium</i> , Thouars.	<i>Hornemannia</i> , Vald.	? <i>Amechania</i> , DC.
	? <i>Acosta</i> , Lour.	<i>Ceratostema</i> , Juss.	

NUMBERS GEN. 13. Sp. 200.

*Ericacææ.*POSITION.—*Cinchonacææ.*—VACCINIACEÆ.—*Columelliacææ.**Escalloniacææ.*

ORDER CCXCII. COLUMELLIACEÆ—COLUMELLIADS.

Columelliæ, Don, in *Edinb. new Phil. Journ. Dec.* (1828).—Columelliaceæ, *Ed. pr. No.* clxxxii.; *Endl. Gen.* p. 745; *Meisner*, p. 256.

DIAGNOSIS.—*Cinchonal Exogens*, with epipetalous stamens, sinuous anthers bursting longitudinally, and unsymmetrical flowers.

Evergreen shrubs, or trees. Leaves opposite, without stipules, entire or serrated. Flowers yellow, terminal. Calyx superior, 5-parted. Corolla rotate, 5-8-parted, with an imbricated æstivation.

Stamens 2, inserted in the throat, alternate with the segments of the corolla; 1 anthers roundish, 3-lobed, bursting externally, each consisting of three pairs of narrow, somewhat sinuous cells, which open longitudinally, and which are placed upon a solid fleshy connective. Ovary inferior, 2-celled, with an indefinite number of ovules; style simple, smooth; stigma capitate, 2-lobed. Disk epigynous, fleshy. Fruit capsular, 2-celled, many-seeded, with both septicial and loculeidial dehiscence; testa polished; embryo taper, erect, in the axis of fleshy albumen, with oval obtuse cotyledous, and a taper radicle longer than the cotyledous.

The late Professor Don, who first noticed this Order, thinks it near Jasmynes, with which it corresponds "in the structure and æstivation of the corolla, in the bilocular ovary, and erect (?) ovules: and it agrees both with them and *Syringa* in the structure and dehiscence of the capsule. The Order differs, however, essentially from *Jasmineworts*, by having an adherent ovary, by the presence of a perigynous (?) disk, by the undivided stigma, and, lastly, by having an inferior capsule with polyspermous cells." He was probably led to this notion by having included in his *Columeliads* the genus *Menodora*, which is a genuine member of the *Jasminaceous* Order. He also supposed that



2 Fig. DV. 3

an affinity could be traced with *Halesia*; and Endlicher, acting upon this supposition, has placed the genus as an anomalous form of *Ebenads*. Meisner adopts Don's first view. But it is very clear that none of the Orders thus referred to can really be in the neighbourhood of *Columella*, which may be almost described as a monopetalous *Onagrad*. Its indefinite seeds are entirely at variance with all the tendencies of *Ebenads* and *Jasmineworts*, to say nothing of its inferior ovary. At the same time it is impossible to say where it really ought to stand, for there seems no great resemblance between *Columella*, &c, and any other Order yet described. In this uncertainty I leave it by the side of *Cranberries* and *Cinchonads*, to either of which, and especially to the latter, it may be compared. The most striking feature in its structure is its stamens; these curious bodies, rudely represented in the *Flora Peruviana*, are apparently composed each of three stamens firmly consolidated; for each anther has 6 cells arranged in 3 pairs upon a 3-lobed fleshy connective, and turned towards the corolla. Now this indicates an irregularity of structure of a most unusual kind, and to which I find no parallel; in order to reduce such a structure to regularity, we

Fig. DV. *Columella oblonga*. 1. a flower, 2. half an ovary; 3. a fruit

must either suppose that three more such triple stamens are abortive, and that consequently the typical number of parts in the andrœceum is 25, or we must imagine that the typical number is 10, and that each of the stamens actually developed is composed of two stamens opposite the segments of the corolla, and one alternate with them; in that case three of the stamens alternating with the lobes of the corolla, and two of those opposite the lobes will have to be supposed undeveloped. This would give us a pentamerous monopetalous flower, with twice as many stamens as parts of the corolla. Endlicher adopts this view so far as admitting the existence of three anthers to each stamen.

The species hitherto discovered are from Mexico and Peru.

They are not stated to possess any useful properties.

GENUS.

Columellia, R. P.

Utuvia, Juss.

NUMBERS. GEN. 1. Sp. 3.

Onagraceæ.

POSITION.—*Vacciniacæ*.—COLUMELLIACEÆ.—*Cinchonacæ*.

ORDER CCXCIII. CINCHONACEÆ.—CINCHONADS.

Rubiaceæ, *Juss. Gen.* 196. (1789) for the most part; *Ann. Mus.* 10. 313. (1807); *Mém. Mus.* 6. 365; *Dict. des Sciences*, 46. 385; *Schlecht. et Chamisso in Linnaea*, 3. 309; *Ach. Rich. Dissert. in Mém. Soc. h. n. Par.* 5. 81; *DC. Prodr.* 4. 341; *Royle's Illustration*, p. 287. (1835); *Endl. Gen.* cxxvii. —Lygodysodaceæ, *Burll. Ord. Nat.* 207. (1830); *Martius Conspectus*, No. 161; *Ed. Pr.* cxxvii.

DIAGNOSIS.—*Cinchonal Exogens*, with epipetalous stamens, straight anthers bursting longitudinally, and leaves with interpetiolar stipules.

Trees, shrubs, or herbs. Leaves simple, quite entire, opposite or verticillate, with interpetiolar stipules. Flowers arranged variously, usually in panicles or corymbs.

Calyx adherent, with a definite number of divisions, or none. Corolla superior, tubular, regular, with a definite number of divisions, which are valvate or imbricated in aestivation and equal to the segments of the calyx. Stamens arising from the corolla, all on the same line, and alternate with its segments. Ovary inferior, surmounted by a disk, usually 2-celled, occasionally with several cells; ovules numerous and attached to a central placenta, or few and erect or ascending, anatropal or amphitropal; style single, inserted, sometimes partly divided; stigma usually simple, sometimes divided into a definite number of parts. Fruit inferior, either splitting into 2 cocci, or indehiscent and dry or succulent, occasionally many-celled. Seeds definite

or indefinite; in the former case erect or ascending, in the latter attached to a central axis; embryo small, oblong, orthotropal or homotropal, surrounded by horny albumen; cotyledons thin; radicle longer, inferior.

This well-marked and strictly limited Order is nearly allied to Composites, from which its distinct anthers, bilocular or plurilocular ovary, abundant albumen, small embryo, and stipules distinguish it; and consequently it participates in all the relationship of that extensive Order. The inflorescence of *Richardsonia* and many others is that of Composites; and in the genus *Argophyllum* the anthers actually cohere in a tube. No doubt then can be entertained that the Campanal and Cinchonal Alliances come in contact at one part of their frontier. This is moreover strengthened by a very curious genus of the present Order, called *Opercularia*, which is remarkable for having but one cell in its ovary and one seed, and the number of stamens unequal to the lobes of the corolla; it occupies an intermediate position between genuine Cinchonads and Teazelworts. There is also, notwithstanding the constantly monopetalous corolla of this Order, the closest resemblance to Umbellifers in certain cases; as, for example, in *Paderia* and *Lygodysodes*, which separate their fruit into two mericarps, adhering



Fig. DVI.

Fig. DVI — *Coffea arabica*. 1 a flower magnified, 2. a section across a ripe fruit; 3. a portion of a seed, showing the small embryo laid bare in the end of convoluted albumen.

to a bifid thread-shaped torus, very much as in Umbellifers themselves. Loganiads (p. 602) may be regarded as Cinchonads with a free ovary. There is nothing to distinguish this Order from the Caprifolds except the stipules, and even this mark occasionally fails us. For example, in *Symphoria racemosa* the strong shoots are occasionally furnished with interpetiolar stipules, and of large size; an instance of which is now before me. Some of the genera have the peculiarity of forming one of the sepals in the thin, large, and gaily-coloured condition of a petal, as occurs in the genera *Mussaenda* and *Calycophyllum*. Sir R. Schomburgk states that in a very fine species of the latter genus, found by him in British Guayana, the growth of this petaline sepal is very rapid, expanding to its natural size in the course of a couple of days, and only forming itself after the flower (corolla) has dropped off.—*Lond. Journ. Bot.* 3. 623.

Cinchonads are almost exclusively found in the hotter parts of the world, especially within the tropics, where they are said to constitute about 1-29th of the whole number of flowering plants. In America the most northern species is *Pinckneya pubens*, a shrub inhabiting the southern states of North America; some *Coprosmas* also occupy very low southern latitudes; the most southern is *Nerteria depressa*, a small herb found in the Straits of Magellan. The Order is represented in northern regions by *Stellatas*.

This Order is not only one of the largest of which we have knowledge, but also contains a very considerable number of important species, largely employed for the use of man in the countries they inhabit. Many are among the most valuable of all remedial agents, acting as tonics, febrifuges, emetics, or purgatives. Others, on the contrary, having their secretions in a state of great concentration, prove to be formidable poisons; nevertheless, a few produce eatable fruit, and one is celebrated over all others for its agreeable stimulating seeds. Dyeing qualities are also observed in a small number. The reader who desires to occupy himself with the detailed study of the uses of this extensive Order will consult Geiger's *Handbuch*, Dierbach's *Arzneikräfte*, Endlicher's *Enchiridion*, the *Flora Medica*, and the works on *Materia Medica* by the two Martiuses, Fée, Gribourt, Pereira, Nees v. Esenbeck, Ebermaier, &c. A few of the principal examples are all that need be mentioned in this place.

Foremost among febrifuges and tonics stand the various Peruvian species of *Cinchona*, of which *C. micrantha* and *Condaminea* are the best. To these succeed the *Remijas* of Brazil, which are in that country species of great importance. Buena hexandra bark is an indifferent febrifuge, known in Brazil under the name of China. The bark of French Guiana, possessing properties analogous to those of *Cinchona*, is obtained from *Portlandia hexandra*, the *Coutarea speciosa* of Aublet. The *Quinquina Piton* and *Quinquina des Antilles* are produced by species of the genus *Exostema*, and are remarkable for possessing properties similar to those of true *Quinquina*, but without any trace of either cinchonine or quinine. A kind of fever bark is obtained at Sierra Leone from *Rondeletia febrifuga*. Besides these, a great number of other species possess barks more or less valuable: *Pinckneya pubens* is the fever bark of Carolina; *Condaminea corymbosa*, *Guettarda coccinea*, *Antirhea*, and *Morinda Royoc*, are all of the same description. Of *Hymenodictyon excelsum*, an East Indian shrub, the inner bark possesses the bitterness and astringency of Peruvian bark, and when fresh in a stronger degree. The bitterness is not so quickly communicated to the taste, on chewing the bark, but is much more durable, especially about the upper part of the fances. *Ophiorhiza Mungos* is so intensely bitter that the plant is called by the Malays Earth-gall; according to Kræmpfer, the taste resembles *Gentian*, but is more penetrating. The root and bark of *Guettarda Angelica* are aromatic and acrid, and are used as febrifuges and astringents in the veterinary practice of Brazil.

As simple astringents the most remarkable is the *Uncaria Gambir*. An extract called Gambier is prepared by the Malays from the leaves of this shrub; with some sweetness, it has a more astringent taste than *Terra Japonica*. Roxburgh considered it one of the drugs, if not the only one, formerly called by that name in Europe. The extract is chewed by the natives with Betel-leaf and Areca; the leaves are chewed to relieve aphthous eruptions of the mouth and fances. Mr. Pereira considers this Gambier not to form any of the Kinins of the shops, but to be one of the substances called Catechu in commerce. The root and bark of *Antirhæa verticillata* are said to be powerfully astringent. In Bourbon it is employed as a styptic to restrain hæmorrhage, and is known by the name of Bois de Losteau. A decoction of the leaves as well as root of *Canthium parviflorum* is prescribed in India in certain stages of flux, and the last is supposed to have anthelmintic qualities, though neither have much sensible taste or smell. The bark and young shoots are also used in dysentery.

Among the purgatives or emetics, *Ipecacuanha* holds the first rank; it is the root of *Cephaelis Ipecacuanha*, a little creeping-rooted, half-herbaceous plant, found in damp shady forests in Brazil. It is also sudorific and expectorant. Its powder acts upon the

respiratory passages as an irritant, producing spasmodic asthma. In some cases the mere odour of the root seems sufficient to excite difficulty of breathing, with a feeling of suffocation. Similar properties are found in the roots of other Cinchonads of the same country, as in *Richardsonia rosea* and *scabra*, *Geophila reniformis*, *Borreria*s, *Spermacoce ferruginea* and *Poaya*, &c. The *Raiz Preta*, which is celebrated for its power in curing dropsy, and in destroying the dangerous consequences of bites of serpents, is



Fig. DVI.*

said to be related to *Ipecacuanha*. The spurious barks called *Quinquina Piton* are capable of exciting vomiting. The powdered fruit of *Randia dumetorum* is a powerful emetic; an infusion of the bark of the root is administered to nauseate in bowel complaints. The bark of the root of *Manettia cordifolia* is esteemed in Brazil a most valuable remedy in dropsy and dysentery. It is given in powder in doses of $\frac{1}{2}$ to $1\frac{1}{2}$ drachm, and acts as an emetic. The fruit of *Gardenia campanulata* is regarded in India as a cathartic and anthelmintic. The fœtid leaves of *Pæderia fœtida* are used to medicate baths, and in decoction are administered internally in retention of urine, and in certain febrile complaints. According to Roxburgh, the root is used by the Hindoos as an emetic. The roots of *Chioceoca anguifuga* and *densifolia*, the one a Brazilian trailing herb, the other a woody bush, are employed with confidence by the natives of Brazil as a certain remedy for serpent bites. The infusion of the bark of the root produces the most violent emetic and drastic effects. In the words of Von Martius:—"Ægrotus scilicet, e veneno languidus, soporosus, vix sui compos, ex quo medicinam sumserit, primum evacuationibus creberrimis et tantis motibus convulsivis excruciat, ut, licet exsanguis et quætu cum facie hippocraticâ, sub summâ virium labe in lectulum corruisset, ne unicum quidem temporis momentum quietus maneri possit. Tandem post plurimos et visu terribiles spasmos universales et corporis volutiones, in enormes rapitur vomitus, quibus salivam, bilem, chymum, immo fœces largâ copiâ edit. Tunc accedunt subitaneæ alvi excretiones fecum quasi succo viscido involutarum quæ, si continua per aliquot temporis serie sese excipiant, cum visibili ægroti levamine, boni exitus pro indicîis habentur." Copious perspirations follow, and these are succeeded by a gentle sleep. The violent action of these roots renders them dangerous to employ, except in cases of poisoning, or in such maladies as require a prompt and complete evacuation of the intestines.

It may easily be supposed that secretions producing such powerful action as that just described would, if a little modified or augmented in force, become dangerous poisons, and accordingly we find several species of Cinchonads included in the class of deleterious agents. Sir R. Schomburgk assures us that Indians have been poisoned by using the wood of *Evosmia corymbosa* to make spits for roasting meat upon.—*Hooker's Journal*, 3. 219. According to Roxburgh, the root of *Randia dumetorum*, bruised and thrown into ponds where there are fish, intoxicates them like *Cocculus indicus*. *Psychotria noxa*, and *Palicourea Maregraviæ*, both called *Erva de rata*, are accounted poisonous in Brazil, where they and other species of the same genera are employed for the destruction of rats and mice. *Cephaelis ruelliaefolia* is venomous, and used for the same purpose.

Fig. DVI.* *Richardsonia scabra*. 1. an ovary with its calyx; 2. a corolla; 3. a vertical section of a seed, with an erect embryo in copious albumen.

An eatable fruit is furnished by a few species. The Genipap, a South American fruit as large as an Orange, of a whitish-green colour, but containing a dark purple juice with an agreeable vinous taste, is borne by *Genipa americana*. *Sarcocephalus esculentus* is the Native Peach of Sierra Leone. *Vangueria edulis*, or *Voa-vanga*, is said to be a good dessert fruit in Madagascar. *Genipa brasiliensis* is also eaten in Brazil, but Martius says that it is only fit for table after becoming blotted, and that it is better when preserved with sugar than when fresh. Some of the bushes called in Tasmania Native Currants are *Coprosmas*; but they are not of good quality.

Coffee is the roasted seeds of a plant of this Order, *Coffea arabica*, and is supposed to owe its stimulating, refreshing characters to a peculiar chemical principle called Caffein, which modern chemists pronounce to be the same as Theine. The part roasted is the albumen, which is of a hard horny consistence; and it is probable that the seed of other plants of this or the stellate Order, whose albumen is of the same texture, would serve as a substitute. This would not be the case with those with fleshy albumen.

Among dyeing plants we have *Oldenlandia umbellata*; whose roots are a substitute for Madder in the East Indies; *Psychotria Simira*, whose bark stains red in Brazil; *Genipa brasiliensis*, whose fruit strikes a deep violet; *Condaminea tinctoria*, *Hydrophyllax maritima*, and a few others of little consequence.

The fragrance or beauty of the flowers of some of the plants of this Order, especially of the *Gardenias*, *Hindsias*, *Posoquerias*, *Ixoras*, *Cinchonas*, *Bouvardias*, *Catesbeas*, &c. is unsurpassed in the vegetable kingdom, and forms a strange contrast with the *Spermaeocetes*, *Richardsonias*, &c., which are among the meanest weeds we know.

GENERA.

I. COFFEÆ. — Ovary with only 1 or 2 seeds in each cell.	<i>Mitracarpum</i> , Zuccar.	<i>Sutera</i> , DC.	<i>Reussia</i> , Dennst.
	<i>Schizangium</i> , Bartl.	<i>Coffea</i> , Linn.	<i>Lecotea</i> , A. Rich.
	<i>Stavrospermum</i> , Thon.	<i>Hornia</i> , DC.	<i>Lygodysolen</i> , R. et Pav.
I. OPERCULARIÆ.	<i>Perama</i> , Aubl.	<i>Pancrasia</i> , DC.	<i>Disodea</i> , Pers.
<i>Pomax</i> , Soland.	<i>Mattuschkeca</i> , Schreb.	<i>Straussia</i> , DC.	
Opercularia, A. Rich.	<i>Staelia</i> , Cham.	<i>Strempelia</i> , A. Rich.	VI. GUETTARDIÆ.
<i>Cryptospermum</i> , Yug.	<i>Tessiera</i> , DC.	<i>Paramea</i> , A. Rich.	<i>Morinda</i> , Vaill.
	<i>Psyllocarpus</i> , Marl.	<i>Tetramerium</i> , DC.	<i>Chrysochiza</i> , DC.
	<i>Diodeis</i> , Pohl.	<i>Potina</i> , Pers.	<i>Myrmecodia</i> , Jacq.
II. ANTHOSPERMIDÆ.	<i>Gaillonia</i> , A. Rich.	<i>Darbua</i> , Rahn.	<i>Hydnophytum</i> , Jacq.
<i>Anthospermum</i> , Linn.	<i>Ptychostigma</i> , Hochst.	<i>Antoniana</i> , Tuss.	<i>Hypobathrum</i> , Blume.
<i>Ambraria</i> , Heist.	<i>Otiophora</i> , Zuccar.	<i>Macronelyx</i> , Miers.	<i>Nertera</i> , Banks.
♀ <i>Crocyclis</i> , E. Mey.	<i>Knoxia</i> , Linn.	<i>Rytidea</i> , DC.	<i>Gomezia</i> , Mutis.
♀ <i>Lagotis</i> , E. Mey.	<i>Janbertia</i> , Guillen.	<i>Grumilea</i> , Gärtn.	<i>Erythrodanum</i> , Thon.
<i>Ambraria</i> , Crusc.	<i>Machaonia</i> , Humb.	<i>Polynosus</i> , Lour.	<i>Mitchella</i> , L.
<i>Nenax</i> , Gärtn.	<i>Emmeorhiza</i> , Pohl.	<i>Conssarea</i> , Aubl.	<i>Chamaedaphne</i> , Mitch.
<i>Galopina</i> , Thunb.	<i>Entollicera</i> , Presl.	<i>Billardiera</i> , Vahl.	<i>Baumannia</i> , DC.
<i>Ozyspermum</i> , Eeld.	<i>Deppea</i> , Cham. et Schl.	<i>Friehlichia</i> , Vahl.	<i>Meplutidia</i> , Rebur.
<i>Phyllis</i> , L.	<i>Cruckshanksia</i> , H. et Arn.	<i>Saprosma</i> , Blume.	<i>Lasianthus</i> , Jacq.
<i>Coprosma</i> , Forst.	<i>Rotheria</i> , Meyen.	<i>Pavetta</i> , L.	<i>Vangueria</i> , Commers.
<i>Leptostigma</i> , Arn.	<i>Cephalanthus</i> , L.	<i>Pavale</i> , Ray.	<i>Vanguiera</i> , Pers.
		<i>Ixora</i> , L.	<i>Vavanga</i> , Rohr.
		<i>Baconia</i> , DC.	<i>Meyenia</i> , Lk.
		<i>Venulania</i> , DC.	<i>Guettarda</i> , Vent.
III. SPERMACOCIDÆ.		<i>Chomelia</i> , Jacq.	<i>Cadamba</i> , Sonner.
<i>Putoria</i> , Pers.	IV. PSYCHOTRIDÆ.	<i>Scolosanthus</i> , Vahl.	<i>Halesia</i> , P. Br.
<i>Plocama</i> , Ait.	<i>Geophila</i> , Don.	<i>Antacanthus</i> , L. C. Rich.	<i>Dicrobotryon</i> , Willd.
<i>Placona</i> , Pers.	<i>Cephaelis</i> , Sw.	<i>Saldinia</i> , A. Rich.	<i>Laigeria</i> , Jacq.
<i>Bartlingia</i> , Rehb.	<i>Callicocca</i> , Schreb.	<i>Margaris</i> , DC.	<i>Ullobus</i> , DC.
<i>Scyphiphora</i> , Gärtn. fil.	<i>Ipecacuanha</i> , Arruda.	<i>Chiococca</i> , P. Br.	<i>Viviania</i> , Rafia.
<i>Hydrophyllax</i> , Linn. fil.	<i>Tapogonca</i> , Juss.	<i>Tertrea</i> , DC.	<i>Malanea</i> , Aubl.
<i>Sarissus</i> , Gärtn.	<i>Callicocca</i> , DC.	<i>Schiedea</i> , A. Rich.	<i>Cunninghamia</i> , Schreb.
<i>Cuneea</i> , Hamill.	<i>Evea</i> , Aubl.	<i>Declieuxia</i> , H. B. K.	<i>Antirrhæa</i> , Commers.
<i>Ernodea</i> , Sw.	<i>Carapichea</i> , Aubl.	<i>Psyllocarpus</i> , Pohl.	♀ <i>Neuropora</i> , Commers.
<i>Wiegmannia</i> , Meyen.	<i>Patabea</i> , Aubl.	<i>Eumachia</i> , DC.	<i>Stenostomum</i> , Gärtn. fil.
<i>Serissa</i> , Commers.	<i>Salzmannia</i> , DC.	<i>Siderodendron</i> , Schreb.	<i>Sturmia</i> , Gärtn.
<i>Dysoda</i> , Lour.	<i>Chasalia</i> , Commers.	<i>Nescidia</i> , A. Rich.	<i>Stenostemum</i> , Juss.
<i>Buchozia</i> , Hierit.	<i>Palicourea</i> , Aubl.	<i>Plectronia</i> , Linn.	<i>Sacconia</i> , Endl.
<i>Democritea</i> , DC.	<i>Gabiania</i> , Vandell.	♀ <i>Mitragalma</i> , Harv.	<i>Crusea</i> , A. Rich.
<i>Octodon</i> , Thom.	<i>Stephanium</i> , Schreb.	<i>Canthium</i> , L.	<i>Chione</i> , DC.
<i>Borreria</i> , Mey.	<i>Colladonia</i> , Spr.	<i>Psyrax</i> , Gärt.	<i>Tinonius</i> , Rumph.
<i>Bigelovia</i> , Spr.	<i>Psychotria</i> , L.	♀ <i>Krausia</i> , Harv.	<i>Bobea</i> , Gaudich.
<i>Chlorophytum</i> , Pohl.	<i>Psychotrophum</i> , P. Br.	<i>Mitrostigma</i> , Hochst.	<i>Buruya</i> , Cham.
<i>Spermaeocete</i> , Linn.	<i>Myrtiphyllum</i> , P. Br.	<i>Diplospora</i> , DC.	<i>Erithalis</i> , Forst.
<i>Hexasepalum</i> , Bartl.	<i>Ronabea</i> , Aubl.	<i>Marquisia</i> , A. Rich.	<i>Eupyreia</i> , Wgt. et Arn.
<i>Diodia</i> , L.	<i>Viscoidea</i> , Jacq.	<i>Dammacanthus</i> , Gärtn. fil.	<i>Pyrostria</i> , Roxb.
<i>Triodon</i> , DC.	<i>Mapouria</i> , A. Rich.	<i>Amaracarpus</i> , Blume.	<i>Santia</i> , Wright et Arn.
<i>Crusea</i> , Cham. et Schl.	<i>Mapouria</i> , Aubl.		<i>Psathyra</i> , Commers.
<i>Pentamisia</i> , Harv.	<i>Simira</i> , Aubl.		<i>Chicoinea</i> , Commers.
<i>Diotocarpus</i> , Hochst.	<i>Antherum</i> , Lour.		<i>Hamiltonia</i> , Roxb.
<i>Richardsonia</i> , Kunth.	<i>Rudgea</i> , Salisb.	V. PÆDERIDÆ.	<i>Spermatidictyon</i> , Roxb.
<i>Richardia</i> , Linn.	<i>Veretia</i> , Del.	<i>Paderia</i> , L.	
<i>Schiedea</i> , Bartl.	<i>Gallinera</i> , Del.		
	<i>Codonoclyx</i> , Miers.		

Leptodermis, Wall.
 Myonina, Commers.
 Pyrostria, Commers.
 Octavia, DC.
 Lithosauthes, Blume.
 Krithalis, P. Br.
 Retiniphyllum, Humb.
 Noutelia, Aubl.
 Oribasia, Schreb.
 Gynochotodes, Blume.
 Cælospermum, Blume.
 Ancylanthus, Desf.
 Pachystigma, Hochst.
 Hylacium, Palis.
 Phallaria, Schumacher.
 Cuviera, DC.
 Dondia, DC.
 Stigmanthus, Lour.
 Stigmatanthus, R. et S.
 Strumpfia, Jacq.
 Strumpfia, Pers.
 Epithimia, Jacq.
 Commianthus, Benth.
 Tricalysia, A. Rich.

II. CINCHONEÆ.—
 Ovary many-seeded.

VII. HAMELIDÆ.

Evosmia, Humb. et Bon.
 Tepesia, Gertn. f.
 Sabicea, Aubl.
 Schœnkfeldia, Willd.
 Schizostigma, Arn.
 Holostyla, DC.
 Stylocoryma, Labill.
 Axanthes, Blume.
 Maschalanthe, Blume.
 Walliechia, Reinw.
 Urophyllum, Jack.
 Walliechia, Roxb.
 Lachnosiphonium, Hoch.
 Hamelia, Jacq.
 Duhamelia, Pers.
 Schradera, Fahl.
 Fuchsia, Swartz.
 Crocolaria, Willd.
 Briznolia, DC.
 Fatima, Aubl.
 Polyphragmon, Desf.

VIII. ISERTIDÆ.

Isertia, Schreb.
 Posaanthus, Rafin.
 Bruinatnanna, Miq.
 Rhysocarpus, Endl.
 Gonzalea, Prra.
 Gonzalagunia, R. et P.
 Anthocephalus, L. C. Rich.
 Cephalidium, A. Rich.
 Metabolus, Blume.
 Sclerococcus, Bartl.

IX. HEDYOTIDÆ.

Dentella, Forst.
 Lippaya, Endl.
 Gonotheca, Blume.
 Helyotis, Lam.
 Diplophragma, Wight.
 Macrandria, W. et A.

Dimetia, Wight et Arn.
 Aotlis, DC.
 Didymoloece, Endl.
 Ambloma, E.
 Eurhaphæ, E.
 Functos, Rafin.
 Houstonia, L.
 Poinetia, Gmel.
 Amphiotis, DC.
 Edrissa, Raf.
 Pentotis, Torr.
 Ereicotis, DC.
 Scleromitron, W. et A.
 Oldenlandia, L.
 Gerontogea, Cham.
 Listeria, Neck.
 Kohautia, Cham. et S.
 Kadua, Cham. et Schl.
 Rhachicallis, P. C.
 Lucyia, DC.
 Dunalia, Spr.
 Karamyschewia, F. et M.
 Tula, Adams.
 Spiradiclis, Blume.
 Leptopetalum, Hook.
 Ophiorrhiza, L.
 Lipostoma, Don.
 Virecta, DC.
 Pentas, Benth.
 Sipauca, Aubl.
 Virecta, Liun. f.
 Ptychocoda, Willd.
 Carphalea, Juss.
 Greenia, Wight et Arn.
 Lerchea, L.
 Codaria, L.
 Xanthophytum, Bl.
 Wendlandia, Bartl.
 Adenosacme, Wall.
 Hindisa, Benth.
 Rondeletia, Blume.
 Petesia, P. Br.
 Lightfootia, Schreb.
 Willdenowia, Gmel.
 Arachniformis, Desv.
 Choristes, Benth.
 Spallanzania, DC.
 Isidorea, A. Rich.
 Bikkia, Reinw.
 Cornigonus, Rafin.
 Portlandia, P. Br.
 Schreihersia, Pohl.
 Augusta, Pohl.
 Augusta, DC.
 Lindenia, Benth.
 Siphonia, Benth.
 Chimarrhis, Jacq.
 Macrocenemum, P. Br.
 Condaminea, DC.

X. CINCHONIDÆ.

Calycophyllum, DC.
 Pluckneya, L. C. Rich.
 Bonvardia, Salisb.
 Houstonia, Andr.
 Christima, Rafin.
 Aginetia, Cavan.
 Manettia, Mutis.
 Nucleiba, Aubl.
 Canotrichia, A. Rich.
 Lygistum, P. Br.

Danais, Commers.
 Alseis, Schott.
 Exostemma, L. C. Rich.
 Pitonia, DC.
 Brachyanthemum, DC.
 Hymenodictyon, Wall.
 Kurria, Hochst.
 Luculia, Sweet.
 Lasionema, Don.
 Remijia, DC.
 Macrocnemum, Vell.
 Cinchona, L.
 Cosmihuena, R. et Pav.
 Buena, Pohl.
 Hymenopogon, Wall.
 Hillia, Jacq.
 Pereira, Vandell.
 Ferdinandusa, Pohl.
 Ferdinanda, Pohl.
 Coutarea, Aubl.
 Stevensia, Poit.
 Crossopteryx, Fenzl.
 Sulipa, Blanc.
 Nauclea, Liun.
 Platanocarpum, Endl.
 Mitragnye, Korth.
 Mamboya, Blanc.
 Nauclearia, DC.
 Acrodryon, Spr.
 Pentacoryna, DC.
 Uncaria, Schreb.
 Agylophora, Neck.
 Ourouparia, Aubl.
 Adina, Salisb.

XI. GARDENIDÆ.

Sarcocephalus, Afzel.
 Cephalina, Thonn.
 Zuccarinia, Blume.
 Luciana, DC.
 Canephora, Juss.
 Breonia, A. Rich.
 Cateshaa, Liun.
 Aspidanthera, Benth.
 Hoffmannia, Se.
 Argostemma, Wall.
 Pomangium, Reinw.
 Neurocalyx, Hook.
 Higgisia, Pers.
 O-Higgisia, R. et Pav.
 Petunga, DC.
 Higgisia, Blum.
 Spicillaria, A. Rich.
 Fernelia, Commers.
 Coccoxyrselum, Swartz.
 Sicclium, P. Br.
 Tontanea, Aubl.
 Bellardia, Schreb.
 Condalia, Ruiz et Pav.
 Petesia, Bart.
 Stylocoryne, Cav.
 Wahlenbergia, Blume.
 Cupia, DC.
 Chometia, Liun.
 Zamaria, Rafin.
 Tareuna, Gartn.
 Pouchetia, A. Rich.
 Bertiera, Aubl.
 Zaluzania, Commers.
 Myctia, Reinw.

Hippotis, Ruiz et Pav.
 Helospora, Jack.
 Menestoria, DC.
 Heinsia, DC.
 Chapelieria, A. Rich.
 Griffithia, W. et Arn.
 Hyptianthera, W. et Arn.
 Randia, Houtt.
 Oryceros, Lour.
 Ceriscus, Gärtn.
 Euclina, DC.
 Rhodostoua, Scheidw.
 Gardeuia, Ell.
 Kumbaya, Endl.
 Piringa, Juss.
 Thunbergia, Mont.
 Chaquepiria, Salisb.
 Rothmannia, Thunh.
 Lasiosstoma, Benth.
 Geulpa, Plum.
 Duroia, Lin. f.
 Conosiphon, Pöpp.
 Sphinctanthus, Benth.
 Oxyanthus, DC.
 Posoqueria, Aubl.
 Cyrtanthus, Schreb.
 Solcna, Willd.
 Posoria, Rafin.
 Tocoyna, Aubl.
 Ucriana, Willd.
 Gynopachys, Bl.
 Cassua, H. B. K.
 Ourouparia, Aubl.
 Mussanda, L.
 Neurocarpa, R. Br.
 Landia, Comm.
 Caanthe, DC.
 Alherta, E. Mey.
 Aceranthera, Arn.
 Gardeniola, Cham.
 Thileodoxa, Cham.
 Melanopsidium, Cels.
 Viviania, Coll.
 Billiottia, DC.
 Scapseothaunus, Cham.
 Alibertia, A. Rich.
 Genipella, L. C. Rich.
 Cordiera, A. Rich.*
 Amaioua, Aubl.
 Hexactina, Willd.
 Ehrenbergia, Spr.
 Burchellia, R. Br.
 Bubatina, Ehrenb.

Sommeria, Schlecht.
 Ausosomeris, Presl.
 Psilobium, Jack.
 Platymerium, Bartl.
 Lecananthus, Jack.
 Morelia, A. Rich.
 Jackia, Wall.
 Zuccarinia, Spr.
 Himatanthus, Willd.
 Aidia, Lour.
 Sickingia, Willd.
 Stipularia, Palis.
 Plunaria, Schum.
 Myrioneuron, R. Br.
 Plethoclea, Wall.
 Egeria, Neraud.
 Meretrich, Neraud.

NUMBERS. GEN. 269. Sp. 2500.

Apiaceæ, Asteraceæ.

POSITION.—Galiaceæ.—CINCHONACEÆ.—Caprifoliaceæ.

Loganiaceæ.

* These changes in the position of a few genera have been made at the suggestion of Mr. Miers.—
 Journ., 1845.

ORDER CCXCIV. CAPRIFOLIACEÆ.—CAPRIFOILS.

Caprifolia, *Juss. Gen.* 210. (1789 *in part.*—Caprifoliaceæ, *Rich. Dict. Class.* 3. 172; *DC. Prodr.* 4. 321; *Bartl. Ord. Nat.* 213. (1830).—Lonicereæ, *Endl. Gen.* cxxviii.

DIAGNOSIS.—*Cinchonal Exogens*, with epipetalous stamens, straight anthers bursting longitudinally, consolidated fruit, and leaves without stipules.

Shrubs or herbaceous plants, with opposite leaves, destitute of stipules. Flowers usually corymbose, and often sweet-scented. Calyx superior, 4-5-cleft, usually with 2



Fig. DVII.

or more bracts at its base. Corolla superior, monopetalous or polypetalous, rotate or tubular, regular or irregular. Stamens epipetalous, equal in number to the lobes of the corolla, and alternate with them. Ovary with from 1 to 5 cells, one of which is often 1-seeded, the others being many-seeded; in the former the ovule is pendulous; style 1; stigmas 3, or 5. Fruit indehiscent, 1- or more-celled, either dry, fleshy, or succulent, crowned by the persistent lobes of the calyx. Seeds either solitary and pendulous, or numerous and attached to the axis; testa often bony; embryo very small, in fleshy albumen; radicle next the hilum.

As left by Jussieu this Order was a heterogeneous assemblage; as altered and better limited it seems to be less objectionable. It possesses a striking affinity with Cincho-

Fig. DVII.—*Sambucus nigra*; 1. a flower; 2. a young pistil; 3. a cross section of its ovary; 4. a perpendicular section of the fruit.

nads, in the monopetalous tubular corolla, definite stamens, inferior ovary, and opposite leaves, an affinity which is confirmed by the corolla of the latter being occasionally regular or irregular. In fact the resemblance between them in habit, structure, inflorescence, and sensible properties is so great that there seems to be no certain character to distinguish them except the stipules of Cinchonads; for the character derived from the presence of one ovule only in one cell, and of many ovules in two other cells, although very striking in *Linnæa* and *Abelia*, disappears in others, especially in *Lycæstera*, whose ovary has 5 polyspermous cells; and yet that genus cannot be possibly separated from Caprifolds. Their epigynous structure divides them from 4 Dogbanes, which have much resemblance in habit: *Loranth*s, once mixed with them, have no petals. But if we consider the Sub-order called Sambuceæ, our view of the affinities of the Order takes a different turn, and we find an approach to Saxifragals: this is established through the intervention of *Hydrangea*, which is undistinguishable in habit from *Viburnum*, with which it accords in inflorescence and in the constant disposition of its flowers to become radiant, but from which it differs in being polypetalous and polyspermous, and only half epigynous. Besides these points of resemblance, Caprifolds probably tend towards Umbellifers through Sambuceæ.



Fig. DVIII.

5

Natives of the northeru parts of Europe, Asia, and America, passing downwards within the limits of the tropics; found very sparingly in northern Africa, and little known in the southern hemisphere.

The fragrance and beauty of Honeysuckles have been celebrated by poets of every age; but independently of such a recommendation, the Order of Caprifolds possesses properties of considerable interest. The flowers of the Elder are fragrant and sudorific, its leaves fœtid, emetic, and a drastic purgative; qualities which are also possessed by *Viburnum Opulus* (the Gueldres Rose), several other species, and even by the Honeysuckle itself. The leaves of *Linnæa borealis* are praised by the Swedes as diaphoretic and diuretic. The inner bark of *Viburnum Lantana* is so acrid as to be included by some writers among vesicants. The fruit of *Viburnum* is destitute of these properties, but has, instead, an austere, astringent pulp, which becomes eatable after fermentation, and is made into a sort of cake by the North American Indians. *Triosteum perfoliatum* is a mild cathartic; in large doses it produces vomiting. Its dried and roasted berries have been used as a substitute for Coffee. The berries of *Lonicera cerulea* are a favourite food of the Kamtchadales. The wine made from the Elder, *Sambucus nigra*, is well known in England, and is used as a means of adulterating Port-wine. According to Mr. Backhouse, there is a species of Elder in *Tasmania*, which has large cymes of white sweetish fruit, respecting which nothing deleterious has been observed.

GENERA.

I. LONICERÆÆ.	<i>Weigela</i> , Thunb.	<i>Chamæcerasus</i> , Tourn.	<i>Lentago</i> , DC.
<i>Linnæa</i> , Gronov.	<i>Calyphyrum</i> , Bung.	<i>Cuphantha</i> , DC.	<i>Tinus</i> , Tournef.
<i>Golartia</i> , Siegesb.	<i>Alsenosmia</i> , Cunn.	<i>Isica</i> , Monch.	<i>Opulus</i> , Tournef.
<i>Abelia</i> , R. Br.	<i>Caprifolium</i> , Tournef.	<i>Triosteum</i> , Linn.	<i>Sambucus</i> , Tournef.
<i>Symphoricarpos</i> , Dill.	<i>Periclymenum</i> , Tourn.		<i>Phytuma</i> , Lohr.
<i>Symphoria</i> , Pers.	<i>Lonicera</i> , Desf.	II. SAMBUCEÆ.	<i>Tripetelus</i> , Lindl.
<i>Anianthus</i> , Willd.	<i>Xylostemon</i> , Juss.	<i>Viburnum</i> , Linn.	? <i>Vilentianna</i> , Raf.
<i>Lycæstera</i> , Wall.	<i>Cobea</i> , Neck.	<i>Solenotus</i> , DC.	? <i>Karpaton</i> , Raf.
<i>Diervilla</i> , Tournef.	<i>Ninnoa</i> , Sweet		

NUMBERS. GEN. II. Sp. 220.

Cornucæa.

POSITION.—Cinchonaceæ.—CAPRIFOLIACEÆ.—Columnelliaceæ.

Hydrangeaceæ.

Fig. DVIII.—1. flower of *Linnæa borealis*; 2. the same cut open and showing the interior of the ovary; 3. a cross section of the ovary; 4. section of fruit of *Lonicera tatarica*; 5. half its seed.

ORDER CCXCV. GALIACEÆ.—STELLATES.

Stellata, *Ray Synops.* 223. (1690); *R. Brown in Congo*, (1818).—Galiæ, *Turp. in Atlas du Nouv. Dict. des Sc.* (?)—Rubiaceæ, § Stellata, *Cham. et Schlecht. in Linnea*, 3. 220. (1828); *DC. Prodr.* 4. 580; *Barthl. Ord. Nat.* 209; *Endl. Gen.* p. 522; *Meisner*, p. 173.—Rubiaceæ, § Galiæ, *N. ab Es. et Fuhlrott. Nat. Pflanz. Syst.* 165. (1829).

DIAGNOSIS.—*Cinchonal Exogens*, with epipetalous stamens, straight anthers bursting longitudinally, didymous fruit, and verticillate leaves without stipules.

Herbaceous plants, with whorled leaves, destitute of stipules, and angular stems. Flowers minute. Calyx superior, obsolete, or 4- 5- or 6-lobed. Corolla monopetalous,

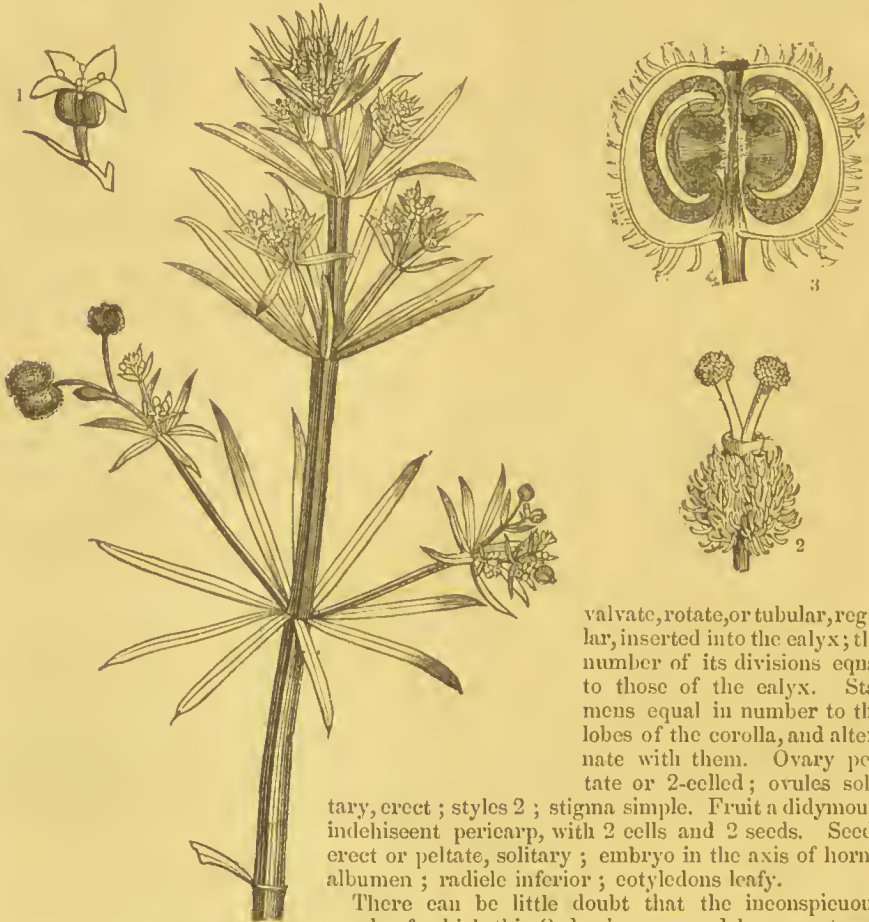


Fig. DIX.

valvate, rotate, or tubular, regular, inserted into the calyx; the number of its divisions equal to those of the calyx. Stamens equal in number to the lobes of the corolla, and alternate with them. Ovary peltate or 2-celled; ovules solitary, erect; styles 2; stigma simple. Fruit a didymous, indehiscent pericarp, with 2 cells and 2 seeds. Seeds erect or peltate, solitary; embryo in the axis of horny albumen; radicle inferior; cotyledons leafy.

There can be little doubt that the inconspicuous weeds of which this Order is composed have as strong a claim to be separated from Cinchonads as that Order from Caprifolds. It is true that no very positive characters are to be obtained from the fructification, but the want is abundantly supplied by the square stems and verticillate leaves without stipules, forming a kind of star, from which circumstance the name Stellate is derived. Nevertheless, Botanists in most instances appear to be against this opinion: I confess I cannot conceive upon what grounds. Usually a material dissimilarity in habit, if accompanied by any clear character, whether of vegetation or fructification, is considered sufficient for the separation of a group of plants into two Orders; in this case the weak angular stems

Fig. DIX.—*Galium Aparine*; 1. a flower; 2. a young fruit without the corolla; 3. a perpendicular section of a ripe fruit.

cause a peculiarity of habit that cannot be mistaken, and the total absence of stipules, to say nothing of the didymous fruit, affords a certain mark of recognition. Surely there is some inconsistency in separating, by the absence of stipules, Caprifolds, which are undistinguishable in habit, while the very same character is rejected when applied to an assemblage of genera all distinctly combined by their habit. The only ground upon which this is intelligible is that taken by De Caudolle and others, who consider the apparent leaves of Stellates to be in part true leaves and in part leaf-like stipules. To this verbal but not real distinction there is this objection, which I conceive quite fatal to it:—If a part of the leaves of each whorl in *Galium* was stipules, the latter must bear a certain proportion to the true leaves; suppose the whorl to consist of two leaves, each will have two stipules, and consequently the whole number of parts in the whorl must be six, and in all cases the number must be some power of 3. But of the first forty species of *Galium* in De Candolle's *Prodromus* only thirteen conform to this rule; and the frequent tendency in the whorls to vary from 4 to 6, or from 5 to 6, or from 6 to 8, seems to me an incontrovertible proof that the apparent leaves of Stellates are true leaves and not a modification of stipules. To this it may be added, that the admitted leaves are so entirely the same as what M. De Candolle conceives to be stipules, that no difference whatever can in general be found in their form, colour, anatomy, or degree of development. Such reasons have, however, not proved satisfactory to Botanists, who with one accord appear to range themselves upon the side of M. De Candolle; and recently the question has been more particularly agitated by one of the most distinguished writers of this country.

Mr. Bentham, in an article on *Crusca rubra*, published in the *Botanist*, page 82, after entering at some length and with great skill into a discussion of the arguments employed on both sides of the question, has decided in favour of the opinion of De Candolle, that a part of the apparent leaves of Stellate plants are stipules. The grounds upon which he has arrived at this conclusion are essentially the following:—

1. That the foliaceous organs in Stellates, if viewed as consisting entirely of leaves, do not bear that relation to the angles of the stem which is usual in Dicotyledons; but that the relation becomes apparent if only two of them are taken as leaves and the rest as stipules. (De Candolle seems influenced by the consideration that it is only two of the apparent leaves which have buds in their axils; but Mr. Bentham does not advert to this.)

2. That in a number of cases, especially in *Asperula*, two opposite leaves are much larger than the others.

3. That in Spermaceæ and other tribes of Cinchonads, the stipules are connected with the petiole of the leaf into a sheath, and that this sheath exists in Stellates.

4. That the number of parts in each whorl is not necessarily some power of 3, but that, taking two of the parts for leaves, it is immaterial by what number of similar parts those two are separated, because the intermediate processes are analogous to the setæ of Spermaceæ, the number of which is variable.

Perhaps this question is more important in appearance than in reality, for in some respects it is a mere difference about words; stipules being rudimentary leaves, and leaves developed stipules. It is, however, connected with some points of speculative interest, especially as regards systematic Botany, and therefore I avail myself of the present opportunity of stating what I conceive to be the objections to Mr. Bentham's line of argument, and why I still retain my original opinion upon the subject.

1. With regard to the relation borne by the leaves to the angles of the stem, it is to be observed, that if those foliaceous organs only which are opposite the angles are said to be leaves in Stellates, and the rest stipules, then we must suppose that Labiate plants have no leaves, but stipules only, for in that and similar Orders the apparent leaves are never opposite the angles of the stem, but are always placed between them. Nor do I find that the number of angles in the stem of verticillate plants necessarily corresponds with the number of their leaves; for example, in *Dysophylla stellata*, where the whorls often consist of ten parts, the stem has still but four angles. Neither can it be admitted that bodies which do not form branches in their axils are therefore not leaves. All foliaceous organs, of whatever kind, and especially stipules, possess that power or not, according to circumstances, as is too well known to require particular proof. Besides, De Candolle's statement is not sustained by fact; for in *Asperula* the uppermost branches, bearing flowers, are frequently produced alternately with the leaves that form the node from which they spring, and consequently must, in such cases, arise from the setæ of one of the supposed stipules. It is more probable that the development of branches from a portion only of the leaves is connected with the form of the stem, and the relation which the leaves bear to each other. If the form of the stem requires an alternate development of a pair or a triplet of opposite branches, then the first whorl in which the development takes place will settle the origin of all that succeed it. For example, if in one whorl of six leaves,

the first, third, and fifth leaves produce axillary buds, then in the whorl next above it, the second, fourth, and sixth leaves will probably be gemmiferous, according to the ordinary laws of decussation. It is plainly impossible to say that what seem to be leaves are in reality stipules, because they have no axillary buds; for if that opinion were maintained, it would be necessary to assign the quality of stipules to a certain portion of the leaves of such verticillate plants as *Dysophylla stellata*, in which only a part of the whorls ever produces branches.

2. If it is true that in *Asperula* two opposite leaves are frequently longer than the others, that circumstance may be reasonably ascribed to the greater development consequent upon their higher functions, and to their peculiar position on the stem; and it is equally true that in the greater part of *Stellates* no trace whatever of any kind of difference between the leaves can be detected, as is most remarkably the case in those surrounding the flowers of *Crucianella maritima*.

3. The argument derived from the occasional connection of the leaves by a membrane can hardly be allowed much weight, when it is remembered that in such cases the intermediate leaves are less like stipules than in those cases where no membrane exists; compare *Asperula cynanchica*, or *littoralis*, or *longiflora*, with such genuine *Crucianellas* as *C. maritima*.

4. The comparison of the supposed stipules of *Stellates* and the setæ of *Spermacocœe* is inadmissible, because the former are at all events single simple organs, be they what they may, while the setæ of *Spermacocœe* are the result of the splitting of two parallel-veined stipules, and therefore will necessarily be uncertain in number.

These arguments do not, however, by any means exhaust the question; and therefore I proceed to make a few additional remarks upon a point not yet adverted to. It is in *Asperula*, more than in any other genus of the Order, that is to be found evidence favourable to the supposition of M. De Candolle and his followers. In *A. longiflora*, *cynanchica*, and some others, the lower whorls are in the usual state, but the upper ones are reduced to two perfect leaves, with one or sometimes two teeth or subulate processes between them, which remain. In this condition the structure of *Asperula* is so very like that of many *Spermacocœous* plants, that the analogy between them seems indisputable; and I presume that it was such cases which first led to the theory under consideration.

It is, however, to be remembered, that in *Stellates* the supposed stipules are always what first disappear in the process of reduction in the number of foliaceous appendages; but that in *Cinchonads* it is in many cases the leaves which are first lost when such a reduction takes place. The latter fact is readily verified upon reference to any of the capitate *Spermacocœes*, where the bracts are evidently stipules, and especially to *S. calyptera*, in which the leaves are gradually merged in the large membranous cup that subtends the flowers, while the stipules suffer no diminution. The same circumstance may be observed in several Brazilian *Cinchonads* allied to *Psychotria barbiflora*, and in *Pæderia fetida*. It is also possible that the large coloured involucrem of *Cephaëlis* is, at least in some cases, formed by the excessive development of stipules and suppression of the leaves, for such is undoubtedly the case in a Sierra Leone plant in my possession, which I presume is the little-known *C. bidentata* of Thunberg. These facts render it more probable than ever that *Stellates* and *Cinchonads* are essentially different Natural Orders; for they would seem to show that while the first has verticillate foliaceous organs, the most imperfect of which have the greater tendency to disappear, the second has verticillate foliaceous organs, the most perfect of which have the greater tendency to become abortive. I need scarcely add, that after a full consideration of this point I retain my original conviction, that the apparent leaves of *Stellates* are really leaves, and not stipules, and that the Order is as distinct from *Cinchonads* as *Nightshades* from *Figworts*, *Verbenes* from *Labiates*, and I might even add, as *Cinchonads* themselves from *Umbellifers*.—See *Bot. Reg.* 1838. 55. To be consistent, then, we must either combine *Caprifoliis* with *Cinchonads*, or we must preserve *Stellates* separate. Properly speaking, the appellation *Rubiaceæ* should be confined to the latter group, as it comprehends the genus *Rubia*; but that name has been so generally applied to the larger mass now comprehended under the name of *Cinchonads*, that I find it better to abolish that of *Rubiaceæ* altogether.

Natives of the northern parts of the northern hemisphere, where they are extremely common weeds, and of high mountainous regions in Peru, Chili, and Australasia.

First among them stands *Madder*, the root of *Rubia tinctoria*, one of the most important dyes with which we are acquainted; a quality in which other species of *Stellates* participate in a greater or less degree. The roots of *Rubia cordifolia* (*Munjista*, *Roeb.*) yield the *Madder* of Bengal, and form even an article of the export commerce to Europe, under the name of *Munjeeth*. *Rubia angustissima*, from Tong Dong, has also highly-coloured roots, and *Rubia Relboun* is the *Madder* of Chib. It has been remarked

that the whole system of animals fed on Madder becomes stained red in consequence. Madder, in addition to its valuable dyeing qualities, passes for a tonic, diuretic, and emmenagogue. The torrefied grains of Galium are said to be a good substitute for coffee. The flowers of Galium verum are used to curdle milk. An infusion of Asperula cynanchica has a little astringency, and has been used as a gargle. Asperula odorata, or Woodruff, is remarkable for its fragrance when dried; it passes for a diuretic. Rubia noxa is said to be poisonous. M. Miergues, a French physician, states that he has cured epilepsy with the extract of Galium rigidum, by employing it in doses of twelve grammes for an adult; and he adds that G. Mollugo has been used with success in the same malady.

GENERA.

Vaillantia, DC.	Aspera, Mönch.	Rubia, Tournef.	Asperula, L.
Valantia, Tournef.	Eyselia, Neck.	Crucianella, L.	Karamyschewia, Fisch.
Callipeltis, Stev.	Aparine, Tournef.	Rubcola, Mönch.	Sherardia, Dill.
Cucullaria, Buxb.	Cruciata, Tournef.	Laxmannia, S.G. Gmel.	Dillenia, Heist.
Galium, L.			

NUMBERS. GEN. 8. Sp. 320.

POSITION.—Cinchonaceæ.—*Cornaceæ.*
 GALIACEÆ.—*Apiaceæ.*

ALLIANCE LV. *UMBELLALES*.—THE UMBELLAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with dichlamydeous polypetalous flowers, solitary large seeds, and a small embryo lying in a large quantity of albumen.*

The combination of a polypetalous corolla, an inferior fruit, and solitary seeds chiefly consisting of albumen, constitute the distinctive character of this Alliance, whose Orders can by no means be separated, whatever mode of general distribution a Botanist may employ. In fact, Umbellifers differ from Ivyworts in nothing except their peculiar epigynous disk, and didymous fruit. Ivyworts are hardly distinguishable from Cornels, if we neglect the opposite leaves and tetramerous flowers of the latter; and from Witch Hazels there is little to separate Cornels, except the valvate corolla and exstipulate leaves of the latter; finally, Bruniads rely for their definition more upon their want of stipules, and anthers turned outwards than on anything else.

If we look to the affinities of this Alliance, we shall again have an instance of a most natural group being so touched at all points of its circumference that it may be almost regarded as a peculiar centre of organisation, from which many other groups diverge.

Thus, in a direct line, Umbellifers touch Stellates on the one hand, and Ivyworts on the other, as is elsewhere explained. Then in lateral affinity we have Umbellifers closing in upon Crowfoots, and stretching towards Saxifrages, Ivyworts almost invading the territory of Vineworts and Caprifolds, Cornels owing their position as a distinct Order, rather than as a mere group of Garryads or Alangiads? chiefly to their unisexual dichlamydeous flowers on the one hand, and their valvate corolla on the other. Witch Hazels have, no doubt, a strong relationship to Mastworts (*Corylaceæ*) on the one hand, and Hippurids on the other, and finally, the affinity of Bruniads to Myrtleblooms is sufficiently shown in speaking of their Natural Order; so that the following may be taken as a representation of the way in which the Natural Orders of Umbellals stand with respect to others.

Galiaceæ.

<i>Saxifragaceæ</i>	<i>Apiaceæ</i>	<i>Ranunculaceæ,</i>
<i>Caprifoliaceæ</i>	<i>Araliaceæ</i>	<i>Vitaceæ.</i>
<i>Alangiaceæ</i>	<i>Cornaceæ</i>	<i>Garryaceæ.</i>
<i>Haloragaceæ</i>	<i>Hamamelidaceæ</i>	<i>Corylaceæ.</i>
<i>Rhamnaceæ</i>	<i>Bruniaceæ.</i>	<i>Myrtaceæ.</i>

Santalaceæ.

NATURAL ORDERS OF UMBELLALS.

<i>Fruit didymous, with a double epigynous disk</i>	296. APIACEÆ.
<i>Fruit not didymous, without a double epigynous disk, 3- or more-celled. Pentamerous flowers. Corolla valvate. Leaves alternate, without stipules. Anthers turned inwards, opening lengthwise</i> }	297. ARALIACEÆ.
<i>Fruit not didymous, without a double epigynous disk, 2- or more-celled. Tetramerous flowers. Corolla valvate. Leaves opposite, without stipules</i> }	298. CORNACEÆ.
<i>Fruit not didymous, without a double epigynous disk, 2-celled. Corolla imbricated. Leaves alternate, with stipules. Anthers with deciduous valves</i> }	299. HAMAMELIDACEÆ.
<i>Fruit not didymous, without a double epigynous disk, 3- (or 1-) celled. Corolla imbricated. Leaves alternate, without stipules. Anthers turned outwards, opening lengthwise</i> . . }	300. BRUNIACEÆ.

ORDER CCXCVI. APIACEÆ.—UMBELLIFERS.

Umbelliferae, *Juss. Gen.* 218. (1789; *Koch in N. Act. Bonn.* 12. 73.; *DC. Mémoire* (1829); *DC. Prodr.* 4. 55.; *Tausch. in Bot. Zeit.* (1834); *Ann. Sc. n. s.* 4. 41.; *Endl. Gen.* cxlii.; *Meisner, Gen.* 139. — Umbellaceae, *Lindl. Key,* No. 11, (1835).

DIAGNOSIS.—*Umbellal Exogens, with didymous fruit, and a double epigynous disk.*

Herbaceous plants, often milky, with solid or fistular furrowed stems. Leaves usually divided, sometimes simple, sheathing at the base, occasionally with close simple parallel

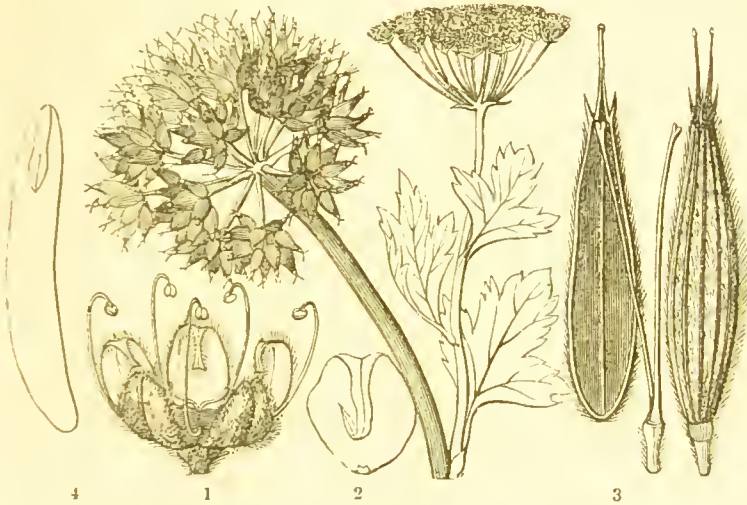


Fig. DX.

veins. Flowers in umbels, white, pink, yellow, or blue, generally surrounded by an involucre. Calyx superior, either entire or 5-toothed. Petals 5, inserted on the outside of a fleshy epigynous disk; usually inflexed at the point; aestivation imbricate, rarely valvate. Stamens 5, alternate with the petals, incurved in aestivation. Ovary inferior, 2-celled, with solitary pendulous ovules crowned by a double fleshy disk; styles 2, distinct; stigmas simple. Fruit consisting of 2 carpels, separable from a common axis, to which they adhere by their face (the commissure); each carpel traversed by elevated ridges, of which 5 are primary, and 4, alternating with them, secondary; the ridges are separated by channels, below which are often placed, in the substance of the pericarp, certain linear receptacles of coloured oily matter called vittæ. Seed pendulous, usually adhering inseparably to the pericarp, rarely loose; embryo minute, at the base of abundant horny albumen; radicle pointing to the hilum.



Fig. DXI.

If Botanists form their ideas of an Umbellifer from the ordinary appearance of such plants in Europe, they will have a very imperfect idea of the singular forms which the genera sometimes assume, unless they take *Hydrocotyle*, *Astrantia*, and *Eryngium* as the chief objects of consideration. Instead of the herbaceous and often fistular stem, they become solid branched bushes; for compound umbels, panicles and racemes are substituted (as in *Horsfieldia*), and the little involucre, which we almost overlook, become the most conspicuous part of the whole structure. Take, for example, on the one hand, the singular *Leucobena rotundifolia*, with its great white 3-lobed plates surrounding the flowers, and on the other the not less singular *Bolax glebaria*, whose tufts of close entangled shoots are described as resembling haystacks, and which D'Urville tells us might deceive the most

Fig. DX.—*Athamanta cervariaefolia*. 1. a separate flower, with hairy petals; 2. a petal by itself; 3. a ripe fruit with the two carpels or mericarps separating from the double carpel axis; 4. a seed deprived of its integuments, and divided vertically, so as to show the position of the embryo.

Fig. DXI.—Flower of *Angelica*.

experienced eye, so much are they at variance with the usual structure of Umbellifers

In all these cases, however, the very peculiar condition of the flower and fruit is abundantly sufficient to mark the Order. Indeed we have no knowledge of any one group so entirely free from deviations from the typical structure, ex-



Fig. DXII.



Fig. DXIII.

cept in accidental monsters. Of these I once found an instance, at Burnham Priory, near Maidenhead, in which the calyx was detached from the ovary, which had become superior, the calyx surrounding it loosely like a 5-toothed ribbed cup. This is quite inconsistent with the theory of Selykoffsky, who assumes that in Umbellifers the calyx proceeds really from the same point as the styles.—*Bot. Reg.* 1841. *Misc.* 35.

It is also stated that in some accidental cases 3 carpels have been found. In *Eryngium* and some *Bupleurums* the leaves consist of nothing but petiole, and thus present the appearance of Endogens. Among the more remarkable facts connected with the structure of the fruit are, 1, the separation of it when ripe into 2 carpels or mericarps, adhering to a stylopod or forked placenta, eventually exterior to the carpels themselves, although in the beginning it must have been included between their confluent margins, between which it rose till near the summit of the cavity, when it turned inwards to bear the solitary ovules; and 2, the presence in the pericarp of fistular passages filled with oil; the latter are no doubt analogous to the cysts of Orange and other leaves, and to the glands of Labiates and some Composites, but they are remarkable for a uniformity in position and number, which, although not absolute, is nevertheless very different from the indefinite nature of common cysts.

Umbellifers differ from Ivyworts in their seed adhering to the pericarp, in their imbricated corolla, and in the two divisions into which their dry fruit always resolves itself eventually. Ivyworts, on the contrary, have a loose seed, a valvate corolla, and more divisions of their succulent fruit than two. The genus *Horsfieldia*, however, forms a complete transition, having the valvate corolla of Ivyworts and their peculiar habit, with the dimerous dry fruit and adherent seed of Umbellifers. As to their other affinities it may be remarked, that they completely represent in the epigynous sub-class the Crowfoots among hypogynous Exogens; some *Thalietrums* indeed would make pretty good Umbellifers, if their calyx adhered to the side of the ovary. They approach Stellates in their didymous inferior fruit and copious albumen, but they are universally polypetalous. With *Saxifrages* Umbellifers agree in habit, if *Hydrocotyle* is compared with *Chrysosplenium*, and if the sheathing and divided leaves of the two Orders are considered. To *Cranesbills* De Candolle remarks that Umbellifers are allied, in consequence of the cohesion of the carpels around a woody axis, and of the umbellate flowers which grow opposite the leaves, and also because of the affinity of *Cranesbills* to Vines, and of the latter to Ivyworts, is not to be doubted. The resun-

Fig. DXII.—*Leucolæna rotundifolia*.—Hooker.Fig. DXIII.—*Bolax glebaria*.—Hooker.

blance of Umbellifers to Cranesbills is however very feeble. Endlicher compares them, and justly, to Cornels; in fact, the little *Cornus suecica*, and the whole genus *Benthamina*, have exactly the involucre and inflorescence of Umbellifers, in addition to their other points of resemblance.

The arrangement of this Order has only within a few years arrived at any very definite state, the characters upon which genera and tribes could be formed having been for a long while unsettled; it is, however, now generally admitted that the number and development of the ribs of the fruit, the presence or absence of reservoirs of oil called vittæ, and the form of the albumen, are the leading peculiarities which require to be attended to. Upon this subject see Koch's *Dissertation*, Lagasea in the *Otiosas Espanolas*, and De Candolle's *Mémoire*, especially the last. The classification of De Candolle has, however, been criticised by Tausch, in the places above quoted, who asserts that the albumen is a fallacious guide. He says that some species of *Bupleurum* are campylopermous, and others orthospermous, and that the same is true of many other genera. He adds, that in *Hasselquistia* the fruit of the ray is orthospermous, while that of the disk is œolospermous. The arrangement which this author proposes to substitute has not yet been examined critically. It must, however, be obvious to every experienced Botanist that the genera and tribes are alike unsatisfactory, and that the arrangement of Umbellifers upon sound principles still remains to be achieved.

Natives chiefly of the northern parts of the northern hemisphere, inhabiting groves, thickets, plains, marshes, and waste places. They appear to be extremely rare in all tropical countries, except at considerable elevations, where they gradually increase in number as the other parts of the vegetation acquire an extra-tropical, or mountain character. Hence, although they are hardly known in the plains of India, they abound on the mountains of the Himalaya. They are, however, not uncommon in the southern hemisphere, where they belong principally to Hydrocotylids and Mulinids.

The Umbelliferous is one of those large Orders in which plants occur with extremely different secretions. They all appear to form three different principles: the first a

watery acrid matter, the second a gum-resinous milky substance, and the third an aromatic oily secretion. When the first of these predominates they are poisonous; the second in excess converts them into stimulants; the absence of the two renders them useful as esculents; the third causes them to be carminatives and pleasant condiments. A vast number of species are referred by writers to one or other of these categories. Without pretending to go into any detailed enumeration of the qualities, real or asserted, of the endless species at one time or other used by man, (for which the reader must consult Endlicher's *Enchiridion*, Geiger's *Handbuch*, the works of Nees v. Esenbeck and Ebermaier, and



Fig. DXIV.



Fig. DXIV.—*Archangelica officinalis*.

others), the following brief enumeration will sufficiently explain the purposes to which Umbellifers are applicable :—

Of the harmless species, in which, with a little aroma, there is no considerable quantity of aerid watery matter or gum-resinous secretion, must be more particularly named Celery, Fennel, Samphire, Parsley, and the roots of Carrots, Parsnips, and Skirrets (*Sium Sisarum*). In addition to these, with which everybody is familiar, the following plants more particularly deserve mention as esculents:—The root of *Eryngium campestre* and *maritimum*, vulgarly called Eryngo, is sweet, aromatic, and tonic. Boerhaave reckons it as the first of aperient diuretic roots. It has been recommended in gonorrhœa, suppression of the menses, and visceral obstructions, particularly of the gall-bladder and liver; it has also the credit of being a decided aphrodisiac. A good deal of it is sold in a candied state. The roots of *Meum athamanticum* and *Mutellina* are aromatic and sweet, and form an ingredient in the compound called Venice treacle. Angelica root, belonging to *Archangelica officinalis*, is fragrant, bitterish, pungent, sweet when first tasted, but leaving a glowing heat in the mouth. The Laplanders extol it not only as food but medicine. In coughs, hoarseness, and other pectoral disorders they eat the stalks roasted in hot ashes; they also boil the tender flowers in milk till it attains the consistence of an extract, which they use to promote perspiration in catarrhal fevers, and to strengthen the stomach and bowels in diarrhœa. It is sold in the shops in a candied state, and was once an inhabitant of every country garden. Chervil, an old-fashioned pot-herb, with eatable roots, is the *Anthriscus Cerefolium*. *Smyrnium Olusatrum*, or Alexanders, was formerly cultivated instead of Celery; its leaves have a slight and pleasant aromatic flavour. The tubers of *Bunium ferulaceum* are eaten in Greece under the name of Topana. Samphire (*Critlmmum maritimum*) is one of the best of all ingredients in pickles. *Carum Bulbocastanum*, the Pignut of the English, is quite wholesome, as are also the tubers of *Cenanthe pimpinelloides*. *Anesorhiza capensis* and *Pœniculum capense* are both Cape esculents. *Arracacha esculenta*, an inhabitant of the table-land of Grenada, has large esculent roots resembling a Parsnip in quality, but better. Finally, *Prangos pabularia*, a herbaceous plant inhabiting the arid plains of Southern Tartary, and the adjoining provinces, has a great reputation as a sheep food, which it appears not to deserve. Dr. Royle thinks that it may have been one of the kinds of Sylphion of the Greeks—that described by Arrian as growing only with Pines on Paropamisus, where it was browsed on by numerous flocks of sheep and cattle. Lieut. Burnes, crossing in the direction of Alexander's route, found this in the same situation, greedily cropped by sheep, and even eaten by his fellow-travellers. The natives of the north of Asia esteem highly the skinned root of the sweet subacrid *Heracleum Sphondylium*.

Among the gum-resinous species those yielding *Asafœtida* hold the first rank. The fetid odour of these plants is supposed to be owing to sulphur in combination with their peculiar essential oil. *Asafœtida* is the milky juice of various species of *Ferula* inhabiting Persia and neighbouring countries. Of these *F. Asafœtida* is the plant described by Kæmpfer (*Aman. Exot.* 535); but *F. persica* and others are no doubt also the origin of the drug. Griffith was of that opinion (*Ann. N. Hist.* X. 193); and the fruits sent home to me by Sir John McNeill prove the fact.—See *Fl. Med.* No. 100. Burnes found *Asafœtida* plants on the mountains of the Hindoo Koosh regarded as a highly nutritious sheep-food. The *Asaduleis*, or *Laser Cyrenaicum*, was yielded by a *Thapsia*, and probably *Thapsia garganica*. This drug was in high reputation among the ancients for its medical uses; it had miraculous powers assigned to it; to neutralise the effects of poison, to cure envenomed wounds, to restore sight to the blind, and youth to the aged, were only a part of its reputed properties; it was also reckoned antispasmodic, deobstruent, diuretic, &c., &c. So great was its reputation, that the princes of Cyrene caused it to be struck on the reverse of their coins; and the Cyrenean doctors were reckoned among the most eminent in the world. Its value was estimated by its weight in gold. The plants appear to be in reality very active purgatives. Galbanum, another fetid gum-resin, has been referred to *Galbanum officinale*, a Syrian plant; but it has been demonstrated to owe its origin to another Umbellifer, the *Opoidia galbanifera*, a Persian plant.—See *Bot. Reg.* 1839, *Misc.* 107. Martius, however, and others maintain that this *Opoidia* yields the Persian Galbanum only, and that it is really the produce of different Umbellifers. *Opopanax* is the concrete juice of *Opopanax Chironum*, a plant resembling a Parsnip, and inhabiting the Levant. *Ammoniacum* has a more doubtful origin; a Persian sort has been made out to be derived from *Dorema Ammoniacum*, but as Dioscorides says that his plant *γεννᾶται ἐν Λιβύῃ κατὰ Ἀμμωνίαν*, it was probably derived from *Ferula orientalis*, which still furnishes a drug of the kind in the kingdom of Morocco. The origin of *Sagapenum*, a drug between Galbanum and *Asafœtida*, is not ascertained with certainty; it is thought to be derived from either *Ferula persica* or *F. Szowitsiana*. Secretions of a similar nature are yielded by *Bolax glebaria*, a curious beehive-shaped plant, in southern Chile; *Peucedanum*

montanum, whose root abounds in a white, bitter, fetid juice, employed in Courland against epilepsy; *Heracleum gummiferum*, *Bubon Galbanum*, *Laserpitium glabrum*, whose root is violently purgative and even caustic; *Daucus gummifer*, which furnished the Sicilian *Bdellium* of the old Pharmacopœias, &c., &c. The Persian Musk root (*Radix Sumbul*), used as a protection against mephitic vapours, and having a very powerful smell of musk, is stated by MM. Reinsch and Buclmer to belong to some large plant of this Order.—*Chem. Gaz.* 1844. 68.

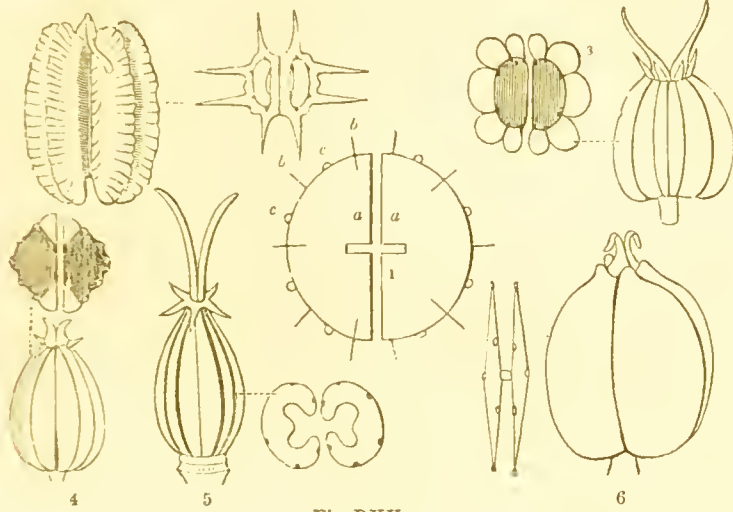


Fig. DXV.

For their aromatic and carminative fruits the most celebrated are Anise (*Pimpinella Anisum*), Dill (*Anethum graveolens*), Caraway (*Carum Carui*), and Coriander (*Coriandrum sativum*). Besides these, great numbers of less note are also employed for the same reason, the chief of which are the Ajwains or Ajowains of India (species of *Ptychotis*), Honewort (*Sison Amomum*), whose fruits smell of bugs, and Cummin (*Cuminum Cyminum*), now only used in veterinary practice.

Of the poisons, Conium or Hemlock holds the first place. This is a powerfully narcotico-acrid plant, occasioning stupor, delirium, palsy, and asphixia; some authors state that it produces death in the most dreadful convulsions, but this is at variance with the accounts of Dr. Christison and Dr. Pereira. *Anthriscus vulgaris* and *sylvestris* are reputed to have the same kind of action, but not so dangerous. The leaves of *Æthusa Cynapium* are poisonous, producing nausea, vomiting, headache, giddiness, drowsiness, spasmodic pain, numbness, &c. *Enanthe crocata* and *Phellandrium* are perhaps the most dangerous of the narcotico-acrid Umbellifers; the roots are often eaten, with fatal consequences, by poor people who mistake them for Parsnips. A violent poison resides in the roots of *Cicuta maculata*; a drachm of the fresh root has killed a boy in an hour and a half; and in America fatal accidents arising from its being mistaken for other Umbellifers are not uncommon. It has been used as a substitute for Conium, with similar effect, except that it is more energetic. *Cicuta virosa*, in like manner, is a highly dangerous plant, producing effects similar to those of hydrocyanic acid. It causes true tetanic convulsions in frequent paroxysms, and death on the third day. Haller considered it the Conium of the Greeks. It appears to be fatal to cattle. From the roots of *Lichtensteinia pyrethrifolia* the Hottentots prepare an intoxicating beverage.

Fig. DXV.—1. Is an ideal plan of a fruit divided transversely; *a a* is the commissure, or plane of contact of the mericarps; *b b* primary ridges; *c c* secondary ridges. 2. Is a view of the back and section of the fruit of *Laserpitium Siler*; each mericarp has the secondary ridges winged, the primary obsolete; there are two vittæ on the commissure, and one under each secondary ridge; these vittæ, which are cavities containing oil, are represented by dots; the albumen is solid. 3. *Sclerosciadium humile*; the primary ridges are corky; there are no secondary ridges; the vittæ alternate with the primary ridges, and there is one at each edge of the commissure; the albumen is solid. 4. *Discopleura capillacea*; there are 5 very small primary ribs, the two lateral of which are in contact with a thickened accessory margin; there are 2 vittæ on each face of the commissure, and one between each primary ridge; the albumen is solid. 5. *Echinophora spinosa*; albumen involute; vittæ alternate with the primary ridges. 6. Compressed fruit of *Diposis sancicula-folia*; the commissure is very narrow; there are 5 minute primary ridges; one along the back, one along each edge, and two on the inflexed side; the albumen is solid.

GENERA.

I. HYDROCOTYLIDÆ.

Hydrocotyle, *Tournef.*
Chondrocarpus, Nutt.
Glyceria, Nutt.
Centella, Linn.
Solandra, Linn. fil.
Crantzia, Nutt.
Cesia, Endl.
Dimetopia, DC.
Erigenia, Nutt.
Micropleura, Lagasc.
Didiscus, DC.
Illegelia, Reichenb.
Pritzelia, Walpers.
Trachymene, *Rudge.*
Azorella, Labill.
Fischera, Spreng.
Catepha, Leschen.
Astrotricha, DC.
Leucolenna, R. Br.
Xanthosia, Rudg.
Cruciella, Leschen.
Pentapetis, Endl.
Scheuchlana, Bunge.
Bowlesia, Ruiz et Pav.
Azorella, Lam.
Chamitis, Soland.
Stiebera, Reichenb.
Fragosa, Ruiz et Pav.
Pectophytum, H. B. K.

II. MULINIDÆ.

Bolax, *Commers.*
Mulinum, Pers.
Asteriscium, Cham.
Cassiodocarpus, Presl.
 ? *Dipterygia*, Presl.
Elsneria, Walp.
Laretia, Gill. et Hook.
Drusa, DC.
Huanaea, Cav.
Homalocarpus, Hook. et Arn.
Diposis, DC.
Spanianthe, Jacq.
Pozon, Lagasc.
Schizilema, Hook. f.

III. SANICULIDÆ.

Actinotus, Labill.
Eriocalia, Smith.
Proustia, Lagasc.
Holotome, Benth.
Petagnia, Guss.
Heterosciadium, DC.
Klotschia, Cham.
Sanicula, *Tournef.*
Hacquetia, Neck.
Dondia, Spreng.
Dondisia, Reichenb.
Astrantia, *Tournef.*
Actinolema, Fenzl.
Alepidea, *Laroch.*
Eryngium, *Tournef.*
Lessonia, Bert.
Strebanthus, Raf.
Horsfieldia, Blum.
Schubertia, Blum.
Actianthus, Ehrenb.
Hohenackeria, Fisch. et Mey.

IV. AMMINIDÆ.

Rumia, Hoffm.
Cicuta, Linn.
Zizia, Koch.
Snyrium, Fil.
Thaspium, Nutt.
Apium, Hoffm.
Oreosciadum, DC.
Petroselinum, Hoffm.

Wyleria, DC.
Trima, Hoffm.
Apinella, Neek.
Spüßmannia, Guss.
Helosciadium, Koch.
Callistroma, Fenzl.
Elæosticta, Fenzl.
Sium, Adams.
Maucharbia, Neck.
Cyclosperrum, Lagasc.
Trachysciadium, DC.
Discopleura, DC.
Ptilimnium, Raf.
Leptocaulis, Nutt.
Spermolepis, Raf.
Ptychotis, Koch.
Microsciadium, Boiss.
Gymnosciadium, Hochst.
Bunium, Lagasc.
Amnoides, Adams.
Trachyspermum, Link.
Ammios, Mönch.
Heterocryptia, DC.
Critanum, Bess.
Falcaria, Rivin.
Drepanophyllum, Hfn.
Prionitis, Delarbr.
Iludniacka, Reichenb.
Sison, Lagasc.
Schultzia, Spreng.
Amul, *Tournef.*
Visnaga, Gärtn.
Gohoria, Neck.
Ægopodium, Linn.
Podagraria, Rivin.
Carum, Koch.
Elwendia, Boiss.
Synpodium, Koch.
Bubocastum, Adams
Lomatocarpum, Fisch.
Buium, Koch.
Comopodium, DC.
 ? *Derinya*, Adams.
Chamæscidium, C. A. M.
Cryptotenla, DC.
Lereschia, Boiss.
Cytospermum, Raf.
 ? *Alacospermum*, Neck.
Pimpinella, Linn.
Tragoselinum, *Tournef.*
Pimpinella, Spreng.
Tragium, Spreng.
Ledeburia, Link.
Anisum, Adams.
Reutera, Boiss.
Berula, Koch.
Sium, Koch.
Ridolfia, *Moric.*
Muretia, Boiss.
Sisarum, Adams.
Bupleurum, *Tournef.*
Agostana, Salisb.
Diaphyllum, Hoffm.
Isophyllum, Hoffm.
Tenoria, Spreng.
Buprestis, Spreng.
Odonites, Spreng.
Diatropa, Dumort.
Trachypleurum, Rehb.
 ? *Orimaria*, Raf.
Atenia, Hook. et Arn.
 ? *Edosmia*, Nutt.
Neurophyllum, Torr.
Heteromorpha, Cham.
Pururohrin, Koch.

V. SESELINIDÆ.

Lichtensteinia, Cham.
Otton, H. B. K.
Gnanthe, Lam.
Phellendrium, Linn.
Haplosciadium, Hochst.

Platysacc, Bunge.
Chamaera, Eckl. et Zeyh.
Anesoriiza, Cham. et Schl.
Anisopleura, Fenzl.
Sclerosciadium, Koch.
Dasyloma, DC.
Cynosciadium, DC.
Æthusa, Linn.
Fœniculum, Adams.
Kundmannia, Scop.
Brignolia, Bertolon.
Campderia, Lagasc.
Deverra, DC.
Pithyranthus, Viv.
Eremocarpus, Bunge.
Soranthus, Ledeb.
Eriocyela, Lindl.
Todarona, Parl.
Seseli, Linn.
Hippomarathrum, Riv.
Marathrum, Raf.
Musicon, Raf.
Elæochytris, Fenzl.
Polygyrtus, Schlecht.
Polenannia, Eckl. et Zyh.
Libanotis, *Crantz.*
Athamantha, Scop.
Eriotis, DC.
Natardia, Meisn.
Petitia, Gay.
Cenolophium, Koch.
Dethawia, Endl.
Wallrothia, DC.
Cnidium, Guss.
Scinnum, Lagasc.
Hymenidium, Lindl.
Thaspium, Nutt. DC.
Trochiscanthus, Koch.
Athamantha, Koch.
Tinguarra, Parl.
Turbith, Tausch.
Libanotis, Scop.
Ligusticum, Linn.
Anisopleura, Fenzl.
Aciphylla, Forst.
Anisotome, Hook. f.
Gingidium, Forst.
Trachidium, Lindl.
Silaus, Bess.
Meum, *Tournef.*
Endressia, Gay.
Neogyna, Meisn.
Gaya, Gaud.
Pachypleurum, Reich.
 ? *Arpittum*, Neck.
Conoselinum, Fisch.
Czernawia, Turcz.
Crithmum, *Tournef.*

VI. PACHYPLEURIDÆ.

Kruberia, Hoffm.
Ulospermum, Link.
Capnophyllum, Lagasc.
Pachypleurum, Ledeb.
Phloiodicarpus, Turcz.
Stenocœlium, Ledeb.

VII. ANGELICIDÆ.

Levisticum, Koch.
Ligusticum, Lagasc.
Uloptera, Fenzl.
Heteroptilis, E. Meyer.
Gomphopetalum, Turcz.
Selinum, Hoffm.
Mylinum, Gaud.
Thyselimum, Adams.
Carvifolia, Vaill.
Oterricum, Hoffm.
Anelica, Hoffm.
Areliangelica, Hoffm.
Uloptera, Fenzl.

VIII. PEUCEDANIDÆ.

Opopanax, Koch.
Ferula, *Tournef.*
Ferulago, Koch.
 ? *Lomatium*, Raf.
Cogsuelicia, Schlult.
Polycyrtus, Schlecht.
Dorema, Don.
Eriosynaphe, DC.
Peucedanum, Linn.
Palœmbia, Bess.
Pteroselinum, Reichb.
Selinum, Gärtn.
Caroselinum, Grise.
Thyselimum, DC.
Cervaria, Gärtn.
Oreoselinum, Duby.
Imperatoria, Linn.
Euryptera, Nutt.
Leptotaenia, Nutt.
Xanthogalum, Lohem.
Sciotohamus, Endl.
Dregea, Eckl. et Zeyh.
Cynorrhiza, Eckl. et Zyh.
Lefeburla, A. Rich.
Callisace, Fisch.
Bubon, Linn.
Gabbanophora, Neck.
Agastilis, Spreng.
Anethum, *Tournef.*
Cortin, DC.
Hammatocaulis, Tausch.
Capnophyllum, Gärtn.
Rumia, Link.
Tiedemaunia, DC.
Oxyptis, Raf.
Archimora, DC.
Lophotœnia, Griseb.
Pastiuca, *Tournef.*
Malabaila, Hoffm.
Lciotulus, Ehrenb.
Astydamia, DC.
Synphyloloma, C. A. Mey.
Stenotaenia, Boiss.
Heracleum, Linn.
Sphondylium, *Tournef.*
Tetratenium, DC.
Carmelia, DC.
Wendtia, Hoffm.
Trichogonium, DC.
Barysona, Bunge.
Zozimia, Hoffm.
Ducrosia, Boiss.
Trigonosciadium, Boiss.
Polytenia, DC.
Eurytenia, Nutt.
Johrcula, DC.
Diplotœnia, Boiss.
Hasselquistia, Linn.
Ainsworthia, Boiss.
Tordylium, *Tournef.*
Condylocarpus, Hoffm.
Syneleosciadium, Boiss.
Tordyliopsis, DC.
Tordylioides, Wall.

IX. SILEPIDÆ.

Agastilis, Hoffm.
Siler, Scop.
Bradleia, Neck.
Galbanum, Don.
Ormosolenia, Tausch

X. CUMINIDÆ.

Cuminum, Linn.
Froriepin, Koch.
Trepocarpus, Nutt.

XI. THAPSIDÆ.

Thapsium, *Tournef.*
Cymopterus, Raf.

Thapsia, Nutt.
Phyllopterus, Nutt.
Leptocnemia, Nutt.
Ptericia, Nutt.
Polylophium, Boiss.
Laserpitium, Tournef.
Siler, Mönch.
Lophosciadium, DC.
Melanoselinum, Hoffm.

XII. DAUCIDÆ.

Artedia, Linn.
Orlaya, Hoffm.
Daucus, Tournef.
Agrocharis, Hochst.
Dariaea, Boiss.
Priatyspermum, Hoffm.
Anisactis, DC.

XIII. ELÆOSELINIDÆ.

Elæoselinum, Koch.
Margotia, Boiss.

XIV. CAUCALINIDÆ.

Szovitsia, Fisch. et Mey.
Caucalis, Linn.
Turgenia, Hoffm.
Torilis, Adans.
Turgeniopsis, Boiss.
Lisæa, Boiss.
Trichocarpæa, DC.

XV. SCANDICIDÆ.

Scandix, Gärtn.
Wylia, Hoffm.
Anthriscus, Hoffm.
Chærophyllum, Lagasc.
Cerxifolium, Trall.
Chærophyllum, Linn.
Butinia, Boiss.
Oreomyrrhis, Erndl.
Caldasia, Lagasc.
Sphallerocarpus, Bess.
Molopospermum, Koch.
Yelæa, DC.
Tauschia, Schlecht.
Myrrhis, Scop.
Freyera, Reichenb.
Biasolettia, Koch.
Osmorrhiza, Raf.
Uraspermum, Nutt.
Spermatura, Reichenb.
Glycosma, Nutt.
Grammosciadium, DC.
Rhabdosciadium, Boiss.
Ozodia, Wright et Arn.
Heterotænia, Boiss.

XVI. SMYRNIDÆ.

Lagoëcia, Linn.
Oliveria, Vent.
Aniosciadium, DC.
Pycnocycla, Royle.

Echinophora, Tournef.
Dicyclophora, Boiss.
Theocarpus, Boiss.
Exoacantha, Labill.
Aretopus, Linn.
Apradus, Adans.
Cachrys, Tournef.
Ægomarathrum, Koch.
Hippomarathrum, Lk.
Lophocachrys, DC.
Praugos, Lindl.
Pteromarathrum, Kch.
Colladonia, DC.
Perlebia, DC.
Meliocarpus, Boiss.
Heptaptera, Reutt.
Lecokia, DC.
Magydaris, Koch.
Eriocachrys, DC.
Hermas, Linn.
Petrocarui, Tausch.
Couium, Linn.
Cicuta, Tournef.
Vicatia, DC.
Arracacha, Bancr.
Pentacrypta, Lchm.
Pleurospermum, Hoffm.
Celopleurum, Ledeb.
Hansenia, Turcz.
Physospermum, Vel.
Enymonospermum, Sp.
Malabaila, Tausch.
Iladnickia, Koch.

Graffa, Reichenb.
Pleutherospermum, Kch.
Hymenolæna, Wall.
Aulacospermum, Ledeb.
Physospermum, Cass.
Danaa, Allion.
Henslera, Lagasc.
Keramocarpus, Fenzl.
Opoidia, Lindl.
Smyrniium, Linn.
Smyrniopsis, Boiss.
Anosmia, Bernh.
Perideridia, Reichenb.
Eulophus, Nutt.
Cynapium, Nutt.
Deweya, Torr. et A. Gr.
Museumium, Nutt.
Scaligeria, DC.

XVII. CORIANDRIDÆ.

Cymbocarpum, DC.
Ormosciadium, Boiss.
Bifora, Hoffm.
Biforis, Spreng.
Corion, Link.
Anidrium, Neck.
Schrenkia, Fisch.
Astonæa, Reichenb.
Astonæa, DC.
Cryptodiscus, Schrenck.
Atræna, DC.
Coriandrum, Linn.
Apiastrum, Nutt.

NUMBERS. GEN. 267. Sp. 1500.

Ranunculacææ.

POSITION.—Araliacææ.—APIACEÆ.—Hamamelidacææ.

Saxifragacææ.

ORDER CCXCVII. ARALIACEÆ.—IVYWORTS.

Araliæ, *Juss. Gen.* 217. (1789).—*Araliaceæ*, *A. Richard in Dictionnaire Classique d'Histoire Naturelle*, 1. 506. (1822); *DC. Prodr.* 4. 251. (1830); *Bartling Ord. Nat.* 237. (1830); *Endl. Gen.* clxiii.; *Wight Illustr.* 2. t. 118.

DIAGNOSIS.—*Umbellal Exogens*, with a 3- or more-celled fruit without a double epigynous disk, pentamerous flowers, a valvate corolla, alternate leaves without stipules, and anthers turned inwards, opening lengthwise.

Trees, shrubs, or herbaceous plants, with in all respects the habit of Umbellifers. Calyx adherent, entire or toothed. Petals definite, 2, 5, 10, deciduous, valvate in æstivation, occasionally 0. Stamens equal in number to the petals or twice as many, arising from within the border of the calyx, and from without an epigynous disk. Ovary inferior, with more cells than 2; ovules solitary, pendulous, anatropal; styles equal in number to the cells, sometimes connate; stigmas simple. Fruit succulent or dry, consisting of several 1-seeded cells. Seeds solitary, pendulous, adhering to the pericarp; albumen fleshy, having a minute embryo at the base, with its radicle pointing to the hilum.

In many respects these plants are much like Umbellifers, from which they are distinguished by their ovary having more cells than 2, and by their greater tendency to form a woody stem; to this may also be in general added a valvate corolla; but *Didiseus* is valvate among Umbellifers, and *Adoxa* in Ivyworts is not. There is also a connection with Caprifoliæ, established by means of *Hedera* and *Viburnum*. Vineworts, too, may be considered a mere hypogynous form of Ivyworts, and must be regarded as representing them in the hypogynous sub-class, as will be most evident if *Aralia racemosa* is compared with certain species of *Cissus*. *Gunnera*, a singular genus with dimerous ♂ ♀ or ♀ flowers, and a single ovule suspended from the apex of the cavity, seems to be a degraded form of this Order, and the genus *Adoxa* is also quite anomalous, though in a different way. Its stamens are slit half way down, so as to appear as if made up of 2 half anthers each; its petals are united into an imbricated monopetalous corolla; and it usually has a calyx whose sepals do not correspond in number with the lobes of the corolla. De Candolle thought this corolla to be a whorl of abortive stamens, but there does not appear to be any sufficient ground for his opinion. See *Decaisne in Ann. Sc. Nat. n. s. vi.* 72. In several instances a tendency to the separation of stamens and pistil is observable; it is usually, however, accompanied by the common ♀ structure.

The species are found in the tropical and sub-tropical regions of all the world; and even in some of the coldest, as in the United States, Canada, the north-west coast of America, and Japan. *Aralia polaris* was even found by Dr. Jos. Hooker, as far to the south as Lord Auckland's group of islands, in 50½° south latitude.

Similar as these plants are to Umbellifers they do not appear to partake in any considerable degree of the dangerous qualities for which some of the latter are known. On the contrary, they are more generally stimulant and aromatic. Neither do their succulent fruits often yield the essential oil which renders many of the Umbellifers useful carminatives and stomachics. The Ginseng, or Ginschen root, so highly prized by the Chinese as a stimulant, belongs to some species of *Panax* (*P. Ginseng*, *Meyer*) unknown. *Meyer* describes it as having a sharp, aromatic, peculiar taste. The Chinese are said to administer it in all diseases resulting from weakness of the body.—*Chem. Gaz.* 1843. 238.



Fig. DXVI.

Fig. DXVI.—1. *Hedera Helix*; 2. flower of *Dimorphanthus edulis* (*Siebold*); 3. perpendicular section of the ovary; 4. undivided ovary; 5. ripe fruit; 6. cross section of it; 7. section of seed of *H. Helix*.

Although its virtues have been pronounced imaginary, it is hardly credible that the root should have gained such great celebrity if it were inert. It was formerly supposed to belong to *Panax quinquifolium*, but that seems to have been a mistake; the species so named is said, however, to be sold by the Americans to the Chinese, as a substitute for their Ginseng; it has an agreeable bitter-sweet root, and is used sometimes as Liquorice. *Panax fruticosus* and *cochleatus* are fragrant aromatics, employed in the Moluccas, and *P. Anisum* has berries with all the odour of the herb whose name it bears. The *Aralias* seem to be similar in their action; an aromatic gum-resin comes from *A. racemosa*, *spiuosa* and *hispida*; *A. nudicaulis* is diaphoretic, and its shoots are employed in North America as a substitute for Sarsaparilla; *Dimorphanthus* (*Aralia*) *edulis* is employed in China as a sudorific; its young shoots are a delicate vegetable; and its root, which is bitter, aromatic, and pleasant to the taste, is employed by the Japanese, in winter, as we use *Scorzonera*. Nor does the common Ivy want the aroma of the Order, although unpleasant in smell; it is mentioned as a sudorific; and its berries are emetic. *Hedera umbellifera*, an Amboyna plant, is said to furnish wood scented like Lavender and Rosemary, and *H. terebinthacea* yields, in Ceylon, a resinous substance smelling of turpentine. *Gunnera scabra* or Panke is astringent; its roots are used by tanners, while its fleshy leaf-stalks are eaten; Mr. Darwin found it growing on the sandstone-cliffs of Chiloe, and describes it as somewhat resembling Rhubarb on a gigantic scale. He measured a leaf which was nearly 8 feet in diameter, and remarked that each plant produced 4 or 5 of these enormous leaves, "presenting together a noble appearance." The fruit of *Gunnera macrocephala* is reputed in Java to be stimulant.

GENERA.

<i>Panax</i> , Linn.	<i>Gastonia</i> , Commers.	<i>Actinophyllum</i> , R. et P.	<i>Touroulia</i> , Aubl.
<i>Aureliana</i> , Catesb.	Trevesia, Vis.	<i>Hedera</i> , Linn.	<i>Robinsonia</i> , Schreb.
<i>Araliastrum</i> , Vaill.	<i>Polyscias</i> , Forst.	<i>Gynaptocina</i> , Blum.	<i>Adoxa</i> , L.
<i>Plectronia</i> , Lour.	<i>Brassaia</i> , Endl.	<i>Paratropia</i> , DC.	<i>Milligania</i> , Hook. fil.
<i>Cussonia</i> , Thunb.	<i>Toricellia</i> , DC.	<i>Heptapleurum</i> , Gärtn.	<i>Gunnera</i> , L.
<i>Marattia</i> , Thouars.	<i>Aralia</i> , Linn.	<i>Arthrophyllum</i> , Blum.	<i>Misandra</i> , Comm.
<i>Gilibertia</i> , Ruiz et Pav.	<i>Scheffera</i> , Forst.	<i>Botryodendrum</i> , Endl.	<i>Diosmea</i> , Banks.
<i>Wangenheimia</i> , Dietr.	<i>Dimorphanthus</i> , Miq.	? <i>Miquefia</i> , Meisn.	<i>Perpensum</i> , Burm.
<i>Ginnania</i> , Dietr.	<i>Sciodaphyllum</i> , P. Br.		<i>Panke</i> , Feuille.

NUMBERS. GEN. 21. Sp. 160.

Vitaceæ.

POSITION.—*Apiaceæ.*—*ARALIACEÆ.*—*Hamamelidaceæ.*

Caprifoliaceæ.



Fig. DXVII.

1

Fig. DXVII.—*Adoxa Moschatellina*. 1. a flower magnified.

ORDER CCXCVIII. CORNACEÆ.—CORNELS.

Caprifoliacæ, § Cornæ, Kunth *Nov. G. Amer.* 3. 430.—Cornæ, DC. *Prodr.* 4. 271. (1830); *Endl. Gen.* clxv.; *Meisner*, p. 143.

DIAGNOSIS.—*Umbellal Exogens, with a 2- or more-celled fruit without a double epigynous disk, tetramerous flowers, a valvate corolla, and opposite leaves without stipules.*

Trees or shrubs, seldom herbs. Leaves (except in one species) opposite, entire or toothed, with pinnate veins. Stipules 0. Flowers capitate, umbellate, or corymbose, naked or with an involucre, occasionally by abortion ♂ ♀. Sepals 4, superior. Petals 4, oblong, broad at the base, inserted into the top of the calyx, regular, valvate in aestivation. Stamens 4, inserted along with the petals and alternate with them; anthers ovate-oblong, 2-celled. Ovary adherent, 2- or perhaps 3-celled, crowned by a disk; ovules solitary, pendulous, anatropal; style filiform; stigma simple. Drupe berried, crowned by the remains of a calyx, with a 2-celled nucleus. Seeds pendulous, solitary. Embryo in the axis of fleshy albumen, and as long; radicle superior, shorter than the two oblong cotyledons.



Fig. DXVIII.

These plants were formerly confounded with Caprifolios, on account of the general resemblance between *Cornus* and *Viburnum*; they however represent an entirely distinct Order, as their habit and general characters sufficiently indicate. From Caprifolios their polypetalous structure removes them. To Witch Hazels they approach more nearly, but differ in the valvate aestivation of their corolla, &c. &c. In many respects Cornelis resemble Loranthis, from which they differ among other things in the stamens being opposite to the sepals, and in the flowers being polypetalous. Hollyworts are sometimes compared with them, but they have a superior fruit and erect ovules. If Garryads were not anentaceous, and had petals and bisexual flowers, they would approach Cornelis very nearly, and probably do in fact represent them in the diclinous sub-class, as seems to be proved by the genus *Pukateria*, whose flowers are ♂ ♀. To Umbellifers they also approach very closely, being chiefly distinguished by their tetramerous flowers, succulent fruit, and single style, to which may be added their opposite leaves. Such Cornelis as *Cornus suecica* and *florida*, and *Benthania* have the inflorescence and involucre of an Umbellifer. As to Ivyworts, it is hard to say in what manner they can be distinguished if we neglect the opposite leaves, the tendency to form a pair of cells in the fruit rather than a larger number, and, in fact, the tetramerous structure of the flower generally.

Found all over the temperate parts of Europe, Asia, and America. It is doubtful whether the African genera belong here.

The bark of *C. florida*, *sericea*, and *circinata*, is said to rank among the best tonics of North America, nothing having been found in the United States that so effectually answers the purposes of Peruvian bark in intermittent fevers. It is a remarkable fact that the young branches of *Cornus florida*, stripped of their bark and rubbed with their ends against the teeth, render them extremely white. From the bark of the fibrous roots the Indians extract a good scarlet colour. Lamp oil has been obtained from the seeds of *Cornus sanguinea*. The *Cornus* of the ancients was the present Cornelian Cherry (*Cornus mascula*), whose little clusters of yellow starry flowers stud its naked branches, and are among the earliest heralds of spring. Its fruit is like a small plum,

Fig. DXVIII.—*Benthania japonica*.—*Siebold*. 1. a flower; 2. a perpendicular section of the pistil; 3. a head of fruit; 4. a section of a seed.

with a very anstere flesh ; but after bletting it becomes sub-aeid, and was once held in some such estimation as sorbs and services. The Turks still use it in the manufacture of sherbet — *Fl. Græc. Pr.* ii. 41. Its fruit and leaves were formerly used in medicine as astringents. *Cornus officinalis*, a large Japanese shrub, is little different, and is there commonly cultivated, for its fruits are a constant ingredient in the fever drinks of the country. *C. succica* is reputed to have tonic berries which increase the appetite, whence its highland name *Lus-a-chrasis*, or plant of gluttony.

GENERA.

<i>Benthamia</i> , Lindl. <i>Cornus</i> , Tournef. <i>Aucuba</i> , Thunb. <i>Eubasis</i> , Salisb.	<i>Decostea</i> , Ruiz et Pav. <i>Pukateria</i> , Raoul. <i>Corokia</i> , Cunn. <i>? Curtisia</i> , Ait.	<i>Doratum</i> , Soland. <i>Relbania</i> , Gmel. <i>Junghansia</i> , Gmel. <i>Sideroxyton</i> , Burm.	<i>? Mastixia</i> , Blum. <i>? Votomita</i> , Aubl. <i>Glossoma</i> , Schreb. <i>Guilleminiu</i> , Neck.
---	---	--	---

NUMBERS. Gen. 9. Sp. 40.

Caprifoliaceæ.

POSITION.—*Apiaceæ.*—*CORNACEÆ.*—*Hamamelidaceæ.*

Alangiaceæ.

Garryaceæ.

ORDER CCXCIX. HAMAMELIDACEÆ.—WITCH-HAZELS.

Hamamelidace, *R. Br. in Abel's Voyage to China*, (1818); *A. Richard Nouv. Elem.* 532. (1828); *DC. Prodr.* 4. 267. (1830); *Endl. Gen.* clxvii.; *Griffith in Asiatic Researches*, (1836), xix. p. 94.

DIAGNOSIS.—*Umbellal Exogens*, with a 2-celled not didymous fruit without a double epigynous disk, an imbricated corolla, alternate leaves with stipules, and anthers with deciduous valves.

Small trees or shrubs. Their woody tubes, in some cases, marked by circular disks. Leaves alternate, deciduous, toothed, with veins running from the midrib straight to the margin. Stipules deciduous.



Fig. DXIX.

Flowers small, axillary, sometimes unisexual by abortion. Calyx adherent, in 4 or 5 pieces. Petals 4 or 5, or 0; if present, with an imbricated aestivation. Stamens 8, of which 4 are alternate with the petals; their anthers turned inwards, 2-celled, and 4 are sterile, and placed at the base of the petals; their dehiscence variable. Ovary 2-celled, inferior; ovules solitary or several, pendulous or suspended; styles 2. Fruit half inferior, capsular, usually opening with 2 septiferous valves. Seeds pendulous; embryo in the midst of fleshy horny albumen; radicle superior.

According to Brown, the affinity of Witch-hazels is on the one hand with Bruniads, from which they are distinguished by the insertion and dehiscence of the anthers, the monospermous cells of the ovary, the dehiscence of the capsule, the quadrifid calyx, and by habit; and on the other with Cornus, Marlea, and the neighbouring genera; in some respects also with Ivyworts, but differing in their capsular fruit, the structure of the anthers, and other marks.—See *Abel's Voyage, Appendix*. Du Petit Thouars looks upon them as allied to Rhamnads, and Jussieu to Hippurids. Others consider them akin to Mastworts and Spurges, through Fothergilla. There can be no doubt that they must be arranged in the Epigynous series, and upon the whole, Bruniads on the one hand, and Cornels on the other, seem to claim the nearest kindred; from the latter they are known by their stipules and imbricated petals, if any are present. It was formerly supposed that they might be allied to Saxifrages, on account in part of their albuminous seeds and half inferior ovary; but that resemblance was but a remote one. Mr. Griffith observed in *Bucklandia* and *Sedgwickia* that the woody tissue is marked with circular dots something like those of Conifers; the same sharp-sighted Botanist observed that in *Bucklandia* the second membrane of the ovule protrudes beyond the foramen in the ripe seed!

The species come from North America, Japan, China, and the central parts of Asia, Madagascar, and South Africa.

The kernels of *Hamamelis virginica* are oily and eatable. The leaves and bark are very astringent, and also contain a peculiar acrid essential oil.

GENERA.

I. HAMAMELEÆ.—Ovules solitary.
Dicoryphe, *Thouars*.
Dicorypha, *Spreng*.
Corylopsis, *Sieb. et Zucc.*

Trichocladus, *Pers.*
Dahlia, *Thunb.*
Hamamelis, *Lin.*
Tritopus, *Mitch.*

Loropetalum, *R. Br.*
Parrotia, *C. A. Mey.*
Fothergilla, *Lin. f.*
Distylium, *Zucc.*

II. BUCKLANDIÆ.—Ovules several in each cell.
Bucklandia, *R. Br.*
Sedgwickia, *Griff.*

NUMBERS. GEN. 10. Sp. 15.

POSITION.—Bruniaceæ.—HAMAMELIDACEÆ.—Cornaceæ.
Saxifragaceæ.

Fig. DXIX.—*Corylopsis*. 1. flowers; 2. branch in fruit; 3. a flower separate; 4. a stamen; 5. a perpendicular section of the ovary; 6. a section of a seed removed from the capsule and placed with the hilum downwards.

ORDER CCC. BRUNIACEÆ.—BRUNIADS.

Bruniaceæ, R. Brown in *Abel's China* (1818 ; *DC. Prodr.* 2. 43 ; *Ad. Brongniart in Ann. des Sc. Nat. ; Endl. Gen.* clxviii. ; *Arnott in Hook. Journ.* 3. 259.—Grubbiaceæ, *Endl. Enchirid.* p. 403. (1841) ; Ophiriaceæ, *Arnott in Hooker's Journal*, 3. 266. (1841).

DIAGNOSIS.—*Umbellal Exogens, without a double epigynous disk, with a 3- (or 1-) celled fruit, imbricated corolla, alternate leaves without stipules, and anthers turned outwards, opening lengthwise.*

Branched, heath-like shrubs. Leaves small, imbricated, rigid, entire, with a callous point. Flowers small, capitate, or panicked, or even terminal, and solitary ; either naked, or with large involucreting bracts. Calyx superior, 5-cleft, imbricated, occasionally nearly inferior. Petals alternate with the segments of the calyx, arising from its throat, imbricated (or valvate ?). Stamens alternate with the petals, arising from the same point, or from a disk surrounding the ovary ; anthers turned outwards, 2-celled, bursting longitudinally. Ovary half inferior, with from 1 to 3 cells, in each of which there is from 1 to 2 suspended collateral anatropal ovules ; sometimes 1-celled from the abortion of carpels or dissepiments ; style simple or bifid ; stigma simple. Fruit dioecious or indehiscent, 2- or 1-celled, crowned by the persistent calyx. Seeds solitary or in pairs, suspended, sometimes with a short aril ; albumen fleshy ; embryo minute at the base of the seed, with a conical radicle, and short fleshy cotyledons.

The relationship of these plants to Witch Hazels is admitted, and therefore they will participate in all the other affinities of that Order, which is known from Bruniads by the habit, stipules, and often deciduous valves of the anthers. Brongniart indicates an affinity with Myrtleblooms through *Imbricaria*, which is very nearly constructed as true Bruniads, but has the stamens opposite the petals, and dotted leaves. He also considers that Cornels bear them much real affinity, and he even contrasts them with Umbellifers, to which they no doubt approximate very nearly. The genus *Raspailia* is remarkable for having the stamens arising from the top of a superior ovary ! and *Thamnea* is an instance of a 1-celled ovary with the ovules adhering to a central columnar axis. Mr. Arnott considers the group named by him Ophiriaceæ to be intermediate between Bruniads and Witch Hazels.

All are found at the Cape of Good Hope, with the exception of a single species inhabiting Madagascar.

Their properties are unknown.

GENERA.

<i>Berzelia</i> , <i>Brongn.</i>	<i>Atrocampa</i> , <i>Neck.</i>	<i>Pavinda</i> , <i>Thunb.</i>	<i>Gravenhorstia</i> , <i>Nees.</i>
<i>Brunia</i> , <i>Linn.</i>	<i>Berardia</i> , <i>Brongn.</i>	<i>Tittmannia</i> , <i>Brongn.</i>	<i>Erasma</i> , <i>R. Br.</i>
<i>Nobelia</i> , <i>Neck.</i>	<i>Nobelia</i> , <i>Sweet.</i>	<i>Mastera</i> , <i>Reichenb.</i>	<i>Grubbia</i> , <i>Berg.</i>
<i>Bockea</i> , <i>Burm.</i>	<i>Pyrostoma</i> , <i>Vahl.</i>	<i>Thamnea</i> , <i>Soland.</i>	<i>Ophiria</i> , <i>L.</i>
<i>Raspailia</i> , <i>Brongn.</i>	<i>Lincolnia</i> , <i>Linn.</i>	<i>Heterodon</i> , <i>Meisn.</i>	<i>Ophiria</i> , <i>Lam.</i>
<i>Staavia</i> , <i>Thunb.</i>	<i>Audouinia</i> , <i>Brongn.</i>	<i>Robenhorstia</i> , <i>Rehb.</i>	<i>Strobilocarpus</i> , <i>Ritzh.</i>
<i>Lericonia</i> , <i>Sel. reb.</i>			

NUMBERS. GEN. 15. Sp. 65.

Santalaceæ.

POSITION.—*Hamamelidaceæ.*—*BRUNIACEÆ.*—*APIACEÆ.*

Myrtaceæ.

Fig. DXX. *Brunia nodiflora* Brongniart 1 a flower ; 2 a perpendicular section of it ; 3 the pistil divided perpendicularly 4 half a seed

3 4

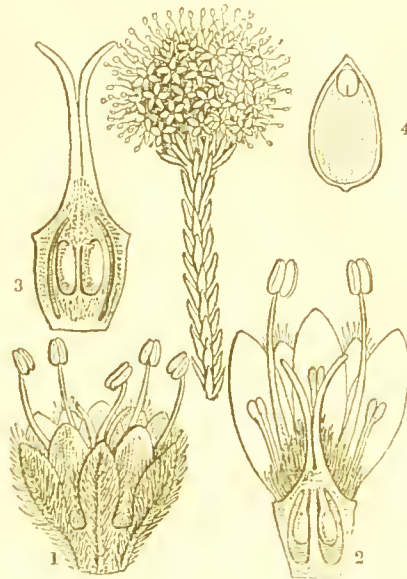


Fig. DXX.

ALLIANCE LVI. ASARALES.—THE ASARAL ALLIANCE.

DIAGNOSIS.—*Epigynous Exogens, with monochlamydeous flowers, and a small embryo, lying in a large quantity of albumen.*

The place which Birthworts should occupy in a Natural arrangement is one of those disputed points respecting which it is extremely difficult to arrive at any positive conclusion. They are so anomalous in their woody structure, and so peculiar in their trimerous flowers, with an inferior ovary abounding in ovules, that an obvious ally can hardly be found for them. In fact they seem to be of an intermediate nature between Exogens and Endogens or Dictyogens. The great livid calyx of *Aristolochia* calls to mind the spathes of *Arads*: the leaves are those of *Sarsaparillas*. It is therefore probable that they should be regarded as a group standing on the borders of the three Sub-classes just mentioned, and joining them to each other, just as Switzerland joins Austria, Italy, and France.

The points of resemblance between Birthworts, Sandalworts, and Loranths are their want of corolla, their inferior ovary, their large albumen, and small embryo. These appear to be circumstances of greater weight than any distinctions that might be found between them. The rim which appears at the summit of the ovary of *Aristolochia* is possibly of the same nature as that of Loranths.

It is not to be wondered at that here—amidst Orders which, although apparently at the uttermost boundary of the vegetable kingdom, are really points of communication by means of which the circles of affinity return into themselves—we should find other tendencies than that of Birthworts to assume the condition of Natural Orders stationed in a lineal arrangement at very distant parts of the line. In truth, Sandalworts stand with respect to the Garryal Alliance, and Loranths to Amentals, in the same position as New Holland to New Zealand, or *Kantchatka* to Russian America upon the maps; the whole world seems to divide them, and yet they are stationed within a few degrees of each other. Thus Loranths, which are often unisexual, approach Oleasters somewhat nearly, and Sandalworts come close up to the limits of Helwingiads.

NATURAL ORDERS OF ASARALS.

<i>Ovary 1-celled. Ovules definite, with a coated nucleus . . .</i>	301. SANTALACEÆ.
<i>Ovary 1-celled. Ovules definite, with a naked nucleus . . .</i>	302. LORANTHACEÆ.
<i>Ovary 3-6-celled. Ovules 00.</i>	303. ARISTOLOCHIACEÆ.

ORDER CCCI. SANTALACEÆ.—SANDALWORTS.

Santalaceæ, R. Brown Prodr. 350. (1810); Juss. Dict. des Sc. Nat. 47. 287; Bartling Ord. Nat. 112; Endl. Gen. cviii.; Griffith in Linn. Trans. 18. 59.—Osyrideæ, Juss. in Ann. Mus. vol. 5. (1802); Martius Conspectus, No. 82. (1835).—Osyrinæ, Link Handb. 1. 371. (1829).

DIAGNOSIS.—*Asaral Exogens*, with a 1-celled ovary and definite ovules having a coated nucleus.

Trees or shrubs, sometimes under-shrubs or herbaceous plants. Leaves alternate, or nearly opposite, undivided, sometimes minute, and resembling stipules. Flowers in spikes, seldom in umbels, or solitary, small. Calyx superior, 4- or 5-cleft, half-coloured, with valvate æstivation. Stamens 4 or 5, opposite the segments of the calyx, and inserted into their bases. Ovary 1-celled, with from 1 to 4 ovules, fixed to a central placenta, and usually near the summit; style 1; stigma often lobed. Fruit 1-seeded, hard and dry, and drupaceous. Albumen fleshy, of the same form as the seed; embryo minute, in the axis, inverted, taper.

Brown observes (*Flinders*, 569) that one of the most remarkable characters of this Order consists in its unilocular ovary containing more than one, but always a determinate number of ovules, which are pendulous, and attached to the apex of a central receptacle; this receptacle varies in its figure in the different genera, in some being filiform, in others nearly filling the cavity of the ovary. In *Santalum* itself, however, the ovules are erect, as Griffith showed, and they are said to be the same in *Osyris*, which is described as being ♂ ♀. The nearest relationship of Sandalworts is a disputed question. Most Botanists assign them to the neighbourhood of Daphnads, or Oleasters; but their inferior ovary, copious albumen, and placentation, disagree with both those groups, and their hermaphrodite flowers also divide them from Oleasters. Endlicher refers them

to the neighbourhood of Olax, but the hypogynous stamens of that Order forbid a close approximation. Loranthi seem to stand in the closest consanguinity, and are principally known by their parasitical manner of growth, and their ovules having a truly naked nucleus.

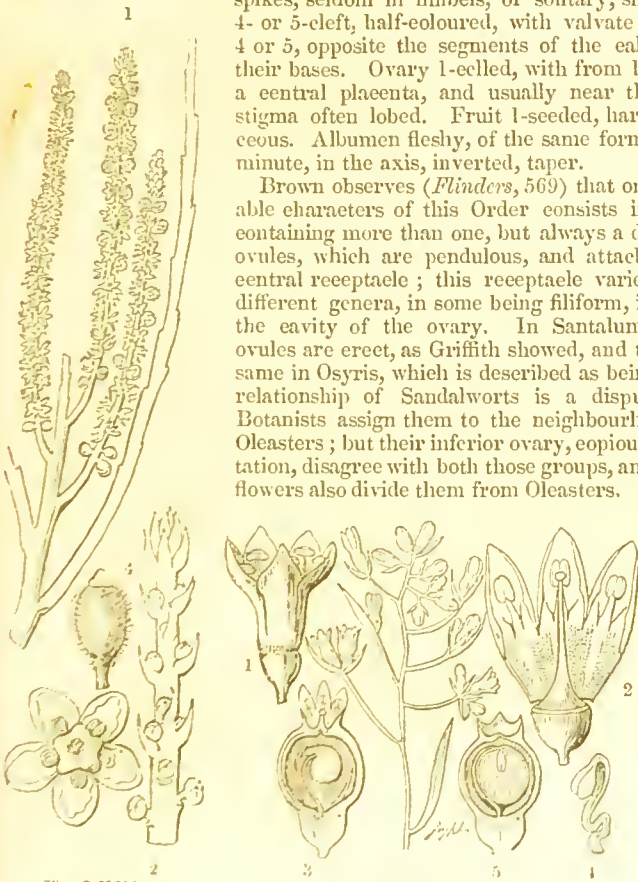


Fig. DXXI.

Fig. DXXII.

The species are found in Europe and North America, in the form of little obscure weeds; in New Holland, the East Indies, and the South Sea Islands, as large shrubs, or small trees.

Sandal-wood is the produce of *Santalum album*; in India it is esteemed by the native doctors as possessing sedative and cooling qualities, and as a valuable medicine in gonorrhœa. It is also employed as a perfume. The Sandal-wood of the Sandwich Islands is the wood of *Santalum Freycinetianum* and *pauciflorum*. The leaves of *Osyris* or *palensis* form a sort of tea. An infusion of *Myoschilos oblongus*, the *Senega* of the

Fig. DXXI.—1. *Leptomeria acida*; 2. a branch more magnified; 3. an expanded flower; 4. a fruit.
Fig. DXXII.—*Thea sinensis*.—Hort. 1. a flower; 2. the same laid open; 3. half an unripe fruit, 4. placenta and pair of ovules; 5. half the ripe fruit and seed.

Chilenos, is purgative. The fruit of the Quandang Nut (*Fusanus acuminatus*) is as sweet and useful to the New Hollanders as Almonds are to us ; that of *Cervantesia tomentosa* has a similar reputation in Peru. Oil is obtained in Carolina from the kernels of *Pyrularia pubera*. *Leptomeria Billardieri*, a common Tasmanian shrub resembling the European Broom in its green and almost leafless habit, is acid in almost every part, especially in the fruit, but astringent also, and is well suited, when chewed, to allay thirst.—*Backhouse*. The *Thesiums* are scentless and slightly astringent.—*DC*.

GENERA.

<i>Quinchamalium</i> , <i>Juss.</i>	<i>Balnerdia</i> , <i>Commers.</i>	<i>Osyris</i> , <i>Linn.</i>	<i>Pyrularia</i> , <i>L. C. Rich.</i>
<i>Arjoona</i> , <i>Cav.</i>	<i>Chorotrum</i> , <i>R. Br.</i>	<i>Casia</i> , <i>Tourn.</i>	<i>Hamiltonia</i> , <i>Muhlent.</i>
<i>Thesium</i> , <i>Linn.</i>	<i>Leptomeria</i> , <i>R. Br.</i>	<i>Sphaerocarya</i> , <i>Wall.</i>	<i>Calinax</i> , <i>Raf.</i>
<i>Alchimilla</i> , <i>Tournef.</i>	<i>Coinandra</i> , <i>Nutt.</i>	<i>Scleropyron</i> , <i>Arn.</i>	<i>Cervantesia</i> , <i>Ruiz et Pav.</i>
<i>Thesiosyris</i> , <i>Rehb.</i>	<i>Fusanus</i> , <i>Linn.</i>	<i>Santalum</i> , <i>Linn.</i>	<i>Myoschilos</i> , <i>Ruiz et Pav.</i>
<i>Frisea</i> , <i>Reichenb.</i>	<i>Colpoon</i> , <i>Berg.</i>	<i>Sirium</i> , <i>Linn.</i>	"
<i>Rhinostegia</i> , <i>Turez.</i>	<i>Eucarya</i> , <i>Mitch.</i>	<i>Mida</i> , <i>A. Cunningh.</i>	<i>Octarillum</i> , <i>Lour.</i>
<i>Nanodea</i> , <i>Banks.</i>			

NUMBERS. GEN. 18. Sp. 110.

Oleaceæ.

POSITION.—Loranthaceæ.—SANTALACEÆ.—Aristolochiaceæ.

Thymelacææ.

ORDER CCCII. LORANTHACEÆ.—LORANTHS.

Loranthæe, *Juss. et Rich. Ann. Mus.* 12. 292. (1808); *DC. Prodr.* 4. 277. *Mémoire* (1830); *Blume, Fl. Jav.*—Viscoideæ, *Rich. Anal. du Fr.* 33. (1818).—Loranthaceæ, *Ed. pr.* xxxiii.; *Endl. Gen.* clxvi.; *Wight Illustr.* 2. t. 119.—Myzodendrea, *R. Brown in Linn. Trans.* xix. 232.

DIAGNOSIS.—*Asaral Exogens, with a 1-celled ovary and definite ovules with a naked nucleus.*

Shrubby plants, in almost all cases growing into the tissue of other vegetables, as true parasites. Leaves opposite, or sometimes alternate, veinless, fleshy, without stipules.

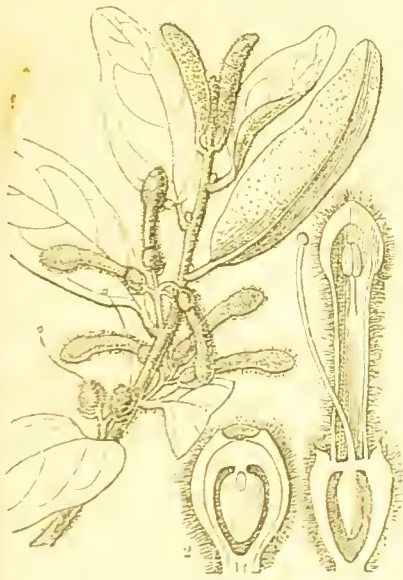


Fig. DXXIII.

1

Loranth. In some respects they are near Caprifoli, from which they are readily known not only by their parasitical habit, but also by their stamens being opposite valvate lobes of a tubular calyx. Don has expressed an opinion that a connection is established between this Order and Araliads, by means of *Auenba* (*Jamson's Journal*, Jan. 1830, p. 168). *Brown* (*Flinders*, 549) suggests a relation to Proteads. *Eudlicher* decides in favour of the relation to Caprifoli, *Witch Hazels* and *Cornels*. *Adrien de Jussien* takes a similar view (*Cours Élément.*, p. 567). *Dr. Wight* suggests a relation to *Alangiads*. *Adolphe Brongniart* combines them, along with *Hornworts*, *Chloranth*, *Sandalworts*, and *Olacads*, into a class which he calls *Santaliniées*. These discordant opinions are caused by the different interpretations put by Botanists upon the nature of the floral envelopes.

It is customary to call the floral envelopes of the genera of Loranth by the name of sepals in *Viscum*, and of petals in *Loranthus*, because in the latter genus we find external to them a cup-like expansion, which is regarded as a calyx. It however seems impossible to doubt that the parts of the perianth are really of the same nature in both instances, as is proved moreover by the stamens, which are applied to their face in both cases. *Schleiden*, indeed, calls the ♂ flower of *Viscum* naked, and supposes it to consist of nothing but anthers; but *M. Decaisne* has more correctly shown the ♂ flowers

* *Schleiden* has taken a very different view of the structure of *Viscum*, and describes it as having a truly naked ovule surrounded by a tetrasporous herbaceous perianth; this ovule he calls "erect, atropal, and consisting of a naked nucleus."—*Wieg. Arch.* 1839, p. 213.

Fig. DXXIII. *Loranthus chrysanthus*. *Blume*. 1, section of a flower, 2, of a fruit.

of that genus to consist of 4 anthers grown to the inner face of 4 calycine sepals. The rim exterior to the calyx, which has given rise to the idea that the coloured part of a Loranth is corolla, is present in *Viscum* also, in the form of a slight annular swelling; and is in all probability analogous to the raised line terminating the cup, from the rim of which the sepals spring in *Chryseis* or *Eschscholtzia*. In fact, we must in theory regard the flower of a Loranth to consist of a fleshy cup-like expansion of the end of a branch, from the upper edge of which expansion the sepals rise. This point being settled, we then have no difficulty in admitting the near alliance of Loranthis and Sandalworts; a fact not lost sight of by Dr. Brown in his *Prodromus*; he also, in speaking of his *Myzodendrea*, or feathered Loranthis, again adverts to the resemblance between their three ovules suspended from the apex of a central placenta, and the same part in Sandalworts.—*Linn. Trans.* xix. 232. Decaisne too, recognises their apetalous condition, and refers them to the neighbourhood of Sandalworts. They may also be looked upon as having considerable analogy with Proteads, which must be considered to occupy a place in the perigynous sub-class parallel with that of Loranthis in the epigynous. The occasional separation of the ♂ and ♀ in different flowers points strongly to a relation to some diclinous Order, which relation seems to be found in *Helwiugiads*. See p. 296.

In some respects this singular Order offers very curious deviations from the ordinary structure of similar plants. The wood of *Viscum* is described by Decaisne as consisting, when young, of eight woody bundles surrounding a green pith; in these bundles are no spiral vessels, but instead, and nearly in the place where they are usually found, some ringed tubes; these, together with elongated and dotted or reticulated cells and fibres analogous to those of the liber, make up all the longitudinal tissue of the plant. On the outside of these bundles of woody matter, and opposite to them, are found others, similar in number but smaller, and composed exclusively of fibres of the liber.—*Mémoire sur le Développement du Gui*. Brown states that in *Myzodendron* the whole woody tissue consists of ladder-shaped vessels (v. scalariformia), a structure very different from that of other genera of Loranthis.

In the genus *Viscum* the anther forms its pollen in a number of distinct cavities, in the same way as in *Ægiceras*; this has been beautifully illustrated by Decaisne, (*Acad. Roy. Brux. XIII. t. 1.*)

The production of the ovules and their fertilisation is attended with some of the most curious phenomena known in the vegetable kingdom, not the least of which is that in *Viscum* the ovule does not appear till three months after the pollen has exercised its influence; and another, that the young ovules sometimes become consolidated, the result of which is the presence of two or more diverging embryos in the same seed. See M.

Decaisne's Memoir above quoted, and also that of Griffith, *On the Development of the Ovules of Loranthus and Viscum*, in the *Linnean Transactions*, vol. xviii. p. 71, for many other important particulars.

The nature of the parasitism of these plants is very curious, and has been most carefully described by Griffith. He states that in *Loranthus* the ripe seeds adhere firmly to the substance on which they are applied, by means

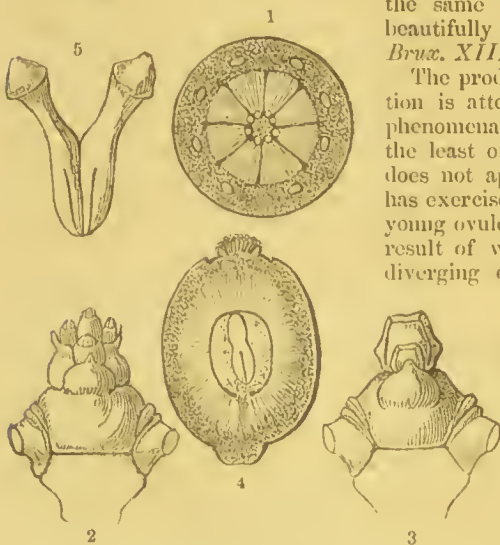


Fig. DXXIV.

of their viscid coating, which hardens into a transparent glue. In two or three days after application, the radicle curves towards its support, and as soon as it reaches it becomes enlarged and flattened. By degrees a union is formed between the woody system of the parasite and stock, after which the former lies exclusively on the latter, the fibres of the sucker-like root of the parasite expanding on the wood of the support "in the form of a pâte d'œie." Prior to that time the parasite had been nourished by its own albumen, which is gradually absorbed. "As soon as the young parasite has acquired the height of one or two inches, when an additional supply of nourishment is perhaps required, a lateral shoot is sent out, which is, especially towards the point, of a green

Fig. DXXIV.—*Viscum album*. 1. a cross section of the stem (Decaisne); 2. ♀ flowers; 3. ♂ flowers (Schlecht); 4. the fruit cut perpendicularly; 5. a pair of embryos united where they come in contact (Decaisne)

colour. This at one, or two, and subsequently at various points, adheres to the support by means of sucker-like productions, which are precisely similar in structure and mode of attachment to the original seminal one." The fibres of the parasite never penetrate beyond their original attachment; in the adult the sucker-bearing shoots frequently run to a considerable distance, many plants being literally covered with parasites, all of which have originated from one seed. "I have seen," says Mr. Griffith, "such shoots, which had taken their course *along a decayed branch*, become replaced, and *return in quest*, as I may express it, *of a part capable of affording some nourishment!*" The attacks of *Loranthus* are not confined to branches or trunks. Mr. Griffith saw cases of their having seized upon the leaf of a Guttiferous plant, and the succulent leaves of a Poly-pody. Although not milky plants, yet they will occasionally establish themselves on such as are so, as for example, on the Jac (*Artocarpus integrifolia*); "hence it is obvious that they must have an eliminating power;" and this is confirmed by the reports of Chemists, who assure us that the wood of the Mistletoe when parasitic on the Apple tree, is found to contain twice as much potash, and five times as much phosphoric acid as the wood of the foster tree. This is the more probable when we call to mind how rapidly some *Loranthus* rot away from their parent branch when it dies, leaving the cellular matter of the latter in the form of huge furrowed and lobed plates which embraced the parasite and held it fast in its place. Exceedingly curious specimens of this kind of growth have been brought to Europe from Guatemala, by Mr. Skinner.

See Dutrochet *Sur la Motilité*, for many curious experiments with Mistletoe.

The Order seems to be equally dispersed through the equinoctial regions of both Asia and America; but on the continent of Africa to be much more rare, only 2 having been yet described from equinoctial Africa, and 5 or 6 from the Cape of Good Hope. Two are named from the South Seas, and 1 from New Holland; but this number requires, no doubt, to be largely increased. Three only are known in Europe. *Nuytsia floribunda*, a beautiful shrub, with very large thyrses of bright orange-coloured flowers, is a singular instance of a plant of this parasitical Order growing upon the ground. And such is the abundance of the orange-coloured blossoms, that the colonists at King George's Sound compare it to a tree on fire; hence it has gained the name of Fire-tree. A second species (*N. ligustrina*, *A. C.*) was found by Mr. Cunningham in 1817 in the more arid parts of the Blue Mountains west from Port Jackson.

The bark is usually astringent, as in the Mistletoe of the Oak. The berries contain a viscid matter like birdlime, which is insoluble in water and alcohol. The most remarkable quality that *Loranthus* possess, however, is the power of rooting on the wood of other plants, at whose expense they live. The habit of the common Mistletoe gives an idea of those of all, except that in the genus *Loranthus* the enlyx is tubular and often richly coloured. In medicine they are of small moment; the Mistletoe of the Oak, consecrated by Druidical superstition, was the common *Viseum album*. *Loranthus tetrandrus* is used for dyeing black in Chile; and some of them are employed in Brazilian medicine as poultices, and even as antisiphilitics; they are, however, of so little moment, that Martius scarcely names them in his Brazilian *Materia Medica*.

GENERA.

<i>Myzodendron</i> , Sol.	<i>Lonicera</i> , Plum.	<i>Phenicanthemum</i> , Blm.	<i>Phthirusa</i> , Mart.
<i>Misodendron</i> , Endl.	<i>Helixanthera</i> , Lour.	<i>Dendrophthoe</i> , Mart.	<i>Elythranthe</i> , Mart.
<i>Angelopogon</i> , Pöpp.	<i>Scurrula</i> , Don.	<i>Cyclanthus</i> , Endl.	<i>Macrosolen</i> , Blum.
<i>Antidaphne</i> , Pöpp.	<i>Nolanthera</i> , Don.	<i>Tapinanthus</i> , Blum.	<i>Tristerix</i> , Mart.
<i>Areuthobium</i> , B. & A.	<i>Gaidendron</i> , Don.	<i>Lichtensteinia</i> , Wendl.	<i>Spirostylis</i> , Presl.
<i>Isosomoneskia</i> , Hoffm.	<i>Baratranthus</i> , Korth.	<i>Mopetia</i> , Spreng. f.	<i>Struthanthus</i> , Mart.
<i>Viseum</i> , Thurnef.	? <i>Glutago</i> , Commers.	<i>Loxanthera</i> , Blum.	<i>Lepeostegeres</i> , Blum.
<i>Ginallon</i> , Korth.	<i>Dendropetalon</i> , Blum.	<i>Psittacanthus</i> , Mart.	<i>Polypanthus</i> , Blum.
<i>Tapéa</i> , Cham. et Schl.	<i>Lipotactes</i> , Blum.	<i>Trygonanthus</i> , Endl.	<i>Nuytsia</i> , R. Br.
<i>Loranthus</i> , Linn.			

NUMBERS. GEN. 23. Sp. 412.

Proteacea.

POSITION.—Santalaceæ.—LORANTHACEÆ.—

Cornacea.

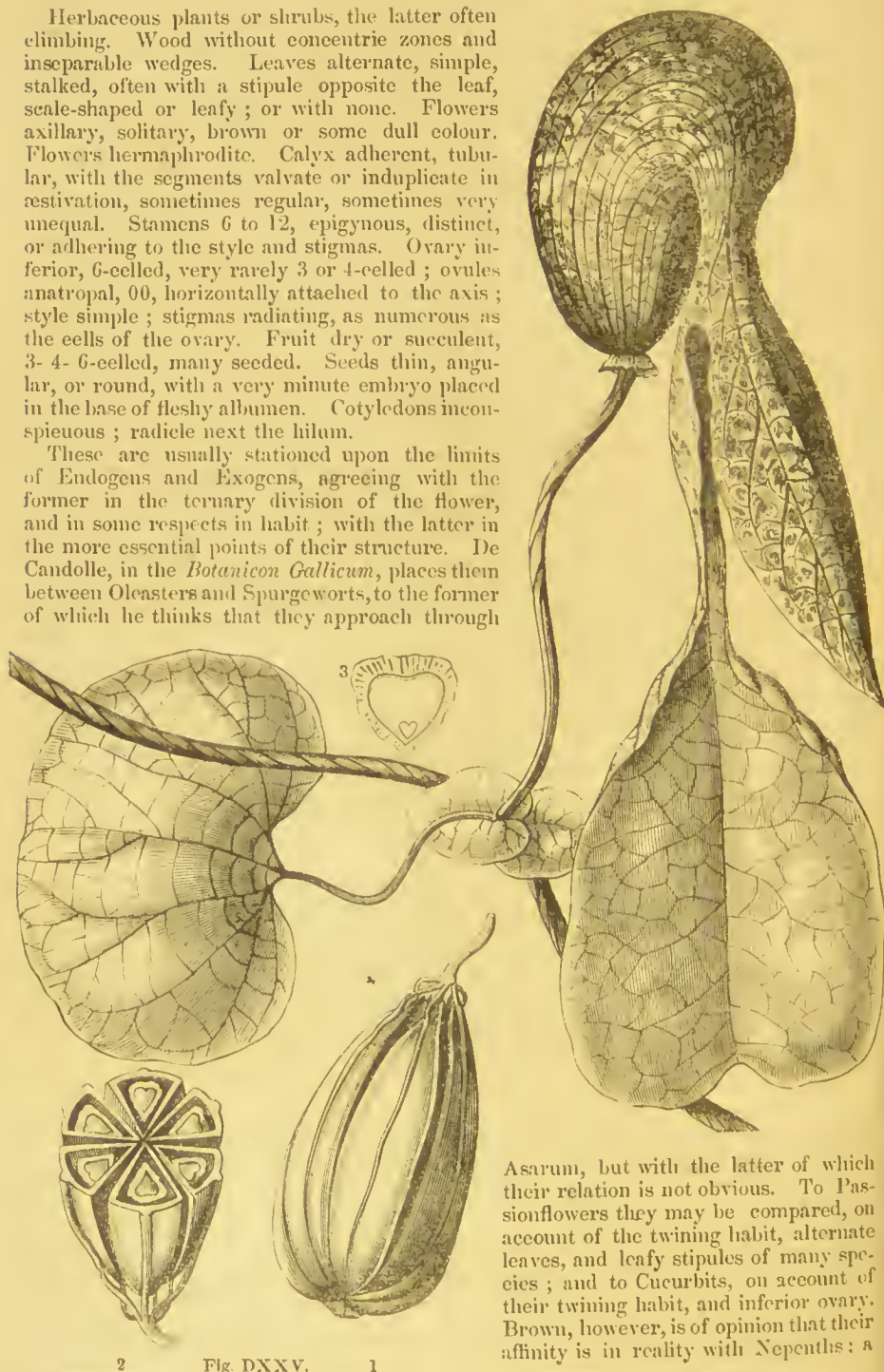
ORDER CCCIII. ARISTOLOCHIACEÆ.—BIRTHWORTS.

Aristolochiæ, *Juss. Gen.* (1789); *R. Brown Prodr.* 349; *Endl. Gen.* cxiv.; *Horsfield Pl. Jav.* p. 43.—*Pistolochinæ* and *Asarinæ*, *Link Handb.* 1. 367. (1829).—*Asarinæ*, *Barth. Ord. Nat.* 81 (1830).

DIAGNOSIS.—*Asaral Exogens*, with a 3-6-celled ovary and 00 ovules.

Herbaceous plants or shrubs, the latter often climbing. Wood without concentric zones and inseparable wedges. Leaves alternate, simple, stalked, often with a stipule opposite the leaf, scale-shaped or leafy; or with none. Flowers axillary, solitary, brown or some dull colour. Flowers hermaphrodite. Calyx adherent, tubular, with the segments valvate or induplicate in aestivation, sometimes regular, sometimes very unequal. Stamens 6 to 12, epigynous, distinct, or adhering to the style and stigmas. Ovary inferior, 6-celled, very rarely 3 or 4-celled; ovules anatropal, 00, horizontally attached to the axis; style simple; stigmas radiating, as numerous as the cells of the ovary. Fruit dry or succulent, 3-4-6-celled, many seeded. Seeds thin, angular, or round, with a very minute embryo placed in the base of fleshy albumen. Cotyledons inconspicuous; radicle next the hilum.

These are usually stationed upon the limits of Endogens and Exogens, agreeing with the former in the ternary division of the flower, and in some respects in habit; with the latter in the more essential points of their structure. De Candolle, in the *Botanicon Gallicum*, places them between Oleasters and Spurge-worts, to the former of which he thinks that they approach through



Asarum, but with the latter of which their relation is not obvious. To Passionflowers they may be compared, on account of the twining habit, alternate leaves, and leafy stipules of many species; and to Cucurbits, on account of their twining habit, and inferior ovary. Brown, however, is of opinion that their affinity is in reality with *Nepenthis*: a

Fig. DXXV.—*Aristolochia galeata*.—*Martius*. 1. fruit of an *Aristolochia*; 2. cross section of it 3. half its seed.

view adopted by Endlicher, myself formerly, and many others. I confess, however, that a more attentive study of the Order and its affinities has greatly weakened this opinion, and that I cannot but consider that there is no very strongly marked affinity to be traced between Birthworts and other plants. Endlicher compares them, with some justice, to Yams and Taccads, but they are most certainly dicotyledonous. Their regularly ternary structure and incompletely formed wood indicate, however, a strong tendency towards the condition of Dietyogens, and perhaps they may be looked upon as the best point of transition to that class from Exogens. It is in some measure on that account that they have been placed in this arrangement last in the whole series, and therefore at a point where we may suppose that the chain of Orders must return into itself. If their association with Sandalworts and Loranthis should be objected to, I would submit that the correspondence of these Orders in their epigynous apetalous flowers, and minute embryo in copious albumen, are circumstances of agreement of no mean importance, and that it is at present impossible to discover any better station for either of the three Orders.

Very common in the equinoctial parts of South America, and rare in other countries; found sparingly in North America, Europe, and Siberia; more frequently in the basin of the Mediterranean, and in small numbers in India.

Birthworts are in general tonic and stimulating; *Aristolochia* is, as its name implies, considered emmenagogue, especially the European species *rotunda*, *longa*, and *Clematitis*. An infusion of the dried leaves of *Aristolochia bracteata*, a nauseously bitter plant, is given by native Indian practitioners as an anthelmintic; fresh, bruised and mixed with castor oil, they are considered as a valuable remedy in obstinate psora. The root of *A. indica* is supposed by the Hindoos to possess emmenagogue and antarthritic virtues; it is very bitter. The *A. fragrantissima*, called in Peru, *Bejuca de la Estrella*, or *Star Reed*, is highly esteemed in Peru as a remedy against dysenteries, malignant inflammatory fevers, colds, rheumatic pains, &c. The root is the part used. The power of the root of *A. serpentaria* in arresting the progress of the worst forms of typhus, is highly spoken of by Barton; it has an aromatic smell, approaching that of Valerian, with a warm, bitterish, pungent taste. It acts as a stimulant, tonic, diaphoretic, and in certain cases as an antispasmodic and anodyne. It is peculiarly useful in supporting the strength and in allaying the irregular action which attends great febrile debility. Dr. Chapman considers it "admirably suited to check vomiting and to tranquillise the stomach, more particularly in bilious cases." As its name implies, it is used as an antidote to serpent bites, a quality in which several other species participate, among which may be mentioned the *A. trilobata*, a Jamaica plant, also employed as a sudden and powerful sudorific, and the Carthagena *A. anguicida*, concerning which Jacquin writes, that the juice of the root chewed and introduced into the mouth of a serpent so stupefies it that it may for a long time be handled with impunity; if the reptile is con-



Fig. DXXXVI.

pelled to swallow a few drops it perishes in convulsions. The root is also reputed to be an antidote to serpent-bites. This plant is probably the celebrated Guaco of the Colombians, concerning whose supposed efficacy as an alexipharmic, so much has been said by Humboldt and others: at least a leaf of what is either this species, or one closely allied to it, has been given me by Dr. Hancock as the genuine Guaco. It is not a little remarkable that the power of stupifying snakes, ascribed in Carthage to *A. anguicida*, should be also attributed to *A. pallida*, *longa*, *botica*, *sempervirens*, and *rotunda*, which are said to be the plants with which the Egyptian jugglers stupify the snakes they play with. In medicine these plants are slightly aromatic stimulating tonics, useful in the latter stages of low fever; the taste is bitter and acrid; the odour strong and disagreeable; they are said to be sudorific, and have been employed as emmenagogues in amenorrhœa.

The stimulating qualities of Birthworts seem to reach their maximum in *A. cymbifera*, *labiosa*, *ringens*, *galcata*, and *macroura*, Brazilian species, whose roots have a very penetrating, disagreeable smell, like that of Rue, and a strong, bitter, aromatic taste, producing almost entirely the same effects as the Virginia snake-root (*A. serpentaria*). They are very frequently used in Brazil against ulcers, paralytic affections of the extremities, dyspepsy, impotentia virilis, in nervous and intermittent fevers, especially those in which a predominant disorder of the pituitous membrane, or the whole lymphatic system has been observed. *A. grandiflora*, a foetid Jamaica species, is said by Swartz to be poisonous to hogs. For the qualities of other species see *Martius Mat. Med. Bras.* 107. One of the Asarabaccas, or Asarums, is analogous in its action, viz. *A. canadense*, which is a warm aromatic stimulant and diaphoretic; but *A. europæum* is said to be purgative, emetic, and diuretic; it is called Cabaret in France, because, as it is said, the frequenters of pot-houses use it to produce vomiting. *Bragantia tomentosa*, an intensely bitter plant, is used in Java as an emmenagogue, according to Horsfield.

GENERA.

<i>Asarum</i> , Tournef.	<i>Sipho</i> , Endl.	<i>Einomenia</i> , Raf.	<i>Munickia</i> , Reichenb.
<i>Heterotropia</i> , Decaisne.	<i>Hocquartia</i> , Dumort.	<i>Endodaca</i> , Raf.	<i>Apama</i> , Lam.
<i>Aristolochia</i> , Tournef.	<i>Siphisia</i> , Raf.	<i>Isotrena</i> , Raf.	<i>Trimeriza</i> , Lindl.
<i>Clematitis</i> , Endl.	<i>Siphonolochia</i> , Reich.	<i>Niphus</i> , Raf.	<i>Asiphonia</i> , Griseb.
<i>Glossula</i> , Raf.	<i>Cardiolochia</i> , Raf.	<i>Bragantia</i> , Lour.	<i>Thottea</i> , Rottb.
<i>Serpentaria</i> , Raf.	<i>Guaco</i> , Liebm.	<i>Ceranium</i> , Blum.	<i>Trichopodium</i> , Lindl.
<i>Pistolochia</i> , Raf.	<i>Nictyanthes</i> , Raf.	<i>Vanhallia</i> , Schult. f.	<i>Trichopus</i> , Gærtn.

NUMBERS. GEN. 8. Sp. 130.

Nepenthaceæ ??

POSITION.—Santalaceæ.—ARISTOLOCHIACEÆ.—Loranthaceæ.

Dioscoreaceæ.

GENERA INSUFFICIENTLY KNOWN ;

WHOSE STATION IN A NATURAL SYSTEM IS ALTOGETHER UNCERTAIN.

APETALOUS

Adelanthus, *Endl.*
 Carexilla, *Tnuno.*
 Moldenhauera, *Spreng.*
 Agdestis, *Moq. et Sessé.*¹
 Aniba, *Aubl.*
 Calrota, *Schreb.*
 Apactis, *Thunb.*
 Augea, *Thunb.*
 Barbeuia, *Thouars.*
 Didymelis, *Thouars.*
 Dulobeia, *Thouars.*
 Donzella, *Tenor.*
 Juliania, *Schlecht.*
 Hypopterygium, *Id. Linn. xvii. 635.*
 Linçera, *Thunb.*
 Mauneia, *Thouars.*
 Morella, *Lour.*
 Physena, *Norouh.*
 Faronthe, *Herb. Juss.*
 Piptolepis, *Benth.*²
 Plegorhiza, *Molin.*
 Pterotum, *Lour.*
 Sthousbaea, *Schum.*
 Stixis, *Lour.*

MONOPETALOUS.

Baitaria, *Ruiz et Pav.*

Calibrachoa, *Llav. et Lex.*
 Cerium, *Lour.*
 Colomba, *Blanco.*³
 Coddingtonia, *Bowd.*
 Corallophyllum, *H. B. K.*⁴
 Lennox, *Lav. et Lex.*
 Cyrtia, *Lour.*⁵
 Dasus, *Lour.*
 Dielidantha, *Martius.*⁶
 Duvaucellia, *Bowd.*
 Epirhizanthus, *Blum.*⁷
 Fouquieta, *H. B. K.*⁸
 Geetzia, *Wydler.*⁹
 Hydroptyxis, *Raf.*
 Keiria, *Bowd.*
 Matthisonia, *Radd.*
 Morelosia, *Llav.*¹⁰
 Noltia, *Schumach.*
 Octas, *Jack.*
 Palladia, *Lam.*
 Blackwellia, *Gärtn.*
 Pentaceras, *C. F. W. Meyer.*
 Pholisma, *Nutt.*¹¹
 Poraqueiba, *Aubl.*
 Barreria, *Scop.*
 Rapourea, *Aubl.*
 Camax, *Schreh.*
 Reussia, *Endl.*¹²

Rochefortia, *Swartz.*
 Rotula, *Lour.*

POLYPETALOUS.

Allasia, *Lour.*¹³
 Balingayum, *Blanco.*
 Calispermum, *Lour.*
 Casimiroa, *Llav. et Lex.*
 Cœlopyrum, *Jack.*
 Dichora, *Lour.*
 Dohera, *Juss.*
 Tomex, *Forsk.*
 Eurila, *Blanco.*
 Floscopa, *Lour.*
 Griseilinia, *Forst.*
 Scopolia, *Forst.*
 Henschelia, *Presl.*¹¹
 Heptaca, *Lour.*
 Hippomanica, *Molin.*
 Lanneoma, *Del.*
 Macarthuria, *Hüg.*
 Macharisia, *Thouars.*
 Sassa, *Molin.*
 Spirospermum, *Thouars.*¹⁵
 Tampoa, *Aubl.*
 Trisceus, *Willd.*
 Trujanoa, *Llav. et Lex.*

GENERA ALTOGETHER UNDESCRIBED.

Adhunia, *Fl. Fl.*
 Eschriou, *Fl. Fl.*
 Barberina, *Fl. Fl.*
 Benjaminia, *Fl. Fl.*
 Berteroa, *Zipp.*
 Biepharistemma, *Benth.*
 Bonamica, *Fl. Fl.*
 Borea, *Zipp.*
 Bareca, *Zipp.*
 Calypteris, *Zipp.*
 Canicidia, *Fl. Fl.*
 Carpocalymma, *Zipp.*
 Carpothales, *F. M.*
 Costonia, *Fl. Fl.*
 Celsa, *Fl. Fl.*
 Cheobula, *Fl. Fl.*
 Conanegria, *Calluz.*
 Curimari, *Aubl.*
 Cynotoxicum, *Fl. Fl.*
 Cyrtanora, *Zipp.*

Democritea, *Fl. Fl.*
 Distrepta, *Miers.*
 Donatophorus, *Zipp.*
 Dulacia, *Fl. Fl.*
 Dysemone, *Forst.*
 Epigenia, *Fl. Fl.*
 Hesioda, *Fl. Fl.*
 Isopteris, *Wall.*
 Ivomia, *Fl. Fl.*
 Kugia, *Bert.*
 Leretia, *Fl. Fl.*
 Leucantha, *Zipp.*
 Mapa, *Fl. Fl.*
 Melanium, *Zipp.*
 Michoxia, *Fl. Fl.*
 Mnassea, *Fl. Fl.*
 Nangha, *Zipp.*
 Narda, *Fl. Fl.*
 Peltocarpus, *Zipp.*
 Peronia, *Wall.*

Petagna, *Raf.*
 Petalostemma, *R. Br.*
 Platystigma, *R. Br.*
 Pombea, *Call.*
 Pometia, *Fl. Fl.*
 Porocillea, *Miers.*
 Quana, *Aubl.*
 Romana, *Fl. Fl.*
 Rutilia, *Fl. Fl.*
 Saldania, *Fl. Fl.*
 Sarcocalyx, *Zipp.*
 Serjania, *Fl. Fl.*
 Stephanostoma, *Zipp.*
 Tenorea, *Raf.*
 Thovetia, *Fl. Fl.*
 Turreta, *Fl. Fl.*
 Valenzuelia, *S. Mut.*
 Vigia, *Fl. Fl.*
 Viviania, *Raf.*

Menispermaceæ, *DC.* ² Near Forestiera, *Benth.*; but the flowers are ♂ and the fruit is unknown.

¹ Not Scrophulariaceæ, because of its 1-celled capsule and the situation and proportion of the stamens, *G. B.* ⁴ Referred in this work to Pir-rapes? p. 452. ⁵ Styracææ, *Endl.* ⁶ Styracææ, *Endl.* ⁷ Not Scrophulariaceæ, because of its solitary seeds and peculiar stamens. ¹¹ This genus has been erected into an Order by De Candolle, and this view has been adopted by myself, Endlicher, and Meisner. But it appears to me doubtful whether the figure of the plant in Humboldt's work is to be relied upon; and, at all events, until its seeds are known it is unsafe to hazard a conjecture about it: for this reason I forbear to repeat the remarks made upon it in the last edition of this work; it is, however, probable that Bronnii of the same authors is nothing more than a *Cantua* without its corolla; and this is an additional reason for leaving Fouquieria for further consideration. ⁸ See *DC. Prodr.* 3. 349; *Ed. Pr.* lxxxix.; *Endl. Gen.* p. 914, who refers the plant to Frankeniaceæ. ⁹ Styracææ, *Endl.* ¹⁰ Styracææ, *Endl.* ¹¹ Certainly not a *Procinnops*; no doubt very near *Corallophyllum*. (See p. 452). ¹² Pontederacææ, *Endl.* ¹³ Cucurbitaceæ, *Aubl.*; but the ovary is free? and the flowers ♂. Arnott supposes the description to be erroneous. ¹⁵ Lardizabalaceæ? *Endl.* *C. curtilicæ*? *Decaisne.* ¹⁵ Menispermaceæ, *Endl.*

. *For Additional Genera, see SUPPLEMENT.*

	Gen.	Sp.				Gen.	Sp.		
Order 168. Monotropaceæ, 452	6	10							
— 109. Ericaceæ, 453	42	850	89	1215	Alliance XLIV. <i>Rhamnales</i>				
Alliance XXXV. <i>Rutales</i> .					Order 219. Penemceæ, 577	3	21		
Order 170. Aurantiaceæ, 457	20	95			— 220. Aquilariaceæ, 579	6	10		
— 171. Amyridaceæ, 459	22	45			— 221. Ulmaceæ, 580	9	60		
— 172. Cedrelaceæ, 461	9	25			— 222. Rhamnaceæ, 581	42	250		
— 173. Meliaceæ, 463	33	150			— 223. Chnildetiaceæ, 583	4	10		
— 174. Anacardiaceæ, 465	41	95			— 224. Hippocrateaceæ,				
— 175. Connaraceæ, 468	5	41			— 225. Celastraceæ, 586	6	86		
— 176. Rutaceæ, 469	47	400			— 226. Stackhonsiaceæ,				
— 177. Xanthoxylaceæ,					— 227. Sapotaceæ, 590	2	10		
— 178. Ochnaceæ, 474	6	82			— 228. Styracaceæ, 592	6	115	123	1034
— — Coriarieteæ, 475	1	8			Alliance XLV. <i>Gentianales</i> .				
— 179. Simarubaceæ, 476	10	35			Order 229. Ebenaceæ, 595	9	160		
— 180. Zygophyllaceæ, 478	7	100			— 230. Aquifoliaceæ, 597	11	110		
— 181. Elatinaceæ, 480	6	22			— 231. Apocynaceæ, 599	100	566		
— 182. Podostemaceæ, 482	9	25	236	1233	— 232. Loganiaceæ, 602	22	162		
All. XXXVI. <i>Geraniaceæ</i> .					— — Cassipoureæ, 604	2	7		
Order 183. Linaceæ, 485	3	90			— 233. Diapensiaceæ, 606	2	2		
— 184. Chlanaceæ, 486	4	8			— 234. Stilbaceæ, 607	3	7		
— 185. Oxalidaceæ, 488	6	325			— 235. Orobanchaceæ, 609	12	116		
— 186. Balsaminaceæ, 490	2	110			— 236. Gentianaceæ, 612	60	450	221	1580
— 187. Geraniaceæ, 493	4	500	19	1033	Alliance XLVI. <i>Solanales</i> .				
Alliance XXXVII. <i>Silenales</i> .					Order 237. Oleaceæ, 616	24	170		
Order 188. Caryophyllaceæ,					— 238. Solanaceæ, 618	60	900		
— 189. Illecebraceæ, 499	53	1055			— 239. Asclepiadaceæ, 623	141	910		
— 190. Portulacaceæ, 500	24	100			— 240. Cordiaceæ, 628	11	180		
— 191. Polygonaceæ, 502	12	184			— 241. Convolvulaceæ, 630	43	660		
Alliance XXXVIII. <i>Chenopodiales</i> .					— 242. Cuscutaceæ, 633	2	50		
Order 192. Nyctaginaceæ, 506	29	490	118	1829	— 243. Polemoniaceæ, 635	17	104	298	2034
— 193. Phytolacaceæ, 508	9	60			Alliance XLVII. <i>Cortusales</i> .				
— — Surianaceæ, 509	1	1			Order 244. Hydrophyllaceæ,				
— 194. Amarantaceæ, 510	38	282			— 245. Plumbaginaceæ,				
— 195. Chenopodiaceæ, 512	63	360	125	803	— 246. Plantaginaceæ, 642	8	160		
Alliance XXXIX. <i>Piperales</i> .					— 247. Primulaceæ, 644	29	215		
Order 196. Piperaceæ, 515	20	600			— 248. Myrsinaceæ, 647	30	320	86	880
— 197. Chloranthaceæ, 519	3	15			Alliance XLVIII. <i>Echiales</i> .				
— 198. Saururaceæ, 521	4	7	27	622	Order 249. Jasmინaceæ, 650	5	100		
Alliance XL. <i>Ficoidales</i> .					— 250. Salvadoraceæ, 652	1	2		
Order 199. Basellaceæ, 524	4	12			— 251. Ehretiaceæ, 653	14	297		
— 200. Mesembryaceæ, 525	5	375			— 252. Nolanaceæ, 654	6	35		
— 201. Tetragoniaceæ, 527	11	65			— 253. Boraginaceæ, 655	53	600		
— 202. Scleranthaceæ, 528	4	14	24	466	— 254. Brunoniaceæ, 657	1	2		
Alliance XLI. <i>Daphnales</i> .					— 255. Lamiaceæ, 659	125	2350		
Order 203. Thymelaceæ, 530	38	300			— 256. Verbenaceæ, 663	56	610		
— 204. Proteaceæ, 532	44	650			— 257. Myoporaceæ, 665	9	42		
— 205. Lauraceæ, 535	16	450			— 258. Selaginaceæ, 666	10	120	280	4158
— 206. Casaythaceæ, 538	1	9	129	1109	Alliance XLIX. <i>Bignoniales</i> .				
Alliance XLII. <i>Rosales</i> .					Order 259. Pedalineeæ, 669	14	25		
Order 207. Calycanthaceæ, 540	2	6			— 260. Gesneraceæ, 671	54	260		
— 208. Chrysobalanaceæ,					— 261. Crescentiaceæ, 673	11	34		
— 209. Fabaceæ, 544	11	59			— 262. Bignoniaceæ, 675	44	450		
— 210. Drupaceæ, 557	5	110			— 263. Acanthaceæ, 678	105	750		
— 211. Pomaceæ, 559	16	200			— 264. Scrophulariaceæ,				
— 212. Sanguisorbaceæ,					— 265. Lentibulariaceæ,				
— 213. Rosaceæ, 563	12	125	551	711	— 266. Campanulaceæ, 680	20	500		
All. XLIII. <i>Saxifragales</i> .					— 267. Lobeliaceæ, 682	27	375		
Order 214. Saxifragaceæ, 567	19	310			— 268. Goodeniaceæ, 691	14	150		
— 215. Hydrangeeæ, 569	9	45			— 269. Stylidiaceæ, 696	5	121		
— 216. Cunoniaceæ, 574	22	199			— 270. Valerianaceæ, 697	12	185		
— 217. Brexiaceæ, 573	4	6			— 271. Dipsacaceæ, 699	6	150		
— 218. Lythraceæ, 574	35	309	90	761	— 272. Calyceraceæ, 701	5	10		
					— 273. Asteraceæ, 702	1005	9000	1162	10191

	Gen	Sp.				Gen	Sp.		
Alliance LI. <i>Myrtales</i> .					Alliance LIV. <i>Cinchonales</i> .				
Order 274. Combretaceæ, 717	22	200			Order 291. Vacciniaceæ, 757	13	200		
— 275. Alangiaceæ, 719	3	8			— 292. Columelliaceæ, 759	1	3		
— 276. Chamælauciaceæ, 721	15	50			— 293. Cinchonaceæ, 761	269	2500		
— 277. Haloragaceæ, 722	8	70			— 294. Caprifoliaceæ, 766	14	220		
— 278. Onagraceæ, 724	28	450			— 295. Galiaceæ, 768	8	320	305	3243
— 279. Rhizophoraceæ, 726	5	20			Alliance LV. <i>Umbellales</i> .				
— 280. Belvisiaceæ, 728	2	4			Order 296. Apiaceæ, 773	267	1500		
— 281. Melastomaceæ, 731	118	1200			— 297. Araliaceæ, 780	21	160		
— 282. Myrtaceæ, 734	45	1300			— 298. Cornaceæ, 782	9	40		
— 283. Lecythidaceæ, 739	7	38	253	3340	— 299. Hamamelidaceæ, 784	10	15		
Alliance LII. <i>Cactales</i> .					— 300. Bruniaceæ, 785	15	65	322	1780
Order 284. Hamaliaceæ, 742	8	30			Alliance LVI. <i>Asarales</i> .				
— 285. Loasaceæ, 744	15	70			Order 301. Santalaceæ, 787	18	110		
— 286. Cactaceæ, 746	16	800	39	900	— 302. Loranthaceæ, 789	23	412		
Alliance LIII. <i>Grossales</i> .					— 303. Aristolochiaceæ, 792	8	130	49	652
Order 287. Grossulariaceæ, 750	2	95			Total				
— 288. Escalloniaceæ, 752	7	60						6191	66225
— 289. Philadelphaceæ, 753	3	25							
Order 290. Barringtoniaceæ, 754	10	23	22	208					

GRAND TOTAL.

Class	Genera.	Species.
I. Thallogens	939	8394
— II. Acrogens	310	4086
— III. Rhizogens	21	53
— IV. Endogens	1420	13684
— V. Dictyogens	17	268
— VI. Gymnogens	37	210
— VII. Exogens	6191	66225
Total	8935	92930

ARTIFICIAL ANALYSIS

OF THE NATURAL ORDERS.

CLASS I. THALLOGENS.

Nourished by spawn or mycelium (<i>Fungales</i>).	
Spores in fours.	
Hymenium naked.	Agaricaceæ, 41
Hymenium inclosed in a peridium	Lycoperdaceæ, 41
Spores or spore cases single.	
Spores naked.	
Thallus obsolete	Uredinaceæ, 41
Thallus floccose	Botrytaceæ, 41
Spores inclosed,	
in asci	Helvellaceæ, 41
in a veil or sporangium	Mucoraceæ, 41
Without spawn.	
Aquatics (<i>Algae</i>).	
Crystalline angular, multiplied by disarticulation	Diatomaceæ, 12
Vesicular, or filamentous, or membranous, multiplied by zoospores	Confervaceæ, 14
Cellular or tubular.	
Multiplied by simple spores	Fucaceæ, 20
" " tetraspores	Ceramiceæ, 23
" " spiral coated nucules	Characeæ, 26
Terrestrial (<i>Lichenales</i>).	
Spores naked	Graphidaceæ, 50
Spores in asci.	
Thallus gelatinous or cartilaginous	Collemaçceæ, 50
Thallus pulverulent or cellular	Parmeliaceæ, 50

CLASS II. ACROGENS.

§ With no distinct axis of growth.

Spores without elaters	Rhizaceæ, 57
Spores furnished with elaters.	
Spore cases opening into valves	Jungermanniaceæ, 59
" " valveless	Marchantiaceæ, 58

§§ With a distinct axis of growth.

Spores furnished with elaters,	
inclosed in cases, opening into valves	Jungermanniaceæ, 59
naked, collected in cones	Equisetaceæ, 61
Spores without elaters.	
Spore cases seated on leaves,	
ringed	Polypodiaceæ, 78
ringless	Danaeaceæ, 82
Spore cases inclosed within the edge of a contracted leaf	Ophioglossaceæ, 77
Spore cases inclosed within an involucre	Marsiliaceæ, 71
Spore cases naked,	
sessile in the axil of leaves or bracts	Lycopodiaceæ, 60
stalked,	
valveless	Bryaceæ, 64
opening into valves	Andraceæ, 63

CLASS III. RHIZOGENS.

Ovules solitary	Balanophoraceæ, 91
Ovules indefinite.	
Anthers opening by slits	Cytinaceæ, 91
" " pores	Rafflesiaceæ, 93

CLASS IV. ENDOGENS.

* *Flowers complete (having distinct floral envelopes).*§ *Ovary inferior.*† *Flowers gynandrous.*

Ovary 1-celled. Seed-coat loose	<i>Orchidaceæ</i> , 175
Ovary 3-celled	<i>Apostasiaceæ</i> , 184

†† *Flowers not gynandrous.*

Veins of leaves diverging from the midrib.	
Anther 1, with 1 cell	<i>Marantaceæ</i> , 168
Anther 1, with 2 cells	<i>Zingiberaceæ</i> , 165
Anthers 5, or 6	<i>Muscæ</i> , 160
Veins of leaves parallel with midrib.	
Stamens 3.	
Anthers turned outwards	<i>Iridaceæ</i> , 159
Anthers turned inwards. (Fruit winged)	<i>Burmamiaceæ</i> , 171
Stamens 6.	
Leaves fiat.	
Fruit 3-celled. Sepals corolline.	
Radicie remote from hilum, which is strophiolate	<i>Hyppoxidaceæ</i> , 154
— next the hilum	<i>Amaryllidaceæ</i> , 155
Fruit 3-celled. Sepals calycine	<i>Bromeliaceæ</i> , 147
Fruit 1-celled	<i>Taccaceæ</i> , 149
Leaves equitant	<i>Hamodoraceæ</i> , 151
Stamens more than 6	<i>Hydrocharaceæ</i> , 111

§§ *Ovary superior.*

Sepals calycine or glumaceous.	
Carpels separate, more or less.	
Placentæ spread over the dissepiments	<i>Butomaceæ</i> , 208
Placentæ narrow	<i>Alismaceæ</i> , 209
Carpels combined in a solid pistil.	
Petals quite distinct from the calyx.	
Placentæ axile	<i>Commelinaceæ</i> , 188
Placentæ parietal	<i>Mayaceæ</i> , 189
Petals undistinguishable from the calyx.	
Flowers scattered	<i>Juncaceæ</i> , 191
Flowers on a spadix	<i>Orontiaceæ</i> , 193
Sepals corolline.	
Carpels more or less separate.	
Seeds solitary	<i>Palmaceæ</i> , 133
Seeds numerous.	
Anthers turned outwards	<i>Melanthaceæ</i> , 198
Anthers turned inwards.	
Floral envelopes 6	<i>Butomaceæ</i> , 208
Floral envelopes 2	<i>Philydraceæ</i> , 146
Carpels combined in a solid pistil.	
Petals rolled inwards after flowering	<i>Pontederaceæ</i> , 206
Petals not rolled inwards after flowering.	
Flowers with external appendages	<i>Gilliesiaceæ</i> , 196
Flowers without external appendages	<i>Liliaceæ</i> , 200

** *Flower incomplete (having no distinct floral envelopes except leaves).*§ *Flowers glumaceous.*

Stems hollow	<i>Graminaceæ</i> , 106
Stems solid.	
Carpel solitary. Seed erect	<i>Cyperaceæ</i> , 117
Carpel solitary. Seed pendulous	<i>Restiaceæ</i> , 121
Carpels several, distinct.	
Glumes only	<i>Desvantiaceæ</i> , 120
A membranous cup within the glumes	<i>Eriocaulaceæ</i> , 122
Carpels several, combined.	
Placentæ parietal	<i>Xyridaceæ</i> , 187
Placentæ central	<i>Restiaceæ</i> , 121

§§ *Flowers naked; or with a few verticillate leaves.*† *Flowers on a spadix.*

Fruit drupaceous	<i>Pandanaceæ</i> , 130
Fruit berried. Leaves in the bud convolute	<i>Araceæ</i> , 127
Fruit dry. Anthers clavate on weak filaments	<i>Typhaceæ</i> , 126

†† *Flowers not on a spadix.*

Floater. Ovules pendulous.	
Pollen globose	<i>Naiadaceæ</i> , 143
Pollen coniferoid	<i>Zosteraceæ</i> , 145
Terrestrial. Ovules erect	<i>Juncaginaceæ</i> , 210
Floater. Ovules erect	<i>Pistiaceæ</i> , 124

CLASS V. DICTYOGENS.

Ovary inferior	<i>Dioscoreaceæ</i> , 214
Ovary superior.	
Carpels distinct, 00	<i>Triuridaceæ</i> , 213
Carpels consolidated.	
Placentæ axile.	
Flowers hexapetaloidous	<i>Smilacæ</i> , 215
— tripetaloidous	<i>Trilliaceæ</i> , 218
Placentæ basal	<i>Roxburghiaceæ</i> , 219
Placentæ parietal	<i>Philesiaceæ</i> , 217

CLASS VI. GYMNOGENS.

Stem jointed	<i>Gnetaceæ</i> , 232
— continuous.	
Leaves pinnate	<i>Cycadeaceæ</i> , 223
— simple.	
Females in cones	<i>Pinaceæ</i> , 227
— solitary	<i>Taxaceæ</i> , 230

CLASS VII. EXOGENS.

POLYPETALOUS.

* POLYANDROUS. *Stamens more than 20.*§ *Ovary inferior, or partially so.*† *Leaves furnished with stipules.*

‡ <i>Carp. more or less distinct (at least as to the styles); or solitary</i>	<i>Pomaceæ</i> , 559
‡‡ <i>Carpels wholly combined into a solid pistil, with more placentas than one.</i>	
Placentas central.	
Leaves opposite	<i>Rhizophoraceæ</i> , 726
Leaves alternate; Flowers irregular	<i>Lecythidaceæ</i> , 739
Placentas parietal	<i>Ifomatiaceæ</i> , 742

†† *Leaves without stipules.*

‡ <i>Carp. more or less distinct (at least as to the styles).</i>	
Carpels numerous, quite inferior	<i>Anonaceæ</i> , 430
‡‡ <i>Carpels wholly combined into a solid pistil.</i>	
Placentas spread over the surface of the dissepiments	<i>Nymphaeaceæ</i> , 409
Placentas parietal.	
Petals definite in number, distinct from calyx	<i>Loasaceæ</i> , 744
Petals indefinite in number, confused with the calyx	<i>Cactaceæ</i> , 746
Placentas in the axis.	
Leaves marked with little transparent dots.	
Ovary one-celled. Embryo homogeneous	<i>Chamaelauciaceæ</i> , 721
Ovary with more than one cell. Cotyledons distinct	<i>Myrtaceæ</i> , 734
Leaves dotless.	
Petals indefinite in number, very numerous	<i>Mesembryaceæ</i> , 525
Petals definite in number, narrow and strap-shaped	<i>Alangiaceæ</i> , 719
round and concave.	
Style 1	<i>Barringtoniaceæ</i> , 754
Styles disunited	<i>Philadelphiceæ</i> , 753

§§ *Ovary wholly superior.*† *Leaves furnished with stipules.*

‡ <i>Carp. more or less distinct (at least as to the styles); or solitary.</i>	
Stamens hypogynous.	
Carpel solitary	<i>Fibaceæ</i> , 544
Carpels 00	<i>Magnoliaceæ</i> , 447
Stamens perigynous.	
Styles from the apex of the carpels.	
Carpel 1	<i>Drupaceæ</i> , 557
Carpels more than 1	<i>Rosaceæ</i> , 563
Styles from the base of the carpels	<i>Chrysobalanaceæ</i> , 542
‡‡ <i>Carpels wholly combined into a solid pistil, with more placentas than one.</i>	
Placentas parietal.	
Leaves marked with round transparent dots	<i>Flacourtiaceæ</i> , 327
Leaves marked with round and linear transparent dots intermixed	<i>Samydaceæ</i> , 330
Placentas in the axis. (<i>See next page</i>)	

Calyx with an imbricated aestivation.	
Flowers unisexual	<i>Euphorbiaceæ</i> , 274
Flowers hermaphrodite.	
Ovary 1-celled. Sepals 2	<i>Portulacaceæ</i> , 500
Ovary with more cells than one.	
Calyx double	<i>Chlænaceæ</i> , 486
Calyx single	<i>Cistaceæ</i> , 349
Calyx with a valvate aestivation.	
Stamens monadelphous. Anthers 2-celled.	
Stamens columnar, all perfect	<i>Sterculiaceæ</i> , 360
Stamens not columnar, partly sterile	<i>Byttneriaceæ</i> , 363
Stamens monadelphous. Anthers 1-celled	<i>Malvaceæ</i> , 368
Stamens monadelphous. Calyx irregular and enlarged in the fruit	<i>Dipteraceæ</i> , 393
Stamens quite distinct	<i>Tiliaceæ</i> , 371
++ <i>Leaves without stipules.</i>	
‡ <i>Carp. more or less distinct (at least as to the styles); or solitary.</i>	
Carpels immersed in a fleshy table-shaped disk	<i>Nelumbiaceæ</i> , 414
Carpels not immersed in a disk.	
Stamens perigynous.	
Carpel 1	<i>Drupaceæ</i> , 557
Carpels more than 1	<i>Rosaceæ</i> , 563
Stamens hypogynous.	
Embryo in vitellus	<i>Cabombaceæ</i> , 412
Embryo naked, very minute.	
Seeds with an aril	<i>Dilleniaceæ</i> , 423
Seeds without an aril. Albumen fleshy.	
Flowers ♀	<i>Ranunculaceæ</i> , 425
Flowers ♂ ♀	<i>Schizandraceæ</i> , 305
Seeds usually without an aril. Albumen aromatic and ruminant nearly as long as seed.	<i>Anonaceæ</i> , 420
Calyx much imbricated.	
Fruit a legume	<i>Fabaceæ</i> , 544
Fruit not a legume.	
Seeds smooth	<i>Hypericaceæ</i> , 405
Seeds hairy	<i>Reaumuriaceæ</i> , 407
Calyx but little imbricated.	
Fruit not a legume	<i>Anacardiaceæ</i> , 465
Fruit a legume	<i>Fabaceæ</i> , 544
†† <i>Carpels wholly combined into a solid pistil, with more placentas than one.</i>	
Placentas parietal, in distinct lines.	
Anthers versatile. Juice watery	<i>Capparidaceæ</i> , 357
Anthers innate. Juice milky	<i>Papaveraceæ</i> , 430
Placentas parietal, spread over the lining of the fruit	<i>Flacourtiaceæ</i> , 327
Placentas spread over the dissepiments	<i>Nymphaeaceæ</i> , 409
Placentas in the axis.	
Stigma large, broad, and petaloid	<i>Sarraceniaceæ</i> , 429
Stigma simple.	
Ovary 1-celled, with free central placenta	<i>Portulacaceæ</i> , 500
Ovary many-celled.	
Calyx much imbricated.	
Leaves compound	<i>Rhizophoraceæ</i> , 398
Leaves simple.	
Petals equal in number to sepals.	
Seeds few	<i>Clusiaceæ</i> , 400
Seeds numerous. Petals flat	<i>Marcgraviaceæ</i> , 403
Seeds numerous. Petals crumpled	<i>Cistaceæ</i> , 349
Calyx but little, or not at all, imbricated.	
Stamens perigynous. Calyx tubular	<i>Lythraceæ</i> , 574
Stamens hypogynous. Calyx many-leaved	<i>Humiriaceæ</i> , 447
** OLIGANDROUS. <i>Stamens fewer than 20.</i>	
§ <i>Ovary inferior, or partially so.</i>	
† <i>Leaves furnished with stipules.</i>	
Placentas parietal	<i>Homaliaceæ</i> , 712
Placentas in the axis.	
Flowers completely unisexual	<i>Begoniaceæ</i> , 318
Flowers hermaphrodite or polygamous.	
Stamens equal to the petals and opposite them	<i>Rhamnaceæ</i> , 581
Stamens, if equal to the petals, alternate with them.	
Leaves opposite	<i>Rhizophoraceæ</i> , 726
Leaves alternate	<i>Hamamelidaceæ</i> , 722
++ <i>Leaves destitute of stipules.</i>	
Placentas parietal.	
Flowers completely unisexual	<i>Cucurbitaceæ</i> , 511
Flowers hermaphrodite or polygamous	<i>Grossulaceæ</i> , 750
Placentas in the axis.	
Flowers in umbels. Styles 2	<i>Apiaceæ</i> , 773
Flowers in umbels. Styles 3 or more	<i>Araliaceæ</i> , 780

Flowers not in umbels.

Carpel solitary.	
Petals strap-shaped. Stamens distinct	<i>Alangiaceæ</i> , 719
Petals very narrow. Stamens growing on them	<i>Loranthaceæ</i> , 789
Petals oblong. Leaves insipid.	
Cotyledons convolute	<i>Combretaceæ</i> , 717
Cotyledons flat	<i>Haloragaceæ</i> , 722
Petals oblong. Leaves balsamic	<i>Anacardiaceæ</i> , 465
Carpels divaricating at the apex.	
Leaves alternate. Herbs	<i>Saxifragaceæ</i> , 567
Leaves opposite. Shrubs	<i>Hydrangeaceæ</i> , 569
Carpels parallel, combined.	
Calyx valvate. Petals opposite stamens	<i>Rhamnaceæ</i> , 581
Calyx valvate. Petals alternate with stamens or isomerous.	
Albumen 0	<i>Onagraceæ</i> , 724
Albumen copious	<i>Cornaceæ</i> , 782
Calyx not valvate.	
Stamens doubled downwards. Leaves ribbed	<i>Melastomaceæ</i> , 731
Stamens only curved. Anthers short.	
Leaves dotted	<i>Myrtaceæ</i> , 734
Leaves not dotted.	
Parts of flower 4.	
Ovules horizontal or ascending	<i>Onagraceæ</i> , 724
Ovules pendulous	<i>Haloragaceæ</i> , 722
Parts of flower not 4. Seeds many.	
Leafy	<i>Escalloniaceæ</i> , 752
Scaly parasites	<i>Monotropaceæ</i> , 452
Parts of flower not 4. Seeds few	<i>Bruniaceæ</i> , 785
§§ <i>Ovary wholly superior.</i>	
† <i>Leaves furnished with stipules.</i>	
‡ <i>Carpels distinct or solitary.</i>	
Anthers with recurved valves	<i>Berberidaceæ</i> , 437
Anthers with longitudinal valves.	
Style from base of carpel	<i>Chrysobalanaceæ</i> , 542
Style from apex of carpel. Fruit leguminous	<i>Fabaceæ</i> , 544
Style from apex of carpel. Fruit drupaceous or capsular	<i>Rosaceæ</i> , 563
‡‡ <i>Carpels wholly combined; with more placentas than one.</i>	
Placentas parietal.	
Flowers with a ring of appendages	<i>Passifloraceæ</i> , 332
Flowers without any ring of appendages.	
Leaves with round and oblong transparent dots	<i>Samydaceæ</i> , 330
Leaves dotless, circinate when young	<i>Droseraceæ</i> , 433
Leaves dotless, straight when young. Fruit capsular	<i>Violaceæ</i> , 338
Leaves dotless, straight when young. Fruit siliquose	<i>Moringaceæ</i> , 336
Placentas in the axis.	
Styles distinct to the base.	
Calyx in a broken whorl, much imbricated	<i>Elatinaceæ</i> , 480
Calyx but little imbricated, in a complete whorl.	
Flowers unisexual	<i>Euphorbiaceæ</i> , 274
Flowers hermaphrodite or polygamous.	
Petals minute	<i>Ulcaceæ</i> , 499
Petals conspicuous. Stamens hypogynous	<i>Malpighiaceæ</i> , 388
Petals conspicuous. Stamens perigynous. Leaves opposite	<i>Cunoniaceæ</i> , 571
Petals conspicuous. Stamens perigynous. Leaves alternate	<i>Saxifragaceæ</i> , 567
Calyx valvate	<i>Tiliaceæ</i> , 371
Styles more or less combined. Gynobasic.	
Gynobase fleshy	<i>Ochnaceæ</i> , 474
Gynobase dry. Leaves regularly opposite	<i>Zygophyllaceæ</i> , 478
Gynobase dry. Leaves alternate more or less.	
Fruit beaked	<i>Geraniaceæ</i> , 493
Fruit not beaked	<i>Oxalidaceæ</i> , 488
Styles more or less combined. Not gynobasic.	
Calyx much imbricated, in a broken whorl.	
Flowers spurred	<i>Vochyaceæ</i> , 379
Flowers not spurred, calyculate	<i>Chlamaceæ</i> , 486
Flowers not spurred, naked	<i>Sapindaceæ</i> , 382
Calyx but little imbricated, in a complete whorl.	
Leaves compound. Sepals more than two	<i>Staphyleaceæ</i> , 381
Leaves simple. Sepals more than two	<i>Malpighiaceæ</i> , 388
Leaves simple. Sepals only two	<i>Portulacaceæ</i> , 500
Calyx valvate or open.	
Stamens columnar	<i>Sterculiaceæ</i> , 360
Stamens not columnar.	
Stamens opposite to petals if equal to them in number.	
Perigynous	<i>Rhamnaceæ</i> , 581
Hypogynous	<i>Vitaceæ</i> , 439
Stamens alternate with petals if equal to them in number.	
Anthers opening by pores	<i>Tiliaceæ</i> , 371
Anthers opening by slits. Petals split	<i>Chaetothaceæ</i> , 583
Anthers opening by slits. Petals undivided	<i>Amygdaceæ</i> , 459

†† *Leaves destitute of stipules.*

‡ *Carpels more or less distinct, or solitary.*

Anthers with recurved valves	<i>Berberidaceæ</i> , 437
Anthers with longitudinal valves.	
Fruit leguminous. Radicle next hilum	<i>Fabaceæ</i> , 544
Fruit leguminous. Radicle remote from hilum	<i>Connaraceæ</i> , 468
Fruit not leguminous.	
Carpels each with an hypogynous scale	<i>Crassulaceæ</i> , 344
Carpels each with two hypogynous scales	<i>Francoaceæ</i> , 451
Carpels without hypogynous scales.	
Albumen very abundant. Embryo minute.	
Flowers ♂ ♀	<i>Lardizabalaceæ</i> , 303
Flowers ♀.	
Embryo in vitellus	<i>Cobombaceæ</i> , 412
Embryo naked.	
Herbs. Albumen solid	<i>Ranunculaceæ</i> , 425
Shrubs. Albumen ruminant	<i>Anonaceæ</i> , 420
Albumen in small quantity or wholly wanting.	
Carpels several, all perfect :	
inlosed in the tube of the calyx	<i>Calycanthaceæ</i> , 540
naked. Flowers unisexual	<i>Menispermaceæ</i> , 307
Carpels solitary, or all but one imperfect.	
Leaves dotted	<i>Amyridaceæ</i> , 459
Leaves dotless	<i>Anacardiaceæ</i> , 465

†† *Carpels combined into a solid pistil.*

Placentas parietal.	
Stamens tetradynamous	<i>Brassicaceæ</i> , 351
Stamens not tetradynamous.	
Flowers with a ring or crown of sterile stamens.	
Sexes distinct.	
Female flower coronetted	<i>Pangiaceæ</i> , 323
" " not coronetted	<i>Papayaceæ</i> , 321
Sexes combined. Placentas lining the fruit	<i>Flacourtiaceæ</i> , 327
Sexes combined. Placentas in rows. Ovary stalked	<i>Malesherbiaceæ</i> , 335
Flowers without sterile stamens.	
Hypogynous disk large. Stamens indefinite	<i>Cappariaceæ</i> , 357
Hypogynous disk large. Stamens definite	<i>Resedaceæ</i> , 356
Hypogynous disk small or wanting.	
Albumen very abundant. Embryo minute	<i>Papaveraceæ</i> , 430
Albumen in small quantity, or wholly wanting.	
Calyx 5-leaved	<i>Turneraceæ</i> , 347
Calyx tubular	<i>Frankeniaceæ</i> , 340
Placentas covering the dissepiments	<i>Nymphaeaceæ</i> , 409
Placentas axile.	
Styles distinct to the base.	
Calyx valvato	<i>Vivianiaceæ</i> , 365
Calyx in a broken whorl, much imbricated.	
Seeds hairy	<i>Reaumuriaceæ</i> , 407
Seeds smooth. Stamens polyadelphous	<i>Hypericaceæ</i> , 405
Seeds smooth. Stamens monadelphous or free	<i>Liniaceæ</i> , 485
Calyx but little imbricated, in a complete whorl.	
Carpels each with an hypogynous scale	<i>Crassulaceæ</i> , 344
Carpels destitute of hypogynous scales.	
Carpels 2, divaricating at the apex	<i>Saxifragaceæ</i> , 567
Carpels not divaricating at apex	<i>Caryophyllaceæ</i> , 495
Styles more or less combined. Gynobasic.	
Stamens arising from seales	<i>Simarubaceæ</i> , 476
Stamens not arising from seales.	
Styles wholly combined. Flowers hermaphrodite	<i>Rutaceæ</i> , 469
Styles wholly combined. Flowers unisexual	<i>Xanthoxylaceæ</i> , 472
Styles divided at point. Flowers irregular	<i>Balsaminaceæ</i> , 490
Styles more or less combined. Not gynobasic.	
Calyx much imbricated, in a broken whorl.	
Flowers symmetrical	<i>Clusiaceæ</i> , 400
Flowers unsymmetrical.	
Flowers regular.	
Petals without appendages	<i>Acraceæ</i> , 387
Petals with appendages	<i>Sapinduceæ</i> , 382
Flowers papilionaceous	<i>Polygalaceæ</i> , 375
Calyx but little imbricated, in a complete whorl.	
Carpels 4 or more. Anthers opening by pores.	
Embryo in the axis	<i>Ericaceæ</i> , 453
Embryo (very minute) at the base	<i>Pyrolaceæ</i> , 450
Carpels 4 or more. Anthers opening by slits.	
Seeds winged.	
Leafy	<i>Cedrelaceæ</i> , 461
Scaly (parasites)	<i>Monotropaceæ</i> , 452
Seeds wingless.	
Stamens united into a long tube	<i>Meliaceæ</i> , 463
Stamens free or nearly so.	
Leaves dotted. Seeds amygdaloid	<i>Aurantiacæ</i> , 457

Leaves dotless. Seeds minute 00.	
Leafy	. . . . . <i>Brexiacca</i> , 573
Scaly parasites	. . . . . <i>Monotropacea</i> , 452
Carpels fewer than 4.	
Flowers unisexual	. . . . . <i>Empetracea</i> , 285
Flowers hermaphrodite.	
Sepals 2	. . . . . <i>Portulacacea</i> , 500
Sepals more than 2.	
Stamens hypogynous.	
Seeds comose	. . . . . <i>Tamaricacea</i> , 341
Seeds naked.	
Ovules ascending or horizontal	. . . . . <i>Pittosporacea</i> , 441
Ovules pendulous	. . . . . <i>Cyrtillacea</i> , 445
Stamens perigynous.	
Ovules ascending	. . . . . <i>Celastracea</i> , 586
Ovules suspended	. . . . . <i>Branziacea</i> , 785
Calyx valvate or open.	
Anthers opening by pores	. . . . . <i>Tremandracea</i> , 374
Anthers opening by slits.	
Stamens if equal in number to petals opposite them	. . . . . <i>Rhamnacea</i> , 581
Stamens if equal in number to petals alternate with them.	
Leaves pinnate	. . . . . <i>Amyridacea</i> , 459
Leaves simple. Calyx tubular. Stamens hypogynous	. . . . . <i>Oleacea</i> , 443
Leaves simple. Calyx tubular. Stamens perigynous	. . . . . <i>Lythracea</i> , 574

APETALOUS.

* ACHLAMYDEOUS.

† Leaves furnished with stipules.

Ovules very numerous.	
Seeds winged	. . . . . <i>Allingiacea</i> , 253
Seeds comose	. . . . . <i>Salicacea</i> , 254
Ovules solitary or very few.	
Flowers hermaphrodite.	
Stamens unilateral	. . . . . <i>Chloranthacea</i> , 519
Stamens whorled	. . . . . <i>Saururacea</i> , 521
Flowers unisexual.	
Carpels solitary. Ovule erect	. . . . . <i>Myricacea</i> , 256
Carpels solitary. Ovule pendulous	. . . . . <i>Platanacea</i> , 272
Carpels triple	. . . . . <i>Euphorbiacea</i> , 274

†† Leaves destitute of stipules.

Ovules very numerous	. . . . . <i>Podostemacea</i> , 482
Ovules solitary or very few.	
Flowers hermaphrodite.	
Embryo in vitellus	. . . . . <i>Piperacea</i> , 515
Embryo without vitellus	. . . . . <i>Oleacea</i> , 616
Flowers unisexual.	
Flowers naked. Carpel single	. . . . . <i>Myricacea</i> , 256
Flowers naked. Carpels double	. . . . . <i>Callitrichacea</i> , 284
Flowers in an involucre. Anther-valves recurved	. . . . . <i>Atherospermeacea</i> , 300
Flowers in an involucre. Anther-valves slit	. . . . . <i>Monimiacea</i> , 298

** MONOCHLAMYDEOUS.

§ Ovary inferior, or partially so.

† Leaves furnished with stipules.

Flowers hermaphrodite	. . . . . <i>Aristolochiacea</i> , 792
Flowers unisexual. Fruit in a cupule	. . . . . <i>Corylacea</i> , 290
Flowers unisexual. Fruit naked:	
many-seeded	. . . . . <i>Begoniacea</i> , 318
one-seeded	. . . . . <i>Artocarpacea</i> , 269

†† Leaves destitute of stipules.

Flowers unisexual, amentaceous.	
Leaves simple, alternate	. . . . . <i>Myricacea</i> , 256
Leaves simple, opposite	. . . . . <i>Garryacea</i> , 295
Leaves compound	. . . . . <i>Juglandacea</i> , 292
Flowers unisexual, not amentaceous.	
Seeds immersed in pulp	. . . . . <i>Cucurbitacea</i> , 311
Seeds dry:	
numerous, parietal	. . . . . <i>Dalicacea</i> , 316
solitary, axile	. . . . . <i>Helwingiacea</i> , 296
Flowers hermaphrodite or polygamous.	
Leaves with transparent dots	. . . . . <i>Myrtacea</i> , 734
Leaves without dots.	
Ovary 3-6-celled, polyspermeous	. . . . . <i>Aristolochiacea</i> , 792
Ovary 1-celled. Anther-valves slit. (See next page.)	

Embryo straight; cotyledons convolute	Combricaceæ, 717
Embryo straight; cotyledons flat.	
Albumen noac	Haloragaceæ, 722
Albumen fleshy	Santalaceæ, 787
Embryo curved; cotyledons flat	Chenopodiaceæ, 512
Ovary 1-celled. Anther many-celled	Loranthaceæ, 789
Ovary with more cells than 1, but neither 3 nor 6.	
Embryo straight	Haloragaceæ, 722
Embryo curved	Tetragoniaceæ, 527

§§ Ovary superior.

+ Leaves furnished with stipules.

Flowers hermaphrodite.	
Sepals 2	Portulacaceæ, 500
Sepals more than 2.	
Carpels more than 1, combined into a solid pistil.	
Stamens hypogynous. Placentas parietal	Flacourtiaceæ, 327
Stamens hypogynous. Placentas in the axis.	
Calyx valvate. Stamens monadelphous:	
partly sterile	Byttneriaceæ, 363
all fertile	Sterculiaceæ, 360
Calyx valvate. Stamens distinct	Tiliaceæ, 371
Calyx imbricated. Fruit beaked	Geraniaceæ, 493
Calyx imbricated. Fruit not beaked	Malpighiaceæ, 388
Stamens perigynous. Placentas parietal	Passifloraceæ, 332
Stamens perigynous. Placentas in the axis.	
Leaves opposite. Stamens more than sepals	Cunoniaceæ, 571
Leaves alternate. Stamens alternate with sepals	Rhamnaceæ, 581
Leaves alternate. Calyx membranous and ragged	Ulmaceæ, 580
Carpels solitary, or quite separate.	
Calyx membranous (stamens hypogynous)	Illecebraceæ, 499
Calyx firm and herbaceous.	
Styles from the base of carpels	Chrysobalanaceæ, 542
Styles terminal; one to each ovary.	
Fruit leguminous	Fabaceæ, 544
Fruit not leguminous	Sanguisorbaceæ, 561
Styles terminal; three to each ovary.	
Stipules ochreate	Polygonaceæ, 502
Stipules simple	Phytolaccaceæ, 509
Flowers unisexual.	
Carpels more than 1, combined into a solid pistil.	
Flowers amentaceous. Seeds arillate	Scopaceæ, 283
Flowers amentaceous. Seeds not arillate	Betulaceæ, 251
Flowers amentaceous. Seeds numerous. Placentas parietal	Laciniaceæ, 329
Flowers not amentaceous	Euphorbiaceæ, 274
Carpels solitary.	
Cells of anthers perpendicular to the filament	Stilaginaceæ, 259
Cells of anthers parallel with the filament.	
Embryo straight:	
albuminous. Stipules small	Urticaceæ, 260
exalbuminous. Stipules large	Artocarpaceæ, 269
Embryo hooked:	
exalbuminous	Cannabinaceæ, 265
albuminous	Moraceæ, 266

++ Leaves destitute of stipules.

Flowers hermaphrodite.	
Sepals 2	Portulacaceæ, 500
Sepals more than 2.	
Carpels more than 1, combined into a solid pistil.	
Placentas parietal, in lines	Papavraceæ, 430
Placentas parietal, lining the pericarp	Flacourtiaceæ, 327
Placentas in the axis.	
Ovary with a very small number of ovules.	
Calyx short, herbaceous Gynobasic	Rutaceæ, 469
Calyx short, herbaceous, not gynobasic.	
Embryo curved round mealy albumina	Phytolaccaceæ, 509
Embryo straight	Celastraceæ, 586
Calyx tubular, coloured	Penaceæ, 577
Ovary with numerous ovules.	
Two divaricating carpels	Saxifragaceæ, 567
Carpels not divaricating. Stamens hypogynous.	
Leaves opposite	Caryophyllaceæ, 496
Leaves alternate	Podostemaceæ, 482
Carpels not divaricating. Stamens perigynous.	
Fruit 1-celled	Primulaceæ, 644
Fruit many-celled	Lythraceæ, 574
Carpels solitary or quite separate.	
Carpels several. Stamens hypogynous	Ranunculaceæ, 425
Carpel single.	
Anther-valves recurved. Leafy	Lauraceæ, 535
Anther-valves recurved. Leafless	Cassylthaceæ, 538
Anther-valves slit.	
Fruit a legume	Fabaceæ, 519

Fruit not a legume.	
Calyx long or tubular, with a hardened base	<i>Nyctaginaceæ</i> , 506
Calyx long or tubular, with a hardened tube	<i>Scleranthaceæ</i> , 528
Calyx long or tubular, no where hardened.	
Stamens in the points of the sepals	<i>Protuceæ</i> , 532
Stamens not in the points of the sepals.	
Ovules erect	<i>Elæagnaceæ</i> , 257
Ovules pendulous.	
Fruit 2-valved	<i>Aquilariaceæ</i> , 579
Fruit indehiscent. Calyx naked	<i>Thymelaceæ</i> , 530
Calyx short, not tubular, or but little so.	
Leaves lepidote.	<i>Elæagnaceæ</i> , 257
Leaves dotted, not lepidote	<i>Amyridaceæ</i> , 459
Leaves neither dotted nor lepidote.	
Flowers in involucls	<i>Polygonaceæ</i> , 502
Flowers naked.	
Calyx dry and coloured	<i>Amarantaceæ</i> , 510
Calyx herbaceous or succulent.	
Stamens hypogynous	<i>Chenopodiaceæ</i> , 512
Stamens perigynous	<i>Basellaceæ</i> , 524
Flowers unisexual.	
Carpels more than one, combined into a solid pistil.	
Ovules indefinite in number.	
Stamens columnar	<i>Nepenthaceæ</i> , 287
Ovules definite in number.	
Leaves alternate, dotted	<i>Xanthoxylaceæ</i> , 472
Leaves alternate, not dotted	<i>Euphorbiaceæ</i> , 274
Carpels solitary, or quite separate.	
Calyx tubular, trifid	<i>Myristicaceæ</i> , 301
Calyx open, carpels several	<i>Menispermaceæ</i> , 307
Calyx open, carpel solitary.	
Embryo straight (without albumen)	<i>Casuarinaceæ</i> , 249
Embryo curled round mealy albumen)	<i>Chenopodiaceæ</i> , 512

MONOPETALOUS.

* *Ovary superior. Flowers regular.*

† <i>Ovary 3-4-5-lobed.</i>	
Leaves dotted.	<i>Rutaceæ</i> , 469
Leaves dotless. Inflorescence gyrate	<i>Boraginaceæ</i> , 655
Leaves dotless. Inflorescence straight.	
Corolla with a plaited revivation	<i>Nolanaceæ</i> , 654
Corolla with a flat aestivation	<i>Stackhousiaceæ</i> , 589
†† <i>Ovary not lobed.</i>	
Carpels from 4 to 5, or none.	
Anthers opening by pores.	
Seeds winged. Herbs	<i>Pyrolaceæ</i> , 450
Anthers 2-celled. Seeds wingless. Shrubs	<i>Ericaceæ</i> , 453
Anthers 1-celled. Shrubs	<i>Epacridaceæ</i> , 448
Anthers opening by slits.	
Stamens equal in number to petals and opposite.	
Shrubs	<i>Myrsinaceæ</i> , 647
Herbs	<i>Primulaceæ</i> , 644
Stamens not opposite the petals if of the same number.	
Seeds indefinite.	
Carpels distinct	<i>Crassulaceæ</i> , 344
Carpels combined. Brown parasites	<i>Monotropaceæ</i> , 452
Seeds definite.	
Carpels distinct	<i>Anonaceæ</i> , 420
Carpels combined.	
Ovules erect.	
Aestivation of corolla imbricate	<i>Sapotaceæ</i> , 590
Aestivation of corolla plicate	<i>Convolvulaceæ</i> , 630
Ovules pendulous.	
Stamens twice as numerous as petals	<i>Ebenaceæ</i> , 595
Stamens same number as petals	<i>Aquifoliaceæ</i> , 597
Carpels usually three.	
Inflorescence gyrate	<i>Hydrophyllaceæ</i> , 638
Inflorescence straight.	
Flowers ♂?	<i>Papayaceæ</i> , 321
Flowers ♀.	
An hypogynous disk	<i>Polemoniaceæ</i> , 635
No hypogynous disk	<i>Diapensiaceæ</i> , 606
Carpels only two.	
Diandrous. Corolla valvate	<i>Oleaceæ</i> , 616
Diandrous. Corolla imbricate	<i>Jasminaceæ</i> , 650
Stamens 4 or more. Inflorescence gyrate.	
Fruit 1-celled	<i>Hydrophyllaceæ</i> , 638
Fruit 2-celled. Style bifid	<i>Elaeagnaceæ</i> , 653
Fruit 2-celled. Style dichotomous	<i>Cordiaceæ</i> , 628
Stamens 4 or more. Inflorescence straight.	
Calyx in a broken whorl.	
Leafy	<i>Convolvulaceæ</i> , 630
Scaly pariete	<i>Cuculaceæ</i> , 633

Calyx in a complete whorl.		
Flowers symmetrical. Carpels ∞		<i>Solanaceæ</i> , 618
Flowers symmetrical. Carpels (∞).		
Anthers grown to stigma		<i>Asclepiadaceæ</i> , 623
Anthers free from stigma.		
Corolla imbricated		<i>Gentianaceæ</i> , 612
Corolla valvate		<i>Loganiaceæ</i> , 602
Corolla contorted		<i>Apocynaceæ</i> , 59
Flowers unsymmetrical.		
Leaves with stipules		<i>Loganiaceæ</i> , 602
Leaves without stipules		<i>Stilbaceæ</i> , 607
Carpel single.		
Stigma with an indusium		<i>Brunoniaceæ</i> , 657
Stigma without an indusium.		
Style single.		
Fruit spuriously 2-celled		<i>Plantaginaceæ</i> , 642
Fruit 1-celled, 1-seeded		<i>Salvadoraceæ</i> , 652
Styles 5		<i>Plumbaginaceæ</i> , 640
	** <i>Ovary superior. Flowers irregular.</i>	
‡ <i>Ovary 4-lobed</i>		<i>Lamiaceæ</i> , 659
‡‡ <i>Ovary undivided.</i>		
Carpel solitary		<i>Selaginaceæ</i> , 666
Carpels two.		
Fruit nucamentaceous, 4-celled.		
Radicule inferior		<i>Verbenaceæ</i> , 663
Radicule superior		<i>Myoporaceæ</i> , 665
Fruit nucamentaceous, 2-celled.		
Anthers 1-celled		<i>Selaginaceæ</i> , 666
Anthers 2-celled		<i>Stilbaceæ</i> , 607
Fruit capsular or succulent.		
Placentæ parietal.		
Seeds amygdaloid.		
Fruit succulent, hard-shelled, many-seeded		<i>Crescentiaceæ</i> , 673
Fruit bony or capsular, few-seeded		<i>Pedaliaceæ</i> , 669
Seeds not amygdaloid.		
Leafy.		
Seeds winged		<i>Bignoniaceæ</i> , 675
Seeds wingless		<i>Gesneriaceæ</i> , 671
Scaly brown parasites		<i>Orobanchaceæ</i> , 609
Placentæ axile.		
Seeds albuminous		<i>Scrophulariaceæ</i> , 681
Seeds without albumen.		
Winged		<i>Bignoniaceæ</i> , 675
Wingless, attached to hard placental processes		<i>Acanthaceæ</i> , 678
Placenta free, central		<i>Lentibulariaceæ</i> , 686
	*** <i>Ovary inferior.</i>	
‡ <i>Carpels solitary.</i>		
Anthers syngenesious.		
Ovule pendulous		<i>Calycecraceæ</i> , 701
Ovule erect		<i>Asteraceæ</i> , 702
Anthers free.		
Carpel quite solitary		<i>Dipsacaceæ</i> , 699
Carpel with two additional abortive ones		<i>Valerianaceæ</i> , 697
‡‡ <i>Carpels more than one.</i>		
Anthers syngenesious		<i>Lobeliaceæ</i> , 692
Anthers free.		
Stamens only 2		<i>Columelliaceæ</i> , 759
Stamens more than 2.		
Anthers opening by pores		<i>Vacciniaceæ</i> , 757
Anthers opening by slits.		
Stigma naked.		
Pentandrous or tetrandrous		<i>Campanulaceæ</i> , 689
Polyandrous		<i>Belvisiaceæ</i> , 728
Gynandrous		<i>Stylidiaceæ</i> , 696
Stigma with an indusium		<i>Goodeniaceæ</i> , 694
Stigma without an indusium.		
Stipules absent. Seeds definite. Stigmas naked.		
Leaves alternate		<i>Ebenaceæ</i> , 595
Leaves opposite, and whorled. Stem square, rough		<i>Galiaceæ</i> , 759
Leaves opposite. Stem round, smooth		<i>Caprifoliaceæ</i> , 766
Stipules between the leaves.		<i>Cinchonaceæ</i> , 761

INDEX

OF THE

SCIENTIFIC AND VERNACULAR NAMES OF SPECIES, AND OF VEGETABLE PRODUCTS.

- Abelmoschus esculentus*, 369
 " *moschatus*, 369
Abies balsamea, 220
 " *canadensis*, 220
 " *Douglasii*, 225
 " *nigra*, 220
 " *pectinata*, 220
Abricot savage, of Cayenne, 740
Abroma angusta, 364
 " *mellifera*, fig., 506
Abrus precatorius, 547, 548
Abutilon esculentum, 360
 " *macropodium*, fig., 368
Acacia *Adansonii*, 552
 " *affinis*, 552
 " *arabica*, 552, 553
 " *Catechu*, 553
 " *cinerea*, 553
 " *concinna*, 553
 " *decurrens*, 552
 " *elata*, 553
 " *Farnesiana*, 553
 " *ferruginea*, 553
 " *lencophaea*, 553
 " *Kalkera*, 553
 " *mollissima*, 552
 " *nilotica*, 552, 553
 " *odoratissima*, 553
 " *xylocarpa*, 553
 " *speciosa*, 552, 553
 " *Seyal*, 552
 " *Sophera*, 552
 " *stipulacea*, 553
 " *sundra*, 553
 " *Verek*, fig., 552
Acæna Sanguisorba, 562
Acalypha Cujameni, 279
Acer campestre, fig., 387
 " *circinatum*, fig., 387
 " *saccharinum*, 287
Achillea Ageratum, 706
 " *Millefolium*, 706
 " *nobilis*, 706
 " *setacea*, 706
Achlya prolifera, 9, 16, 30, fig., 17
Achmanthes, 12, fig., 12
Achras Sapota, 501
 " *mammosa*, 501
Achyranthes arborescens, 510
 " *aspera*, 511
 " *fruticosa*, 511
 " *globulifera*, 511
 " *viridis*, 511
Acletolepta spathulata, fig., 701
Acid, *Comenic*, 431
 " *Gallic*, 291
 " *Malic*, 503, 500, 751
 " *Meconic*, 431
 " *Nitric*, 503
 " *Oxalic*, 503
 " *Prussic*, 500
 " *Quercitanic*, 291
Acid, *Pyromeconic*, 431
 " *Smilasperic*, 626
 " *Suberic*, 291
Ackawai Nutmeg, 536
Acocanthera venenata, 619
Acoita cavallos, 372
Aconitum Cammarum, 427
 " *ferox*, 427
 " *paniculatum*, 427
 " *Napellus*, 427
Acorus Calamus, 194
Acrocarpidium hispidulum, 518
Acrocomia sclerocarpa, 135
Acrodiclidium Camara, 536
Acrospermum cornutum, 35
Acrostalagmus cinnabarinus, fig., 44
Acrostichum furcatum, 112
 " *Huacsaro*, 79
Actæa racemosa, 427
 " *spicata*, 427
Acuyari, 460
Adenanthera pavonina, 553
Adenocarpus frankenioides, fig., 544
Adiantum Capillus Veneris, 79
 " *melaucaulon*, 79
 " *pedatum*, 79
Adoxa moschatellina, fig., 781
Echmea fulgens, fig., 148
Æginetia indica, 610
 " *abbreviata*, 610
Ægle marmelos, 458
Ægæon το μαζον, *Diosc.*, 345
Æollanthus suavis, 660
Æsculus Hippocastanum, 384
 " *ohiotensis*, 384
 " *of Virgil*, 291
Æthionema cristatum, fig., 355
Æthusa Cynapium, 777
Afonsea, fig., 545
African Hemp, 205
 " *Teak*, 281
Agallochum, 278
Agarie, *hymenium* of, fig., 29
 " *of the Olive*, 38
Agaricus bulbosus, 38
 " *campestris*, 34
 " *campestris*, var. *Swan River*, 38
 " *cantharellus*, 41
 " *cephalipes*, fig., 29
 " *comatus*, 33
 " *elixus*, fig., 33
 " *epicleysium*, 30
 " *fortens*, 29
 " *Gardneri*, 40
 " *olearius*, 40
 " *peronatus*, 37
 " *piperatus*, 41
 " *pluteus*, 33
 " *semiovatua*, fig., 23
 " *volvaceus*, 35
Agathophyllum aromaticum, 536
Agathotes chirayta, 614
Agati grandiflora, 547
Agave americana, 153, fig., 157
 " *mexicana*, 158
 " *cubensis*, 158
 " *saponaria*, 158
 " *vivipara*, 158
Agila-wood, 579
Agrimonia Eupatoria, 564
Agrostemma Githago, 497
Agrostis alba, fig., 106
 " *algida*, 110
Aiphanes Praga, 135
Aira, 138
 " *caryophyllea*, fig., 106
Aizoon canariense, 527
 " *hispanicum*, 527
Ajowains, 777
Ajwains, 777
Akebia quinata, 302
Akee-tree, 383
Aki, 736, 737
Åkund, 626
Alangium decapetalum, 720
Alaria esculenta, 21
Albertinia erythropappa, fig., 703
Alecampora, 279
Alchemilla vulgaris, 561
Alcornoco bark, 390
Alder, 251, 252
Alectoria Arabum, 48
 " *juhata*, 47
 " *usneoides*, 48
Aletris farinosa, 152
Aleurites lacifera, 278
 " *triloba*, 278, 280
Alexanders, 776
Alfonsia amygdalina, 134
Algaroba-bean, 549
 " (*Prosopis juliflora*), 553
Alhagi Maurorum, 547
Alisma Plantago, 101, 209
 " *ramunculoides*, fig., 209
Alkæuet, 656
Alnamaida cathartica, 600
Allecim brabo, 406
Allikee, 118
Allium ascalonicum, 203
 " *leptophyllum*, 203
 " *tuberosum*, 203
Allspice, 537, 737
Almonds, 558
 " *bitter*, 604
Aloe purpurascens, 204
 " *socotrina*, 204
 " *splenda*, 204
 " *vulgaris*, 204
Aloes, 201, 203
 " *American*, 157
 " *wood*, 278, 579
Allexylon Agallochum, 552

- Alona cælestis*, fig., 654
Alopecurus, 107
 ,, *pratensis*, fig., 106
Alpinia Allinghas, 167
 ,, *aromatica*, 167
 ,, *Galanga*, 166
 ,, *nutans*, 166, 167
 ,, *pyramidalis*, 167
 ,, *racemosa*, 166
Alstonia scholaris, 600
Alstroemeria pallida, 157
 ,, *Pelegrina*, fig., 155
 ,, *Salsilla*, 157
Althea rosea, 369
Alum-root, 494, 568
 Ἄλυρον of Dioscorides, 667
Alypum, 667
Alyssum spatulatum, fig., 355
Alyxia stellata, 600
Amadou, 40, 531,
Amande de terre, 118
Amandier du bois, 584
Amanita muscaria, 38
Amaranthus Anardhana, 511
 ,, *debilis*, 511
 ,, *frumentaceus*, 511
 ,, *obtusifolius*, 511
Amaryllis Belladonna, 156
 ,, *ornata*, 157
Ama-tsjâ, 570
Ambriua ambrosioides, 513
 ,, *anthelmintica*, 513
 ,, *Botrys*, 513
American China root, 216
 ,, *Palmetto*, 138
Amiathium muscetoxiem, 199
Ammannia vesicatoria, 575
Ammoniacum, 776
Anomum aromaticum, 167
 ,, *angustifolium*, 167
 ,, *Clusii*, 167
 ,, *Grana Paradisi*, 167
 ,, *macrosperrum*, 167
 ,, *maximum*, 167
Anuorophallus orixensis, 128
 Ἀντέλος μελαίνα, 214
Anuphobolis zosterifolia, 145
Amplitetras, fig., 12
Amygdalus cochinchinensis, 558
 ,, *microphylla*, 557
 ,, *persica*, 558
Amyyis balsamifera, 460
 ,, *hexandra*, 460
 ,, *Plumieri*, 460
 ,, *toxifera*, 460
Anabaina spiralis, 16
Anacardium occidentale, 466
 ,, *orientale*, 466
Anacyclus Pyrethrum, 706
Anagallis arvensis, 645, fig., 644
 ,, *cærulea*, 645
Anagyris fetida, 547, 548
Ananairta Bauerana, fig., 309
 ,, *Cocculus*, 309
Ananas, 147
Anandria discoidea, 708
Anastatica hierochuntina, 534, fig., 353
Anatherum Nardus, 113
 ,, *murientum*, 113
Anchietea salutaris, 339
Anchusa tinctoria, 656
Anda, 276, 280
Andira inermis, 548
 ,, *retusa*, 548
 Ἀνθεαχνη, 501
Andrachne telephioides, fig., 274
Andræa nivalis, fig., 63
 ,, *rupestris*, 63
Andromeda ovalifolia, 454
 ,, *mariana*, 454
 ,, *polifolia*, 454
Andropogon, 107
 ,, *Calamus aromaticus*, 113
Andropogon, Iwarancusa, 113
 ,, *saccharatus*, 113
 ,, *Sorghum*, 113
 ,, *Schœnanthus*, 113
Androsæmum officinale, 406
Aneilema erispatum, fig., 188
Aneimia tomentosa, 79
Anesorhiza capensis, 776
Aneimum graveolens, 777
Angelica, 776, fig., 773
Angiopteris evecta, 79, 82
Angioridimn siuosum, fig., 29
Angostura bark, 471
Angræcum eburneum, fig., 176
Anigozanthus floridus, 152
Anime resin, 551
Auise, 520, 777
Anisocæta milkanioides, 704, fig., 703
Anisoperma Passiflora, 315
Anoua furfuracea, fig., 420
 ,, *lmurifolia*, 421
 ,, *palustris*, 420, 421
 ,, *squamosa*, 421, fig., 420
 ,, *sylvatica*, 421
Anoplantlus uniflorus, fig., 609
Antennaria Robinsonii, fig., 43
Anthemis nobilis, 706
 ,, *tinctoria*, 706
Anthericum ramosum, 204
Antheridia, 5
Anthistria australis, 113
 ,, *eilata*, 113
Anthoxanthum odoratum, 113
Anthriscus Cerefolium, 776
 ,, *sylvestris*, 777
 ,, *vulgaris*, 777
Anthyllis Hermannia, 548
Antiaris toxicaria, 270
Antidesma alexiteria, 259
 ,, *pubescens*, 259
Antirrhæa verticillata, 762
Antirrhinum, fig., 683
Antjar poison, 270
Apeiba aspera, fig., 371
Aphanizomenon incurvum, 16
Aphelandra cristata, fig., 680
Aphloia theiformis, 328
Aplectrum hyemale, 180
Aplocarya divaricata, fig., 654
Aplotaxus nepalensis, 704, fig., 703
Apocynum ndrosensifolium, 600
 ,, *cannabinum*, 600
Apodytes dimidiata, fig., 443
Apostasia odorata, fig., 184
Apple, 560
 ,, *monstrous*, fig., 735
Apteria setacea, 172 fig., 171
Aquilaria Agallochum, fig., 679
 ,, *ovata*, 579
Aquilegia vulgaris, fig., 426
Arabis chinensis, 353
Araça, 737
Arachis hypogæa, 547, fig., 112
Aralia hispida, 781
 ,, *edulis*, 781
 ,, *nudicaulis*, 781
 ,, *polaris*, 780
 ,, *spiuosa*, 781
 ,, *racemosa*, 439, 781
Arar-tree, 229
Araticu do mato, 421
Araucaria Bidwillii, 228, 229
 ,, *brasiliensis*, 229
 ,, *Dombeyi*, 229
 ,, *excelsa*, 228
Arayana, 676
Arbre à perruque, 467
 ,, *du Voyageur*, 163
Arbutus Andrachne, 454
 ,, *Unedo*, 454
Archangelica officinalis, 776, fig., 775
Archill, 47
Arctostaphylos alpinna, 454
Arctostaphylos pungens, fig., 453
 ,, *Uva ursi*, 454
Arcyria flava, fig., 29
Ardisia odontophylla, fig., 647
Areca oleracea, 137, 518
 ,, *Catechu*, 137
Arenga saccharifera, 136
Arcthusa, fig., 174
 ,, *bulbosa*, 180
Arctia Vitaliana, fig., 644
Argel, 626
Argemone mexicana, 431
Argiel, 626
Argophylla, fig., 573
Argyreia bracteata, 631
Arisæma Pythonium, 129
Aristolochia, fig., 792
 ,, *anguicida*, 793, 794
 ,, *bœtica*, 794
 ,, *bracteata*, 793
 ,, *Clematitis*, 237
 ,, *cymbifera*, 794
 ,, *fragrantissima*, 793
 ,, *galeata*, 794, fig., 792
 ,, *grandiflora*, 794
 ,, *indica*, 793
 ,, *labiosa*, 794
 ,, *longa*, 794
 ,, *macroura*, 794
 ,, *pallida*, 794
 ,, *ringens*, 794
 ,, *rotunda*, 794
 ,, *sempervirens*, 794
 ,, *Serpentaria*, 268, 519, 793, 794
 ,, *trilobata*, 793
Aristolocia Maqui, 372
Arneria vulgaris, fig., 640
Arucia montana, 707
Arnoseri pusilla, fig., 703
Arnotto, 328
Aromadendron elegans, fig., 419
Arvaecha, 488
 ,, *esculenta*, 776
Arrack, 136
Arrow-root, 167, 224
Arruda clusioidea, fig., 401
Artabotrys odoratissima, 421
Artanthe aduoca, 518
 ,, *trichostachya*, 518
 ,, *crocata*, 518
 ,, *elongata*, 517, 518, 707
 ,, *eucalyptifolia*, 518
Artemisia Abrotanum, 705
 ,, *Asinthium*, 705
 ,, *nectica*, 705
 ,, *alba*, 706
 ,, *cærulescens*, 706
 ,, *camphorata*, 706
 ,, *chinensis*, 705
 ,, *Contra*, 705
 ,, *Draeneuculus*, 705
 ,, *gallica*, 706
 ,, *indica*, 705
 ,, *Lereheana*, 705
 ,, *maderaspata*, 705
 ,, *Mutellina*, 705
 ,, *pauciflora*, 05
 ,, *pontica*, 705
 ,, *Sieberi*, 705
 ,, *spicata*, 705
 ,, *Vahliana*, 705
Arthrocnemis arbuscula, 513
Arthrolobium scorpioides, 548
Arthropodium paniculatum, fig., 260
Artichoke, 708
 ,, *Jernsalem*, 709
Arum campanulatum, 128
 ,, *Draeneuculus*, 128
 ,, *triphylum*, 128
 ,, *cordifolium*, 128
 ,, *indicum*, 128
 ,, *Italicum*, 128

- Arum macrorhizon*, 129
 „ *maculatum*, figs., 127, 128
 „ *montanum*, 129
 „ *umphaefolium*, 128
 „ *triphylum*, 128
Artocarpus incisus, 112, 270, fig., 269
 „ *integrifolia*, 791, fig., 270
Arundinaria Schomburgkii, 114
Arundo arenaria, 114
 „ *donax*, 111
 „ *fragmites*, 108
Arvore de Palma, 361
Asaduleis, 776
Asaferida, 776
Asagraea officinalis, 199
Asarabacca, 794
Asarum, fig., 793
 „ *canadense*, 794
Ascarina polystachya, 520
Asclepias curassavica, 625
 „ *decumbens*, 625
 „ *syriaca*, 623
 „ *tuberosa*, 625
Aseroe pentactina, fig., 34
Ash, 716, 617
Asparagus, 406
Asparagin, 204
Asparagus, 204
 „ *acutifolius*, 204
 „ *adscendens*, 204
 „ *racemosus*, 204
Aspasia epidendroides, fig., 173
Aspen, 255
Asperula cynanchica, 771
 „ *odorata*, 771
Asphodels, 292
Asphodeline lutea, 204
Asphodelus ramosus, 204, fig., 200
Aspidium augeens, 76
 „ *exaltatum*, fig., 73
 „ *fragrans*, 79
 „ *Filix Mas*, 79
 „ *Lonchitis*, fig., 73
Aspidosperma excelsum, 691
Astelia alpina, 192
Asterostemma repandum, fig., 623
Astragalus boteticus, 549
 „ *creticus*, 548
 „ *gummifer*, 548
 „ *glycyphyllus*, 547
 „ *strobiliferus*, 543
 „ *verus*, 543
Astroloma humifusa, 448, 449
Astronia papetaria, 733
Ataxia Horsfieldii, 113
Athamanta cervariaefolia, fig., 773
Atherosperma moschata, fig., 300
Ativisha, 427
Atriplex hortensis, 512, 513
Atropa Belladonna, 619
Attalea, 137
 „ *amygdalina*, 135
Attar of roses, 564
Aubergine, 621
Ancklandia Costus, 768
Anzia chinensis, 466
Ava, 513
Averrhoa Bilimbi, 488, 489
 „ *Carambola*, 488
Avicennia tomentosa, 625
Avocado pear, 537
Ayapana, 707
Ayendendron Cujumary, 536
 „ *Laurel*, 536
Ayer Ayer, 464
Azalea pontica, 455
Azolla pinnata, 73

Babeer, 113
Babouny, 706
Badiera diversifolia, 773
Baekia mirantha, 735
Bajree, 113
Balanites egyptiaca, 499
Balanophora, 84
Balissan, of Bruce, 460
Balm, 661
 „ of Gilead, American, 460
 „ *Fir*, 229
 „ of Mecca, 460
Balsam of Acouchi, 460
 „ *Canadian*, 229
 „ *Carpathian*, 229
 „ of Copaiva, 394, 460, 552
 „ *Hungarian*, 228
 „ of Marin, 401
 „ of Peru, 552
 „ of Tolu, 552
 „ of Umiri, 447
Balsamodeudron africanum, 460
 „ *Gilendense*, 460
 „ *Myrrha*, 460
 „ *Orobalsamum*, 460
 „ *Roxburghii*, 460

Bamboo, 114
Banaua, 163
 „ *Musa*, 112
Baudikai, 369
Baneberry, 427
Banyan-tree, 267
Baobab-tree, 361
Baphia nitida, 550
 „ *tinctoria*, 548
Baranetz, 76
Barbaceuia, 99
 „ *Alexandrinae*, 152
Bardana, 708
Barley, 111
 „ *monstrous*, 109
Barometz, 76
Barosma crenata, 471
Barringtonia speciosa, fig., 755
Bartonia albicaulis, fig., 744
Bartramia fontana, 55
Baru, 137
Barwood, 550
Basella alba, 524
 „ *ruhra*, fig., 524
 „ *tuberosa*, 524
Basil, 660
Bassia butyracea, 591
 „ *latifolia*, 591
 „ *longifolia*, 591, fig., 590
Bassorin, 180
Batatas, 111
 „ *edulis*, 631
 „ *jalapa*, 631
Batis maritima, fig., 286
Batrachospermum moniliforme, fig., 20
Bauhinia emarginata, 551
 „ *parviflora*, 551
 „ *racemosa*, 551
 „ *retusa*, 551
 „ *tomentosa*, 550
 „ *variegata*, 550
Bdellium, 469
 „ *Egyptian*, 137
 „ *African*, 707
 „ *Sicilian*, 777
Beam-tree, 569
Bean, 547
Beume à cochon, 460
 „ *à sucrier*, 469
Beaver-tree, 418
Becheeru, 536
Beech, 291
Beet, 513
 „ *Chard*, 513
Begonia coccinea, 319
 „ *grandiflora*, 319
 „ *malabarica*, 319
 „ *Meyenii*, 319
 „ *tomentosa*, 319
 „ *tuberosa*, 319
Bejuca de la Estrella, 793
Belladonna, 629
Belotes, 261
Bençao de Deus, 369
Benincasa cerifera, 314
Ben-nuts, 337
Ben, oil of, 337
Benthamia japonica, fig., 782
Benzoin, 593, 718
 „ *odoriferum*, 536
Berberis Aquifolium, fig., 437
 „ *asiatica*, 438
 „ *vulgaris*, 438, fig., 437
Berchemia lineata, 582
 „ *volubilis*, 582
Bergem Kônigii, 458
Bergia ammannioides, 480
Berkleya, 12
Bernhardia dicbotoma, fig., 69
Berya Ammonilla, 372, fig., 371
Berthelotia lanceolata, fig., 704
Bertholonia excelsa, 740
Bertolonia maculata, 318
Besban, 460
Beta Cycla, 512
Betel-nut, 137
Betony, 661
Betula alba, fig., 251
 „ *leuta*, 252, fig., 251
 „ *nigra*, 252
 „ *papyracea*, 251
Betuline, 251
Bhabhur, 119
Bhadlee, 113
Bibiri, 526
Bicuiba, 302
Biddulphia, fig., 12
Bignonia antisiphilitica, 677
 „ *Cberere*, 677
 „ *Chica*, 676
 „ *echinata*, 677, fig., 676
 „ *leucoxydon*, 677
Bihai, 163
Bilkh, 427
Bikma, 427
Bilbergia tinctoria, 148
Bilberry, 757
Billardiera mutabilis, 441
Birch, 251
 „ *camphor*, 251
Bird-cherry, 558
 „ *lime*, 598
Bish, 427
Bishma, 427
Bitter-blain, 684
 „ *sweet*, 620
 „ *wood*, 421
Bixa Orellana, 328, fig., 327
Blackberry, 564
Black birch, 251
 „ *drink*, 598
 „ *lac*, 466
Bladder-green, 582
 „ *senna*, 547
Blakea parasitica, 733
 „ *triphnervis*, 733
Blancoa canescens, fig., 151
Blazing star, 199
Bletia verecunda, 180
Blighia sapida, 383, 384
Blimbing, 488
Blumen sneceoides, figs., 703, 704
Bolua laurina, 593
Bolueria caudata, 261
Boyer-tree, 418
Boerhaavia decumbens, 507
 „ *hirsuta*, 507
 „ *procumbens*, 507
 „ *tuberosa*, 507
Bois de Colophane, 460
 „ *de Chypre*, 628
 „ *d'huile*, 391
 „ *de lettres*, 271
 „ *de Lostan*, 762
 „ *de Palkandre*, 518
 „ *de Rose*, 536
 „ *tan*, 390
Bolax glebaria, 776, fig., 774
Bolbophyllum barlagcum, 179

- Bolbohyllum bracteolatum*, 176
 " *Careyanum*, 179
Boldo fragrans, fig., 298, 299
Boldu, 299
Boletus aeneus, 41
 " *edulis*, 38
Bomarea Salsilla, 157
Bombax pentandrum, 361
Bongardia Chrysogonum, 438
 " *Rauwolfii*, 438
Bonplandia trifoliata, 471
Boottia, 141
Borage, 656
Borago officinalis, 656
Borassus flabelliformis, 135, 136,
 138
Borreria furfuracea, 48
Boswellia glabra, 460
 " *serrata*, 459
Botany Bay Gum, 204
Botrophis actaeoides, 427
Botrychium cicutarium, 77
Botrytis curta, fig., 33
Bottle gourd, 313
Bowdichia major, 550
Bowstring hemp, 203
Box, 276, 279
Brabejum stellatum, 533
Brachypterys, fig., 388
Brachyramphus obtusus, fig., 704
Bragantia tomentosa, 794
 " *Blumel*, fig., 793
Brania serrata, 684
Brassia maculata, figs., 174, 177
Brayera authelmintica, 564
Braziletto-wood, 547
Brazil-woods, 740
Brazilian-trees, ancient, fig., 551
Brazil-wood, 550
Bread-fruit, 112
Brejeuba, 138
Brexia madagascariensis, fig., 573
Bridelia, 279
Briujal, 621
Bristleworts, 105
Bromelia fastuosa, fig., 147
 " *Pinguin*, fig., 147
Bromus catharticus, 113
 " *mollis*, 113
 " *purgans*, 113
Brook-bean, 614
Broom, 547
Brosimum alicastrum, 270
Brossca coccinea, 454
Brucea antidysenterica, 477
 " *sumatrana*, 477
Brugmansia Zippelii, 85
Brugiera gymnorhiza, 727
Brunia nodiflora, fig., 785
Brunonia sericea, fig., 657
Bruon thalassium, 18
Bryonia abyssinica, 314
 " *africana*, 314
 " *alba*, 314
 " *americana*, 314
 " *dioica*, 314, fig., 311
 " *epigea*, 314
 " *ficifolia*, 314
Bryophyllum calcei um, 345
Bryum argenteum, 55
 " *cuspidatum*, 55
 " *punctatum*, 55
 " *roseum*, fig., 64
 " *paustre*, 55
 " *unlulatum*, 51
Bubon Galbanum, 77
Buchanania latifolia, 464
Bucida Buceras, 718
Buck-bean, 614
 " *-eye chesnut*, 384
Buckwheat plants, 471
Buckwheat, 503
Buena hexandra, 762
Bukium-wood, 550
Bulbine plauifolia, 204
Bullet-tree, 591
Bully-tree, 591
Bulrushworts, 105
Bunelia graveoleus, 591
 " *lycioides*, 591
 " *nigra*, 591
 " *retusa*, 591
Bunchosia armeniaca, 390
Bunium ferulaceum, 776
Burasia, 302
Burdachia, fig., 388
Burdee, 118
Burdock, 708
Burmanna, fig., 171
 " *caerulea*, 172
 " *disticha*, fig., 171
Burnet, 562
Bursera acuminata, 460
 " *gummifera*, 460
 " *pauiculata*, 460
Busl, 203
Butchers' Broom, 204
Butea frondosa, 548
 " *superba*, 548
Butomus umbellatus, 208
Butter-tree, of Mungo Park, 591
Butter and Tallow-tree, 401
Butterfly-weed, 625
Butua, 308
 " *do curvo*, 350
Buxbaumia aphylla, 66
Buxus sempervirens, 279
Byrsanthus, Brownii, fig., 742
Byrsanima, fig., 388
 " *crassifolia*, 390
 " *coccolobæfolia*, 390
 " *laurifolia*, 390
 " *rhopalæfolia*, 390
 " *spicata*, 390
 " *bark*, 390
Byttneria celtoides, fig., 363
Caapim de Angola, 113
Caá-tigúá, 464
Cabaret, 794
Cabbage, 353
 " *Palm*, 137
Caheza de Negro, 138
Cabomba aquatica, fig., 412
Cabotz, 564
Cacao, 364
Cachibou resin, 460
Cadaba indica, 358
Cæsalpinia Bonducella, 462
 " *brasiliensis*, 550
 " *coriaria*, 550
 " *echinata*, 550
 " *Moringa*, 550
 " *Nuga*, 550
 " *oleosperma*, 551
 " *Sappan*, 550
Caffeine, 384, 764
Cafferbread, 224
Calabash nutmeg, 422
 " *tree*, 674
Caladenia, fig., 176
Caladium bicolor, 128
 " *pedicellatum*, 128
 " *violaceum*, 128
Calamagrostis, 113
Calambac, 551
Calamint, 661
Calamus Draco, 138
 " *rudentum*, 135
Calathea villosa, fig., 168
 " *zebrina*, 168
Calceolaria, fig., 683
 " *arachnoidea*, 684
Caleana nigrita, 179
Calendula officinalis, 708
Calla palustris, fig., 193
Callicarpa lanata, 663
 " *longifolia*, fig., 663
Calligonum Pallasia, 503
Callitriche verna, fig., 284
Callitris quadrivalvis, 228, 229
Calluna vulgaris, 454
Calosee, 261
Calophyllum angustifolium, 402
 " *brasiliense*, 401
 " *Calaba*, 401
 " *inophyllum*, 401
Calothrix nivea, 16
Calotropis gigantea, 626
Calumba, 314
 " *American*, 614
 " *root*, 308
Calumbine, 308
Calycanthus floridus, fig., 540, 541
Calyptranthes aromatica, 737
Calystegia sepium, 631
 " *soldanella*, 631
Calytrix, fig., 721
Camara, 536
Camarinheira, 284
Camassia esculenta, 203
Cambogia gutta, fig., 400
Cambura, 322
Camhuý, 737
Camelina sativa, 353
Camellia japonica, 397
 " *oleifera*, 397
Camel's-thorn, 547
Cameraria latifolia, 600
Campanula glauca, 691
 " *Medium*, figs., 689, 690
 " *Rapunculus*, 691
Camphor, Chinese, 537
 " *of Sumatra*, 394
 " *oil of Borneo and Su-*
matra, 394
Camphora officinarum, 537
Camphorosma monspeliaca, 513
Caupylostachys abbreviata, 607
 " *cernua*, 607
Camwood, 550
Canada rice, 113
Canagong, 526
Canarina Campanula, 691
Canarium commune, 460
Canary-seed, 113
Cancer-powder, Martin's, 610
Candollea tetrandra, fig., 423
Canella alba, 442, 600
 " *bark*, 442
 " *de Cheiro*, 537
Canna A chiras, 169
 " *aureantica*, 169
 " *coccinea*, 168
 " *glauca*, 169
Cannabis sativa, 265
Cannoball-tree, 740
Cantliarellus lobatus, 30
Canthium parviflorum, 762
Caoutchouc, 267, 271, 277, 600
Caper, 357, 358, 479
 " *-bush*, (Euphorbia), 280
Capillaire, 79
Capitão do matto, 664
Capparis ægyptiaca, 358
 " *amygdalina*, 358
 " *cynophallophora*, 358
 " *ferruginea*, 358
 " *Fontanesii*, 358
 " *pulcherrima*, 358
 " *rupestris*, 358
 " *Sinclairii*, fig., 357
 " *Sodada*, 358
 " *spinosa*, 357, 358
Capsicum toxicarium, 621
Caraclichu, 621
Carajura, 676
Carambola, 488
Caramporphine, 431
Carapa guianensis, 464
 " *obovata*, 464
 " *Touloucouana*, 464
Carapixo da Calenda, 372
Caraway, 777
Cardanum pratense, 353
Cardamoms, 167

- Cardamoms*, Ceylon, 165, 167
 ,, Malabar, 167
Cardiospermum Halicacabum, 384
Cardoon, 708
Cardopatium corymbosum, 708
Cardo sauto, 431
Carex arenaria, 118, 119
 ,, *disticha*, 118
 ,, *hirta*, 118
 ,, *rivularis*, fig., 117
Careya arborea, fig., 754
Carica digitata, 322
 ,, *Papaya*, figs., 321, 322
Carissa Caraudas, 600
 ,, *edulis*, 600
Carlina acuminis, 708
 ,, *gumifera*, 708
Carnanba, 137
Carob-tree, 549
Carolina Pink-root, 604
Carrageen moss, 24
Carrot, 776
Carthamus persicus, 708
 ,, *tinctoria*, 708
Carum Bulboecastanum, 776
 ,, *Carui*, 777
Carya alba, 293
 ,, *amara*, 293
Caryodaphne densiflora, 536
Caryophyllus aromaticus, 736, 737
Caryota urens, 136, 137
Casca d'Anta, 419
 ,, *de larangeira da terra*, 471
 ,, *preciosa*, 536
Cascara de Lingue, 167
 ,, *de Pingue*, 167
Cascarilla, 276, 279, 460
Casearia Anavinga, 331
 ,, *astringens*, 331
 ,, *esculenta*, 331
 ,, *grandiflora*, fig., 330
 ,, *lingua*, 331
 ,, *ulmifolia*, 331
Cashew-nut, 465, 466
Cassava, 277, 280
Cassia, 526
 ,, *Abus*, 552
 ,, *acutifolia*, 549, fig., 550
 ,, *auriculata*, 550
 ,, *lanceolata*, 549
 ,, *Senna*, 549
 ,, *bark*, Chinese, 536
Cassipourea elliptica, fig., 604
Casso, 564
Cassuvium occidentale, 466
Cassytha filiformis, fig., 538
Castanha do Jobota, 315
Castela Nicolsoni, 474
Castilloa elastica, 271
Cauarina, fig., 249
 ,, *equisetifolia*, 250
 ,, *muricata*, 250
 ,, *nodiflora*, 250
 ,, *quadrivalvis*, 250
Catalpa syringifolia, 677
Catasetum, 178
Cataya, 503
Catechu, 553, 762
Catha edulis, 587, fig., 586
Cathartocarpus Fistula, 549
Catnua spiciflora, 276, 279
Caulinia, 161
 ,, *fragilis*, 143
Caulophyllum thalictroides, 428
Caulotretus microstachyus, 559
Cavapora do Gentio, 718
Cayaponia, 314
Ceanothus americanus, 582
Cebadilla, 169
Cecropia peltata, 271
Cedar, 228
 ,, *Virginian*, 228
 ,, *wood of Guinea*, 469
Cedra, 438
Cedrela angustifolia, 462
Cedrela febrifuga, 462
 ,, *Tooum*, 462, 520
Celastrus nutans, 587
 ,, *pauciculatus*, fig., 587
 ,, *scandens*, 587
 ,, *seuogaleusis*, 587
 ,, *veuenatus*, 587
Celery, 776
Celosia cristata, 511
 ,, *longiflora*, fig., 510
Celtis australis, 580
 ,, *occidentalis*, 580
 ,, *orientalis*, 580
Cenomyce coccifera, 48
 ,, *coccinea*, fig., 45
 ,, *pyxidata*, 48
 ,, *rangiferina*, 48
Centaurea Cyanus, fig., 702
 ,, *Calcitrapa*, 708
Centauray, 614
Centranthus ruher, fig., 697
Centrolepis fascicularis, fig., 120
Centropogon surinamensis, 693
Cephaelis Ipecacuanha, 762
 ,, *ruelliaefolia*, 763
Ceradia furcata, 707
Cerastium, fig., 497
Cerasus avium, 558
 ,, *communis*, fig., 557
 ,, *Lauroceruus*, 558
 ,, *occidentalis*, 557, 558
 ,, *Padus*, 558
 ,, *virginiana*, 558
Ceratiola ericoides, fig., 285
Ceratcephalus orthoceras, fig., 428
Ceratodon purpureus, fig., 64
Ceratouia Siliqua, 549
Ceratophyllum submersum, fig., 263
Cerbera lactaria, 600
 ,, *Manghas*, 600
 ,, *Odollam*, 600
 ,, *salutaris*, 600
Cereus speciosissimus, fig., 746
Ceropia edulis, 625
Ceroxylon andicola, 135, 137
Cervantesia tomentosa, 788
Cestrum auriculatum, 621
 ,, *hracteatum*, 621
 ,, *corymosum*, 621
 ,, *euantes*, 621
 ,, *Hediunda*, 621
 ,, *levigatum*, 621
 ,, *laurifolium*, 621
 ,, *macrophyllum*, 619
 ,, *nocturnum*, 619
 ,, *Parqui*, 620
 ,, *Pseudoquina*, 621
Cetraria islandica, fig., 48
 ,, *nivalis*, 48
Cetrarine, 48
Cevadilla, 199
Charradodia Chilensis, 158
Cha de Frade, 331
 ,, *de pedestre*, 664
Chagas da Mhuda, 267
Chailetia pedunculata, fig., 583
 ,, *toxicaria*, 583
Chamerops humilis, 135, 136, fig. 131
 ,, *Palmetto*, 136
Chamoinile, 796
Champ, 419
Chandler-tree, 131
Chandineæ, 12
Chapara Manteca, 369
Chara collabens, 27
 ,, *dellatula*, 27
 ,, *firma*, 27
 ,, *vulgaris*, 27, fig., 26
Chaunogora, 323
Chavica Betle, 518
 ,, *Chaba*, 518
 ,, *majuscula*, 518
 ,, *officinarium*, 518
 ,, *populoidea*, 518
Chavica Roxburghii, 517
 ,, *Siriboa*, 518
 ,, *sylvatica*, 518
Cheiranthra linearis, fig., 441
Cheiranthus Chhiri, fig., 352
Cheirostemon platanoides, 361
Chelidonium majus, 431, fig., 430
Chenopodium album, fig., 512
 ,, *Bonus Henricus*, 513
 ,, *olidum*, 513
 ,, *Quinon*, 112, 512, 513
 ,, *vulvaria*, 513
Cherimoyer, 421
Cherris, 265
Cherry, 558
 ,, *wild*, 558
Chervil, 776
Chibou resin,
Chica, 361, 676
Chichm, 552
Chicrassia tabularis, 462
Chicot, 337
Chimaphila corymbosa, 450
 ,, *umbellata*, 450
China bark, 762
Chinchin, 378
Chin-chon, 24
Chiococca anguifuga, 763
 ,, *densifolia*, 763
Chironia baccifera, fig., 612
Chives, 203
Chlora perfoliata, 614
Chlorea disoides, 180
Chloranthus brachystachys, 519
 ,, *monostachys*, fig., 519
 ,, *officinalis*, 519
Chloroxylon Swietenia, 462
Chocolate, 364
Xολχολον, 199
Chomoro, 231
Chondria obtusa, fig., 23
Chondrilla juncea, 708
Chondrodendron convolvulaceum, 309
Chondrus crispus, 24
Choopta, 383
Chorisia speciosa, 361
Chou-carail, 128
Chrysanthemum Leucanthemum, fig., 706
Chrysobalanus Icaco, 542, 543
 ,, *luteus*, 543
Chrysophyllum Cainito, 591
Chrysosplenium alternifolium, 568
Cbumhelee, 651
Churras, 265
Chussalonga, 707
Chymocarpus pentaphyllum, fig., 366
Cicca disticha, 276, 279, 280
 ,, *racemosa*, 280
Ciccr arietinum, 421
Cichorium Endivia, 708
 ,, *Intybus*, 708, 709
Cicuta maculata, 777
 ,, *virosa*, 777
Cider, 569
Cinchona bark, 471
 ,, *Condaminica*, 762
 ,, *micrantha*, 762
Cinnamodendron axillare, 442
Cinnamomum aromaticum, 536
 ,, *Cassia*, 536
 ,, *Cullawan*, 536, 536
 ,, *nitidum*, 536
 ,, *zeylanicum*, 536
Cinnamon, 536
 ,, *of the Isle of France*, 536
 ,, *of Santa Fe*, 536
Cjanatan, 552
Cissampelos Canpeba, 308
 ,, *ebrectentus*, 308
 ,, *glabra*, 308
 ,, *glaberrimus*, 308

- Cissampelos mauritanus*, 308
 " *obtectus*, 308
 " *ovalifolius*, 308
 " *Pareira*, 308, fig., 309
 " *tropæolifolius*, fig., 307
Cissus cordata, 440
 " *setosa*, 440
 " *tinctoria*, 440
Cistus Berthelotianus, fig., 349
 " *creticus*, 350
Citron, 458
 " *fingered*, 457
Citrullus Colocynthis, 314
Citrus Aurantium efferata, 458
Cladonia coccifera, fig., 46
 " *rangiferina*, 49
Clavaria coralloides, 41
Claytonia perfoliata, 501
Clearing Nut, 604
Clematis flammula, 427
 " *recta*, 427
Cleome violacea, 357
 " *dodecandra*, 358
Clitoria Ternata, 548
Clove Cassia, of Brazil, 536
 " *Nutmegs*, of Madagascar, 536
Clover, 547
Cloves, 736, 737
Clusia flava, 401
 " *insignis*, 401
Cluytia collina, 280
Cnemidostachys Chamaelea, 279
Cnicus Benedictus, 708
Cnidioscolus herbaceus, 281
 " *quinquelobus*, 281
Cobnut of Jamaica, 280
Cocn, 391
Cocallera, 279
Coccinia Indica, 314, fig., 311
Cocobryon capense, 518
Coecoloba, 503
 " *americana*, 503
 " *uvifera*, 503
Cocculus Bakis, 308
 " *Cebatha*, 309
 " *cincrascus*, 308
 " *cordifolius*, 308, 309
 " *flavescens*, 308
 " *indicus*, 309
 " *palmatus*, 308
 " *peltatus*, 308
 " *platyphyllus*, 308
 " *verrucosus*, 309
Cochlearia officinalis, 353
Cochlospermum, 349
 " *Gossypium*, 350
 " *insigne*, 350
 " *tinctorium*, 350
Cockscomb, 511
Coco, le Petit, 648
Cocoa, 364
 " *-nut*, 136
 " *-nut oil*, 137
 " *-plum*, 543
 " *-root*, 128
Cocos butyracea, 135
 " *nucifera*, 135
 " *schizophyllus*, 137
Codeium variegatum, 279
Codeine, 431
Coentrilho, 473
Coffea arabica, 764, fig., 761
Coffee, 764
Coir rope, 136
Coix Lachryma, 114
Colchicum autumnale, 199, fig., 198
 " *variegatum*, 199
Coleostachys, fig., 388
Colicodendron Yeo, 358
Collema fiaccidum, 46
 " *limosum*, 46
Collomia gracilis, fig., 635
Coltophora ntilis, 600
Colocasia antiquorum, 288
 " *esculenta*, 128
 " *himalensis*, 128
 " *macrorhiza*, 128
 " *mucronata*, 128
Colocynth, 314
Colubrina Fermentum, 582
Columella oblonga, fig., 759
Columnnea scandens, 672
Colutea arborescens, 547
Comarum palustre, 564
Combretum alternifolium, 718
 " *purpureum*, fig., 717
Cometes abyssinica, 510
Comfrey, 656
Commelyna augustifolia, 188
 " *celestis*, 188
 " *Rumphii*, 188
 " *medica*, 188
 " *striata*, 188
 " *tuberosa*, 188
Commia, 276
 " *cochinchinensis*, 278
Commiphora madagascariensis, 460
Composites, fig., 703
Comptonia aspleuifolia, fig., 256
Conceveiba guianensis, 280
Condaminea corymbosa, 762
 " *tinctoria*, 764
Conessi bark, 600
Conferva, 14
 " *area*, 14
 " *crispa*, 16
 " *fugacissima*, 8
 " *glomerata*, 15
 " *rivularis*, 15
Congee villosa, 664
Conium, 777
 " *of the Greeks*, 777
Conarus pinnatus, fig., 468
Conocarpus racemosa, 718
Conohoria Lobolobo, 339
Conophobis americana, 610
Conostylis amula, fig., 151
Convolvulus arvensis, 631
 " *althæoides*, 631
 " *Batatas*, 112
 " *dissectus*, 631
 " *macrocarpus*, 631
 " *maritimus*, 631
 " *panduratus*, 631
 " *Scammonia*, 631
 " *Soldanella*, 631
 " *tricolor*, fig., 630
Cookia punctata, 458
Copaifera bracteata, 550
 " *pubiflora*, 550
Copaiva, 460
Copai yé, 380
Copal, 394
 " *Brazilian*, 551
 " *of Madagascar*, 551
 " *of Mexico*, 551
Copalche bark, 279, 603
Coptis trifolia, 427
Corallina officinalis, fig. 23
Corchorus capsularis, 372
 " *olitorius*, 372
Cordia Myxa, 629
 " *Gerascanthus*, 628
 " *Sebestena*, fig., 628
 " *Rumphii*, 628
Cordleafs, 105
Cordylina reflexa, 204
 " *Ti*, 203
Coriander, 777
Coriandrum sativum, 777
Coriaria myrtifolia, 475
 " *napalensis*, 475
 " *ruscifolia*, 475
 " *sarmentosa*, 475
Corinthian capital, 679
Corinths, 440
Coris monspeliensis, 645
Cork, 291
Corn-cockle, 497
Cornelian Cherry, 782
Cornus circinata, 782
 " *florida*, 782
 " *mascula*, 782
 " *officinalis*, 783
 " *sanguinea*, 782
 " *sericea*, 782
 " *suedica*, 782, 783
Coronilla Emerus, 547
 " *varia*, 547, 548
Corraea alba, 471
Coriscan moss, 24
Corydalis bulbosa, 436
 " *capnoides*, 436
 " *tuberosa*, 436
Corydalin, 436
Corylopsis, fig., 784
Corynophorus canescens, fig., 106
Corynostylis Hybanthus, fig., 338
Corypha Gebanga, 138, fig., 133
Cosculium fenestratum, 308
 " *idicum*, 309
Costus, 708
Cotoneaster microphylla, 560
 " *Uva Ursi*, 560
Cotton, 370
 " *grasses*, 118, 119
 " *tree of India*, 361
Coumarin, 549
Couropita guianensis, 740
Court plaster, 593
Coutarea speciosa, 762
Cowitch, 549
Cow-plant, of Ceylon, 625
Cowslip, 645
Cow-trees, 267, 270, 591, 600
Crambe tatarica, 354
Cranberry, 757
 " *Tasmanian*, 448
Craniolaria annua, 670
Crassula tetragona, 346
Cratava excelsa, 358
 " *gyaundra*, 358
 " *Nurvala*, 358
 " *Tapia*, 358
Cratogeomys Hornschuchia, 406
Cremanium reclinatum, 733
 " *tinctorium*, 733
Crème d'Absinthe, 705
Crepis lacera, 708
Cresecentia Cujete, 674
 " *acurbitina*, fig., 673
 " *obovata*, fig., 673
Cress, 353
Creynt, 679
Crithium maritimum, 776
Crocus odoratus, 161
 " *sativus*, 160
Crotalaria juncea, 547, 549
Croton adipatus, 279
 " *balsamifer*, 279
 " *campestris*, 279
 " *Cascarilla*, 279
 " *cascarilloides*, 279
 " *Draco*, 278
 " *Eleuteria*, 279
 " *gratissimus*, 279
 " *humilis*, 279
 " *micans*, 279
 " *nitens*, 279
 " *nivens*, 279
 " *organifolius*, 279
 " *Pavana*, 280
 " *perdicipes*, 279
 " *pseudo-China*, 279
 " *sanguiferum*, 278
 " *siberosus*, 279
 " *thurifer*, 279
 " *Tiglium*, 276, 279
Crowberry, 284
Crow Imperial, 204
Crozophora tinctoria, 281
Crusea rubra, 769
Cryptocarya moschata, 536

- Cryptococcus, 5
 Cryptocoryne ovata, 128
 Cubeba, 204
 " canina, 518
 " officinalis, 518
 " Wallichii, 518
 Cubebs, 518
 Cucunchully, 339
 Cucumber, fig., 313
 " spirting, 314
 " trees, 418
 Cucumis, 317
 " acutangulus, 314
 " Colocythis, 314
 " Hardwickii, 314
 " Melo, 314, fig., 312
 " utilissimus, 314
 " pseudo-colocythis, 314
 Cucurbita citrullus, 314
 " maxima, 314
 " ovifera, 314
 " Pepo, 314
 Cudbear, 47
 Cujumary Beans, 536
 Culantrillo, 451
 Culman Bark, 536
 Cummin, Black, 427
 Cumminum Cyminum, 777
 Cummin, 777
 Cunila mariana, 660
 " microcephala, 661
 Cupanea sapida, 383, 384
 Cuphea Balsamona, 575
 Cupressus sempervirens, fig., 228
 Curana, 460
 Curatella Sambaiba, 424
 Curcas multistriatus, 280
 " purgans, 280
 Curculigo orchoides, fig., 154
 " stans, 154
 Curcuma angustifolia, 167
 " longa, 167
 " Roscoeana, 166
 " rubescens, 167
 " Zedoaria, 166
 " Zerumbet, 166
 Currant, 750, 751
 " black, 750
 Currants, 440
 " Native of Tasmania, 764
 Cuscuta, fig., 633
 " Trifolii, fig., 633
 " europæa, fig., 633
 " racemosa, 634
 " verrucosa, fig., 633
 Custard Apple, 421
 Cyanotis axillaris, 188
 Cyathea medullaris, 79
 Cycas circinalis, fig., 223, 224
 " revoluta, 224, fig., 225
 Cyclamen persicum, 645
 Cynoches Egertonianum, 178, fig., 177
 " ventricosum, 178, fig., 177
 Cymbella, 12
 Cymopolia barbata, fig., 23
 Cynanchum Argel, 549
 " acutum, 626
 " fruticulosum, fig., 623
 " ovalifolium, 626
 Cynara Cardunculus, 704
 " Scolymus, 704
 Cynodon Dactylon, 113, 114, fig., 196
 " lineare, 114
 Cynoglossum officinale, 656
 Cynomorium, 84
 " coccineum, -6, 80, fig., 89
 Cynosurus cristatus, 113, fig., 196
 Cyperus bulbosus, 114
 " esculentus, 114
 " hexastachyus, 118
 " Hydra, 110
 Cyperus imudatus, 119
 " Irla, 118
 " jemenicus, 118
 " longus, 118
 " odoratus, 118
 " peruvianus, 118
 " rotundus, 118
 " textilis, 118
 Cyphia digitata, 691
 Cypress, 228, 229
 Cyripedium guttatum, 180
 " pubescens, 180
 Cytisus, 547
 " alpinus, 548
 " Liburnus, 548
 " scoparius, 547
 " Weldenii, 548
 Cytaria Darwinii, 39
 Dacca, 265
 Dacryd, 228
 Dacrydium taxifolium, 231
 Daffodil, 156
 Dahlia, 707
 Dais madagascariensis, 531
 Dalbergia monetaria, 548
 " Sissoo, 548
 Damasonium, 101
 " indicum, 141
 Dammar, 228
 " Pine, 229
 Dammara australis, 228, 229
 Dammer pitch, 394
 Danaea alata, fig., 82
 Dandelion, 708
 Daoun Setan, 261
 Daphne Bholua, 531
 " canubina, 531
 " cestrifolia, 531
 " Gnidium, 531
 " Laureola, 531
 " Mezereum, fig., 530
 " pontica, 531
 Darwinia, fig., 721
 Dasycladus claviformis, fig., 23
 Date, 134
 " Palm, 137
 " Plum, 596
 Datisca cannabina, fig., 316
 " hirta, 317
 Datura Metel, 619
 " sanguinea, 620
 " Stramonium, 619
 " Tatula, 619
 Daucus gummifer, 777
 Davilla elliptica, 424
 " rugosa, 422
 Day Lilies, 201
 Deal, 228
 Deeringia celosioidea, 510, 511
 Dehaasia media, fig., 535
 Delphinium consolida, 427
 " Staphisagria, 427
 " tricornis, fig., 126
 Dent de Lion, 708
 Deodar, 228
 Desmidiium mucosum, 13
 " Swartzii, 13
 Desmochæta flavescens, 510
 Desmodium diffusum, 547
 Detarium microcarpum, 550
 " senegalense, 552
 Deutzia crenata, fig., 753
 " scabra, 754
 Devil's Apple, 620
 " Bl., 199
 " leaf, 261
 Dewax, 440
 Deyertia rigida, 110
 Diase, 575
 Dhamnoo, 372
 Dhoona, 394
 " Putch., 394
 Dhoonatil, 394
 Dialium indicum, 549
 Dimella odorata, 204
 Dicentra cucullaria, 436
 Dicranum glaucum, 64
 " Schraderi, 52
 " spurium, 52
 Dictyostegia orobanchoides, fig., 171
 Dicycellium caryophyllum, 536
 Didesmus ægyptius, fig., 355
 Didymodon sphagmoides, 65
 Dieffenbachia Segnina, 128
 Digitalis ferruginea, 683
 " lævigata, 683
 " ochroleuca, 683
 " purpurea, fig., 681, 683
 Dill, 777
 Dillenia scabrella, 424
 " spectosa, 424
 Dillesk, 24
 Dimorphanthus edulis, fig., 780, 781
 Dion edule, 224
 Dionaea muscipula, fig., 433
 Dioscorea alata, 111
 " adenocarpa, fig., 214
 " dæmonia, 214
 " triphylla, 214
 Diospyros, 596
 " Ebenaster, 596
 " Ebenus, 596
 " Kaki, 596
 " Mabola, 596
 " melanoxylon, 596
 " Roylei, 596
 " tomentosa, 596
 " virginiana, 596
 Diotis ceratoides, 513
 Diplazium esculentum, 79
 Diploclinium acuminatum, 318
 " Evansianum, fig., 318
 Diplopteris paralias, fig., 388
 Diplosodon arboreus, fig., 574
 Diposis saniculaefolia, fig., 777
 Dipsacus Fullonum, 700
 Dryas, 700
 Dipteroarpus trinervis, 394 fig., 393
 Dipteryx odorata, 540, fig., 546
 Dirca palustris, 531
 Disa spatulata, fig., 176
 Discaria febrifuga, 582
 Discopleura capillacea, fig., 777
 Dittany of Crete, 661
 Diuris, fig., 176
 Dividivi, 550
 Divi Ladner, 601
 D'Jurnang, 138
 Dodonæa dioica, 384
 " Tbunbergiana, 384
 " viscosa, 384
 Dog Mercury, 279
 Dolichos bulbosus, 547
 " tuberosus, 547
 Dombeya spectabilis, 364
 Donax arundinaceus, 114
 Doughtan, 302
 Doon Palm, 135, 137, 610
 Doora, 113
 Doorla, 113
 Doorwa, 113
 Dorema Ammoniacum, 776
 Doronikum Pardallanches, 707
 Dorstenia brasiliensis, 267
 " contrayerva, fig., 267
 " opifera, 267
 Doryphora Sassafras, fig., 300
 Doura, 111, 112
 Dracæum Draco, 99, 203, 204
 " terminalis, 203
 Dracoutium ferridum, 193
 " polyphyllum, 129, 193
 Dracophyllum scoparium, fig., 448
 Dragon's Blood, 138, 204, 548
 Dragon trees, 99

- Drakien elastica*, 179
Drinys axillaris, 419
 „ *grauteusis*, 419
 „ *Winteri*, 417, 419, 600
Droge amère, 679
Drosera communis, 433
 „ *erythrorhiza*, 434
 „ *gigantea*, 434
 „ *longifolia*, fig., 433
 „ *lunata*, 433
 „ *stolonifera*, 434
Drosophyllum lusitanicum, 433
Drymoda picta, fig., 176
Dryobalanops camphora, 394, fig., 393

Duckweed, 102
Dudaim, 620
Duguetia quitarensis, 421
Dulse, 24
Dumb Caue, 128
Dunantia aelyranthes, fig., 704
Dungan, 302
Durian, 361
Durio zibethinus, 361
Durra, 113
Durvillea utilis, 21
Dutchman's Laudanum, 333
Duvaua latifolia, 466
Dwarf Grass-tree, 203

Eagle-wood, 551, 579
Earahau, 620
Earina mucronata, 180
Earth-gall, 702
Eau d'Ange, 737
 „ *de Cologne*, 660, 661
 „ *de Créole*, 402
 „ *de Mantes*, 279
 „ *médicinale*, 684
Ebony, 596
Echaliun agreste, 314
Eccremocarpus seaber, fig., 675
Echeveria lurida, 345
Echinophora spinosa, fig., 777
Echium plantagineum, 656
Ecklonia buccinalis, 21
Eclipta erecta, 707
Eddoes, 128
Edgeworthia buxifolia, 648
Egg Apples, 621
Egyptian Hean of Pythagoras, 414

Ehretia buxifolia, 653
Eichornia speciosa, fig., 206
Ekebergia senegalensis, fig., 463
Elavagnus arborea, 257
 „ *nugustifolia*, 257
 „ *conferta*, 257
 „ *orientalis*, 257
Elavococa vernicia, 280
 „ *verrucosa*, 280
Elæodendron Kubu, 587
 „ *Roxburghii*, 587
Eleoptine, 537
Elais guineensis, 137
 „ *melanococca*, 137
Elaphrium excelsum, fig., 459
 „ *tomentosum*, 460
Elatarium, 314
Elatine hydropiper, fig., 480
Elcaija, Arabian, 464
Elder, 767
Elecampane, 707
Elemi, American, 460
Eleocharis capitata, 118
Elettaria Cardamomum, 167
 „ *Cardamomum* } 165
 „ *Zeylanicum*, fig., }
 „ *major*, 167
Elensine coraeum, 112, 113
 „ *stricta*, 112
 „ *indica*, 114
 „ *Tocusso*, 113
Eleutheria Bark, 279
Ελισκοπίσιος, 277

Ελισκοπίσιος, 281
Elm, 580
 „ *Spanish*, 628
 „ *Galls*, 31
Elodea virginica, 406
Elymus arenarius, 114
Embelia Ribes, 648
 „ *robusta*, 648
Emblca officinalis, 280
Empetrum nigrum, 284
Euchelis Pulvisculus, 15
 „ *sanguinea*, 15
Enekea glaucescens, 518
 „ *unguiculata*, 518
Endive, 708
Endocarpum minutum, 45
Engelhardtia spicata, 293
English Mercury, 279, 513
Enhalus, 141
Ensião, 345
Entada Purisatha, 553
Eperua falcata, 550
Ephedras, Asiatic, 234
Ερταγον, 199
Epidendrum bifidum, 180
Epidium alpinum, 438
Epiphegus americana, fig., 610
 „ *virginiana*, 610
Equisetum arvense, fig., 61
 „ *fluviale*, 62
 „ *hyemale*, 62
 „ *palustre*, 61
 „ *pratense*, 61
Eragrostis poæformis, fig., 106
Eremocarpus setigerus, fig., 276
Ergot, 35
 „ *of Maize*, 114
 „ *of Rye*, 39, 114
Erica arborea, 454
Eriueum botryocephalum, fig., 31
 „ *Juglandis*, fig., 31
Eriocaulon setaceum, 122
Eriophorum, 118
 „ *cannabinum*, 119
 „ *comosum*, 119
Eriostemon myoporoides, fig., 469
Erodium moschatum, 494
Ericastrum canariense, fig., 351
Erva de rata, 763
 „ *Maira*, 621
Ervum Ervilia, 548
Eryngium campestre, 776
 „ *maritimum*, 776
Eryngo, 776
Erythraea Centaurium, 614
Erythrum monosperma, 548
Erythrine, 48
Erythronium americanum, 204
 „ *Deus canis*, 203, 204
Erythroxyton, fig., 391
 „ *angulifugum*, 391
 „ *areolatum*, 391
 „ *campestre*, 391
 „ *Coca*, 391
 „ *hypericifolium*, 391
 „ *suberosum*, 391
Escallonia pulverulenta, fig., 752
Eschscholtzia californica, fig., 430
Esenbeckia febrifuga, 471
Esprit d'Ivn, 706
Ether, *Ænanthic*, 560
Eucalyptus Gunnii, 737
 „ *mnunifera*, 737
 „ *resinifera*, 737
 „ *robusta*, 737
Euchresta Horsfieldia, 548
Eugenia, 737
 „ *acris*, 737
 „ *aquea*, 737
 „ *brasiliensis*, 737
 „ *Caryophyllus*, 737
 „ *cauliflora*, 736
 „ *depauperata*, 737
 „ *dysenterica*, 737
 „ *Jambos*, 737

Eugenia malaccensis, 737
 „ *Micheli*, 737
 „ *Pimento*, 737
 „ *tuberulata*, fig., 734
 „ *variabilis*, 737
Eulophia, 180
Eunotia, fig., 12
Euonymus europæus, fig., 587
 „ *tingens*, 587
Eupatorium Ayapana, 707
 „ *cannabinum*, 707
 „ *glutinatum*, 518, 707
 „ *perfoliatum*, 707
Euphorbia, fig., 275
 „ *uleppica*, 277
 „ *amygdaloides*, 277
 „ *antiquorum*, 277
 „ *Apios*, 277
 „ *balsamifera*, 278
 „ *buxifolia*, 277
 „ *canariensis*, 277
 „ *canescens*, 277
 „ *Caput Medusæ*, fig., 277
 „ *cereiformis*, 277
 „ *cotinifolia*, 277
 „ *Chamaesyce*, 277
 „ *Cyparissias*, 277
 „ *dendroides*, 277
 „ *Esula*, 277
 „ *Gerardiana*, 278
 „ *Melioscopia*, 277
 „ *heptagona*, 277
 „ *libernica*, 277, 280
 „ *hirta*, 277
 „ *hypericifolia*, 278
 „ *Ipeacacanha*, 278
 „ *Lathyrus*, 280, fig., 275
 „ *laurifolia*, 277
 „ *lincaris*, 277
 „ *mauritanica*, 278
 „ *nerifolia*, 277
 „ *officinum*, 277
 „ *palustris*, 277
 „ *papillosa*, 277
 „ *pavillora*, 277
 „ *pilosa*, 277
 „ *piscatoria*, 280
 „ *Peplis*, 277
 „ *Peplodes*, 277
 „ *Peplus*, 277
 „ *Pithyusa*, 278
 „ *phosorea*, 278
 „ *portulacoides*, 277
 „ *thymifolia*, 278
 „ *tribuloides*, 277
 „ *Tincalli*, 277
 „ *spinosa*, 277
 „ *virosa*, 277
Euphorbium, 277
Euphrasia officinalis, 683
Eurycoma longifolia, 468
Eutassa, 228
 „ *excelsa*, 228
Evening Primrose, 725
Evernia prunastri, 47, 48
 „ *vulpina*, 48
Evosmia corymbosa, 763
Excoecaria Agallocha, 278
Exidia auricula Judeæ, 39
Exillaria, 12
Exogen, fig., 236
Exogonium Purga, 631

Fafeer, 118
Faglhureh of Avicenna, 473
Fagine, 291
Fagopyrum esculentum, 503
 „ *tataricum*, 503
Fagus sylvatica, fig., 290
Fall Poison, 199
Farsefia, fig., 355
Fava de S. Ignacio, 315
Fegatella eonica, 52

Fel Terra, 672
 Fennel, 776
 Fenugreek, 549
 Feronia elephantum, 458
 Ferraria cathartica, 161
 .. purgans, 161
 Ferula Asafoetida, 776
 .. orientalis, 776
 .. persica, 776
 .. Szowitziana, 776
 Festuca dasyantha, 140
 .. duriusculus, fig., 106
 .. flabellata, 113
 .. pratensis, 113
 .. quadridentata, 113
 Feuillea cordifolia, 315
 .. hederacea, 312
 Feverfew, 76
 Fico del inferno, 431
 Ficus antbelmuntica, 267
 .. aspera, 267
 .. auriculata, 267
 .. australis, 266
 .. benghalensis, 267
 .. Benjaminia, 267
 .. Carica, 267
 .. Diemona, 267
 .. elastica, 267
 .. elliptica, 267
 .. Granatum, 267
 .. indica, 267, 268
 .. microcarpa, 267
 .. prinoides, 267
 .. pumila, 267
 .. racemosa, 268
 .. Radula, 267
 .. religiosa, 267, 268
 .. Rumphii, 267
 .. Saussureana, 267
 .. septicata, 267
 .. Sycomorus, 267
 .. toxicaria, 267
 .. Tsjala, 267
 Fig, 266
 Fijil burree, 664
 Fir, 228
 Firmiana platanifolia, 360
 Flacourtia cataphracta, 328
 .. Hamoneli, 328
 .. sapida, 328
 .. sepiaria, 328
 Flagellaria indica, 188
 Flax, 485
 .. -bush, 203
 Fleur de quatre heures, 507
 Flotovia diacanthoides, 798
 Foeniculum capense, 776
 Folia Malabathri, 526
 .. Tamalapathri or Indi, 526
 Forbidden Fruit, 458
 Forstera clavifera, fig., 606
 Fox-grape, 449
 Fragaria indica, 565
 .. vesca, fig., 522
 Frazilaria, 12
 Franciscea uniflora, 684
 Prancea appendiculata, fig., 451
 Frankenia ericifolia, fig., 349
 Fraxinus excelsior, 617
 .. rotundifolia, 617
 Frazeria Walteri, 614
 French Berries, 502
 Freycinetia imbricata, fig., 131
 Fruit, ideal, of an Umbellifer, fig., 777
 Frustilia, 12
 Fruta de Burro, of Humboldt, 358, 421
 .. de Burro of Carthagena, 358
 .. de parao, 303
 Fucus amygdalus, 24
 .. cartilagineus, 24
 .. nodosus, 24
 .. serratus, 24

Fucus vesiculosus, 21
 .. tenuis, 24
 Fuirena umbellata, 118
 Fumaria officinalis, fig., 438
 Fundi, 113
 Fundungi, 113
 Fungine, 1
 Fungus melitensis, 90
 Furze, 547
 Fusanus acuminatus, 788
 Fustic, 268
 Gaglee, 128
 Galangale, 166, 167
 Galbanum, 776
 .. officinale, 776
 .. Persiana, 776
 Galeopsis cchroleuca, 661
 Galipea Cusparia, 471
 .. officinalis, 471
 Galium Aparine, fig., 768
 .. Mollugo, 771
 .. rigidum, 771
 .. verum, 771
 Gall of the earth, 708
 Gallinha choca, 391
 Galls, fig., 32
 Gama Grass, 113
 Gambier, 762
 Garcinia cornea, 402
 .. Kydiana, 402
 .. Mangostana, 402
 .. pedunculata, 402
 Gardenia campanulata, 763
 Garlic, 203
 .. Pear, 358
 Garou, 531
 Garrya elliptica, fig., 295
 Gastrodia sesamoides, 180
 Gaultheria antipoda, 454
 .. hispida, 454
 .. procumbens, 454
 .. Shallon, 454
 Geaster, 90
 Geastrum multifidum, fig., 29
 Gebang Palm, 138
 Gela, 553
 Gen, 342
 Gendarussa vulgaris, 679
 Genetyllis, fig., 721
 Genipa brasiliensis, 764
 .. americana, 764
 Genipap, 764
 Genista tinctoria, 548
 Gentian, 614
 Gentiana Amarella, 614, fig., 612
 .. campestris, 614
 .. Catesbaei, 614
 .. cruciata, 614
 .. Kurroo, 614
 .. lutea, 614
 .. pannonica, 614
 .. punctata, 614
 .. purpurea, 614
 Geoffroya spinulosa, 548
 .. vernifera, 548
 Geophila reniformis, 763
 Geranium maculatum, 494
 .. Robertianum, 494, fig., 493
 .. parviflorum, 494
 German millet, 113
 .. Sarsaparilla, 11
 Geum arisanum, 564
 .. rivale, 564
 Ghona Grass, 113
 Gillettia stipularia, 564
 .. trifoliata, 564
 Glesia graminea, fig., 103
 Ginger, 106
 .. grass, 113
 Gingerbread-tree, 157
 Gischen, 789
 Givara, 790, 791
 Giramont seeds, 315
 362

Gladiolus segetum, 161
 Glaphyria nitida, 737
 Glechon spatulatus, 660
 Gleditschia tricantha, 559
 Gleichenia Hermannii, 79
 Globba uviformis, 167
 Globularia Alypum, 666
 .. orientalis, fig., 666
 Gloionema, fig., 12
 Gloriosa superba, 204
 Glossonema Boryanum, fig., 623
 Glyceria fluitans, fig., 106
 Glycosmis citrifolia, 458
 Glycyrrhiza echinata, 547
 .. glabra, 547
 .. glandulifera, 547
 Gueldia parviflora, 664
 Gnetum, fig., 233
 .. Brunonianum, 233
 .. Gnemom, 234, fig., 232
 Gnida daphnoides, 531
 Goatbush, 474
 Gobbo, 369
 Gold of Pleasure, 353
 .. thread, 427
 Gombo, 369
 Gomma da Batata, 631
 Goupfia angustifolia, 474
 .. hexasperma, 474
 .. Jabotapita, 474
 .. parvifolia, 474
 Gomphocarpus fruticosus, 626
 Gompholobium, 549
 Gomphonema, 12
 Gomphrena macrocephala, 511
 .. officinalis, 511
 Gometie, 137
 Gongonha, 598
 Gonogono, 302
 Gonolobus macrophyllus, 626
 Goorgoora, 643
 Gooseberry, 750, 751
 Gossypium vitifolium, 370
 Gouania domingensis, 582
 Gourrd, red, 314
 .. white, 314
 Grabowskia boerhaaveifolia, 654
 Graines d'Avignon, 582
 Grains of Paradise, 167
 Gram, 421
 Grammonema, fig., 12
 Grandilla, 333
 Grana molucca, 280
 Grape Vine, 440
 Grapple Plant, 670
 Grasses, 105
 Grass-tree of Tasmania, 203
 Gratiola Dei, 684
 Gratiola peruviana, 684
 .. officinalis, 684
 Grawathia, 148
 Greenheart-tree of Demerara, 526
 Greenovia aurca, fig., 316
 Grevillea robusta, 533
 Grewia asiatica, 372
 .. elastica, 372
 .. sapida, 372
 Griffithsia coralina, fig., 23
 .. sphaerica, fig., 23
 Grisea tomentosa, 575
 Ground Ivy, 661
 Gromixameira, 737
 Guabinoba, 736
 Guaco, 631, 794
 Guaducine, 479
 Guaiacum, 479
 .. officinale, 479
 Guarana-bread, 264
 Guaramee, 384
 Guarea Aubletii, 464
 .. purgans, 464
 .. spiciflora, 464
 Guarea trichiloides, 464
 Guntheria virata, 421
 Guava, 736

- Guazuma ulmifolia*, 364
Guelder Rose, 767
Gupeps végétantes, 32
Guttarda Angelica, 762
 " *Antirrhœna*, 762
 " *coccinea*, 762
Guillaudina Bonduc, 550, 552
Guildingia psidioides, 733
Guimauve, 369
Guizotia oleifera, 707
Guj-pippul, 194
Guluncha, 309
Gum animi, 394
 " *Arabic*, 547, 552, 718
 " *Butea*, 548
 " *Doctors'*, 467
 " *Dragon*, 547
 " *Elcom*, 460
 " *Gutta, American*, 406
 " *Hog*, 467
 " *Kino*, 503, 547, 737
 " *lac*, 267, 278, 548
 " *Senegal*, 547 552
 " *Tragacanth, of Sierra Leone*,
 361
 " *trees*, 736
 " " *stringy bark*, 736
Gumbo musqué, 369
Gummi Oreburgeuse, 229
Gunnera macrocephala, 781
 " *Panke*, 781
 " *scabra*, 781
Gunua australis, 180
Gunya, 372
Gymnema lactiferum, 625
 " *tingens*, 626
Gynerium, 114
 " *parviflorum*, 114
 " *saccharoides*, 114
Gynocardia odorata, 323
Gypsophila Struthium, 497
Gyrogonites, 28
Gyrophora deusta, 47
 " *pustulata*, 47

Hadschy, 265
Hemanthus toxicarius, 156
Hæmatococcus Noltii, 16
 " *salinus*, 16
Hæmatoxyton campechianum,
 550
Hæmodorum paniculatum, 152
 " *spicatum*, 152, fig.,
 151
Haimarada, 684
Hai-tsai, 24
Hakea acicularis, fig., 533
Hafedsch, 460
Halesia tetraptera, fig., 592
Halocnemum strobilaceum, 513
Halogeton tamariscifolium, 513
Haloragis citriodora, 723
Hamamelis virginica, 784
Hauchimol, 575
Hancornia pubescens, 600
Handplant of Mexico, 361
Haplophyllum tuberculatum, 471
Hashish, 265
Hasseltia arborea, 600
Hanzel-nut, 291
Heather, 454
Heathworts, 492
Hebenstreitia dentata, 666
Hedeoma pulgoides, 660
Hedera Helix, fig., 780
 " *terebintinacea*, 781
 " *umbellifera*, 781
Hedwigia balsamifera, 460
Hedycarpus malayanus, 383
Hedychium coruarium, 166
Hedysmum Bonplandianum, 520
Heimia salicifolia, 575
Heisteria coccinea, 443
Heliampora nutans, fig., 429
Helianthemum vulgare, 350
Helianthemum canariense, fig.,
 349
Helianthus annuus, 707
 " *tuberosus*, 709
Heliconia Psittacorum, 163
Helicteres brevispira, fig., 360
 " *Sacarotha*, 361
Heliophila crithmifolia, fig., 355
Heliotrope, Peruvian, 653
Heliotropium europæum, 653
Hellebore, 427
 " *black*, 427
 " *white*, 199
Helleborus niger, 427
 " *officinalis*, 427
Helminthia echioides, 709
Helminthostachys dulcis, 77
Helonias bullata, 199
 " *dioica*, 199
 " *frigida*, 199
Helosis, 83
Helvella clastica, fig., 33
Helwingia ruscifolia, fig., 296
Hemidesmus indicus, 626
Hemlock, 777
 " *Spruce*, 229
Hemp, 265, 610
 " *African*, 203
 " *Bengal*, 549
Heubane, 619, 620
Heunné, of Egypt, 575
Henslovina, fig., 570
Hepatica, 427
Heracleum gummiferum, 777
 " *Sphondylium*, 776
Herbe au Charpentier, 706
 " *du Diable*, 641
Herminium Mouorchis, fig., 173
Hermandia guianensis, 531
Herpestes amara, 683
Heteraria pygmaea, fig., 186
Heteropterys anomala, fig., 389
Heterostemma acuminatum, fig.,
 623
Heuchera americana, 568
Hibiscus arboreus, 369
 " *canuabinus*, 369
 " *Rosa Sinensis*, 369
 " *Sabduriffa*, 369
 " *surtensis*, 369
Hickory, 293
Hierochloa borealis, 113
Hillegie, 460
Hiunanthalia lorea, 21
Himeranthus runcinatus, 620
Hippobroma alatum, 385
Hippocratea Arnotiana, fig., 584
 " *comosa*, 584
Hippomane Mancinella, 278
Hippophaë rhamnoides, fig., 257
Hippuris vulgaris, fig., 723
Hog gum, 401,
 " *-meat*, 507
 " *-nut of Jamaica*, 280
 " *-plums*, 465, 467
Holbollia, 302
Holigarna longifolia, 466
Hollyhock, 369
Honesty, 354
Honewort, 777
Honey Locust, 550
 " *Euxine*, 455
 " *Narbonne*, 661
Honcysuckle, 767
Hop, 265
Hordcum Ægiceras, 109
Horehound, 660
Horse-chesnut, 384
 " *American*, 384
Horseradish, 353
Hortia braziliiana, 471
Hottentot's Fig, 526
Houttuynia cordata, fig., 521
Hovenia dulcis, 582
Hoya viridiflora, 625
Hugonia Mystax, 489
Huille des Marmottes, 558
Humirium balsamiferum, 447
 " *crassifolium*, fig., 447
 " *floribundum*, 447
Humulus Lupulus, fig., 265
Hungary water, 661
Huon Pine of Tasmannia, 228
Hura, 276
 " *crepitans*, 280, fig., 278
Hureek, 113
Hurryalee, 113
Hya Hya, 600
Hyænanche globosa, 280
Hydnocarpus venenatus, 323
Hydnora africana, 86, 91, fig., 92
Hydrangea hortensis, fig., 569
 " *Thunbergii*, 570
 " *virgens*, fig., 569
Hydrastis canadensis, 427
Hydrilla alternifolia, 141
Hydrocharis Morsus Ranae, 141
Hydrocleis Comersoni, fig., 208
Hydrodictyon utriculatum, 15,
 fig., 16
Hydrogastrium, fig., 21
Hydropeltis purpurea, 413, fig.,
 412
Hydrophyllax maritima, 764
Hydrophyllum canadense, 639, fig.,
 638
 " *virginianum*, 638
Hydrostachys verruculosa, fig. 482
Hymenaea verrucosa, 551
 " *Courbaril*, 550, 551, 552
Hymenandra Wallichiana, fig., 647
Hymenocystis caucasica, fig., 79
Hymenodictyon excelsum, 762
Hyananche sanguinea, fig., 610
Hyoescyamus, fig., 618
 " *albus*, 620
 " *niger*, 620
Hypanthera Guapeva, 315
Hypericum connatum, 406
 " *floribundum*, fig., 405
 " *hircinum*, 406
 " *laxiusculum*, 406
 " *perforatum*, 406
Hyphæne coriacea, 135
 " *thebaica*, 137
Hypnea, 5
 " *muiformis*, 24
Hypnum squarrosum, 55
Hypocyrtia gracilis, fig., 671
Hypoporum nutans, 118
Hypoxis erecta, 154
Hypoxylon punctatum, fig., 29
Hyssop, 660, 661

Iceland Moss, fig., 48
Ice-plant, 526
Ichnocarpus frutescens, 600
Iceia altissima, 460
 " *ambrosiaca*, 460
 " *Aracouchini*, 460
 " *Carana*, 460
 " *Icicariba*, 460
 " *guianensis*, 460
Ignatia amara, 603
Heodictyon, 39
Ilex Gongonha, 598
 " *Macoucoua*, 598
 " *macrophylla*, fig., 597
 " *paraguayensis*, 598
 " *theezans*, 598
 " *vomitaria*, 598
Illicium anisatum, 419
 " *floridanum*, 419
 " *religiosum*, 419
Ilupie-tree, 591
Imbricaria malabarica, 591
 " *maxima*, 591
Impatiens Balsamua, fig., 490
 " *macrochila*, fig., 490, 491
 " *Nolitangere*, 492

- Imperata arudinacea*, 111
Inceuse-wood, 460
Indian Gnjua, 394
 " Rubber, 267, 278
 " Chocolate-root, 564
 " Cress, 366
 " Figs, fig., 747
 " shot, 169
Indigo, 547, 548, 600, 626
Indigofera Anil, 548
 " *cerulea*, 548
 " *enneaphylla*, 547
 " *tinctoria*, 548, 549
Inga fuculifera, 553
 " *vera*, 553
 " *tetraphylla*, 552
Inocarpus edulis, 531
Inula Helenium, 707
Inuline, 707
Ionidium Itubn, 339
 " *parviflorum*, 339
 " *Poaya*, 339
Ipecacuanha, 278, 339, 762
 " *Guiana*, 507
 " *of Venezuela*, 626
 " *wild*, 625
Ipeirano, 664
Ipe-tobacco, 677
Ipomoea batatoides, 631, fig., 630
 " *ficifolia*, fig., 632
 " *macrorrhiza*, 631
 " *maritima*, 631
 " *operculata*, 631
 " *pandurata*, 631
 " *Quamoclit*, 631
 " *sensitiva*, 631
 " *Turpethum*, 631
 " *tuberosa*, 631
Ιταμαρι, 199
Ιταραϊς, 277
Iridaea edulis, 24
Iris, fig., 159
 " *fetidissima*, 161
 " *Florentina*, 160
 " *germanica*, 161, fig., 159
 " *pseud-acorus*, 160, 161
 " *sibirica*, 161
 " *tuberosa*, 169
 " *verna*, 160
 " *vesicicola*, 160
Ironwood, 566
I-ratis tinctoria, 354
Isidinum Westringii, 47
Iakeel, 204
Isnardia alternifolia, 725
Isoteles setacea, 73
Isotoma longiflora, 692
Itaballi, 340
Itaka-wood, 548
Ivarancusa, 114
Ivory, vegetable, 123
Ivy, 741
Ιζις, 708
Ιζις, 708
Jaborosa runcinata, 620
Jaboticaburas, 736
Jabuti, 737
Jabuticaba, 736
Jacaranda, 553
 " *procera*, 677
Jack, 270, 791
Jackals Kost, or Kaiump, 91
Jagery, 136
Jalap, 621
 " *plant*, 667
 " *Male of Mestilan*, 621
Jamrosade, 736
Janzi, 141
Janpha Manhot, 228
Japan Lacquer, 106
Jarilo, 625
Jasmine, 616, 651
 " *essential oil of*, 651
J. inum angustifolium, 651
Jasminum grandiflorum, 651
 " *ligustrifolium*, fig., 650
 " *officinale*, 651
 " *pubescens*, 651
 " *sambac*, 651
 " *undulatum*, 651
Jatropha glauca, 280
 " *Manihot*, 111, 280
 " *officinalis*, 279
 " *purpurea*, 280
 " *urens*, 281
Jaursa, 547
Jewbush, 278
Jito, 464
Job's tears, 114
Jobbia africana, 314
Jodla, 113
Jowaree, 113
Jubaea spectabilis, 135
Jubelia riparia, fig., 388
Juglans cathartica, 292
 " *nigra*, 293
 " *regia*, 293, fig., 292
Jujube, 582
Junceus acutiflorus, fig., 191
Jungermannia bidentata, fig., 59
 " *hyalina*, fig., 59
Jungle Bandy, 316
Juniper, 228, 229
Juniperus communis, 229
 " *oxycedrus*, 228, 229
 " *Sabina*, 229
 " *virginiana*, fig., 228
Juriballi bark, 462
Jussiaea Caparosa, 725
 " *peruviana*, 725
 " *pilosa*, 725
 " *scabra*, 725
Justicia biflora, 679
 " *Ecobobum*, 679
 " *paniculata*, 679
 " *pectoralis*, 679
Kadsura japonica, fig., 305
Kaempferia Galanga, 167
 " *pandurata*, 165
Kakaterro, 231
Kala kangnee, 113
Kaladana, 631
Kalaf, 255
Kalancboe brasiliensis, 345
Kalmia latifolia, 454
Kalumba root, 308
Kandelia Rheedii, fig., 726
Kangaroo Apple, 621
 " *Grass*, 113
Kanten, 24
Ka-ri-shutur, 547
Kasson-Khawe, of Senegal, 462
Kat, 587
Katu-tutan, 378
Kau Apple, 596
Kawrie Tree, of New Zealand, 228
Kayo Linur Panjang, 737
Kerobeta, 469
Khair-tree, 553
Khat, 587
Khiya, 462
Khen, 465
Khumr-ool-majnoon, 309
Khus, 113
Kidar-patri, 458
Kidney Bean, Scarlet Rumlug, 548
 " *Under-ground*, 547
Kielmeyera rosea, fig., 396
 " *spectiosa*, 397
Kino, African, 547
 " *East Indian*, 547
Kiriaghuna, 625
Kirschenwasser, 558
Knightia excelsa, 533
Knowltonia vesicatoria, 127
Kodoya Bikh, 427
Kodro, 113
Kokra, 283
Kola, 361
 " *nuts*, 604
Koλλας, 708
Kouages, of Diosc., 454
Koolah-i-Hinzareh, 640
Kopeh-roots, 128
Kora Kang, 113
Korras, 203
Koshel, 113
Krameria cistoidea, fig., 377
 " *triaudra*, 378
Kuchoo, 128
Kunda Oil, 464
Kunkirzeed, 708
Κονοζαυβη of Diosc., 513
Kunthia montana, 135
Κυπριος, of Hippocrates, 118
Kuteera, 350
Kutbar-chara, 458
Kutulegee, 462
Kydia calycina, 364
Kylliuga odorata, 118
 " *triceps*, 118
Labaria plant, of Demerara, 193
Laburnum, 547, 548
Lace-bark, 531
Lachnanthes tinctoria, 152
Lacistema serrulatum, fig., 329
Lactuca altissima, 708
 " *sativa*, 709
 " *Scariola*, 708
 " *sylvestris*, 708
 " *virosa*, 708
Lactucarium, 708
Ladanum, 350
Lætia apetalæ, 328
Lagenaria vulgaris, 313
Lagerströmia Regine, 575
Lagetta linearia, 531
Lagurus ovatus, 111
Lalo, 361
Lamb's Lettuce, 698
Laminaria bracteata, 21
 " *bulbosa*, 21
 " *digitata*, 21
 " *potatorum*, 21
 " *saccharina*, 21
Lancewood, 421
Langsat, 464
Lansdorffia, 83
Lanséh, 464
Lantana pseudo-thea, 663
Lapageria,
 " *rosea*, fig., 217
Λαπαθον κρητινον, 503
Lappa major, 708
 " *minor*, 708
Laranga da terra, 458
Larch, 229
Lardizabala triternata, fig., 303
Laser Cyrenaicum, 776
Laserpitium Siler, fig., 777
 " *glabrum*, 777
Lasiandra argentea, 733
Lathraea Squamaria, 610
Lathyrus Aphaca, 547, 548
 " *Cicer*, 547
 " *tuberosus*, 547
Laurel, 558
Laurentia pinnatifida, 24
Laurus nobilis, 537
Lavandula Spica, 660
 " *Stoechas*, 660
 " *vern.*, 660
Lavender, 669, 661
 " *French*, 660
Laver, 18
 " *green*, 18
Lavradia Vellozii, fig., 343
Lawsonia Inermis, 575
Lecanora utra, 47
 " *erlun*, 47
 " *hematomma*, 17

- Lecnora perella*, 47, fig., 45
 ,, *tartarea*, 47
Leeanorine, 48
Lecheguana honey, 384
Lechetres, 277
Lecidea geographica, 49
 ,, *luteo-alba*, 47
Lecythis grandiflora, fig., 740
 ,, *ollaria*, 740
 ,, *ovata*, fig., 739
Ledebouria hyacinthoides, 204
Ledum latifolium, 454
 ,, *palustre*, 454
Leek, 203
Leersia oryzoides, fig., 106
 Leguminous structure, fig., 545
Leiteira, 277
Lemma, 99
Leonon, 458
 ,, *grass*, 113
Lentils, 547
Leonotis nepetifolia, 660
Leontice Leontopetalum, 438
Leonurus Cardiaca, 661
Leotia uliginosa, 30
Lepidium africanum, fig., 355
Lepidostachys Roxburghii, 283
Lepraria, 46
 ,, *chlorina*, 47
Leptolena multiflora, 486
Leptomeria acida, fig., 787
 ,, *Billardiæri*, 788
Lepturis, 107
Lepurandra saccidora, 271
Lepyrodia hermaphrodita, fig., 121
Leschenaultia formosa, fig., 694
Lessonia fuscescens, 21
Lettuce, 708, 709
 ,, *opium*, 621
Leucas martinicensis, 660
Leuceria tenuis, fig., 703
Leucobryum albidum, 65
 ,, *minus*, 65
 ,, *longifolium*, 65
Leucodium verna, 156
Leucolena rotundifolia, fig., 774
Leucomeris spectabilis, fig., 703
Leucopogon Richei, 449
Liane à blessures, 180
 ,, *rouge*, 424
 ,, *à sirop*, 672
Libanus thurifer, 459
Libidibi, 550
Licaria guianensis, 536
Lichtensteinia pyretirifolia, 777
Lign-aloes, 552
Lignum colubrinum, 603
 ,, *Rhodium*, 460
 ,, *vitre*, 479
 ,, *of New Zealand*, 737
Ligustrum vulgare, fig., 617
Lilac, 616, 617
 ,, *Persian*, 616
Lilacine, 617
Liliegrün, 161
Lilium candidum, 204
 ,, *chalconicum*, 201
 ,, *pomponium*, 203
Lily of the Valley, 204
Lime, 458
Limnæthes Douglasii, 366
Limnocharis Plumieri, fig., 208
Limnochloa plantaginea, 118
Limonia Laureola, 458
Linaria, fig., 683
 ,, *cymbalaria*, 684
 ,, *Elatine*, 684
 ,, *ramosissima*, 684
 ,, *vulgaris*, 684
Lingua de Pin, 331
Linua borealis, fig., 767
Linum catharticum, 485
 ,, *pereunc*, fig. 485
Linum selagnoides, 485
 ,, *nsitatissimum*, 485
Lipochæta umbellata, figs., 703, 704
Lippia citrata, 664
Liquidambar orientale, 253
 ,, *Altingia*, fig., 253
 ,, *styraciflua*, 253
Liquid Storax, 229
Liquorice, 547
 ,, *root*, 547
Liriodendron tulipifera, 418
Lissanthe sapida, 448
Litchi, 383
Lithocarpus javensis, 291
Lithospermum tinctorium, 656
Litmus, 47
Litsæa Baueri, fig., 535
Littrea gemiuflora, fig., 156
Loasa Pentlandica, fig., 745
Lobelia cardinalis, 693
 ,, *inflata*, 692
 ,, *urens*, 693
 ,, *syphilitica*, fig., 692
Locust-tree, 548, 549, 550
 ,, *West Indian*, 550
Logania floribunda, fig., 602
Logwood, 547, 550
Loiselentia procumbens, 455
Lolium, 107
 ,, *perenne*, 113
 ,, *temuleutum*, 113
Longan, 383
Lonicera cærulea, 767
 ,, *tatarica*, fig., 767
Lophira alata, fig., 395
Loranthus chrysanthus, fig., 789
Lord Wood, 253
Lot-bush, 582
Lotophagi, 582
Lotus, 414
Londonia aurca, fig., 722
Love Apple, 621
Lucerne, 547
Ludwigia Jussæoides, fig., 724
Luffa amara, 314
 ,, *acutangula*, 314
 ,, *Biindaal*, 314
 ,, *drastica*, 314
 ,, *fatida*, 313
 ,, *purgans*, 314
Lutæa divaricata, 372
 ,, *grandiflora*, 372
Λυκίον ἰνδικόν of Diosc., 438
Lunaria botryoides, 77
Lungs of the Oak, fig., 48
Lunulinae, 12
Lupuline, 265
Lus-a-chrasis, 783
Luzula campestris, 192
Lychnis Chalcedonica, 497
 ,, *Flos Cuculi*, fig., 496
 ,, *dioica*, 497
 ,, *diurna*, fig., 498
Lycopode, 70
Lycopodium alpinum, 70
 ,, *annotinum*, fig., 69
 ,, *catharticum*, 70
 ,, *clavatum*, 70
 ,, *denticulatum*, fig., 69
 ,, *rubrum*, 70
 ,, *Phlegmaria*, 70
 ,, *Selaginoides*, 70
 ,, *Sclago*, 70
 ,, *squamatum*, 70
Lycopus europæus, 661
Lygeum Spartum, 111
Lysimachia ciliata, 645
 ,, *hybrida*, 645
Lysurus mokusin, 39
Lythrum Salicaria, fig., 575
Mace 302
Machaerium Schomburgkii, 543
Maché, 698
Maclura aurantiaca, 266, 268
Maclura tinctoria, 268
Maba elliptica, fig., 595
Macrocyrtis pyriferæ, 21
Macropiper methysticum, fig., 516
 518
Macrozamia spiralis, 224
Madder, 770, 771
 ,, *of Bengal*, 770
 ,, *of Chili*, 770
Madhuca-tree, 591
Madia sativa, 707
Madoodooma, 591
Mæsa argentea, fig., 647
 ,, *ovata*, fig., 647
Magnolia acuminata, 418
 ,, *auriculata*, 418
 ,, *conspicua*, 418
 ,, *excelsa*, 419
 ,, *Frazeri*, 418
 ,, *glauca*, 418, fig., 417
 ,, *grandiflora*, 418
 ,, *pumila*, 418
 ,, *tripetala*, 418
 ,, *Yulan*, 418
Magonia glabrata, 384
 ,, *pubescens*, 384
Maguei-mcti, 158
Maguey de Cocay, 158
Mahogany, 462, 536
Malva-tree, 591
Mainunna, 582
Maïs peladero, 115
Malze, 111, 112, 114
Maizurrye Palm, 138
Mæsson, 431
Malach, 265
Μαλαχον of Diosc., 369
Malaxis paludosa, fig., 177
Malesherbia fasciculata, fig., 335
Μαλινοβαλλων of Theophrastus, 118
Malva, 369
Malpighia, fig., 388
 ,, *Monreila*, 390
Malva crispa, 369
 ,, *sylvestris*, fig., 368
Mamnee Apple, 402
Mammillaria, fig., 746
Manaca, 684
Manawa, 665
Manchineel, 278
 ,, *tree*, 677
 ,, *Bastard*, 600
Mand, 113
Mandioc, 280, 281
Mandragora officinalis, 620
Mandrake, 620
 ,, *Apples*, 621
Manettia cordifolia, 763
Mangifera indica, 466
Mangleia glauca, 419
Mango, 466
Mangold Wurzel, 513
Mangosteem, 402
Mangrove, 718
 ,, *White*, of Brazil, 665
Manguai, 158
Manguai divinum, 158
Man-guri, 128
Mani, 401
Manihot, 111, 277
 ,, *Aipi*, 281
 ,, *ntilissima*, 280
Manioc, 328
Manita, 361
Mankuchoo, 128
Manna, 547, 617, 737
 ,, *of Briangon*, 229
 ,, *Persian*, 342
 ,, *of Mount Sinai*, 341
Mannite, 41, 617
Mantisia saltatoria, fig., 166
Maprounea brasiliensis, 281
Mara, 460
Maranta Alonyia, 169
 ,, *arundinæca*, 169

- Maranta uobidis*, 169
 .. *ramosissima*, 169
Marattia alata, 82
Marcgravia umbellata, 404
Marchantia commutata, fig., 58
 .. *polymorpha*, 52
Margaricarpus setosus, 562
Mariposa-tree, 461
Mariquinia obtusifolia, fig., 459
Marigold, Pot, 708
Mariscus, 118
Marjoram, 669
Markea begonifolia, fig., 719
Marmalade, 591
Marmaleiro do Mato, 331
Marmeireiro do Campo, 281
Marron d'Eau, 723
Marrubium vulgare, 660
Marrum Grasses, 114
Marsdenia tenacissima, 626
 .. *tinctoria*, 626
Marshmallow, 369
Marsilea polycarpa, 71
 .. *pubescens*, fig., 71, 72
 .. *vestita*, 71
Marsiphanthus hypnotoides, 660
Martinezia caryotafolia, 135
Martynia lutea, fig., 669
 .. *proboscidea*, 670
Maruta foetida, 706
Marvel of Peru, 506, 507
Massoola boots, 372
Mastich, 496
Maté, 528
Mathiola livida, fig., 355
 .. *oxyceras*, fig., 355
Matico, 518, 661, 707
Matricaria Chamomilla, 706
Mauritia flexuosa, 135
 .. *vinifera*, 136
Mayaca vivatilis, 189
 .. *Vandellii*, fig., 189
May-apple, 427
Maynas resin, 491
Mays del Monte, 90
Maytenus chilensis, 587
Meadow Saffron, 159
Mechamek, 631
Meconine, 431
Meconopsis napalensis, 431
Medick, 547
Medinilla macrocarpa, fig., 731
 .. *radicans*, fig., 731
Medlar, 559
 .. of Surinam, 591
Melissa aurica, 8
Messia longiceta, fig., 64
Megacolinum Bufo, fig., 179
Mexzo, 431
Melaleuca Cajeputi, 737
Melambo-bark, 471
Melampyrum pratense, 683
Melanorrhœa usitatissima, 466
Melanoxylon Brabua, 559
Melastoma malabathrica, 733
Mella Azedarach, 464
 .. *Azedarachta*, 464
Melastoma major, 479
Melleococa bijuga, 343
Melilot, 549
Melilotus carulea, 549
 .. *officinalis*, 549
Melissa Calamitica, 661
 .. *officinalis*, 661
Melochia zambinifolia, fig., 363
Melodinus monozymus, 699
Melon, 313
Malweira, 12
Memecylon edule, 733
Mendexia bicolor, fig., 702
Menispermia, 369
Menonvillea linearis, fig., 355
Mentha aquatica, 660
 .. *arvensis*, 660
 .. *citriodora*, 660
Mentha Pulegium, 660
 .. *rotundifolia*, 660
 .. *viridis*, 660
Mentzelia hispida, 745
Menya, 113
Menyanthes trifoliata, 614
Mercurialis, 279
 .. *anua*, 276, 279
 .. *perennis*, 276, 279
 .. *tomeutosa*, 279
Mercurio do campo, 391
 .. *vegetal*, 684
Meriandra benghalensis, 660
Merteusia dichotoma, 79
 .. *hexuosa*, fig., 80
Merulius lacrymans, 39
 .. *vastator*, 39
Mesembryanthemum, fig., 525
 .. *aquilaterale*, 526
 .. *copticum*, 526
 .. *crystallinum*, 526
 .. *edule*, 525
 .. *amaricidum*, 526
 .. *geniculiflorum*, 526
 .. *nodiflorum*, 526
Mespilodaphne pretiosa, 536
Mesua ferrea, 402
Meth, 158
Metrosideros buxifolia, 736
 .. *lucida*, 736
 .. *polymorpha*, 737
Meum athamanticum, 776
 .. *Mutellina*, 776
Mexical or aguardiente de Maguey, 158
Mezereum-bark, 531
Michelia Doltsopa, 419
 .. *gracilis*, 419
 .. *Tsjampac*, or *Champaca*, 418
 .. *montana*, 418
Miconia longifolia, 733
 .. *tinctoria*, 733
Microcachrys tetragona, 228
Microdon ovatum, fig., 666
Microglena monadina, 2
Microlæna spectabilis, 364
Micromega, 12
Micromelum monophyllum, fig., 457
Miersia chilensis, fig., 196
Mignonette, 356
Mikania Guaco, 707
 .. *officinalis*, 707
 .. *opifera*, 707
Mildew, 39, fig., 35
Milfoil, 705
Mimosa saponaria, 553
 .. *sensitiva*, 553
Mimulus guttatus, 683
Mimusops Elengi, 531
 .. *Kaki*, 531
Mint, 660
Mirabilis dichotoma, 507
 .. *Jalapa*, 507, fig., 506
 .. *longiflora*, 507
 .. *surveolens*, 507
Misobrad, 194
Mistletoe, 791
Miumna cuspidatum, fig., 54
Moacura gelonioides, fig., 583
Moedeca integrifolia, 322
 .. *palmata*, 322
Mœna angolensis, fig., 357
Mohaut, 363
Moho Moho, 618
Mohoe, 329
Mohria thurifera, 79
Molida varia, 113
Moinœdica Balsamina, 314
 .. *Clara*, 314
 .. *Claterium*, 314
 .. *monadelphica*, 314
 .. *operculata*, 314
Monachanthus viridis, 178
Monarda punctata, 661
 .. *flutulosa*, 661
Monesia bark, 591
Monnina polystachya, 378
 .. *salicifolia*, 378
Mouochoria vaginalis, 206
Mouoclea crispata, fig., 59
Mouodora Myristica, 422
Moutotaxis tridentata, fig., 276
Moutropa Hypophitys, fig., 462
Monsonia speciosa, 494
Monstera Adansonii, 129
 .. *pertusa*, 193
Mootha, 118
Mopha, 591
Moquila canomensis, fig., 542
Mora excelsa, 553
Morinda Royce, 762
Moringa aptera, fig., 336
 .. *pterygosperma*, 357, fig., 336
Moronoba coccinea, 401
Morphia, 431
Morus alba, fig., 266
 .. *nigra*, 267
Moscharia pinnatifida, 708
Moutain Ash, 560
 .. *Tobacco*, 707
Mouron, 645
Mowra, 591
Moxa, 40
 .. of China, 705
Moxo-moxo, 707
Mucor caninus, 29
 .. *Mucedo*, fig., 30
Mucuna pruriens, 548, 549
Mudar, 626
Muhlenbeckia adpressa, 503
Mulberry, 266, 267
 .. *white*, 267
Mulgedium floridanum, 708
Mundia spinosa, 378
Munduli, 547
Munjeeth, 770
Murdannia scapiflora, 188
Murici, 390
Murucuja ocellata, 333
Musa Paradisiaca, fig., 163
 .. *textilis*, 163
Musanga, 270
Muscadine, 32
Muscari moschatum, 204
Musk, 458
 .. *-root*, Persian, 777
Mustard, 353
 .. *tree of Scripture*, 652
Myanthus barbatus, 178
Myblita australis, 39
Mylocaryum ligustrinum, fig., 445
Myoschilos oblongus, 787
Myrica cerifera, fig., 256
 .. *Gale*, fig., 256
 .. *sapida*, 256
Myricaria germanica, 342
Myristica acuminata, 392
 .. *Bicifida*, 392
 .. *fatua*, 392
 .. *fragrans*, fig., 391
 .. *madagascariensis*, 392
 .. *moschata*, 392
 .. *officinalis*, 392
 .. *spuria*, 392
 .. *Otoba*, 392
 .. *tomentosa*, 392
Myrobolan, 718, 469
Myrobolani Eudicis, 280
Myrodia angustifolia, 361
Myrospermum peruvianum, 552
 .. *toluiferum*, 552
Myrrhinium atropurpureum, 733
Myrsine africana, 648
 .. *bifaria*, 648
 .. *horidana*, 647
Myrtidannum, 737
Myrtle, 736, 737

- Myrtus communis, 734, 736, 737
 fig., 738
 nummularia, 736
 Tabaseo, 737
 Myscolus hispanicus, 709

 Nabalus albus, 708
 serpentaria, 708
 Nabal, 582
 Nagkesur, 402
 Nagla Ragee, 113
 Nagur-Mootha, 118
 Naias, 101
 Napha-water, 458
 Napoleona Imperialis, fig., 728
 Naranjitas de Quito, 621
 Narceine, 431
 Nareissus odorus, 156
 Poeticus, 156
 Pseudo-Narcissus, 157
 Tazetta, 156
 Narcotine, 431
 Nard, 698
 Nardostachys Jatamansi, 698
 Nardhecium ossifragum, 192
 Natchnee, 113
 Native Carrot, 494
 Currant, 449
 Potato, of Tasmannia, 180
 Navicula, 12
 Navicularis, 12
 Neb-neb, 553
 Nectandra cinnamomoides, 536
 cymbarum, 536
 Rodiæi, 536
 Pnechury, 536
 Nectarine, 558
 Neem-tree, 464
 Neer-mel-neripoo, 480
 Negro's-head, 138
 Nehal, 82
 Nelsonia campestris, fig., 678
 Nelumbium luteum, 415
 speciosum, fig., 414
 Nepenthes distillatoria, fig., 287
 Nepeta Glechoma, 661
 Nephrodium esculentum, 79
 Nerium odorum, 600
 Oleander, 600
 Nertera depressa, 762
 Nesaea verticillata, 575
 Nettle-tree, 580
 Neurosperma cuspidata, 314
 New Zealand Flax, 203
 Spinaekt, 527
 Nicandra physaloides, 620
 Nicker-tree, 552
 Nicotiana multivalvis, 618, 736
 persica, 619, 620
 rustica, 620
 Tahaem, 620
 Niepa bark, 477
 Nieshout, 385
 Nightshade, 619
 Nima quassioides, 477
 Niontout, 460
 Nipa fruticans, fig., 133
 Nir Bishi, 427
 Nirbikhi, 427
 Nitella, fig., 28
 Nitraria Schoberi, fig., 389
 Nitrariaceæ, 389
 Nolana paradoxa, 736
 prostrata, fig., 654
 Norfolk Island Pine, 228
 Nostoc, 18
 foliaceum, 46
 lichonoides, 46
 Notelara ovata, fig., 616
 Nothochlæna piloselloides, 79
 Noyau, 631, 653
 Nuphar luteum, 410, 411
 Nut, Quandang, 788
 Nut-grass, 119
 Nutmeg, 302

 Nutmegs, Brazilian, 536
 of Santa Pê, 302
 Nuts, Brazil, 740
 Siughana, 723
 marking, 461
 Nux Vomica, 603
 Nyctanthes, fig., 650
 Arbor tristis, 651
 Nymphæa alba, figs., 409, 410
 Nyssa candicans, 720
 capitata, 720
 montana, fig., 719

 Oak, 291
 Oak-currants, 31
 Oak-spaugles, fig., 31
 Oanani, 401
 Oat, 111, fig., 107
 Obeonia portulacoides, 513
 Oberonia Griffithiana, fig., 176
 βεβα, 214
 Οχισσεα, 356
 Oehua dubia, fig., 474
 hexasperma, 474
 Oehranthe arguta, fig., 571
 Ochro, 369
 Ochroma Lagopus, 361
 Octoblepharum albidum, fig., 64
 cylindricum, 65
 Ocymum, 520
 febrifugum, 661
 incanescens, 660
 Odina wodier, 466
 Odontoglossum grande, fig., 183
 Oenanthe erecta, 777
 pimplinelloides, 776
 P'hellandrium, 777
 Onocarpus Bacaba, 137
 Onothera biennis, 724
 Ogechee Lime, 720
 Oil of Almonds, 558, 560
 of Bitter Almonds, 558
 cake, 353
 Cajeputi, 737
 of Carapa guianensis, 464
 Gingilie, 670
 of Hops, 265
 of Lavender, 660
 of Lilies, 204
 Madia, 707
 of Neroli, 458
 Olive, 616
 of Rhodium, 631
 of Sesamum, 670
 of Spearmint, 660
 of Spike, 660
 of Tobacco, 620
 of Turpentine, 228
 of Wintergreen, 454
 Ol, 128
 Olax Zeylanica, 444
 Olea Europæa, 616
 fragens, 617
 Oleander, 600
 Oldenlandia umbellata, 764
 Olibanum, 450
 Olio di Marmotta, 455
 Olive, 464, 616
 Ombrophytum, 90
 Omphalen, 280
 triandra, 279
 Omphalobium Lambertii, 468
 Onion, 203
 Onobrychis sativa, 547
 Onyehium lucidum, fig., 80
 Opegrapha scripta, fig., 45
 Ophiocaryon paradoxum, fig., 333
 Ophioglossum lusitanicum, 77
 vulgatum, 77
 Ophiorhiza Mungos, 762
 Ophioxylon serpentinum, 600
 Ophrys apifera, fig., 174, 177
 Opoidin galbanifera, 776
 Opopanax, 776
 Chironum, 776

 Oporanthus luteus, 157
 Opuntia, 747
 Dillenii, fig., 746
 Tuna, 747
 vulgaris, 747
 Orach, Garden, 513
 Orange, 458, fig., 457
 horued, 457
 within Orange, 457
 Osage, 266, 268
 Quito, 621
 Orehall, 47
 Orchid flower, fig., 178
 Orehis mascula, fig., 174, 180
 Orcine, 48
 Ornela de Gato, 406
 de Onça, 308
 Oreodaphne cupularis, 536
 exaltata, 536
 factens, 536
 opifera, 537
 Oreodoxa frigida, 135
 regia, 135
 Oreoseris lanuginosa, fig., 704
 Origanum Dietamnus, 661
 Ormoearpum senoides, 547
 Ornithopus, 547
 Orobanche, 87
 epithyllum, 610
 major, 610
 ramosa, 610
 Orontium aquaticum, 193
 Orris-root, violet-seented, 160
 Orseille des Canaries, 47
 de terre, 47
 Orthianthera viuinea, 626
 Osage Orange, 266, 268
 Osbeckia chiensis, 733
 Principis, 733
 Osculni, 48
 Oscillatoria, 15
 serugeseus, 16
 Osiers, 255
 Osmunda regalis, 79
 Osyris nepalensis, 787
 Otilia, 141
 Ourari, 603
 Ouvirandra Bernieriana, fig., 210
 feustralis, fig., 210
 Oxalis Biophytum, 488
 confertissima, fig., 488
 erassicaulis, 489
 crenata, 488
 Deppel, 488
 esculenta, 489
 sensitiva, 489
 stricta, 489
 tetraphylla, 489
 Oxhoof, 550
 Oxleya xanthoxyla, 462
 Οξυμυρτιν of Diosc., 204
 Oxycoceus macrocarpa, 757
 palustris, 757
 Oxytelma esculentum, 625
 Oyster-green, 18

 Pachana, 308
 Pæco seroca, 167
 Pacoury-uva, 402
 Pæderia fetida, 763
 Pæonia Montana, fig., 426
 Palapata, 600
 Paleourea Marcgraavii, 763
 Palm, fig., 96
 Palma Christi, 280
 P. smella, 5
 botryoides, 46
 Paluinjunci, 135
 Palm oil, 137
 trees, fig., 133
 wine, 137
 Palmyra-wood, 138
 Palo, 308
 Coto, 22
 de Vaca, 270

- Panacea lapsorum*, 707
Panax *Anisum*, 781
 cochleatum, 781
 Coloni, 660
 fruticosus, 781
 Ginseng, 780
 quinquefolium, 781
Pancreatum, 203
 maritimum, 156, fig., 155
Pandanus, fig., 130
 candelabrum, 131
 odoratissimus, 132
Pangi, 323
Pangium edule, fig., 323
Panicum, 107
 frumentaceum, 112, 113
 miliaceum, 113
 pilosum, 113
 spectabile, 113
Πανθειον of Diosc., 203
Panococco-bark, 550
Pansuri, 137
Pao d'arco, 677
Pao de rosa 575
Papaw, 321
Papæta, 603
Pappea capensis, 383
Pappophorum, 107
Papyrus antiquorum, 118
 corymbosus, 118
 Pangorei, 118
Paraguay Tea, 598
Paraiba, 476
Para todo, 511
Pardanthus Chinensis, fig., 160
Pardepis, 385
Paregoric elixir, 593
Pareira brava, 308
Paribaroha, 518
Parietaria diffusa, 261
 erecta, 261
 officinalis, fig., 260
Parietin, 47
Parinarium excelsum, 543
 montanum, 543
 campestre, 543
Paris quadrifolia, fig., 218
Parkia africana, 552
Parmelia conoplea, 46
 conspersa, 47
 encausta, 47
 farinacea, 49
 fraxinea, 49
 gelida, 46
 gossypina, 48
 lanuginosa, 46
 omphalodes, 47
 parietina, 45, 47, 48, fig., 46
 saxatilis, 47
 sarmentosa, 49
 tiliacea, fig., 46, 49
Parmelochromine, 45
Parmentiera edulis, 674
Parolinia, 352
 ornata, fig., 352
Paronychia capitata, fig., 499
Paropsia edulis, 323
Parosley, 776
Parosip, 776
Partridge-wood, 443
Paspalum exile, 113
 serobiculatum, 113
Passan-Batu, 201
Passerina tinctoria, 531
Passiflora, fig., 372
 capularis, 323
 coccinea, 323
 Contrayerva, 233
 edulis, 323
 flamentosa, 323
 foetida, 323
 incarnata, 323
 laurifolia, 323
 lutea, 323
 maliformis, 323
Passiflora pallida, 333
 quadrangularis, 333
 rubra, 323
 serrata, 333
Passiflorine, 333
Patagonula vulneraria, 664
Patchouli, 660
Paulinia australis, 381
 Cupana, 384
 Cururu, 384
 pinnata, 384
 sorbilis, 384
 subrotunda, 383
Pavonia ciuretica, 369
Pea, 547
Peach, 558
 Native of Sierra Leone, 764
Pear, 560
Pedaliium Murex, 670
Pe de Perdis, 279
Pedilanthus padifolius, 278
 tithymaloides, 278
Peganum Harmala, 479
Pelargonium antidysentericum, 494
 triste, 494
 zonale, 493
Pellitory of Spain, 706
Peltandra virginica, 128
Peltidea aphthosa, 48
 canina, fig., 45
Peltigera canina, 48
Peltobryon longifolium, 518
Peltodon radicans, 660
Peltophyllum luteum, fig., 213
Pemphis acidula, 575
Penæa fruticulosa, fig., 577
Penang lawyers, 138
Penicillaria spicata, 113, fig., 107
Pennyroyal, 660
 of the North Americans, 66
Pentadesma butyracea, 401
Peon, 402
Peperomia blanda, fig., 515
 pellucida, 518
Περαλιον of Hippoc., 277
Περαλις of Diosc., 277
Περαλος of Hippoc., 277
Pepper, 737
 black, 517, 518
 Cayenne, 621
 long, 517, 518
 white, 517
Pepperdulse, 24
Peppermint, 660
Perelle d'Auvergne, 47
Pereskia aculeata, 747
Periploca græca, 626
Pernambuco-wood, 550
Perotis latifolia, 114
Perpetua, 511
Perry, 560
Persea, 628
 gratissima, 537
 indica, 536
Persoonia macrostachya, 533
Pernvian Bark, 462
Petarkura, 323
Petrophila brevifolia, 533
Petunia nyctaginiflora, 619
 violacea, 619, fig., 618
Peucedanum montanum, 776
Πιων of Diosc., 228
Peziza aurantia, fig., 33
 clavus, 30
Phalaris Tankervillea, fig., 177
Phalaris aquatica, fig., 106
 canariensis, 113
Phallus impudicus, 99
Pharbitis cathartica, 631
 carulea, 631
Phaseolus multiflorus, 518
 trilobus, 518
Phelipæca lutea, 610
Phadelphus coronarius, 754
Philesia, 211
Philesia buxifolia, fig., 217
Phillyrea, 616
 latifolia, 616
Philydrum lanuginosum, fig., 186
Phileum pratense, 113
Phoenix dactylifera, 137
 farinifera, 136
 sylvestris, 137
Pholidia scoparia, fig., 665
Phorium tenax, 203, 204
Photinia dubia, 560
Phragmites arundinacea, 114
 Calamagrostis, 114
Phrynium dichotomum, 169
Phu of Diosc., 698
Phyllanthus Conami, 279
 Niruri, 279
 urinaria, 279
Phyllocladus rhomboidalis, fig., 231
 tricornanoides, 231
Phylloglossum Drummondii, fig., 70
Physalis Alkekengi, 620
 angulata, 620
 pubescens, 620
 somnifera, 620
 viscosa, 620
Physocalymna floribunda, 575
Physostemon lanceolatum, fig., 358
Phytelephas macrocarpa, 138
Phyteuma spicatum, 691
Phytocrene, fig., 270
Phytolacca acinosa, 508
 decandra, fig., 508
 drastica, 509
Pichurim Beans, 536
Picræna excelsa, 476
 wood, 476
Picramnia ciliata, 460
Picris hieracioides, 610
Picrobinene, 48
Picrotoxine, 309
Pierardia dulcis, 383
 sativa, 383
Pigeon-peas, 547
Pig-faces, 526
Piguut, 776
Pigonil, 113
Pilea muscosa, 261
Pilosyles Berterii, 93
Pilularia globulifera, fig., 72
Pimento, 737
Pimpinella Anisum, 777
Pinang Palm, 518
Pinckneya pubens, 762
Pindaiba, 421
 preta, 421
Pine Apple, 147
 Scotch, 228
 Stone, 228
 Weymouth, 228
 Virginian, 228
Piney varnish, 394
 Dammar, 394
 tree, 402
Pinguicula vulgaris, fig., 686
Pinhoon, 280
Pinus Cembra, 229
 Gerardiana, 229
 halepensis, 228
 Lumbertiana, 228, 229
 palustris, 228
 Picea, 229
 Pinaster, 229
 Pinen, 229
 Pumilio, 228
 sylvestris, fig., 226, 228
Piper, 137
 Amalago, 518
 angustifolium, 518
 longum, 517
 nigrum, 517
 orthoceras, 421
 Parthenium, 518
 trioicum, 517
Piperine, 517

- Pipeworts, 105
 Pippul, 267
 Pippula Moola, 517
 Piptostegia Gomezii, 631
 Pisonis, 631
 Piratinera guianensis, 271
 Puri-Jiri, 723
 Pisang, 112
 Piscidia Erythrina, 549
 Pisonia grandis, fig., 506
 Pistacia atlantica, 467, fig., 465
 Lentiscus, 467
 Terebinthus, 467
 vera, 466
 nut, 466
 Pistia Stratiotes, fig., 124
 Pistillidia, 5
 Pitanga, 737
 Pitangueira, 737
 Pita-plant, 157
 Pitcairnia ringens, fig., 147
 Pitch, Burgundy, 228
 common, 228
 Pithecolobium gunmiferum, 551
 Pi-tsi, 118
 Pitoumba, 385
 Pittosporum Tobira, 441
 uudulatum, fig., 441
 Πιτυς of Diosc., 229
 Planera Abelicea, 580
 Plantago arenaria, 643
 Coronopus, 643
 Cynops, 643
 pusilla, 70
 Ispaghula, 643
 lanceolata, fig., 642
 L'syllium, 643
 squarrosa, 643
 Plantain, 163
 Platanus orientalis, fig., 272
 Platania insignis, 402
 Platycrater arguta, 570
 Plocaria candida, 24
 compressa, 24
 Helminthochorton, 24
 tenax, 24
 Plosslea floribunda, 384
 Plukenetia corniculata, 279
 Plum, 558
 Plumbago europæa, 641
 rosea, 641
 scandens, 641
 Zeylanica, 640, 641
 Poa Abyssinica, 111, 113
 dactyloides, 110
 disticha, 110
 mahliensis, 110
 Poaya, 339
 brauca, 339
 de prain, 339
 Pocañ, 508
 Podocarp, 228
 Podocarpus cupressina, 231
 Totarra, 231
 Podophyllum peltatum, 427
 Pohuta Kawa, 737
 Poineiana puleherrima, 459
 Pois doux, of St. Domingo, 553
 Quéniques, 337
 Poison for arrows, 277
 Macassar, 531
 Poivre purpurea, fig., 717
 Polanisia graveolens, 357
 icosandra, 358
 Polemonium aceruleum, 636
 Polianthes tuberosa, 204
 Polychroite, 160
 Polygala amara, 377
 Chamaebuxus, 378
 crotarioides, 378
 crioptera, fig., 375
 glandulosa, 378
 major, 377
 paniculata, 378
 poaya, 378
 Polygala purpurea, 378
 rubella, 377
 sanguinea, 378
 Senega, 378
 scoparia, 378
 serpentaria, 378
 thesioides, 378
 tinctoria, 378
 venenosa, 378
 vulgaris, 377, fig., 375
 Polygaline, 378
 Polygonum aviculare, 503
 barbatum, 503
 Bistorta, 503
 Convolvuli, fig., 502
 hispidum, 503
 Hydropiper, 503
 lappathifolium, fig., 502
 tinctorium, 503
 Polyplocium inquinans, fig., 42
 Polypodium Calaguala, 79
 crassifolium, 79
 effusum, fig., 75
 phymatodes, 79
 Polypogon, uonspeliensis, fig., 106
 Polyporus destructor, 39
 fomentarius, 39, 40
 officialis, 39
 portentosus, 39
 Polytrichum commune, 55, fig., 54
 Pomegranate, 735, 737
 Pompelmoose, 458
 Poplar, 254
 Poppy, 431
 opium, 431
 Populine, 254
 Populus alba, 254
 balsamifera, 254
 eandicans, 254
 tremula, 254, 255
 Porlira hygrometrica, 479
 Porphyra laciniata, 18
 vulgaris, 18
 Porrigo lupinosa, 33
 Portlandia hexandra, 762
 Portland Sago, 128
 Portulaca anstralis, fig., 500
 oleracea, 501
 Port wine, 378
 Potalia amara, 604
 resinifera, 604
 Potamogeton natans, 210
 Potato, 619, 620, 621
 sweet, 631
 Potentilla anserina, 564
 reptans, 564
 Πορρω of Diosc., 548
 Potbomorpha sidæfolia, 518
 subpeltata, 518
 umbellata, 518
 Pothos pedatus, 193
 quinquerivius, 193
 scandens, 194
 Pourouma bicolor, 271
 Prangos pabularia, 776
 Prasiola furfuracea, fig., 14
 Prebenta Cavallos, 692
 Premna esculenta, 664
 integrifolia, 664
 Pretrea Zanguibarica, fig., 670
 Primrose, Evening, 725
 Primula Auricula, 645
 veris, 645
 Prinos glabra, 598
 Prinsepia utilis, 543
 Printzia arouaticea, 708
 Prionium Palmita, 191
 Procris splendens, fig., 260
 Prosopis Algaroba, 553
 juliflora, 553
 Protea abyssinica, 533
 grandiflora, 533
 mellifera, 533
 Paulina, 533
 Protea speciosa, 533
 Protococcus, 5, 15
 salinus, 16
 viridis, fig., 14
 Prunella vulgaris, 661
 Prunes, 558
 Prunus, 736
 brigantiaca, 558
 Capollin, 558
 Coccomilia, 558
 domestica, 558, fig., 557
 spinosa, 558
 Pseudosantalum creticum, 580
 Psidium albidum, 737
 Cattleyanum, 736
 pomiferum, 736
 pyrifera, 736
 Psoralea corylifolia, 548
 Psychotria noxa, 763
 Simira, 764
 Ptarmica atrata, 706
 moschata, 706
 nana, 706
 vulgaris, 706
 Pteris aquilina, 79
 esculenta, 79
 Pterocarpus dalbergioides, 548
 Draco, 548
 erinaceus, 547
 marsupium, 547
 Sautalinus, 548
 Pterospora andromedea, fig., 452
 Pteroxylon utile, 384
 Pterygodium atratum, fig., 174
 Pterygota alata, 361
 Puccinia graminis, 39, fig., 35
 Puccoon, 431
 Puchá pat, 660
 Pueraria tuberosa, 549
 Pufer ciceghi, 411
 Pulque, 158
 Pulse, 547
 Punica granatum, 737, fig., 735
 Punowur Pait, 468
 Purga Macho, 631
 da Paulistas, 280
 Purging-nuts, 280
 Puri-drempa, 118
 Purple Heart tree, 550
 Purslane, 501
 Potty-root, 180
 Puya chilensis, 148
 lanuginosa, 148
 Pyrethrum Parthenium, 406
 Pyrola chlorantha, fig., 450
 rotundifolia, 450
 Pyrrhosa tingens, 302
 Pyrolaria pubera, 788
 Pyrus Aria, 560
 Acuparia, 560
 communis, fig., 559
 Malus, fig., 559
 Pyxidanthera barbata, fig., 606
 Quamash, 203
 Quandang-ut, 788
 Quassia amara, 476
 chips, 476
 Quercitron bark, 291
 Quereus Egilops, 291
 falcata, 291
 grammutia, 291
 infectoria, 291
 mannifera, 291
 pedunculata, fig., 290
 Skinneri, fig., 291
 sessiliflora, 291
 Suber, 291
 tinctoria, 291
 Quick-grass, 114
 Quilla bark, 564
 Quillia brasiliensis, 564
 saponaria, 564
 Quina de la Angostura, 471
 blanca, 279

- Quina of Brazil, 582, 621
 „ de la Guayna, 471
 Quince, 569
 Quinquina des Antilles, 762
 „ Pitou, 762, 763
 Quinquino, 552
 Quitche, 114
 Quito Oranges, 621
- Radish, 353
 Radix Ari .Ethiopia, 193
 „ Lopeziama, 308
 „ et Semina floridi, 208
 „ Sumbul, 777
 „ vesicatoria, 641
 Rafflesia, 83
 „ Arnoldi, 86
 „ Patua, 84, 93
 Raisins, 440
 Raiz do Padre Salerma, 511
 „ Preta, 763
 „ de Tihu, 279
 Ral, 394
 Ramalina scopulorum, 47
 Rameh, 383
 Rambutan, 383
 Rampion, 691
 Rami-til, 707
 Randia dumetorum, 763
 Ranunculus acutis, 425
 „ bulbosus, fig., 425
 „ Flammula, 427
 „ glacialis, 427
 „ Krapfia, fig., 428
 „ lingua, 101
 „ parnassiolius, 101, 207
 „ reptans, fig., 425
 „ scleratus, 427
 „ Thora, 427
- Rape, 353
 Raphia vimifera, 136
 Rasperry, 564
 Rata, 737
 Ratsbane, 583
 Rattan Palms, 135
 Rattans, 138
 Rauwolfia nitida, 600
 Ravenala, 163
 Reaumuria hypericoides, fig., 407
 „ variegata, 407
- Redweed, 130
 Red-wood tree, 462
 Reed, rich aromatic, 113
 Rein-Deer Moss, 48
 Reihun, 684
 Remirea maritima, 118
 Reptonia luxifolia, 648
 Reseda luteola, 356
 „ mediterranea, fig., 356
 „ odorata, 356
 „ Phyteuma, 356
 Resin, 229
 „ of Carana, 490
 „ of Conria, 490
 „ of Hemp, 265
- Restio dichotomus, fig., 121
 „ tetorum, 121
 Retenaria maxima, 34
 Rex amararia, 375
 Rhabdabath, 204
 Rhabdia lycioides, fig., 653
 Rhagodia Billardieri, 513
 Rhamnus amygdalinus, 5-2
 „ catharticus, 5-2
 „ factorius, 5-2
 „ saratilla, 5-2
- Rhathany-root, 378
 Rheum Emodi, 503
 „ leucorhizum, 503
 „ palmatum, 503
 „ Ribes, 503
 „ undulatum, 503
 „ Webbianum, 503
- Rhipsalis pachyptera, 747
 Rhizophora macrocarpa, fig., 726
- Rhizophora Mangie, 727
 Rhodiola rosea, 346, 631
 Rhododendron albidiflorum, fig., 453
 „ arborcum, 455
 „ campanulatum, 455
 „ chrysanthum, 454
 „ ferrugineum, 455
 „ ponticum, 455
 „ maximum, 455
- Rhododermis Drummondii, 24
 Rhodomocua pahuata, 24
 Rhodorhiza scoparia, 631
 „ florida, 631
 Rhuharb, Monk's, 503
 „ Turkey, 503
- Rhus coriaria, 466, 467
 „ Cotinus, 467
 „ glabrum, 467
 „ metopium, 467
 „ radicans, 467
 „ succedaneum, 467
 „ Toxicodendron, 467, 630
 „ Typhinum, 317
 „ venenatum, 467
 „ verniciferum, 467
 „ vernix, 467
- Ribas, 503
 Ribes inebrians, 750
 „ ruhrum, fig., 750
 Rice, 111, fig., 107
 Riccia glauca, fig., 57
 „ natans, fig., 57
 Ricinus, 276
 „ communis, 276, 280
 Richardia africana, 193
 Richardsonia rosea, 763
 „ scabra, fig., 763
- Rigidella immaculata, fig., 160
 Riwasch, 503
 Robinia Pseudacacia, 547, 548
 Rocambole, 203
 Rocella fusiformis, 47
 „ tinctoria, 47
- Rocket, 354
 Rock-lily, 70
 'Podia pica, Diosc., 631
 Rohuna of Hindostan, 462
 Romeria refracta, fig., 430
 Rondeletia febrifuga, 762
 Room, 679
 Ropera fabagifolia, fig., 478
 Rora, 118
- Rosa canina, 564
 „ damascena, 564
 „ gallica, 564
 „ moschata, 564
 „ rubiginosa, 564
- Rose Apples, 726, 737
 „ flower, fig., 564
 „ of Jericho, 354
- Rosemary, 661
 Rosetangles, 20
 Rosewood, 547, 548, 575
 Rosmarinus officinalis, 661
 Rotifer vulgaris, 21
 Rottlera tinctoria, 281
 Rough-skinned Plum, of Sierra Leone, 513
- Rowan-tree, 560
 Roxburghia gloriosoides, fig., 219
 Rubia augustissima, 770
 „ cordifolia, 770
 „ Munjista, 770
 „ noxa, 771
 „ Reihun, 770
 „ tinctoria, 770
- Rubus arcticus, 564
 „ villosus, 564
- Rue, 470
 Ruella strepera, 679
 Ruizia fragrans, fig., 29
 Rukta-chandun, 563
 Rumex alpinus, 593
 „ crispus, fig., 592
 „ Patens, 593
- Rumex scutatus, 593
 Ruscus aculeatus, 204
 „ hypophyllum, 204
 „ hypoglossum, 204
 Russian Mats, 372
 Rust, 39
 Ruta montana, 470
 Ruyschia amazonica, fig., 403
 Rye, 111
 Ryssopteris timorensis, fig., 388
 Rytiplea tinctoria, 24
- Sahadilla, 199
 Sahnua florida, 548
 Sacchnrum officinarum, 114
 „ Ravennae, 111
 „ Teneriffe, 111
 Sacred Fig, 267
 Sadr, 582
 Safflower, 708
 Saffron, 160
 Sagapenum, 776
 Sage, 660, 661
 „ of Bengal, 660
 Sageretia theezans, 582
 Sagittaria sagittifolia, 209
 „ sinensis, 209
- Sago, 112, 138
 Saguerus saccharifer, 136, 137, 138
 Sagus genuina, 136
 „ filaris, 138, fig., 135
 „ levis, 136
 „ Rumphii, fig., 135
- Saintfoin, 547
 St. Ignatius's Beans, 603
 St. John's Bread, 549
 St. Martin's Herb, 343
 Salacia pyriformis, 584
 Salep, 180
 Salicine, 254
 Salicornia articulata, 513
 „ herbacea, fig., 512
- Salix alba, 102, 255
 „ arctica, 254
 „ couifera, 254
 „ eriocephala, 254
 „ fragilis, 245
 „ helix, 254
 „ herbacea, 102
 „ nigra, 254
 „ aegyptiaca, 255
 „ pentandra, 254
 „ polaris, 254
 „ purpurea, 254
 „ rosmarinifolia, 255
 „ Russelliana, 254
- Sallows, 254, 255
 Salmalia malabarica, 361
 Salpiglossis straminea, 619
 Salsafy, 708
- Salsola fruticosa, 513
 „ Kali, fig., 512
- Salvadora persica, fig., 652
 „ indica, 652
 Salvertia convallariodora, fig., 379
 Salvia grandiflora, 660
 „ officinalis, 660, fig., 659
 Salvinia verticillata, fig., 72
- Sandacra indica, 477
 Samnabun, 79
 Samaria, 460
 Sambabimba, 424
 Sambucus nigra, 767, fig., 766
 Samolus Valerandi, fig., 615
 Samsphire, 776
 Sand Box-tree, 280
 Sandal-wood, 787
 „ red, 548, 553
 „ of the Sandwich Islands, 787
- Sandaracum, 229
 Sanchoriem indicum, 464
 Sanguerie, 706
 Sanguerite, 706
 Sanguaria canatensis, 431

- Sanguisorba canadensis*, 562
 „ *officinalis*, 562, fig., 561
Saponeira, 204
Santalum album, 787
 „ *Freycinetianum*, 787
 „ *paniculatum*, 787
Santolina Chamaecyparissus, 706
 „ *fragrantissima*, 706
Sapiidus esculentas, 383
 „ *inequalis*, 384
 „ *saponaria*, 384
 „ *senegalensis*, 384, fig., 382
Sapium aucuparium, 278
Saponine, 497
Sapota, fig., 590
Sappan-wood, 550
Sappodilla Plum, 591
Sapucaya, 740
Snpitá, 584
Sarcocephalus esculentus, 764
Sarcocol, 577, 578
Sarcollin, 577
Sarcophyte, 85, 90
Sarcostemma Forskalianum, 625
 „ *glaucum*, 626
 „ *stipitaceum*, 625
Sargassum acanthocarpum, 21
 „ *bacciferum*, 21
 „ *ceranoides*, 22
 „ *cuneifolium*, 21
 „ *pyrifforme*, 21
 „ *vulgare*, 21
Σαρχοκόλλα of Diosc., 577
Sarriacuta repens, 672
Sarsaparilla, 211, 215
 „ *Italian*, 216
 „ *Jamaica*, 215
 „ *Lisbon or Brazilian*, 215
 „ *Rio Negro*, 215
 „ *of Vera Cruz*, 215
Sassafras, 300
 „ *Brazilian*, 536
 „ *officinale*, 536
 „ *Oriental*, 536
 „ *Parthenoxyloyn*, 536
Satin-wood, 462
Saul, 394
Saururus cernuus, fig., 521
Sauvagesin crectn, 343
Savin, 229
Savocja, 199
Savory, 660, 661
Saxifraga crassifolia, 568
 „ *tridactylites*, fig., 567
Scabiosa ntropurpurea, fig., 699
 „ *succisa*, 700
Scaveola Hela Modogm, 695
 „ *Taccada*, 695
Scaumony, 278, 631
 „ *Montpellier*, 626
Scopa villosa, fig., 283
Schinus, 553
 „ *Airoeira*, 466
 „ *Molle*, 466, 467
Schivereckia podolica, fig., 355
Schizaea dichotoma, fig., 81
Schizogonium murale, fig., 14
Schizonema, 12
Schleichera trijuga, 383, 384
Schmidelia edulis, 383
 „ *serrata*, 384
Schuce, 460
Schubertia multiflora, fig., 627
Scilla indica, 204
 „ *maritima*, 203
Scillitin, 203
Scindapsus officinalis, 194
Scio turpentine, 467
Scirpus dubius, 118
 „ *lacustris*, 118, fig., 117
 „ *tuberosus*, 118
 „ *triqueter*, 118
Sciranthus perennis, fig., 528
Scleria lithosperma, 118
Sclerosciadium humile, fig., 777
Sclerotium lotorum, 35
 „ *scutellatum*, 35
 „ *mycetospora*, 35
Scolymus hispanicus, 709
Scoparia dulcis, 683
Scorzonera, 708
 „ *deliciosa*, 709
 „ *glastifolia*, 709
 „ *hispanica*, 708, 709
 „ *tuberosa*, 709
Scotch Fir, 228
Scrophularia aquatica, 683
Scurdy-grass, 353
Scybalium, 84
 „ *fungiforme*, 86
Scythian Lamb, 76
Scytosiphon filum, 21
Scytothalia Jacquinotii, 21
Sea-kale, 353
Seaside-grape, 503
Sea-wrack, 145
Sehestens, 628
Scamone emetica, 625
Sedges, 105
Sedum nre, 345, fig., 344
 „ *ochroleucum*, 345
 „ *Telephium*, 345
Segutera floribunda, fig., 386
Seje Pnlm, 135
Selaginella convoluta, 70
Selago distans, fig., 606
Self-heal, 661
Sem, 548
Semecarpus Anacardium, 466
Semen Barbotine, 706
 „ *Ciuae*, 705
 „ *in granis*, 706
 „ *levanticum*, 706
 „ *contra*, 705
 „ *Seriphii*, 706
Semina cataputiae majoris, 280
 „ *cataputiae minoris*, 280
Sem-ke-gond, 551
Sempervivum aureum, fig., 346
 „ *glutiniosum*, 345
 „ *tectorum*, 345
Senebiera serrata, fig., 355
Senegine, 378
Senma, 547, 549
 „ *Alexandrian*, 626
 „ *blunt-leaved*, 547
 „ *of the Chilenos*, 787
 „ *Nubian*, 626
 „ *Scorpion*, 547
Sensitive Plants, 489
Senpa octopodia, 645
Scrymania lethalis, 384
 „ *tritermata*, 384
Serrndilla, 547
Serratula tinctoria, 708
Serronia Jaboraudi, 518, fig., 515
Service, 560
Sesamum, 670
 „ *indicum*, fig., 669
 „ *orientale*, 277
Sesbania picta, 549
Sesuvium portulacastrum, 527
 „ *repens*, 527
Setaria germanica, 113
 „ *italica*, 113
Shaddock, 458
Shallots, 203
Shaloo, 113
Shauoola, 113
Sheelandieresee, 118
Sbe-Oak, 250
Shorea robusta, 394
 „ *Timbugaia*, 394
Shummi, 549
Shah dana, 427
Scilian Safron, 161
Sida abutila, 362
 „ *carpinifolia*, 369
 „ *cordifolia*, 369
Sida lanceolata, 369
 „ *mauritiana*, 369
 „ *uicerantha*, 369
Sieversia montana, 564
Σίζος αγριος, 314
Silenc Oütcs, 497
 „ *virginica*, 497
Silk button galls, fig., 31
Silver Fir, 229
Simaba guinnensis, fig., 476
Sinnruba amara, 476, 477
 „ *versicolor*, 476
Simbl, 548
Sinapis chinensis, 353
Singhara Nut, 723
Siphocampylus Cautchouc, 692
Siphonia clastica, 278
Sipo de Chumbo, 634
Siraball, 536
Sison Amomum, 777
Sissoo, 548
Sisyrinchium Galaxioides, 161
Sium Sisarum, 776
Sizygium terebinthaceum, 737
Σζάλλ of Diosc., 203
Sklret, 776
Skunk Cabbage, 193
Sloe, 558
Smilacin ramosa, 204
Smilax aspera, 216
 „ *brasilensis*, fig., 215
 „ *Chiun*, 216
 „ *excelsa*, 216
 „ *glabra*, 216
 „ *glycyphylla*, fig., 215
 „ *lanceifolia*, 216
 „ *leucophyllum*, 216
 „ *medica*, 215
 „ *officinalis*, 215
 „ *ppyracea*, 215
 „ *perfoliata*, 216
 „ *Pseudo-China*, 216
 „ *Purhampuy*, 215
 „ *siphilifca*, 215
 „ *Zeylanica*, 216
Smirnum Ohsatrum, 776
Snake-nut, 383
 „ *root*, 378
 „ *Virginian*, 794
 „ *wood*, 271
Snow drop, 156
 „ *plant*, 15
Soap-root, Egyptian, 497
Soda, 513, 613
Solanum cernuum, 621
 „ *guineense*, 620
 „ *Dulcamara*, 620, fig., 618
 „ *laciniatum*, 621
 „ *maumosum*, 620
 „ *Melongena*, 621
 „ *muricatum*, 621
 „ *nemorense*, 621
 „ *nigrum*, 620, 621
 „ *paniculatum*, 620
 „ *pseudoquina*, 621
 „ *quitoense*, 621
 „ *tuberosum*, 620
Solenostemma Argel, 626
Solonon's Seal, 203
Solorina crocea, 47
Som, 203
Sophora japonica, 548
 „ *tomentosa*, 547
Sorb, 560
Sorghum, 111, 112
Sorrel, 488
Souchet comestible, 118
Soulaunca nmar, 378
Soum, 460
Southernwood, 705
Sowbreads, 645
Soymid febrifuga, 462
Spr'tlum, 526
Spanish Arbor Vinc, 631
 „ *Chestnut*, 291

- Sparattosperma lithontriplica*, 677
Spatulum, 326
 Spear-mint Water, 660
Specularia pentagona, 691
 Speculum, 691
Spergula arvensis, 497
Sphaeralea cisplatina, 369
Sphæria Robertsii, fig., 40
 siuensis, fig., 39
Sphaerostema propinquum, 305
Spherozyga, 16
 spiralis, fig., 16
Sphagnum, spiral threads of, fig., 55

Spiculea ciliata, fig., 179
Spigelia anthelmia, 604
 glabrata, 604
 marilandica, 604
Spikenard, 698
Spinach, 513
Spiræa Aruncus, fig., 565
 tilipendula, 564
 Ulmaria, 564, fig., 563
Spiranthes diuretica, 180
Spirozyra quinua, fig., 15
Splachnum luteum, fig., 64
Sporodias Birrea 467
 cytherea, 467
 dulcis, 467
 Mombin, 467
 purpurea, 467
 tuberosa, 467
 venulosa, 467
Spruce, 228
Spurge, 275
 Laurel, 531
Spurrey, 497
Squills, 202, 203
Stachys Botonica, 661
 palustris, 669
Stachytarpheta jamaicensis, 663
Stackhousia, fig., 589
Stagmaria vermiciflua, 466
Stapeña, fig., 625
Staphylea Bumalda, fig., 381
Star-apple, 591
 Jelly, 15
 reed, 793
Statice caroliniana, 641
Staurantonia hexaphylla, 302
Stearoptine, 537, 661
Stellaria Helostea, fig., 496
 media, fig., 498
Stenodon suberosus, fig., 732
Stenorhynchus, fig., 174
 speciosus, fig., 177
Sterculia, 604
 acuminata, 361
 Chicha, 361
 foetida, 361
 laureantha, 361
 nobilis, 361
 tomentosa, 361
 Tragacantha, 361
 urens, 361
Sticta pulmonacea, 47, 48, figs., 45, 45
Stictine, 15
Stilago Banias, 259
 lanceolata, fig., 259
Stilbe ericoides, 697
 pinastra, fig., 697
Stillingia sebifera, 290
 sylvatica, 279
Stipa, 113
 pennata, fig., 106
Stock, 354
Stone fruits, 542
 Oak, 291
 Pine, 229
Storax, 253, 592, 616
Stramonium, 619, 629
Stratiotes aloides, fig., 141
Stravadium racemosum, 754
Strawberry, 544
 tree, 454
Streamworts, 102
Streptocarpus Rexii, fig., 672
Streptopus amplexifolius, 204
Στρογγύλιος Στραγγιλιος of Diosc., 620
Strychnerythrine, 48
Strychnos ligustrina, fig., 603
 Nux vomica, 603
 potitorum, 604
 pseudoquina, 603
 Tieuté, 603
 toxifera, 603
Stryphnodendron Barbatemas, 553
 Jurema, 553
Stylaria, 12
Stylidium calcaratum, fig., 696
Styphelia adscendeus, 449
Styphnolobium jnpouicum, 548
Styrax aurea, 593
 Beuzoin, 593
 ferruginea, 593
 officinalis, 593
 reticulata, 593
 suberifolia, fig., 592
Suberia, 291
Succory, 748
Sugar-berry, 580
 cane, 114
Sumach, of Sicily, 737
Sumach, Venetian, 467
Sun, 369, 549
Sunflower, 707
Suriana maritima, fig., 599
Surirella, 12
Swamp Sassafras, 418
Swartzia tomentosa, 550
 triphylia, 552
Sweet cane, 113
 leaf, 593
 tea, 216
 wood Bark, 279
 wood, of Jamaica, 536
Swietenia Mahagoni, 462, fig., 461
Sylphion, 776
Symphoria racemosa, 762
Symphytum officinale, 656, fig., 655
Symplocarpus foetidus, 193
Symplocos Alstonia, 593
 laurina, 593
 tinctoria, 593
Synaphea dilatata, fig., 532
Syringa, 616
 vulgaris, 617

Taag, 549
Talashcer, 114
Tabernæmontana dichotoma, 601
 utibis, 600
Tacamahac, 255, 460
Tacamahaca, East India, 401
 Isle of Bourbon, 401
Tacca dubia, 159
 integrifolia, fig., 149
 montana, 159
 pinnatifida, 112, 159, fig., 149
 young, 159
Taconia mollisima, 333
 speciosa, 333
 tripartita, 333
Tagna, 131, 128
Talinum patens, 591
Tallicoanah Oil, 454
Tamarind, 549
 brown, 549
 velvet, 549
 plum, 549
Tamarix, fig., 341
 africana, 341
 dioica, 342
 Puras, 342
 gallica, 341, 342
 indica, 342
 mannifera, 341
 orientalis, 342

Tampui, 383
Tamus communis, 214
 cretica, 214
Tanacetum Jurowa, 674
Tanacetum vulgare, 706
Tangethina venueifera, 599
Tangle, 21
Tansy, 706
Tapioca, 281
Taquarussa, 114
Tara, 128
 feru, 79
Taraxacium, 708
Taraxacum Denis Leonis, 708, fig., 702
Tarfa, 342
Tarragon, 705
Tartar bread, 354
Taruma, 664
Tasmannia aromatica, 419
Tasmanian fern-root, 79
Tat, 372
Taxodium distichum, 229
Taxus baccata, fig., 230
Tea, 397
 Brazilian, 663
 Plant, Bencoolen, 737
 of Heaven, 570
 Paraguay, 598
Teak, 664
 African, 281
Teazel, 700
Tecoma impetiginosa, 677
 Ipe, 677
 speciosa, 677
 stans, 677
Tectona grandis, 664
Teff, 113
Tej-bul, 473
Telfaria pedata, 314
Telenga Potato, 128
Tephrosia Apollinea, 548
 purpurea, 548
 Senna, 547
 toxicaria, 548, 549
Tereng jabina, 547
Terminalia (?) fig., 717
 alata, 718
 argentea, 718
 bellerica, 718
 Benzoin, 718
 catappa, 718
 citrina, 718
 latifolia, 718
Terra Japonica, 533, 762
Testa di Qunglia, 670
Tetudinaria elephantipes, 211
Teta de Capra, 451
Tetracellon, 352
Tetracera Breyniana, 423
 oblongata, 422
 Tienrea, 424
Tetragonia, fig., 527
 expansa, 527
Tetrameles, 316
Tetranthera Roxburghii, 537
Tetratheca hirsuta, fig., 374
Thapsia garganica, 776
Thelmine, 431
Theel-see, 406
Thiene, 384, 598, 764
Thekel, 158
Thelephora sulphurea, 35
Thelygonum Cynocrambe, 513
Theobroma Cacao, 364
Theo-mell, 158
Theophrasta Jussieci, 648
Theophrum pratense, fig., 787
Thevetia Aloval, 600
Thibaudia macrophylla, 757
 Quercus, 757
Thlaspi latifolium, fig., 355
Thorn-apple, 619
Thuja occidentalis, 229
 orientalis, fig., 229
Thyme, 699

- Ti plant, 203
Tiaridium indicum, 653
Ticocea febrifuga, 471
 " *jasminiflora*, 471
 Tîl, of the Canaries, 536
Tillandsia usneoides, 97
Tillandsea, 147
Tinea favosa, 33
 Tinguy, 384
Tiresias erictorum, 16
Τιβύμαλος, 277
Τιβύμαλος μεγας, Hippoc., 277
 Tjettek, 603
 Tobacco, 619, 620
Tococa guianensis, 733
 Toccuso, 113
Toddalia aculeata, 473
 " *floribunda*, fig., 472
Todea Frazeri, fig., 81
 Toddy, or Palm wine, 136
 Tomato, 621
Tonina fluviatilis, fig., 122
 Touka Bean, 549, fig., 546
Tontelea pyriformis, 584
 Toonghi, 118
 Topana, 776
Topenia asiatica, 683
Tortula fallax, 66
 " *ruralis*, 55, fig., 64
Tournefortia umbellata, 653
 Tous les mois, Arrow-root, 169
Trachylobium Martianum, 551
Tradescantia diuretica, 188
 " *malabarica*, 188
Tragacanth, 547, 548
Tragia cannabina, 279
 " *involutata*, 279
 " *Mercurialis*, 279
 " *volubilis*, 279
Tragopogon porrifolius, 708
Trapa bicornis, fig., 723
 " *bispinosa*, 723
 " *natans*, 723
 Tree of Long Life, 737
 " ferns, fig., 74
 Trees, age of, 551
 Trefoil, 517
Tremella mesenterica, 39
Trianosperma ficifolia, 314
Tricerastes glomerata, fig., 316
Trichilia cathartica, 464
 " *Catigoa*, 464
 " *emetica*, 464
 " *speciosa*, 464
Trichodesmium, 16
 " *erythraeum*, 16
Trichodium, 107
Trichomanes radicans, fig., 80
Trichonema edule, 161
Trichormus, 16
Trichosantes anguina, 314
 " *palmata*, 314
Trifolium alpinum, 547
Triglochin palustre, fig., 210
Trigonella Pænum Græcum, 549
Trigonia crotonoides, fig., 376
Trincomalee wood, 372
Triosteum perfoliatum, 767
Tripe de Roche, 48
Triplaris americana, 503
Tripsacum dactyloides, 113
Tripterococcus, fig., 589
Tristemma virusanum, 733
Triticum glaucum, 114
 " *juncum*, 114
 " *repens*, 114
Triumfetta cordifolia, fig., 371
Triuris lhyalina, fig., 213
Trixis brasiliensis, 708
Tropæolum majus, 367, fig., 366
 Truffle, 38
 " Piedmontese, fig., 33
 Trumpet-tree, 503
 Tsantjan, 24
 Tsin-y, 418
Tuber Borchii, 38
 " *magnatum*, fig., 33
Tuberosa, 204
Tufah al-Sheitan, 620
Tulbaghia, 204
Tulipa hortensis, fig., 200
Tupa Peullæi, 692
Tupelo-trees, 720
Turmeric, 167
Turnera genistoides, fig., 347
 " *opifera*, 347
 " *trioniflora*, 347
 " *ulmifolia*, 347
Turnip, 353
Turnsole, 281
Turpentine, Bourdeaux, 229
 " Strasburgh, 229
 " Venetian, 229
Tussac-grass, 113
Tussilago Farfara, 708
Tylophora asthmatica, 625, 626
Typha latifolia, fig., 126
Ubat papada, 733
Ule, 271
Ulmfossa, 48
Ulinu, 580
Ulmus campestris, fig., 580
Ulothrix zonata, 2
Ulva, 14
 " *compressa*, 18
 " *furfuracea*, fig., 14
 " *Lactuca*, 18
 " *latissima*, 18
 " *thernalis*, 16
Umbellifer, ideal plau of a fruit of
 divided transversely, fig., 777
Uncaria Gambir, 762
 " *procumbens*, 670
Unguis cati, 553
Unha de Boy, 550
Upas Radja, 603
 " tree, 270
Urania speciosa, 163
Urari, 114
Urceola elastica, 600
Urceolaria cinerea, 47
 " *scruposa*, 47
Urena lobata, 369
Urgeráo, 663
Urginea maritima, 203, 204
Urtica cannabina, 261
 " *crenulata*, 261
 " *dioica*, 261, fig., 260
 " *membranacea*, 261
 " *pilulifera*, 261
 " *stimulans*, 261
 " *tenacissima*, 626
 " *tuberosa*, 261
 " *urens*, 261
 " *urentissima*, 261
Usnea florida, 48
 " *hirta*, 49
 " *jubata*, 46
 " *plicata*, 47, 49
Usnic acid, 49
Usnine, 49
Uva del Monte, 309
Uvalha, 737
Uvaria febrifuga, 421
 " *triloba*, 421
 " *tripetaloides*, 421
Uvularia grandiflora, 199
Vaccaria vulgaris, 497
Vaccinium anænum, fig., 757
 " *Myrtillus*, 757
 " *uliginosum*, 757
 " *Vitis idæa*, 757
Vachellia Parnesiana, 552
Valcha gummifera, 600
Valeriaua celtica, 698, fig., 698
 " *Dioscoridis*, 698
 " *officinalis*, 698
 " *Plin*, 698
Valeriana Saliunca, 698
 " *sitchensis*, 698
Valerian, Greek, 636
 " red, 698
Vallea cordifolia, 372
Vallisneria alternifolia, 141
Vandellia diffusa, 683
Vangueria edulis, 764
Vanilla, 180
 " *aromatica*, fig., 174
 " *claviculata*, 180
 " *planifolia*, 180
Variolaria amara, fig., 45
 " *lactea*, 47
Varioline, 48
Varnish of Martaban, 466
 " of Sylhet, 466
Vateria indica, 394
Vancheria clavata, 21
Vegetable ivory, 131, 138
 " *brimstone*, 70
 " *marrow*, 313, 314
Velame do Campo, 279
Vellozias, figs., 152, 153
Velonia, 291
Venice treacle, 776
Venivel, 308
Venularia grammica, 34
Venus Bath, 700
Veratria, 199
Veratrum album, 199
 " *nigrum*, fig., 198
 " *viride*, 199
Verbascum nigrum, 683
 " *Lychnitis*, 683
 " *Thapsus*, 683
Verbesina sativa, 707
Vermicularia trichella, fig., 29
Vernal Grass, 113
Verrucaria submersa, G, 46
Verrucaria acuminata, 401
Vervain, 664
Vesce cultivé, 547
Vetch, 547
 " *bitter*, 548
Vetiver, 113
Vibrissa truncorum, 30
Viburnum Lantana, 767
 " *Opulus*, 767
Viciniba, 302
Vijoco del Guano, 707
Villarsia nymphoides, 614
Vinaigre aux quatre voleurs, 600,
 661
Vinatico, 536
Vinca minor, fig., 599
Vincetoxicum nigrum, fig., 623
 " *officinale*, 626
Vin d'Aulnéc, 707
Viola canina, 339
 " *odorata*, 339
 " *ovata*, 339
 " *tricolor*, fig., 338
Virgin's Milk, 593
Virola sebifera, 302
Viscum album, 791, fig., 790
Vish or Visha, 427
Vismia laceifera, 406
 " *micrantha*, 406
 " *guianensis*, 406
Vitex Agnus castus, 664
 " *Negundo*, 664
 " *Taruma*, 664
 " *trifolia*, 664
Vitis indica, 440
 " *vinifera*, fig., 439
Viviana crenata, fig., 365
Voa-vanga, 764
Vochya guianensis, 380
Volkmæria inermis, 664
Vouën pouën, 358
Voyra aurantiaca, fig., 613
Waak, 369
Wagen boom, 533

- Wahlebergia graminiflora*, 691
 " *linarioides*, 691
 " *procumbens*, fig., 689
Walkeria serrata, 474
Wallaba-tree, 550
Wallenia laurifolia, 648
Wall-flower, 352, 354
Walnut, 292
 " oil, 292
Waltheria Douradiua, 364
Wampee, 458
Warree, 113
Water-chestnut, 723
 " cress, 353
 " fire, 480
 " melon, 314
 " vine, 271
Wattles, black, 552
 " silver, 552
Wax-cluster, 454
Wax-palm, 137
Webbia aristata, fig., 704
Weenong, 316
Weinmannia Balbisiana, fig., 571
Weld, 356
Wheat, 111
White Wood Bark, 442
Wilbrandia, 314
Wild Apricot of South America, 402
 " Cinnamon, 442
 " Lemon, 427
 " Pepper, 684
 " Prunes, 383
 " Rosemary, 270
Willdenowia teres, 121
Willow, 254
Willughbeia edulis, 600
Winter Cherry, 621
Winter's Bark, 419
Witsenia maura, 161
Wood, 354
Wolfsmilch, 277
Woniwol, 393
Wood oil, 394
Woodruff, 771
Woolly-oak galls, fig., 32
Woorali, 114
Wooraly, 593
Woruseed, 706
 " Spanish, 513
 " Oil, 513
Wormwood, 705
Wortleberry, 757
Wrightia antidysenterica, 600
 " coccinea, 600
 " mollissima, 601
 " tuctoria, 600
Xanthochymus pictorius, 401
Xanthorhiza apiifolia, 427
Xanthorrhæa arborea, 204
 " hastilis, 98, fig., 203
 " humilis, 203
Xanthosoma sagittifolia, 128
Xanthoxylon Avicennæ, 473
 " caribæum, 473
 " Budrunga, 473
 " Clava, 473
 " fraxiueum, 473
 " hastile, 473
 " hiemale, 473
 " nitidum, 473
 " piperitum, 473
 " Rhetsa, 473
Ximenia americana, 444
Xylocarpus Granatum, 464
Xylon Effendi, 253
Xylopiæ aromatica, 421
 " glabra, 421
 " grandiflora, 421
 " sericea, 421
Yagis, 161
Xyris americana, 187
 " indica, 187
 " operculata, fig., 187
 " vaginata, 187
Yams, 111, 112, 128, 211, 214
Yuri Yuri, 421
Yatum condensado, 70
Yellow-root, 427
 " wood of New South Wales, 462
Yerba de la purgaciou, 507
Yerum, 626
Yew, Common, 231
Young Fustick, 467
Yucca aloifolia, fig., 100
 " gloriosa, 98
Yulan, 418
Zachun, 460
Zacyntha verrucosa, 708
Zalacca edulis, 137
Zamias, fig., 223
Zamia punila, 224
Zannichellia, 99, 101
 " palustris, fig., 143
Zehra-wood, 468
Zedoary, 166
Zehneria cissoides, 312
 " clavigera, 312
Zeysoum, 706
Zingiber officinale, 166
Zinzeyd, 257
Zizania aquatica, 113
Zizyphus Baclei, 582
 " orthacanthus, 582
 " saporiferus, 582
 " Enoplia, 582
 " Napeca, 582
 " Joazeiro, 582
 " Lotus, 582
 " Jujuba, 582, 583
 " vulgaris, 582
 " Baclei, fig., 581
Zostera marina, 145
 " Noltii, fig., 145
Zygnemas, 15
Zygophyllum Fabago, 479
 " simplex, 479

INDEX

or

CLASSES, ALLIANCES, ORDERS, GENERA, AND THEIR SYNONYMS.

The numbers refer to the pages; those pages in which principal mention is made of the subject indexed are distinguished by an asterisk.]

- | | | |
|---|---|--|
| <p>Abalon, <i>Adans.</i> 199
 <i>Abama</i>, <i>Adans.</i> 192
 <i>Abasin</i>, <i>Kämpf.</i> 281
 <i>Abasoloa</i>, <i>L. et Lex.</i> 715
 <i>Abatia</i>, <i>Ruiz et Pav.</i> 575
 <i>Abazicarpus</i>, <i>Andr.</i> 354
 <i>Abelia</i>, <i>R. Br.</i> 767
 <i>Abelicea</i>, <i>Hon. Belli.</i> 580
 <i>Abelmoscibus</i>, <i>Med.</i> 370
 <i>Abena</i>, <i>Neck.</i> 664
 <i>Aberemoa</i>, <i>Aubl.</i> 422
 <i>Abies</i>, <i>Tournef.</i> 229
 <i>Abietæ</i>, 229
 <i>Abietina</i>, <i>Rich.</i> 226
 <i>Abikia</i>, <i>Presl.</i> 119
 <i>Abilgaardia</i>, <i>Vahl.</i> 119
 <i>Ablania</i>, <i>Aubl.</i> 372
 <i>Abolaria</i>, <i>Adans.</i> 667
 <i>Abolboda</i>, <i>H. et Bonpl.</i> 187
 <i>Abrahamia</i>, <i>DC.</i> 733
 <i>Abrineæ</i>, 555
 <i>Abrodictyum</i>, <i>Presl.</i> 89
 <i>Abroma</i>, <i>Jacq.</i> 364
 <i>Abronia</i>, <i>Juss.</i> 597
 <i>Abrotanella</i>, <i>Cass.</i> 712
 <i>Abrotanum</i>, <i>Tournef.</i> 712
 <i>Abrus</i>, <i>Linn.</i> 555
 <i>Absinthium</i>, <i>Tournef.</i> 712
 <i>Abumon</i>, <i>Adans.</i> 295
 <i>Abuta</i>, <i>Aubl.</i> 399
 <i>Abuta</i>, <i>Pöppig</i> 309
 <i>Abutilon</i>, <i>Gärtn.</i> 370
 <i>Acacia</i>, <i>Willd.</i> 556
 <i>Acaciæ</i>, 556
 <i>Acæna</i>, <i>Vahl.</i> 562
 <i>Acájon</i>, <i>Tourn.</i> 467
 <i>Acájoba</i>, <i>Gärtn.</i> 467
 <i>Acalypha</i>, <i>Linn.</i> 281
 <i>Acalyphæ</i>, 281
 <i>Acanos</i>, <i>Adans.</i> 714
 <i>Acanthaceæ</i>, 663, 67*
 <i>Acanthiads</i>, 67*
 <i>Acanthi</i>, <i>Juss.</i> 67*
 <i>Acanthidæ</i>, 67*
 <i>Acanthobolus</i>, 19
 <i>Acanthoborhya</i>, <i>E. et Z.</i> 554
 <i>Acanthocarya</i>, <i>Arrud.</i> 399
 <i>Acanthocephalus</i>, <i>Ka.</i> 713
 <i>Acanthocera</i>, 19
 <i>Acanthococcus</i>, <i>Hook. f. et Harv.</i> 713

 <i>Acanthodium</i>, <i>Delil.</i> 679
 <i>Acanthoglossum</i>, <i>Blum.</i> 181
 <i>Acantholepis</i>, <i>Less.</i> 713
 <i>Acanthotus</i>, <i>Benth.</i> 554
 <i>Acanthonychia</i>, <i>DC.</i> 466
 <i>Acanthopappin</i>, <i>Bl.</i> 181
 <i>Acanthopora</i>, <i>Lamx.</i> 16, 25
 <i>Acanthophyllium</i>, <i>C. A. M.</i> 498
 <i>Acanthophyllum</i>, <i>Hook. et Arn.</i> 714

 <i>Acanthophyton</i>, <i>Less.</i> 715</p> | <p><i>Acanthoprasium</i>, <i>Benth.</i> 662
 <i>Acanthosperma</i>, <i>Arrab.</i> 701
 <i>Acanthospermum</i>, <i>Sch.</i> 711
 <i>Acanthospora</i>, <i>Spreng.</i> 148
 <i>Acanthostachys</i>, <i>Klotsch.</i> 148
 <i>Acanthotheca</i>, <i>DC.</i> 712
 <i>Acanthotylus</i>, <i>Kützng.</i> 10
 <i>Acanthus</i>, <i>Tournef.</i> 679
 <i>Acarna</i>, <i>Cass.</i> 714
 <i>Acarna</i>, <i>Vaill.</i> 714
 <i>Acaste</i>, <i>Salisb.</i> 161
 <i>Accorombona</i>, <i>Endl.</i> 554
 <i>Acephala</i>, <i>A. DC.</i> 648
 <i>Acer</i>, <i>Linn.</i> 387
 <i>Acera</i>, <i>Juss.</i> 387
 <i>Aceraceæ</i>, 373, 387*
 <i>Acerantbus</i>, <i>Morven.</i> 438
 <i>Aceras</i>, <i>R. Br.</i> 182
 <i>Acerates</i>, <i>Elliot.</i> 626
 <i>Acerineæ</i>, <i>DC.</i> 387
 <i>Acetabularia</i>, <i>Lamx.</i> 10, 19
 <i>Acetabulariæ</i>, 19
 <i>Acetabulum</i>, <i>Tourn.</i> 19
 <i>Achania</i>, <i>Sis.</i> 370
 <i>Acharia</i>, <i>Thunb.</i> 322
 <i>Achariterium</i>, <i>Bluff. et F.</i> 713
 <i>Achetaria</i>, <i>Cham.</i> 685
 <i>Achillea</i>, <i>Neck.</i> 712
 <i>Achimenes</i>, <i>Vahl.</i> 685
 <i>Achimenes</i>, <i>P. Brown.</i> 672
 <i>Achiton</i>, <i>Corda.</i> 58
 <i>Achlya</i>, <i>Nees.</i> 18
 <i>Achlys</i>, <i>DC.</i> 438
 <i>Achnanthes</i>, <i>Bory.</i> 13
 <i>Achneria</i>, <i>Palis.</i> 116
 <i>Achnodon</i>, <i>Link.</i> 115
 <i>Achnodonton</i>, <i>Palis.</i> 115
 <i>Achras</i>, <i>P. Brown.</i> 591
 <i>Achroanthus</i>, <i>Raf.</i> 181
 <i>Achromolæna</i>, <i>Cass.</i> 712
 <i>Achlupalla</i>, <i>Humb.</i> 148
 <i>Achymus</i>, <i>Soland.</i> 271
 <i>Achyrachiæna</i>, <i>Schawer.</i> 711
 <i>Achyrantheæ</i>, 511
 <i>Achyranthes</i>, <i>Linn.</i> 511
 <i>Achyrastrum</i>, <i>Neck.</i> 715
 <i>Achyrideæ</i>, 719
 <i>Achyrocline</i>, <i>DC.</i> 713
 <i>Achyropappus</i>, <i>Bieberst.</i> 711
 <i>Achyropappus</i>, <i>H. B. K.</i> 712
 <i>Achyrophorus</i>, <i>Scop.</i> 715
 <i>Achyrophorus</i>, <i>Vaill.</i> 715
 <i>Achyrospermum</i>, <i>Blum.</i> 662
 <i>Acin</i>, <i>Willd.</i> 543
 <i>Acianthera</i>, <i>Schridb.</i> 181
 <i>Acianthidæ</i>, 182
 <i>Acianthus</i>, <i>R. Br.</i> 182
 <i>Acicarpa</i>, <i>Juss.</i> 791
 <i>Acidandra</i>, <i>Mart.</i> 555
 <i>Acidanthera</i>, <i>Hochst.</i> 161
 <i>Acidobolium</i>, <i>Schwegl.</i> 67
 <i>Acidolon</i>, <i>Sis.</i> 281</p> | <p><i>Acilepis</i>, <i>Don.</i> 709
 <i>Acinaria</i>, <i>Targ.</i> 22
 <i>Acineta</i>, <i>Lindl.</i> 182
 <i>Acinodendron</i>, <i>Linn.</i> 733
 <i>Acinosa</i>, <i>Mönch.</i> 661
 <i>Acinotum</i>, <i>DC.</i> 354
 <i>Acinula</i>, <i>Fries.</i> 44
 <i>Actoa</i>, <i>Aubl.</i> 543
 <i>Actotis</i>, <i>Don.</i> 733
 <i>Aciphylla</i>, <i>DC.</i> 711
 <i>Aciphylla</i>, <i>Forst.</i> 778
 <i>Acis</i>, <i>Salisb.</i> 158
 <i>Acisantbera</i>, <i>P. Br.</i> 575
 <i>Acispermum</i>, <i>Neck.</i> 711
 <i>Acisama</i>, <i>A. Cunn.</i> 572
 <i>Acladodea</i>, <i>R. P.</i> 385
 <i>Acleia</i>, <i>DC.</i> 713
 <i>Aclisia</i>, <i>E. Meyer.</i> 188
 <i>Acmaënia</i>, <i>B. et W.</i> 471
 <i>Acmeila</i>, <i>Rich.</i> 711
 <i>Acmena</i>, <i>DC.</i> 738
 <i>Acmosporium</i>, <i>Corda.</i> 43
 <i>Acnida</i>, <i>Mitch.</i> 513
 <i>Acnistus</i>, <i>Schott.</i> 622
 <i>Acocanthera</i>, <i>G. Don.</i> 621
 <i>Acoidium</i>, <i>Lindl.</i> 182
 <i>Acolea</i>, <i>Dun.</i> 60
 <i>Acolium</i>, <i>Fée.</i> 50
 <i>Acoma</i>, <i>Adans.</i> 743
 <i>Acoma</i>, <i>Benth.</i> 711
 <i>Aconiopteris</i>, <i>Presl.</i> 79
 <i>Aconitella</i>, <i>Spach.</i> 428
 <i>Aconitum</i>, <i>Tournef.</i> 428
 <i>Acougonon</i>, <i>Metsn.</i> 504
 <i>Acotias</i>, <i>Schott.</i> 129
 <i>Acoraceæ</i>, 193
 <i>Acorus</i>, 194
 <i>Acosmium</i>, <i>Schott.</i> 555
 <i>Acosmus</i>, <i>Deso.</i> 390
 <i>Acosta</i>, <i>Loureiro.</i> 758
 <i>Acosta</i>, <i>Ruiz et Pav.</i> 387
 <i>Acosta</i>, <i>DC.</i> 709
 <i>Acotyledoneæ</i>, <i>Agardh.</i> 5
 <i>Acotyledones</i>, <i>A. Brongn.</i> 54
 <i>Acouron</i>, <i>Aubl.</i> 555
 <i>Acourtila</i>, <i>Don.</i> 715
 <i>Acourtila</i>, <i>Jacq.</i> 622
 <i>Acrien</i>, <i>Lindl.</i> 182
 <i>Acranthiphrya</i>, <i>Endl.</i> 235
 <i>Acranthera</i>, <i>Arn.</i> 765
 <i>Acremonium</i>, <i>Link.</i> 43
 <i>Acriolacarpus</i>, <i>Guillem.</i> 390
 <i>Acriopsis</i>, <i>Blum.</i> 181
 <i>Acrobolus</i>, <i>Nees.</i> 69
 <i>Acrobrya</i>, <i>Mohl.</i> 51
 <i>Acrocarphidium</i>, <i>Miq.</i> 518
 <i>Acrocarpus</i>, <i>Arn.</i> 536
 <i>Acrocarpus</i>, <i>Nees.</i> 10, 119</p> |
|---|---|--|

- Acrocentron, *Cass.* 714
 Acrocephalum, *Cass.* 713
 Acrocephalus, *Benth.* 661
 Acrocoxia, *Mart.* 139
 Acrodichidium, *Nees.* 537
 Acrodryon, *Spreng.* 765
 Acrogenæ, *Ad. Brongn.* 51
 Acrogens, 4, 51 *
 Acroglucin, *Schrad.* 511
 Acrogyrate, *Bernh.* 81
 Acrolasia, *Presl.* 745
 Acrolepis, *Schrad.* 119
 Acrolophus, *Cass.* 714
 Acronia, *Presl.* 183
 Acronodia, *Blum.* 372
 Acronyctia, *Forst.* 458
 Acropeltis, 25
 Acropera, *Lindl.* 182
 Acrophorus, *Presl.* 80
 Acrophyton, *Eschw.* 44
 Acropteris, *Link.* 80
 Acroptilion, *Cass.* 714
 Acrosanthes, *E. et Z.* 498
 Acroschisma, *Hook.* 63
 Acrosopilion, *Bess.* 116
 Acrospernum, *Tode.* 42
 Acrosphaeria, *Corda.* 43
 Acrostalagnus, *Corda.* 43
 Acrostemon, *Klotzsch.* 455
 Acrostichum, *Linn.* 79
 Acrothamnium, *Nees.* 44
 Acrotome, *Benth.* 662
 Acrotrema, *Jack.* 424
 Acrotliche, *R. Br.* 449
 Acrozus, *Spr.* 372
 Actæa, *Linn.* 428
 Actæa, *Loureir.* 424
 Actææ, 428
 Actegiton, *Blum.* 588
 Actephila, *Blum.* 282
 Actin, *Adans.* 718
 Actidium, *Fries.* 43
 Actimeris, *Rafin.* 711
 Actinanthus, *Ehrenb.* 778
 Actinea, *Cass.* 712
 Actinella, *D. C.* 712
 Actinidia, *Lindl.* 424
 Actinobole, *Endl.* 712
 Actinocarpus, *R. Br.* 209
 Actinocephalus, *Kützinger.* 9
 Actinochloa, *Willd.* 116
 Actinochloris, *Panz.* 115
 Actinocladium, *Ehrenb.* 4
 Actinococcus, *Kützinger.* 9
 Actinodaphne, *Nees.* 537
 Actinodium, *Schauer.* 721
 Actinodontium, *Schwägr.* 67
 Actinolema, *Fenzl.* 778
 Actinolepis, *D. C.* 712
 Actinomeris, *Nutt.* 711
 Actinophora, *Nutt.* 710
 Actinophora, *Wall.* 364
 Actinophyllum, *R. et P.* 781
 Actinospermum, *Ell.* 711
 Actinospora, *Turcz.* 428
 Actinostachys, *Wallich.* 81
 Actinostema, *Mart.* 281
 Actinostemma, *Griff.* 315
 Actinothyrium, *Kunze.* 42
 Actinotrichia, *Decaisn.* 22
 Actinotus, *Labill.* 778
 Aculeosa, *Pluken.* 691
 Acuna, *Ruiz et Pav.* 455
 Acyntha, *Commel.* 205
 Adamaram, *Adans.* 718
 Adamben, *Lam.* 575
 Adamia, *Wallich.* 570
 Adamsia, *Fisch.* 565
 Adamsia, *Willd.* 205
 Adansonia, *L.* 361
 Aders' Tongues, 77
 Adelanthus, *Endl.* 795
 Adelbertia, *Meisn.* 733
 Adelia, *L.* 281
 Adelia, *L. C. Rich.* 283
 Adelobotrys, *D. C.* 733
 Adenacanthus, *Nees.* 679
 Adenachæna, *D. C.* 712
 Adenandra, *Willd.* 471
 Adenanthera, *Linn.* 556
 Adenanthos, *Labill.* 533
 Adenaria, *H. B. K.* 575
 Adenaria, *Rafin.* 758
 Adenilema, *Blume.* 572
 Adenium, *Röm. et Sch.* 601
 Adenobasium, *Presl.* 372
 Adenocalymna, *Mart.* 677
 Adenocalyx, *Bert.* 555
 Adenocarpus, *D. C.* 554
 Adenocaulon, *Hook.* 709
 Adenocline, *Turcz.* 281
 Adenocrepis, *Blum.* 282
 Adenocyclus, *Less.* 709
 Adenodus, *Lour.* 372
 Adenogramma, *Reichb.* 498
 Adenogyne, *Kl.* 281
 Adenolepis, *Less.* 711
 Adenolinum, *Reichb.* 485
 Adenoncos, *Blum.* 181
 Adenonema, *Bung.* 498
 Adenopappus, *Benth.* 711
 Adenopeltis, *Bert.* 281
 Adenophora, *Fisch.* 691
 Adenophorus, *Gaudich.* 79
 Adenophyllum, *Pers.* 711
 Adenorhachis, *D. C.* 560
 Adenorhopium, *Pohl.* 281
 Adenosacme, *Wall.* 765
 Adenosepalum, *Spach.* 406
 Adenosma, *R. Br.* 679, 685
 Adenosolen, *D. C.* 712
 Adenostegia, *Benth.* 685
 Adenostemma, *Forst.* 709
 Adenostemon, *Pers.* 537
 Adenostephanes, *Klotzsch.* 534
 Adenostoma, *Hook. et A.* 562
 Adenostyleæ, 709
 Adenostyles, *Cass.* 709
 Adenostyles, *Blum.* 182
 Adenotrachelium, *Nees.* 537
 Adenotrichia, *Lindl.* 713
 Adesmia, *D. C.* 554
 Adhatoda, *Nees.* 680
 Adhunia, *Fl. Fl.* 795
 Adiantum, *Linn.* 79
 Adina, *Salisb.* 765
 Adinandra, *Jack.* 397
 Adisca, *Bl.* 281
 Adleria, *Neck.* 556
 Adlumia, *Rafin.* 436
 Adolphia, *Meisn.* 582
 Adonanthe, *Spach.* 428
 Adonis, *Dillen.* 428
 Adopogon, *Neck.* 715
 Adoxa, *Linn.* 781
 Adrasten, *D. C.* 424
 Adriana, *Gaudich.* 281
 Adupa, *Bosc.* 119
 Adyseton, *Scopol.* 354
 Æchmanthera, *Arn.* 315
 Æchmanthera, *Nees.* 679
 Æchmea, *Ruiz et Pav.* 148
 Æchmolepis, *Dec.* 626
 Æcidium, *Gmel.* 42
 Ægagropila, *Kützinger.* 10
 Ægeria, *Adans.* 598
 Ægerita, *Pers.* 43
 Ægalina, *Schult.* 116
 Ægialitis, *R. Br.* 641
 Ægialitis, *Trin.* 116
 Ægiceraceæ, *Blume.* 648
 Ægicerns, *Gärtn.* 648
 Ægicerns, *Green.* 67
 Ægilops, *Linn.* 116
 Æginetia, *Cav.* 765
 Æginetia, *Linn.* 611
 Ægiphila, *Jacq.* 664
 Ægira, *Fries.* 22
 Ægle, *Corr.* 458
 Æglophyllum, *Kützinger.* 11
 Ægocloa, *Benth.* 636
 Ægomarathrum, *Koch.* 779
 Ægonychion, *Gray.* 656
 Ægopodium, *Linn.* 778
 Ægopogon, *Willd.* 115
 Ægopigon, *L.* 281
 Ægotoxicum, *R. et P.* 282
 Æleuropus, *Trin.* 116
 Æollanthus, *Mart.* 661
 Æonium, *W. et Berth.* 346
 Æranthus, *Lindl.* 181
 Ærides, *Loureir.* 181
 Æriobion, *Spreng.* 181
 Ærope, *Endl.* 727
 Ærua, *Forsk.* 511
 Æschrion, *Fl. Fl.* 795
 Æschynanthus, *Jack.* 672
 Æschynomene, *Linn.* 554
 Æsculaceæ, *Ed.* 382
 Æsculus, *L.* 385
 Æthaliium, *Link.* 42
 Æthellema, *R. Br.* 679
 Ætheolæna, *Cass.* 713
 Ætheopappus, *Cass.* 714
 Ætheorhiza, *Cass.* 715
 Ætheria, *Blum.* 182
 Æthionema, *R. Br.* 355
 Æthionia, *Dou.* 715
 Æthiopsis, *Tournef.* 661
 Æthusa, *Linn.* 778
 Ætinodon, *Brid.* 67
 Ætotoxicum, *Ruiz et Pav.* 282
 Afouzen, *St. Hil.* 556
 Afzelia, *Ehrh.* 67
 Afzelia, *Gmel.* 685
 Afzelia, *Smith.* 556
 Agalmantus, *Endl.* 737
 Agalmiyla, *Blum.* 672
 Aganippea, *D. C.* 712
 Aganisia, *Lindl.* 181
 Aganosma, *G. Don.* 601
 Agapanthus, *Herit.* 205
 Agapetes, *Don.* 758
 Agardhia, *Cabr.* 22
 Agardhila, *Gray.* 18
 Agardhia, *Spreng.* 380
 Agardhia, *Mench.* 25
 Agaricaceæ, 41
 Agaricina, 41
 Agaricus, *Linn.* 41
 Agarista, *D. C.* 711
 Agarista, *Don.* 455
 Agaruu, *Gre.* 10, 22
 Agasillis, *Spreng.* 778
 Agassizia, *Chav.* 684
 Agassizia, *Spach.* 725
 Agastachys, *R. Br.* 533
 Agasyllis, *Hoffm.* 778
 Agatheæ, *Cass.* 709
 Agathelpis, *Chais.* 667
 Agathis, *Salisb.* 229
 Agathisanthes, *Blum.* 718
 Agathodes, *Dou.* 614
 Agathomeris, *Delacn.* 712
 Agathophyllum, *Juss.* 537
 Agathophyllum, *Moq.* 513
 Agathisma, *Willd.* 471
 Agathyrus, *Don.* 715
 Agati, *Rheed.* 554
 Agauria, *D. C.* 455
 Agave, *Linn.* 158
 Agaveæ, 158
 Agdestis, *Moc. et Sess.* 785
 Agenium, *Nees.* 116
 Agenora, *Dou.* 715
 Agerateæ, 709
 Ageratum, *Linn.* 709
 Aggregatæ, *L.* xxxi
 Aglæa, *Pers.* 161
 Aglaja, *Lour.* 464
 Aglaja, *Noronh.* 424
 Aglomorpha, *Schott.* 79
 Aglonema, *Schott.* 129
 Aglrophyllum, *Mont.* 25
 Aglossa, *D. C.* 711

- Agnanthus, *Vail.* 664
 Agnostus, *A. Cunn.* 534
 Agnus castus, *T.* 664
 Agonis, *DC.* 737
 Agonolobus *C. A. Mey.* 354
 Agoseris, *Raun.* 715
 Agostana, *Salisb.* 778
 Agraphis, *Link.* 205
 Agretta, *Eckl.* 161
 Agrianthus, *Mart.* 709
 Agricola, *Schrank.* 664
 Agrimonia, *Tournef.* 565
 Agrimonioides, *Tournef.* 565
 Agriodaphne, *Nees.* 537
 Agriodendron, *Haw.* 205
 Agriophyllum, *Bieberst.* 513
 Agriphyllum, *Juss.* 713
 Agriphyllum, *Less.* 713
 Agrocharis, *Hochst.* 789
 Agrophylum, *Neck.* 477
 Agronyrum, *Palis.* 116
 Agrostae, 115
 Agrostemma, *L.* 498
 Agrostemma, *Wall.* 765
 Agrosticula, *Radd.* 115
 Agrostis, *Linn.* 115
 Agrostophyllum, *Blum.* 181
 Agrostophora, *Neck.* 765
 Agryneia, *Linn.* 282
 Agrytae, *Sturtz.* 82
 Agryrum, *Fries.* 43
 Ahnfeldia, *Fries.* 25
 Ahouai, *Pl.* 601
 Aichryson, *W. et Berth.* 346
 Aidelus, *Spreng.* 685
 Aidia, *Loureir.* 765
 Aikinia, *R. Br.* 672
 Aikinia, *Salisb.* 691
 Aikinia, *Wallich.* 116
 Ailanthus, *Desf.* 473
 Ailographum, *Lb.* 43
 Aimactis, *Kützling.* 10
 Ainsliea, *DC.* 714
 Ainsworthia, *Boiss.* 778
 Ainotheca, *DC.* 711
 Aira, *Linn.* 116
 Airochloa, *Link.* 116
 Airopsis, *Desv.* 116
 Aithales, *Webb et Berth.* 346
 Aititara, *Marogr.* 139
 Aitonia, *Forst.* 53
 Aitonia, *L. fil.* 464
 Aizoideae, *Endl.* 527
 Aizoon, *Linn.* 527
 Aizoonia, *Tausch.* 568
 Aizoona, 527
 Ajax, *Hav.* 154
 Ajroea, *Aubl.* 537
 Ajuga, *Linn.* 662
 Ajuges, 662
 Akebia, *DC.* 394
 Akeesia, *Juss.* 385
 Alacospermum, *Neck.* 778
 Alafia, *Thouars.* 691
 Alaga, *Baudo.* 645
 Alagoptera, *Nees.* 129
 Alanania, *Lav.* 181
 Alandina, *Neck.* 337
 Alangiaecae, 716, 719*, 772
 Alangiaea, 719
 Alangiaea, *DC.* 719
 Alangium, *Lam.* 720
 Alania, *Endl.* 205
 Alaphalantia, *Endl.* 714
 Alarconia, *DC.* 711
 Alaria, *Green.* 19, 22
 Alaternus, *Tournef.* 562
 Albersia, *Kunth.* 511
 Alberta, *E. Mey.* 765
 Albertinia, *Spreng.* 769
 Albina, *Giseke.* 167
 Albizza, *Louraz.* 556
 Albrandia, *Quadr.* 268
 Albrua, *Linn.* 205
 Albuca, *Reichb.* 205
 Alcanna, *Gartn.* 575
 Alcea, *L.* 370
 Alcheuilla, *Linn.* 562
 Alchimiilla, *Tournef.* 788
 Alchornea, *Sol.* 281
 Aleicorium, *Gaudich.* 79
 Alcia, *Cav.* 711
 Alciope, *DC.* 709
 Alcithoe, *Don.* 714
 Aldama, *Llav. et Lex.* 711
 Aldea, *Ruiz et Pav.* 639
 Aldinn, *Endl.* 556
 Aldrovinda, *Monti.* 434
 Alectorolophus, *Bieb.* 685
 Alectra, *Thunb.* 684
 Alectryon, *Gartn.* 335
 Alepidea, *Laroche.* 778
 Alepyrum, *R. Br.* 120
 Aletris, *Linn.* 153
 Aleurisma, *Link.* 43
 Aleurites, *Forst.* 231
 Aleuritia, *Endl.* 645
 Aleuroedron, *Reinw.* 364
 Alexandria, *Bunge.* 513
 Alexandrina, *Schomb.* 555
 Alexis, *Salisb.* 167
 Alfonsia, *Kunth.* 139
 Alfredia, *DC.* 714
 Algæ, *Juss.* 8, 43
 Algæ, *L.* xxxiv.
 Algales, 7, 8*
 Algarobia, *Benth.* 556
 Albagi, *Tournef.* 554
 Alibertia, *A. Rich.* 765
 Alibrexia, *Miers.* 654
 Alibum, *Less.* 709
 Aliciteres, *Neck.* 361
 Alicularia, *Cord.* 60
 Alps, *Hfmg.* 181
 Alisma, *Juss.* 209
 Alismaceae, 207*, 209*
 Alismads, 209
 Alismales, 104, 207*
 Alismoideae, *D. C.* 209
 Alismorchis, *Thouars.* 182
 Alix, *Commerc.* 710
 Alkanna, *Tausch.* 656
 Alkekengi, *Tournef.* 622
 Allaganthera, *Mart.* 511
 Allagopappus, *Cass.* 710
 Allamanda, *Linn.* 601
 Allania, *Benth.* 556
 Allantodia, *R. Brown.* 80
 Allardia, *Decaisne.* 712
 Allasia, *Loureir.* 795
 Allegria, *Moc. et Sess.* 372
 Allendea, *Llav. et Lex.* 715
 Alliaceae, *Link.* 200
 Allaria, *Adans.* 354
 Alliee, *Link.* 205
 Allionia, *Linn.* 507
 Allium, *Linn.* 205
 Allmania, *R. Br.* 511
 Allobrogia, *Trattin.* 205
 Allocarpus, *H. B. K.* 712
 Allochroa, *F. et M.* 725
 Alلودape, *Endl.* 449
 Allomonium, *Kützling.* 10
 Alloispermum, *Willd.* 712
 Allomonphila, *Blum.* 733
 Allophyllum, *Linn.* 385
 Alloplectus, *Mart.* 672
 Allosorus, *Benth.* 80
 Alloteropsis, *Presl.* 116
 Allughas, *Linn.* 167
 Almellea, *St. Hil.* 471
 Almoja, *Swall.* 328
 Almondworts, 557
 Alnaster, *Spach.* 252
 Alnus, *L.* 252
 Aloe, *Tournef.* 205
 Aloexylon, *Lour.* 154
 Aloides, *Bergh.* 142
 Aloine, *Link.* 209, 205
 Aloiszonium, *Ker.* 713
 Aloula, *H. B. K.* 709
 Aloniace, 709
 Alona, *Lindl.* 654
 Alonsoa, *Ruiz et Pav.* 684
 Alopecurus, *Linn.* 115
 Alophia, *Herb.* 161
 Alophium, *Cass.* 714
 Aloysia, *Orteg.* 664
 Alphonitia, *Russ.* 582
 Alpinia, *Linn.* 167
 Alpinia, *Plum.* 167
 Alpiniaeeae, *Link.* 165
 Alseis, *Schott.* 765
 Alsenosmia, *A. Cunn.* 767
 Alseodaphne, *Nees.* 537
 Alsidium, *Ag.* 11, 25
 Alsinanthe, *Fenzl.* 497
 Alsinanthus, *Desv.* 498
 Alsinastrum, *E.* 481
 Alsiue, *Wahlenb.* 497
 Alsiueae, *DC.* 496
 Alsiueae, 497
 Alsinell, *Dill.* 497
 Alsinocarpus, *Endl.* 497
 Alsinoides, *Vall.* 501
 Alsoydia, *Mart.* 677
 Alsoidea, *Mart. et Zucc.* 339
 Alsoeae, 339
 Alsoeia, *Thouars.* 339
 Alsomitra, *Blume.* 315
 Alsoiphila, *R. Brown.* 80
 Alstonia, *R. Br.* 601
 Alstonia, *Linn.* 593
 Alstromeria, *Linn.* 158
 Alstromerieae, 158
 Alstensteinia, *H. B. K.* 182
 Alternanthera, *Forsk.* 511
 Alternaria, *Corda.* 42
 Alternasemina, *Manso.* 315
 Althæa, *Cav.* 370
 Althæastrum, *DC.* 370
 Althenia, *Thouars.* 144
 Altheria, *Thouars.* 364
 Altigin, *Loud.* 229
 Altigia, *Noranh.* 253
 Altigiaceae, 248, 253*
 Altora, *Adans.* 282
 Alymnia, *Neck.* 711
 Alypum, *Tournef.* 667
 Alysicarpus, *Neck.* 554
 Alysum, *Ag.* 22
 Alyssiade, 354
 Alyssoides, *Medik.* 354
 Alysson, *Medik.* 354
 Alyssum, *Adans.* 354
 Alyssum, *Linn.* 354
 Alytospodium, *Link.* 44
 Alyxin, *R. Br.* 601
 Alzatea, *Ruiz et Pav.* 588
 Alziniana, *Diétr.* 588
 Amagris, *Raf.* 115
 Amaloua, *Aubl.* 765
 Amalia, *Rehb.* 181
 Amalia, *Hort. Hisp.* 148
 Amanita, *Fries.* 41
 Amanon, *Aubl.* 282
 Amanzia, *Lamx.* 11, 25
 Amansieae, 11
 Amarcarpus, *Blum.* 764
 Amarnicus, *Mönch.* 661
 Amaranthaceae, 505, 510*
 Amaranthi, *Juss.* 510
 Amaranthus, 510
 Amaranthus, *Linn.* 511
 Amaranthus, *Presl.* 554
 Amaria, *Mutis.* 556
 Amaryllee, 158
 Amaryllicae, 146, 155*
 Amarylloideae, *R. Br.* 155, 171
 Amarylloids, 155
 Amarella, *Linn.* 158
 Amasonia, *Linn.* 664
 Amauria, *Benth.* 712
 Ambelania, *Aubl.* 601
 Amberbon, *Perr.* 714

- Ambinux, *Comm.* 281
 Amblachænium, *Turcz.* 715
 Amblia, *Prest.* 79
 Amblidom, *Palis.* 67
 Ambliorion, *Rafn.* 205
 Ambloma, *Endl.* 765
 Amblostoma, *Scheidt.* 183
 Amblyanthus, *A. DC.* 648
 Amblyglottis, *Blum.* 182
 Amblygonon, *Meisn.* 504
 Amblyocarpum, *F. et M.* 713
 Amblyolepis, *DC.* 712
 Amblyopappus, *Hooker.* 712
 Amblyopogon, *Fisch.* 714
 Amblyosperma, *Benth.* 714
 Ambora, *Juss.* 299
 Ambraria, *Cruse.* 764
 Ambraria, *Heist.* 764
 Ambrina, *Spach.* 513
 Ambroma, *L. fl.* 364
 Ambrosia, *Tournef.* 711
 Ambrosien, 711
 Ambrosinia, *L.* 125
 Ambulia, *Lam.* 685
 Amecarpus, *Benth.* 554
 Amechania, *DC.* 758
 Amelanchier, *Med.* 560
 Ameletia, *DC.* 575
 Amelleæ, 709
 Amellus, *Adans.* 709
 Amellus, *Cass.* 709
 Amentaceæ, *Juss.* 251, 254
 Amentaceæ, *L.* xxxiii
 Amentales, 243, 246, 248*
 Amerimnum, *P. Br.* 555
 Amcrina, *DC.* 653
 Amethystea, *Linn.* 602
 Amerstia, *Wall.* 556
 Amerstiere, 556
 Amiantanthus, *Kunth.* 199
 Amianthium, *A. Gr.* 199
 Amicia, *Kunth.* 554
 Amida, *Nutt.* 712
 Amirola, *Pers.* 385
 Ammannia, *Houtt.* 575
 Ammi, *Tournef.* 778
 Ammiuide, 778
 Ammios, *Mönch.* 778
 Ammobium, *R. Br.* 712
 Amuocharis, *Herb.* 158
 Ammodendron, *Fisch.* 555
 Ammodia, *Nutt.* 710
 Amuogeton, *Schrad.* 715
 Amuoides, *Adans.* 778
 Ammolirion, *Kar.* 205
 Ammonalia, *Desv.* 498
 Ammophila, *Houtt.* 115
 Ammoseris, *Endl.* 715
 Ammysine, *Parsh.* 455
 Amomales, 104, 162*
 Amouçæ, *Juss.* 165
 Amomum, *Linn.* 167
 Amoor, *Roxb.* 464
 Auordica, *Neck.* 315
 Amorenxin, *Moc. et S.* 565
 Amoria, *Prest.* 554
 Amorpha, *Linn.* 554
 Amorphophallus, *Bl.* 129
 Ampalus, *Boj.* 268
 Ampelanus, *Rafn.* 626
 Ampelidæ, *Kunth.* 439
 Ampelodesmos, *Link.* 115
 Ampelopsis, *L. C. Rich.* 440
 Ampelosicyos, *Thouars.* 315
 Ampelolygonum, *Lindl.* 504
 Amperea, *Adr. Juss.* 281
 Amphania, *Banks.* 397
 Ampherephis, *Kunth.* 709
 Amphiantus, *Tourn.* 085
 Amphibia, *Stackh.* 25
 Amphiblestra, *Prest.* 80
 Amphiblistrum, *Corda.* 43
 Amphiholis, *Agardh.* 145
 Amphibromus, *Nees.* 116
 Amphihrya, *Endl.* 95
 Amphicalyx, *Blume.* 455
 Amphicarpæa, *Raf.* 555
 Amphicarpum, *Raf.* 115
 Amphichilla, *A. DC.* 695
 Amphicomæ, *R. Br.* 677
 Amphicorda, *Fries.* 44
 Amphiderris, *R. Br.* 534
 Amphidesmium, *Schott.* 80
 Amphidium, *Nees.* 67
 Amphidonax, *Nees.* 115
 Amphidoxa, *DC.* 713
 Amphigencæ, *Brongn.* 5
 Amphiglossa, *DC.* 713
 Amphiglottium, *Salis.* 181
 Amphilochia, *Mart.* 380
 Amphiloma, *Endl.* 534
 Amphiloma, *Fries.* 50
 Amphilophlum, *Kunth.* 677
 Amphiotis, *DC.* 765
 Amphipappus, *T. et Gr.* 710
 Amphipogon, *R. Br.* 115
 Amphirapis, *DC.* 710
 Amphirrhinum, *Green.* 67
 Amphiroa, *Lamx.* 10, 25
 Amphirrhoge, *Reichb.* 339
 Amphirrhox, *Spreng.* 339
 Amphiscopis, *Nees.* 680
 Amphispodium, *Link.* 44
 Amphitetras, *Ehr.* 13
 Amphithalea, *Eckl. et Zeyh.* 553
 Amphitrichum, *Corda.* 43
 Amphitrix, *Kützng.* 10
 Amphodea, *Salisb.* 455
 Amphodus, *Lindl.* 555
 Amphoradenium, *Desv.* 79
 Amphorchis, *Thouars.* 182
 Amphymenium, *H. B. K.* 555
 Amsincia, *Lehm.* 656
 Amsonia, *Linn.* 601
 Amura, *Schult.* 464
 Amygdaleæ, *Juss.* 557
 Amygdalophora, *Neck.* 558
 Amygdalus, *Linn.* 558
 Amyridaceæ, 456, 459*
 Amyridæ, 460
 Anyridæ, *R. Br.* 459
 Amyrids, 459
 Amyris, *Linn.* 460
 Anabaena, *Adr. Juss.* 10, 281
 Anabaina, *Bory.* 18
 Anabasis, *Linn.* 513
 Anabata, *Willd.* 604
 Anacalosa, *Blum.* 444
 Anacalypta, *Rohk.* 67
 Anacamperos, *Tournef.* 346, 501
 Anacamptis, *L. C. Rich.* 182
 Anacamptodon, *Brid.* 67
 Anacardeæ, *Br.* 465
 Anacardiaceæ, 456, 465*
 Anacardium, *Rottb.* 467
 Anacardium, *Lam.* 467
 Anacards, 465
 Anacharidæ, *Endl.* 141
 Anacharis, *Rich.* 142
 Anacclasis, *Benth.* 455
 Anacotus, *Grisch.* 614
 Anactis, *Cass.* 714
 Anacyclus, *Pers.* 712
 Anacystis, *Menegh.* 18
 Anadenia, *R. Br.* 533
 Anadyomene, *Lamx.* 10, 19
 Anadyomenæ, *Kützng.* 10
 Anæctochilus, *Blume.* 183
 Anagallidæ, *Bando.* 644
 Anagallidre, 646
 Anagallidium, *Grisch.* 614
 Anagallis, *Tourn.* 646
 Anaglypha, *DC.* 710
 Anagyris, *Linn.* 553
 Anagyzanthæ, *Bando.* 645
 Anaitis, *DC.* 711
 Annlectis, *Vahl.* 428, 664
 Anamirta, *Colobr.* 309
 Ananas, *Gärtn.* 148
 Ananas, *Tournef.* 148
 Ananassa, *Lindl.* 148
 Anandrea, *Link.* 5
 Anandria, *Siegesb.* 714
 Ananthopus, *Rafn.* 188
 Ananthrix, *Nutt.* 626
 Anapausia, *Pr.* 79
 Anaphalis, *DC.* 713
 Anaphrenium, *E. Mey.* 467
 Anaporeæ, 129
 Anarmosa, *Miers.* 451
 Anarrhinum, *Desf.* 684
 Anarthria, *R. Br.* 121
 Anarthrosyne, *E. Mey.* 554
 Anasser, *Juss.* 604
 Anastatica, *Gärtn.* 354
 Anastaticidæ, 354
 Anastrabe, *E. Mey.* 684
 Anastraphia, *Don.* 714
 Anasyllis, *E. Mey.* 467
 Anatherum, *Palis.* 116
 Anatropa, *Ehrenb.* 481
 Anavinga, *Rheed.* 331
 Anaxagorea, *St. Hil.* 422
 Anaxeton, *Cass.* 713
 Anaxeton, *Gärtn.* 713
 Anaxetum, *Schott.* 79
 Anblatum, *Tournef.* 611
 Anchietca, *St. Hil.* 339
 Anchoinidæ, 355
 Anchonium, *DC.* 355
 Anchusa, *Linn.* 656
 Anchusidæ, 656
 Ancistrocarpus, *Kunth.* 509
 Ancistrolobus, *Spach.* 406
 Ancistrostigma, *Fenzl.* 527
 Ancistrum, *Forst.* 562
 Aneclanthus, *Desf.* 765
 Ancylocalyx, *Tulasnc.* 555
 Ancylocladus, *Wall.* 601
 Auda, *Piso.* 281
 Andersonia, *R. Br.* 449
 Andersonia, *König.* 696
 Andersonia, *Roxb.* 464, 718
 Andersonia, *Schl.* 604
 Andira, *Lam. et Lour.* 555
 Andiscus, *Fl. Flum.* 281
 Andrachne, *Linn.* 282
 Andræa, *Ehrh.* 63
 Andræaceæ, 56, 63*
 Andrapis, *Duby.* 645
 Andreoskia, *DC.* 354
 Andrewsia, *Don.* 758
 Andrewsia, *Spreng.* 614
 Andrewsia, *Vent.* 665
 Andriapetalum, *Pohl.* 534
 Andrieuxia, *DC.* 711
 Andripetalum, *Tournef.* 534
 Androceræ, *Nutt.* 622
 Androcoma, *Nees.* 119
 Androcymbium, *Willd.* 199
 Andrographidæ, 680
 Andrographis, *Wall.* 680
 Andromachia, *Cass.* 709
 Andromachia, *H. B. K.* 709
 Andromeda, *Linn.* 465
 Andromedidæ, 465
 Androphyllax, *Wendl.* 309
 Andropogon, *Linn.* 116
 Andropogonæ, 116
 Androrchis, *Endl.* 182
 Androsace, *Tournef.* 645
 Androsium, *All.* 406
 Androscepiæ, *Brongn.* 116
 Androstemma, *Lindl.* 153
 Androstoma, *Hook. fil.* 449
 Androtrichium, *Brongn.* 119
 Andryala, *Linn.* 715
 Andrzeiowska, *Reichb.* 354
 Anethia, *DC.* 714
 Aneçio, *Neck.* 713
 Aneçlema, *R. Br.* 188
 Aneimia, *Swartz.* 80
 Aneugrostis, *Trin.* 115
 Anemanthus, *Endl.* 428
 Anemarrhena, *Bunge.* 205

- Anemia, *Nutt.* 521
 Anemidietyon, *J. Sm.* 80
 Anemiopsis, *Hook.* 521
 Anemonaute, *Spach.* 427
 Anemonauther, *DC.* 428
 Anemone, *Haller.* 437
 Anemoneæ, 427
 Anemonospermus, *DC.* 428
 Anemopaguma, *Mart.* 677
 Anesorrhiza, *Ch. et Sch.* 778
 Anethum, *Tournef.* 778
 Anetia, *Endl.* 743
 Aneura, *Dumort.* 59
 Aneurida, 59
 Aneuriscus, *Prest.* 402
 Angelandra, *Endl.* 771
 Angelica, *Hoffm.* 778
 Angelicidæ, 778
 Angelonia, *H. et B.* 684
 Angelopogon, *Pöppig.* 791
 Angiantheæ, 712
 Angianthus, *Wendl.* 712
 Angidium, *Lindl.* 182
 Angiopoma, *Lev.* 42
 Angiopteris, *Hoffm.* 81
 Angiopteris, *Mitchell.* 80
 Angioridium, *Grev.* 42
 Angiospermæ, 10
 Angolam, *Adans.* 720
 Angolamia, *Scop.* 720
 Angophora, *Cav.* 737
 Angostura, *R. et Sch.* 471
 Angræcum, *Thouars.* 181
 Anguillareæ, *Don.* 198
 Anguillaræ, *R. Br.* 199
 Anguina, *Michx.* 315
 Anguloa, *Fl. Per.* 182
 Anguria, *Linn.* 315
 Anhalonium, *Lemair.* 748
 Anhaltia, *Schwabe.* 18
 Ania, *Lindl.* 181
 Aniba, *Aubl.* 795
 Anictoclea, *Nimmo.* 317
 Anidrum, *Necker.* 779
 Anigosanthus, *Libill.* 153
 Anigozia, *Salisb.* 153
 Aniosciadium, *DC.* 779
 Aniotum, *Solan.* 531
 Anisacantha, *R. Br.* 513
 Anisactis, *DC.* 779
 Anisadenia, *Wall.* 340
 Anisandra, *Bartl.* 661
 Anisanthera, *Raf.* 656
 Anisanthus, *Sweet.* 161
 Anisanthus, *Willd.* 767
 Aniseia, *Chois.* 631
 Anisocarpsus, *Nutt.* 712
 Anisochæta, *DC.* 709
 Anisochilus, *Wall.* 661
 Anisocoma, *Torrey.* 715
 Anisodus, *Link.* 622
 Anisogonium, *Prest.* 80
 Anisozynæ, *Brongn.* 11
 Anisolepis, *Steud.* 712
 Anisobolus, *A. DC.* 691
 Anisobolus, *Benth.* 554
 Anisomeles, *R. Br.* 662
 Anisomeria, *Don.* 509
 Anisomeris, *Prest.* 765
 Anisometra, *Adr. Juss.* 282
 Anisopappus, *H. et A.* 715
 Anisopetalum, *DC.* 494
 Anisopetalum, *Hook.* 181
 Anisophyllum, *Horn.* 281
 Anisopleura, *Fenzl.* 778
 Anisopogon, *R. Br.* 116
 Anisoptera, *Korth.* 394
 Anisorhamphus, *DC.* 715
 Anisosperma, *S. Munn.* 315
 Anisostemonæ, *Brongn.* 11
 Anisostictæ, *Payson.* 357
 Anisotes, *Lindl.* 575
 Anisotoma, *Hook. f.* 778
 Anisotome, *Fenzl.* 627
 Anisum, *Adans.* 778
 Anixia, *Fries.* 44
 Aukropetalum, *Fenzl.* 498
 Auneslea, *Andrews.* 411
 Auneslea, *Wall.* 397
 Auoda, *Cav.* 370
 Anodemirou, *A. DC.* 601
 Anodouium, *Brid.* 67
 Anodopetalum, *A. Cunn.* 572
 Anæctangium, *Hedw.* 67
 Anæctochilus, *Blum.* 183
 Anægosanthus, *Reichb.* 153
 Anogeissus, *Wall.* 718
 Anogra, *Spach.* 725
 Anogyna, *Nees.* 119
 Anoma, *Lour.* 337, 556
 Anomalophyllæ, 25
 Anomalopteris, *G. Don.* 390
 Anomataeca, *Ker.* 161
 Anomaza, *Laws.* 161
 Anomodon, *Hook. et Tayl.* 67
 Anomorhegma, *Meisn.* 672
 Anomospermum, *Miers.* 309
 Anomostephium, *DC.* 711
 Anona, *Linn.* 422
 Anonaceæ, 416, 420*
 Anonads, 420
 Anonæ, *Juss.* 420
 Anonææ, *Endl.* 422
 Anonis, *Tournef.* 554
 Anopanthus, *Endl.* 611
 Anoplon, *Waltr.* 611
 Anopterus, *Labill.* 752
 Anosmia, *Berth.* 779
 Anosporum, *Nees.* 119
 Anotea, *DC.* 370
 Anotis, *DC.* 765
 Anredera, *Juss.* 524
 Ansellia, *Lindl.* 181
 Antacanthus, *L. C. Rich.* 764
 Antennaria, *Link.* 43
 Antennaria, *Corda.* 43
 Antennaria, *R. Br.* 713
 Antennariæ, 713
 Antenoron, *Rafin.* 504
 Authactinia, *Bory.* 334
 Antheischima, *Korth.* 397
 Anthelia, *Dum.* 60
 Anthema, *Medik.* 370
 Anthemidæ, 712
 Anthemis, *DC.* 712
 Anthephora, *Schreb.* 115
 Anthericæ, *Bartl.* 205
 Anthericlis, *Raf.* 182
 Anthericum, *Juss.* 205
 Anthericum, *Linn.* 205
 Atherura, *Lour.* 764
 Atheryllium, *Rohr.* 575
 Athiina, *Fries.* 43
 Anthistria, *Linn.* 116
 Anthoboleæ, *Endl.* 274
 Anthoboleæ, *Mart. C.* 530
 Anthobolus, *R. Br.* 282
 Anthocephalus, *L. C. Rich.* 765
 Anthocercis, *Labill.* 684
 Anthocerrineæ, 59
 Anthocerites, *Cord.* 60
 Anthoceros, *Michx.* 60
 Anthocerotæ, *Nees.* 60
 Anthochlamys, *Fenzl.* 513
 Anthochloa, *Nees.* 116
 Anthochortus, *Nees.* 121
 Anthocleista, *Afz.* 604
 Anthocometes, *E. M.* 680
 Anthodendron, *Neck.* 455
 Anthodendron, *Reich.* 455
 Anthodiscus, *C. W. Mey.* 339
 Anthodiscus, *Mart.* 545
 Anthodon, *R. P.* 585
 Anthogonium, *Wall.* 181
 Antholonia, *Labill.* 694
 Antholyza, *Linn.* 161
 Anthoema, *Nutt.* 568
 Anthologia, *Beauv.* 556
 Anthophytæ, *Oken.* 235
 Anthopterus, *Hook.* 758
 Anthora, *DC.* 428
 Anthospermide, 764
 Anthospermum, *Linn.* 764
 Anthostema, *A. J.* 281
 Anthotium, *R. Br.* 695
 Anthotroche, *Endl.* 621
 Anthoxanthum, *Linn.* 116
 Anthriscus, *Hoffm.* 779
 Anthrocarpum, *Meyer.* 50
 Anthrolobus, *Steud.* 355
 Anthurium, *Schott.* 194
 Anthyllis, *Linn.* 554
 Antiaris, *Leschen.* 271
 Anticharis, *Endl.* 684
 Antichorus, *Linn. f.* 372
 Anticlea, *Kth.* 199
 Antidaphne, *Pöppig.* 791
 Antidesma, *Linn.* 259
 Antidesmads, 259
 Antidesmeæ, *Sweet.* 259
 Antigena, *Flor. Flon.* 331
 Antigoneon, *Endl.* 504
 Antigramma, *Prest.* 80
 Antilyssus, *Haller.* 50
 Antiphylla, *Haworth.* 568
 Antiphyllum, *DC.* 656
 Antirrhæa, *Commers.* 764
 Antirrhineæ, 684, 681
 Antirrhinidæ, *Benth.* 684
 Antirrhinum, *L.* 684
 Antistrophe, *A. DC.* 648
 Anthrixia, *DC.* 713
 Antistragus, *Gärtn.* 115
 Antitrichia, *Brid.* 67
 Antodon, *Neck.* 715
 Antoiria, *Raddi.* 59
 Antomarchia, *Aubl.* 471
 Antonia, *Pohl.* 604
 Antonia, *R. Br.* 672
 Antoniana, *Juss.* 764
 Antopetitia, *Reich.* 554
 Antrocephalus, *Lehm.* 58
 Antrophyum, *Kaulf.* 79
 Antura, *Forsk.* 601
 Anurus, *E. Mey.* 554
 Anvillea, *DC.* 710
 Anychia, *L. C. Rich.* 499
 Aopla, *Lindl.* 182
 Aotus, *Smith.* 553
 Apactis, *Thunb.* 795
 Apatia, *Aubl.* 555, 556
 Apalus, *DC.* 711
 Apama, *Lam.* 794
 Apargia, *Less.* 715
 Apargidium, *Torr.* 715
 Aparine, *Tournef.* 771
 Aparisthium, *Endl.* 281
 Apata, *Adans.* 665
 Apatanthus, *Vivian.* 715
 Apatelia, *DC.* 424
 Apatilia, *Desv.* 733
 Apaturia, *Lindl.* 181
 Apeiba, *Aubl.* 372
 Apenula, *Neck.* 691
 Apera, *Falis.* 115
 Apheriphacta, *Nees.* 537
 Apluca, *Tournef.* 554
 Aphanamixis, *Bl.* 464
 Aphananthe, *Link.* 509
 Aphanantheum, *Sp.* 350
 Aphanes, *Linn.* 562
 Aphanis, *Bl.* 385
 Aphanochilus, *Benth.* 661
 Aphanopappus, *Endl.* 711
 Aphanopetalum, *Endl.* 572
 Aphanostemma, *St. Hil.* 428
 Aphanostephus, *DC.* 710
 Aphanizomenon, *Morr.* 18
 Apherandra, *R. Br.* 679
 Apherelis, *Boj.* 713
 Apheris, *R. Br.* 120
 Aphilax, *Salisb.* 188
 Aphila, *Horn.* 328
 Aphora, *Neck.* 553
 Aphragula, *Nees.* 679

- Aphyragmus, *Andrz.* 354
 Aphyllæ, *Ed. prim.* 5
 Aphyllanthæ, *Endl.* 205
 Aphyllanthæ, *Dal.* 691
 Aphyllanthæ, *Tourn.* 205
 Aphyllocarpa, *Cavan.* 81
 Aphyllocaulon, *Lagasc.* 714
 Aphyllorhynchis, *Blumc.* 181
 Aphyteia, *Linn.* 92
 Apiacæ, 772, 773*
 Apiastrum, *Nutt.* 779
 Apicra, *Haw.* 205
 Apimella, *Neck.* 778
 Apios, *Böerh.* 555
 Apiosporium, *Kze.* 42
 Apista, *Bl.* 181
 Apium, *Hoffm.* 778
 Aplectrum, *Blum.* 733
 Aplectrum, *Nutt.* 181
 Aplocarya, *Lindl.* 654
 Apلودon, *R. Br.* 67
 Aploplodium, *Chauv.* 677
 Apionema, *Huss.* 796
 Aplopappus, *Cass.* 710
 Aploplanesia, *Presl.* 555
 Aplosporeæ, *Decaisne.* 20
 Aplozia, *Dum.* 60
 Apluda, *Linn.* 116
 Apochoris, *Duby.* 645
 Apocopsis, *Nees.* 116
 Apocynacæ, 594, 599*
 Apocynæ, *Juss.* 599, 623
 Apocynum, *Tourn.* 601, 626
 Apodanthere, *R. Br.* 93
 Apodanthera, *Arn.* 315
 Apodanthes, *Poit.* 93
 Apodanthus, *La Pylaie.* 67
 Apodotes, *Benth.* 661
 Apodynomenæ, *E. Mey.* 554
 Apodytes, *E. M.* 444
 Apogon, *Elliott.* 715
 Apogon, *Eudl.* 115
 Apolepis, *Bl.* 679
 Apollonias, *Nees.* 537
 Aponogeton, *Thunb.* 210
 Apopedunia, *Bl.* 679
 Apophlœa, *Hav.* 796
 Apophragma, *Grieseb.* 614
 Apophysis, *Hedw.* 67
 Aporetica, *Forst.* 355
 Aporosa, *Blum.* 271
 Aporum, *Blum.* 181
 Aposeris, *Neck.* 715
 Aposphæria, *Berk.* 42
 Apostasin, *Blum.* 184
 Apostasiacæ, 70, 184*
 Apostasiads, 184
 Apostasiæ, *Lindl.* 184
 Apotemnium, *Corda.* 44
 Apoterium, *Blum.* 402
 Apoxyanthera, *Hochst.* 627
 Appendicula, *Blum.* 181
 Appleworts, 559
 Apradus, *Adans.* 779
 Apteranthes, *Mik.* 627
 Apteris, *Nutt.* 172
 Apteris, *Miers.* 172
 Apterocaryon, *Spach.* 252
 Aptosimere, 684
 Aptosimum, *Burch.* 684
 Apuleia, *Gärtn.* 713
 Apuleia, *Mart.* 556
 Apyrophorum, *Neck.* 560
 Aquifoliacæ, 594, 597*
 Aquifolium, *Tourn.* 598
 Aquilaria, *Lam.* 579
 Aquillariacæ, 576, 579*
 Aquillariads, 579
 Aquillariæ, *R. Br.* 579
 Aquilegia, *Tournef.* 428
 Aquilicia, *Linn.* 440
 Arabidæ, 354
 Arabidia, *Tausch.* 568
 Arabidium, *C. Mey.* 354
 Arabidopsis, *DC.* 354
 Arabis, *Adans.* 354
 Arabis, *Linn.* 354
 Aracæ, 123, 127*
 Arachidæ, 554
 Arachis, *Linn.* 554
 Arachnanthe, *Blum.* 181
 Arachne, *Neck.* 282
 Arachnimorpha, *Desv.* 765
 Arachnion, *Schwein.* 42
 Arachnis, *Blum.* 181
 Arachnites, *Hoffm.* 182
 Arachnoides, *Blumc.* 80
 Aracium, *Neck.* 715
 Arads, 127
 Aræococcus, *Brongn.* 148
 Aragoa, *H. B. K.* 685
 Aragoacæ, *Don.* 681
 Arales, 103, 123*
 Aralia, *Linn.* 781
 Araliacæ, 772, 780*
 Araliæ, *Juss.* 780
 Araliastrum, *Vaill.* 781
 Arapabaca, *Plum.* 604
 Araucaria, *Juss.* 229
 Arauja, *Brotcr.* 626
 Arausina, *Bl.* 138
 Arbustiva, *L. xxxiii*
 Arbutus, *Tournef.* 455
 Arceuthobium, *Bieberst.* 791
 Archangelica, *Hoffm.* 778
 Archemora, *DC.* 778
 Archidium, *Brid.* 67
 Archimedeæ, *Leandr.* 80
 Archytea, *Mart. et Zucc.* 397
 Arcimbalda, *Endl.* 455
 Arctio, *Lam.* 713
 Arction, *Cass.* 713
 Arctium, *Lam.* 713
 Arctogeron, *DC.* 709
 Arctopus, *Linn.* 779
 Arctostaphylos, *Adans.* 455
 Arctotæ, 713
 Arctotheca, *Vaill.* 713
 Arctotheca, *Wendl.* 713
 Arctotis, *Gärtn.* 713
 Arcephyllum, *Ell.* 555
 Arcyria, *Hill.* 42
 Ardinghelia, *Conw.* 282
 Ardisia, *Swartz.* 648
 Ardisiacæ, *Juss.* 647
 Ardisiads, 647
 Ardisiæ, 648
 Arduina, *Linn.* 601
 Areca, *Linn.* 138
 Arecæ, 138
 Aregina, *Fries.* 42
 Arelina, *Neck.* 713
 Aremonia, *Neck.* 565
 Arenaria, *L.* 498
 Aregna, *Labill.* 138
 Arctibusa, *Gronov.* 182
 Arethuseæ, 179, 182
 Aretia, *Gaudin.* 645
 Aretia, *Linn.* 645
 Aretiastrum, *DC.* 698
 Argania, *R. et Sch.* 591
 Argelia, *Dec.* 626
 Argemone, *Tournef.* 431
 Argemonidium, *Spach.* 431
 Argentina, *Blackw.* 564
 Argolasia, *Juss.* 153
 Argophyllum, *Forst.* 573
 Arguzia, *Anm.* 653
 Arguziæ, *Link.* 628
 Argylia, *D. Don.* 677
 Argyranthemum, *Webb.* 712
 Argyreia, *Lour.* 631
 Argyrochaeta, *Cuv.* 711
 Argyrocome, *Gärtn.* 713
 Argyrolepis, *Spach.* 350
 Argyrolobium, *E. et Z.* 554
 Argyrophyton, *Hook.* 712
 Argyropsis, *Herb.* 158
 Argyrothamnia, *P. Br.* 282
 Argyroxiphium, *DC.* 712
 Aria, *DC.* 560
 Arietinum, *Beck.* 183
 Ariocarpus, *Scheidw.* 748
 Arisæma, *Mart.* 129
 Arisarum, *Tournef.* 129
 Aristaria, *Jungb.* 116
 Ariste, *Soland.* 161
 Aristella, *Kütz.* 115
 Aristida, *Linn.* 115
 Aristidium, *Endl.* 116
 Aristolochia, *Tournef.* 794
 Aristolochiacæ, 786, 792*
 Aristolochiæ, *Link.* 91, 287
 Aristolochiæ, *Juss.* 792
 Aristotela, *Adans.* 713
 Aristotelia, *Herit.* 372
 Aristoteliacæ, *Endl.* 371
 Arjoona, *Cav.* 788
 Armania, *Berter.* 711
 Armeniaca, *Tournef.* 558
 Armeria, *Willd.* 641
 Armeriastrum, *Jaub.* 641
 Aruillaria, *Fries.* 41
 Armodorum, *Kuhl. et H.* 181
 Aruoracia, *Rupp.* 354
 Arnebia, *Forsk.* 656
 Arnica, *Linn.* 713
 Arnoglossum, *Endl.* 643
 Arnoldia, *Blumc.* 572
 Arnoldia, *DC.* 712
 Arnopogon, *Willd.* 715
 Arnosieris, *Gärtn.* 715
 Arnotia, *A. Rich.* 182
 Aroideæ, *R. Br.* 126
 Aroideæ, *Juss.* 127
 Aromadendrum, *Blumc.* 419
 Aromia, *Nutt.* 712
 Arongana, *Pers.* 406
 Aronia, *Pers.* 560
 Aronicum, *Neck.* 713
 Aroton, *Neck.* 281
 Arouna, *Aubl.* 556
 Arpitium, *Neck.* 778
 Arpophyllum, *Blumc.* 181
 Arabidæa, *DC.* 677
 Arrabidea, *Stued.* 582
 Arracaba, *Bancroft.* 779
 Arrhenacine, *Cass.* 710
 Arrhenatherum, *Palis.* 116
 Arrhenopterum, *Hedw.* 67
 Arrow-Grasses, 210
 Arrowsmithia, *DC.* 715
 Arrozia, *Schrad.* 115
 Arudæ, *St. Hil.* 402
 Arsacæ, *Salisb.* 455
 Arsis, *Lour.* 372
 Artahotrys, *R. Brown.* 422
 Artanema, *Don.* 685
 Artanthe, *Miq.* 518
 Artedia, *Linn.* 779
 Artemisia, *Linn.* 712
 Artemisiæ, 712
 Arthratherum, *Palis.* 115
 Arthroxon, *Fulis.* 116
 Arthrinium, *Kunze.* 43
 Arthrobolus, *Andrz.* 355
 Arthrobotrys, *Pr.* 80
 Arthrobotrys, *Corda.* 43
 Arthrocardia, *Dec.* 25
 Arthrocladia, *Duby.* 10, 22
 Arthrocnemum, *Moq.* 513
 Arthroclactylis, *Forst.* 132
 Arthrodicæ, *Bory.* 8
 Arthrolobium, *Desv.* 554
 Arthronaria, *Fries.* 50
 Arthronema, *Huss.* 796
 Arthronia, *Achar.* 50
 Arthrophyllum, *Blumc.* 781
 Arthrophyllum, *Boj.* 674
 Arthropodium, *R. Br.* 205
 Arthropogon, *Nees.* 116
 Arthrostelen, *Meyer.* 531
 Arthrostachya, *Link.* 116
 Arthrostemma, *Pav.* 733
 Arthrostigma, *Eudl.* 533

- Arthrotilidium, *Ruppr.* 116
 Arthrotaxis, *Don.* 229
 Arthrozamia, *Reichb.* 225
 Artocarpaceæ, 258, 260*
 Artocarpaceæ, 260
 Artocarpus, *R. Br.* 269
 Artocarpus, *Linn.* 271
 Artotrogus, *Mont.* 795
 Aruba, *Aubl.* 477
 Aruba, *Nees, et Mart.* 471
 Arum, *Linn.* 129
 Aruncus, *Ser.* 365
 Arundarbor, *Bauh.* 116
 Arundina, *Blum.* 181
 Arundinaria, *Rich.* 116
 Arundinete, 115
 Arundinella, *Rudol.* 116
 Arundo, *Linn.* 115
 Arversia, *Cambess.* 459
 Asagracea, *Lindl.* 169
 Asaphes, *DC.* 473
 Asaphes, *Spreng.* 700
 Asarales, 246, 786*
 Asarca, *Lindl.* 182
 Asarca, *Popp.* 182
 Asarina, *Link.* 792
 Asarineæ, *Bart.* 792
 Asarum, *Tournef.* 794
 Ascariacida, *Cues.* 709
 Ascarina, *Forst.* 520
 Ascidium, *Fie.* 59
 Ascium, *Schreb.* 404
 Asclepiadaceæ, 615, 623*
 Asclepiadæ, *R. Br.* 623, 626
 Asclepiads, 623
 Asclepias, *Linn.* 626
 Ascobolus, *Pers.* 43
 Ascomycetes, 41, 43
 Ascophora, *Tole.* 43
 Ascophylla, *Sæck.* 22
 Ascospora, *Fr.* 44
 Ascothamion, *Kützing.* 10
 Asca, *Schott.* 328
 Ascyrum, *Linn.* 406
 Asenospermæ, *Kützing.* 9
 Aseroe, *Labill.* 42
 Atimina, *Adans.* 422
 Asiphonia, *Griff.* 794
 Aspalathus, *Linn.* 544
 Asparagæ, *DC. et Duby.* 200
 Asparagæ, *Lindl.* 205
 Asparagi, *Juss.* 200
 Asparagineæ, 200
 Asparagineæ, *Ach. Rich.* 209
 Asparagopsis, *Mont.* 25
 Asparagus, *Linn.* 205
 Aspasia, *Lindl.* 181
 Aspaia, *E. Mey.* 662
 Aspegenia, *Popp. et E.* 181
 Aspella, *Thouars.* 711
 Aspelina, *Neck.* 713
 Aspera, *Monch.* 771
 Aspergillus, *Nichol.* 43
 Asperifolia, *L. xxiii.* 653, 655
 Asperocaulon, *Grev.* 25
 Asperococcus, *Levaz.* 22
 Asperugo, *Tournef.* 676
 Asperula, *Linn.* 771
 Asperuleæ, *R. Br.* 209
 Asphodeli, *Juss.* 209
 Asphodeli, *Reichenb.* 205
 Asphodeline, *Reichenb.* 205
 Asphodeloides, *Monch.* 205
 Asphodelus, *Linn.* 205
 Aspicarya, *J. C. Rich.* 399
 Aspolaha, *Gorta.* 713
 Aspidanthera, *Benth.* 765
 Aspidelium, *Zoll.* 715
 Aspidistra, *Ker.* 265
 Aspidistrea, *Lindl.* 205
 Aspidium, *Straetz.* 91
 Aspidocarpus, *Neck.* 582
 Aspidoglossum, *E. Mey.* 625
 Aspidopteryx, *A. de J.* 359
 Aspidosperma, *Mart.* 691
 Aspidostigma, *Hochst.* 473
 Asplenium, *Linn.* 80
 Asprella, *Host.* 116
 Asprella, *Humb.* 116
 Asprella, *Schreb.* 115
 Assa, *Hottotog.* 424
 Assonia, *Cav.* 361
 Astarten, *DC.* 737
 Astella, *Sol.* 192
 Asteliæ, *Broogn.* 11
 Astelma, *Less.* 713
 Astemma, *Less.* 711
 Astephannanthes, *Bory.* 331
 Astephanus, *R. Br.* 626
 Aster, *Nees.* 709
 Asteracantha, *Nees.* 679
 Asteraceæ, 688, 702*
 Asterandra, *Kl.* 282
 Asteranella, *Reich.* 428
 Asteranthus, *Desfont.* 730
 Asteranthus, *Loureir.* 743
 Astereæ, 709
 Asterella, *Palis.* 58
 Asterias, *Reacalm.* 614
 Asteriden, *Lindl.* 710
 Asterina, *Levill.* 796
 Asterisca, *Meyer.* 50
 Asteriscum, *Cham.* 778
 Asteriscus, *Mösch.* 710
 Asteroacarpus, *Eckl. et Zeyh.* 588
 Asterocephalus, *Vaill.* 700
 Asterochete, *Nees.* 119
 Asteroogyne, *Benth.* 281
 Asteroideæ, 703, 709
 Asterolinon, *Link. et H.* 645
 Asteroma, *DC.* 42
 Asteromea, *Blum.* 710
 Asteromyrtus, *Schauer.* 737
 Asteropeia, *Thouars.* 743
 Astrophora, *Dittm.* 43
 Astropsis, *Less.* 709, 713
 Astropterus, *Vaill.* 713
 Astrosperis, *Endl.* 715
 Astrosperma, *Less.* 710, 713
 Astrosporium, *Kunze.* 42
 Astrostemma, *Decsn.* 627
 Astrothecium, *Wallr.* 44
 Asterothrix, *Cass.* 10, 715
 Astrotichion, *Kl.* 361
 Astianthus, *Don.* 677
 Astilbe, *Humb.* 568
 Astoma, *DC.* 779
 Astomæa, *Reichb.* 779
 Astrea, *Kl.* 282
 Astraguleæ, 554
 Astragalus, *Linn.* 554
 Astrantia, *Tourn.* 778
 Astrapica, *Lindl.* 364
 Astrephla, *DC.* 698
 Astrocarpus, *Neck.* 356
 Astrocaryum, *C. W. G. Meyer.* 139
 Astrocoma, *Neck.* 785
 Astrodendron, *Dennst.* 362
 Astrodontium, *Schwillgr.* 67
 Astrolonia, *R. Brown.* 449
 Astromarchantia, *Nees.* 59
 Astronia, *Blum.* 733
 Astronium, *Jacq.* 467
 Astrophe, *A. DC.* 648
 Astrophæ, *DC.* 334
 Astrophila, *Nutt.* 554
 Astrophytum, *Lemair.* 748
 Astropus, *Spreng.* 364
 Astroschæmus, *Nees.* 119
 Astrothelium, *Eschweil.* 50
 Astrotricha, *DC.* 778
 Atydamia, *DC.* 778
 Atyria, *Lindl.* 361
 Austasia, *Blum.* 679
 Ataxia, *J. S. Presl.* 150
 Atalanta, *Nutt.* 358
 Atalanthus, *Don.* 715
 Atalantia, *Corr.* 458
 Atanaisquea, *Miers.* 358
 Atavia, *R. Br.* 116
 Ata, *Lindl.* 182
 Atelandra, *Lindl.* 661
 Atelea, *Moc. et Sess.* 555
 Atenia, *Hook. et Arn.* 778
 Ateramnus, *P. Br.* 282
 Athalamum, *Neck.* 710
 Athamantia, *Koch.* 778
 Athamantia, *Scop.* 778
 Athanasia, *Cass.* 712
 Athanasia, *Wall.* 712
 Athanasieæ, 712
 Athelia, *Pers.* 44
 Athenæa, *Schreb.* 331
 Atherandra, *Dec.* 626
 Atherocephala, *DC.* 449
 Atheropogon, *Mühlenb.* 116
 Atherosperma, *Labill.* 300
 Atherospermæ, 267, 300*
 Atherospermæ, *R. Brown.* 300
 Atherurus, *Blum.* 129
 Athlianthus, *Endl.* 679
 Athrix, *Ker.* 713
 Athroisma, *DC.* 710
 Athronia, *Neck.* 711
 Athruphyllum, *Lour.* 648
 Athymalus, *Neck.* 281
 Atocium, *Othl.* 498
 Atractolobus, *Tode.* 42
 Atractylis, *L.* 714
 Atractylis, *Vaill.* 714
 Atragene, *Linn.* 427
 Atraphaxis, *Linn.* 504
 Atreia, *DC.* 779
 Atrichum, *Palis.* 67
 Atriplex, *Linn.* 513
 Atriplices, *Juss.* 512
 Atropa, *Linn.* 622
 Atta, *Martius.* 422
 Attalea, *H. B. K.* 139
 Atunus, *Rumph.* 362
 Atylosia, *Wight et Arn.* 555
 Atylus, *Saltis.* 535
 Aubertia, *Bory.* 473
 Aubertia, *Palis.* 67
 Aubletia, *Gärtn.* 738
 Aubletia, *Jacq.* 664
 Aubletia, *Lour.* 582
 Aubletia, *Rich.* 471
 Aubletia, *Schreb.* 372
 Aubrietia, *Adans.* 354
 Auchenanangium, *Brid.* 67
 Auchera, *DC.* 714
 Aucklandia, *Falc.* 713
 Aucuba, *Thunb.* 783
 Aueubertia, *Med.* 560
 Aueubertia, *Benth.* 661
 Audounia, *Brown.* 785
 Audrienella, *Bory.* 22
 Auganthus, *Link.* 645
 Augea, *Retz.* 153
 Augea, *Thunb.* 795
 Augia, *Lour.* 467
 Augusta, *Leand.* 744
 Augusta, *Pohl.* 765
 Augustea, *DC.* 765
 Augustinea, *Naud.* 733
 Aulacia, *Lour.* 458
 Aulacium, *Rich.* 733
 Aulacanthus, *E. Mey.* 551
 Aulacocystis, *Hussall.* 796
 Aulacomonlon, *Schwägr.* 67
 Aulacophora, *DC.* 713
 Aulacophyllum, *Nees.* 119
 Aulacospermum, *Ledeb.* 779
 Aulax, *Bory.* 533
 Aulaxanthus, *Elliott.* 115
 Aulaxia, *Nutt.* 115
 Aulaxia, *Haworth.* 368
 Aulaxia, *Havy.* 685
 Aulaxium, *Lindl.* 181
 Aurantaceæ, 456, 457*
 Aurelia, *Cass.* 710
 Aurelium, *Cateb.* 781
 Auricula, *Endl.* 615
 Auricularia, *Fries.* 41
 Aurilia, *Desv.* 354

- Australina, *Gaudich.* 262
 Avena, *Linn.* 116
 Aveneæ, 116
 Averno, *Linn.* 489
 Avicennia, *Linn.* 665
 Avicenniæ, *Endl.* 665
 Aviceps, *Lindl.* 182
 Avicularia, *Meisn.* 504
 Avonia, *E. Mey.* 501
 Avrainvillæa, *Dec.* 19
 Axanthes, *Blum.* 765
 Axia, *Lour.* 698
 Axillaria, *Rafin.* 205
 Axilæa, *Ruiz et Pav.* 733
 Axinopus, *Röm. et Sch.* 115
 Axolopha, *DC.* 370
 Axonoblasteæ, 10
 Axonopus, *Palis.* 115
 Axonotectium, *Fenzl.* 526
 Axyris, *Linn.* 513
 Ayndendron, *Nees, et M.* 537
 Ayenia, *Linn.* 364
 Aylmeria, *Mart.* 499
 Aypi, *Bauh.* 281
 Azadirachta, *Adr. Juss.* 464
 Azalen, *Linn.* 455
 Azamaza, *Hochst.* 385
 Azanza, *Moq. et Sess.* 370
 Azaola, *Blanc.* 591
 Azara, *Ruiz et Pav.* 328
 Azederach, *Tournef.* 464
 Azima, *Lam.* 598
 Azolla, *Lamarck.* 73
 Azollinæ, *Griff.* 71
 Azorella, *Labill.* 778
 Azorella, *Lamarck.* 778
 Azosma, *Cordu.* 44

 Babactes, *DC.* 672
 Babiana, *Ker.* 161
 Babingtonia, *Lindl.* 738
 Babounya, *DC.* 712
 Bacazia, *Ruiz et Pav.* 714
 Baccaroides, *Linn.* 709
 Baccarea, *Lour.* 282
 Baccharideæ, 710
 Baccharis, *Linn.* 710
 Baccularia, *Gray.* 22
 Bacillarin, *Ehr.* 13
 Baconia, *DC.* 764
 Bacopa, *Aubl.* 685
 Bactridium, *Kunze.* 42
 Bactris, *Jacq.* 139
 Bactrylobium, *Willd.* 555
 Badamia, *Gärtn.* 718
 Badara, *Bert.* 315
 Badiauífera, *Linn.* 419
 Badiera, *DC.* 378
 Badula, *Juss.* 648
 Bæa, *Pers.* 684
 Bæa, *Commers.* 672
 Bæckea, *Linn.* 738
 Bæobotrys, *Forster.* 648
 Bæometra, *Salisb.* 199
 Bæomyces, *Pers.* 50
 Bæothryon, *Nees.* 119
 Bæria, *Fisch. et Mey.* 712
 Bæumerta, *Fl. Weit.* 354
 Bagnatta, *Roxb.* 309
 Bagassa, *Aubl.* 271
 Baha, *DC.* 712
 Baillieria, *Less.* 711
 Baillouvianna, *Gris.* 25
 Baissea, *A. DC.* 601
 Baitaria, *Ruiz et Pav.* 795
 Balanghas, *Burm.* 362
 Balangue, *Gärtn.* 651
 Balaniteæ, *Endl.* 459
 Balanites, *Del.* 460
 Balanium, *Wallr.* 44
 Balanophora, *Forst.* 90
 Balanophoraceæ, 88, 89*
 Balanophorææ, *Rich.* 89
 Balanopteris, *Gärtn.* 362
 Balantium, *Desv.* 543
 Balantium, *Kauf.* 80
 Balanus, *Endl.* 337
 Balaridia, *Camb.* 499
 Balbisia, *DC.* 713
 Balbisia, *Cav.* 489
 Baldingera, *Demst.* 664
 Baldingera, *Gärtn.* 115
 Baldingera, *Neck.* 711
 Balduina, *Elliott.* 711
 Balduina, *Rafin.* 334
 Balenerdia, *Commers.* 788
 Ballesam, *Bruce.* 460
 Balfouria, *R. Br.* 601
 Balingayum, *Blanc.* 795
 Baliospermum, *Bl.* 281
 Ballia, *Harvey.* 10, 24
 Ballota, *Linn.* 662
 Ballotidæ, 662
 Baloghia, *Endl.* 281
 Balsamaceæ, 253, 484, 490*
 Balsamea, *Gled.* 460
 Balsamia, *Vittad.* 43
 Balsamia, *Gärtn.* 492
 Balsamifluæ, *Blume.* 253
 Balsaminææ, *A. Rich.* 490
 Balsamita, *Less.* 712
 Balsamodendron, *Kunth.* 460
 Balsamona, *Fand.* 575
 Balsams, 490
 Baltimora, *Linn.* 711
 Bambusa, *Schreb.* 116
 Bambusidææ, 116
 Baumia, *R. Br.* 370
 Banara, *Aubl.* 328
 Bancroftia, *Macfad.* 372
 Banfiya, *Bauing.* 498
 Bangia, *Lyngb.* 10, 19
 Banistereæ, *A. de J.* 390
 Banisteria, *Linn.* 390
 Banjolea, *Bowd.* 680
 Banksia, *Bruce.* 565
 Banksia, *König.* 167
 Banksia, *Forst.* 531
 Banksia, *Linn. fil.* 534
 Banksidæ, 534
 Banobab, *P. Alpin.* 361
 Baphia, *Afzel.* 556
 Baphorhiza, *Link.* 656
 Baptisia, *Vent.* 553
 Baraldeia, *Thouars.* 727
 Baratostachys, *Korth.* 791
 Barba capreæ, *Tournef.* 565
 Barbacenia, *Fand.* 153
 Barbarea, *R. Br.* 354
 Barberina, *Fl. Fl.* 795
 Barberina, *Velloz.* 593
 Barbeuia, *Thouars.* 795
 Barbieria, *DC.* 555
 Barbula, *Hedw.* 67
 Barbula, *Lour.* 664
 Barbylus, *P. Br.* 460
 Barclaya, *Wall.* 411
 Barclayidæ, 411
 Barjonia, *Dec.* 626
 Barkeria, *Kn.* 181
 Barkhausenia, *Hopp.* 715
 Barkhausia, *Möuch.* 715
 Barleria, *Linn.* 679
 Barleridææ, 679
 Barnadesia, *Linu. f.* 714
 Barnadesiææ, 714
 Barnardin, *Lindl.* 205
 Barosma, *Willd.* 471
 Barreria, *Scoop.* 795
 Barringtonia, *Forsk.* 755
 Barringtoniaceæ, 749, 754*
 Barringtoniads, 754
 Barringtoniææ, *DC.* 754
 Barrowia, *Dec.* 627
 Barthesia, *Commers.* 648
 Bartholina, *R. Br.* 182
 Bartlingia, *Brongn.* 721
 Bartlugia, *Reichb.* 764
 Bartolina, *Adans.* 711
 Bartonla, *Mühlentb.* 614
 Bartouia, *Sims.* 745
 Bartramia, *Gärtn.* 372
 Bartramia, *Hedw.* 67
 Bartsia, *Linn.* 685
 Baryosma, *Gärtn.* 555
 Baryosma, *Röm.* 471
 Baryosma, *Baug.* 778
 Baryxylon, *Lour.* 555
 Basella, *Linn.* 524
 Basellaceæ, 523, 524*
 Basellads, 524
 Basilea, *Juss.* 205
 Baskervillea, *Lindl.* 183
 Bassia, *Alliou.* 513
 Bassia, *Köuig.* 591
 Bassovia, *Aubl.* 622
 Bastardia, *Kunth.* 370
 Basteria, *Adans.* 541
 Basteria, *DC.* 713
 Basteria, *Houtt.* 713
 Batatas, *Chois.* 631
 Batemaia, *Lindl.* 182
 Bathellum, *Achar.* 50
 Bathæogyne, *Benth.* 543
 Bathuim, *Presl.* 80
 Batideæ, 273
 Batideæ, *Mart.* 286
 Batis, *Roxb.* 263
 Batis, *P. Br.* 286
 Batocidia, *Mart.* 677
 Batrachium, *DC.* 428
 Batrachospermææ, 10, 22
 Batrachospermum, *Roll.* 10, 22
 Batrathrum, *Nees.* 116
 Batridium, *Salisb.* 455
 Batschia, *Gaut.* 656
 Batschia, *Thunb.* 309
 Batschia, *Vahl.* 556
 Batatarea, *Pers.* 42
 Baudinia, *Lesch.* 737
 Bauern, *Sm.* 570
 Bauereææ, *Ed. pr.* 569
 Bauereæ, *DC.* 569
 Bauhiua, *Linn.* 556
 Bauhinieæ, 556
 Baumannia, *DC.* 455, 764
 Baumannia, *Spach.* 725
 Baumgartenia, *Spr.* 205
 Baumgartia, *Möuch.* 309
 Bauraultia, *Steud.* 727
 Baxtera, *Reichb.* 627
 Baxteria, *R. Br.* 192
 Beanapers, 478
 Bentonia, *Herb.* 161
 Bentonia, *Roxb.* 340
 Beaufortia, *R. Br.* 737
 Beauharnoisia, *Ruiz et Pav.* 402
 Beaumontia, *Wall.* 601
 Bechium, *DC.* 709
 Becium, *Lindl.* 661
 Becken, *Burm.* 785
 Beckera, *Fresen.* 115
 Beckmannia, *Host.* 115
 Beclardia, *A. Rich.* 181
 Bequerela, *Brongn.* 119
 Bedfordia, *DC.* 713
 Bedousia, *Dgnst.* 331
 Beefwoods, 248, 249
 Beesa, *Palis.* 119
 Beesha, *Rhede.* 116
 Befaria, *Mutis.* 455
 Beggiaria, *Trev.* 118
 Begonia, *Linn.* 319
 Begoniaceæ, 310, 318*
 Begoniads, 318
 Behenantha, *Othl.* 498
 Behuria, *Cham.* 733
 Beilschmidia, *Nees.* 537
 Bejaria, *Adr. Juss.* 455
 Bejuco, *Léfl.* 585
 Belangera, *Cambess.* 572
 Belangereæ, *Gardn.* 572
 Belémcanda, *Rhede.* 161
 Belenia, *Decaisne.* 621

- Nelis, Salisb.* 229
Belladonna, Sweet. 158
Belladonna, Tournef. 622
Bellardia, All. 685
Bellardia, Coll. 715
Bellardia, Schreb. 765
Bellendeua, R. Br. 533
Bellendenia, Rafin. 161
Bellevalia, DCil. 144
Bellevalia, Lapeyr. 205
Bellidææ, 710
Bellidiastrum, Mich. 709
Bellidiastrum, Vaill. 713
Bellieæ, 710
Bellincinia, Raddi. 59
Bellinia, Röm. et Sch. 622
Bellis, Linn. 710
Bellium, Linn. 710
Bellonia, Blum. 672
Bellucia, Adams. 475
Bellucia, Neck. 733
Bellworts, 689
Belmontia, E. Mey. 614
? Beloanthera, Hassk. 526
Belonites, E. Mey. 601
Beloperone, Nees. 680
Belostemma, Wall. 626
Belotia, A. Rich.
Belon, Adams. 456
Belvedera, Gronor. 450
Belvisia, Mirb. 80
Belvisia, Desv. 730
*Belvisiaceæ, 716, 728**
Belvisiæ, R. Br. & C. 728
Bembecodiæ, Kunz. 712
Bemhix, Lour. 390
Bencomia, Webb. 562
Benincasa, Savi. 315
Benjaminia, Fl. Fl. 795
Bennetia, Gray. 713
Benthamia, Lindl. 656
Benthamia, Lindl. 783
Benthamia, A. Rich. 182
Bentinkia, Berry. 139
Benzoin, Hayne. 593
Benzoin, Nees. 537
Benzonia, Schum. 765
Bequerela, Brongn. 119
Berardia, Brongn. 785
*Berberales, 214, 246, 432**
*Berberidaceæ, 432, 437**
Berberidææ, 438
Berberidææ, Vent. 437
Berberis, 437
Berberis, Linn. 438
Berchemia, Neck. 582
Bercholdia, Presl. 115
Bergenia, Monch. 508
Bergera, Kon. 454
Bergeretia, Desv. 354
Berghausia, Endl. 115
Berzia, L. 481
Beringeria, Neck. 662
Berinia, Brign. 715
Berkheya, Ehrh. 713
Berlandiera, DC. 711
Bermudiana, Tournef. 161
Bernardia, Houtt. 281
Bernardia, Vill. 713
Bernardina, Bando. 615
Bernhardia, Willd. 70
Berniera, DC. 714
Bernonia, Endl. 633
Berrebera, Hochst. ? 555
Berrya, Klein. 537
Berrya, Korb. 372
Bersama Fresco. 449
Bertera, Sweet. 161
Bertera, DC. 354
Bertera, Zippel. 795
Berthelotia, DC. 710
Bertholletia, Humb. et B. 749
Bertiera, Avbl. 765
Bertolonia, DC. 714
Bertolonia, Radd. 733
Bertolouia, Rafin. 664
Bertolonia, Spr. 492
Bertolonia, Spin. 664
Bertya, Planchon. 796
Berula, Koch. 778
Betula, L. 252
Betulaster, Spach. 252
Betulineæ, L. C. Rich. 251
Berzelia, Brongn. 785
Berzelia, Mart. 511
Beslerin, Plum. 672
Bessera, Fl. Fl. 507
Bessera, Schult. 205
Bessera, Schult. fil. 656
Bessera, Spreng. 328
Beta, Tourn. 513
Betckea, DC. 698
Betencourtia, St. Hil. ? 555
Bethencourtia, Choix. 713
Betonica, Linn. 662
*Betulaceæ, 248, 251**
Beureria, Ehret. 541
Beurrieria, Jacq. 653
Beverinckia, Salisb. 455
Beyeria, Miq. 281
Beyrichia, Cham. 684
Beythea, Endl. 372
Bhesa, Ham. 588
Bia, Kl. 281
Biarum, Schott. 129
Biasia, Vand. 189
Biassoletia, Koch. 779
Biatora, Fr. 50
Bichatia, Turp. 18
Bichenia, Don. 714
Bichy, Luman. 362
Bicornella, Lindl. 182
Bicornes, L. xxxlii
Bicorona, A. DC. 601
Bicuculla, Borkh. 436
Bicucullata, March. 436
Bidaria, Endl. 627
Biddulphia, Gray. 13
Bidens, Linn. 711
Bidentidææ, 711
Bidwillia, Herb. 205
Biebersteinia, Steph. 471
Biebersteinia, Endl. 469
Bidia, Stackh. 25
Bifolium, Fl. Wett. 205
Biforia, Hoffm. 779
Biforis, Spreng. 779
Bifrenaria, Lindl. 182
Bifucaria, Stack. 22
Bigamea, König. 718
Bigelovia, DC. 339
Bigelovin, Smith. 283
Bigelovia, Spr. 764
Bigelovia, DC. 710
Bignonia, L. 677
*Bignoniaceæ, 668, 675**
Bignoniads, 675
Bignonia, Juss. 675
*Bignoniales, 243, 245, 246, 668**
Bihai, Plum. 164
Bikkia, Reinw. 765
Blabrella, Lindl. 182
Bilimbi, Endl. 489
Billardiera, Monch. 664
Billardiera, Sm. 441
Billardiera, Vahl. 764
Billbergia, Thunb. 148
Billhotia, Coll. 737
Billiotia, DC. 765
Billiotia, R. Br. 737
Binniera, J. Agh. 24
Bindweeds, 639
Binectaria, Forsk. 591
Bintagor, Rumph. 492
Bionia, Mart. 555
Biophytum, DC. 489
Biota, Don. 229
Biota, Cass. 712
Biota, DC. 709
Bipinnula, Commers. 182
Biporeia, Thouars. 477
Bircha, A. Rich. 181
Birchworths, 248, 251
Biroliia, Bellard. 481
Birthingworts, 792
Biachofia, Blum. 473
Biscutella, Linn. 354
Bisserrula, Linn. 554
Bispora, Corda. 42
Bissula, Rumph. 139
Bistella, Delile. 568
Bistorin, Tournef. 504
Bitegmia, Dumort. xxxvii
Bivonæa, DC. 354
Bivonæa, Moc. et Sess. 499
Bivonea, Raf. 281
Bixa, Linn. 328
Bixaceæ, Ed. 337
Bixads, 327
Bixææ, 328
Bixinea, Kunth. 327
Blaberopus, A. DC. 601
Blackhörnria, Forst. 473
Blackstonia, Huds. 614
Blackstonia, Scop. 402
Blackwellia, Commers. 743
Blackwellia, Gärtn. 795
Bladder-ants, 381
Bladhia, Thunb. 648
Blaria, Linn. 455
Blainvillea, Cass. 710
Blairia, Houtt. 664
Blakea, Linn. 733
Blanchetia, DC. 709
Blanca, Lindl. 153
Blandfordia, Andr. 450
Blandfordia, Smith. 205
Blasia, Micheli. 59
Blasotrichium, Corda. 43
Blatti, Rheed. 738
Blaxium, DC. 712
Blachnum, Linn. 80
Blachnum, P. Br. 680
Blennoderma, Spach. 725
Blennoderma, Mougeot. 43
Blennosperma, Less. 711
Blenothrix, Kützng. 19
Blepharacanthus, Nees. 679
Blepharanthemum, Kl. 361
Blepharanthus, Smith. 322
Blepharodon, Dec. 626
Blepharidium, DC. 378
Blepharipappus, Hook. 712
Blepharis, Juss. 679
Blepharispermum, W. 710
Blepharistemma, Benth. 795
Blepharochloa, Endl. 115
Blepharolepis, DC. 713
Blepharolepis, Nees. 119
Blepharostoma, Dum. 60
Blepharozia, Dum. 60
Blephilia, Rafin. 661
Bletia, Ruiz et Pav. 181
Bletidææ, 181
Blighia, Kon. 385
Blinkworthia, Choix. 632
Blitanthus, Reichb. 511
Blitum, Linn. 513
Blochmannia, Weig. 504
Blondia, Neck. 568
Blood Roots, 151
Blossevillea, Dec. 10, 22
Bluffia, Nees. 115
Blumæa, DC. 710
? Blumæa, Meyer. 181
Blumenbachia, Koch. 116
Blumenbachia, Schrad. 745
Blumia, Nees. 419
Blumia, Spr. 424
Blumms, Panz. 119
Blytia, Endl. 59
Blytia, W. Arn. 626
Blytia, Fries. 116
Blyxa, Thoms. 142
Boaria, A. DC. 617

- Bobartia, *Linn.* 161
 Bobartia, *Petiv.* 711
 Boben, *Gaudich.* 764
 Bobua, *DC.* 593
 Bocagea, *St. Hil.* 422
 Bocageneæ, *Endl.* 422
 Bocconia, *Plum.* 431
 Bocus, *Kützling.* 9
 Bœbera, *Less.* 711
 Bœckhia, *Kunth.* 121
 Bœaninghausenia, *Reichenb.* 471
 Boerhaavia, *Linn.* 507
 Bohadschia, *Presl.* 347
 Bohadschia, *Crantz.* 354
 Böhmeria, *Jacq.* 262
 Boique, *Molin.* 419
 Boisduvalia, *Spach.* 725
 Boissiera, *Domb.* 304
 Boisjeana, *Reichb.* 554
 Bojeria, *DC.* 709
 Bojeriaceæ, 709
 Bolanthus, *Ser.* 498
 Bolax, *Commers.* 778
 Bolbidium, *Lindl.* 181
 Bolbitis, *Schott.* 79
 Bolbitis, *Fr.* 41
 Bolbophyllum, *Thouars.* 181
 Boldoa, *Cavan.* 507
 Boldon, *Juss.* 299
 Boldu, *Feuill.* 537
 Bolducia, *Neck.* 555
 Boletus, *Dill.* 41
 Bolcum, *Desv.* 355
 Bolivaria, *Ch.* 651
 Bolivariaceæ, *Griseb.* 650
 Bolophyta, *Nutt.* 711
 Boltonia, *Hérit.* 710
 Bomarea, *Mirb.* 158
 Bombaceæ, *Kunth.* 360, 361
 Bombax, *L.* 361
 Bombacyella, *DC.* 370
 Bombacyllena, *DC.*
 Bombacospermaui, *Fr.* 631
 Bonafousia, *A. DC.* 601
 Bonamia, *Thouars.* 631
 Boanania, *Fl. Fl.* 795
 Boaa Nox, *Rafin.* 631
 Bonapartea, *Ruiz et P.* 148
 Bonapartea, *Willd.* 158
 Bonapedia, *Neck.* 554
 Bonatea, *Willd.* 182
 Bonaveria, *Scop.* 554
 Boaduc, *Plum.* 555
 Bonellia, *Bert.* 648
 Boagardia, *C. A. Mey.* 438
 Bonnauia, *Raf.* 385
 Bonnauia, *Presl.* 355
 Bonnaya, *Link. et Otto.* 685
 Bonneimaisonia, *Ag.* 11, 25
 Bonaetia, *Mart. et Zucc.* 397
 Bonnetia, *Schreb.* 397
 Bonninghausenia, *Spr.* 554
 Bonplandia, *Cav.* 636
 Boaplaudia, *Willd.* 471
 Bontia, *Pet.* 181
 Bontia, *Plum.* 665
 Boophane, *Herb.* 158
 Boopidea, *Cassin.* 701
 Boopis, *Juss.* 701
 Booram, *Endl.* 455
 Bootia, *Bigel.* 564
 Bootia, *Wall.* 142
 Boquila, *DC.* 304
 Borageworts, 655
 Boraginaceæ, 649, 655*
 Boragineæ, *Juss.* 655
 Borasseo, 139
 Borassus, *Linn.* 139
 Borbonia, *Linn.* 553
 Borboniceæ, 553
 Borea, *Zippel.* 795
 Boreava, *Jaub.* 355
 Borellia, *Neck.* 629
 Boretta, *Neck.* 455
 Borkhanseia, *Fl. Wett.* 436
 Borkhausenia, *Roth.* 684
 Borkhausia, *Boehm.* 715
 Boronia, *Smith.* 471
 Boronlea, 471
 Borragineæ, *Alph. DC.* 628, 653
 Borrageo, *Tourn.* 656
 Borrera, *Ach.* 50
 Borreria, *Mey.* 764
 Borrchia, *Adams.* 710
 Borya, *Labill.* 205
 Borya, *Willd.* 283
 Boryna, *Gratel.* 24
 Bosca, *Fl. Fl.* 328
 Boschniakia, *C. A. M.* 611
 Boscia, *Lam.* 358
 Boscia, *Thunb.* 473
 Bosea, *Linn.* 580
 Bossiaea, *Vent.* 553
 Botrychia, *Mout.* 25
 Boswellia, *Roxb.* 460
 Bothriospermum, *Bung.* 656
 Boton, *Adans.* 555
 Botria, *Lour.* 440
 Botrophis, *Rafin.* 428
 Botryadenia, *Fisch.* 710
 Botryantho, *KL.* 281
 Botryanthus, *Kth.* 205
 Botrycarpum, *A. Rich.* 751
 Botryceras, *Willd.* 467
 Botrychinum, *Swartz.* 77
 Botrydina, *Brebis.* 9, 18
 Botrydium, *Spach.* 10, 513
 Botrydium, *Walbr.* 22
 Botryocarpa, *Grev.* 11, 25
 Botryocarpæ, 11
 Botryocarpum, *Spach.* 751
 Botryocystis, *Kützling.* 9
 Botryodendrum, *Endl.* 781
 Botryolotus, *Jaub. et Sp.* 554
 Botryopteris, *Presl.* 77
 Botryospora, *Schwein.* 42
 Botryosporium, *Corda.* 43
 Botrypus, *Rich.* 77
 Botrytaceæ, 41
 Botrytis, *Mich.* 43
 Bottionea, *Colla.* 205
 Bouccrosia, *Wight.* 627
 Bouchea, *Cham.* 664
 Bouea, *Meisn.* 467
 Bougueria, *Decaisn.* 643
 Bouesia, *Grev.* 25
 Bourreria, *P. Br.* 653
 Boussingaultia, *H. B. K.* 524
 Bouteloua, *Lagasc.* 116
 Boutonia, *DC.* 674
 Bouvardia, *Salisb.* 765
 Bovea, *Decaisn.* 684
 Bovista, *Dill.* 42
 Bowdichia, *H. B. K.* 555
 Bowia, *Haworth.* 205
 Bowlesia, *Grev.* 10
 Bowlesia, *Ruiz et Pav.* 778
 Bowmannia, *Gardn.* 714
 Boykinia, *Nutt.* 568
 Boymia, *Adr. Juss.* 473
 Brabejum, *Linn.* 533
 Brabya, *Linn.* 533
 Brachaathemum, *DC.* 712
 Brachellema, *R. Br.* 715
 Brachyachyris, *Spreng.* 710
 Brachyandra, *Naud.* 733
 Brachyantheum, *DC.* 765
 Brachycarpæa, *DC.* 355
 Brachycentrum, *Meisn.* 733
 Brachychaeta, *Torrey.* 710
 Brachychitou, *Schk.* 362
 Brachycladium, *Corda.* 43
 Brachyclados, *Don.* 714
 Brachycome, *Cass.* 710
 Brachycoris, *Schrad.* 684
 Brachycorythis, *Lindl.* 182
 Brachydera, *Cass.* 715
 Brachyelytrum, *Falis.* 115
 Brachyglottis, *Forst.* 709
 Brachylena, *R. Br.* 710
 Brachylepis, *Hook. et A.* 629
 Brachylepis, *C. A. Mey.* 513
 Brachylepis, *W. et A.* 626
 Brachyloana, *Sander.* 449
 Brachyloanium, *Hook.* 67
 Brachymeris, *DC.* 712
 Brachyodoatum, *Führn.* 67
 Brachyodus, *Führn.* 67
 Brachyolobos, *Allion.* 354
 Brachyotum, *DC.* 733
 Brachypetalum, *Don.* 350
 Brachypetalum, *Nutt.* 205
 Brachypodium, *Brid.* 67
 Brachypodium, *Pal.* 116
 Brachypterium, *W. et A.* 555
 Brachypterys, *A. de J.* 390
 Brachypteris, *Led.* 354
 Brachyramphus, *DC.* 715
 Brachyrhynchos, *Less.* 713
 Brachyrhis, *Nutt.* 710
 Brachysema, *R. Br.* 553
 Brachysteleum, *Reichb.* 67
 Brachystelma, *R. Br.* 627
 Brachystemma, *Don.* 498
 Brachystemum, *Rich.* 661
 Brachystephium, *Less.* 710
 Brachystylis, *E. Mey.* 712
 Brachytrichum, *Rohl.* 67
 Brachytropis, *DC.* 378
 Bractearia, *DC.* 733
 Bradburia, *Torrey.* 710
 Bradburya, *Rafin.* 555
 Bradleia, *Neck.* 778
 Bradlea, *Banks.* 282
 Bradlea, *Fl. Fl.* 339
 Bradrypiptum, *DC.* 354
 Bragantia, *Lour.* 794
 Bragatia, *Vandell.* 511
 Brahea, *Mart.* 139
 Bramia, *Lam.* 685
 Brandesia, *Mart.* 511
 Brandonia, *Reichb.* 686
 Brandtia, *Kunth.* 116
 Braneaia, *Neck.* 711
 Brasavola, *R. Br.* 181
 Braseia, *Pursh.* 413
 Brasilettia, *DC.* 555
 Brassia, *Endl.* 781
 Brassavola, *Adans.* 712
 Brassia, *R. Br.* 181
 Brassica, *Linn.* 355
 Brassien, *Tournef.* 355
 Brassicaceæ, 348, 351*
 Brassicidæ, 355
 Brassidæ, 181
 Brathydium, *Spach.* 406
 Brathys, *Mut.* 406
 Braunea, *Willd.* 309
 Bravaisia, *DC.* 677
 Bravao, *Lav.* 158
 Braya, *Fl. Fl.* 543
 Braya, *Sternb. et Hopy.* 354
 Brayera, *Kunth.* 565
 Brebissonia, *Spach.* 725
 Bremeyeria, *W.* 378
 Breen, *Less.* 714
 Brehmia, *Harv.* 602
 Bremoutiera, *DC.* ? 554
 Breonia, *A. Rich.* 765
 Bretenillia, *Buch.* 713
 Breweria, *R. Br.* 631
 Brexia, *Thouars.* 673
 Brexiaceæ, 566, 573*
 Brexiads, 573
 Breynia, *Forst.* 282
 Breynia, *Plum.* 358
 Breyniastrium, *DC.* 358
 Briarica, *Corda.* 43
 Brickellia, *Rafin.* 636
 Brickellia, *Ell.* 709
 Bridgesia, *Bert.* 385
 Bridgesia, *Hook.* 714
 Bridgesia, *Hook. et Arn.* 509
 Briedelia, *W.* 282
 Brignolia, *Bertol.* 778

- Brigmolia, *DC.* 765
 Brillantaisia, *Palis.* 680
 Briudonia, *Thouars.* 402
 Brissocarpus, *Bischoff.* 57
 Brissonia, *Neck.* 554
 Bristleworts, 120
 Brittleworts, 12
 Briza, *Linn.* 116
 Brizopyrum, *Link.* 116
 Brocchia, *DC.* 712
 Brocchinia, *Schult. fil.* 148
 Brodiaea, *Smith.* 205
 Bromelia, *Linn.* 148
 Bromeliaceae, 146, 147*
 Bromelie, *Juss.* 147
 Bromefworts, 147
 Bromfeldia, *Neck.* 281
 Bromheadia, *Lindl.* 181
 Bromidæ, 116
 Bromidium, *Nees.* 116
 Bromus, *Linn.* 116
 Brongniartella, *Bory.* 25
 Brongniartia, *Blum.* 299
 Brongniartia, *H. B. K.* 554
 Brongniartiæ, 554
 Bronnia, *H. B. K.* 636
 Broomeia, *Berk.* 42
 Broomrapes, 609
 Brosimum, *Swartz.* 271
 Brossæa, *Plum.* 758
 Brossardia, *Boiss.* 354
 Brotera, *Cav.* 364
 Brotera, *Fl. Fl.* 372
 Brotera, *Spreng.* 661, 711
 Brotera, *Willd.* 713
 Broteroa, *DC.* 711
 Bronghtonia, *R. Br.* 181
 Broussaisia, *Gaud.* 579
 Broussonetia, *Ort.* 555
 Broussonetia, *Vent.* 268
 Browallia, *Linn.* 684
 Brownea, *Jacq.* 556
 Brownera, *L. C. Rich.* 231
 Brownlea, *Harr.* 182
 Brownlowia, *Rox.* 372
 Brucea, *Banks.* 477
 Bruchia, *Schwægr.* 67
 Bruckenthalia, *Reichb.* 455
 Bruckmannia, *Nutt.* 115
 Bruea, *Gaud.* 271
 Brugmansia, *Blum.* 93
 Brugmansia, *Pers.* 621
 Bruguiera, *Lam.* 727
 Bruguiera, *Rich.* 733
 Bruguiera, *Thouars.* 718
 Brunsmanmia, *Miq.* 765
 Brunella, *Monch.* 661
 Brunella, *Ruiz et Pav.* 473
 Brunfelsia, *Plum.* 684
 Brunia, *Linn.* 785
 Bruniaceae, 772, 785*
 Bruniads, 765
 Brunnichia, *Banks.* 594
 Brunnichæa, *Meisn.* 544
 Brunonia, *Smith.* 658
 Brunoniaceae, 649, 657*
 Brunoniads, 657
 Brunsvia, *Neck.* 281
 Brunsvigia, *Heister.* 189
 Brya, *P. Br.* 554
 Bryaceæ, 56, 64*
 Bryanthus, *Gmel.* 458
 Bryobium, *Lindl.* 131
 Bryocladium, *Kunze.* 42
 Bryocles, *Salisb.* 205
 Bryodes, *Benth.* 685
 Bryomorpha, *Karel.* 498
 Bryonia, *Linn.* 315
 Bryonopsis, *Arn.* 315
 Bryophyllum, *Salisb.* 346
 Bryopogon, *Link.* 59
 Bryopsis, *Lamx.* 10, 22
 Bryopteris, *Nees.* 59
 Bryothallum, *E. Mey.* 450
 Bryothamnion, *Kützling.* 11
 Bryum, *Linn.* 67
 Bryum, *Hedw.* 67
 Bubalina, *Ehrenb.* 765
 Bubon, *Linn.* 778
 Bubonium, *DC.* 710
 Bubroma, *Schreb.* 364
 Bucanaphyllum, *Pluk.* 429
 Bucco, *Wendl.* 471
 Buceulina, *Lindl.* 182
 Buceas, *P. Br.* 718
 Buceas, *Monch.* 554
 Buchananiana, *Roxb.* 467
 Buchavea, *Reichb.* 565
 Buchenrœdera, *Eck. et Zeyh.* 554
 Buchia, *H. B. K.* 664
 Buchnera, *Linn.* 685
 Buchuereæ, 685
 Buchozia, *Mart.* 511
 Buchozia, *Fl. Fl.* 206
 Buchozia, *Herit.* 764
 Bucida, *Linn.* 718
 Buckia, *Gieske.* 167
 Bucklandæa, 784
 Bucklandia, *R. Br.* 784
 Buckwheats, 502
 Bucquetia, *DC.* 733
 Buddlea, *Linn.* 685
 Buddlæa, 685
 Buddleioides, *Benth.* 661
 Bueckia, *Nees.* 119
 Buena, *Pohl.* 765
 Buffonia, *Linn.* 497
 Buffonia, *Sauv.* 497
 Bugainvillea, *Comm.* 507
 Buglossum, *Tournef.* 656
 Bugula, *Tournef.* 662
 Bujacia, *E. Mey.* 555
 Bulbilla, *Rafin.* 116
 Bulbillaria, *Zucc.* 204
 Bulbine, *Linn.* 205
 Bulbinella, *Kth.* 205
 Bulbocarpus, *Benth.* 436
 Bulbocastanum, *Ad.* 778
 Bulbochæte, *Ag.* 22
 Bulbocodium, *Linn.* 199
 Bulbospermum, *Blum.* 205
 Bulbostylis, *DC.* 709
 Bulgaria, *Fries.* 43
 Bulliardia, *DC.* 346
 Bulliardia, *Necker.* 422
 Bulowia, *Schum.* 334
 Bulrushes, 126
 Bumalda, *Thunb.* 381
 Bumelia, *Swartz.* 591
 Bunburia, *Harvey.* 626
 Buncobosia, *Rich.* 390
 Bungea, *C. A. Mey.* 685
 Buniadæ, 355
 Bunias, *R. Br.* 355
 Bunias, *Desv.* 354
 Bunium, *Koch.* 778
 Bunium, *Lagasc.* 778
 Buphane, *Herb.* 158
 Buphthalmæa, 719
 Buphthalmum, *Neck.* 710
 Bupleurum, *Tournef.* 778
 Buprestis, *Spreng.* 778
 Buramin, *DC.* 455
 Burasala, *Thouars.* 304
 Burchardia, *R. Br.* 189
 Burchardia, *Duham.* 664
 Burchardia, *Neck.* 738
 Burchellia, *R. Br.* 765
 Burdachia, *A. de J.* 390
 Bureca, *Zippel.* 795
 Burghartia, *Necker.* 347
 Burglarina, *Wendl.* 598
 Burgsdorffia, *Mûnch.* 662
 Burkardia, *Scop.* 347
 Burkla, *Benth.* 555
 Burlingtonia, *Lindl.* 182
 Burmannia, *Linn.* 172
 Burmanniaceæ, 170, 71*
 Burmanniads, 171
 Burmanniæ, *Spreng.* 171
 Burmanniæ, *Michx.* 172
 Burnetia, *Lindl.* 183
 Burneya, *Cham.* 764
 Burriella, *DC.* 712
 Burns, *Guell.* 354
 Bursaria, *Cav.* 441
 Bursaria, *Jacq.* 460
 Bursariaceæ, *Kunth.* 459
 Bursariadæ, 460
 Bursaria, *Endl.* 779
 Burtonia, *R. Br.* 553
 Burtonia, *Salisb.* 424
 Busbeckia, *Endl.* 358
 Busbeckia, *Marl.* 622
 Butea, *Kön.* 555
 Buteræa, *Nees.* 679
 Butomaceæ, 207, 208*
 Butomads, 208
 Butomæa, *Richard.* 208
 Butomopsis, *Kth.* 208
 Butomus, *Tournef.* 208
 Butonica, *Lam.* 755
 Butterworts, 686
 Buttneria, *Duham.* 541
 Buxbaumia, *Haller.* 67
 Buxea, 282
 Buxus, *Tournef.* 282
 Byblis, *Salisb.* 434
 Byronia, *Endl.* 598
 Byrsanthes, *Presl.* 693
 Byrsanthus, *Guill.* 743
 Byrsocarpus, *Schum.* 468
 Byrsonima, *Rich.* 390
 Bysaceæ, *Fr. Syst.* 29
 Byttacaulon, *Monl.* 43
 Byssus, *Linn.* 44
 Bystropogon, *Herit.* 661
 Byttneræa, 364
 Byttneria, *Loff.* 364
 Byttneriaceæ, 359, 363*
 Byttneriads, 363
 Caantebe, *DC.* 765
 Caapeba, *Plum.* 309
 Caballera, *Ruiz et Pav.* 648
 Cabomba, *Aubl.* 413
 Cabombaceæ, 408, 412*
 Cabombeæ, *Rich.* 412
 Cabrera, *Adr. Juss.* 464
 Cabrera, *Lagasc.* 115
 Cabrus, *Bernh.* 622
 Cacalia, *Cass.* 713
 Cacalia, *DC.* 713
 Cacalianthemum, *Dill.* 713
 Cacao, *Tourn.* 364
 Cacara, *Thouars.* 555
 Cacatali, *Adans.* 670
 Caccinia, *Sav.* 656
 Cachrys, *Tourn.* 779
 Caconapea, *Cham.* 685
 Cacosmia, *H. B. K.* 709
 Caccoucia, *Aubl.* 718
 Cactaceæ, 741, 746*
 Cactales, 246, 741*
 Cactæa, *DC.* 746
 Cacti, *Juss.* 746
 Cactoidæ, *Vent.* 746
 Cadaba, *Forsk.* 358
 Cadambula, *Son.* 764
 Cadetia, *Gaudich.* 181
 Cadin, *Forsk.* 555
 Caidiscus, *E. Mey.* 715
 Cadmus, *Bory.* 18
 Caelosporium, *Lk.* 44
 Cæmoglum, 50
 Cæmopteris, *Berg.* 80
 Cæmomucel, *Corda.* 42
 Cæsalpinia, *Linn.* 555
 Cæsalpinieæ, 549, 555, 556
 Cæsaræa, *Cambess.* 365
 Cæsin, *R. Br.* 205
 Cæsulina, *Roxb.* 710
 Cæsulineæ, 710
 Cætocarpin, *Link. et O.* 15*
 Callien, *Guill.* 556

- Caimito, *Tussac*. 591
 Cajaneæ, 555
 Cajanus, *DC*. 555
 Cajophora, *Prest*. 745
 Cajuputi, *Adans*. 737
 Cakile, *Tournef*. 354
 Calkidæ, 354
 Calaburna, *Pluken*. 372
 Caladenia, *R. Br*. 182
 Caladiæ, 129
 Caladium, *Vent*. 129
 Calais, *DC*. 715
 Calaisine, *Endl*. 497
 Calamagrostis, *Adans*. 115
 Calamaria, *Dillen*. 73
 Calamarie, *L. xxxiii*
 Calameæ, 138
 Calaminæ, *Griff*. 138
 Calamintha, *Mönch*. 661
 Calamoscus, *Griff*. 139
 Calampelis, *Don*. 677
 Calanus, *Linn*. 138
 Calaudrinia, *H. B. K.* 501
 Calantra, *R. Br*. 182
 Calanthea, *DC*. 358
 Calanthidæ, 182
 Calanctis, 10
 Calathea, *G. F. W. Meyer*. 169
 Calathiana, *Frat*. 614
 Calathiscus, *Mont*. 42
 Calboia, *Cor*. 631
 Calcearia, *Blum*. 182
 Calceolareæ, 684
 Calceolaria, *Foell*. 684
 Calceitrapa, *DC*. 714
 Caldasia, *Lagasc*. 779
 Caldasia, *Mutis*. 90
 Caldasia, *Willd*. 636
 Caldeuvia, *Don*. 572
 Calea, *R. Br*. 712
 Calea, *Gärtn*. 713
 Calencte, *DC*. 712
 Calencte, *Less*. 712
 Caleana, *R. Br*. 182
 Calibrachys, *DC*. 712
 Calectasia, *R. Br*. 192
 Calectasiæ, *Endl*. 191
 Calendula, *Neck*. 713
 Calenduleæ, 713
 Calceothrix, *Desv*. 13
 Calceolina, *Adans*. 355
 Calceya, *R. Br*. 182
 Calceyidæ, 182
 Calibrachoa, *Llav*. 632, 795
 Caliciflora, *Dunort*. xxxvii
 Calicungulia, *Dunort*. xxxvii
 Calidictyon, *Grev*. 25
 Calimeris, *Cass*. 709
 Calinea, *Aubl*. 424
 Calinix, *Rafin*. 788
 Caliphylum, *Gaud*. 568
 Calispermum, *Lour*. 795
 Calla, *Linn*. 194
 Callaceæ, *Endl*. 193
 Callææ, 194
 Callerya, *Endl*. 555
 Callinichrysis, *Torr. et Gr*. 712
 Calliandra, *Benth*. 556
 Calliantra, *Miq*. 518
 Callianthemum, *C. A. M.* 428
 Calliblepharis, *Kutzing*. 10
 Callibotrys, *Sal*. 455
 Callibrachoa, *Llav*. 621, 632, 795
 Callibryum, *Weber*. 67
 Callicarpa, *Linn*. 664
 Callicephalus, *C. A. M.* 714
 Callichlamys, *Miq*. 677
 Callichron, *Fisch. et M.* 712
 Callicocca, *DC*. 764
 Callicocca, *Schreb*. 764
 Callicoma, *Andræus*. 572
 Callicornia, *Burm*. 713
 Callicystus, *Endl*. 555
 Calligonum, *Linn*. 504
 Calligonum, *Lour*. 424
 Callilepis, *DC*. 712
 Calliopeia, *Don*. 715
 Calliopsis, *Reichb*. 711
 Calliopsis, *Sweet*. 494
 Calliorea, *Cham*. 664
 Callipeltis, *Stev*. 771
 Calliphuria, *Herb*. 158
 Calliphysa, *F. et M.* 504
 Calliprora, *Lindl*. 205
 Callipteris, *Bory*. 80
 Callirhoë, *Nutt*. 370
 Callirhoë, *Link*. 158
 Callisacæ, *Fisch*. 778
 Callisemæa, *Vog*. 555
 Callisia, *Loffl*. 188
 Callista, *D. Don*. 455
 Callista, *Lour*. 183
 Callistachya, *Rafin*. 685
 Callistachys, *Vent*. 533
 Callistemma, *Cass*. 709
 Callistemon, *R. Br*. 737
 Callistephus, *Cass*. 709
 Callisthene, *Mart. et Zucc*. 380
 Callisthenia, *Spreng*. 380
 Callistroma, *Fenzl*. 778
 Callithamniæ, *Kutzing*. 10
 Callithamnion, *Lyngb*. 10, 24
 Callithamne, *Herb*. 158
 Callitriche, *Linn*. 284
 Callitricheæ, 273, 284*
 Callitricbinæ, *Link*. 284
 Callitris, *Vent*. 229
 Callixene, *Commers*. 205
 Callophyllis, *Kutzing*. 10
 Callophilophorum, *Don*. 19
 Calloposma, *Mart. et Zucc*. 614
 Callostylis, *Blum*. 181
 Calluna, *Salisb*. 455
 Calobota, *Eckl. et Zey*. 554
 Calobotrya, *Spach*. 751
 Calcephalus, *R. Br*. 712
 Calocera, *Fries*. 42
 Calochilus, *R. Br*. 182
 Calochortus, *Prnsh*. 204
 Calocladia, *Grev*. 25
 Calodendron, *Thunb*. 455, 471
 Calodium, *Lour*. 538
 Calodonta, *Nutt*. 715
 Calodryum, *Desv*. 464
 Calogyne, *R. Br*. 695
 Calomecon, *Spach*. 431
 Calomelanos, *Prest*. 79
 Calomeria, *Vent*. 712
 Calonema, *Lindl*. 182
 Calonyction, *Chois*. 631
 Caloppus, *Meyen*. 714
 Calophanes, *Don*. 679
 Calophylleæ, 402
 Calophyllum, *L.* 402
 Calophysa, *DC*. 733
 Calopogon, *R. Br*. 182
 Calopogonium, *Desv*. 555
 Calopsis, *Palis*. 121
 Caloptilium, *Lagasc*. 714
 Calorhabdos, *Benth*. 685
 Caloropbus, *Labill*. 121
 Calosacme, *Wall*. 672
 Calosantes, *Blum*. 677
 Caloscardum, *Herb*. 205
 Caloseris, *Benth*. 715
 Calosma, *Prest*. 537
 Calospermum, *Raf.* ? 22
 Calostemma, *R. Br*. 158
 Calostigma, *Decaisn*. 626
 Calostigma, *Schott*. 129
 Calota, *Harv*. 182
 Calothamnus, *Labill*. 737
 Calotheca, *Kunth*. 116
 Calotheca, *Steudel*. 115
 Calothrix, *Ag*. 10, 18
 Calothyrsus, *R. Br*. 533
 Calothyrsus, *Spach*. 385
 Calotis, *R. Br*. 710
 Calotrichæ, *Kutzing*. 10
 Calotropis, *Don*. 554
 Calotropis, *R. Br*. 626
 Calycarpum, *G. Don*. 691
 Calpidia, *Thouars*. 507
 Calpurnia, *E. Mey*. 555
 Callina, *Linn*. 428
 Calucechinus, *H. et J.* 291
 Calusia, *Bert*. 555
 Calusparmus, *H. et J.* 291
 Calycadenia, *DC*. 712
 Calycandra, *A. Rich*. 556
 Calycanthaceæ, 539, 540*
 Calycanthæ, *Perl*. xlix
 Calycanthæ, *Lindl*. 540
 Calycanthemæ, *Vent*. 574
 Calycanthemæ, *L. xxxiii*
 Calycanthiæ, *Link*. 540
 Calycanthus, 540
 Calycanthus, *Lindl*. 541
 Calycera, *Cavan*. 701
 Calyceraceæ, 638, 701*
 Calyceræ, *R. Br*. 701
 Calycers, 701
 Calycidæ, 50
 Calyciflora, *L.* xxxiv
 Calycium, *Elliott*. 710
 Calycium, *Pers*. 50
 Calycobolus, *Willd*. 631
 Calycogonium, *DC*. 733
 Calycopsis, *R. Br*. 572
 Calycosporium, *Prest*. 554
 Calycopetalæ, *Perl*. xlix
 Calycophyllum, *DC*. 765
 Calycopterus, *Lam*. 718
 Calycopterus, *Rich*. 733
 Calycosorus, *Schmidt*. 715
 Calycotrix, *Labill*. 721
 Calycotome, *E. Mey*. 554
 Calycotome, *Link*. 554
 Calycotomus, *Rich*. 733
 Calydermos, *Lagasc*. 712
 Calydermos, *Ruiz et P.* 622
 Calydorea, *Herb*. 161
 Calylophus, *Spach*. 725
 Calymella, *Prest*. 80
 Calyruenina, *Nutt*. 507
 Calymmatanthus, *Sch*. 721
 Calymnandra, *Torr*. 710
 Calymnodon, *Prest*. 79
 Calymperes, *Swartz*. 67
 Calyplectus, *Ruiz et P.* 575
 Calyptea, *Raddi*. 60
 Calypso, *Salisb*. 181
 Calypso, *Thouars*. 595
 Calypteris, *Zippel*. 795
 Calypterium, *Berth*. 80
 Calyptrauthes, *Swartz*. 738
 Calyptranthus, *Blum*. 738
 Calyptranthus, *Juss*. 738
 Calyptria, *Dunort*. xxxvii
 Calyptridium, *Nutt*. 501
 Calyptrin, *Gingins*. 339
 Calyptrocalyx, *Blum*. 138
 Calyptrocaryus, *Less*. 711
 Calyptrocarya, *Nees*. 119
 Calyptrospermum, *Dietr*. 651
 Calyptrostigma, *Kt*. 281
 Calyptrostylis, *Nees*. 119
 Calypsaccon, *Wight*. 402
 Calysphyrum, *Bnng*. 767
 Calyssonium, *Corda*. 43
 Calystegia, *R. Br*. 631
 Calytrix, *Labill*. 721
 Calytriplex, *R. P.* 685
 Calyxhymenium, *Orteg*. 507
 Camagnoc, *Aubl*. 281
 Camara, *Cham*. 664
 Camarea, *St. Hil*. 390
 Camaridium, *Lindl*. 182
 Camarotis, *Lindl*. 181
 Cannasia, *Lindl*. 205
 Camax, *Schreb*. 795
 Canbannia, *Commers*. 464
 Camben, *Hamilt*. 755
 Cambesseden, *Kunth*. 467
 Cambesseden, *Wight*. 467

- Cambessedesia, *DC.* 733
 Cambogia, *Linn.* 402
 Camelia, *Crantz.* 354
 Camelioides, 354
 Camellia, *Linn.* 397
 Camellieæ, *DC.* 396
 Cameraria, *Dillen.* 501
 Cameraria, *Plum.* 601
 Camirium, *Rumph.* 281
 Cammarum, *DC.* 428
 Campanacei, *L.* xxviii
 Campanales, 243, 246, 688°
 Campanales, 668
 Campanaria, *Endl.* 428
 Campanistrum, *Rehb.* 662
 Campanopsis, *R. Br.* 691
 Campanula, *Linn.* 691
 Campanulacæ, 688, 689*
 Campanulacæ, *R. Broten.* 692
 Campanule, *Juss.* 689, 694
 Campanulæ, *Alph. DC.* 689, 691
 Campanumæa, *Bl.* 691
 Campderia, *A. Rich.* 153
 Campderia, *Lagasc.* 778
 Campëcia, *Adans.* 555
 Campelepis, *Falc.* 626
 Campelia, *Rich.* 188
 Campella, *Link.* 116
 Campora, *Nees.* 537
 Camphorata, *Monch.* 513
 Camphoromæa, *Nees.* 537
 Camphorosma, *Linn.* 513
 Campia, *Domb.* 217
 Campium, *Presl.* 79
 Campomanesia, *Ruiz et Pav.* 738
 Campsiandra, *Benth.* 556
 Campsis, *Lour.* 677
 Campsotrichum, *Ehrenb.* 43
 Campteria, *Presl.* 80
 Camptocarpus, *Dec.* 626
 Camptoloma, *Benth.* 685
 Camptosema, *Hook. et A.* 555
 Camptosorus, *Link.* 80
 Campoum, *Link.* 43
 Campuleia, *Dup. Thourars.* 685
 Campuloa, *Desr.* 116
 Campulosus, *Palis.* 116
 Campylanthera, *Hook.* 441
 Campylanthera, *Scht.* 261
 Campylanthus, *Both. ?* 685
 Campylia, *Sweet.* 494
 Campylocarpus, *C. A. Mey.* 354
 Campylocaryum, *DC.* 656
 Campyloclinium, *DC.* 709
 Campyloclonium, *Schw.* 67
 Campyloclonema, *Poir.* 158
 Campyloclonum, *Prl.* 79
 Campyloclonum, *Boiss.* 355
 Campyloclonum, *Bril.* 67
 Campyloclonum, *Spach.* 406
 Campyloclonum, *Sp.* 406
 Campylostachys, *Kunth.* 608
 Campylostemon, *L. M.* 689
 Campylothea, *Cass.* 711
 Campylothea, *Rudge.* 554
 Campylothea, *Labill.* 158
 Campylothea, *Rumph.* 191
 Canantia, *Horn.* 711
 Canala, *Pohl.* 694
 Canalia, *F. W. Sch.* 531
 Cananua, *And.* 422
 Canaria, *Linn.* 691
 Canarina, *Juss.* 691
 Canarium, *Linn.* 499
 Canavalia, *DC.* 555
 Cancellaria, *DC.* 370
 Cankerina, *Kunt.* 712
 Candarium, *Rehb.* 129
 Candehabria, *Hochst.* 321
 Candehares, *L.* xxvix
 Candollea, *Muhl.* 79
 Candollea, *Raddi.* 59, 60
 Candollea, *Labill.* 424, 696
 Candollea, *Humbog.* 455
 Canella, *R. Br.* 442
 Cauellaceæ, *Vou Martius.* 442
 Canello, *Dombey.* 419
 Cauephora, *Juss.* 765
 Canicidia, *Fl. Fl.* 795
 Canna, *Linn.* 169
 Canuabis, *Tourn.* 265
 Canuabinacææ, 258, 265°
 Canuabinacææ, *Endl.* 265
 Canuacææ, *Agardh.* 168
 Canuacorus, *Tournef.* 169
 Cannæ, *Juss.* 165, 168
 Canuere, *Brown.* 168
 Canuomois, *Palis.* 121
 Canonanthus, *Don.* 693
 Canscora, *Lam.* 614
 Cansjera, *Gmel.* 444
 Cantharellus, *Adans.* 41
 Cantharosperrum, *W. et A.* 555
 Canthium, *Linn.* 764
 Cantua, *Juss.* 636
 Capea, *Montagn.* 22
 Capellia, *Blume.* 424
 Caperonia, *St. Hil.* 282
 Capillaria, *Stackh.* 24, 25
 Capillaria, *Pers.* 44
 Capitularia, *Förk.* 50
 Capnia, *Venten.* 50
 Capnites, *Endl.* 436
 Capnitis, *E. Mey.* 554
 Capnocystis, *Juss.* 436
 Capnogonium, *Bernh.* 436
 Capnoides, *Boerh.* 436
 Capnophyllum, *Lagasc.* 778
 Capnophyllum, *Gärtn.* 778
 Capnorchis, *Borkh.* 436
 Cappa, *DC.* 710
 Cappareæ, 358
 Capparidaceæ, 348, 357°
 Capparidistrum, *DC.* 358
 Capparideæ, *Juss.* 357
 Capparids, 357
 Capparis, *Linn.* 358
 Capraria, *Linn.* 685
 Caprifolia, *Juss.* 766
 Caprifoliaceæ, 756, 766°, 772
 Caprifoliaceæ, *Kunth.* 782
 Caprifolium, *Tournef.* 767
 Caprifolium, 766
 Capriola, *Adans.* 115
 Capsella, *Venten.* 354
 Capsella, *Dumort.* xxxvii
 Capsicum, *Tournef.* 622
 Capura, *Linn.* 531
 Caragana, *Lam.* 554
 Caraguata, *Plum.* 148
 Carallia, *Roxb.* 727
 Caralluma, *R. Br.* 627
 Carambola, *Endl.* 489
 Caranaiba, *Haregr. Piso.* 139
 Carapa, *Aubl.* 397, 464
 Carapichea, *Aubl.* 764
 Carara, *Medik.* 355
 Carbeni, *Adans.* 714
 Cardamine, *Linn.* 354
 Cardaminopsis, *C. A. Mey.* 354
 Cardaminum, *Monch.* 354
 Cardamomum, *Rumph.* 167
 Cardamomum, *Salisb.* 167
 Cardamon, *DC.* 354
 Cardaria, *Deso.* 354
 Cardarina, *Cass.* 713
 Cardiaea, *Linn.* 662
 Cardiaea, *Monch.* 662
 Cardiantra, *Sieb. et Z.* 570
 Cardiocarpus, *Rebow.* 378
 Cardiocaryon, *Endl.* 533
 Cardioclonum, *Endl.* 205
 Cardiolepis, *Raf.* 582
 Cardiolepis, *Walt.* 351
 Cardiolochia, *Raf.* 791
 Cardiolopium, *Griff.* 672
 Cardionanes, *Presl.* 80
 Cardionema, *DC.* 499
 Cardiopetalum, *Schl.* 422
 Cardiophora, *Benth.* 467
 Cardiospermum, *Linn.* 385
 Cardiotheca, *Ehrenb.* 684
 Cardiospermum, *Traut.* 712
 Cardopateæ, 713
 Cardopatum, *Juss.* 713
 Carduineæ, 714
 Carduncellus, *Adans.* 714
 Carduus, *Gärtn.* 714
 Carelia, *Less.* 709
 Carex, *Mich.* 119
 Careya, *Roxb.* 755
 Cargillia, *R. Br.* 596
 Carica, *Linn.* 322
 Cariceæ, 119
 Cariceæ, *Turpin.* 321
 Caricteria, *Scop.* 372
 Cariniana, *Casar.* 740
 Carissa, *Linn.* 601
 Carissee, 601
 Carlina, *Tournef.* 713
 Carlineæ, 713
 Carlowitzia, *DC.* 714
 Carludovicia, *Ruiz et Pav.* 132
 Carmelia, *DC.* 778
 Carmelita, *Cl. Gay.* 714
 Carmichaelia, *Grev.* 22
 Carmichaelia, *R. Br. ?* 554
 Carminatia, *Moc.* 709
 Carmona, *Cav.* 653
 Caroli-Gmelina, *Fl. Wett.* 354
 Caroleina, *Linn. f.* 361
 Carolina, *Ner.* 582
 Caroselinum, *Grisch.* 778
 Carovaglia, *Endl.* 67
 Caroxylon, *Thunb.* 513
 Carpacanthus, *Kütz.* 10, 22
 Carpanthus, *Raf.* 73
 Carpesium, *Linn.* 713
 Carpha, *Banks et Sol.* 119
 Carphalea, *Juss.* 765
 Carphophorus, *Cass.* 709
 Carpholobus, *Schott.* 709
 Carpholoma, *Don.* 713
 Carpinus, *Linn.* 291
 Carpopheparidææ, *Kutzing.* 11
 Carpopheparis, *Kutzing.* 11
 Carpholus, *Schwein.* 58
 Carpopalymma, *Zip.* 795
 Carpopaulon, *Kutzing.* 11
 Carpoceras, *A. Rich.* 670
 Carpoceras, *Link.* 354
 Carpodemia, *Grev.* 10, 22
 Carpodetææ, *Fenzl.* 752
 Carpodetes, *Herb.* 158
 Carpodetus, *Forst.* 752
 Carpodinus, *R. Br.* 601
 Carpodontos, *Labill.* 406
 Carpopogon, *Kutzing.* 10
 Carpolobia, *Don.* 378
 Carpolobium, *Don.* 555
 Carapichea, *Salisb.* 158
 Carpomitra, *Kutzing.* 10
 Carponemum, *DC.* 355
 Carpophyllum, *Grev.* 10, 22
 Carpophyllum, *Suhr.* 25
 Carpophyte, *Oken.* 235
 Carpopodium, *DC.* 355
 Carpopogon, *Roeb.* 555
 Carpothales, *E. M.* 795
 Carpotroche, *Endl.* 328
 Carrichterum, *DC.* 355
 Carteritum, *A. Rich.* 181
 Cartesia, *Cass.* 709
 Carthameæ, 711
 Carthamus, *Tournef.* 714
 Cartonema, *R. Br.* 188
 Carum, *Koch.* 778
 Carumbulum, *Rebow.* 281
 Carusla, *Mart.* 390
 Carvifolia, *Pail.* 778
 Caryu, *Nutt.* 283
 Caryocarp, *Linn.* 399
 Caryocheila, *Spring.* 116
 Caryochloa, *Vein.* 115
 Caryodaphne, *Blum.* 527

- Caryolobis, *Gärtn.* 394
 Caryolopha, *Fisch. et Trltv.* 656
 Caryophyllaceæ, 495, 496°
 Caryophyllata, *Tournef.* 565
 Caryophyllæ, *Juss.* 496
 Caryophyllei, *L.* xxxi
 Caryophyllum, *Endl.* 498
 Caryophyllus, *Tournef.* 738
 Caryopteris, *Bing.* 664
 Caryota, *Linn.* 138
 Caryotaxus, *Zucc.* 231
 Casalea, *St. Hil.* 428
 Casarettoa, *Walpers.* 664
 Cascarilla, *Adans.* 281
 Casearia, *Jacq.* 331
 Casia, *Tournef.* 788
 Casimira, *Scop.* 385
 Casimiroa, *Lav. et Lex.* 795
 Casparea, *Kunth.* 556
 Cassandra, *Don.* 455
 Cassebeeria, *Kanlf.* 80
 Cassebeeria, *Dennst.* 733
 Casselia, *Dum.* 656
 Casselia, *Nees. et Mart.* 664
 Cassia, *Linn.* 555
 Cassida, *Tournef.* 661
 Cassidocarpus, *Presl.* 778
 Cassiere, 555
 Cassine, *Linn.* 598
 Cassinia, *R. Br.* 712
 Cassinæ, 712
 Cassiope, *Don.* 714
 Cassiphone, *Rehb.* 455
 Cassipourea, *Aubl.* 605
 Cassipourea, *Meisn.* 604
 Cassumunar, *Colla.* 167
 Cassupa, *H. B. K.* 765
 Cassuvieæ, *Brown.* 465
 Cassuvium, *Rumph.* 467
 Cassytha, *L.* 538
 Cassythaceæ, 529, 538°
 Cassythæ, *Nees.* 538
 Castalia, *Salisb.* 411
 Castalis, *DC.* 712
 Castanea, *Gärtn.* 291
 Castaneaceæ, *Link.* 332
 Castaneæ, *Adans.* 290
 Castanospermum, *A. Cunn. ?* 555
 Castela, *Turp.* 475
 Casteleæ, 475
 Castelia, *Cav.* 664
 Castiglioniæ, *R. et Pav.* 281
 Castilleja, *Linn. fil.* 635
 Castillon, *Cerv.* 271
 Castorea, *Plum.* 664
 Castraltia, *A. Rich.* 22
 Casuarina, *L.* 250
 Casuarinaceæ, 248, 249
 Casuarinæ, *Mirb.* 249
 Catabrosa, *Palis.* 116
 Catagyna, *Palis.* 119
 Catallum, *Hamill.* 727
 Catalobus, *C. A. Mey.* 354
 Catalpa, *Scop.* 677
 Catauanche, *Tournef.* 715
 Catapodium, *Link.* 116
 Catappa, *Gärtn.* 718
 Cataria, *Mönch.* 662
 Catascopium, *Brid.* 67
 Catasetidæ, *Lindl.* 182
 Catasetum, *L. C. Rich.* 182
 Cataterophora, *Steud.* 115
 Catenaria, *Rafn.* 22
 Catenella, *Grœ.* 10, 24
 Catepha, *Lechen.* 778
 Catesbæa, *Linn.* 765
 Catevala, *Medik.* 205
 Catha, *Forsk.* 588
 Cathanthes, *Richard.* 144
 Catharanthus, *G. Don.* 601
 Catharina, *Ehrenb.* 67
 Cathartocarpus, *Pers.* 555
 Cathartolinum, *Reichenb.* 485
 Catha, *Salisb.* 182
 Cathestecum, *Presl.* 115
 Cathetus, *Lour.* 282
 Catillaria, *Achar.* 50
 Catimhium, *Juss.* 167
 Catinga, *Aubl.* 755
 Catocoma, *Bth.* 378
 Catouia, *Pl. Pl.* 795
 Catonia, *Mönch.* 715
 Catonia, *Vahl.* 596
 Catophractes, *D. Don.* 677
 Catostemma, *Benth.* 397
 Cattleya, *Lindl.* 181
 Caturus, *Linn.* 281
 Catyona, *Cass.* 715
 Caucalinidæ, 779
 Caucalis, *Linn.* 779
 Caucanthus, *Forsk.* 390
 Caulacantbere, *Kützling.* 10
 Caulacanthus, *Kützling.* 10
 Caulerpa, *Lamx.* 10, 18
 Caulerpiidæ, 18
 Caulinia, *DC.* 145
 Caulinia, *Mönch.* 555
 Caulinia, *Willd.* 144
 Canlogaster, *Corda.* 43
 Cauloglossum, *Fries.* 42
 Caulophyllum, *Miehr.* 438
 Caulotretus, *Rich.* 556
 Causera, *Scop.* 543
 Caustis, *R. Br.* 119
 Cavalam, *Rumph.* 362
 Cavallium, *Sch. et Endl.* 362
 Cavanilla, *Fl. Fl.* 282
 Cavanilla, *Lam.* 596
 Cavanillea, *Borkh.* 67
 Cavanillea, *Thunb.* 795
 Cavanillesia, *Ruiz et Pav.* 361
 Cavendishia, *Lindl.* 758
 Cavininn, *Thouars.* 758
 Cayaponia, *Manso.* 315
 Cayusea, *St. Hil.* 356
 Cayratia, *Juss.* 440
 Ceanothus, *Linn.* 582
 Cebatha, *Forsk.* 309
 Cecalypthum, *Palis.* 67
 Cacidodaphne, *Nees.* 537
 Cecropia, *Linn.* 271
 Cedrela, *Linn.* 462
 Cedrela, *Lourei.* 738
 Cedrela, *Lour.* 752
 Cedrelaceæ, 456, 461°
 Cedrelads, 461
 Cedreæ, 462
 Cedreleæ, *Brown.* 461
 Cedreleæ, *DC.* 461
 Cedronella, *Mönch.* 662
 Cedrota, *Schreb.* 795
 Cedrus, *Endl.* 462
 Cedrus, *Mill.* 229, 462
 Ceiba, *M. et Z.* 361
 Celanthera, *Thouin.* 82
 Celastraceæ, 578, 586°
 Celastrinæ, *DC.* 381, 597
 Celastrinæ, *R. Brown.* 586
 Celastrus, *Kunth.* 588
 Cellulares, *DC.* 5
 Cellulares, *Foliaceæ, DC.* 54
 Celoseæ, 511
 Celosia, *Linn.* 511
 Celsa, *Fl. Pl.* 195
 Celsia, *Linn.* 684
 Celtæ, 580
 Celtidæ, *Rich.* 580
 Celtis, *Tournef.* 580
 Cenangium, *Fries.* 43
 Cenarrhenes, *Labill.* 533
 Cenchrus, *Linn.* 115
 Cenia, *Commers.* 712
 Cenocline, *Koch.* 712
 Cenococcum, *Fries.* 42
 Cenolophium, *Koch.* 778
 Cenolophon, *Blum.* 167
 Cenomyce, *Achar.* 50
 Cenostigma, *Palasnc.* 555
 Centaurea, *Less.* 714
 Centaurella, *L. C. Rich.* 614
 Centauridium, *Torreyn.* 710
 Centauriæ, 714
 Centaurium, *DC.* 714
 Centaurium, *Hall.* 714
 Centaurium, *Pers.* 614
 Centauropsis, *Boj.* 709
 Centella, *Linn.* 778
 Centipeda, *Less.* 710
 Centothea, *Dese.* 116
 Centrachena, *Schott.* 712
 Centradenia, *G. Don.* 733
 Centranthera, *R. Br.* 685
 Centranthera, *Scheidw.* 181
 Centranthus, *DC.* 698
 Centrapalus, *Cass.* 709
 Centratherum, *Cass.* 709
 Centrocera, *Kützling.* 10
 Centrocichlus, *Schæner.* 182
 Centrolema, *DC.* 711
 Centrolepidæ, *Desv.* 120
 Centrolepis, *Labill.* 120
 Centrobium, *Benth.* 555
 Centronia, *Blum.* 611
 Centronia, *Don.* 733
 ? Centronota, *DC.* 611
 Centropetalum, *Lindl.* 182
 Centrophorum, *Trin.* 116
 Centropodium, *Burch.* 504
 Centropogon, *Presl.* 693
 Centrosema, *DC.* 555
 Centrosia, *A. Rich.* 182
 Centrospermum, *Kunth.* 711
 Centrospermum, *Spr.* 712
 Centrostachys, *Wall.* 511
 Centrostemma, *Dec.* 627
 Centunculus, *Linn.* 646
 Cepa, *Tourn.* 205
 Cephaëis, *Swartz.* 764
 Cephalandra, *Schrad.* 315
 Cephalanthera, *L. C. Rich.* 182
 Cephalanthus, *Linn.* 764
 Cephalaria, *Schrad.* 700
 Cephaleros, *Kauze.* 44
 Cephalidium, *A. Rich.* 765
 Cephalina, *Thonn.* 765
 Cephalocarpus, *Nees.* 119
 Cephalocroton, *Cl.* 281
 Cephalogyne, *A. DC.* 648
 Cephalouenes, *Presl.* 80
 Cephalonoplus, *Neck.* 714
 Cephalopappus, *N. et M.* 714
 Cephalophilon, *Meisn.* 504
 Cephalophora, *Cav.* 712
 Cephaloscaenus, *Nees.* 119
 Cephaloseris, *Popp.* 714
 Cephalosporum, *Corda.* 43
 Cephalostigma, *A. DC.* 691
 Cephalotaxa, *Lindl.* 428
 Cephalotaxus, *Zucc.* 231
 Cephalotete, *R. Brown.* 428
 Cephalothecium, *Corda.* 43
 Cephalotrichum, *Fr.* 43
 Cephalotus, *R. Br.* 428
 Cephaloxis, *Palis.* 67
 Cephaloxys, *Desv.* 192
 Cephalozia, *Dum.* 60
 Ceradia, *Lindl.* 713
 Cerain, *Lour.* 181
 Ceramæ, 24
 Ceramia, *Don.* 455
 Ceramiaceæ, 9, 23°
 Ceraminæ, *Bory.* 8
 Ceraminum, *Adans.* 24
 Ceramium, *Blum.* 794
 Ceraminum, *Reinv.* 80
 Ceramophora, *Nees.* 537
 Ceramus, *Salisb.* 455
 Cerauthe, *Reichenb.* 656
 Ceranthera, *Ell.* 661
 Ceranthera, *Horn.* 167
 Ceranthera, *Palis.* 339
 Ceranthera, *Rafn.* 622
 Ceranthus, *Schreb.* 617
 Ceraseidos, *Zucc.* 558
 Cerasophora, *Neck.* 558

- Cerastites, Gray. 431
 Cerastium, L. 498
 Cerastus, Juss. 558
 Ceratandra, Lindl. 182
 Ceratanthera, Hornem. 167
 Ceratella, Hook. fil. 712
 Ceratiola, Michx. 285
 Ceratiosicyos, Nees. 322
 Ceratium, Ath. et Schue. 43
 Ceratium, Blum. 181
 Ceratohium, Lindl. 181
 Ceratocarpus, Buxb. 513
 Ceratocaryum, Nees. 121
 Ceratocaulis, Bernh. 621
 Ceratocephalus, Mönch. 428
 Ceratocephalus, Faill. 711
 Ceratochilus, Blum. 181
 Ceratochilus, Lodd. 182
 Ceratochloa, Palis. 116
 Ceratocladium, Corda. 43
 Ceratococcus, Meisn. 281
 Ceratodactylis, J. Smith. 80
 Ceratodon, Brid. 67
 Ceratogonon, Meisn. 504
 Ceratolana, DC. 711
 Ceratolepis, Cass. 711
 Ceratolobus, Blum. 139
 Ceratonia, Linn. 556
 Ceratopetalum, Smith. 572
 Ceratophora, Humb. 44
 Ceratophyllaceæ, 258, 263²
 Ceratophyllæ, Gray. 263
 Ceratophyllum, Linn. 264
 Ceratopodium, Corda. 43
 Ceratopsis, Lindl. 182
 Ceratopteris, Brongn. 80
 Ceratosanthus, Juss. 315
 Ceratoscheenus, Nees. 119
 Ceratospermum, Pers. 513
 Ceratospira, Schuecin. 42
 Ceratostachys, Blum. 718
 Ceratostema, Juss. 753
 Ceratostigma, Bunge. 641
 Ceratostylis, Blum. 181
 Ceratotheca, Endl. 670
 Ceraunia, Achar. 50
 Cerbera, Linn. 601
 Cerbera, Lourier. 695
 Cericidium, Tukirne. 555
 Cercis, Linn. 556
 Cercocarpus, H. B. K. 565
 Cercocoma, Wall. 691
 Cercodea, Lam. 723
 Cercodia, Murr. 723
 Cercodiaceæ, Juss. 722
 Cercostylis, Less. 712
 Cardana, Ruiz et Pav. 629
 Cardia, Moq. et Sess. 499
 Cardifolium, Haller. 773
 Cardisæ, 743
 Ceresia, Pers. 115
 Cersus, Hav. 743
 Cerinthe, Linn. 656
 Cerinthoides, Bérh. 656
 Ceriumyces, Ball. 41
 Cerionanthus, Schott. 799
 Ceriops, Arn. 727
 Cericens, Garbn. 765
 Cerinum, Lour. 765
 Cerocarpus, Hook. 733
 Ceropogia, Linn. 627
 Cerophyllum, Spach. 751
 Cerotylon, H. et B. 133
 Cernana, Forsk. 710
 Cernichia, Girtl. 711
 Cervantesia, Ruiz et Pav. 785
 Cervaria, Garbn. 778
 Cerria, Rodrig. 652
 Cerviana, Minuart. 498
 Cervicla, Del. 691
 Cervina, Gray. 22
 Cervisplina, Dill. 582
 Cesatia, Endl. 778
 Cestichia, Thourax. 181
 Cestraceæ, Ed. 618
 Cestrinæ, Mart. Consp. 618
 Cestrinus, Cass. 714
 Cestrum, Linn. 621
 Ceterach, Adans. 79
 Cetraria, Achar. 50
 Ceuthospora, Grev. 42
 Cevalia, Lagasc. 745
 Chahrea, DC. 575, 714
 Chadara, Forsk. 372
 Chadsia, Boj. ? 554
 Chænaactis, DC. 712
 Chænanthe, Lindl. 182
 Chænanthera, Rich. 733
 Chænesthes, Miers. 622
 Chænomeles, Lindl. 560
 Chænoptera, Rich. 733
 Chænostoma, Benth. 684
 Chæradodia, Herb. 158
 Chæradoplectron, Schr. 182
 Chærophyllum, Lagasc. 779
 Chærophyllum, Linn. 779
 Chætacanthus, Nees. 679
 Chætachlæna, Don. 714
 Chætæa, Jacq. 364
 Chætangiæ, Kützling. 10
 Chætangium, Kützling. 10
 Chætanthera, H. B. K. 714
 Chætanthera, Ruiz et Pav. 714
 Chætanthus, R. Br. 121
 Chætaria, Palis. 115
 Chætaphora, Brid. 67
 Chæthymenia, H. et Arn. 711
 Chætium, Nees. 115
 Chætobromus, Nees. 116
 Chætocalyx, DC. 554
 Chætocarpus, L. 591
 Chætochilus, Vahl. 684
 Chætocrater, Ruiz et Pav. 331
 Chætocyperus, Nees. 119
 Chætoderma, Kützling. 10
 Chætogastra, DC. 733
 Chætolepis, DC. 733
 Chætonium, Kunze. 43
 Chætopappa, DC. 710
 Chætopetalum, DC. 733
 Chætophora, Schrank. 10, 18
 Chætophora, Nutt. 710
 Chætophoreæ, Kützling. 10
 Chætophoroideæ, Grev. 8, 18
 Chætopsis, Grev. 43
 Chætopteris, Kützling. 10
 Chætospora, Ag. 24
 Chætospora, R. Br. 119
 Chætosporium, Corda. 44
 Chætostachys, Benth. 661
 Chætostoma, DC. 733
 Chætostoma, Naud. 733
 Chætostroma, Corda. 43
 Chætotropis, Kunth. 115
 Chæturus, Link. 115
 Chailletia, DC. 583
 Chailletiacæ, 576, 583*
 Chailletia, 583
 Chailletia, R. Brown. 583
 Chaiturus, Mönch. 662
 Chaixia, Lapeyr. 672
 Chakiatella, Cass. 711
 Chalarium, Poll. 711
 Chalca, Lour. 458
 Chama-buxus, Dill. 378
 Chama-cerasus, Tourn. 767
 Chama-cistus, Don. 455
 Chama-celstus, Gray. 455
 Chama-celma, Mönch. 662
 Chama-cilius, Mart. 79
 Chama-crista, E. Mey. 555
 Chama-cyparis, Spach. 229
 Chama-cyparissus, DC. 712
 Chama-daphne, Buxb. 455
 Chama-daphne, Mitch. 764
 Chama-dorea, Willd. 138
 Chama-doris, Mont. 22
 Chama-dryon, Ser. 665
 Chama-dryus, Tourn. 662
 Chama-estula, DC. 555
 Chamælauciaceæ, 716, 721*
 Chamælaucicæ, DC. 721
 Chamælaucium, Desf. 721
 Chamælaen, Tourn. 471
 Chamæledon, Link. 455
 Chamæleon, C. Bauh. 713
 Chamæleon, DC. 714
 Chamælium, Willd. 199
 Chamæmeles, Lindl. 560
 Chamæmelum, DC. 712
 Chamæmespilus, DC. 560
 Chamænana, Kützling. 9
 Chamænerion, Tourn. 725
 Chamæpeuce, Alpin. 714
 Chamæpeuce, Zucc. 229
 Chamæphyceæ, Kützling. 9
 Chamæpitys, Tourn. 662
 Chamæplium, Waltr. 354
 Chamæraphis, R. Br. 115
 Chamærea, Spreng. 182
 Chamærhodos, Bunge. 564
 Chamæriphe, Ponted. 139
 Chamærops, Linn. 130
 Chamæscadium, C. A. Mey. 778
 Chamæsideritis, Reichenb. 662
 Chamæsphacos, Schrenk. 662
 Chamæstephanum, W. 712
 Chamagrostis, Borkh. 115
 Chamarea, Eckl. et Z. 778
 Chamæranthemum, Nees. 680
 Chamira, Thunb. 355
 Chamissoa, H. B. K. 511
 Chamissoia, Link. 725
 Chamitiss, Soland. 778
 Chamorchis, Rich. 182
 Champaca, Rheed. 419
 Champia, Lamc. 11
 Champia, Agh. 25
 Champieæ, Kützling. 11
 Chantransia, Fries. 10, 22
 Chantransiæ, Kützling. 10
 Chaos, Bory. 18
 Chaodineæ, Bory. 8
 Chapelieria, A. Rich. 765
 Chapelieria, Nees. 119
 Chapmannia, T. et A. G. 554
 Chaptalia, Vent. 714
 Chaquepiria, Salisb. 765
 Chara, Linn. 10, 28
 Characeæ, 9, 26²
 Charachera, Forsk. 664
 Charas, 26
 Chardinia, Desf. 713
 Chareæ, Kützling. 26
 Chariantheæ, 733
 Charianthus, Don. 733
 Charieis, Cass. 710
 Charlowdia, Sweet. 205
 Charopsis, Kütz. 28
 Charospermum, Link. 18, 22
 Charpentiera, Gaud. 511
 Chartolepis, Cass. 714
 Chasalia, Comm. 764
 Chascanum, E. Mey. 662
 Chascelytrum, Desv. 116
 Chasmanthera, Hochst. 309
 Chasvanthium, Link. 116
 Chasme, Salisb. 533
 Chasnia, Schott. 677
 Chasmonæ, E. Mey. 553
 Chasmonæ, Presl. 662
 Chastenea, DC. 733
 Chasteloma, Bunge. 355
 Chastelulia, Neck. 715
 Chaulmoogra, Roxb. 324
 Chauvina, Bory. 18
 Chauvnesia, A. DC. 601
 Chavica, Miq. 518
 Chayota, Jacq. 315
 Cheilanthes, Swartz. 79
 Chellaria, Lib. 43
 Chellococca, Salisb. 553
 Chellocopsis, Moq. 679
 Cheliosa, H. 284
 Chellosandra, Grif. 672

- Cheilosecyphus, *Corda*. 60
 Cheilosporium, *Dec.* 25
 Cheilyetis, *Rafin.* 661
 Cheiranthera, *A. Cunn.* 441
 Cheiranthodendron, *Lavrad.* 361
 Cheiranthus, *L.* 354
 Cheiri, *Adans.* 354
 Cheirinia, *Link.* 354
 Cheirolophus, *DC.* 714
 Cheiropsis, *C. A. M.* 354
 Cheirostemon, *Humb.* 361
 Cheirostylis, *Blum.* 182
 Chelidonium, *Tournef.* 431
 Chelonanthera, *Blume.* 181
 Chelonanthus, *Gries.* 614
 Chelone, *Link.* 634
 Cheloneæ, *Don.* 681
 Cheloneæ, 684
 Chenolea, *Thunb.* 513
 Chenopodales, 243, 245°, 246, 505
 Chenopodeæ, *Vent.* 512
 Chenopodiaceæ, 505, 512°
 Chenopodium, *Link.* 513
 Cheopods, 512
 Cheobula, *Fl. Pl.* 795
 Chermela, *Rumph.* 282
 Cherina, *Cass.* 714
 Cherleria, *Hall.* 497
 Chesnaya, *Lindl.* 554
 Chevreaulia, *Cass.* 714
 Chiazospermum, *Bernh.* 436
 Chichona, *Prest.* 362
 Chickrassia, *Adr. Juss.* 462
 Chicioeua, *Commers.* 764
 Chilecium, *Raf.* 656
 Chiliadenus, *Cass.* 710
 Chilianthus, *Burch.* 685
 Chiliophyllum, *DC.* 711
 Chilitricheum, *Cass.* 709
 Chilmoria, *Hamilt.* 324
 Chilocarpus, *Blum.* 601
 Chilochoa, *Palis.* 115
 Chilodia, *R. Br.* 661
 Chilodia, *Rich.* 711
 Chiloglottis, *R. Br.* 182
 Chilogramma, *Blum.* 79
 Chilopsis, *D. Don.* 677
 Chilopteris, *Prest.* 79
 Chiloschista, *Lindl.* 181
 Chilosigma, *Hochst.* 684
 Chilurus, *R. Br.* 533
 Chimaphila, *Pursh.* 450
 Chimarrhis, *Jacq.* 765
 Chmaza, *R. Br.* 450
 Chinonanthus, *Lindl.* 541
 Chinophila, *Benth.* 684
 Chiococca, *P. Br.* 764
 Chiodecton, *Achar.* 50
 Chiogenes, *Salisb.* 455
 Chionachne, *R. Br.* 115
 Chionanthus, *Link.* 617
 Chione, *DC.* 764
 Chionolæna, *DC.* 710
 Chionoptera, *DC.* 714
 Chionostemma, *DC.* 713
 Chionotria, *Jack.* 458
 Chionophe, *Thienem.* 9, 43
 Chirita, *Hamilt.* 672
 Chironia, *Link.* 614
 Chiroptetalum, *A. Juss.* 282
 Chisoeheton, *Bl.* 464
 Chitonina, *Don.* 733
 Chitonina, *Moc. et Sess.* 479
 Chlenaceæ, 484, 486°
 Chlamidia, *Banks.* 205
 Chlamidium, *Corda.* 58
 Chlamydanthus, *Meyer.* 531
 Chlamyspermum, *Less.* 712
 Chlamysporum, *Salisb.* 205
 Chlenads, 486
 Chlenobolus, *Cass.* 710
 Chlidanthus, *Lindl.* 158
 Chloanthes, *R. Br.* 664
 Chloerum, *Willd.* 187
 Chloidia, *Lindl.* 182
 Chloopsis, *Blum.* 205
 Chlora, *Link.* 614
 Chloræa, *Lindl.* 182
 Chloranthaceæ, 514, 519°
 Chloranthææ, *R. Brown.* 519
 Chloranthus, 519
 Chloranthus, *Swartz.* 520
 Chloraster, *Haw.* 158
 Chloreæ, 115
 Chloris, *Swartz.* 115
 Chloroecum, *Grev.* 18
 Chloroedon, *Benth.* 455
 Chlorogalum, *Lindl.* 205
 Chloromyron, *Pers.* 402
 Chloroniton, *Gaill.* 18
 Chlorophytum, *Ker.* 205
 Chlorophytum, *Pohl.* 764
 Chlorosa, *Lindl.* 182
 Chlorosiphon, *Kützling.* 10
 Chlorotylium, *Kützling.* 10
 Chloroxylon, *DC.* 462
 Chloryllis, *E. Mey.?* 555
 Chnaumatophora, *Kützling.* 796
 Chnoophora, *Kaulf.* 80
 Choaspis, *Gray.* 18
 Choirmyces, *Vittad.* 43
 Choisyia, *Kunth.* 471
 Chomelia, *Fl. Fl.* 598
 Chomelia, *Jacq.* 764
 Chomelia, *Link.* 765
 Chomicarpon, *Corda.* 58
 Chona, *Don.* 455
 Chondodendrum, *R. et P.* 369
 Chondracanthus, *Kützling.* 10
 Chondraehne, *R. Br.* 119
 Chondria, *Ag.* 11
 Chondrilla, *Tournef.* 715
 Chondrocarpus, *Nutt.* 778
 Chondrodietyon, *Kützling.* 10
 Chondrolæna, *Nees.* 115
 Chondrolomia, *Nees.* 119
 Chondropetalum, *Rotth.* 121
 Chondrophyllum, *B.* 614
 Chondros, *Kützling.* 10
 Chondrosea, *Haw.* 568
 Chondrosium, *Desf.* 116
 Choudrospermum, *Wall.* 617
 Chondrus, *Grev.* 25
 Chonemorpha, *G. Don.* 601
 Chonta, *Molin.* 80
 Chorda, *Stack.* 10, 22
 Chordaria, *Ag.* 22
 Chordaria, *Link.* 22
 Chordarida, 22
 Chordeæ, *Kützling.* 10
 Chordostylum, *Tode.* 43
 Choretis, *Herb.* 158
 Choretium, *R. Br.* 788
 Chorilæna, *Endl.* 471
 Choriophyllum, *Gries.* 614
 Choripetalum, *Alph. DC.* 618
 Chorisia, *H. B. K.* 361
 Chorisia, *DC.* 715
 Chorisma, *Don.* 715
 Chorisma, *Sweet.* 494
 Chorispermum, *R. Br.* 354
 Chorispore, *DC.* 354
 Choristachys, *Endl.* 531
 Choristea, *DC.* 713
 Choristes, *Benth.* 765
 Choristocarpeæ, *Kützling.* 11
 Choristosporeæ, *Decaisn.* 23
 Choristylis, *Havv.* 752
 Chorizandra, *R. Br.* 119
 Chorizanthæ, *R. Br.* 504
 Chorozeina, *Labill.* 553
 Choteckia, *Op. et C.* 661
 Choupalon, *Adans.* 758
 Cresta, *Arab.* 709
 Christammia, *Prest.* 328
 Christiana, *DC.* 372
 Christima, *Rafin.* 765
 Christolea, *Camb.* 354
 Christophoriana, *Tournef.* 428
 Christya, *Ward.* 601
 Christya, *Monch.* 554
 Chroëma, *Bernh.* 710
 Chromelosporium, *Corda.* 44
 Chromochæta, *DC.* 710
 Chromochiton, *Cass.* 712
 Chromolæna, *DC.* 709
 Chromolepis, *Beuth.* 711
 Chromosporium, *Corda.* 44
 Chromostegia, *Beuth.* 455
 Chronobium, *DC.* 346
 Chronopappus, *DC.* 709
 Chroolepus, *Ag.* 10
 Chrostroma, *Corda.* 44
 Chrosperma, *Raf.* 199
 Chrysa, *Rafin.* 428
 Chrysaetinium, *Kunth.* 709
 Chrysanthellina, *Cass.* 711
 Chrysanthellum, *Rich.* 711
 Chrysanthemææ, 712
 Chrysanthemum, *DC.* 712
 Chryseis, *Cass.* 714
 Chryseis, *Talbot.* 431
 Chryseis, *Less.* 714
 Chrysiphiala, *Ker.* 158
 Chrysis, *Reacalm.* 711
 Chrysitrix, *Link.* 119
 Chrysitrieheæ, 119
 Chrysobaetron, *Hook. f.* 205
 Chrysobalanaceæ, 539, 542*
 Chrysobalanææ, *R. Brown.* 543
 Chrysobalanus, 542
 Chrysobalanus, *Link.* 543
 Chrysobaphus, *Wall.* 183
 Chrysobotrya, *Spach.* 751
 Chrysoealyx, *Güille.* 554
 Chrysoeryne, *Endl.* 712
 Chrysocephalum, *Walp.* 713
 Chrysochlamys, *Pöpp.* 402
 Chrysocoma, *Cass.* 710
 Chrysocephalus, *Nutt.* 428
 Chrysochlamys, *Steez.* 713
 Chrysochlamys, *Blum.* 181
 Chrysochlamys, *Link.* 711
 Chrysoliga, *Hoffm.* 575
 Chrysonia, *Nutt.* 710
 Chrysonallium, *Th.* 664
 Chrysomelea, *Tausch.* 711
 Chrysophania, *Kunth.* 711
 Chrysophyllum, *Link.* 591
 Chrysopia, *Noron.* 402
 Chrysopogon, *Trin.* 116
 Chrysosideræ, 710
 Chrysopsis, *Nutt.* 710
 Chrysorhiza, *DC.* 764
 Chrysorhoë, *Lindl.* 721
 Chrysoseias, *E. Mey.* 555
 Chrysosplenium, *Tournef.* 568
 Chrysosporium, *Corda.* 44
 Chrysostachys, *Pohl.* 718
 Chrysostemma, *Less.* 711
 Chrysostoma, *Lilja.* 745
 Chrysostammus, *Nutt.* 710
 Chrysurus, *Palis.* 116
 Chrysumenia, *J. Agh.* 25
 Chthamalia, *Dec.* 626
 Chthonia, *Cass.* 709
 Chthonoblastus, *Kützling.* 9
 Chthonocephalus, *Steez.* 712
 Chukrasia, *A. J.* 462
 Chuneon, *Pav.* 718
 Chuquiranga, *Juss.* 714
 Chusquea, *Kunth.* 116
 Chyloëndia, *Grev.* 25
 Chymocarpus, *Don.* 367
 Chysis, *Lindl.* 181
 Chytraculia, *P. Br.* 738
 Chytralia, *Adans.* 738
 Cibothium, *Kaulf.* 80
 Cicca, *Link.* 282
 Cieëndia, *Adans.* 614
 Cicer, *Link.* 554
 Cicerella, *Monch.* 554
 Cicloraceæ, *Juss.* 702, 703, 715
 Cichorium, *Tournef.* 715
 Cielanthus, *Endl.* 791

Aconium, Sweet. 494
Acuta, Linn. 788
Acuta, Tournef. 779
Acuta, DC. 334
Acutifolia, Willd. 370
Acutifolia, Cav. 370
Acutifolia, Hanc. 568
Acutifolia, Stackh. 25
Acutifolia, 50
Acutifolia, Corda. 42
Acutifolia, Corda. 43
Acutifolia, Linn. 428
Acutifolia, Borkh. 614
Acutifolia, Linn. 765
Acutifolia, 756, 761*
Acutifolia, 761
Acutifolia, 746, 756*
Acutifolia, 765
Acutifolia, Desv. 79
Acutifolia, Dumort. 60
Acutifolia, Palis. 67
Acutifolia, Less. 713
Acutifolia, Linn. 115
Acutifolia, 442
Acutifolia, Burm. 537
Acutifolia, Neck. 281
Acutifolia, Kuhl. et H. 182
Acutifolia, Griseb. 627
Acutifolia, Bl. 464
Acutifolia, Aubl. 593
Acutifolia, Aubl. 161
Acutifolia, Tournef. 725
Acutifolia, 725
Acutifolia, Lindl. 724
Acutifolia, Fée. 50
Acutifolia, Nees. 41
Acutifolia, Lindl. 182
Acutifolia, Mart. 42
Acutifolia, Lindl. 181
Acutifolia, DC. 714
Acutifolia, Less. 714
Acutifolia, Tournef. 714
Acutifolia, Lemaire. 713
Acutifolia, 309
Acutifolia, Pipp. 395
Acutifolia, Linn. 449
Acutifolia, 348, 349
Acutifolia, 244, 246, 348
Acutifolia, Link. 611
Acutifolia, Spach. 501
Acutifolia, Blume. 182
Acutifolia, Juss. 349
Acutifolia, DC. 349
Acutifolia, Kunth. 439
Acutifolia, Vent. 349
Acutifolia, Coley. 424
Acutifolia, Tournef. 350
Acutifolia, 91
Acutifolia, Bung. 354
Acutifolia, Linn. 664
Acutifolia, AC. 441
Acutifolia, Don. 598
Acutifolia, 457
Acutifolia, Ruiz et Pav. 299
Acutifolia, Neck. 315
Acutifolia, L. 458
Acutifolia, Lour. 555
Acutifolia, Bernh. 229
Acutifolia, Willd. 475
Acutifolia, Cass. 712
Acutifolia, 119
Acutifolia, Havn. 706
Acutifolia, P. Br. 119
Acutifolia, Lindl. 182
Acutifolia, Nees. 43
Acutifolia, Nees. 60
Acutifolia, Gardn. 122
Acutifolia, DC. 713
Acutifolia, Lour. 282
Acutifolia, P. 41
Acutifolia, Brid. 67
Acutifolia, Zippel. 2-1
Acutifolia, Achar. 59
Acutifolia, Hoffm. 59

Cladophora, 10
Cladoseris, Less. 714
Cladosiphon, Kütz. 10
Cladospirium, Link. 43
Cladostachys, Don. 511
Cladostephus, Agh. 10, 22
Cladostyles, H. B. K. 631
Cladotela, Hook. f. 796
Cladothamnus, Bunge. 450
Cladotrichum, Fog. 555
Cladotrichium, Corda. 43
Cladrastis, Raf. 555
Clairvillea, DC. 709
Clandestina, Tournef. 611
Clandestina, DC. 354
Claoxydon, A. J. 281
Clappertonia, Meisn. 372
Clarionea, DC. 715
Clarionella, DC. 715
Clarisia, Ruiz et Pav. 256
Clarkia, Pursh. 725
Clasterisporia, Schw. 42
Clathrus, Mich. 42
Claudia, Lamx. 11, 25
Claudiee, Kütz. 11
Clausea, Burm. 458
Clausia, Trotk. 354
Clavaleta, Bory. 22
Clavaria, L. 42
Clavati, 42
Clavena, DC. 714
Clavigera, DC. 709
Clavija, Ruiz et Pav. 648
Clavulium, Desv. 554
Claytonia, Linn. 501
Cleanthe, Salisb. 161
Cleanthes, Don. 714
Cleidion, Blume. 281
Cleisostoma, Blume. 67, 181
Cleistis, L. C. Rich. 182
Cleitria, Schrad. 713
Clematee, 427
Clematis, Linn. 427
Clematitidis, Endl. 794
Clematopsis, Boj. 427
Clementea, Cav. 82, 555
Cleobulia, Mart. 555
Cleodora, Kl. 282
Cleome, DC. 358
Cleomee, 358
Cleomella, DC. 358
Cleonia, Linn. 661
Cleophora, Garbn. 139
Clercia, Fl. Fl. 585
Clermontia, Gaud. 693
Clerodendron, Linn. 664
Clethra, Linn. 455
Clethria, P. Brown. 42
Clethropsis, Spach. 252
Cleyera, Thunb. 397
Cleyria, Neck. 556
Clianthus, Soland. 554
Cliadum, Linn. 711
Clidemia, Don. 733
Cliffortia, Linn. 562
Cliffortiaceae, Mart. 561, 563
Cliftonia, Sol. 445
Climacium, Web. et M. 67
Climanthus, Herb. 158
Clinclinkia, Feußl. 378
Clinopodium, Linn. 661
Clinostylis, Hochst. 205
Clintoniae, 693
Clintonia, Dougl. 693
Clintonia, Hoffm. 295
Cliococca, Bab. 485
Clio-tonum, Fries. 43, 59
Cliosporium, Fries. 41
Clistax, Mart. 690
Clitris, Fries. 43
Clitropilus, Fries. 41
Cliboria, Linn. 555
Clitoreae, 555
Clivia, Lindl. 158
Clomema, Palis. 115

Clouenocoma, Cass. 711
Clompanus, Rumph. 362
Clonostachys, Corda. 43
Closasclima, Korth. 397
?Closiospermum, Neck. 715
Closterandra, Belong. 431
Closterium, Nützsch. 9, 13
Clovesworts, 496
Clovesia, Lindl. 182
Clubmosses, 69
Clugnia, Comm. 424
Clusia, Linn. 402
Clusiaceae, 392, 405*
Clusiaceae, 402
Clusia, Boerh. 282
Clusia, Atl. 282
Cluzella, Bory. 13
Clymenum, Tournef. 554
Clynghymenia, A. Rich. 182
Clypea, Blume. 309
Clypeola, Linn. 354
Clytocybe, Fr. 41
Cnemidaria, Presl. 80
Cnemidia, Lindl. 182
Cnemidostachys, Adr. Juss. 281
Cneoreae, Webb. 469, 471
Cncorum, Linn. 471
Cnesmosa, Bl. 281
Cnestis, Juss. 468
Cnicus, Schreb. 714
Cnicus, Vaill. 714
Cnidium, Cass. 778
Cnidioscolus, Pohl. 281
Coa, Plum. 585
Coadunatae, L. xxxiii
Coapia, Piso. 406
Cobaea, Cav. 636
Clethra, Neck. 767
Cohreaceae, Don. 635
Cobamba, Blanco. 795
Coburgia, Herb. 158
Coccinia, W. et A. 315
Coccolobus, Fr. 44
Coccolobus, Klotzsch. 518
Coccolarydæ, 25
Coccolariidæ, 18
Coccolochloris, Spreng. 9, 18
Coccolypselum, Swartz. 765
Coccodea, Pal. 18
Coccoloba, Jacq. 504
Cocconema, Ehr. 13
Coccolophora, Greu. 10, 22
Coccolophore, Hor. xlix
Coccolophyium, Link. 18
Coccosperma, Kl. 455
Coccosporium, Corda. 44
Coccotrichium, Corda. 44
Coccotylus, Kütz. 10
Coccularia, Corda. 44
Cocculinia, Dumort. xxxvii
Cocculus, DC. 309
Coccygontha, Rehb. 498
Cochlearia, Linn. 354
Cochlia, Blum. 181
Cochlidiospermum, R. 685
Cochlidium, Kaulf. 79
Cochliospermum, Lag. 513
Cochliospermum, Kunth. 350
Cochraena, Miers. 661
Cococua, 139
Cocos, Linn. 139
Codaria, Linn. 765
Codarium, Soland. 556
Coddingtonia, Bowd. 795
Codia, Forst. 572
Codium, Rumph. 281
Codium, Kütz. 10
Codium, Stackh. 10, 22
Codon, Rozen. 639
Codonanthæ, Mart. 672
Codonanthemum, Klotzsch. 43
Codonanthus, C. Don. 604
Codonia, Don. 59
Codonia, Spreng. 691
Codonidae, 59

- Codonoblepharum, *Schw.* 67
 Codonocalyx, *Miers.* 764
 Codonocarpus, *A. Cunn.* 282
 Codonocephalum, *Fenzl.* 710
 Codonophora, *Lindl.* 672
 Codonoprasum, *Rehb.* 205
 Codonopsis, *Wall.* 691
 Codonorchis, *Lindl.* 182
 Codonostigma, *Kl.* 455
 Codoriocalyx, *Hassk.* 554
 Codylis, *Raf.* 621
 Cœlachine, *R. Br.* 116
 Cœlantha, *Fröhl.* 614
 Cœlanthum, *E. Mey.* 498
 Cœlanthus, *Willd.* 205
 Cœlebogyne, *J. Smith.* 281
 Cœlestinia, *Cass.* 709
 Cœlia, *Lindl.* 182
 Cœlidium, *Vogel.* 553
 Cœloblastem, *Kützng.* 10
 Cœloculou, *Link.* 50
 Cœlocline, *A. DC.* 422
 Cœloglossum, *Lindl.* 182
 Cœlogyne, *Lindl.* 181
 Cœlogynidæ, 181
 Cœlopleurum, *Ledeb.* 779
 Cœlopyrum, *Jack.* 795
 Cœlorhachis, *Bronqn.* 116
 Cœlospermum, *Blum.* 765
 Cœlostyleæ, *Endl.* 602
 Cœlostylis, *Torr. et A. Gray.* 604
 Cœlotheca, *Alph. DC.* 691
 Cœnogonium, *Ehrenb.* 50
 Coffea, *Linn.* 764
 Coffea, 764
 Cogswellia, *Schult.* 778
 Coilantha, *Borkh.* 614
 Coilophyllum, *Mor.* 429
 Coilostigma, *Benth.* 455
 Coilostigma, *Endl.* 533
 Coinogyne, *Less.* 712
 Coix, *Linn.* 115
 Cola, *Bauh.* 362
 Colax, *Lindl.* 182
 Colbertia, *Satisb.* 424
 Colchicaceæ, *Dec.* 198
 Colchicæ, *Nees.* 199
 Colchicum, *Tournef.* 199
 Coldenia, *Linn.* 653
 Colea, *Boj.* 674
 Coleanthus, *Scid.* 115
 Colebrookia, *Smith.* 167, 661
 Coleochaete, *Breb.* 18
 Coleonema, *Barll.* 471
 Coleophora, *Miers.* 531
 Coleophyllum, *Klotzsch.* 158
 Coleosanthus, *Cass.* 709
 Coleostachys, *A. de J.* 390
 Coleostephus, *Cass.* 712
 Coleostylis, *Sonder.* 696
 Coleus, *Cav. et Sech.* 42
 Coleus, *Lourcivo.* 661
 Colicodendron, *Mart.* 358
 Collabium, *Blum.* 181
 Collacystis, *Kunze.* 44
 Collada, *Cav.* 116
 Colladon, *Pers.* 115
 Colladonia, *DC.* 779
 Colladonia, *Spreng.* 764
 Collea, *DC.* 555
 Collea, *Spreng.* 711
 Collania, *Schult. fil.* 158
 Collarium, *Link.* 43
 Collema, *Ach.* 49
 Collema, *Andrs.* 695
 Collemaceæ, 50
 Colletia, *Comm.* 582
 Colletia, *Flor. Flum.* 189
 Colletotrichum, *Corda.*
 Colliguaja, *Mol.* 281
 Collinaria, *Ehrh.* 116
 Collingmonia, *Endl.* 507
 Collinsia, *Nutt.* 684
 Collinsonia, *Linn.* 661
 Collomia, *Nutt.* 636
 Collophora, *Mart.* 601
 Collybia, *Fries.* 41
 Colmeiron, *Reuter.* 282
 Colobachne, *Palis.* 115
 Colobandra, *Barll.* 661
 Colobanthus, *Barll.* 498
 Colobanthus, *Trin.* 116
 Colobium, *Roth.* 715
 Colocasia, *Ray.* 129
 Colocynthis, *Tourn.* 315
 Cologauia, *H. B. K.* 555
 Colona, *Cav.* 372
 Colonnea, *Buch.* 711
 Colophonia, *Comm.* 460
 Colopias, *E. Mey.* 684
 Colpodium, *Trin.* 115
 Colpoon, *Berg.* 788
 Colposoria, *Prest.* 80
 Colquhounia, *Wallich.* 662
 Colsmannia, *Lehm.* 656
 Columba, *Comm.* 309
 Columbaria, *Thuill.* 700
 Columbia, *Pers.* 372
 Columbrina, *L. C. Rich.* 582
 Columella, *Comm.* 370
 Columella, *Fl. Fl.* 507
 Columella, *Jaeg.* 713
 Columella, *Lour.* 440
 Columella, *Ruiz et Pav.* 760
 Columelliaceæ, 756, 759*
 Columellids, 759
 Columellieæ, *Don.* 750
 Columnea, *Phen.* 672
 Columiferæ, *L. xxxiii*
 Coluria, *R. Br.* 565
 Colutea, *Linn.* 554
 Coluteocarpus, *Boiss.* 351
 Colvillea, *Boj.?* 555
 Colymbea, *Satisb.* 229
 Colyris, *Vahl.* 627
 Colythrum, *Schott.* 471
 Comacephalus, *Klotzsch.* 455
 Comandra, *Nutt.* 788
 Comaropsis, *L. C. Rich.* 565
 Comarostaphylis, *Zucc.* 455
 Comarum, *Linn.* 564
 Combretaceæ, 716, 717
 Combretæ, 718
 Combretum, *Löfl.* 716
 Comesperma, *Labill.* 378
 Cometes, *Burn.* 499
 Commelyna, *Dill.* 188
 Commelynaceæ, 185, 188*
 Commelynetæ, *R. Brown.* 188
 Commersona, *Sonn.* 755
 Commersonia, *Comm.* 588
 Commersonia, *Forst.* 364
 Commia, *Lour.* 281
 Commianthus, *Benth.* 765
 Commidendron, *Burch.* 710
 Commulobium, *Benth.* 555
 Commiphora, *Jacq.* 460
 Comocladia, *P. Br.* 467
 Comosæ, *L. xxxiii*
 Comostemum, *Nees.* 119
 Compartmentia, *P. et E.* 182
 Compositæ, *Adans.* 702
 Compositæ, *L. xxxiii*
 Composites, 702
 Compsanthus, *Spreng.* 199
 Comptonia, *Banks.* 256
 Conaceæ, *Lindl.* 226
 Conandron, *Sieb. et Zucc.* 672
 Conanthera, *Ruiz et P.* 205
 Conantheræ, *Don.* 205
 Conceveiba, *Aubl.* 281
 Conceveibum, *Rich.* 281
 Conchidium, *Griff.* 181
 Conchium, *Smith.* 534
 Conchocarpus, *Mik.* 471
 Conchochilus, *Hsskl.* 181
 Conchophyllum, *Blum.* 627
 Condalia, *Cav.* 582*
 Condalia, *Ruiz et Pav.* 765
 Condaminea, *DC.* 765
 Condrachyrum, *Nees.* 116
 Condrosiphææ, *Kützng.* 11
 Condrosiphon, *Kützng.* 11
 Condrothamnion, 11
 Condylocarpon, *Desf.* 601
 Condylocarpus, *Hoffm.* 778
 Condylocarpus, *Satisb.* 229
 Condylocarya, *Bess.* 355
 Conferva, *Fries.* 18
 Confervaceæ, 10, 14*
 Confervæ, *Bory.* 8
 Confervas, 14
 Congea, *Roxb.* 664
 Coniandra, *Schrad.* 315
 Coniangium, *Fries.* 50
 Coniferæ, *Juss.* 226
 Coniferæ, *L. xxxiii*
 Conifers, 226
 Coniocalyx, *DC.* 50
 Coniocybe, *Achar.* 50
 Coniogeton, *Bhwa.* 467
 Coniologia, *Flörk.* 50
 Coniomorpha, *Oth.* 498
 Coniomyces, *Fr.* 41, 42
 Conioselinium, *Fisch.* 778
 Coniothalamæ, 50
 Coniothecium, *Corda.* 42
 Coniothecium, *DC.* 711
 Coniothyrium, *Corda.* 42
 Conioselinium, *Lk.* 44
 Conium, *Linn.* 779
 Conjugata, *Lk.* 118
 Connaraceæ, 456, 468
 Connarads, 468
 Conocarpus, *Linn.* 468
 Conocoba, *Aubl.* 685
 Conocarpus, *Adans.* 533
 Conocarpus, *Gärtn.* 718
 Conocephalus, *Blum.* 271
 Conocephalus, *Vaill.* 58
 Conoclinium, *DC.* 709
 Conogyne, *R. Br.* 533
 Conohoria, *Kruth.* 339
 Conohoria, *Aubl.* 339
 Cononitra, *Fenzl.* 626
 Cononorphus, *Alph. DC.* 601, 648
 Conopholis, *Wallr.* 611
 Conoplea, *Pers.* 42
 Conopodium, *DC.* 778
 Conosiphon, *Pöpp.* 705
 Conospermideæ, 533
 Conospermum, *Smith.* 533
 Conostegia, *Don.* 733
 Conostephium, *Benth.* 449
 Conostomum, *Suartz.* 67
 Conostyle, 153
 Conostylis, *R. Br.* 153
 Conostylis, *Pohl.* 648
 Conothamnus, *Lindl.* 737
 Conotrichia, *A. Rich.* 765
 Conradia, *Mart.* 672
 Conradia, *Rafin.* 199
 Consua, *Adans.* 355
 Consiligo, *DC.* 428
 Consolida, *DC.* 428
 Constantina, *Postels.* 10, 25
 Consuegria, *Cud.* 795
 Contarena, *Adans.* 709
 Contarinia, *Endl. et Dies.* 796
 Contortæ, *Linn.* 599
 Contorti, *L. xxxiii*
 Conuleum, *L. C. Rich.* 257
 Convallaria, *Desf.* 205
 Convallariaceæ, *Link.* 200
 Convolvulaceæ, 615, 630, 633
 Convolvuleæ, 631
 Convolvuli, *Juss.* 630
 Convolvuloides, *Mönch.* 631
 Convolvulus, *Linn.* 631
 Conyza, *Less.* 710
 Conyza, 710
 Cookia, *Gmel.* 531
 Cookia, *Sonner.* 458
 Cooperia, *Herb.* 158
 Copanera, *Linn.* 556

- Coperucina, *Marl.* 139
 Copisua, *E. Mey.* 555
 Coprinus, *Pers.* 41
 Coprosma, *Forst.* 764
 Coproxylou, *Tuss.* 463
 Coptis, *Salisb.* 428
 Coquehertia, *Brongn.* 533
 Cora, *Fr.* 41
 Corallina, *Tourn.* 10, 25
 Coralliaceæ, 10, 25
 Corallocephalus, 10
 Corallo dendron, *Jungb.* 43
 Corallo dendron, *Tour.* 555
 Corallo dendron, *Ktz.* 19
 Coralloides, *Haffn.* 50
 Corallophyllum, *H. B. K.* 452, 795
 Corallo rhiza, *Hall.* 181
 Corallo rhizide, 181
 Corbi chonia, *Scopol.* 526
 Corbularia, *Hanc.* 158
 Corchoropsis, *Sieb. et Zuc.* 372
 Corchorus, *Linn.* 372
 Cordæa, *Nees.* 59
 Cordæa, *Spr.* 554
 Cordæa, *Phum.* 629
 Cordiaceæ, 615, 628*
 Cordiere, 628
 Cordiera, *A. Rich.* 765
 Cordierites, *Mout.* 43
 Cordleafs, 121
 Cordyla, *Blum.* 182
 Cordyla, *Lour.* 556
 Cordylestylis, *Falc.* 182
 Cordylina, *Comm.* 205
 Cordylocarpus, *Desf.* 354
 Cordylogyne, *E. Mey.* 626
 Corema, *Don.* 285
 Coremium, *Corda.* 43
 Coreocarpus, *Benth.* 711
 Coreopsidæ, 711
 Coreopsis, *Linn.* 711
 Coreosina, *Spach.* 751
 Coreta, *P. Brown.* 372
 Corethrogyne, *DC.* 709
 Corethroplis, *Corda.* 43
 Corethroplis, *DC.* 714
 Corethrostylis, *E.* 364
 Corethrum, *Vahl.* 115
 Coriandridæ, 719
 Corianderum, *Linn.* 779
 Coriariæ, *DC.* 475
 Coridia, *Spach.* 406
 Coridocheia, *Nees.* 115
 Corindum, *Tournef.* 375
 Coriaria, *Heist.* 354
 Corion, *Link.* 779
 Coria, *Tournef.* 646
 Coriander, *Wall.* 672
 Coriaperma, *Mog.* 512
 Coriapermum, *A. Juss.* 513
 Cornigonus, *Rafin.* 765
 Cornonema, *Koiss.* 582
 Cornaceæ, 772, 782*
 Cornachinnia, *Sav.* 664
 Cornales, 246
 Cornea, *Stackh.* 25
 Cornea, *Kunth.* 782
 Cornelia, *Arn.* 575
 Cornela, 782
 Cornicina, *Boiss.* 554
 Corniclaria, *Hoffm.* 50
 Cornidia, *Reiz et P.* 570
 Cornuopisæ, *Linn.* 115
 Cornulaca, *Del.* 513
 Cornua, *Tournef.* 783
 Cornutia, *Phum.* 604
 Corokia, *A. Cunn.* 783
 Corona Solis, *Tourn.* 711
 Coronaria, *L.* 498
 Coronarie, *Agardh.* 269
 Coronarie, *L.* xxxiii
 Coronilla, *Linn.* 534
 Coronilleæ, 554
 Coronopifolia, *Stackh.* 25
 Coronopus, *Hall.* DC. 355
 Coronopus, *Tourn.* 618
 Corradoria, *Marl.* 25
 Corradorus, *Gray.* 13
 Correa, *Smith.* 471
 Correia, *Velloz.* 475
 Corrigiola, *Linn.* 499
 Corsiua, *Raddi.* 57
 Cortesia, *Cav.* 653
 Cortia, *DC.* 778
 Corticalia, *Dumort.* xxxvii
 Corticiuum, *Fr.* 41
 Cortiuarium, *Fr.* 41
 Cortusa, *Linn.* 645
 Cortusales, 245, 246, 637*, 668
 Cortusina, *Eckl.* 494
 Corvisartia, *DC.* 710
 Coryanthes, *Hook.* 182
 Coryanthus, *Nutt.* 661
 Coryhas, *Salisb.* 182
 Corycarpus, *Zea.* 116
 Corycida, 182
 Corycium, *Swartz.* 182
 Corydalis, *DC.* 436
 Corydalis, *L.* xxxiii
 Corydandra, *Rehb.* 181
 Corylaceæ, 289, 290*, 772
 Corylopsis, *Sieb. et Z.* 784
 Corylus, *L.* 291
 Corymbifera, *Juss.* 702
 Corymbis, *Thouars.* 183
 Corymbium, *Linn.* 709
 Corymbocephalon, *Meisner.* 504
 Corynandra, *Schrad.* 358
 Coryne, *Nees.* 42
 Corynelia, *Fr.* 43
 Corynella, *DC.* 554
 Corynephora, *Ag.* 10, 22
 Corynephorus, *Palis.* 116
 Coryneum, *Kze.* 42
 Corynitis, *Spr.* 554
 Corynocarpus, *Forst.* 648
 Corynophlea, *Kützling.* 10
 Corynostylis, *Marl. et Z.* 339
 Corynotrichum, *DC.* 714
 Corypha, *Linn.* 139
 Coryphea, *Lindl.* 182
 Corypheæ, 139
 Corysantes, *R. Br.* 182
 Corytbacanthus, *Nees.* 679
 Corytholohium, *Benth.* 555
 Coscinium, *Colubr.* 309
 Coscinodon, *Spreng.* 67
 Cosmarium, *Menegh.* 13
 Cosmanthus, *Nolt.* 639
 Cosmea, *Willd.* 711
 Cosmella, *B. Br.* 449
 Cosmia, *Dombey.* 501
 Cosmibuena, *Ruiz et P.* 543, 765
 Cosmidium, *Gray.* 711
 Cosmos, *Cav.* 711
 Cosmostigma, *Wight.* 627
 Cossignia, *Cambes.* 385
 Costa, *Fl. Fl.* 471
 Costaria, *Grev.* 10, 22
 Costus, *Linn.* 167
 Cotinus, *Tourn.* 467
 Cotoneaster, *Med.* 569
 Cottea, *Kunth.* 115
 Cottendorfia, *Schult. fil.* 148
 Cotula, *Gärtn.* 712
 Cotuleæ, 712
 Cotylanthera, *Blum.* 622
 Cotyle, *DC.* 340
 Cotyle, *Hav.* 568
 Cotyledon, *DC.* 346
 Cotyledon, *Gaudin.* 568
 Cotylephora, *Mrian.* 361
 Cotylephyllum, *Link.* 346
 Cotyliscus, *Desv.* 355
 Coulbandia, *Aubl.* 533, 555
 Coulteria, *H. B. K.* 555
 Couma, *Aubl.* 691
 Coumarouma, *Aubl.* 555
 Coupoul, *Aubl.* 755
 Couralia, *SpBth.* 677
 Couratari, *Aubl.* 740
 Courbaril, *Phum.* 556
 Courimari, *Aubl.* 795
 Couroupa, *Aubl.* 740
 Coursetia, *DC.* 554
 Courteuin, *R. Br.* 362
 Cousioisii, *Nees.* 119
 Cousiua, *Cass.* 714
 Coussapoa, *Aubl.* 271
 Coussarea, *Aubl.* 764
 Coutarea, *Aubl.* 765
 Coutoubea, *Aubl.* 614
 Couturia, *Casty.* 42
 Cowania, *Don.* 565
 Coxia, *Endl.* 645
 Crabbea, *Hav.* 679
 Cracca, *Linn.* 554
 Cræpaba, *Schrank.* 116
 Cræpalopumnou, *E.* 323
 Cræfordia, *Rafin.* 554
 Crambe, *Tourn.* 355
 Crauberries, 757
 Crauesbills, 493
 Cranicichæ, *Lindl.* 182
 Cranicichis, *Swartz.* 182
 Craniolaria, *Linn.* 670
 Craspidospermum, *Lehm.* 656
 Craniotome, *Reichb.* 662
 Crantzia, *Lag.* 354
 Crantzia, *Nutt.* 778
 Crantzia, *Schreb.* 473
 Crantzia, *Scop.* 672
 Crantzia, *Swartz.* 282
 Craspedia, *Forst.* 712
 Craspedium, *Lour.* 372
 Craspidospermum, *Boj.* 601
 Crassina, *Scop.* 711
 Crassocephalum, *M.* 713
 Crassouvia, *Comm.* 346
 Crassula, *Hav.* 346
 Crassulaceæ, 326, 344*
 Crassule, *Juss.* 344
 Crassulea, 346
 Cratægus, *Linn.* 560
 Cratæva, *Linn.* 358
 Craterellus, *Fr.* 41
 Crateria, *Pers.* 331
 Cratericarpium, *Sp.* 725
 Crateritecoma, *Marl.* 677
 Craterium, *Trent.* 42
 Crateromyces, *Corda.* 43
 Craterostigma, *Hochst.* 672, 685
 Cratochwilia, *Neck.* 282
 Cratoxylon, *Blum.* 406
 Cratylia, *Mart.* 555
 Crawfordia, *Wall.* 614
 Cremanium, *Don.* 733
 Cremastostenon, *Hort.* 733
 Cremastra, *Lindl.* 181
 Cremocephalum, *Cass.* 713
 Cremolobidæ, 354
 Cremolobus, *DC.* 354
 Cremonia, *Comm.* 370
 Crenacantha, *Kützling.* 10
 Crenæa, *Aubl.* 575
 Crenias, *Spreng.* 483
 Crenularia, *Boiss.* 354
 Creclochiton, *Blum.* 733
 Creodus, *Lour.* 520
 Creolobus, *Lilja.* 745
 Crepidaria, *Hav.* 281
 Crepidium, *Nutt.* 715
 Crepidium, *Blum.* 181
 Crepidotropis, *Walp.* 555
 Crepidotus, *Fries.* 41
 Crepinia, *Reichb.* 715
 Crepis, *Linn.* 715
 Crescentia, *Linn.* 671
 Crescentinæ, 608, 673*
 Crescentids, 673
 Crescentinæ, *DC.* 673
 Cresea, *Linn.* 631
 Cribraria, *Schrad.* 42
 Criulosa, *Don.* 715
 Crinita, *Münch.* 710

- Crinitaria, *Less.* 710
 Crinodendron, *Mol.* 372
 Crinonia, *Blum.* 181
 Crinula, *Fries.* 42
 Crinum, *Linn.* 158
 Criocephalus, *Schl.* 199
 Criosanthes, *Rafin.* 183
 Cristaria, *Cav.* 370
 Cristaria, *Sonn.* 718
 Cristatella, *Nutt.* 358
 Critamus, *Besser.* 778
 Critesium, *Raf.* 116
 Crithmum, *Tournef.* 778
 Critonia, *Gärtn.* 709
 Critonia, *P. Brown.* 709
 Crocanthemum, *Spach.* 350
 Crocidium, *Hook.* 713
 Crocodia, *Link.* 50
 Crocodilium, *DC.* 714
 Crocodylodes, *Adans.* 713
 Crocodylodes, *Vaill.* 714
 Crocoxylon, *E. Z.* 588
 Crocus, *Tournef.* 161
 Crocylis, *E. Mey.* 764
 Crocysporium, *Corda.* 44
 Crodisperma, *Poit.* 711
 Cronartium, *Fries.* 42
 Croomia, *Torr.* 438
 Crossandra, *Salisb.* 679
 Crossoccephalum, *Frül.* 614
 Crossolepis, *Less.* 712
 Crossopetalum, *P. Br.* 588
 Crossopetalum, *Roth.* 614
 Crossophyllum, *Spach.* 406
 Crossopteryx, *Fenzl.* 765
 Crossostephium, *Less.* 712
 Crossostigma, *Spach.* 725
 Crossostylis, *Forst.* 740
 Crossotoma, *Don.* 695
 Crotalaria, *Linn.* 554
 Crotalariae, 554
 Crotalopsis, *Michx.* 553
 Croton, *Linn.* 281
 Crotonae, 281
 Crotonopsis, *Rich.* 281
 Crouania, *J. Agh.* 24
 Crowberries, 285
 Crowea, *Smilh.* 471
 Crowfoots, 425
 Crownworts, 335
 Crozophora, *Neck.* 282
 Crucianella, *Linn.* 771
 Crucata, *Tournef.* 771
 Crucibulum, *Tul.* 42
 Crucicella, *Leschen.* 778
 Cruciferae, *Juss.* 351
 Crucifers, 351
 Crucigenia, *Morren.* 9, 13
 Crucita, *Löffl.* 511
 Cruckshanksia, *Hook.* 489
 Cruckshanksia, *Hook. et Arn.* 764
 Cruckshanksia, *Micrs.* 161
 Crudya, *Willd.* 556
 Crumenaria, *Mart.* 582
 Cruminium, *Desv.* 555
 Cruria, *Fries.* 22
 Crupina, *Cass.* 714
 Crusea, *A. Rich.* 764
 Crybe, *Lindl.* 182
 Cryosophila, *Blumc.* 139
 Cryphaea, *Brid.* 67
 Cryphaea, *Hamilt.* 520
 Cryphia, *R. Br.* 661
 Cryphiacanthus, *Nees.* 679
 Cryphiantha, *Eckl. et Z.* 553
 Cryphiospermum, *Palis.* 710
 Cryphium, *Palis.* 67
 Crypsis, *Ait.* 115
 Crypta, *Nutt.* 481
 Cryptadenia, *Misn.* 531
 Cryptadia, *Lindl.* 710
 Cryptandra, *Smilh.* 582
 Cryptanguina, *Schr.* 119
 Cryptantha, *Lehn.* 656
 Cryptantbus, *Klotzsch.* 148
 Cryptarrhena, *R. Br.* 182
 Crypteronia, *Blumc.* 796
 Cryptina, *Rafin.* 481
 Cryptocalyx, *Benth.* 664
 Cryptocarpha, *R. Br.* 701
 Cryptocarpon, *Dozy.* 67
 Cryptocarpus, *H. B. K.* 513
 Cryptocarya, *R. Br.* 537
 Cryptochilidae, 181
 Cryptochilus, *Wall.* 181
 Cryptococeae, 9
 Cryptococens, *Kützling.* 9
 Cryptocoryne, *Fisch.* 129
 Cryptocoryneae, 129
 Cryptocotyledoneae, *Agh.* 95
 Cryptodiscus, *Corda.* 43
 Cryptodiscus, *Schrenck.* 779
 Cryptogamicæ, *Nees.* 54
 Cryptogeus, *Rich.* 80
 Cryptoglottis, *Blum.* 181
 Cryptogramma, *Grev.* 80
 Cryptogramma, *R. Br.* 79
 Cryptogyne, *Cass.* 712
 Cryptolobus, *Spr.* 555
 Cryptomeria, *Don.* 229
 Cryptomyces, *Grev.* 43
 Cryptonemae, 24
 Cryptonemia, *J. Agh.* 25
 Cryptopetalum, *Cass.* 709
 Cryptopetalum, *Hook.* 568
 Cryptophragmium, *Nees.* 679
 Cryptophyta, *Link.* 5
 Cryptopleura, *Kützling.* 11
 Cryptoplenra, *Nutt.* 715
 Cryptopodia, *Röhl.* 67
 Cryptopus, *Lindl.* 181
 Cryptoseto, *Hook.* 67
 Cryptospermeae, 10
 Cryptospermum, *Young.* 764
 Cryptospora, *Kar.* 355
 Cryptosporium, *Kunze.* 42
 Cryptostegia, *R. Br.* 626
 Cryptostemma, *R. Br.* 713
 Cryptostomum, *Schreb.* 378
 Cryptostylis, *R. Br.* 182
 Cryptotenia, *DC.* 778
 Cryptotheca, *Blum.* 575
 Crystalworts, 57
 Czernaevia, *Turczan.* 778
 Cteisium, *Richard.* 81
 Ctenium, *Pancz.* 115
 Ctenodontidae, *Mont.* 25
 Ctenodus, *Kütz.* 10, 25
 Ctepomera, *Harv.* 281
 Ctenopteris, *Blum.* 79
 Ctenospermum, *Lehn.* 656
 Cubeba, *Miq.* 518
 Cubospermum, *Laur.* 725
 Cucifera, *Dell.* 139
 Cucubalus, *Tournef.* 498
 Cuculla, *Blum.* 181
 Cucullaria, *Burb.* 771
 Cucullaria, *Rafin.* 436
 Cucullaria, *Schreb.* 380
 Cucullifera, *Nees.* 121
 Cucumeroides, *Gärtn.* 315
 Cucumis, *Linn.* 315
 Cucurbita, *Linn.* 315
 Cucurbitaceae, 310, 311*
 Cucurbitaceae, *L.* xxxiv
 Cucurbitales, 243, 244, 246, 310*
 Cucurbitae, 243
 Cucurbites, 311
 Cuellaria, *R. et P.* 455
 Cuidbeja, *Forsk.* 262
 Cuitlauzinia, *Llav.* 182
 Cujete, *Plum.* 674
 Culcacia, *Palis.* 129
 Culcita, *Prest.* 80
 Culcitium, *H. B. K.* 713
 Culhamia, *Forsk.* 362
 Cullumia, *R. Br.* 713
 Culminia, *L.* xxxiii
 Cumada, *Jon.* 614
 Cuninia, *Colla.* 662
 Cuminum, *Linn.* 778
 Cummingia, *Don.* 205
 Cuminidae, 778
 Cuncea, *Hamilt.* 764
 Cunila, *Linn.* 661
 Cuniilide, 661
 Cunnighamia, *R. Br.* 229
 Cunnighamia, *Schreb.* 764
 Cunnighamiaceae, *Siebold.* 226
 Cunonia, *Battn.* 161
 Cunonia, *Linn.* 572
 Cunoniaceae, 566, 571*
 Cunoniads, 571
 Cupaneni, *Adans.* 281
 Cupania, *Plum.* 385
 Cuphautha, *DC.* 767
 Cuphea, *Jacq.* 575
 Cupia, *DC.* 765
 Cupresseae, 229
 Cupressina, *Rich.* 226
 Cupressus, *Tournef.* 229
 Cupuliferae, *Rich.* 290
 Curanga, *Juss.* 685
 Curatella, *Linn.* 424
 Curcas, *Adans.* 281
 Curculigo, *Gärtn.* 154
 Curcuma, *Linn.* 167
 Curantworts, 750
 Cursonia, *Nutt.* 714
 Curtia, *Cham.* 614
 Curtisia, *Aton.* 783
 Curtisia, *Schreb.* 473
 Curtoisia, *Rehb.* 636
 Curtopogon, *Palis.* 115
 Cururi, *Plum.* 385
 Curvembryae, 621
 Cuscuta, *Tournef.* 634
 Cuscutaceae, 615, 633*
 Cuscutae, *Choisy.* 633
 Cuscutae, *J. S. Presl.* 633
 Cuscutinae, *Link.* 633
 Cusimbua, *DC.* 711
 Cusparia, *Humb.* 471
 Cuspariae, 471
 Cuspidaria, *DC.* 677
 Cuspidaria, *Link.* 354
 Cuspidella, *DC.* 710
 Cuspidin, *Gärtn.* 713
 Cussambium, *Rumph.* 385
 Cusso, *Brac.* 565
 Cussonia, *Comm.* 406
 Cussonia, *Thunb.* 781
 Cutleria, *Grev.* 10, 22
 Cuttara, *Rafin.* 614
 Cutuba, *Mart. et Zucc.* 614
 Cuveracea, *Jones.* 462
 Cuviera, *DC.* 765
 Cuviera, *Koel.* 116
 Cyamopsis, *DC.* 554
 Cyanus, *Salisb.* 415
 Cyananthus, *Wall.* 636
 Cyanastrum, *Cass.* 714
 Cyanea, *DC.* 411
 Cyanea, *Gaud.* 693
 Cyanea, *Reacalm.* 614
 Cyanotis, *Rafin.* 199, 205
 Cyanella, *Linn.* 205
 Cyanitis, *Reimb.* 570
 Cyanocephalus, *Pohl.* 661
 Cyanopis, *Cass.* 714
 Cyanopsis, *Blum.* 709
 Cyanopsis, *Cass.* 714
 Cyanoseris, *Koch.* 715
 Cyanospermum, *Wight. et Arn.* 556
 Cyanostreuma, *Benth.* 555
 Cyanothamnus, *Lindl.* 471
 Cyanotis, *Don.* 188
 Cyanotris, *Rafin.* 199, 205
 Cyanothillium, *Blumc.* 709
 Cyanus, *DC.* 714
 Cyathnuthera, *Pohl.* 733
 Cyathia, *Smith.* 80
 Cyathae, *Kawf.* 80
 Cyathidium, *Cass.* 713
 Cyathocline, *Cass.* 710
 Cyathoconia, *Nees.* 119

Cyathodes, *R. Br.* 419
 Cyathodium, *Lehm.* 58
 Cyathoglottis, *Pöpp. et Endl.* 182
 Cyatholoma, *Benth.* 455
 Cyathophorum, *Palis.* 67
 Cyathospermum, *Willd.* 604
 Cyathostyles, *Schott.* 622
 Cyathula, *Lourc.* 511
 Cyathus, *Haller.* 42
 Cybhanthera, *Ham.* 685
 Cybele, *Salisb.* 534
 Cybelion, *Spreng.* 182
 Cybiauthus, *Mart.* 648
 Cybistax, *Mart.* 677
 Cycadeaceæ, 222, 223²
 Cycadeis, *Rich.* 223
 Cycads, 223
 Cycas, *Linn.* 225
 Cyclachena, *Freem.* 711
 Cyclamen, *Tournef.* 645
 Cyclandrophora, *Hass.* 543
 Cyclanthaceæ, *Ad. Brongn.* 130
 Cyclantheæ, *Poitou.* 130, 132
 Cyclanthera, *Schrad.* 315
 Cyclagthus, *Poit.* 132
 Cyclea, *Arnott et Wight.* 309
 Cyclobotria, *Don.* 204
 Cyclocarpa, *DC.* 354
 Cyclocarpus, *Jaugh.* 473
 Cycloclerma, *Klotzsch.* 42
 Cycloclodium, *Presl.* 80
 Cyclogyne, *Benth.* 554
 Cyclolepis, *Don.* 714
 Cyclolepis, *Moy.* 513
 Cyclolobium, *Benth.* 555
 Cyclocoma, *Moy.* 513
 Cyclocomium, *Walp.* ? 554
 Cyclomyces, *Klotzsch.* 41
 Cyclonema, *Hochst.* 664
 Cyclophorus, *Presl.* 79
 Cyclophorus, *Desv.* 79
 Cyclophia, *Vent.* 553
 Cyclophis, *Gaill.* 714
 Cyclopon, *Presl.* 182
 Cycloptera, *R. Br.* 534
 Cycloptychis, *E. M.* 355
 Cyclosanthes, *Pöpp.* 132
 Cyclosia, *Klotzsch.* 182
 Cyclosperma, *Bonnem.* 18
 Cyclospermum, *Leg.* 778
 Cyclostegia, *Benth.* 661
 Cyclostemon, *Bl.* 282
 Cyclotella, *Kütz.* 13
 Cycnia, *Lindl.* 543
 Cycnium, *E. Mey.* 685
 Cycnocheus, *Lindl.* 182
 Cycnogeton, *Embl.* 210
 Cycnosoria, *Endl.* 715
 Cydonia, *Tournef.* 560
 Cylactis, *Raf.* 564
 Cylegonia, *Nees.* 555
 Cylindrium, *Walt.* 44
 Cylindrolaphe, *Nees.* 537
 Cylindria, *Lourc.* 534
 Cylindrocline, *Cass.* 710
 Cylindrolobus, *Blum.* 1-1
 Cylindropus, *Nees.* 119
 Cylindroris, *Benth.* 712
 Cylindrospermum, *Kütz.* 10
 Cylipogon, *Rafin.* 534
 Cylista, *Bl.* 555
 Cymantus, *E.* 194
 Cymaria, *Benth.* 662
 Cymation, *Spreng.* 190
 Cymbachne, *Retz.* 116
 Cymbalaria, 684
 Cymbanthes, *Salisb.* 160
 Cymbaria, *Linn.* 685
 Cymbellæ, 13
 Cymbidium, *Swartz.* 141
 Cymbocarpa, *Miers.* 172
 Cymbocarpum, *DC.* 779
 Cymhodontus, *Cass.* 713
 Cymbophora, *Kütz.* 13
 Cymbopogon, *Spr.* 116

Cymbosema, *Benth.* 555
 Cymbostemon, *Spach.* 419
 Cymburnus, *Salisb.* 664
 Cymnosoma, *Gärtn.* 473
 Cymodocen, *Kön.* 145
 Cymoplia, *Lamx.* 10, 22
 Cymopterus, *Rafin.* 778
 Cymose, *L.* xxxiv
 Cynanchum, *Linn.* 626
 Cynapium, *Nutt.* 779
 Cynara, *Thunb.* 709
 Cynara, *Vaill.* 714
 Cyuareæ, 703, 713
 Cynarocephalæ, *Juss.* 702
 Cynidium, *Swartz.* 67
 Cynocardium, *W. et Berth.* 354
 Cynocephalum, *Wigg.* 58
 Cynocrambæ, *Th. N. ab. E.* 512
 Cynoconium, *Gmel.* 614
 Cynoconium, *E. Mey.* 626
 Cynodon, *Brid.* 796
 Cynodon, *Rich.* 115
 Cynodontium, *Brid.* 67
 Cynoglossidæ, 656
 Cynoglossum, *Linn.* 656
 Cynometra, *Linn.* 556
 Cynometreæ, 556
 Cynomoridæ, 90
 Cynomorium, *Michel.* 90
 Cynomoriums, 89
 Cynophalla, *DC.* 358
 Cynopsale, *Endl.* 90
 Cynorchis, *Thouars.* 182
 Cynorrhiza, *Eckl. et Z.* 778
 Cynoshata, *DC.* 494
 Cynosciadium, *DC.* 778
 Cynosurus, *Linn.* 116
 Cynotis, *Hoffm.* 713
 Cynotodium, *Hedw.* 67
 Cynotoxicum, *Fl. Fl.* 795
 Cynthia, *Don.* 715
 Cyparissa, *Don.* 229
 Cypella, *Herb.* 161
 Cypellium, *Desv.* 593
 Cyperaceæ, 105, 117*
 Cyperæ, 119
 Cyperoidæ, *Juss.* 117
 Cyperus, *Linn.* 119
 Cyphellium, *Achar.* 59
 Cyphella, *Fries.* 42
 Cyphia, *L.* 691
 Cyphiaceæ, *DC.* 689
 Cyphium, *Gmel.* 691
 Cyphomandra, *Sedter.* 622
 Cyphorhina, *Rafin.* 656
 Cyprianthe, *Spach.* 423
 Cypripedæ, 179, 183
 Cypripedium, *Linn.* 183
 Cypsela, *Turpin.* 527
 Cypselodontia, *DC.* 710
 Cyrbasium, *Endl.* 358
 Cyrilla, *Linn.* 445
 Cyrilla, *Herit.* 672
 Cyrillaceæ, 432, 445*
 Cyrillads, 445
 Cyrillæ, *Torr. et Gray.* 445
 Cyrtia, *Benth.* 661
 Cyrtia, *Lourc.* 795
 Cyrtandra, *Forst.* 672
 Cyrtandraceæ, *Juck.* 671
 Cyrtandree, 672
 Cyrtandridiæ, 672
 Cyrtanthus, *Ad.* 158
 Cyrtanthus, *Herb.* 158
 Cyrtanthus, *Schreb.* 765
 Cyrtocarpa, *H. B. K.* 467
 Cyrtocera, *Beau.* 627
 Cyrtocilium, *H. B. K.* 181
 Cyrtodon, *R. Br.* 67
 Cyrtogonium, *J. Sm.* 79
 Cyrtogyne, *Humbert.* 316
 Cyrtolepis, *Less.* 712
 Cyrtomium, *Presl.* 80
 Cyrtomeia, *Schrad.* 315
 Cyrtowera, *Zippel.* 793

Cyrtopera, *Lindl.* 181
 Cyrtophlebium, *R. Br.* 79
 Cyrtophyllum, *Weinm.* 691
 Cyrtopodium, *Brid.* 67
 Cyrtopodium, *R. Br.* 182
 Cyrtopus, *Brid.* 67
 Cyrtorhyncha, *Nutt.* 427
 Cyrtosia, *Blum.* 182
 Cyrtospermum, *Rafin.* 778
 Cyrtostachys, *Blum.* 138
 Cyrtostigma, *Endl.* 533
 Cyrtostylis, *R. Br.* 182
 Cyrtotropis, *Wall.* 555
 Cystanthe, *R. Br.* 449
 Cystapophysium, *Reichb.* 67
 Cysticapnos, *Böerh.* 436
 Cystidium, *J. Sm.* 80
 Cystocloniæ, 10
 Cystoclonium, *Kütz.* 10
 Cystophora, *J. Agh.* 22
 Cystopteris, *Bernh.* 80
 Cystoseira, *Ag.* 22
 Cytinus, *Linn.* 92
 Cytisæ, 554
 Cytisopsis, *Jaub. et Spch.* 554
 Cytispora, *Fr.* 42
 Cytisus, *Linn.* 554
 Cyttaria, *Berk.* 43
 Czackia, *Andr.* 205
 Czarna, *Presl.* 115

 Dabœcia, *Don.* 455
 Dacriua, *Fries.* 43
 Dacryanthus, *Endl.* 449
 Dacrydium, *Sol.* 231
 Dacrymyces, *Fr.* 42
 Dacryodes, *Vahl.* 460
 Dactylæna, *Schrad.* 358
 Dactylanthus, *Haw.* 281
 Dactylicapnos, *Wall.* 436
 Dactyliota, *Blum.* 733
 Dactylis, *Linn.* 116
 Dactylum, *Nees.* 43
 Dactyloctenium, *Willd.* 115
 Dactyloides, *Tausch.* 568
 Dactylon, *Vill.* 115
 Dactylophyllum, *Benth.* 636
 Dactylostemon, *Kl.* 281
 Dactylostylis, *Schäubl.* 182
 Dactylophyllum, *Rafin.* 554
 Dædalea, *Pers.* 41
 Daemia, *R. Br.* 626
 Dæmonorops, *Blum.* 139
 Dahlia, *Cavan.* 710
 Dahlia, *Thunb.* 784
 Dais, *Linn.* 531
 Dalbergaria, *Tuss.* 672
 Dalbergia, *Linn.* 555
 Dalbergiæ, 555, 556
 Dalea, *Gärtn.* 667
 Dalea, *Linn.* 551
 Daleaupia, *Plum.* 281
 Dalhousiana, *Wall.* 555
 Dalia, *Adans.* 455
 Dalibarda, *Linn.* 561
 Dalrympelæ, *Roxb.* 381
 Daltonia, *Hook.* 67
 Dambosium, *Juss.* 209
 Dambosium, *Schreb.* 112
 Damatris, *Cass.* 715
 Dambie, *Endl.* 372
 Dandronia, *Cass.* 713
 Dammara, *Gärtn.* 160
 Dammara, *Bonnem.* 229, 231
 Dammarsanthus, *Gärtn.* *Bl.* 761
 Dampiera, *R. Br.* 695
 Danaæ, *Coll.* 713

- Danae, *Medik.* 205
 Danaea, *Allon.* 779
 Danaea, *Smith.* 82
 Danæaceæ, 76, 82*
 Danæaworts, 82
 Danaida, *Link.* 205
 Danais, *Comm.* 765
 Dangervilla, *Fl. Fl.* 471
 Daniella, *DC.* 346
 Dautbonia, *DC.* 116
 Dantia, *Thouars.* 725
 Daphnaceæ, *C. A. Meyer.* 530
 Daphnads, 530
 Daphnales, 243, 245, 246, 529*
 Daphne, *Linn.* 531
 Daphnidium, *Nees.* 537
 Daphnikon, *Pohl.* 585
 Daphniphyllum, *Bl.* 582
 Daphnitis, *Spreng.* 467
 Daphnoideæ, *Vent.* 530
 Daphnopsis, *Mart.* 531
 Darea, *Juss.* 80
 Dargeria, *Decaisne.* 685
 Darlingtonia, *DC.* 556
 Darluca, *Rafn.* 764
 Dartus, *Loureir.* 622
 Darwinia, *Dennst.* 537
 Darwinia, *Rudg.* 721
 Dasanthera, *Rafn.* 684
 Dasus, *Lour.* 795
 Dasys, *Ag.* 10, 25
 Dasynactis, *Kützng.* 10
 Dasyanthera, *Presl.* 328
 Dasyanthes, *Benth.* 455
 Dasyccephala, *Borkh.* 614
 Dasycladace, 10
 Dasycladide, 22
 Dasycladus, *Ag.* 10, 22
 Dasycyem, 10
 Dasylirion, *Zucc.* 148
 Dasyloma, *DC.* 778
 Dasymalla, *Endl.* 665
 Dasynema, *Schott.* 372
 Dasysphila, *Sonder.* 796
 Dasysphlea, *Mont.* 25
 Dasysphyllum, *H. B. K.* 714
 Dasypogon, *R. Br.* 187
 Dasystemon, *DC.* 346
 Dasystemphana, *Ren.* 614
 Dasystema, *Raf.* 685
 Datisca, *Linn.* 317
 Datiscaeeæ, 310, 316*
 Datiscads, 316
 Datiscaee, *R. Br.* 316
 Datura, *Linn.* 621
 Daubentonia, *DC.* 554
 Daubenia, *Lindl.* 205
 Daucideæ, 779
 Daucus, *Tournef.* 779
 Davallia, *Smith.* 80
 Daviesia, *Lam.* 205
 Daviesia, *Smith.* 553
 Davilla, *Vell.* 424
 Davyna, *DC.* 733
 Dawsonia, *Bory.* 25
 Dawsonia, *R. Br.* 67
 Dayenia, *Mill.* 364
 Debraea, *R. et Sch.* 380
 Decachæna, *Torr. et Gr.* 758
 Decanehæta, *DC.* 709
 Decadia, *Lour.* 593
 Decaisnea, *Brongn.* 182
 Decaisnea, *Lindl.* 182
 Decalepis, *Wight et A.* 626
 Decaloba, *DC.* 334
 Decanema, *Deesn.* 626
 Decanemum, *DC.* 709
 Decarhaphæ, *Miq.* 733
 Decaselistia, *W. et A.* 370
 Decaspermum, *Forst.* 738
 Decaspora, *R. Br.* 449
 Decanimum, *Raf.* 639
 Deckern, *Schultz.* 715
 Declinænia, *H. B. K.* 764
 Decodon, *Gmel.* 575
 Deoorticalia, *Dumort.* xxxvii
 Decosteæ, *Ruiz et P.* 783
 Decumaria, *Linn.* 753
 Dedogonium, *Kützng.* 10
 Deeringia, *R. Br.* 511
 Defforgia, *Lam.* 752
 Deguelia, *Aubl.* 555
 Delaasia, *Blum.* 537
 Deidamia, *Thouars.* 334
 Deilosnia, *Andrz.* 354
 Deimböllia, *Schum.* 385
 Dejanira, *Ch. et Schl.* 614
 Delairea, *Lemaire.* 713
 Delaria, *Desv.* 555
 Delastreæ, *A. DC.* 591
 Delesseria, *Lamx.* 11, 25
 Delesserieæ, 11, 25
 Delila, *Dum.* 499
 Dellia, *Spr.* 711
 Delima, *Linn.* 424
 Delimeæ, 424
 Delisea, *Lamx.* 25
 Delisella, *Bory.* 22
 Delissea, *Gandich.* 693
 Delisseæ, 693
 Deloderium, *Cass.* 715
 Delophosporium, *Desm.* 42
 Delostoma, *D. Don.* 677
 Delostylis, *Raf.* 218
 Delphinastrium, *DC.* 428
 Delphinellum, *DC.* 428
 Delphinium, *Tourn.* 428
 Deltocarpus, *Herit.* 355
 Delucæ, *DC.* 711
 Deunatiei, *Fr.* 43
 Dematium, *Pers.* 43
 Demetria, *Lag.* 710
 Demidium, *DC.* 713
 Demidofia, *Dennst.* 727
 Demidofia, *Gmel.* 632
 Demidovia, *Hoffm.* 218
 Democritea, *DC.* 764
 Democritea, *Fl. Fl.* 795
 Dendragrostis, *Nees.* 116
 Dendranthema, *DC.* 712
 Dendrina, *Fries.* 43
 Dendrium, *Desv.* 455
 Dendrobideæ, 181
 Dendrobium, *Swartz.* 181
 Dendrocalamus, *Nees.* 116
 Dendrochilum, *Blum.* 181
 Dendrocolla, *Blum.* 181
 Dendrocoryne, *Lindl.* 181
 Dendrolirium, *Blume.* 181
 Dendrolobium, *Wight et Arn.* 554
 Dendromecon, *Benth.* 431
 Dendropemon, *Bl.* 791
 Dendrophthoe, *Mart.* 791
 Dendropogon, *Schimp.* 67
 Dendroselia, *Don.* 715
 Dendryphiium, *Corda.* 43
 Denekia, *Thunb.* 710
 Denhamia, *Melsn.* 328
 Denhamia, *Schott.* 129
 Denira, *Adans.* 711
 Dens canis, *Tournef.* 204
 Denstredtia, *Benth.* 80
 Dentaria, *Tournef.* 354
 Dentella, *Forst.* 765
 Dentidia, *Lour.* 661
 Denudatæ, *L.* xxxiii
 Deparia, *Hook. et Gr.* 80
 Depierrea, *Schl.* 691
 Deppen, *Ch. et Schl.* 764
 Deringia, *Adans.* 778
 Dermasea, *Hæc.* 568
 Dermatoblastere, 10
 Dermatocarpus, *Eschw.* 50
 Dermatosiphææ, 10
 Dermea, *Fries.* 43
 Dermocybe, *Fries.* 41
 Dermosporium, *Lk.* 44
 Derris, *Lour.* 555
 Deschampsia, *Palis.* 110
 Descurainia, *W. et B.* 354
 Deseurea, *Guett.* 354
 Desfontainea, *R. et S.* 614
 Desfontaineæ, *Endl.* 612
 Desfontainesia, *Hoffm.* 617
 Desfontanea, *Fl. Fl.* 282
 Desmanthus, *Willd.* 556
 Desmarstella, *Bory.* 22
 Desmarestia, *Lamx.* 10, 22
 Desmatodon, *Brid.* 67
 Desmazierella, *Lib.* 43
 Desmia, *D. Don.* 455
 Desmia, *Lymb.* 22
 Desmidiæ, 9, 13
 Desmidium, *Ag.* 9, 13
 Desmidorchis, *Ehrenb.* 627
 Desmocaropus, *Walt.* 358
 Desmochæta, *DC.* 611
 Desmodium, *DC.* 554
 Desmoneus, *Mart.* 139
 Desmophyllum, *Webb.* 471
 Desmos, *Lour.* 422
 Desmotrichum, *Blum.* 181
 Despretzia, *Kunth.* 115
 Desvauxia, *R. Br.* 120
 Desvauxiaceæ, 105, 120*
 Desvauxiæ, *Nicus Plant.* 120
 Detarium, *Juss.* 556
 Dethardingia, *Nees.* 631
 Dethawia, *Endl.* 778
 Dethridium, *Nees.* 709
 Detris, *Adans.* 709
 Deutzia, *Thunb.* 753
 Devauxia, *Palis.* 116
 Deverra, *DC.* 778
 Deville, *Bert.* 148
 Deweya, *T. et A. Gr.* 779
 Dewexia, *Clar.* 115
 Diabasis, *DC.* 712
 Diacæcarpium, *Blum.* 720
 Diacalpe, *Blum.* 80
 Diacanthia, *Less.* 714
 Diacha, *Fries.* 42
 Diaerria, *Endl.* 629
 Diacrium, *Lindl.* 181
 Diadema, *Pal.* 18
 Diadenium, *Föpp. et E.* 182
 Diagramme, *Blume.* 79
 Dialæta, *H. B. K.* 709
 Dialissa, *Lindl.* 181
 Dialium, *Linn.* 556
 Dialla, *Grisb.* 390
 Dialypetalæ, *Brongn.* li
 Diamorpha, *Nutt.* 346
 Diamorphææ, 346
 Diamphora, *Mont.* 43
 Diana, *Comm.* 205
 Dianella, *Lam.* 205
 Dianthera, *Sol.* 680
 Dianthoides, *Endl.* 636
 Dianthus, *L.* 498
 Diapensia, *Linn.* 606
 Diapensiaceæ, 594, 606*
 Diapensiads, 606
 Diaperia, *Nutt.* 710
 Diaphora, *Loureir.* 119
 Diaphoranthus, *Meyen.* 714
 Diaphyllum, *Hoffm.* 778
 Diarina, *Rafn.* 116
 Diarrhæna, *Palis.* 116
 Diarthron, *Turez.* 531
 Diasela, *Link. et Otto.* 684
 Diasia, *DC.* 161
 Diaspasla, *R. Br.* 695
 Diastella, *Salisb.* 533
 Diastemma, *Benth.* 672
 Diastrophis, *F. et M.* 354
 Diatoma, *DC.* 13
 Diatoma, *Lour.* 727, 755
 Diatomaceæ, 9, 12*
 Diatropa, *Dum.* 778
 Diazenxis, *Don.* 714
 Diblemma, *J. Sm.* 79
 Dibracthiou, *Tulasne.* 555
 Dicanlyx, *Lour.* 397, 593
 Dicarpen, *Presl.* 509

- Dicarpeia, *Bory.* 25
 Dicentra, *Borkh.* 436
 Dicera, *Forst.* 372
 Dicera, *Adra, Benth.* 661
 Diceras, *Endl.* 372
 Diceratium, *Aiton.* 354
 Dicerua, *DC.* 534
 Dicerocaryum, *Bojer.* 670
 Diceros, *Lour.* 685
 Diceros, *Blum.* ? 685
 Dichæa, *Lindl.* 181
 Dichælostemma, *Kth.* 205
 Dichæta, *Nutt.* 712
 Dichætanthera, *Ensl.* 733
 Dichæpatalum, *Thouars.* 583
 Dichelachne, *Endl.* 115
 Dichelostylis, *Palis.* 119
 Dichilus, *DC.* 554
 Dichloria, *Greer.* 22
 Dichodon, *Bardl.* 498
 Dichoglottis, *Fisch. et Mey.* 498
 Dichondra, *Forst.* 632
 Dichondrea, 632
 Dichophyllum, *Kütz.* 10
 Dichopogon, *Kth.* 205
 Dichoragana, *Schultz.* xl, 235
 Dichorisandra, *Mikan.* 188
 Dichosema, *Benth.* 558
 Dichosma, *DC.* 471
 Dichosporium, *Nees.* 43
 Dichostylis, *Palis.* 119
 Dichotomaria, *Lamk.* 22
 Dichroa, *Lour.* 795
 Dichroanthus, *Webb. et Benth.* 354
 Dichrobotryon, *Willd.* 764
 Dichrocephala, *DC.* 710
 Dichroma, *Car.* 685
 Dichromena, *Rich.* 119
 Dichrostachys, *Benth.* 556
 Dickkia, *Berk.* 13
 Dickkeraia, *Fl. Fl.* 534
 Dicksonia, *Ehrh.* 67
 Dicksonia, *Herit.* 89
 Dielidanthera, *Mart.* 795
 Dielidium, *Sch.* 119
 Dielidostigma, *Kze.* 315
 Dielinothrys, *Raf.* 199
 Dielinous, 241, 243
 Dielinous Exogens, 243, 246, 247*
 Dieliptera, *Juss.* 650
 Dielipteridæ, 699
 Dielis, *Benth.* 684
 Dielimon, *Schwagr.* 67
 Dielococcum, *Corda.* 42
 Dieloma, *Cass.* 714
 Dielonia, *Mitchel.* 752
 Dielorynea, *Benth.* 555
 Dielorypha, *Spreng.* 784
 Dieloryphe, *Thouars.* 784
 Dielotyledoneæ, *DC.* 235
 Dielotyledoneæ, *Juss.* 235
 Dielraia, *Thouars.* 433
 Dielrananthera, *Pohl.* 733
 Dielranema, *Sander.* 796
 Dielranilla, *Fenzl.* 498
 Dielranophlebia, *Mart.* 89
 Dielranopteris, *Bernh.* 80
 Dielranopteris, *Burm.* 79
 Dielranum, *Hook.* 67
 Dielrypta, *Lindl.* 182
 Dieltanææ, 471
 Dieltanina, *Linn.* 171
 Dieltyanthus, *Raf.* 791
 Dieltyanthus, *Dec.* 626
 Dieltyderna, *Bonnema.* 24
 Dieltyllum, *Schrad.* 12
 Dieltylma, *Raf.* 18
 Dieltyocarpus, *Wight.* 370
 Dieltyochiton, *Corda.* 58
 Dieltygens, 1, 211
 Dieltyolona, *DC.* 173
 Dieltyomenia, *Greer.* 11, 25
 Dieltyomenia, *Ag.* 19
 Dieltyomenia, *P.* 11
 Dieltyopetalum, *Fisch. et Mey.* 725
 Dieltyopteris, *Lamx.* 22
 Dieltyopteris, *Prest.* 79
 Dieltyosiphon, *Greer.* 10, 22
 Dieltyosphaeria, *Dec.* 19
 Dieltyosporium, *Corda.* 42
 Dieltyostegia, *Miers.* 172
 Dieltyota, *Lamx.* 22
 Dieltyoteæ, 10
 Dieltyothrix, *Kütz.* 10
 Dieltyotida, 22
 Dieltyoxiphium, *Hooker.* 80
 Dieltyurus, *Bory.* 25
 Dielcyclophora, *Boiss.* 779
 Dielypellium, *Nees.* 537
 Dielelta, *Less.* 713
 Dielerma, *Pers.* 42
 Dielidismus, *Desv.* 355
 Dielidiplis, *Rafin.* 575
 Dielidiscus, *DC.* 778
 Dielidymandra, *Willd.* 329
 Dielidymanthera, *Benth.* 455
 Dielidymanthus, *Endl.* 513
 Dielidymaria, *Corda.* 44
 Dielidymeles, *Thouars.* 795
 Dielidymeria, *Lindl.* 471
 Dielidymium, *P.* 42
 Dielidymocarpea, *Don.* 671
 Dielidymocarpidæ, 672
 Dielidymocarpus, *Wall.* 672
 Dielidymocephalon, *Meisn.* 504
 Dielidymochiton, *Bl.* 464
 Dielidymochlæna, *Desv.* 80
 Dielidymocrater, *Mart.* 43
 Dielidymodon, *Hedw.* 67
 Dielidymoglossum, *Desv.* 80
 Dielidymonema, *Prest.* 119
 Dielidymophysa, *Boiss.* 354
 Dielidymoplexis, *Griff.* 182
 Dielidymoprium, *Kütz.* 9
 Dielidymotoce, *Endl.* 765
 Dielictomis, *Palis.* 116
 Dieliffenbachia, *Schott.* 129
 Dielilytra, *Borkh.* 436
 Dielienia, *Lindl.* 181
 Dielierbachia, *Spreng.* 621
 Dielervilla, *Tournef.* 767
 Dieliesingia, *Endl.* 555
 Dieleteria, *Nutt.* 710
 Dieleteria, *Seringe.* 572
 Dieletes, *Salisb.* 161
 Dielietrichia, *Trattin.* 346
 Dielietrichia, *Giescke.* 167
 Dieligenæ, *Ag.* 11, 25
 Dieligera, *Forsk.* 511
 Dieligitaleæ, 685
 Dieligitalis, *Tournef.* 670
 Dieligitalis, *L.* 685
 Dieligitalia, *Juss.* 115
 Dieligitalia, *Scop.* 115
 Dieliglossus, *Cass.* 711
 Dieliglottis, *Nees. et Mart.* 471
 Dieliglyphis, *Blum.* 181
 Dieliglyphosa, *Bl.* 181
 Dieligonocarpus, *Fl. Fl.* 365
 Dieligrammaria, *Prest.* 80
 Dieligraphis, *Trin.* 115
 Dielilena, *Dumort.* 59
 Dielilatria, *Bory.* 153
 Dielilepis, *Endl.* 119
 Dielileptium, *Rafin.* 355
 Dielilepyrum, *Nichl.* 115
 Dielilepyrum, *Raf.* 115
 Dielilivaria, *Juss.* 679
 Dielilenseæ, 421
 Dielilenia, *Hedw.* 771
 Dielilenia, *Linn.* 421
 Dielileniaceæ, 116, 123*
 Dielileniada, 423
 Dielilwynella, *Bory.* 18
 Dielilwynia, *Smith.* 553
 Dielilobæia, *Thouars.* 795
 Dielilochia, *Lindl.* 181
 Dielilosa, *Stackh.* 21
 Dielimarina, *Sweet.* 191
 Dielimeræa, *Lab.* 385
 Dielimeria, *Raf.* 116
 Dielimerostenma, *Cass.* 715
 Dielimetia, *Wight. et Arn.* 765
 Dielimetopia, *DC.* 778
 Dielimocarpus, *Lour.* 885
 Dielimorphia, *Willd.* 556
 Dielimorphandra, *Schott.* 556
 Dielimorphandrea, 556
 Dielimorphanthæes, *Cass.* 710
 Dielimorphanthus, *Miq.* 781
 Dielimorphopetalum, *Bert.* 451
 Dielimorphotheca, *Vaill.* 712
 Dielinema, *Lindl.* 181
 Dielinemagonum, *A. de J.* 390
 Dielinemandra, *A. de J.* 390
 Dielinetus, *Sweet.* 631
 Dieliolea, *H. B. K.* 555
 Dieliolea, *Spreng.* 656
 Dielioleæ, 555
 Dieliodia, *Linn.* 764
 Dieliodois, *Pohl.* 764
 Dieliodonta, *Nutt.* 711
 Dieliodmedea, *Cass.* 710
 Dieliodmeles, *Hav.* 153
 Dieliodon, *Lindl.* 225
 Dieliolea, *Ellis.* 434
 Dielionysia, *Fenzl.* 645
 Dielioygmæ, *Pohl.* 764
 Dielioscorea, *L.* 214
 Dielioscoreææ, 212, 214*
 Dielioscoreæ, *R. Br.* 214
 Dieliosma, *L.* 471
 Dieliosmææ, *R. Br.* 469
 Dieliospyroideæ, *Brongn.* li
 Dieliospyros, *Linn.* 596
 Dieliotanthera, *DC.* 733
 Dieliothonea, *Lindl.* 181
 Dieliotis, *Desf.* 712
 Dieliotis, *Schreb.* 513
 Dieliotocarpus, *Hochst.* 764
 Dieliototus, *Tausch.* ? 554
 Dieliotostephus, *Cass.* 711
 Dieliototheca, *Vaill.* 700
 Dielipadi, *Mösch.* 205
 Dielipera, *Spreng.* 182
 Dieliphaca, *Lour.* 554
 Dieliphilus, *Salisb.* 455
 Dielipholis, *A. DC.* 591
 Dieliphyses, *Blume.* 181
 Dieliphylleia, *Nichl.* 438
 Dieliphylum, *Rafin.* 182
 Dieliphysa, *Jacq.* ? 554
 Dieliphysium, *Webb. et Mohr.* 67
 Dielipidax, *Lawson.* 199
 Dieliplachne, *Palis.* 115
 Dieliplachne, *R. Br.* 721
 Dieliplacrum, *R. Br.* 119
 Dieliplacus, *Nutt.* 684
 Dielipladenia, *A. DC.* 601
 Dieliplanda, *Hook. et Arn.* 725
 Dieliplanthera, *Banks et Sol.* 684
 Dieliplanthera, *Thouars.* 144
 Dieliplarrhena, *Labill.* 161
 Dieliplarrhinus, *Rafin.* 119
 Dieliplasia, *L. C. Rich.* 119
 Dieliplax, *Sol.* 115
 Dieliplazium, *Sweetz.* 80
 Dieliplecobolææ, 355
 Dieliplectria, *Blum.* 733
 Dieliplectrum, *Rich.* 182
 Dieliplesthes, *Hare.* 585
 Dieliplocosia, *Blume.* 455
 Dieliplocalypanna, *Spreng.* 632, 679
 Dieliplocea, *Raf.* 116
 Dieliplocentrum, *Lindl.* 181
 Dieliplochæta, *Nees.* 119
 Dieliplochilus, *Lindl.* 182
 Dieliplochita, *DC.* 733
 Dieliplochiton, *Spreng.* 733
 Dieliplochitum, *Lindl.* 319
 Dieliplochium, *Fenzl.* 527
 Dieliplocoma, *Don.* 710
 Dieliploconium, *Webb. et Mohr.* 67
 Dieliplocorallium, *Schauer.* 181
 Dieliploclerina, *Link.* 42, 14

- Diplodin, *Fr.* 42
 Diplodium, *Sw.* 182
 Diplodon, *Spreng.* 575
 Diplogenea, *Lindl.* 733
 Diploglossum, *Meisn.* 626
 Diplogon, *Rafin.* 710
 Diploëna, *Dumort.* 59
 Diploëna, *R. Br.* 471
 Diplolepis, *R. Br.* 626
 Diplomeris, *Don.* 182
 Diplomitridæ, 59
 Diplomitrium, *Corda.* 59
 Diplomorpha, *Meisn.* 531
 Diploponema, *Don.* 596
 Diploonyx, *Rafin.* ? 554
 Diplopappæe, 709
 Diplopappus, *DC.* 710
 Diplopappus, *Less.* 710
 Diplopeltis, *Eadl.* 385
 Diplopetalon, *Spr.* 385
 Diplophractum, *Desf.* 372
 Diplophragma, *Wight.* 765
 Diplophyllum, *Lchm.* 685
 Diplopogon, *R. Br.* 115
 Diploprion, *Visian.* 554
 Diplopterys, *A. de J.* 390
 Diplosastra, *Tausch.* 711
 Diplospora, *DC.* 764
 Diplosporium, *Link.* 44
 Diplostachyum, *Palis.* 70
 Diplostegium, *Don.* 733
 Diplostemma, *Hst. et Steud.* 715
 Diplostemon, *Wight.* 575
 Diplostephium, *Cass.* 709
 Diplostromium, *Kützng.* 10
 Diplotænia, *Boiss.* 778
 Diplotaxis, *DC.* 355
 Diploterium, *Mart.* 139
 Diplothrix, *DC.* 711
 Diplotrichia, *J. Ag.* 18
 Diplotropis, *Beuth.* 555
 Dipluria, *Raf.* 455
 Diplosodon, *Pohl.* 575
 Diplosum, *R. Br.* 181
 Dipogonia, *Palis.* 115
 Diporidium, *Wendl.* 475
 Diposis, *DC.* 778
 Dipsacaceæ, 688, 699°
 Dipsacæ, *Juss.* 699
 Dipsacozamia, *Lchm.* 225
 Dipsacus, *Tournef.* 700
 Diptera, *Borkh.* 568
 Dipteracanthus, *Nees.* 679
 Dipteracæ, 392, 393°
 Dipterads, 393
 Dipteris, *Reinv.* 79
 Dipterix, *Schreb.* 555
 Dipteroalcyx, *Cham.* 664
 Dipteroearpæe, *Bl.* 393
 Dipteroearpus, *Gärtn.* 394
 Dipterocone, *Fisch. et Mey.* 710
 Dipterosperma, *Wall.* 677
 Dipterygia, *Presl.* 778
 Dipterygium, *DeCaisn.* 358
 Diptychandra, *Tulasnc.* 555
 Dipyrena, *Hook.* 664
 Diracodes, *Blum.* 107
 Dirca, *Linn.* 531
 Dirina, *Fries.* 50
 Disa, *Berg.* 182
 Disaccium, *DC.* 355
 Disandra, *Linn.* 685
 Disarrhenum, *Labill.* 116
 Discanthera, *Torr. et A. Gray.* 315
 Discanophyllum, *Reichb.* 67
 Discaria, *Hook.* 532
 Discelium, *Brid.* 67
 Dischidia, *R. Br.* 627
 Dischisma, *Chois.* 667
 Discocactus, *Pfeiff.* 748
 Discocalyx, *A. DC.* 648
 Discocarpus, *Cham. et Schlecht.* 436
 Discocarpus, *Kl.* 282
 Discolobium, *Beuth.* 555
 Discomela, *Rafin.* 711
 Discopleura, *DC.* 778
 Discopodium, *Hochst.* 622
 Discosia, *Lb.* 43
 Discostigma, *Hassk.* 402
 Discovium, *Rafin.* 355
 Disella, *Lindl.* 182
 Disemma, *Labill.* 334
 Disidæ, 182
 Disocactus, *Lindl.* 748
 Disodea, *Pers.* 764
 Disomene, *Banks.* 781
 Disparago, *Gärtn.* 713
 Dispeltophorus, *Lchm.* 355
 Disperis, *Swartz.* 182
 Disphemia, *Presl.* 80
 Disporocarpa, *C. A. M.* 346
 Disporum, *Salisb.* 199
 Dissanthelium, *Trin.* 116
 Dissochaeta, *Blum.* 733
 Dissodia, *Willd.* 711
 Dissodon, *Grev. et Arn.* 67
 Dissolena, *Lour.* 664
 Dissorhynchium, *Schauer.* 182
 Distasis, *DC.* 710
 Distephana, *Juss.* 334
 Distephanus, *Cass.* 709
 Distephia, *Salisb.* 334
 Distichia, *Brid.* 67
 Distichia, *Nees.* 192
 Distichis, *Raf.* 116
 Distichis, *Thouars.* 181
 Distichmus, *Raf.* 119
 Distictis, *DC.* 677
 Distrepta, *Miers.* 795
 Distreptus, *Cass.* 709
 Distylis, *Gaudich.* 695
 Distylium, *Zucc.* 781
 Disynanthus, *Raf.* 713
 Disynaphia, *DC.* 709
 Ditassa, *R. Br.* 626
 Ditaxia, *Raf.* 684
 Ditaxis, *Vahl.* 282
 Ditheca, *Wight. et Arn.* 575
 Dithyrea, *Hav.* 354
 Ditiola, *Fries.* 43
 Ditoca, *Banks.* 523
 Ditrichium, *Timm.* 67
 Ditrichum, *Cass.* 711
 Dittmaria, *Spreng.* 380
 Ditruidæ, *Lindl.* 183
 Diuris, *Smith.* 183
 Dizonium, *Willd.* 710
 Dizygandra, *Mysner.* 679
 Dobera, *Juss.* 795
 Dobiuea, *Ham.* 387
 Dodartia, *Linn.* 684
 Dodder-Laurels, 538
 Didders, 633
 Dodecadenia, *Nees.* 537
 Dodecantheon, *Linn.* 645
 Dodecas, *Linn.* 575
 Dodonæa, *L.* 385
 Dodonæa, *Phen.* 467
 Dodoneæ, 385
 Dogbanes, 599
 Dolia, *Lindl.* 654
 Dolichandra, *Cham.* 677
 Dolichlasium, *Lagasc.* 714
 Dolichogyne, *DC.* 715
 Dolichonema, *Nees.* 555
 Dolichos, *Linn.* 555
 Dolichostylis, *Cass.* 714
 Dolioearpus, *Roland.* 424
 Dollinera, *Endl.* 554
 Döllingeria, *Nees.* 709
 Dolomiaea, *DC.* 713
 Dolophragma, *Fenzl.* 498
 Dombeya, *Cav.* 361
 Dombeya, *Lher.* 677
 Dombeya, *Lamarck.* 229
 Dombeyaceæ, *Barlt.* 363
 Dombeyæe, 364
 Dombrowskya, *Presl.* 693
 Donacodes, *Blum.* 167
 Donatia, *Forst.* 568
 Donatia, *Lessl.* 665
 Donatophorus, *Zipp.* 795
 Donax, *Palis.* 115
 Dondia, *Spreng.* 778
 Dondisia, *DC.* 765
 Dondisia, *Neck.* 355
 Dondisia, *Reichb.* 778
 Douin, *R. Br.* 504, 710
 Doutostemon, *Andrz.* 354
 Dorella, *Tenor.* 795
 Doodia, *R. Brown.* 80
 Doodia, *Reichb.* 554
 Dopatrium, *Hamilt.* 685
 Dorena, *Thunb.* 622
 Doranthera, *Benth.* 684
 Doratum, *Soland.* 783
 Doratolepis, *Benth.* 713
 Doratomyces, *Corda.* 43
 Doroceras, *Bunge.* 672
 Dorema, *Don.* 778
 Doria, *Adans.* 710
 Doria, *Less.* 713
 Doriæna, *Dennst.* 473
 Doritis, *Lindl.* 181
 Dorobea, *Cass.* 713
 Doronicum, *Linn.* 713
 Dorstenia, *Plum.* 268
 Dortmannia, *Rudb.* 693
 Dorvalia, *Comm.* 725
 Doryanthes, *Correa.* 158
 Dorycium, *Tournef.* 554
 Dorycnopsis, *Boiss.* 554
 Doryopteris, *J. Sm.* 80
 Doryphora, *Endl.* 300
 Dorystigma, *Miers.* 622
 Dothidea, *Fries.* 43
 Douglasia, *Lindl.* 645
 Douglassia, *Amm.* 664
 Douglassia, *Schreb.* 537
 Douina, *Lam.* 139
 Doupen, *Cambess.* 355
 Dovea, *Kth.* 121
 Dovyalis, *E. Mey.* 282
 Draba, *Linn.* 354
 Drabopsis, *Koch.* 354
 Dracæna, *Vandell.* 205
 Dracunculæe, *Link.* 200
 Dracocephalum, *Linn.* 662
 Dracontium, *Linn.* 194
 Dracophyllum, *Labill.* 449
 Dracopis, *Cass.* 711
 Dracunculæe, 129
 Dracunculus, *Bess.* 712
 Dracunculus, *Tournef.* 129
 Draken, *Lindl.* 182
 Drekensteinia, *Neck.* 555
 Draparnaldia, *Bory.* 10, 18, 22
 Draparnaldiee, 10
 Drapetes, *Lam.* 531
 Drapiezia, *Blum.* 199
 Dregen, *E. Mey.* 627
 Dregen, *Eckl. et Zeyh.* 778
 Drepanandrum, *Neck.* 733
 Drepania, *Juss.* 715
 Drepanocarpus, *C. F. W. Mey.* 550
 Drepanolobus, *Natt.* 554
 Drepanophyllum, *Hoff.* 778
 Drepanophyllum, *Rich.* 67
 Drilosiphon, *Kützng.* 10
 Drimia, *Jacq.* 205
 Drimiphyllum, *Burch.* 711
 Drimys, *Forst.* 419
 Drimyspermum, *Reinv.* 579
 Dripax, *Noronh.* 339
 Dromophylla, *Silv. M.* 315
 Drosanthe, *Spach.* 406
 Drosera, *Linn.* 434
 Droseraceæ, 432, 433°
 Drosocarpium, *Spach.* 406
 Drosophyllum, *Link.* 434
 Drozia, *Cass.* 715
 Drummondia, *DC.* 568
 Drupacæe, 539, 557°
 Drupacæe, *L.* xxxiii
 Druparia, *Silv. M.* 315

- Drupatris, *Lour.* 593
 Drusa, *DC.* 778
 Dryadlanthe, *Endl.* 561
 Dryandra, *Thunb.* 281
 Dryandra, *R. Br.* 534
 Dryas, *Linn.* 565
 Drymaria, *W.* 499
 Drymoda, *Lindl.* 181
 Drymoglossum, *Presl.* 79
 Drymonia, *Mart.* 672
 Drymopalaeus, *Zipp.* 138
 Drymophila, *R. Br.* 205
 Drymyrhizeæ, *Vent.* 165
 Drymaria, *Presl.* 79
 Dryobalanops, *Girttn. f.* 394
 Dryopeia, *Flouras.* 182
 Dryophilum, *Schwein.* 44
 Dryopteris, *Adans.* 80
 Dryostachyum, *J. Sm.* 79
 Drypetes, *Fuhl.* 282
 Drypis, *Michx.* 498
 Dryptodon, *Brid.* 67
 Dryptopetalum, *Arn.* 60.5
 Duabauga, *Hawill.* 575
 Duhausia, *Gaud.* 712
 Duboisia, *R. Br.* 684
 Dubautia, *Gaud.* 262
 Dubyaea, *DC.* 575, 715
 Duchekia, *Kostel.* 205
 Duchesnea, *Smith.* 564
 Duchesnea, *Cass.* 710
 Duchola, *Adans.* 281
 Duckweeds, 124
 Ducrosia, *Boiss.* 778
 Dudresneya, *Bonnem.* 24
 Dufourea, *Achar.* 59
 Dufourea, *Bory.* 483
 Dufourea, *Gren.* 467
 Dufourea, *Kunth.* 631
 Dufresnea, *DC.* 698
 Dugagelia, *Gaud.* ? 518
 Dugaldea, *Cass.* 712
 Dugortia, *Scop.* 543
 Duguetia, *St. Hil.* 422
 Duhaldea, *DC.* 710
 Duhamelia, *Pers.* 765
 Dulacia, *Fl. Fl.* 795
 Dulacia, *Neck.* 543
 Dulichium, *L. C. Rich.* 119
 Dumasia, *DC.* 555
 Dumerilla, *Less.* 714
 Dumontia, *Lamx.* 10, 25
 Dumortiera, *Nees.* 58
 Dumosse, *L.* xxiii
 Dumreicheria, *Steud.* 379
 Dunalia, *Spreng.* 765
 Dunalia, *H. B. K.* 621
 Dunalia, *R. Br.* 685
 Dunantia, *DC.* 711
 Dunbaria, *Wight et Arn.* 555
 Duncania, *Reichb.* 473
 Dupatya, *Fl. Fl.* 122
 Duperraya, *Gaud.* 631
 Dupinia, *Neck.* 337
 Dupontia, *R. Br.* 116
 Dupratia, *Rafin.* 636
 Dupulala, *A. Rich.* 467
 Durandea, *Labare.* 355
 Duranta, *Linn.* 664
 Duretia, *Gaud.* 262
 Durtea, *B. et Moq.* 57
 Durtea, *Boiss.* 779
 Durtea, *Morat.* 685
 Durio, *Bumph.* 361
 Duroia, *Linn.* f. 765
 Durvillea, *Bory.* 10, 22
 Durva, *Bernh.* 621
 Duvalia, *Nees.* 58
 Duvaia, *Kunth.* 467
 Duvaucellia, *Boed.* 795
 Duvernaya, *Desp.* 575
 Duvernoia, *E. M.* 680
 Dyckia, *Schult.* 118
 Dypsis, *Socran.* 138
 Dyschoriste, *Nees.* 679
 Dysenone, *Forst.* 795
 Dysmicodon, *Endl.* 691
 Dysoda, *Lour.* 764
 Dysodia, *Cav.* 711
 Dysodium, *L. C. Rich.* 711
 Dysophylla, *Blum.* 661
 Dysosmia, *DC.* 334
 Dysosmon, *Raf.* 670
 Dysoxylum, *Bl.* 464
 Dysphania, *R. Br.* 513
 Earina, *Lindl.* 181
 Eatonia, *Raf.* 116
 Ebelingia, *Reichb.* 477
 Ebenaceæ, 594, 595
 Ebenads, 595
 Ebenidium, *Jaub. et Spch.* ? 551
 Ebermeyera, *Nees.* 679
 Ecalyptria, *Dumort.* xxxvii
 Ecapsellia, *Dumort.* xxxvii
 Echaliuu, *L. C. Rich.* 315
 Ecilia, *Fries.* 41
 Ecclinusa, *Mart.* 591
 Ecremocarpos, *R. et P.* 677
 Ecdysanthera, *Hook.* 601
 Echaltium, *Wight.* 601
 Echeandia, *Ort.* 205
 Echeuais, *Cass.* 714
 Echeveria, *DC.* 346
 Echiales, 245, 246, 649
 Echinacanthus, *Nees.* 679
 Echinaceæ, *Monch.* 711
 Echinalsium, *Trin.* 116
 Echinanthus, *Neck.* 713
 Echinaria, *Desf.* 115
 Echinella, *Achar.* 13
 Echinella, *DC.* 428
 Echinobotrys, *Corda.* 42
 Echinocactidæ, 748
 Echinocactus, *L. et O.* 748
 Echinocarpus, *Blum.* 328
 Echinocaulon, *M.* 10, 504
 Echioceras, 10
 Echiocloa, *Palis.* 115
 Echinocystis, *Torr. et A. Gr.* 315
 Echinodiscus, *Benth.* 555
 Echinodium, *Poir.* 711
 Echinodorus, *Rich.* 209
 Echinogyna, *Dum.* 59
 Echinolea, *Desv.* 115
 Echinolea, *Jacq. f.* 701
 Echinolobium, *Desv.* 555
 Echinolytrum, *Desv.* 119
 Echinomeria, *Nutt.* 711
 Echinomitrium, *Corda.* 59
 Echinophora, *Tournef.* 779
 Echinoplaca, *Fée.* 50
 Echinopogon, *Palis.* 115
 Echinops, *Linn.* 713
 Echinopsidæ, 713
 Echinopsilon, *Moq.* 513
 Echinopsis, *Zucc.* 748
 Echinopteris, *A. de J.* 399
 Echinopus, *Tourn.* 713
 Echinoscleris, *Nees.* 119
 Echinospermum, *Swartz.* 656
 Echinosphera, *Sich.* 2-1
 Echinostachys, *F. Mey.* 661
 Echinus, *Lour.* 282
 Echiochilon, *Desf.* 656
 Echioglossum, *Blum.* 181
 Echioides, *Monch.* 656
 Echiopsis, *Reichb.* 656
 Echites, *P. Br.* 691
 Echium, *Tourn.* 656
 Echnatacanthid, 679
 Ecthroneia, *Herb.* 161
 Eckardia, *Rehb.* 182
 Ecklonia, *Herb.* 22
 Ecklonia, *Steud.* 10, 119
 Eclipta, *Linn.* 719
 Ecliptæ, 719
 Eclipses, *Girttn.* 713
 Ectadium, *P. Moq.* 629
 Ectasis, *Benth.* 173
 Ecthrus, *Lour.* 431
 Ectocarpea, 10, 22
 Ectocarpea, *Lyngh.* 22
 Ectosperma, *Vauch.* 22
 Ectospermeæ, 10
 Ectostroma, *Fries.* 44
 Ectrosia, *R. Br.* 116
 Edgworthia, *Meyer.* 531
 Edgworthia, *Pils.* 648
 Edmondia, *DC.* 713
 Edosmia, *Nutt.* 778
 Edraianthus, *A. DC.* 691
 Edrissa, *Raf.* 765
 Edwardia, *Raf. f.* 362
 Edwardsia, *Neck.* 711
 Edwardsia, *Salisb.* 555
 Egenolfia, *Schott.* 79
 Egeria, *Ner.* 765
 Egletes, *Less.* 712
 Ehrenbergia, *Mart.* 473
 Ehrenbergia, *Spreng.* 745
 Ebrebia, *Linn.* 537, 653
 Ebretiaceæ, 649, 653*
 Ebretris, 653
 Ebretriez, *Aph. DC.* 653
 Ehlharta, *Thunb.* 115
 Eichornia, *Kth.* 206
 Eichwaldia, *Ledeb.* 407
 Einomenia, *Raf.* 794
 Ekebergia, *Sparn.* 461
 Elachia, *DC.* 715
 Elachista, *Aresch.* 22
 Elachothamnus, *DC.* 719
 Elæagnaceæ, 248, 257*
 Elæagnæ, *Ach. Rich.* 257
 Elæagni, *Juss.* 257
 Elæagnus, *Linn.* 257
 Elæocarpea, *Juss.* 371, 372
 Elæocarpeus, *Linn.* 372
 Elæochytris, *Fenzl.* 778
 Elæococca, *Comm.* 281
 Elæodendrea, 588
 Elæodendron, *Jacq.* 588
 Elæoselinidæ, 779
 Elæoselinum, *Koch.* 779
 Elæostieta, *Fenzl.* 778
 Elaionema, *Berk.* 22
 Elais, *Jacq.* 139
 Elaphoglossum, *Schott.* 79
 Elaphomyces, *Nees.* 43
 Elaphrium, *Jacq.* 460
 Elate, *Ait.* 139
 Elateriospermum, *Bl.* 281
 Elaterium, *Jacq.* 315
 Elaterium, *Tourn.* 315
 Elatinaceæ, 465, 480*
 Elatine, *Dill.* 481
 Elatine, *Monch.* 684
 Elatineæ, *Cambessedes.* 489
 Elatostemma, *Forst.* 262
 Elcaja, *Forsk.* 464
 Electra, *DC.* 711
 Elegia, *Thunb.* 121
 Elegia, *Beauv.* 121
 Eleiotes, *DC.* 554
 Eleofera, *Plum.* 469
 Eleocharis, *Rhede.* 591
 Eleocharis, *R. Br.* 119
 Eleogiton, *Link.* 119
 Eleogonum, *Nees.* 119
 Elephantopæ, 709
 Elephantopus, *Linn.* 709
 Elephantorhiza, *Benth.* 556
 Elephantorhiza, *Less.* 709
 Elephantusia, *Wald.* 139
 Elephas, *Tourn.* 685
 Eletharia, *Rhede.* 167
 Eleusia, *Girttn.* 115
 Eleutheria, *Palis.* 67
 Eleutherine, *Herb.* 161
 Eleutheriospermum, *Kth.* 779
 Eleutherostemon, *Klotzsch.* 115
 Elilea, *Cand.* 496
 Elimia, *Nutt.* 356
 Elomirna, *Kunth.* 116

- Elisianthe, *Endl.* 498
 Elisena, *Herb.* 158
 Elizabetha, *Schomb.* 556
 Elleanthus, *Prest.* 181
 Elliottia, *Mühlentb.* 445
 Ellipsaria, *DC.* 354
 Ellisia, *P. Br.* 664
 Ellisia, *Linn.* 639
 Ellisius, *Gray.* 25
 Ellobocarpus, *Kaulf.* 80
 Ellobum, *Blum.* 685
 Ellobum, *Lilja.* 725
 Elmigera, *Rcichb.* 684
 Elodea, *Adans.* 406
 Elodea, *L. C. Rich.* 142
 Elodeæ, 406
 Elphegea, *Cass.* 710
 Elsholtzia, *Rich.* 740
 Elsholtzia, *Willd.* 661
 Elsholtziæ, 661
 Elsneria, *Walp.* 778
 Elytheria, *P. Br.* 464
 Elvasia, *DC.* 475
 Elvellacei, *Fr.* 43
 Elvira, *DC.* 711
 Elwendia, *Boiss.* 778
 Elymus, *Linn.* 116
 Elyna, *Schrad.* 119
 Elynanthus, *Palis.* 119
 Elyneus, 119
 Elytranthe, *Mart.* 791
 Elytranthe, *Endl.* 182
 Elytraria, *Vahl.* 679
 Elytropappus, *Cass.* 713
 Elytrophorus, *Palis.* 116
 Elytrospermum, *C. A. Mey.* 119
 Elytrostegia, *Benth.* 455
 Elytrostemium, *Boj.* 631
 Embelia, *Juss.* 645
 Embeliceæ, 648
 Embira, *Piso.* 422
 Emblica, *Gärtn.* 282
 Embolium, *Forst.* 534
 Embryopteris, *Gärtn.* 596
 Emericia, *Röm. et Sch.* 601
 Emex, *Neck.* 504
 Emilia, *Cass.* 713
 Eminium, *Blum.* 129
 Emmenanthe, *Benth.* 639
 Emmorhiza, *Pohl.* 764
 Emmoteca, *Desv.* 444
 Empedoclea, *Rafin.* 662
 Empedoclea, *St. Hil.* 424
 Empetraceæ, 273, 285*
 Empetræ, *Nutt.* 285
 Empetrum, *L.* 285
 Empleurum, *Soland.* 471
 Empusa, *Lindl.* 181
 Empusaria, *Reichb.* 181
 Eualcida, *Cass.* 711
 Enantiotrichum, *E. Mey.* 713
 Enargea, *Soland.* 205
 Encalypta, *Hedw.* 67
 Encelia, *Adans.* 711
 Eucephalartos, *Lehm.* 225
 Enclidium, *Jack.* 282
 Encholirium, *Mart.* 148
 Enchylæna, *R. Br.* 513
 Enchysia, *Prest.* 693
 Enckea, *Kuntz.* 518
 Enclindra, *Zucc.* 725
 Encæliæ, 10
 Encælium, *Ag.* 10, 22
 Encyclium, *Hooker.* 181
 Encyonema, *Kütz.* 13
 Endiandra, *R. Br.* 537
 Endiphus, *Rafin.* 639
 Endlichera, *Prest.* 764
 Endlicheria, *Nees.* 537
 Endocarpidæ, 50
 Endocarpum, *Hedw.* 50
 Endocladia, *J. Ag.* 24
 Endodæca, *Raf.* 794
 Endodromia, *Berk.* 4
 Endogena, *DC.* 95
 Endogens, 95
 Endogone, *Link.* 43
 Endogonia, *Turcz.* 656
 Endolenca, *Cass.* 713
 Endopogon, *Nees.* 679
 Endoptera, *DC.* 715
 Endorhizæ, *Rich.* 95
 Endorima, *Rafin.* 711
 Endospermia, *Kützing.* 10
 Endospermum, *Blum.* 555
 Endotriche, *Fröl.* 614
 Endotrichum, *Corda.* 42
 Endotrichum, *Dozy.* 67
 Endotropis, *Endl.* 626
 Endrachi, *Flac.* 632
 Endrachium, *Juss.* 632
 Endressia, *Gay.* 778
 Encimion, *Rafin.* 428
 Engelhardtia, *Lesch.* 293
 Engelmannia, *Torrey.* 711
 Engelmannia, *Vil.* 281
 Enhalus, *L. C. Rich.* 142
 Enhydra, *Lour.* 711
 Enkleia, *Griff.* 531
 Enkyanthus, *Lour.* 455
 Enneapogon, *Desv.* 115
 Enourea, *Aubl.* 385
 Ensatae, *Ker.* 159
 Ensatae, *L.* xxxiii
 Ensifera, *Bl.* 181
 Ensenia, *Nutt.* 626
 Entada, *Linn.* 556
 Entelea, *R. Br.* 372
 Enterographa, *Fée.* 50
 Enterolobium, *Mart.* 556
 Enteromorpha, *J. Ag.* 19
 Enteromorpha, *Link.* 10, 19
 Enteromorphae, 10
 Euteropogon, *Nees.* 116
 Enthrixia, *Dou.* 714
 Entogannu, *Banks.* 471
 Entoloma, *Fr.* 41
 Entomyclium, *Wall.* 44
 Entophysalis, *Kützing.* 9
 Entosthodon, *Schwägr.* 67
 Entosthymenium, *Brid.* 67
 Entothrix, *Kützing.* 10
 Euaehoglossum, *DC.* 712
 Eula, *Duby.* 710
 Eymnospermum, *Spr.* 779
 Epacraeæ, 449
 Epacridaceæ, 446, 448*
 Epacridæ, *R. Br.* 448
 Epacrids, 448
 Epacris, *Smith.* 449
 Epallage, *DC.* 712
 Epallage, *Endl.* 531
 Epallæ, *Cass.* 710
 Eperua, *Aubl.* 556
 Ephebe, *Fries.* 50
 Ephebidæ, 50
 Ephebus, *Sal.* 455
 Ephedra, *Linn.* 234
 Ephecreæ, *Batsch.* 188
 Ephecerum, *Reichb.* 645
 Epheherum, *Tourn.* 188
 Epheialis, *Sol.* 664
 Epheialis, *Schreb.* 385
 Epheppiorhynchium, *Nees.* 119
 Epheppium, *Blum.* 181
 Epiantria, *Prest.* 119
 Epithaterium, *Forst.* 309
 Epithlastere, 10
 Epithlema, *R. Br.* 183
 Epicampes, *Prest.* 115
 Epicarpurus, *Blum.* 268
 Epicharis, *Bl.* 464
 Epichysium, *Tode.* 41, 44
 Epicladium, *Lindl.* 181
 Epicocum, *Lk.* 43
 Epicoranthos, *Blum.* 181
 Epidendrea, 179, 181
 Epidendrum, *Linn.* 181
 Epigæa, *Linn.* 455
 Epigenia, *Fl. Fl.* 795
 Epigenia, *Vell.* 593
 Epigynanthus, *Blum.* 144
 Epigynous, 241, 243
 Epigynous Exogens, 246, 687*
 Epilepis, *Benth.* 711
 Epilithes, *Blum.* 507
 Epilobere, 725
 Epilobiaceæ, *Vent.* 724
 Epilobium, *Linn.* 725
 Epimedium, *Linn.* 438
 Epineum, *Harv.* 796
 Epipactis, *Fœuill.* 182
 Epipactis, *Hall.* 182
 Epiphanes, *Blum.* 182
 Epiphægus, *Nutt.* 611
 Epiphora, *Lindl.* 181
 Epiphyllum, *Pfeiff.* 748
 Epiphytis, *Link.* 29
 Epiphytis, *Trin.* 116
 Epipogium, *Gmel.* 182
 Epiphrizanthus, *Blum.* 795
 Episcia, *Mart.* 672
 Epistemum, *Walp.* 553
 Epistephium, *H. B. K.* 182
 Epistylidium, *Swartz.* 282
 Epithema, *Blum.* 672
 Epithiua, *Jacq.* 765
 Epitrichys, *DC.* 714
 Epochium, *Link.* 43
 Equisetaceæ, 56, 61*
 Equisetum, *Linn.* 62
 Ericlissa, *Forsk.* 282
 Eragrostis, *Palis.* 116
 Erangetia, *Reenalm.* 158
 Eranthemum, *R. Br.* 680
 Eranthis, *Salisb.* 428
 Erasua, *R. Br.* 785
 Erasua, *Miq.* 518
 Erato, *DC.* 710
 Eriatobotrys, *Fenzl.* 205
 Ercilla, *Adr.* Juss. 509
 Erebintus, *Mitch.* 554
 Erebomema, *Röm.* 796
 Erechtites, *Rafin.* 713
 Erechtium, *Less.* 713
 Ereictis, *DC.* 765
 Eremsea, *Lindl.* 737
 Eremnanthe, *Spach.* 406
 Eremnanthis, *Cass.* 713
 Eremnanthus, *Less.* 709
 Eremnia, *Don.* 455
 Eremocallis, *Sal.* 455
 Eremocarpus, *Benth.* 281
 Eremocarpus, *Bunge.* 778
 Eremodendron, *DC.* 665
 Eremodon, *Brid.* 67
 Eremogone, *Fenzl.* 498
 Eremophila, *R. Br.* 665
 Eremosparton, *Fisch.* 554
 Eremospermea, *Kützing.* 9
 Eremosporus, *Spach.* 406
 Eremostachys, *Bung.* 662
 Eremosyne, *Endl.* 568
 Eremurus, *Bieb.* 205
 Eresia, *Spach.* 356
 Eresia, *Plum.* 648
 Eria, *Lindl.* 181
 Eriacne, *R. Br.* 116
 Erianthem, *Benth.* 662
 Erianthem, *Nees.* 680
 Erianthus, *Rich.* 116
 Eria, *Linn.* 455
 Ericaceæ, 446, 453*
 Ericæ, *Juss.* 453
 Eriacna, *Ren.* 614
 Ericales, 244, 246, 446*
 Eriameria, *Nutt.* 710
 Eriarica, *Stack.* 22
 Ericæ, 455
 Ericæ, *DC.* 448
 Ericæ, *R. Brown.* 453
 Eridice, 456
 Eridicæ, *Desv.* 453
 Eriocella, *Klotzsch.* 455
 Eriocolla, *Borkh.* 614

Frigeula, *Nutt.* 778
 Erigerea, 710
 Erigerou, *DC.* 710
 Erimatalia, *Röm. et Schnlt.* 596
 Erinacea, *Boiss.* 554
 Erinea, *Link.* 681
 Erineum, *P.* 44
 Erinia, *Naud.* 691
 Erinostua, *Herb.* 158
 Erinus, *Linn.* 685
 Eriobotrya, *Lindl.* 560
 Eriocachrys, *DC.* 779
 Eriocalia, *Smith.* 778
 Eriocarpha, *Cass.* 711
 Eriocarpum, *Nutt.* 710
 Eriocarpum, *Dun.* 350
 Eriocaulaceæ, 105, 122^o
 Eriocaulææ, *Kunth.* 122
 Eriocaulon, *L.* 122
 Eriocauloneæ, *L. C. Rich.* 122
 Erioccephalææ, 712
 Erioccephalus, *Linn.* 712
 Eriochilus, *R. Br.* 182
 Eriochloa, *Kunth.* 115
 Eriochrysis, *Palis.* 116
 Eriocladium, *Lindl.* 712
 Eriocline, *Cass.* 713
 Eriocnema, *Naud.* 733
 Eriococcus, *Hassk.* 282
 Eriocoma, *Kunth.* 711
 Eriocoma, *Nutt.* 115
 Eriocoryne, *Wall.* 713
 Eriocyela, *Lindl.* 778
 Eriodaphne, *Nees.* 537
 Eriodendron, *DC.* 361
 Erioderma, *Fée.* 50
 Eriodesmia, *Don.* 455
 Eriodictyon, *Benth.* 639
 Erioglossum, *Bl.* 385
 Erioglossum, *G. et P.* 385
 Eriogoneæ, *Benth.* 504
 Eriogonum, *L. C. R.* 504
 Eriogyne, *Hook.* 568
 Eriolena, *DC.* 364
 Erioleneæ, 364
 Eriolema, *DC.* 733
 Eriolepis, *Cass.* 714
 Eriolobus, *DC.* 569
 Erione, *Sch. et E.* 261
 Eriopappus, *Arn.* 712
 Eriope, *H. et B.* 661
 Eriopetalum, *Wight.* 627
 Eriophorum, *Linn.* 119
 Eriophorum, *Vahl.* 715
 Eriophyllum, *Lag.* 712
 Eriophyton, *Benth.* 662
 Eriopogon, *Endl.* 116
 Eriosema, *DC.* 555
 Eriosolena, *Blum.* 531
 Eriospermum, *Juss.* 205
 Eriosphæra, *Lam.* 713
 Eriosphæria, *Benth.* 671
 Eriostachys, *Benth.* 662
 Eriostegia, *DC.* 733
 Eriostemon, *Less.* 713
 Eriostemon, *Smith.* 471
 Eriostomum, *Lk. et H.* 672
 Eriostylis, *R. Br.* 523
 Eriostynaphæ, *DC.* 778
 Eriotheca, *Sch. et E.* 391
 Eriothrix, *Less.* 713
 Eriotis, *DC.* 778
 Eriphia, *P. Br.* 672
 Eriphilema, *Herb.* 161
 Erisma, *Rudol.* 390
 Eriuthalia, *Bong.* 614
 Eriuthalis, *Boiss.* 761
 Eriuthalis, *P. Br.* 765
 Eriuthis, *Gray.* 710
 Eritrichium, *Schrad.* 656
 Eriudaphnes, *Nees.* 328, 743
 Ermannia, *Cham.* 354
 Erndlia, *Giescke.* 167
 Ernestia, *DC.* 733
 Eriodea, *Savatz.* 764

Ernstiugina, *Neck.* 385
 Erobatos, *DC.* 428
 Erodendrum, *Salisb.* 533
 Erodium, *Herit.* 494
 Eropheron, *Tausch.* 568
 Erophila, *DC.* 354
 Erosma, *Roth.* 263
 Erotium, *Sol.* 397
 Erpetiou, *DC.* 339
 Erpodium, *Brid.* 67
 Eruca, *Tourn.* 355
 Erucago, *DC.* 355
 Erucaria, *Gärtn.* 355
 Erucaridææ, 355
 Erucastrum, *DC.* 355
 Eryuun, *Linn.* 554
 Erycibe, *Koxb.* 596
 Erycibææ, *Endl.* 595
 Eryngium, *Tourn.* 778
 Erysimastrum, *C. A. Mey.* 354
 Erysimum, *Linn.* 354
 Erysiphe, *Hedw. fil.* 43
 Erytheremia, *Nutt.* 715
 Erythracanthus, *Nees.* 679
 Erythraea, *Ren.* 614
 Erythranthe, *Spach.* 684
 Erythrina, *Linn.* 555
 Erythrineææ, 555
 Erythrocarpus, *Bl.* 231
 Erythrochilus, *Reinw.* 281
 Erythrochiton, *N. et M.* 471
 Erythrocostus, *Dun.* 350
 Erythrodonum, *Thouars.* 764
 Erythrodos, *Blum.* 183
 Erythrolæna, *Sweet.* 714
 Erythronium, *Linn.* 204
 Erythropalum, *Blum.* 315
 Erythropila, *E. M.* 385
 Erythropilæum, *Afzel.* 556
 Erythropogon, *DC.* 713
 Erythropopsis, *Lindl.* 362
 Erythrorechia, *Blum.* 182
 Erythrorhiza, *L. C. R.* 450
 Erythrospermeææ, 323
 Erythrospermum, *Lam.* 328
 Erythrostemon, *Lk.* 555
 Erythrostickus, *Schlecht.* 199
 Erythrostigma, *Hassk.* 467
 Erythroxyloceææ, 373, 391^o
 Erythroxyloceææ, *Kth.* 391
 Erythroxyloceææ, *Linn.* 391
 Erythroxyloceææ, 391
 Escallonia, *Mutis.* 752
 Escalloniaceææ, 749, 752^o
 Escalloniads, 752
 Escalloniæææ, *DC.* 752
 Eschenbachia, *Mönch.* 710
 Eschscholtzia, *Cham.* 431
 Eschweilera, *Mart.* 740
 Escobedia, *Rütz et Pav.* 684
 Escobediæææ, 684
 Esenbeckia, *Bl.* 261
 Esenbeckia, *Brid.* 67
 Esenbeckia, *H. B. K.* 471
 Esera, *Neck.* 434
 Esmeraldia, *Reichb.* 498
 Esopon, *Rufa.* 715
 Espejoa, *DC.* 712
 Espletia, *Mut.* 711
 Esjera, *Willd.* 372
 Espera, *Dec.* 19
 Espinosa, *Lagase.* 564
 Esterhazyia, *Mik.* 685
 Esula, *Hon.* 241
 Etballia, *Benth.* 556
 Ethanum, *Schub.* 167
 Ethulla, *Cass.* 709
 Ethulla, *Gurln.* 710
 Ethulicæææ, 709
 Etlingera, *Giescke.* 167
 Euactis, *Kützling.* 10
 Euarthrocarpus, *Labill.* 355
 Eucastrum, *Ehr.* 10, 13
 Eubasis, *Salisb.* 783
 Eucalyptus, *Herit.* 737

Eucapnos, *Bernh.* 436
 Eucarpha, *R. Br.* 534
 Eucarya, *Mitch.* 788
 Eucephalus, *Nutt.* 709
 Eucerca, *Mart.* 331
 Eucheretis, *Barth. et Wendl.* 471
 Eucharidium, *Fisch. et Mey.* 725
 Euchilus, *R. Br.* 553
 Euchiton, *DC.* 713
 Euchlora, *Eckl. et Zey.* 553
 Euchloris, *Kunth.* 115
 Euchresta, *Benn.* 555
 Euchroma, *Fenzl.* 511
 Euchroma, *Nutt.* 685
 Euclea, *Linn. f.* 596
 Euclidæææ, 354
 Euclidium, *R. Br.* 354
 Euclimia, *DC.* 765
 Euclisia, *Nutt.* 354
 Eucnemis, *Brid.* 67
 Eucnemis, *Lindl.* 182
 Eucomis, *Herit.* 205
 Eucosia, *Blum.* 182
 Eucurium, *Nutt.* 204
 Eucrosia, *Ker.* 158
 Eucryphia, *Cav.* 406
 Eucryphiæææ, *Endl.* 405
 Eucyathocoma, *Fenzl.* 119
 Eudema, *Humb. et B.* 354
 Eudesia, *R. Br.* 737
 Eudianthe, *Reichb.* 498
 Eudiosmeæææ, 471
 Eudorus, *Cass.* 713
 Eudoxia, *Don.* 614
 Euepidium, *Lindl.* 181
 Eufragia, *Col.* 685
 Eugamelia, *Fl. Mex.* 711
 Eugaissona, *Griff.* 139
 Eugenia, *Mich.* 738
 Eugenioides, *Linn.* 593
 Eugratiolæææ, 684
 Euhymenia, *Kützling.* 10
 Eulalia, *Kunth.* 116
 Eulohus, *Nutt.* 725
 Eulophia, *R. Br.* 181
 Eulophus, *Nutt.* 779
 Eumachia, *DC.* 764
 Eumimoseæææ, 556
 Eumorphia, *Eckl.* 494
 Eumorphia, *DC.* 712
 Eumanus, *Benth.* 684
 Eunomia, *DC.* 354
 Eunotia, *Ehr.* 13
 Euonymeæææ, 588
 Euonymus, *L.* 588
 Euosma, *Andrews.* 604
 Euosmanthus, *A. Cunn.* 721
 Euosmia, *H. B. K.* 765
 Euparea, *Banks.* 646
 Eupatoriaceæææ, 703, 709
 Eupatorium, *Tournef.* 709
 Eupetalum, *Lindl.* 319
 Euphorbia, *L.* 281
 Euphorbiaceæææ, 273, 274^o
 Euphorbie, *Juss.* 274
 Euphorbiates, 243, 246, 273^o
 Euphorbiææææ, 281
 Euphorbium, *Sm.* 281
 Euphorbia, *Comm.* 385
 Euphrasiææææ, 685
 Euphrouia, *Mart. et Z.* 565
 Euphrosinia, *Reichb.* 711
 Euphrosyne, *DC.* 711
 Euploca, *Nutt.* 653
 Eupodium, *J. Sm.* 82
 Eupogonum, *Kützling.* 10
 Eupotelen, *Zucc.* 580
 Eupreum, *Wight. et Arn.* 764
 Euphyllææææ, *Endl.* 765
 Eurhaphia, *Trin.* 115
 Eurila, *Blum.* 795
 Euriosma, *Pear.* 555
 Eurytia, *Adans.* 513
 Eurrolium, *Link.* 43
 Eurya, *Thunb.* 397

- Euryale, *Salisb.* 411
 Euryalidae, 411
 Euryandra, *Forst.* 424
 Euryanthe, *Schlecht.* 397
 Eurylasis, *Brid.* 67
 Eurylybia, *Cass.* 709
 Eurybiopsis, *DC.* 709
 Eurychiton, *Nimmo.* 641
 Eurycles, *Salisb.* 158
 Eurycoma, *Jack.* 468
 Eurydice, *Pers.* 161
 Eurylepis, *Benth.* 455
 Eurylobium, *Hochst.* 608
 Euryloma, *Don.* 455
 Eury nema, *Endl.* 479
 Euryops, *Cass.* 713
 Euryptera, *Nutt.* 778
 Eury spermium, *Salisb.* 533
 Eurystegia, *Benth.* 455
 Eurystoma, *Benth.* 455
 Eurytania, *Nutt.* 778
 Eurythalia, *Reichb.* 614
 Eurytion, *DC.* 25
 Eusephias, *S. et Z.* 381
 Eusepala, *Baudo.* 645
 Euspermeæ, *Hor.* liv
 Eustachya, *Rafin.* 685
 Eustachyis, *DC.* 115
 Eustathes, *Lour.* 385
 Eustegia, *R. Br.* 626
 Eustictia, *Brid.* 67
 Eustoma, *Don.* 614
 Eustrephus, *R. Br.* 205
 Eustrobilus, *Endl.* 533
 Eutassa, *Salisb.* 229
 Eutaxia, *R. Br.* 553
 Eutelia, *R. Br.* 575
 Euterpe, *Gärtn.* 138
 Euthales, *R. Br.* 695
 Euthalia, *Penzl.* 498
 Euthamia, *DC.* 710
 Euthemis, *Jack.* 475
 Eutmon, *Rafin.* 501
 Eutoca, *R. Br.* 639
 Eutomia, *Haw.* 13
 Eutrema, *R. Br.* 354
 Eutriana, *Trin.* 116
 Eutropia, *Kl.* 282
 Eutropis, *Valc.* 626
 Euxenia, *Cham.* 710
 Euxeniæ, 710
 Euzomum, *Link.* 355
 Evallaria, *Neck.* 205
 Evandra, *R. Br.* 119
 Evanthe, *Salisb.* 455
 Evax, *Gärtn.* 710
 Even, *Aubl.* 764
 Evelyne, *Pöpp. et Endl.* 181
 Evernia, *Achar.* 50
 Eversmannia, *Bunge.* 554
 Evodia, *Forst.* 471
 Evodia, *Gärtn.* 537
 Evolvulus, *Linn.* 631
 Evonymodaphne, *Nees.* 537
 Evonymoides, *Soland.* 385
 Evonymus, *Tournef.* 588
 Evopis, *Cass.* 713
 Evosmia, *H. et B.* 765
 Eyota, *Lindl.* 182
 Ewyelia, *Bhm.* 733
 Exacum, *Linn.* 614
 Exadenus, *Gries.* 614
 Exarrhena, *R. Br.* 636
 Excipula, *Fries.* 42
 Excæcaria, *L.* 281
 Excremis, *Willd.* 205
 Exidia, *Fries.* 42
 Exilaria, *Grev.* 13
 Exitelia, *Blum.* 364
 Exocantha, *Labill.* 779
 Exocarpeæ, *Arnott.* 530
 Exocarpus, *Labill.* 531
 Exochrenium, *Gris.* 614
 Exogeneæ, *DC.* 235
 Exogens, 4, 235*
 Exogonium, *Chois.* 631
 Exomis, *Moq.* 513
 Exorhizeæ, *Rich.* 235
 Exosporium, *Link.* 43
 Exostemma, *L. C. Rich.* 765
 Exostyles, *Schott.* 556
 Exothea, *Macfad.* 385
 Exothostemon, *G. Don.* 601
 Exydra, *Endl.* 116
 Eyselia, *Neck.* 771
 Eyselina, *Reichb.* 712
 Eysenhardtia, *H. B. K.* 554
 Faba, *Tourn.* 554
 Fabaceæ, 539, 544*
 Fabago, *Tourn.* 479
 Fabiana, *Ruiz et P.* 621
 Fabria, *E. M.* 680
 Fabricia, *Adans.* 661
 Fabricia, *Gärtn.* 738
 Fabricia, *Scop.* 554
 Fabronia, *Raddi.* 67
 Facchinia, *Rehb.* 497
 Facelidæ, 714
 Facelis, *Cass.* 714
 Fadgenia, *Endl.* 295
 Fadgenia, *Hook.* 80
 Fagara, *Lam.* 473
 Fagarastrum, *Don.* 460
 Fagelia, *Neck.* 555
 Fagonia, *Tourn.* 479
 Fagopyrum, *Tourn.* 504
 Fagraea, *Thunb.* 604
 Fagus, *L.* 291
 Falcaria, *Rivin.* 778
 Falcatula, *Forst.* 554
 Falconeria, *Royle.* 259
 Faldermannia, *Bunge.* 661
 Falkia, *Linn. f.* 632
 Fallopia, *Adans.* 504
 Fallugia, *Endl.* 565
 Faramca, *Aubl.* 764
 Farnesia, *Gasp.* 556
 Farobæa, *Schr.* 713
 Farsetia, *Torr.* 354
 Fartima, *Dumort.* xxxvi
 Fasciata, *Gray.* 22
 Fasciola, *Dum.* 59
 Fastigiaria, *Stackh.* 24
 Fatia, *DC.* 575
 Fatoua, *Gaud.* 268
 Fatrea, *Thouars.* 718
 Faujasia, *Cass.* 713
 Faustula, *DC.* 713
 Favolus, *Fries.* 41
 Favonium, *Gärtn.* 713
 Fææa, *Spreng.* 711
 Fedia, *Adans.* 698
 Fedia, *Mönch.* 698
 Feen, *Bory.* 80
 Fegatella, *Raddi.* 58
 Felicia, *DC.* 709
 Felicianna, *Camb.* 733
 Fenzlia, *Benth.* 636
 Fenzlia, *Endl.* 733
 Ferberia, *Scop.* 370
 Ferdinanda, *Lajase.* 711
 Ferdinandæa, *Pohl.* 765
 Ferdinandusa, *Pohl.* 765
 Fereiria, *Vand.* 765
 Feretia, *Del.* 764
 Fernandesia, *Ruiz et P.* 181
 Fernelia, *Comm.* 765
 Ferns, 78
 Feronia, *Corr.* 458
 Ferreola, *Roeb.* 596
 Ferula, *Tourn.* 778
 Ferulago, *Koch.* 778
 Festuca, *Linn.* 116
 Festuceæ, 116
 Fenillea, *L.* 315
 Fibi gina, *Med.* 354
 Fibraurea, *Lour.* 309
 Fibrillaria, *Pers.* 11
 Ficaria, *Dill.* 428
 Fichten, *C. H. Sch.* 715
 Ficinia, *Schrad.* 119
 Ficinidæ, 119
 Ficoidales, 243, 245, 246, 523*
 Ficoides, *Dill.* 527
 Ficoides, *Juss.* 525
 Ficoideis, 525
 Ficus, *Tournef.* 268
 Fidelia, *Schultz.* 715
 Fiedia, *A. Cunn.* 672
 Fiedia, *Gaud.* 181
 Figworts, 681
 Filaginopsis, *Tourn.* 710
 Filago, *Tourn.* 713
 Filago, *Willd.* 710
 Filicales, 53, 74*
 Filices, *Juss.* 74
 Filices, *L.* xxxiv
 Filices vere, *Willd.* 78
 Filicineæ, *Perl.* xlix
 Filipendula, *Tourn.* 565
 Filicea, *Grill. et P.* 555
 Filum, *Stack.* 22
 Fimbriaria, *Nees.* 58
 Fimbriaria, *Stackh.* 25
 Fimbriaria, *St. Hil.* 390
 Fimbrillaria, *Cass.* 710
 Fimbristylis, *Vahl.* 119
 Fincke, *Klotzsch.* 455
 Findlaya, *Bowd.* 616
 Fingerhuthia, *Nees.* 115
 Finlaysonia, *Wall.* 626
 Fintelmannia, *Kunth.* 119
 Firensia, *Neck.* 629
 Firmiana, *Mart.* 362
 Fir-rapes, 452
 Fischera, *Spreng.* 778
 Fischera, *Swartz.* 455
 Fischeria, *DC.* 10, 626
 Fissena, *R. Br.* 745
 Fissidens, *Hedw.* 67
 Fissilia, *Comm.* 44
 Fissurina, *Fée.* 50
 Fistularia, *Grev.* 19
 Fistulina, *Bull.* 41
 Fiwa, *Gmel.* 537
 Flabellaria, *Cav.* 390
 Flabellaria, *Link.* 19
 Flacourtee, 328
 Flacourtia, *Comm.* 328
 Flacourtiaceæ, 326, 327*
 Flacourtiaceæ, *Rich.* 327
 Flagellaria, *Linn.* 188
 Flagellaria, *Stack.* 22
 Flagellariceæ, *Endl.* 188
 Flammula, *Fries.* 41
 Flaveria, *Juss.* 711
 Flaverlece, 711
 Flaxworts, 485
 Fleischeria, *Steud.* 364, 715
 Flemingia, *Ham.* 679
 Flemingia, *Roeb.* 555
 Fleurya, *Gaud.* 262
 Flindersia, *R. Br.* 462
 Florestium, *Cass.* 712
 Florida, *J. Ag.* 23
 Florinda, *Nor.* 588
 Flörken, *Spr.* 691
 Flörken, *W.* 367
 Floscopa, *Lour.* 795
 Flotuya, *Spreng.* 714
 Floureusia, *Camb.* 498
 Flourensia, *DC.* 711
 Flüggen, *Rich.* 205
 Flüggen, *Willd.* 282
 Fluidacia, *Dumort.* xxxvii
 Fluviales, *Vent. et Rich.* 143
 Fluvialis, *Mich.* 144
 Fœniculum, *Adans.* 778
 Fœnum Græcum, *Tournef.* 554
 Fœtidia, *Comm.* 755
 Folliculæ, 533
 Fontanesia, *Labill.* 617
 Fontenellea, *St. Hil.* 565
 Fontinalis, *Linn.* 67

- Forbesia, *Eckl.* 154
 Forestiera, *Poir.* 283
 Forestiera, *Endl.* 283
 Forficaria, *Lindl.* 182
 Forgardia, *Fl. Fl.* 718
 Forsesia, *Conn.* 752
 Fornicaria, *Num.* 181
 Fornicium, *Cass.* 714
 Forrestia, *A. Rich.* 188
 Forrestia, *Raf.* 582
 Forskolea, *Linn.* 262
 Forstera, *Linn. f.* 696
 Forsteronia, *C. F. W. Mey.* 601
 Forsteropsis, *Sonder.* 696
 Forsythia, *Vahl.* 617
 Forsythia, *Walt.* 753
 Fortuynia, *Schutt.* 355
 Fortuynide, *Boiss.* 355
 Fossellia, *Scop.* 354
 Fossombronia, *Raddi.* 59
 Fothergilla, *Aubl.* 733
 Fothergilla, *Linn.* 784
 Fougeria, *Mönch.* 711
 Fougroudia, *DC.* 711
 Fougneria, *H. B. K.* 795
 Fougroya, *Fent.* 158
 Foveolaria, *DC.* 372
 Foveolaria, *Ruiz et Pav.* 593
 Fragaria, *Linn.* 564
 Frageria, *DC.* 714
 Fragillaria, *Lynob.* 13
 Fragillaria, *Bory.* 12
 Frangosa, *Ruiz et Pav.* 778
 Franca, *Mich.* 340
 Francisca, *DC.* 346
 Francisca, *DC.* 346
 Francisca, *Pohl.* 684
 Francisia, *Endl.* 721
 Francoa, *Cavan.* 451
 Francoacea, 446, 451*
 Francoads, 451
 Francoeuria, *Cass.* 710
 Frangula, *Tourn.* 582
 Frankenia, *Linn.* 340
 Frankeniaceae, 326, 340*
 Frankeniads, 340
 Frankia, *Stud.* 710
 Franklandia, *R. Br.* 533
 Franklandide, 533
 Franklinia, *Marsh.* 397
 Franquevillia, *Gray.* 614
 Franseria, *Car.* 711
 Fraxera, *Walt.* 614
 Frauenhoferia, *Mart.* 588
 Fraxineae, 616, 617
 Fraxinella, *Tourn.* 471
 Fraxinellae, *Nees et Martius.* 469
 Fraxinus, *Tourn.* 617
 Fremania, *Boj.* 713
 Fressa, *Eckl.* 161
 Freira, *Gaud.* 262
 Fremontia, *Torrey.* 513
 Fresenia, *DC.* 710
 Frenchenia, *Eckl.* 161
 Freycinetia, *Gaud.* 152
 Freycinetia, *Ad. Brongn.* 139
 Freyera, *Reichb.* 779
 Freyria, *Sepp.* 617
 Freylinia, *Colla.* 684
 Freziera, *Sepp.* 397
 Fridericia, *Mart.* 677
 Friedlandia, *Chom.* 573
 Friedrichsthalia, *Penzl.* 656
 Friesia, *DC.* 372
 Friesia, *Spr.* 281
 Fringe Myrtles, 721
 Frisen, *Reichb.* 788
 Fritillaria, *Linn.* 204
 Fritzscheia, *Chom.* 793
 Frivaldia, *Endl.* 710
 Fröhlichia, *Mönch.* 511
 Fröhlichia, *Vahl.* 784
 Fröhlichia, *Wulf.* 119
 Froloria, *Leleb.* 713
 Froripia, *Keck.* 774
 Frostia, *Bert.* 93
 Fructaulia, *Dumort.* xxxvii
 Fructesca, *DC.* 604
 Fructiflora, *Dumort.* xxxvii
 Fructitegmia, *Dumort.* xxxvii
 Fructitubia, *Dumort.* xxxvii
 Fructuugilia, *Dumort.* xxxvii
 Frullania, *Nees.* 59
 Frullanioides, *Raddi.* 59
 Frustulia, *Ag.* 13
 Fucaceae, 9, 20*
 Fucaea, 10, 22
 Fucellaria, 10
 Fuchsee, 725
 Fuchsia, *Num.* 725
 Fuchsia, *Swartz.* 765
 Fucideae, 22
 Fucus, *L.* 10, 52
 Fugosia, *Juss.* 370
 Fuirena, *Rollb.* 119
 Fuireneae, 119
 Fulcaldea, *Poir.* 714
 Fulgia, *Chev.* 50
 Fullartonia, *DC.* 710
 Fumana, *Spach.* 350
 Fumaria, *Tourn.* 436
 Fumariaceae, 432, 435*
 Fumariace, 436
 Fumeworts, 435
 Funaria, *Hedw.* 67
 Fungales, 7, 29*
 Fungi, *Juss.* 29
 Fungi, *L.* xxxiv
 Funginia, *Dumort.* xxxvii
 Funifera, *Leandr.* 531
 Funkia, *Donst.* 718
 Funkia, *Spreng.* 205
 Funkia, *Willd.* 192
 Furcaria, *DC.* 370
 Furcaria, *Desv.* 80
 Furcellaria, *Lamx.* 24
 Furnrohria, *Koch.* 778
 Fusanus, *Linn.* 788
 Fusarium, *Lk.* 43
 Fuscaria, *Stackh.* 25
 Fuscina, *Schrank.* 67
 Fusiconia, *Palis.* 67
 Fusidium, *Link.* 43
 Fuspisporium, *Fries.* 43
 Fusoma, *Corda.* 44
 Gabertia, *Gaud.* 181
 Gärtnera, *Lam.* 604
 Gärtnera, *Retz.* 691
 Gagea, *Raddi.* 67
 Gagea, *Satisb.* 204
 Gagnebina, *Neck.* 556
 Gaguedi, *Bruce.* 533
 Galuia, *Forst.* 119
 Gaillardia, *Foug.* 711
 Gaillardia, 711
 Gaillardotella, *Bory.* 18
 Gaillonia, *A. Rich.* 764
 Gailloua, *Bonnem.* 25
 Gaillonella, *Bory.* 13
 Guimardia, *Gauleich.* 120
 Gaiodendron, *G. Don.* 791
 Galacineae, *Don.* 451
 Galactia, *P. Br.* 555
 Galactites, *Mönch.* 714
 Galactodendrum, *H.* 271
 Galanthus, *Linn.* 158
 Galardia, *Lam.* 711
 Galasia, *Cass.* 715
 Galtea, *Cass.* 709
 Galatella, *Cass.* 709
 Galathea, *Herb.* 158
 Galathea, *Satisb.* 161
 Galatheiina, *Kull.* 715
 Galax, *Linn.* 459
 Galaxaura, *Lamx.* 22
 Galaxia, *Thunb.* 161
 Galbanophora, *Neck.* 773
 Galbanum, *Don.* 778
 Galbina, *Ner.* 582
 Gale, *Tourn.* 256
 Galeana, *Llar. et L.* 715
 Galeandra, *Lindl.* 181
 Galearia, *Presl.* 554
 Galedragon, *Gray.* 700
 Galedupa, *Lour.* 555
 Galega, *Tourn.* 554
 Galegeae, 554
 Galenia, *Linn.* 527
 Galeobdolon, *Mönch.* 662
 Galeoglossum, *A. Rich.* 182
 Galeola, *Lour.* 183
 Galeopsis, *Linn.* 662
 Galeotia, *A. Rich.* 182
 Galera, *Blum.* 183
 Galera, *Fries.* 41
 Galeworts, 248, 256
 Galiceae, 756, 768*, 772
 Galistrum, *Heist.* 498
 Galieae, *Turp.* 768
 Galiniere, *Del.* 764
 Galinsoga, *Ruiz et P.* 712
 Galinsogaea, *Zucc.* 712
 Galinsogaea, *Less.* 712
 Galinsogaeae, 712
 Galipea, *Aubl.* 471
 Galium, *Linn.* 771
 Gallaria, *Schrank.* 733
 Galliesia, *Casar.* 386
 Galopina, *Thunb.* 746
 Galopthalmum, *Nees.* 715
 Galordia, *Reusch.* 711
 Galorhæus, *Haw.* 281
 Galphimia, *Cav.* 390
 Galurus, *Spr.* 281
 Galvaia, *Vand.* 764
 Galvezia, *Domb.* 684
 Galvezia, *Ruiz et Pav.* 473
 Gamocarpha, *DC.* 701
 Gamochilum, *Walp.* 554
 Gamochilus, *Lestib.* 167
 Gamolepis, *Less.* 712
 Gamoplexis, *Falc.* 182
 Gandola, *Rumph.* 524
 Gandulium, *Rumph.* 167
 Ganitrus, *Gärtn.* 372
 Gauja, *Rumph.* 372
 Gausblum, *Adans.* 354
 Ganymedes, *Haw.* 158
 Garcia, *Rohr.* 281
 Garciana, *Lour.* 186
 Garcilassa, *Pöpp.* 711
 Garciaia, *Linn.* 402
 Garcinieae, 402
 Gardenia, *Ell.* 765
 Gardeniade, 765
 Gardeniola, *Cham.* 765
 Gardneria, *Wall.* 604
 Gardoquia, *Ruiz et P.* 661
 Gardiella, *Tourn.* 428
 Carnotia, *Brongn.* 115
 Garrya, *Dougl.* 295
 Garryaceae, 294, 295*, 772
 Garryades, 295
 Garryales, 243, 246, 294*
 Gärtnera, *Schreb.* 390
 Garuga, *Roxb.* 460
 Garulium, *Cass.* 710
 Gasparium, *Endl.* 611
 Gasterin, *Dun.* 295
 Gasterocarpidæ, 25
 Gasteromyces, 41, 42
 Gasteromycel, *Grav.* 29
 Gastrothallumae, 50
 Gastonia, *Comm.* 781
 Gastridium, *Palis.* 115
 Gastridium, *Grav.* 25
 Gastrocarpha, *Don.* 714
 Gastrochilus, *Dun.* 181
 Gastrochilus, *Wall.* 167
 Gastrochilum, *Kützling.* 11
 Gastrochil, *R. Br.* 182
 Gastrodium, 182
 Gastroglottis, *Blum.* 181
 Gastrolobium, *R. Br.* 553

- Gastrolychnis, *Fenzl*. 498
 Gastromeria, *Don*. 684
 Gastronema, *Herb*. 158
 Gastropodium, *Lindl*. 181
 Gattenhofia, *Neck*. 712
 Gatyona, *Cass*. 715
 Gaudichaudæ, *A. de J.* 390
 Gandichaudia, *Kth.* 390
 Gaudinia, *Gay*. 509
 Gaudinia, *Palis*. 116
 Gautheria, *Linn*. 455
 Gaura, *Linn*. 725
 Gaureæ, 725
 Gauridium, *Spach*. 725
 Gaultiera, *Kalm*. 455
 Gaultiera, *Vill*. 42
 Gavillea, *Pöpp*. 182
 Gaya, *Gaud*. 778
 Gaya, *H. B. K.* 370
 Gaya, *Spreng*. 364
 Gaylussacia, *Kunth*. 753
 Gayophytum, *A. Juss*. 725
 Gazania, *Gärtn*. 713
 Geantliia, *Rafin*. 199
 Geanthus, *Reine*. 167
 Genster, *Pers*. 42
 Geblera, *F. et M.* 282
 Geeria, *Blum*. 397
 Geigera, *Schott*. 471
 Geigeria, *Gries*. 710
 Geisenia, *Rafin*. 428
 Geissaspis, *W. et A.* 554
 Geisscleria, *Kl.* 281
 Geissois, *Labill*. 572
 Geissoloma, *Lindl*. 578
 Geissolomeæ, *Endl*. 577
 Geissomeria, *Lindl*. 679
 Geissorhiza, *Ker*. 161
 Geissostegia, *Benth*. 455
 Geitonoplesium, *A. C.* 205
 Gela, *Lourc*. 473
 Gelasina, *Herb*. 161
 Gelatinaria, *Fürke*. 50
 Gelatinaria, *Roussel*. 22
 Gelidieæ, 10
 Gelidium, *Lamx.* 10, 25
 Gelinaria, *Sonder*. 796
 Gelonium, *Gärtn*. 385
 Gelonium, *Roeb*. 281
 Gembanga, *Bhon*. 139
 Gemella, *Lour*. 385
 Gendarussa, *Nees*. 680
 Gevea, *Vitt*. 43
 Genesiphylia, *Herit*. 282
 Genetyllis, *DC*. 721
 Genicularia, *Rouss*. 22
 Geniosporium, *Wall*. 651
 Geniostoma, *Forst*. 604
 Genipa, *Blum*. 765
 Geupella, *L. C. Rich*. 765
 Genista, *Linn*. 554
 Genistææ, 553
 Genlisa, *Sl. Hill*. 686
 Genlisa, *Reichb*. 161
 Genoplesium, *R. Br.* 183
 Genoria, *Pers*. 575
 Genosiris, *Labill*. 161
 Gentiana, *Tournef*. 614
 Gentianaceæ, 594, 612*, 668
 Gentianales, 245, 246, 594*
 Gentianeæ, 612, 614
 Gentianella, *Bork*. 614
 Gentianworts, 612
 Geocalycidæ, 60
 Geocalyx, *Nees*. 60
 Geochorda, *Ch*. 685
 Geocyclus, *Kütz*. 10
 Geodorum, *Jacke*. 182
 Geoffroya, *Jacq*. 555
 Geoglossum, *Pers*. 43
 Geonoma, *Willd*. 139
 Geophila, *Berg*. 199
 Geophila, *Don*. 764
 Geopogon, *Endl*. 115
 Georchis, *Lindl*. 183
 Georgia, *Elyth*. 67
 Georgia, *Spreng*. 710
 Georgina, *Willd*. 710
 Gerania, *Juss*. 493
 Geraniaceæ, 484, 493*
 Geraniales, 244, 246, 484*
 Geranium, *Herit*. 494
 Gerardia, *Linn*. 685
 Gerardiææ, 685
 Geraseanthus, *P. Br.* 629
 Gerbera, *Gronov*. 714
 Gerberia, *Scop*. 361
 Germanea, *Lam*. 661
 Gerontogea, *Cham*. 765
 Geropogon, *Linn*. 715
 Gersinia, *Ner*. 181
 Gerumia, *Forsk*. 440
 Gerymia, *Schrank*. 568
 Gesneria, *Mart*. 672
 Gesneraceæ, 668, 761*
 Gesnerææ, 672
 Gesnerææ, *Von Martius*. 671
 Gesueriaceæ, *Link*. 671
 Gesneriææ, *Rich. et Juss*. 671
 Gesnerworts, 671
 Gesnonimia, *Gaud*. 262
 Gethioides, *Col*. 205
 Gethyllis, *Linn*. 158
 Gethym, *Salisb*. 167
 Gictodia, *Roeb*. 718
 Geum, *Linn*. 565
 Geunsia, *Blum*. 664
 Geunsia, *Pl. mex*. 501
 Ghiesbreghtia, *A. Rich*. 182
 Ghinia, *Schreb*. 664
 Gibbaria, *Cass*. 715
 Gibbera, *Fries*. 44
 Giesckia, *Linn*. 509
 Gifola, *DC*. 713
 Gigandra, *Salisb*. 455
 Gigantea, *Stack*. 22
 Gigartina, *Lamx.* 10, 25
 Gigartiææ, 10
 Gigerum, *Cesalp*. 129
 Gilia, *Ruiz et Pav*. 636
 Gilbertia, *Gmel*. 464
 Gilbertia, *Ruiz et Pav*. 781
 Gillenia, *Münch*. 565
 Gilliesia, *Lindl*. 197
 Gilliesiaceæ, 195, 196*
 Gilliesiads, 196
 Gimbernata, *R. et P.* 718
 Givalloa, *Korth*. 791
 Gingerworts, 165
 Gingidium, *Forst*. 778
 Ginginsia, *DC*. 498
 Ginko, *Kämpf*. 231
 Gimnania, *Diels*. 781
 Gimnania, *Mont*. 25
 Gimnania, *Scop*. 556
 Ginora, *Linn*. 575
 Ginoria, *Jacq*. 575
 Girardia, *Gray*. 19
 Girardinia, *Gaud*. 262
 Girodella, *Gaill*. 13
 Gisopteris, *Beruh*. 81
 Gissonia, *Salisb*. 533
 Githago, *Desf*. 498
 Givotia, *Griff*. 281
 Glabraria, *Linn*. 537
 Gladiolus, *Tourn*. 161
 Glæoporus, *Mont*. 41
 Glandularia, *Gmel*. 664
 Glandulifolia, *Wendl*. 471
 Glaphyranthus, *Endl*. 737
 Glaphyria, *Jacq*. 738
 Glastaria, *Baiss*. 355
 Glastum, *DC*. 355
 Glancium, *Tourn*. 431
 Glaux, *Tourn*. 645
 Glebionis, *Cass*. 712
 Glechoma, *Linn*. 662
 Glechon, *Spreng*. 661
 Gleditschin, *Linn*. 556
 Gleichenere, *R. Br.* 80
 Gleichenia, *Smith*. 85
 Gleicheniaceæ, *Mart*. 85
 Glinus, *L.* 526
 Gliocladium, *Corda*. 43
 Gliostroma, *Corda*. 44
 Gliotrichum, *Eschw*. 44
 Gliroidia, *Kunth*. 555
 Glioschrocaryon, *Endl*. 723
 Glissanthe, *Salisb*. 167
 Globba, *Linn*. 167
 Globifera, *Gmel*. 685
 Globularia, *Linn*. 667
 Globularinææ, *DC*. 666
 Globulea, *Haw*. 346
 Globulina, *Link*. 18
 Globulina, *Turp*. 18
 Gloclidion, *Forst*. 282
 Glochidonopsis, *Adr. Juss*. 282
 Gloccapsa, *Kütz*. 9
 Gloeosiphææ, 9
 Gloetila, *Kütz*. 10
 Gloiocladii, *J. Agh*. 24
 Gloiocladiidææ, 24
 Gloiocoocus, *Shutt*. 18
 Gloiodictyon, *Ag*. 13
 Gloiopeltis, *J. Agh*. 24
 Gloiotrictia, *J. Agh*. 18
 Glomera, *Blum*. 181
 Glonium, *Müllerb*. 43
 Gloriosa, *Linn*. 205
 Glossanthus, *Klein*. 672
 Glossarthei, *M. et Z.* 339
 Glossaspis, *Lindl*. 182
 Glossocardia, *Cass*. 711
 Glossocaryn, *Wall*. 664
 Glossocomia, *Pon*. 691
 Glossodia, *R. Br.* 182
 Glossogyne, *Cass*. 711
 Glossoma, *Schreb*. 783
 Glossoneura, *Dce*. 626
 Glossopetalum, *Schreb*. 588
 Glossospermum, *Wall*. 364
 Glossosperon, *Desf*. 364
 Glossostephanus, *E. M.* 626
 Glossostigma, *Arn*. 685
 Glossostylis, *Cham*. 684
 Glossula, *Lindl*. 182
 Glossula, *Raf*. 794
 Glottidium, *Deso*. 554
 Glotinia, *Herit*. 672
 Glumales, 103, 105*
 Glumosa, *Herb*. 161
 Gluta, *Linn*. 467
 Glutago, *Comm*. 791
 Glutiaria, *Comm*. 710
 Glyce, *Lindl*. 354
 Glyceria, *Nutt*. 778
 Glyceria, *R. Br.* 116
 Glyciderns, *Cass*. 715
 Glycine, *Linn*. 555
 Glycineææ, 555
 Glycosma, *Nutt*. 779
 Glycosmis, *Corr*. 458
 Glycyphylla, *Rafin*. 455
 Glycyrrhiza, *Linn*. 554
 Glypha, *Lourc*. 695
 Glyphia, *Cass*. 715
 Glyphidææ, 50
 Glyphis, *Achar*. 50
 Glyphocarpus, *R. Br.* 67
 Glyphomitrium, *Brid*. 67
 Glyphomitrium, *Schw*. 67
 Glyphospermum, *Don*. 614
 Glyptospermeææ, *Vent*. 40
 Gmelina, *Linn*. 664
 Gnaphalium, *Don*. 713
 Gnaphalium, *Tourn*. 712
 Gnaphalium, *Vaill*. 710
 Gnaphalodes, *Tourn*. 710
 Gnaphalopsis, *DC*. 715
 Gnetum, *Rumph*. 234
 Gnetophosia, *Cass*. 712
 Gnetaceææ, 222, 232*
 Gnetæææ, *Blume*. 232
 Gnetum, *Linn*. 234

- Gnidia, *Linn.* 531
 Gochmatia, *H. B. K.* 714
 Godetia, *Spach.* 725
 Godinella, *Lestib.* 645
 Godovia, *Pers.* 307
 Godoya, *Ruiz et Pav.* 307
 Gœppertia, *Nees.* 169, 537
 Gœthea, *N. et M.* 370
 Götzen, *Wyd.* 795
 Gohoria, *Neck.* 778
 Goldbachia, *DC.* 355
 Goldbachia, *Trin.* 116
 Goldfussia, *Nees.* 679
 Gomara, *Adans.* 346
 Gomara, *Ruiz et Pav.* 685
 Gomesia, *Llar.* 715
 Gomezia, *R. Br.* 182
 Gomezia, *Mut.* 764
 Gomezium, *DC.* 555
 Gomortega, *R. et P.* 537
 Gomphandra, *Wall.* 444
 Gomphen, *Schrœb.* 475
 Gomphichis, *Lindl.* 182
 Gomphidius, *Fr.* 41
 Gomphocarpus, *R. Br.* 626
 Gompholobium, *Smith.* 553
 Gomphonema, *Ag.* 13
 Gomphopetalum, *Turez.* 778
 Gomphophorus, *Brid.* 67
 Gomphosporia, *Kütz.ing.* 9
 Gomphostigma, *Turez.* 685
 Gomphostemma, *Wall.* 662
 Gomphostylis, *Wall.* 181
 Gomphrena, *Linn.* 511
 Gomphrenœæ, 511
 Gomutus, *Rumph.* 138
 Gonatanthus, *Kl.* 129
 Gonatobotrys, *Corda.* 43
 Gonatocarpus, *Willd.* 723
 Gonatorhodus, *Corda.* 43
 Gonatotrichum, *Nees.* 43
 Gongora, *Pl. Fern.* 182
 Gongroceras, *Kütz.ing.* 10
 Gongronœa, *Endl.* 627
 Gongrosira, 10
 Gongycladon, *Link.* 22
 Gonzylanthus, *Nees.* 60
 Gonzylocarpus, *Schied. et J.* 725
 Gonzyolocladium, *Wallr.* 44
 Gonycarpus, *Kön.* 723
 Goniocaulon, *DC.* 714
 Goniociton, *Bl.* 464
 Goniocystis, *Hassall.* 795
 Gonioma, *E. Mey.* 601
 Goniophlebium, *Blum.* 79
 Goniopteris, *Presl.* 79
 Goniopodium, *Link.* 43
 Goniostemma, *Wight.* 625
 Goniotalamus, *Blum.* 422
 Goniotrichium, *Kütz.ing.* 10
 Gonocarpus, *Hamil.* 718
 Gonocarpus, *Thunb.* 723
 Gonogona, *Link.* 182
 Gonolobææ, 625
 Gonolobus, *Michx.* 628
 Gonopyrum, *Fisch.* 504
 Gonosperrum, *Less.* 712
 Gonotheca, *Born.* 765
 Gouyanthes, *Born.* 172
 Gonzalaguia, *Ruiz et Pav.* 765
 Gonzalesia, *Pers.* 765
 Goodenia, *Sm.* 595
 Goodeniaceæ, 649, 688, 694*
 Goodeniads, 694
 Goodeniææ, 695
 Goodenovia, *R. Brown.* 657, 694
 Goodia, *Salisb.* 553, 554
 Goodyera, *P. Br.* 182
 Gorlonia, *Ellis.* 367
 Gorinkia, *Presl.* 354
 Gorteria, *Gärtn.* 713
 Gorteriææ, 713
 Gossampina, *Rumph.* 261
 Gossypianthus, *Hook.* 511
 Gossypium, *Floer.* 379
 Gothofreda, *Vent.* 626
 Gouania, *Jacq.* 582
 Goulfeia, *Rob. et Curt.* 498
 Goupia, *Aubl.* 588
 Goupilia, *Merat.* 44
 Goutliea, *Gill.* 555
 Govenia, *Lindl.* 182
 Grabowskya, *Schlecht.* 622
 Gracilaria, *Grœv.* 25
 Graderia, *Benth.* 685
 Grællsia, *Boiss.* 354
 Græmia, *Hook.* 712
 Graffenrieda, *Mart.* 738
 Grafia, *Reichb.* 779
 Grahamia, *Gill.* 501
 Gramina, *Juss.* 106
 Gramina, *L.* xxxiii
 Graminaceæ, 105, 106*
 Gramineæ, *R. Br.* 106
 Grammanthes, *DC.* 346
 Grammarthron, *Cass.* 713
 Grammatocarpus, *Presl.* 745
 Grammatophyllum, *Bl.* 181
 Grammatotheca, *Presl.* 693
 Grammica, *Lour.* 634
 Grammita, *Bonnemais.* 25
 Grammitis, *Swartz.* 79
 Grammonema, *Ag.* 13
 Grammosciadium, *DC.* 779
 Grandilla, *Tournef.* 334
 Grandilla, *DC.* 334
 Granatææ, *Don.* 734
 Grandinia, *Fr.* 41
 Grangea, *Adans.* 710
 Grangeineæ, 710
 Grangeria, *Comm.* 543
 Granifere, *Agh.* 95
 Granulinia, *Dumort.* xxxvii
 Grapheporum, *Desv.* 115
 Graphidææ, *Chev.* 45, 50
 Graphiola, *Poit.* 42
 Graphis, *Eschw.* 50
 Graphis, *Fries.* 50
 Graphium, *Corda.* 43
 Graptophyllum, *Nees.* 630
 Grasses, 106
 Grastidium, *Bl.* 181
 Grateloupella, *Bory.* 25
 Grateloupia, *Ag.* 10, 25
 Gratiola, *L.* 685
 Gratiolææ, 684
 Graumüllera, *Reichb.* 145
 Gravenhorstia, *Nees.* 785
 Graya, *Hook. et Arn.* 53
 Greenia, *Nutt.* 115
 Greenia, *Wight. et Arn.* 765
 Greenovia, *W. et Berth.* 345
 Greenwaya, *Giescke.* 167
 Greggia, *Gärtn.* 738
 Gregoria, *Duby.* 645
 Grevillea, *R. Br.* 533
 Grevillidææ, 533
 Grewia, *Juss.* 372
 Grewidææ, 372
 Grias, *Linn.* 755
 Grileus, *Sweet.* 563
 Grielum, *Linn.* 565
 Grieselinia, *Neck.* 555
 Griffinia, *Ker.* 158
 Griffithia, *R. Br.* 67
 Griffithia, *Wight. et Arn.* 765
 Griffithia, *Ag.* 10, 22
 Grimaldia, *Sclerank.* 555
 Grimaldia, *Boott.* 55
 Grimmia, *Forsk.* 67
 Grindelia, *Willd.* 710
 Grisebachia, *Klotzsch.* 155
 Grieselinia, *Forst.* 795
 Grislea, *Loefl.* 575
 Grobya, *Lindl.* 182
 Grona, *Lour.* 555
 Gronovia, *Linn.* 745
 Gronovius, *Endl.* 744
 Grossales, 246, 749*
 Grossulariææ, *Mirb.* 750
 Grossularia, *Tournef.* 751
 Grossulariaceæ, 749, 750*
 Grossulariææ, 750
 Groulia, *Guillœm.* 444
 Grubbia, *Berg.* 785
 Grubbiææ, *Endl.* 785
 Gruinales, *L.* xxxiv
 Grumilea, *Gärtn.* 764
 Guaco, *Raf.* 794
 Guadua, *Kunth.* 116
 Guaincanææ, *Juss.* 595
 Guaiacana, *Tourn.* 596
 Guaiava, *Tournef.* 738
 Guajacum, *Plum.* 479
 Guanabanus, *Plum.* 422
 Guandiola, *Ste.* 711
 Guapea, *Gomez.* 591
 Guapurium, *Juss.* 738
 Guardiola, *H. B. K.* 711
 Guarea, *Linn.* 464
 Guariruma, *Cass.* 714
 Guatteria, *Ruiz et Pav.* 422
 Guazuma, *Plum.* 364
 Guepinia, *Fr.* 41
 Guepinia, *Bart.* 354
 Guettarda, *Vent.* 764
 Guettardidææ, 764
 Guevinia, *Molin.* 533
 Guechenotia, *Gay.* 364
 Guideria, *Plum.* 331
 Guiera, *Adans.* 718
 Guilandina, *Linn.* 555
 Guildingia, *Hook.* 733
 Guillema, *Mart.* 139
 Guilleminea, *H. B. K.* 523
 Guilleminea, *Neck.* 783
 Guildinia, *Gill.* 473
 Guioa, *Cav.* 385
 Guizotia, *Cass.* 711
 Gùldenstedtia, *Fisch.* 554
 Gùldenstedtia, *Neck.* 513
 Gumillea, *Ruiz et Pav.* 572
 Gumira, *Rumph.* 664
 Gundelia, *Tourn.* 709
 Gundelsheimeria, *Cass.* 709
 Gunisanthus, *A. DC.* 596
 Gunnera, *Linn.* 781
 Gunnia, *Lindl.* 181
 Güntheria, *Sprenq.* 712
 Güntheria, *Trevir.* 57
 Güntheria, *Andrz.* 355
 Gupia, *Javm.* 588
 Gussonea, *A. Rich.* 181
 Gussonea, *Presl.* 119
 Gussonia, *Spr.* 281
 Gustavia, *Linn.* 755
 Gutierrezia, *Lagasc.* 711
 Guttiferææ, *Juss.* 400
 Guttiferiales, 244, 246, 392*
 Guttifers, 400
 Gutzmannia, *Ruiz et P.* 148
 Guzzilima, *Rottl.* 419
 Gyalecta, *Achar.* 50
 Gyas, *Salisb.* 181
 Gymnancanthus, *Nees.* 679
 Gymnachrena, *Reichb.* 713
 Gymnadenia, *R. Br.* 182
 Gymnadenidææ, 182
 Gymnandra, *Pall.* 667
 Gymnanthe, *Tag.* 60
 Gymnanthemum, *Cass.* 709
 Gymnanthera, *R. Br.* 625
 Gymnanthes, *Spr.* 281
 Gymnanthus, *Jungh.* 419
 Gymnarrhen, *Steud.* 740
 Gymnarrhen, *Leandr.* 281
 Gymnarrhena, *Desf.* 710
 Gymnela, *Benth.* 661
 Gymnema, *R. Br.* 627
 Gymnema, *Rafin.* 710
 Gymnocalamus, *Nees.* 537
 Gymnocarpus, *Forsk.* 419
 Gymnocephalum, *Bl.* 274
 Gymnocephalus, *Schw.* 67
 Gymnocladia, *Lam.* 555

- Gymnocline, *Cass.* 712
 Gymnocoronis, *DC.* 709
 Gymnodiscus, *Less.* 713
 Gymnogens, 4, 221*
 Gymnogongrus, *Mart.* 25
 Gymnognonia, *R. Br.* 358
 Gymnogramme, *Desv.* 67
 Gymnogyne, *Slectz.* 711
 Gymnogynum, *Palis.* 70
 Gymnolæna, *DC.* 711
 Gymnoloma, *Ker.* 711
 Gymnolomia, *Kunth.* 711
 Gymnomitridæ, 60
 Gymnomitrium, *Corda.* 60
 Gymnonychium, *Bartl.* 471
 Gymnopetalum, *Arn.* 315
 Gymnophlæa, *Kütz.* 10
 Gymnophlæaceæ, 10
 Gymnopogon, *Palis.* 116
 Gymnopsis, *DC.* 711
 Gymnopteris, *Presl.* 79
 Gymnoreime, *Decaisne.* 656
 Gymnoschœnus, *Nees.* 119
 Gymnosciadium, *Hochst.* 778
 Gymnoscyphus, *Cord.* 60
 Gymnosiphon, *Blum.* 172
 Gymnosperma, *Less.* 710
 Gymnosperma, *Nixus.* 221
 Gymnosperme, *Kütz.* 9
 Gymnospermeæ, 710
 Gymnospermes, *Ad. Brongn.* 221
 Gymnosphaera, *Blum.* 80
 Gymnosporangium, *Lk.* 42
 Gymnosporium, *Corda.* 44
 Gymnostachys, *R. Br.* 194
 Gymnostachyum, *Nees.* 680
 Gymnostephium, *Less.* 710
 Gymnostichum, *Schreb.* 116
 Gymnostomum, *Hedw.* 67
 Gymnostyles, *Juss.* 712
 Gymnotheca, *Decaisne.* 521, 745
 Gymnothrix, *Palis.* 115
 Gynation, *A. DC.* 629
 Gynandropsis, *DC.* 358
 Gynanthistrophe, *Poit.* 556
 Gynapteina, *Blum.* 781
 Gynastrum, *Neck.* 665
 Gyneryon, *H. B. K.* 115
 Gynestum, *Poit.* 139
 Gyueteria, *Spreng.* 710
 Gynheteria, *Willd.* 710
 Gynheteria, *R. Br.* 324
 Gynocarpus, *Lesch.* 696
 Gynochtodes, *Blum.* 765
 Gynoon, *A. Juss.* 282
 Gynopachys, *Blum.* 765
 Gynopleura, *Cav.* 335
 Gynopogon, *Forst.* 601
 Gynostemma, *Blume.* 315
 Gynostoma, *DC.* 372
 Gynotroches, *Blum.* 402
 Gynoxis, *Cass.* 713
 Gynura, *Cass.* 713
 Gypsocallis, *Salisb.* 455
 Gypsophila, *Linn.* 498
 Gyandra, *Gris.* 614
 Gyrate, *Swartz.* 78
 Gyriopsis, *Görtl.* 579
 Gyrocarpeæ, *Nees.* ab *Esenb.* 717
 Gyrocarpus, *Jacq.* 718
 Gyrocerus, *Corda.* 42
 Gyrolophium, *Kunze.* 44
 Gyromia, *Nutt.* 218
 Gyromium, *Wahlb.* 50
 Gyrophora, *Achar.* 50
 Gyrophragmium, *Mont.* 42
 Gyrosigma, *Hassall.* 796
 Gyrostachys, *Pers.* 182
 Gyrostemon, *Desf.* 282
 Gyrostemoneæ, *Endl.* 273, 282
 Gyrostomum, *Fries.* 50
 Gyrotheca, *Salisb.* 153
 Gyrothrix, *Corda.* 43
 Gytanthes, *Rafn.* 698
 Haasia, *Blum.* 537
 Habenaria, *Willd.* 182
 Haberlandia, *Friedl.* 672
 Habertia, *Denst.* 467
 Hablitzia, *Bieb.* 511
 Habranthus, *Herb.* 158
 Habrothamnus, *Endl.* 621
 Habrozia, *Fenzl.* 528
 Habzelia, *A. DC.* 422
 Hacquetia, *Neck.* 778
 Hadestaphyllum, *Denst.* 467
 Hafgygia, *Kütz.* 10
 Hæmadictyon, *Lindl.* 601
 Hæmanthus, *Linn.* 158
 Hæmaria, *Lindl.* 182
 Hæmatococcus, *Ag.* 18
 Hæmatospermum, *W.* 281
 Hæmatostrobos, *Endl.* 90
 Hæmatoxylon, *Linn.* 555
 Hæmax, *E. Mey.* 626
 Hæmocarpus, *Nor.* 406
 Hæmocharis, *Salisb.* 397
 Hæmodoraceæ, 146, 151
 Hæmodorææ, 153
 Hæmodorum, *Smith.* 153
 Hæmodorum, *Waltr.* 611
 Hæmospermum, *Bl.* 604
 Hænkea, *Ruiz et P.* 588
 Hænkea, *Salisb.* 501
 Hænkea, *Smith.* 471
 Hænsclera, *Boiss.* 715
 Hæga, *Vent.* 499
 Hægebachia, *N. et M.* 205
 Hægeia, *Eschw.* 50
 Hægenia, *Mönch.* 498
 Hægenia, *Willd.* 565
 Hæka, *Schrad.* 534
 Hælarachnion, *Kütz.* 10
 Hælea, *Torr. et Gray.* 711
 Hælenia, *Borkh.* 614
 Hælerica, *Ktz.* 10
 Hælesia, *Ellis.* 593
 Hælesia, *P. Br.* 764
 Hælesiaceæ, *Don.* 592
 Hælgania, *Gaud.* 653
 Hælianthus, *Fr.* 498
 Hælidrys, *Stack. et Lyngb.* 22
 Hæligeria, *Dec.* 22
 Hælimeda, *Ktz.* 10
 Hælimium, *Dun.* 350
 Hælimocnemis, *C. A. M.* 513
 Hælimodendron, *Fisch.* 554
 Hælimolobos, *T.* 354
 Hælimus, *Löffl.* 527
 Hælimus, *Waltr.* 513
 Hæliptilon, *Dec.* 25
 Hæliithridax, *Targ.* 19
 Hælleria, *Linn.* 684
 Hælleriaceæ, *Link.* 681
 Hællia, *Dum.* 498
 Hællia, *Thunb.* 554
 Hælmia, *Med.* 560
 Hælmyna, *Salisb.* 158
 Hælochloa, *Kütz.* 10, 22
 Hælochloæ, 10
 Hælocnemum, *Bieb.* 512
 Hælodendron, *DC.* 554
 Hælodendrum, *Th.* 665
 Hælodictyon, *Ktz.* 10
 Hælodule, *Endl.* 144
 Hælogeton, *C. A. Mey.* 513
 Hæloglossum, *Ktz.* 10
 Hælophila, *Thouars.* 483
 Hælophithys, *Ktz.* 11
 Hælopteris, *Ktz.* 10
 Hæloragaceæ, 716, 722*, 772
 Hæloragææ, *R. Br.* 722, 723
 Hæloragis, *Forst.* 723
 Hælorhiza, *Ktz.* 10
 Hælosaccion, *Ktz.* 11
 Hæloschœnus, *Nees.* 119
 Hælostachys, *C. A. Mey.* 513
 Hælurus, *Ktz.* 10
 Hælydris, *Ktz.* 10
 Hælymeda, *Lamr.* 19
 Hælymedidæ, 19
 Hælymenia, *Ag.* 10, 25
 Hælymenieæ, 10
 Hælyserææ, 22
 Hælyseris, *Targ.* 10, 22
 Hælysiun, *Ktz.* 10
 Hæmadryas, *Comm.* 428
 Hæmameleæ, 784
 Hæmaneliidææ, 772, 784*
 Hæmamelidææ, *R. Br.* 784
 Hæmanclis, *Linn.* 784
 Hæmastris, *Mart.* 733
 Hæmbergera, *Scop.* 718
 Hæmbergia, *Neck.* 718
 Hæmelia, *Jacq.* 765
 Hæmefidæ, 765
 Hæmelinia, *A. Rich.* 192
 Hæmelonia, *Müllerb.* 788
 Hæmiltonia, *Roxb.* 764
 Hæmnatoceulis, *T.* 778
 Hæmmatolobium, *Fenzl.* 554
 Hæmpea, *Nees.* 58
 Hæmpea, *Schlecht.* 361
 Hæmulium, *DC.* 711
 Hæmolemia, *Goncz.* 601
 Hænguana, *Blum.* 192
 Hænowia, *Sonder.* 796
 Hænsenia, *Turcz.* 779
 Hæpæcarpus, *Nutt.* 712
 Hæpalanthus, *Jacq.* 188
 Hæpalidium, *Ktz.* 10
 Hæpalisia, *W. et A.* 499
 Hæpalostephium, *Don.* 715
 Hæplachin, *Presl.* 116
 Hæplancheria, *Hochst.* 679
 Hæplanthus, *Nees.* 680
 Hæplocarpea, *Wight.* 575
 Hæplocarpha, *Less.* 713
 Hæplochilus, *Endl.* 182
 Hæplochyenium, *Schw.* 67
 Hæplolepidææ, 59
 Hæplolegma, *Mont.* 24
 Hæplolephium, *Endl.* 677
 Hæplomitrium, *Nees.* 60
 Hæploppus, *Cass.* 710
 Hæplophlebia, *Mart.* 80
 Hæplophyllum, *A. Juss.* 471
 Hæplophyllum, *Less.* 714
 Hæplophyton, *A. DC.* 601
 Hæplopteris, *Presl.* 80
 Hæplosciadium, *Hochst.* 778
 Hælopsorium, *Mont.* 43
 Hæplotellis, *A. Rich.* 182
 Hæplotemna, *Endl.* 626
 Hæplotemum, *Rafn.* 119
 Hælostiphium, *Mart.* 709
 Hælostyhis, *Nees.* 119
 Hæplotaxis, *DC.* 713
 Hæplotella, *Ktz.* 13
 Hæplotrichum, *Link.* 43
 Hærdenbergia, *Benth.* 555
 Hærdwickia, *Roxb.* 556
 Hærgasseria, *Meyer.* 531
 Hærina, *Hæmilt.* 138
 Hæriota, *Lemairc.* 748
 Hærmala, *Mönch.* 479
 Hærmodia, *Don.* 714
 Hærouga, *Thouars.* 406
 Hærongana, *Lam.* 406
 Hærapogophytum, *DC.* 670
 Hærapalium, *Cass.* 711
 Hærapalyce, *Don.* 715
 Hærapalyce, *Moc. et S.* 554
 Hærapnema, *Dec.* 626
 Hærapanthus, *Nees.* 60
 Hærapophora, *Endl.* 711
 Hærapocarpus, *Endl.* 713
 Hærapochloa, *Kunth.* 115
 Hærpulia, *Roxb.* 385
 Hærrachia, *Jacq.* f. 679
 Hærrachia, *Adans.* 67
 Hærrissonia, *Hook.* 627
 Hærrissonia, *R. Br.* 477
 Hærrissonia, *Neck.* 713
 Hærrigheica, *A. J.* 461

- Hartigia, *Miq.* 733
 Hartmannia, *DC.* 712
 Hartmannia, *Spach.* 725
 Hartogia, *Ta.* 588
 Hartwegia, *Lindl.* 181
 Hartwegia, *Nees.* 205
 Harveya, *Hook.* 685
 Hasseltia, *H. B. K.* 372
 Hasselquistia, *Linn.* 778
 Hasseltia, *Blum.* 601
 Hasturgia, *Kön.* 364
 Hastingsia, *Smith.* 662
 Hauya, *Moc. et S.* 725
 Havetia, *H. B. K.* 402
 Haworthia, *Dur.* 205
 Haxtonia, *Caley.* 709
 Haylockia, *Herb.* 158
 Haynea, *Reichb.* 370
 Haynea, *Schum.* 262
 Haynea, *Willd.* 709
 Heartworts, 453
 Hebanthe, *Mart.* 511
 Hebe, *Juss.* 685
 Hebea, *Pers.* 161
 Hebeandra, *Bonpl.* 378
 Hebecladus, *Miers.* 622
 Hebelinimum, *DC.* 709
 Hebelena, *DC.* 713
 Hebelia, *Gmel.* 199
 Hebeloma, *Fries.* 41
 Hebenaster, *Rumph.* 596
 Hebenstreitia, *Linn.* 687
 Hebephora, *DC.* 710
 Heberdenia, *Banks.* 648
 Hebradendron, *Grah.* 402
 Hecastophyllum, *Kunth.* 555
 Hecatea, *Thouars.* 281
 Hecatonia, *Lour.* 428
 Hectia, *Klotzsch.* 148
 Heckeria, *Kunth.* 518
 Hectorea, *DC.* 709
 Hecubaea, *DC.* 712
 Hedaroma, *Lindl.* 721
 Hedeoma, *Lour.* 498
 Hedeoma, *Pers.* 661
 Hedera, *Linn.* 781
 Hederaceae, *L.* xxxiv
 Hedralophyllum, *Less.* 714
 Hedralostylis, *Hassk.* 281
 Hedwigia, *Hook.* 67
 Hedwigia, *Med.* 188
 Hedwigia, *Swartz.* 490
 Hedycaurus, *Jack.* 385
 Hedycaura, *Forst.* 289
 Hedychium, *Kön.* 167
 Hedycrea, *Schreb.* 543
 Hedyosmum, *Swartz.* 529
 Hedyotidae, 765
 Hedyotis, *Lam.* 765
 Hedyotis, *Tournef.* 715
 Hedyzarea, 554, 556
 Hedyzarum, *Linn.* 555
 Heeria, *Meisn.* 467
 Heeria, *Schlecht.* 733
 Hegemone, *Bunge.* 428
 Hegetschweilera, *Heer.* 554
 Heimia, *L. et O.* 575
 Heinsia, *DC.* 765
 Heinszelmannia, *Nees.* 685
 Heinszia, *Sczp.* 555
 Heisteria, *Berg.* 378
 Heisteria, *L.* 344
 Helkorima, *Rafin.* 199
 Helatruia, *A. de J.* 203
 Helcia, *Lindl.* 181
 Heldeischia, *Boiss.* 354
 Heliantrum, *DC.* 709
 Helenia, *Linn.* 712
 Heleniara, 711
 Helenium, *Linn.* 712
 Heliochloa, *Hort.* 115
 Heliopta, *Rafin.* 711
 Helia, *Mart. et Zucc.* 614
 Helictia, *Kütz.* 13
 Heliamphora, *Boiss.* 129
 Helianthemum, *Tourn.* 350
 Helianthus, *Linn.* 711
 Helichroa, *Rafin.* 711
 Helichryseae, 712
 Helichrysum, *DC.* 713
 Helicia, *Lour.* 534
 Helicodonium, *Schw.* 67
 Helicoma, *Corda.* 43
 Helicomycetes, *Corda.* 42
 Helicouea, 164
 Heliconia, *Gärtn.* 164
 Heliconia, *Linn.* 164
 Helicophyllum, *Brid.* 67
 Helicosperma, *Rehb.* 498
 Helicosporium, *Corda.* 43
 Helicostylum, *Corda.* 43
 Helicothamion, *Kütz.* 11, 25
 Helicotrichum, *Nees.* 43
 Helicta, *Cass.* 711
 Helictereae, 361
 Helicteres, *L.* 361
 Helierella, *Bory.* 13
 Heligme, *Blum.* 601
 Heliius, *E. Mey.* 582
 Heliocarpus, *L.* 372
 Heliogenes, *Benth.* 712
 Helioiucyces, *Léveill.* 41
 Heliophanes, *Salisb.* 455
 Heliophila, *N. Burm.* 355
 Heliophilidae, 355
 Heliophthalmum, *Rafin.* 711
 Heliophytum, *DC.* 653
 Heliopsidae, 711
 Helioopsis, *Pers.* 711
 Heliosperma, *Grisch.* 498
 Heliotropeae, 653
 Heliotropiaceae, *Mart.* 653
 Heliotropiaceae, *Endl.* 653
 Heliotropium, *Linn.* 653
 Helipterum, *DC.* 713
 Helitophyllum, *Blum.* 534
 Helixanthera, *Lour.* 791
 Helleboraster, *Mönch.* 428
 Helleboreae, 428
 Helleborine, *Pers.* 182
 Helleboroides, *Adans.* 428
 Helleborus, *Linn.* 428
 Hellenia, *Retz.* 167
 Hellenia, *Willd.* 167
 Helleria, *N. et M.* 447
 Hellwingia, *Adans.* 328
 Helminthia, *Juss.* 715
 Helminthochortos, *Link.* 25
 Helminthonema, *Kütz.* 9
 Helminthora, *Fries.* 10, 24
 Helminthoslachys, *Kaulf.* 77
 Helogyne, *Nutt.* 709
 Helonias, *Linn.* 199
 Helonias, *Willd.* 199
 Helophytum, *E. et Z.* 346
 Helopodium, *DC.* 50
 Helopus, *Trin.* 115
 Helosciadium, *Koch.* 773
 Helosidae, 90
 Helosis, *Rich.* 90
 Helospora, *Jack.* 765
 Helothrix, *Nees.* 119
 Helvella, *Linn.* 43
 Helvellaceae, 41
 Helwingia, *Willd.* 296
 Helwingiaceae, 294, 296*
 Helwingiads, 296
 Helxine, *Linn.* 262
 Helygia, *Bhm.* 601
 Hemarthria, *R. Br.* 116
 Hemerocallaeae, *R. Br.* 205
 Hemerocallidae, *R. Br.* 200
 Hemerocallis, *Linn.* 205
 Hemerostria, *Rafin.* 698
 Hemiachyria, *DC.* 710
 Hemiadelphis, *Nees.* 679
 Hemandra, *R. Br.* 691
 Hemilanthus, *Nutt.* 685
 Hemicalpha, *Nees.* 119
 Hemicalyx, *Nees.* 129
 Hemichlana, *Benth.* 684
 Hemichlana, *Schrad.* 119
 Hemichlamydeae, 119
 Hemichloriste, *Wall.* 680
 Hemichroa, *R. Br.* 511
 Hemielidia, *R. Br.* 534
 Hemicyclia, *W. et A.* 281
 Hemidesmus, *R. Br.* 626
 Hemidictyum, *Presl.* 80
 Hemigenia, *R. Br.* 661
 Hemigymnia, *Griff.* 664
 Hemigyne, *A. DC.* 648
 Hemiloba, *DC.* 672
 Hemimeridaceae, 684
 Hemimeris, *L.* 684
 Hemiminthosporium, *Lk.* 43
 Hemionitis, *Linn.* 79
 Hemiphlebiun, *Presl.* 80
 Hemiphragma, *Wall.* 685
 Hemipilia, *Lindl.* 182
 Hemipogon, *Dec.* 626
 Hemipus, *Endl.* 116
 Hemiragis, *Brid.* 67
 Hemisacris, *Steud.* 116
 Hemiscypha, *Corda.* 43
 Hemisumata, *Bisch.* 57
 Hemisynapsium, *Brid.* 67
 Hemispadon, *Endl.* 554
 Hemistemma, *Comm.* 424
 Hemistephia, *Bung.* 713
 Hemistoma, *Ehrenb.* 662
 Hemitelia, *R. Br.* 80
 Hemitome, *Nees.* 679
 Hemitrema, *R. Br.* 25
 Hemizonia, *DC.* 712
 Hemna, *Rafin.* 57
 Hempelia, *Meyen.* 18
 Hemprichia, *Ehrenb.* 460
 Hempworts, 265
 Hemnanthus, *Less.* 710
 Henuckelia, *Spreng.* 672
 Hendecaudra, *Esch.* 281
 Hendersonia, *Berk.* 42
 Hemicostemma, *Blum.* 614
 Henningia, *Kar.* 205
 Henutogyne, *DC.* 710
 Henricea, *Lam. Lis.* 614
 Henricia, *Cass.* 709
 Henriettea, *DC.* 733
 Henschelia, *Presl.* 795
 Henslera, *Lagasc.* 779
 Henslovia, *Wall.* 570
 Henslovaceae, *Lindl.* 570
 Hepatica, *Dill.* 428
 Hepaticae, *Endl.* 54, 56
 Hepaticae, *Juss.* 58, 59
 Hepatica, *Swartz.* 148
 Hepata, *Lour.* 795
 Heptapleurum, *Gärtn.* 781
 Heptaptera, *Reut.* 779
 Heptas, *Meisn.* 680
 Heracantha, *DC.* 713
 Heracantha, *Link.* 714
 Heracleum, *Linn.* 778
 Herberia, *Succet.* 161
 Herbichia, *Zawadzsky.* 713
 Hercospora, *Fr.* 44
 Herderia, *Cass.* 709
 Hercidium, *Fries.* 41
 Heringia, *J. Ag.* 25
 Heritiera, *Art.* 362
 Heritiera, *Meisn.* 153
 Heritiera, *Retz.* 167
 Heritiera, *Schrank.* 199
 Hermannens, 364
 Hermannia, *L.* 364
 Hermannia, *Barthl.* 361
 Hermanns, *Linn.* 779
 Hermbstädtia, *Rehb.* 511
 Hermes, *Benth.* 455
 Hermsia, *Lévl.* 556
 Herminia, *G. et P.* 554
 Herminulum, *R. Br.* 182
 Hermitone, *Haw.* 158
 Hermodactylus, *R. Br.* 189

- Hermodactylus, *Tourn.* 161
 Hermupora, *Lévl.* 358
 Hernandia, *Plum.* 531
 Hernandiacæ, *Blanc.* 530
 Hernandiæ, 531
 Herniaria, *Tourn.* 499
 Herniarie, *Cat. Hort. Par.* 499
 Herorchis, *Lindl.* 182
 Herpestes, *Gärtn.* 685
 Herpetium, *Nees.* 60
 Herpotrichum, *Fries.* 44
 Herpysma, *Lindl.* 183
 Herrania, *Goudot.* 364
 Herrera, *R. et P.* 205
 Herschelia, *Bowd.* 622
 Herschelia, *Lindl.* 182
 Hertia, *Neck.* 713
 Hertia, *Less.* 713
 Hesioda, *Fl. Fl.* 795
 Hesiodia, *Mönch.* 662
 Hesperantha, *Ker.* 161
 Hesperanthus, *Salisb.* 161
 Hesperideæ, *L.* xxxiii
 Hesperidium, *DC.* 354
 Hesperidopsis, *DC.* 354
 Hesperis, *Linn.* 354
 Hesperomelcs, *Lindl.* 560
 Hesperoscordium, *Lindl.* 235
 Hessa, *Berg.* 158
 Heteria, *Endl.* 186
 Heterachena, *Fres.* 715
 Heteracia, *P. et M.* 715
 Heteractis, *DC.* 10, 713
 Heterandra, *Pals.* 206
 Heteranthesis, *Sch.* 712
 Heteranthera, *R. et P.* 206
 Heterantheria, *N. et M.* 684
 Heterelytron, *Jungh.* 116
 Heterocarpeæ, 10
 Heterocarpeia, *Turp.* 13
 Heterocentron, *H. et A.* 733
 Heterochænia, *A. DC.* 691
 Heterochæta, *DC.* 710
 Heterochlamys, *Turcz.* 281
 Heterochroa, *Bung.* 498
 Heterocladia, *Dec.* 25
 Heterocoma, *DC.* 709
 Heterocomæ, 709
 Heterodendron, *Desf.* 471
 Heterodon, *Meisn.* 785
 Heterodonta, *Nutt.* 711
 Heteroleuca, *Endl.* 531
 Heterolepis, *Cass.* 713
 Heteroloma, *Desv.* 554
 Heterolophus, *Cass.* 714
 Heteromeris, *Spach.* 350
 Heteromorpha, *Cham.* 778
 Heteromorpha, *Cass.* 713
 Heteronema, *Fr.* 51, 54
 Heteronoma, *DC.* 733
 Heteropappæ, 710
 Heteropappus, *Less.* 710
 Heterophragma, *DC.* 677
 Heterophyllum, *Boj.* 364
 Heteropogon, *Pers.* 116
 Heteropsis, *Kth.* 194
 Heteropterys, *Kth.* 390
 Heteroptycha, *DC.* 778
 Heteroptylis, *E. Meyer.* 778
 Heterorgana, *Sch.* xi
 Heterosciadium, *DC.* 778
 Heterosiphonia, *Mont.* 25
 Heterosperma, *Cav.* 711
 Heterospermum, *Willd.* 711
 Heterosphaeria, *Grev.* 43
 Heterostega, *Desv.* 116
 Heterostemma, *W. et A.* 627
 Heterostemon, *Desf.* 556
 Heterostemum, *Nutt.* 725
 Heterostylus, *Hook.* 144
 Heterotenia, *Boiss.* 779
 Heterotaxis, *Lindl.* 182
 Heterothalamæ, 709
 Heterothalamus, *Less.* 709
 Heterotheca, *Cass.* 710
 Heterothecæ, 710
 Heterotoma, *Zucc.* 693
 Heterotrichum, *Bieb.* 713
 Heterotrichum, *DC.* 733
 Heterotropa, *Decaisne.* 794
 Heterozygis, *Bung.* 479
 Heteryta, *Raf.* 639
 Heuchera, *Linn.* 568
 Heuchercia, *Torr. et A. Gray.* 568
 Heudelotia, *A. Rich.* 469
 Heudusa, *E. Mey.* 553
 Hevea, *Aubl.* 281
 Hewardia, *J. Sm.* 80
 Hewittia, *Wight.* 631
 Hexacentris, *Nees.* 679
 Hexactina, *Willd.* 765
 Hexadesmia, *Brongn.* 181
 Hexadesmia, *R. Br.* 181
 Hexadica, *Lour.* 282
 Hexaglottis, *Vent.* 161
 Hexagonia, *Fr.* 41
 Hexalobus, *Alph. DC.* 422
 Hexanthera, *Endl.* 331
 Hexanthus, *Lour.* 537
 Hexaptera, *Hook.* 355
 Hexarrhena, *Prest.* 115
 Hexasepalum, *Barth.* 764
 Hexastemon, *Kl.* 455
 Hexisea, *Lindl.* 181
 Hexopia, *Batcm.* 181
 Heydia, *Donst.* 282
 Heylandia, *DC.* 553
 Heymassoli, *Aubl.* 444
 Heynea, *Roxb.* 464
 Hibbertia, *Andr.* 424
 Hibiscæ, 370
 Hibiscus, *L.* 370
 Hicorius, *Raf.* 293
 Hidalgoa, *Ll. et L.* 711
 Hidalgo, *Less.* 711
 Hidrosia, *E. Mey.* 555
 Hieraciæ, 715
 Hieracium, *Tourn.* 715
 Hierochloa, *Gmel.* 116
 Hierocontis, *Adans.* 354
 Hieronia, *Fl. Fl.* 424
 Higginsia, *Pers.* 765
 Hilaria, *DC.* 714
 Hilaria, *H. B. K.* 115
 Hildegardia, *Sch. E.* 362
 Hildenbrandia, *Nardo.* 22
 Hildenbrandtia, *Ktze.* 10
 Hilleria, *Fl. Fl.* 509
 Hillia, *Jaqc.* 765
 Hilsenbergia, *Boj.* 364
 Hilsenbergia, *Tausch.* 622
 Himantialia, *Lyngb.* 10, 22
 Himantia, *P.* 44
 Himantoglossum, *Spr.* 182
 Himantophyllum, *Spr.* 158
 Himanthus, *Willd.* 765
 Himeranthus, *E.* 622
 Hindsia, *Benth.* 765
 Hingcha, *Roxb.* 711
 Hiorthia, *Neck.* 712
 Hippagrostis, *Rumph.* 115
 Hippeastrum, *Herb.* 158
 Hippia, *Linn.* 712
 Hippicæ, 712
 Hippoides, *DC.* 712
 Hippion, *Spr.* 614
 Hippobroma, *Don.* 693
 Hippobroma, *Eck. et Zey.* 385
 Hippocastaneæ, *DC.* 382, 385
 Hippocastanum, *Tourn.* 385
 Hippocentaurea, *Sch.* 614
 Hippocratea, *L.* 585
 Hippocrateæ, 576, 584*
 Hippocrateads, 584
 Hippocrateicæ, *Juss.* 584
 Hippocrepis, *Linn.* 554
 Hippodium, *Gaud.* 80
 Hippoglossum, *Hartm.* 656
 Hippomane, *L.* 281
 Hippomanæ, 281
 Hippomanica, *Mol.* 795
 Hippomarathrum, *Riv.* 778
 Hippomarathrum, *Link.* 779
 Hippomarathrum, *L.* 257
 Hippoperdon, *Mont.* 42
 Hippophææ, *L.* 257
 Hippopodium, *Harv.* 182
 Hippopodium, *Röhl.* 67
 Hippotis, *R. et P.* 765
 Hippurideæ, *Link.* 722
 Hippurids, 722
 Hippurina, *Stack.* 22
 Hippuris, *Linn.* 723
 Hiptage, *Gärtn.* 390
 Hirrea, *Jaqc.* 390
 Hirreulus, *Tausch.* 468
 Hireæ, *A. de J.* 399
 Hirneoia, *Fries.* 44
 Hircipium, *Cass.* 712, 713
 Hirschfeldia, *Mönch.* 355
 Hirtella, *Linn.* 543
 Hirsingera, *Reichb.* 778
 Hloera, *Swetz.* 794
 Hochstetteria, *DC.* 710
 Hockea, *Endl.* 626
 Hockinia, *Gardn.* 614
 Hoquartia, *Dum.* 794
 Holzha, *Neck.* 556
 Hoferia, *Scop.* 397
 Hofmannia, *Swartz.* 765
 Hofmannia, *Willd.* 70
 Hofmanseggia, *Cav.* 555
 Hohenackeria, *P. et M.* 778
 Hohenbergia, *Sch. f.* 148
 Hohenwarta, *West.* 714
 Hohenia, *A. Cunningham.* 361
 Hoitzia, *Juss.* 636
 Holargidium, *Turcz.* 354
 Holarrhena, *R. Br.* 601
 Holbellia, *Wall.* 115, 304
 Holcus, *Linn.* 115
 Holocræce, *L.* xxxiv
 Holigarna, *Roxb.* 467
 Hollia, *Sicber.* 67
 Hollia, *Endl.* 59
 Hollyworts, 597
 Holmskiöldia, *Retz.* 662
 Holochiloma, *Hochst.* 664
 Holochilus, *Cass.* 714
 Holochloa, *Nutt.* 568
 Holocystis, *Hassall.* 796
 Hologamium, *Nees.* 116
 Hologymne, *Barth.* 712
 Hololachna, *Ehrh.* 407
 Hololepis, *DC.* 709
 Holopetalum, *DC.* 494
 Holopetalum, *Turcz.* 356
 Holophyllum, *Less.* 712, 714
 Holoregmia, *Nees.* 670
 Holosecenus, *Link.* 119
 Holosepalum, *Spach.* 406
 Holostemma, *R. Br.* 626
 Holostemum, *L.* 498
 Holostigma, *Don.* 693
 Holostigma, *Spach.* 725
 Holostyla, *DC.* 765
 Holothrix, *L. C. Rich.* 182
 Holotome, *Benth.* 778
 Holotrichidæ, 182
 Homaid, *Adans.* 129
 Homaliæ, 741, 742*
 Homaliads, 742
 Homalinea, *R. Brown.* 742
 Homalium, *Jaqc.* 743
 Homalocarpus, *DC.* 428
 Homalocarpus, *H. et A.* 778
 Homalocentrus, *Mieg.* 115
 Homalocline, *Cass.* 715
 Homalonema, *Schott.* 129
 Homalotes, *DC.* 712

- Homalotheca, Cass. 713
 Homanthus, Kunth. 715
 Howback, Adams. 358
 Homeoplitis, Trin. 116
 Homera, Nees. 555
 Homeria, Vent. 161
 Homochilus, A. DC. 693
 Homochroma, DC. 710
 Homocladia, Ag. 13
 Homogens, Lindl. 235
 Homoglossum, Salisb. 161
 Homogyne, Cass. 709
 Homoianthus, Bonpl. 715
 Homolobus, Nutt. 554
 Homonemea, Fries. 5
 Homouoia, Lonn. 282
 Homopappus, Nutt. 710
 Homoranthus, A. Cunn. 721
 Homorana, Sch. xl
 Homostylium, Nees. 706
 Honkenya, Ehrh. 498
 Honkenya, Willd. 372
 Honorius, Gray. 205
 Hoodia, Sweet. 627
 Hookeria, Salisb. 205
 Hookeria, Smith. 67
 Hookia, Nees. 714
 Hoorebekia, Corn. 710
 Hoopa, Roxb. 394
 Hoopa, L. 593
 Hopkirkia, DC. 712
 Hopkirkia, Spreng. 710
 Hoplophyllum, DC. 709
 Hoplothea, Nutt. 511
 Hoppea, Reichb. 713
 Hoppea, Willd. 614
 Hoppia, Nees. 119
 Horan, Adams. 718
 Horaninovia, F. et Mey. 513
 Hordeæ, 116
 Hordeum, Linn. 116
 Horkelia, Ch. et Schl. 564
 Horkelia, Reichb. 125
 Hormidieæ, 10
 Hormidium, Lindl. 10, 181
 Horminidæ, 661
 Horminum, Linn. 661
 Hormiscia, Fries. 13
 Hormoceras, Ktze. 10
 Hormogyne, A. Cunn. 591
 Hormophysa, Ktze. 10
 Hornosiphon, Ktze. 10
 Hornosira, Endl. 10, 22
 Hornospora, Brob. 18
 Hornemannia, Reichb. 634
 Hornemannia, Benth. 6-5
 Hornemannia, Vahl. 755
 Hornia, DC. 764
 Hornschuchia, Bl. 406
 Hornschuchia, Nees. 3-5
 Hornstedtia, Ktze. 167
 Hornungia, Bernh. 291
 Hornwortæ, 203
 Horsetails, 61
 Horstfeldia, Blum. 773
 Horstfeldia, Willd. 392
 Hortensia, Juss. 579
 Hortia, Vahl. 471
 Hortonia, Wight. 206
 Hosackia, Dougl. 554
 Hoshundia, Vahl. 661
 Hosta, Fl. Fl. 648
 Hosta, Jacq. 648
 Hosta, Trattin. 205
 Hostaria, Pers. 664
 Hostia, Willd. 626
 Hostia, M. sch. 715
 Hostia, M. et D. 363
 Hottonia, Linn. 611
 Hottonia, 646
 Hottelina, A. Brongn. 1
 Housleaka, 244
 Houstonia, Andr. 765
 Houstonia, Linn. 706
 Houttuynia, Houtt. 161
 Houttuynia, Thunb. 521
 Hovea, R. Br. 553
 Hovea, 553
 Hovenia, Thunb. 582
 Hoya, R. Br. 627
 Huanea, Cavan. 778
 Huberia, DC. 733
 Hubertia, Bory. 713
 Hudsonia, Linn. 350
 Hudsonia, Robins. 718
 Hugelina, Benth. 636
 Hugelina, R. Br. 471
 Hugelina, Reichb. 778
 Huernia, R. Br. 627
 Huerteia, R. et P. 467
 Hufelandia, Nees. 537
 Huguonia, L. 489
 Hugoniaceæ, Arnott. 488
 Hugueninia, Reichb. 354
 Hulthemia, Dum. 564
 Humata, Cav. 80
 Humbertia, Comm. 632
 Humboldtia, Fl. Peruv. 181
 Humboldtia, Neck. 614
 Humboldtia, Vahl. 556
 Humea, Roxb. 372
 Humea, Smith. 712
 Humida, Gray. 18
 Humiri, Aubl. 447
 Humiria, Juss. 447
 Humiriaceæ, 446, 447
 Humiriads, 447
 Humirium, Mart. 447
 Humulus, Linn. 265
 Hunefeldia, Walp. 710
 Hunemannia, Sweet. 431
 Hunteria, Roxb. 601
 Hunteria, Fl. mex. 711
 Huntleya, Lindl. 182
 Huperzia, Bernh. 70
 Hura, König. 167
 Hura, L. 281
 Hutchinia, Wight. 627
 Hutchinsia, Ag. 25
 Hutchinsia, R. Br. 354
 Huttum, Adams. 755
 Hyacinthineæ, Link. 200
 Hyacinthus, Linn. 265
 Hyænanche, Lamb. 2-2
 Hyala, Herit. 499
 Hyalea, DC. 714
 Hyalina, Stack. 22
 Hyalis, Don. 714
 Hyalis, Salisb. 161
 Hyalolepis, DC. 712
 Hyalopus, Corda, 43
 Hyalosperma, Steetz. 713
 Hyalostemma, Wall. 302
 Hybanthera, Endl. 626
 Hybanthus, Jacq. 339
 Hybridella, Cass. 711
 Hydastylis, Salisb. 161
 Hydatia, Neck. 568
 Hydangium, Waltr. 42
 Hydnei, Fr. 11
 Hydnoholtes, Tul. 43
 Hydnocarpus, Girtl. 321
 Hydnocaryon, Wallr. 41
 Hydnohyllum, Jacq. 764
 Hydnoza, Thunb. 92
 Hydnozeæ, R. Br. 91
 Hydnum, Linn. 41
 Hydnales, 103, 140*
 Hydrangea, Linn. 579
 Hydrangeaceæ, 566, 569
 Hydrangeola, 539
 Hydrangeæ, DC. 569
 Hydranthellum, Kunth. 648
 Hydrastis, Linn. 128
 Hydrila, Rich. 112
 Hydrobryna, Endl. 4-3
 Hydrocarya, Link. 722
 Hydrocerea, Blume. 462
 Hydrocerea, Blume. 460
 Hydrocharads, 141
 Hydrocharidaceæ, 140, 141*
 Hydrocharidæ, 141
 Hydrocharides, Juss. 141
 Hydrocharis, Linn. 142
 Hydrochloa, Link. 116
 Hydrochloa, P. Br. 115
 Hydroclathrus, Bory. 22
 Hydrocleis, Rich. 208
 Hydrocolece, 9
 Hydrococcus, Kütz. 18
 Hydrococcus, Link. 9, 18
 Hydrocoleum, Ktze. 9
 Hydrocoryne, Schwab. 18
 Hydrodictyæ, 10, 18
 Hydrocotyle, Tournef. 778
 Hydrocotylidæ, 778
 Hydrodictyon, Roth. 10, 18
 Hydrogastriidæ, 22
 Hydrogastrium, Desv. 22
 Hydrogeton, Pers. 210
 Hydrogetones, Link. 143
 Hydroglossum, Willd. 81
 Hydrolapathia, Stack. 25
 Hydroleaceæ, R. Br. 638
 Hydrolea, Linn. 639
 Hydrolia, Thouars. 639
 Hydrolineæ, 13
 Hydrolinum, Link. 13
 Hydromestus, Sch. 680
 Hydromystrina, G. F. W. Meyer. 112
 Hydronema, Carus. 18
 Hydronemateæ, Nees. 8
 Hydropetlidæ, DC. et Schleid. 412
 Hydropeltis, Mich. 413
 Hydrophora, Tode. 43
 Hydrophyceæ, Fries. 8
 Hydrophyllax, Linn. fil. 764
 Hydrophyllæ, Von Martius. 6, 38
 Hydrophyllaceæ, 637, 638*
 Hydrophyllum, Tournef. 639
 Hydrophylls, 638
 Hydrophyta, Lyngb. 8
 Hydropipper, E. 481
 Hydroptilyon, Gärtn. 685
 Hydropogon, Brid. 67
 Hydropterides, Willd. 71
 Hydroputia, Mont. 25
 Hydropyrum, Link. 115
 Hydropyxys, Rafin. 795
 Hydrosolen, Mart. 19
 Hydrospondylus, Iskl. 142
 Hydrostachys, Thouars. 483
 Hydrotaenia, Lindl. 161
 Hydrothrombium, Ktze. 18
 Hydrotriche, Zucc. ? 685
 Hydrurus, Ag. 9, 13
 Hygrobiæ, Rich. 722
 Hygrocharis, Hochst. 632
 Hygrocrocus, Ag. 9, 18
 Hygrocybe, Fr. 41
 Hygrophila, R. Br. 679
 Hygrophyta, Tayl. 58
 Hygrozyza, Nees. 115
 Hygrophilidæ, 679
 Hygrophorus, Fr. 41
 Hyacinium, Palis. 765
 Hyas, Bigel. 723
 Hylozyne, Salisb. 531
 Hylophila, Lindl. 182
 Hymenachne, Palis. 115
 Hymenaea, Linn. 556
 Hymenandra, Alph. DC. 618
 Hymenanthum, Ktze. 42
 Hymenanthus, Fenzl. 498
 Hymenanthus, R. Br. 339, 57
 Hymenanthum, Cass. 711
 Hymenanthus, Blum. 475
 Hymenaea, Moc. et Suss. 398
 Hymenema, Græc. 25
 Hymenidium, Lindl. 778
 Hymenocallis, Salisb. 158
 Hymenocalyx, Zenk. 370
 Hymenocordia, Willd. 283
 Hymenocarpan, Suss. 554
 Hymenocentrum, Cass. 714

- Hymenochaete, *Palis.* 119
 Hymenocrater, *Fisch. et Mey.* 662
 Hymenocystis, *C. A. Mey.* 80
 Hymenodictyon, *Wallich.* 765
 Hymenoglossum, *Presl.* 80
 Hymenogramme, *Mont. et Berk.* 41
 Hymenogyne, *Haw.* 526
 Hymenolena, *DC.* 779
 Hymenolepis, *Cass.* 712
 Hymenolepis, *Kauf.* 79
 Hymenolobus, *Nutt.* 354
 Hymenolytrum, *Schr.* 119
 Hymenomyces, 41
 Hymenonema, *Cass.* 715
 Hymenopappus, *Herit.* 712
 Hymenophylleae, *Endl.* 80
 Hymenophyllum, *Smith.* 80
 Hymenophysa, *C. A. Mey.* 355
 Hymenopodium, *Corda.* 42
 Hymenopogon, *Palis.* 67
 Hymenopogon, *Wall.* 765
 Hymenopus, *Benth.* 543
 Hymenopyramis, *Wall.* 664
 Hymenoria, *Achar.* 50
 Hymenopron, *Spr.* 555
 Hymenostachys, *Bory.* 80
 Hymenostigma, *Hochst.* 161
 Hymenostomum, *R. Br.* 67
 Hymenostyllum, *Brid.* 67
 Hymenothalameae, 50
 Hymenotheca, *Salisb.* 142
 Hymenotomia, *Gaud.* 80
 Hymenoxys, *Cass.* 712
 Hymenula, *Fries.* 42
 Hyobauche, *Sparrm.* 92
 Hyobanche, *Thunb.* 611, 685
 Hyophila, *Brid.* 67
 Hyophorbe, *Gärtn.* 138
 Hyoscyannus, *Tournef.* 621
 Hyoserideae, 715
 Hyoseris, *Linn.* 715
 Hyospatha, *Mart.* 138
 Hypælyptum, *R. Br.* 119
 Hypanthera, *S. Mans.* 315
 Hypocerae, 436
 Hypocoum, *Tournef.* 436
 Hypelata, *P. Br.* 385
 Hypelate, *Smith.* 337
 Hypelytrum, *Link.* 119
 Hypenantha, *Blum.* 733
 Hypenantron, *Corda.* 58
 Hypenia, *Mart.* 661
 Hyperanthera, *Forsk.* 337
 Hyperhiza, *Bosc.* 42
 Hyperica, *Juss.* 405
 Hypericaceae, 392, 405^o
 Hypericene, 406
 Hypericineae, *Chois.* 405
 Hypericum, *L.* 406
 Hyperomyxa, *Corda.* 42
 Hypertelis, *E. Mey.* 498
 Hypheae, *Gärtn.* 139
 Hypphelia, *Fries.* 44
 Hypheothrix, *Kütz.* 10
 Hyppholoma, *Fries.* 41
 Hypphomyces, 41, 43
 Hypphydra, *Schreb.* 122
 Hypnea, *Lamx.* 25
 Hypnophycus, *Kütz.* 10
 Hypnum, *Linn.* 67
 Hypobathrum, *Blum.* 764
 Hypobrichia, *M. O. Curt.* 575
 Hypocalymma, *Endl.* 737
 Hypocalyptus, *Thunb.* 554
 Hypocarpus, *A. DC.* 444
 Hypocherideae, 715
 Hypochaeris, *Linn.* 715
 Hypochmus, *Ehrenb.* 42
 Hypocrea, *Fries.* 43
 Hypocyrtia, *Mart.* 672
 Hypocystis, *Tourn.* 92
 Hypodermium, *Link.* 44
 Hypodorrhis, *R. Br.* 80
 Hypodiscus, *Nees.* 121
 Hypodryas, *Pers.* 41
 Hypoestes, *Sol.* 680
 Hypogaei, *Berk.* 42
 Hypoglossum, *Kütz.* 11
 Hypogynium, *Nees.* 116
 Hypogynous, 241, 243
 Hypogynous Exogens, 244, 246, 325^o
 Hypolaena, *R. Br.* 121
 Hypolepis, *Palis.* 119
 Hypolepis, *Presl.* 79
 Hypolepis, *Pers.* 92
 Hypolyssus, *Berk.* 41
 Hypolytreae, 119
 Hypolytrum, *L. C. Rich.* 119
 Hypophrestum, *Gray.* 714
 Hypophialum, *Nees.* 119
 Hypophyllocarpodendron, *Boerh.* 533
 Hypopithys, *Dillen.* 452
 Hypoporium, *Nees.* 119
 Hypopterygium, *Brid.* 67
 Hypopterygium, *Schlecht.* 795
 Hypospermeae, 10
 Hypospila, *Fries.* 44
 Hypothronia, *Schrank.* 661
 Hypoxanthus, *Rich.* 733
 Hypoxidaceae, 146, 154^o
 Hypoxideae, *R. Br.* 154
 Hypoxids, 154
 Hypoxis, *Linn.* 154
 Hypoxylon, *Bull.* 43
 Hypsanthus, *Endl.* 533
 Hypsela, *Presl.* 693
 Hyptidae, 661
 Hyptis, *Jaeg.*, 661
 Hyrophila, *Mack.* 58
 Hyssopidae, 661
 Hyssopifolia, *C. Bauh.* 575
 Hyssopus, *Linn.* 661
 Hysterangium, *Vittad.* 42
 Hysteria, *Reim.* 183
 Hysterina, *Ach.* 50
 Hysterium, *Fr.* 43
 Hysterocarpus, *Langsd.* 80
 Hysterographium, *Corda.* 43
 Hysteronica, *Willd.* 715
 Hysterophorus, *Vail.* 711
 Hystrix, *Mönch.* 116
 Iantha, *Hook.* 182
 Ianche, *Griesb.* 684
 Ibatia, *Dec.* 626
 Ibbetsonia, *Sims.* 553
 Iberidella, *Boiss.* 354
 Iberis, *Linn.* 354
 Ibidium, *Salisb.* 182
 Ibirá, *Mavegr.* 422
 Icacina, *Adr. Juss.* 441
 Icacineae, *Benth.* 444
 Icacó, *Plum.* 543
 Icacorea, *Aubl.* 643
 Icaranda, *Pers.* 677
 Ichnanthus, *Palis.* 115
 Ichnocarpus, *R. Br.* 601
 Ichthyomethia, *R. Br.* 555
 Ichthyosma, *Schlecht.* 90
 Ichthyothere, *Mart.* 711
 Icaia, *Aubl.* 460
 Ictodes, *Bigel.* 194
 Ideleria, *Kunth.* 119
 Idiothalameae, 50
 Idothea, *Kth.* 205
 Ifoga, *Cass.* 713
 Ignatia, *Linn.* 604
 Ignanura, *Blum.* 138
 Ildefonsia, *Gardn.* 685
 Ilea, *Fries.* 19
 Ileadictyon, *Tul.* 42
 Ilex, *L.* 598
 Ilex, *Tourn.* 291
 Ilicinere, *Ad. Brong.* 597
 Ilicioides, *Dumort.* 598
 Illecebraceae, 495, 499^o
 Illecebræ, *Barth.* 528
 Illecebræ, *R. Brown.* 499
 Illecebrum, *Gärtn. f.* 499
 Illiciae, *DC.* 417
 Illicium, *Linn.* 419
 Illigera, *Blum.* 718
 Illigeraceae, *Lindl.* 717
 Illigereae, *Blum.* 717
 Illosporium, *Mart.* 43
 Ilyogeton, *Endl.* 685
 Ilysanthes, *Raf.* 685
 Imatophyllum, *Hook.* 158
 Imbricaria, *Comm.* 591
 Imbricaria, *Fries.* 50
 Imbricaria, *Smith.* 738
 Imhofia, *Herb.* 158
 Impiens, *Linn.* 492
 Imperata, *Cyrril.* 116
 Imperatoria, *Linn.* 778
 Imperialis, *Juss.* 204
 Impia, *Dodon.* 713
 Inactis, *Ktz.* 10
 Incarvillea, *Juss.* 677
 Incillaria, *Fries.* 50
 Indian Cresses, 366
 Indian Figs, 746
 Indigofera, *Linn.* 554
 Indigoferae, 554
 Inga, *Willd.* 556
 Ingenhousia, *Demst.* 440
 Ingenhousia, *E. Mey.* 553
 Ingenhouzia, *Bert.* 713
 Ingeuhouzia, *Moc. et Sess.* 370
 Inocarpus, *Forst.* 531
 Inochorion, *Ktz.* 11
 Inoderma, *Ktz.* 9
 Inoloma, *Fries.* 41
 Inomeria, *Kütz.* 796
 Instilato, *Fries.* 44
 Intsia, *Thouars.* 556
 Intybellia, *Cass.* 715
 Intybellia, *Mon.* 715
 Intybus, *Fries.* 715
 Inula, *Gärtn.* 710
 Inuleae, 710
 Inuulate, *L.* xxxiv
 Involucraria, *Ser.* 315
 Ionopsidiae, 182
 Ionopsidium, *Reichenb.* 354
 Ionopsis, *H. B. K.* 182
 Iozoste, *Nees.* 537
 Ipecacuanha, *Arrud.* 764
 Iphigenia, *Kth.* 204
 Ipbiona, *DC.* 710
 Ipomæa, *L.* 631
 Ipomeria, *Nutt.* 636
 Ipomopsis, *L. C. Rich.* 636
 Ipsen, *Lindl.* 181
 Iresine, *Willd.* 511
 Iria, *Rich.* 119
 Iriarteae, *Ruiz et Pav.* 138
 Iridaceae, 146, 159^o
 Iridaea, *Bory.* 10, 24
 Iridaps, *Comm.* 271
 Iridae, 159
 Iridae, *Juss.* 159
 Iridion, *Burm.* 434
 Iridis, 159
 Iriua, *Blum.* 385
 Irls, *Linn.* 161
 Irlbachia, *Mart.* 614
 Iron, *P. Brown.* 343
 Iroucana, *Aubl.* 331
 Irpex, *Fries.* 41
 Irsiola, *P. Brown.* 410
 Isachne, *R. Br.* 115
 Isanthera, *Nees.* 622, 672
 Isanthus, *L. C. Rich.* 661
 Isanthus, *DC.* 715
 Isaria, *Hil.* 43
 Isariaceae, *Corda.* 43
 Isatidae, 355
 Isatis, *Linn.* 355
 Isauxis, *Arn.* 394
 Ischaemum, *Linn.* 116
 Ischnum, *Blum.* 129
 Ischnia, *DC.* 664, 670

- Isertia, Schreb. 765
 Isertidae, 765
 Isica, Mönch. 767
 Isidorea, A. Rich. 765
 Isidrogalvia, Ruiz, et Pav. 199
 Isis, Trattinik. 161
 Ismelia, Cass. 712
 Ismene, Herb. 158
 Isuardia, Linn. 725
 Isocarpeæ, 9
 Isocarpha, R. Br. 709
 Isochilidæ, 181
 Isochilus, R. Br. 181
 Isochænus, Nees. 119
 Isocoma, Nutt. 710
 Isolesmia, Gtrdn. 554
 Isodon, Schrad. 661
 Isotææ, Rich. 71
 Isotetes, Linn. 73
 Isogyne, Brongn. li
 Isolepis, R. Br. 119
 Isolobus, DC. 693
 Isoloma, J. Sm. 80
 Isomeria, Don. 709
 Isoomeris, Nutt. 353
 Isoomerium, R. Br. 533
 Isobandra, Wight. 591
 Isoneura, Cass. 709
 Isoneura, R. Br. 601
 Isopappus, Torrey. 710
 Isopetalum, Sweet. 494
 Isophyllum, Hoffm. 778
 Isophyllum, Spach. 406
 Isoplexis, Lindl. 685
 Isopogon, R. Br. 533
 Isoporus, Wall. 795
 Isopryum, Linn. 428
 Isora, Sch. E. 361
 Isostemonææ, Brongn. li
 Isostigma, Less. 711
 Isostylis, A. DC. 648
 Isostylis, R. Br. 534
 Isothecium, Brid. 67
 Isotoma, R. Br. 693
 Isotrema, Raf. 794
 Isotria, Raf. 182
 Isotropis, Benth. 553
 Isotypus, H. B. K. 714
 Isthmia, Ag. 13
 Itea, Linn. 752
 Ittnera, Gmel. 144
 Ita, Linn. 711
 Iteæ, 711
 Ivira, Aubl. 362
 Ivonia, Fl. Fl. 795
 Ivywort, 780
 Ixerba, A. Cunn. 573
 Ixeris, Cass. 715
 Ixia, Linn. 161
 Ixianthes, Benth. 684
 Ixianthus, Griseb. 614
 Ixianchennus, Less. 710
 Ixiolena, Benth. 713
 Ixiolirion, Fisch. 158
 Ixionanthes, Jack. 397
 Ixodia, R. Br. 712
 Ixora, Linn. 764

 Jaborosa, Juss. 622
 Jabotapita, Plum. 475
 Jacaranda, Juss. 677
 Jacca, Curt. 714
 Jackia, H. 378
 Jackia, Spreng. 264
 Jackia, Wall. 765
 Jacksonia, R. Br. 553
 Jacobia, DC. 732
 Jacosta, E. Mey. 712
 Jacquemontia, Belong. 712
 Jacquemontia, Choix. 631
 Jacquinia, Linn. 648
 Jacquinia, Molle. 372
 Jacquinsa, Ledeb. 167
 Jageria, H. B. K. 711
 Jagera, Griseb. 167

 Jalambicea, Llav. et Ler. 142
 Jalapa, Tournef. 507
 Jaltomata, Schlecht. 622
 Jambolifera, Auct. 738
 Jambolifera, Linn. 473
 Jambos, Adans. 738
 Jambosa, Rumph. 738
 Jamesia, Torr. et A. Gray. 570
 Jamesonia, Hook. 80
 Jania, Lamx. 10, 25
 Jania, Schull. 199
 Janipha, Kunth. 281
 Janraja, Plum. 214
 Janusia, A. de J. 390
 Jarava, Ruiz et Pav. 115
 Jaravæa, Scop. 733
 Jaroba, Marten. 674
 Jasiona, Linn. 691
 Jasiouææ, 691
 Jasminaceæ, 649, 650*
 Jasiuineæ, Juss. 650
 Jasminum, L. 651
 Jasminworts, 650
 Jasionia, Cass. 710
 Jatropha, Kunth. 281
 Jatus, Rumph. 664
 Jauhertia, Guillem. 764
 Jaumea, Pers. 712
 Jeffersouia, Barton. 438
 Jenkinsia, Griff. 531
 Jenkinsonia, Sweet. 494
 Jirasekia, Schm. 646
 Joachiuia, Tenore. 115
 Joannea, Spreng. 714
 Joannesia, Pers. 714
 Jochroma, Benth. 621
 Jodanthus, Torr. et A. Gray. 354
 Jödes, Blum. 309
 Jodinia, Hook. et Arn. 598
 Johannesia, Velloz. 281
 Johanna, Willd. 714
 Johnia, Roxb. 585
 Johnia, Wight. et Arn. 555
 Johnsouia, Catesb. 664
 Johnsonia, R. Br. 205
 Johrenia, DC. 778
 Joint Pirs, 232, 248
 Joliffia, Bojer. 315
 Joncquetia, Schreb. 460
 Jondraba, Medik. 354
 Jonesia, Roxb. 585
 Jonidium, Venten. 339
 Jonquillia, DC. 158
 Jonsonia, Adans. 462
 Jonthiaspi, Tournef. 351
 Josepha, Fl. Fl. 507
 Josephia, Salisb. 584
 Josephinia, Vent. 670
 Jossinia, Comm. 738
 Jovellana, Ruiz et Pav. 684
 Jovibarba, DC. 346
 Juanilloa, Ruiz et Pav. 622
 Jubæa, H. B. K. 139
 Jubelina, A. de J. 390
 Jubula, Dumort. 59
 Jubulide, 59
 Jucunda, Cham. 733
 Juglandaceæ, 289, 292*
 Juglandæ, DC. 292
 Juglandites, Sternb. 795
 Juglands, 292
 Juglans, Linn. 293
 Juliana, Llav. et Ler. 479
 Julieta, Lessch. 449
 Julitognia, Dumort. xxxvii
 Julocroton, Mart. 281
 Juncaceæ, 199, 191*
 Juncagineæ, Rich. 210
 Juncagineæ, 297, 210*
 Juncago, Town. 210
 Juncæles, 191, 190*
 Juncaria, Cuv. 469
 Juncos, DC. 191
 Juncos, Nees, v. E. Beck. 121
 Junci, Juss. 191

 Jimens, DC. 192
 Jundzillia, Andr. 354
 Jungermannia, Dillen. 60
 Jungermaniaceæ, 56, 59*
 Jungermannidæ, 60
 Jungansia, Gmel. 783
 Jungulmia, Corda. 41
 Jungia, Gürtn. 738
 Jungia, Linn. f. 714
 Jungia, Mönch. 661
 Jungia, Adans. 455
 Juniperus, Linn. 229
 Jürgensia, Spreng. 364
 Jurinea, Cass. 714
 Jussiaea, Linn. 725
 Jussiaea, 725
 Jussievia, Honst. 281
 Justicia, Nees. 680
 Justiciadæ, 679

 Kadsura, Juss. 306
 Kadsurads, 305
 Kadua, Cham. et Schl. 765
 Kämpfera, Houtt. 664
 Kämpferia, Linn. 167
 Kämpferkia, Ruiz et Pav. 565
 Kahria, Forsk. 709
 Kalanchœ, Adans. 346
 Kampfussia, Schultz. 715
 Kalifornia, Stackh. 25
 Kallias, DC. 711
 Kallströmia, Scop. 479
 Kallymenia, Agh. 25
 Kalmia, Linn. 455
 Kalosantia, Haw. 346
 Kampmannia, Rafin. 473
 Kamptzia, Nees. 737
 Kanahia, R. Br. 626
 Kandelia, Wight et Arn. 727
 Kandi, Adans. 354
 Karamuschewia, Fisch. 765, 771
 Karatas, Plum. 148
 Kariuia, Less. 710
 Karivia, Arn. 315
 Karpaton, Raf. 767
 Karwinskia, Zucc. 582
 Kaulfussia, Blum. 82
 Kaulfussia, Nees. 710
 Kayea, Wall. 402
 Keerlia, DC. 710
 Keiria, Bowd. 795
 Keithia, Benth. 661
 Kennedy, Vent. 555
 Kennedyææ, 555
 Kentia, Steud. 604
 Kentia, Blum. 138, 422
 Kentrauthus, Neck. 698
 Kentrophyllum, Neck. 714
 Kentrophyta, Nutt. 554
 Kentropsis, Moq. 513
 Keppleria, Mart. 139
 Keramocarpus, Fenzl. 799
 Keranthus, Lour. 181
 Keraselma, Neck. 281
 Kerandrenia, Gay. 361
 Kermesia, Endl. 509
 Kernera, Medik. 354
 Kernera, Willd. 145
 Keruceria, Mönch. 711
 Kerria, DC. 565
 Ketzlia, Tourn. 370
 Keulia, Molina. 537
 Keurva, Forsk. 132
 Kinya, A. Juss. 462
 Kibara, Endl. 299
 Kibatalla, Don. 601
 Kibera, Adans. f. 354
 Kibessia, DC. 733
 Kieksia, Linn. 681
 Kielmeyera, Mart. et Zucc. 397
 Kierschloigeria, Spach. 725
 Kiesera, Reinw. 555
 Kieseria, Nees. 397
 Kigelia, DC. 671
 Kiggellaria, Linn. 328

- Kingia, *R. Br.* 192
 Kingiaceæ, *Endl.* 191
 Kingstonia, *Gray.* 568
 Kirganella, *Juss.* 282
 Kirilovia, *Bunge.* 513
 Kissi, *L.* 397
 Kitabelia, *W.* 370
 Kittelia, *Reichenb.* 693
 Kixia, *Blum.* 601
 Klaprotia, *H. B. K.* 745
 Klasea, *Cass.* 714
 Kleinhowia, *Linn.* 361
 Kleinia, *Jacq.* 711
 Kleiria, *Juss.* 712
 Kleinia, *Linn.* 713
 Klotzschia, *Cham.* 778
 Kluckia, *Andrz.* 354
 Klugia, *Schlecht.* 672
 Knautia, *Linn.* 700
 Kneiffia, *Spach.* 725
 Kneiffia, *Fr.* 41
 Kneua, *Lour.* 302
 Knightia, *R. Br.* 534
 Kniphofia, *Mönch.* 205
 Knorria, *Moc. et Scss.* 460
 Knotwortia, 499
 Knowltonia, *Salisb.* 428
 Knoxia, *Linn.* 764
 Koanophyllum, *Arrud.* 715
 Kobresia, *Bridl.* 119
 Koehlia, *Roth.* 513
 Kœchlea, *Endl.* 713
 Kœberlinia, *Zucc.* 411
 Kœlern, *Willd.* 328
 Kœleria, *Pers.* 116
 Kœllea, *Birch.* 428
 Kœllia, *Mönch.* 661
 Kœreutera, *Hedw.* 67
 Kœreutera, *Murr.* 509
 Kœreuteria, *Lam.* 385
 Kœrnigia, *Comm.* 364
 Kœrnigia, *Linn.* 504
 Kœhantia, *Cham. et Schlecht.* 76
 Kœhranschia, *Kunth.* 498
 Kolbea, *Schlecht.* 199
 Kolbia, *Palis.* 322
 Kollera, *Prest.* 527
 Kolowratia, *Prest.* 167
 Kœhpinia, *Pall.* 715
 Kœniga, *Adans.* 354
 Koon, *Gœrtn.* 385
 Kopsia, *Blum.* 601
 Kopsia, *Dumort.* 611
 Kordelestris, *Arrud.* 677
 Kosaria, *Forsk.* 268
 Kosteletzkyia, *Prest.* 370
 Kotschyia, *Endl.* 554
 Krameria, *Löffl.* 378
 Krameriaceæ, *Martius.* 375
 Krapfia, *DC.* 428
 Kraschenimikovia, *Turcz.* 495
 Kraschenimikowia, *Gülden.* 513
 Kraunhia, *Raf.* 554
 Krausia, *Harv.* 764
 Krebsia, *Eckl. et Zeyh.* 554
 Kreysigia, *Reichb.* 199
 Krigia, *Schreb.* 715
 Krockeria, *Neck.* 422
 Krokeria, *Mönch.* 554
 Krubera, *Hoffm.* 778
 Kruegeria, *Neck.* 556
 Kryntzickia, *Fisch.* 656
 Kuguaia, *DC.* 711
 Kugia, *Bert.* 795
 Kuhlia, *H. B. K.* 328
 Kuhlha, *Reine.* 604
 Kuhlma, *Linn.* 709
 Kuhlminera, *Lam.* 554
 Kunnara, *Medik.* 205
 Kumbaya, *Endl.* 765
 Kundmannia, *Scopol.* 77
 Kuntlia, *Dennis.* 460
 Kunthia, *H. et B.* 1
 Kunzen, *Reichb.* 73
 Kunzea, *Sp.* 56
 Kurria, *Hochst.* 765
 Kurrinaia, *Wall.* 588
 Kutchubaa, *Fisch.* 765
 Kutzingia, *Souder.* 796
 Kyberia, *Neck.* 710
 Kydia, *Roeb.* 364
 Kyllingia, *Linn.* 119
 Kymapleura, *Nutt.* 715
 Kyphocarpa, *Fenzl.* 511
 Labatia, *Scop.* 598
 Labatia, *Swartz.* 591
 Labiatae, *Juss.* 659
 Labiates, 659
 Labiatifloræ, 703, 714
 Labichea, *Gaud.* 555
 Labillardiera, *R. Sch.* 441
 Labisia, *Lindl.* 648
 Lablab, *Adans.* 555
 Labordia, *Gaud.* 604
 Labourdonnaisia, *Boj.* 591
 Labrdia, *Swediaur.* 555
 Labrella, *Fries.* 43
 Laburnum, *Griseb.* 554
 Lacæna, *Lindl.* 182
 Lacathea, *Salisb.* 397
 Lacellia, *DC.* 714
 Lacedæa, *H. B. K.* 585
 Lachanodes, *DC.* 713
 Lacheualia, *Jacq.* 205
 Lachnæa, *Linn.* 531
 Lachnagrostis, *Trin.* 115
 Lachnanthes, *Elliott.* 153
 Lachnocaulon, *Kth.* 122
 Lachnoloma, *Bunge.* 355
 Lachnopus, *Blum.* 733
 Lachnopylis, *Hochst.* 685
 Lachnospermum, *Willd.* 713
 Lachnostoma, *H. B. K.* 626
 Lachuosyphonium, *Hoch.* 765
 Lacia, *Lindl.* 483
 Lacistema, *Swartz.* 329
 Lacisteunaceæ, 328, 329
 Lacistemads, 329
 Lacistemeæ, *Martius.* 329
 Lactarius, *Pers.* 41
 Lactuca, *Linn.* 715
 Lactuceæ, 715
 Ladanum, *Spach.* 350
 Ladanopsis, *DC.* 733
 Lælia, *Adans.* 355
 Lælia, *Lindl.* 181
 Læliadæ, 181
 Lænuccia, *Cass.* 710
 Lætia, *Löffl.* 328
 Læfoensia, *Yandell.* 575
 Læfuentea, *Lagasc.* 685
 Lagarinthus, *E. Mey.* 626
 Lagarosiphon, *Harvey.* 142
 Lagascea, *Cav.* 709
 Lagatea, *Nutt.* 709
 Lagenaria, *Sering.* 315
 Lagenias, *E. Mey.* 614
 Lagenium, *Brid.* 67
 Lagenocarpus, *Klotzsch.* 455
 Lagenocarpus, *Nees.* 119
 Lagenophora, *Cass.* 710
 Lagerströmia, *Linn.* 575
 Lagetta, *Juss.* 531
 Lagochilus, *Bunge.* 662
 Lagœcia, *Linn.* 779
 Lagonychimni, *Stephens.* 556
 Lagophylla, *Nutt.* 712
 Lagopsis, *Bunge.* 662
 Lagoseris, *Bieberst.* 715
 Lagothamnus, *Nutt.* 713
 Lagotis, *Gœrtn.* 764
 Lagumaria, *Don.* 370
 Laguncularia, *Gœrtn.* 718
 Lagunczia, *Scop.* 743
 Lagunea, *Cav.* 370
 Lagunea, *Lour.* 504
 Lagurranthera, *C. A. Mey.* 713
 Lagurostemon, *Cav.* 713
 Lagurus, *Linn.* 116
 Lahaia, *H. et Sch.* 491
 Lalage, *Lindl.* 553
 Lallemtantia, *Fisch. et Mey.* 662
 Lamanonia, *Fl. Fl.* 572
 Lamarchea, *Gaud.* 737
 Lamarckea, *Pers.* 621
 Lamarckia, *Hort.* 588
 Lamarckia, *Mönch.* 116
 Lamarckia, *Olivi.* 22
 Lambertia, *Smith.* 534
 Lamia, *Yand.* 501
 Lamiaceæ, 649, 659*
 Lamiidæ, 662
 Laminareæ, 10
 Laminaria, *Lamx.* 10, 22
 Laminariidæ, 22
 Laministrum, *Duby.* 22
 Lamiopsis, *Dum.* 662
 Lanium, *Linn.* 662
 Lamourouxia, *Ag.* 25
 Lamourouxia, *H. B. K.* 685
 Lampra, *Benth.* 188
 Lamprocarpus, *Blume.* 188
 Lamprocarya, *R. Br.* 119
 Lamprostachys, *Boj.* 662
 Lamprotis, *Don.* 455
 Lampsana, *Yall.* 715
 Lampsaneæ, 715
 Lampujang, *Rumph.* 167
 Lamyra, *Cass.* 714
 Lanaria, *Thunb.* 153
 Lanceolaria, *DC.* 355
 Lancisia, *Gœrtn.* 712
 Lanerelia, *Del.* 481
 Landia, *Comm.* 765
 Landolphia, *Palis.* 601
 Landtia, *Less.* 713
 Langeveldia, *Gaud.* 262
 Langia, *Endl.* 511
 Langlea, *Scopol.* 331
 Langsdorfia, *Leand.* 473
 Langsdorfia, *Mart.* 90
 Langsdorfia, *Radd.* 139
 Langsdorfia, *Willd.* 714
 Langnia, *Köngl.* 167
 Langirostemma, *Chap.* 406
 Lanipila, *Burch.* 712
 Lanium, *Lindl.* 181
 Lannea, *A. Rich.* 467
 Lanneoma, *Del.* 795
 Lanosa, *Fries.* 43
 Lanium, *Rumph.* 464
 Lantana, *Linn.* 664
 Lapachys, *Less.* 711
 Lappageria, *Ruiz et Pav.* 217
 Lappelia, *Gris.* 614
 Lappyrhosia, *Pourret.* 161
 Lappyrhosia, *Thunb.* 712
 Lapidra, *Lagasc.* 158
 Laplacea, *H. B. K.* 397
 Laportea, *Gaud.* 262
 Lappa, *Tourn.* 714
 Lappago, *Schreb.* 115
 Lappula, *DC.* 372
 Lappula, *Mönch.* 656
 Lapsana, *Tourn.* 715
 Larbrea, *St. Hil.* 498
 Lardizabala, *Ruiz et P.* 304
 Lardizabalaceæ, 297, 303*
 Lardizabalads, 303
 Lardizabaleæ, *Decaisne.* 305
 Laretia, *Gill. et Hook.* 778
 Larix, *Tourn.* 229
 Larochea, *Haw.* 346
 Larrea, *Cav.* 479
 Lasallia, *Merat.* 50
 Lascadium, *Rafin.* 282
 Laschia, *Fries.* 41
 Laseguen, *A. DC.* 601
 Lasepitium, *Tourn.* 779
 Lasia, *Brid.* 67
 Lasia, *Lour.* 191
 Lasinagrostis, *Lindl.* 115
 Lasiandra, *DC.* 733
 Lasianthea, *DC.* 711

- Lasiandra*, *Palis.* 430
Lasianthus, *Jacq.* 764
Lasianthus, *Catesb.* 397
Lasianthus, *Zucc.* 711
Lasiobotrys, *Kze.* 43
Lasiocephalus, *Schl.* 715
Lasiocloha, *Kinoh.* 116
Lasiocorys, *Beuth.* 662
Lasioplepis, *J. J. B.* 477
Lasionema, *Don.* 765
Lasiopera, *Hoffm.* 685
Lasiopetalidee, 364
Lasiopetalum, *Smith.* 364
Lasioptera, *Andrz.* 355
Lasiopus, *Don.* 715
Lasiorrhiza, *Lagase.* 714
Lasiosphion, *Fresen.* 531
Lasiosperma, *Lagase.* 712
Lasiospermum, *Fisch.* 715
Lasiopora, *Cuss.* 715
Lasiostemum, *Nees. et Mart.* 471
Lasiostoma, *Schreb.* 604
Lasiostoma, *Beuth.* 765
Lasiopogon, *Cuss.* 713
Lasiostenia, *DC.* 712
Lasiostenia, *Cuss.* 712
Lastrea, *Bory.* 80
Lastrea, *Presl.* 79
Latania, *Commers.* 139
Laterna, *Turp.* 42
Lathraea, *Lin.* 611
Lathraeophila, *Leandr.* 90
Lathriogyne, *Eckl. et Z. yh.* 553
Lathrisia, *Swartz.* 182
Lathyrus, *Lin.* 554
Latipes, *Kinoh.* 115
Latouria, *Endl.* 695
Latreillea, *DC.* 711
Laubertia, *A. DC.* 601
Laugeria, *Jacq.* 764
Launea, *Cuss.* 715
Launzia, *Buchan.* 47
Lauraceae, 529, 535²
Laurelia, *Juss.* 390
Laurels, 535
Laurumbergia, *Bory.* 723
Laurencia, *Lauc.* 25
Laurertia, *Neck.* 693
Laureria, *Schlecht.* 621
Lauri, *Juss.* 525
Lauridia, *Eckl. et Zeyh.* 583
Laurineae, *Vent.* 535, 538
Laurocerasus, *Tourn.* 553
Laurophyllus, *Thunb.* 467
Laurus, *Tourn.* 557
Lavandula, *Lin.* 661
Lavanga, *Jhén.* 458
Lavatera, *L.* 570
Lavauxia, *Spach.* 725
Lavenia, *Swartz.* 709
Lavoisiera, *DC.* 733
Lavoisierae, 733
Lavradia, *Feloz.* 344
Lawrencella, *Walp.* 713
Lawrencia, *Hook.* 370
Lawsonia, *Lin.* 575
Laxmannia, *Fisch.* 565
Laxmannia, *Forst.* 711
Laxmannia, *R. Br.* 295
Laxmannia, *S. G. Gmel.* 771
Laxmannia, *Savth.* 473
Laya, *Hook. et Arn.* 712
Laya, *Hook. et Arn.* 555
Lazarides, *M. A.* 590
Lea, *Walt.* 640
Leala, *Forak.* 209
Leandra, *Rudl.* 723
Leandria, *Schrad.* 723
Leathina, *Gray.* 22
Leavenworthia, *Torr. et G.* 111
Lebeckia, *Thunb.* 554
Lebetanthus, *Endl.* 419
Lebetina, *Cuss.* 711
Lebetonia, *Schub.* 570
Lebocactis, *Focke.* 59
Leeammthus, *Jack.* 765
Leeanium, *Presl.* 80
Leeanocarpus, *Nees.* 511
Leeanopteris, *Reime.* 79
Leeanora, *Achar.* 56
Leeanotis, *Rehb.* 50
Leechea, *Cuss.* 711
Leechea, *Lin.* 350
Leechea, *Low.* 188
Leecheoides, *Dunal.* 350
Leechidium, *Spach.* 350
Leeceia, *Achar.* 50
Leeceida, 50
Lecokin, *DC.* 779
Lecotea, *A. Rich.* 764
Lecontia, *Torr.* 129
Lecostemon, *Mos. et Sess.* 543
Lecythidaceae, 716, 739²
Lecythideae, *Richard.* 739
Lecythis, *Löfl.* 740
Lecythopsis, *Schr.* 740
Lecythis, 739
Leda, *Bory.* 18
Ledebouria, *Roth.* 205
Ledeburia, *Link.* 778
Ledocarpeae, *Meyen.* 488
Ledocarpum, *Desf.* 489
Ledonia, *Spach.* 350
Ledum, *Lin.* 455
Lea, *Lin.* 440
Leeaceae, *Barth.* 439
Leeae, 440
Leersia, *Hodw.* 67
Leersia, *Sol.* 115
Leuwenhœckia, *E. M.* 364
Lefeburia, *A. Rich.* 778
Legendrea, *Webb.* 632
Legnotideae, *Barth.* 604
Legnotis, *Swartz.* 605
Legouzia, *Dur.* 691
Leguminosae, *Juss.* 544
Leguminous Plants, 544
Lehmannia, *Spreng.* 621
Leianthus, *Gries.* 614
Leiblinia, *Endl.* 10, 22
Leibnitzia, *Cuss.* 714
Leighia, *Cuss.* 711
Leighia, *Scop.* 709
Leimanthium, *Willd.* 199
Leinkeria, *Scop.* 534
Leiocarpum, *DC.* 714
Leiocarpus, *Bhon.* 282
Leiocorysum, *DC.* 713
Leitogonia, *DC.* 709
Leiolobium, *DC.* 354
Leiophyllum, *Pers.* 455
Leiorreuma, *Eschw.* 50
Leiospermum, *Don.* 572
Leiospermum, *Wall.* 511
Leiospora, *C. A. Mey.* 354
Leiostegia, *Beuth.* 733
Leiothamnus, *Gries.* 611
Leiotheca, *Brid.* 67
Leiotulus, *Ehrenb.* 778
Leiphalmos, *Schl.* 614
Lejennia, *Lib.* 59
Lejenniaceae, *Dumort.* 59
Lejica, *Hüll.* 711
Lemalis, *Fries.* 42
Lemanea, *Bory.* 22
Lemnaide, 22
Lemnaidee, 10
Lemnaia, *Bory.* 10
Lembosia, *Loebl.* 796
Lembotropis, *Gris. b.* 551
Lemmatium, *DC.* 712
Lemna, *Juss.* 73
Lemna, *L.* 125
Lemnaceae, *DC.* 124
Lemnada, 121
Lemniscia, *Schreb.* 372, 147
Lemnicola, *Zeyh.* 433
Lemobia, *L. R.* 171
Lemobia, *Pers.* 161
Lemida, *Thomax.* 124
Lennea, *L. K. O.* 504
Lennea, *L. et L.* 795
Lenormandia, *Mont.* 25
Lenormandia, *Sonder.* 793
Lenago, *DC.* 767
Lentibularia, *Vaill.* 686
Lentibulariaceae, 688, 686*
Lentibularie, *R. Brown.* 686
Lentibularia, *Richard.* 686
Leutibus, *Fr.* 41
Leutiscus, *Tourn.* 467
Leuzites, *Fr.* 41
Leobordea, *Del.* 554
Leophilus, *Knowles.* 181
Leonia, *Lil. et L.* 661
Leonia, *Ruiz et Pav.* 328
Leonicenia, *Scop.* 733
Leontotis, *Pers.* 662
Leontice, *Lim.* 438
Leonticoideae, *DC.* 436
Leontodon, *Adans.* 715
Leontodon, *Lin.* 715
Leontonyx, *Cuss.* 713
Leontopetalum, *Tourn.* 433
Leontophthalmum, *Less.* 712
Leontopodium, *R. Br.* 713
Leonurus, *Lin.* 662
Leonurus, *Tourn.* 662
Leopoldia, *Herb.* 158
Leopoldinia, *Mart.* 138
Leotia, *Hüll.* 43
Lepanthes, *Swartz.* 181
Lepargyreia, *Nutt.* 257
Lepchinia, *Willd.* 662
Lepocercis, *Trin.* 116
Lepocostegeres, *Blum.* 791
Lepia, *Desv.* 355
Lepicaune, *Lapeyr.* 715
Lepicephalus, *Lag.* 700
Lepicline, *Cuss.* 713
Lepidadenia, *Nees.* 537
Lepidagathis, *Willd.* 679
Lepidanche, *Engelm.* 634
Lepidanthus, *Nees.* 121
Lepidaploa, *Cuss.* 709
Lepidilemma, *Trin.* 116
Lepidistraum, *DC.* 355
Lepididee, 354
Lepidium, *R. Br.* 354
Lepidocarpodendron, *Böerh.* 533
Lepidocaryae, *Martius.* 138
Lepidocaryum, *Mart.* 139
Lepidoma, *Achar.* 50
Lepidoneua, *F. et M.* 715
Lepidopappus, *Fl. mex.* 712
Lepidophorum, *Neck.* 712
Lepidophyllum, *Cuss.* 710
Lepidopilum, *Brid.* 67
Lepidopogon, *Tausch.* 710
Lepidosperma, *Labill.* 119
Lepidostachys, *Wall.* 283
Lepidostephanus, *Barth.* 711, 712
Lepidotheca, *Null.* 712
Lepidotis, *Palis.* 70
Lepidotisperma, *R. et Sch.* 119
Lepidozia, *Dum.* 60
Lepigonum, *Fr.* 499
Lepionurus, *Bl.* 114
Lepiota, *Fries.* 41
Lepironia, *Rich.* 119
Lepisanthes, *Bl.* 385
Lepismium, *Pfaff.* 748
Lepistemon, *Blum.* 631
Lepistoma, *Blum.* 626
Leposma, *Blum.* 626
Lepurantha, *Pauf.* 50
Lepuraria, *Achar.* 59
Lepus, *Loew.* 538
Lepaenanthus, *Nees.* 679
Lepalenia, *R. Br.* 627
Lepaleum, *DC.* 351
Lepanthium, *Hoffm.* 611
Lepandra, *Nutt.* 685
Lepanthus, *L. C. R.* 206
Leptrichna, *R. Br.* 568

- Lepasea, *Haw.* 568
 Leptaspis, *R. Br.* 115
 Leptatherum, *Nees.* 116
 Leptemon, *Raf.* 281
 Lepteranthus, *DC.* 714
 Leptica, *E. M.* 714
 Leptilix, *Raf.* 199
 Leptinella, *Cass.* 712
 Leptis, *E. Mey.* 553
 Leptobalanus, *Benth.* 543
 Leptocallis, *G. Don.* 631
 Leptocarpæa, *DC.* 354
 Leptocarpus, *DC.* 710
 Leptocarpus, *Raf.* 711
 Leptocarpus, *R. Br.* 121
 Leptocarpus, *Willd.* 664
 Leptocaulis, *Nutt.* 778
 Leptoceras, *R. Br.* 182
 Leptochilus, *Kaulf.* 79
 Leptochloa, *Palis.* 115
 Leptocnemis, *Nutt.* 779
 Leptocoma, *Less.* 710
 Leptocoryphium, *Nees.* 115
 Leptocyanus, *Benth.* 555
 Leptocyonium, *Prest.* 80
 Leptodactylon, *Hook.* 636
 Leptodaphne, *Nees.* 537
 Leptodendron, *Benth.* 455
 Leptodermis, *Wall.* 765
 Leptoderris, *DC.* 710
 Leptodon, *Heber.* 67
 Leptoglossis, *Benth.* 684
 Leptoglottis, *DC.* 556
 Leptogramma, *Fr.* 49
 Leptogramma, *J. Sm.* 79
 Leptogyne, *Ell.* 710
 Leptohymenium, *Schic.* 67
 Leptolæna, *Thouars.* 487
 Leptolobieæ, 555
 Leptolobium, *Benth.* 555
 Leptolobium, *Vogel.* 555
 Leptomeria, *R. Br.* 788
 Leptomitæ, *Röm.* 9
 Leptomitus, *Ag.* 9, 18
 Leptomorpha, *DC.* 713
 Leptonema, *A. Juss.* 282
 Leptonia, *Fries.* 41
 Leptopetalum, *Hook.* 765
 Leptophytus, *Cass.* 713
 Leptopleuria, *Prest.* 80
 Leptopoda, *Nutt.* 711
 Leptopyrum, *Rafin.* 116
 Leptopyrum, *Reichb.* 482
 Leptorhabdos, *Schrenck.* 685
 Leptorhachis, *Kl.* 281
 Leptorhynchus, *Less.* 713
 Leptormus, *DC.* 355
 Leptoscheucus, *Nees.* 119
 Leptosoma, *Benth.* 553
 Leptosia, *Nutt.* 715
 Leptosiphon, *Benth.* 636
 Leptosolena, *Prest.* 167
 Leptospermææ, 737
 Leptospermoides, *DC.* 709
 Leptospermum, *Forst.* 737
 Leptostachya, *Mitch.* 664
 Leptostachya, *Nees.* 680
 Leptostegia, *Don.* 80
 Leptostelia, *Don.* 710
 Leptostemma, *Blum.* 627
 Leptostigma, *Arn.* 764
 Leptostomum, *R. Br.* 67
 Leptostroma, *Fries.* 42
 Leptostylis, *C. A. Mey.* 35
 Leptosyne, *DC.* 711
 Leptotenia, *Nutt.* 778
 Leptotes, *Lindl.* 181
 Leptothamnus, *DC.* 710
 Leptotheca, *Schwägr.* 67
 Leptothrium, *Kunth.* 116
 Leptothrix, *Kützing.* 10
 Leptothyrium, *Kunze.* 42
 Leptotrichææ, *Kützing.* 10
 Leptotrichum, *Corda.* 43
 Leptriina, *Rafin.* 501
 Leptuberia, *Rafin.* 50
 Lepturus, *R. Br.* 116
 Lepurandra, *Nimmo.* 271
 Lepuropetalum, *Ell.* 568
 Lepyrodia, *R. Br.* 121
 Lepyrodielis, *Fenzl.* 498
 Lerchea, *Linn.* 765
 Lerchia, *Hall.* 513
 Lereschia, *Boiss.* 778
 Leretia, *Fl. Fl.* 795
 Leretia, *Vell.* 444
 Lerieæ, 714
 Lerouxia, *Merat.* 645
 Leschenaultia, *R. Br.* 695
 Leskea, *Hedw.* 67
 Lespedeza, *Rich.* 554
 Lessertia, *DC.* 554
 Lessingia, *Cham.* 710
 Lessonia, *Bert.* 778
 Lessonia, *Bory.* 10, 22
 Lestadia, *Kunth.* 710
 Lestibodea, *DC.* 712
 Lestibodesia, *Thouars.* 511
 Lethæa, *Noronh.* 199
 Lettsonia, *Roze.* 632
 Lettsomia, *Roze et Pav.* 397
 Leucadendron, *Herm.* 533
 Leucadendron, *Linn.* 533
 Leucæna, *Benth.* 556
 Leucandra, *Kl.* 281
 Leucantha, *Gray.* 714
 Leucantha, *Zipp.* 795
 Leucanthemum, *Tourn.* 712
 Leucas, *R. Br.* 662
 Leuceria, *Lag.* 714
 Leucharis, *Less.* 714
 Leucoblepharis, *Arn.* 710
 Leucocarpon, *A. Rich.* 328
 Leucocarpus, *Don.* 684
 Leucocephala, *Roze.* 122
 Leucochrysum, *DC.* 713
 Leucocoryne, *Lindl.* 205
 Leucocrocinum, *Nutt.* 199
 Leucodon, *Schwägr.* 67
 Leucogramma, *Meyer.* 50
 Leucoium, *Monch.* 354
 Leucojum, *Linn.* 158
 Leucolæna, *R. Br.* 778
 Leucoloma, *Brid.* 67
 Leucomeris, *Don.* 714
 Leucomyrtus, *DC.* 738
 Leuconotis, *Jack.* 691
 Leuconymphaea, *Boerh.* 411
 Leucophaea, *Webb.* 662
 Leucophanes, *Brid.* 67
 Leucopholis, *Gardn.* 709
 Leucophyllum, *H. B. K.* 684
 Leucophyta, *R. Br.* 712
 Leucophyton, *Less.* 714
 Leucoploeus, *Nees.* 121
 Leucopodium, *Gardn.* 710
 Leucopogon, *R. Br.* 449
 Leucopsidium, *DC.* 712
 Leucoryphe, *Endl.* 714
 Leucoseptrum, *Sm.* 662
 Leucoseris, *Nutt.* 715
 Leucosia, *Thouars.* 583
 Leucosidea, *E. et Z.* 582
 Leucospermum, *R. Br.* 533
 Leucospora, *Nutt.* 685
 Leucosporium, *Corda.* 44
 Leucostachys, *Uffg.* 182
 Leucostegia, *Prest.* 80
 Leucostemma, *Benth.* 498
 Leucostemma, *Don.* 713
 Leucothamnus, *Lindl.* 364
 Leucothoë, *Don.* 455
 Leucoxyton, *Blum.* 397
 Leuzea, *DC.* 714
 Leveillea, *Dec.* 25
 Levenhookia, *R. Br.* 696
 Levisanus, *Schreb.* 785
 Levisticum, *Koch.* 778
 Lewisia, *Pursh.* 526
 Lewisiaæ, 525
 Lexarza, *Llav.* 361
 Leyersteria, *Wall.* 767
 Leyssera, *Linn.* 713
 Leysserææ, 713
 Lhotskya, *Schauc.* 721
 Liaber, 709
 Liabum, *Adans.* 709
 Liagora, *Lamx.* 10, 22
 Liagoreæ, 10
 Liatris, *Schreb.* 709
 Libanotis, *Crantz.* 778
 Libanotis, *Scopol.* 778
 Libanus, *Colebr.* 460
 Libertia, *Dum.* 205
 Libertia, *Lejeunc.* 116
 Libertia, *Spreng.* 161
 Licania, *Aubl.* 543
 Licaria, *Aubl.* 537
 Lichen, *Schrad.* 42
 Lichenes, *Juss.* 45
 Lichenoides, *Bisch.* 57
 Lichenopsis, *Sch.* 42
 Lichina, *Ag.* 49
 Lichtensteinia, *Ch.* 778
 Lichtensteinia, *Wendl.* 791
 Lichtensteinia, *Willd.* 199
 Liemophora, *Ag.* 13
 Lictoria, *J. Agh.* 25
 Licuala, *Rumph.* 139
 Lidbeckia, *Berg.* 712
 Lieberkühnia, *Schreb.* 714
 Liebigia, *Endl.* 672
 Liebmanna, *J. Ag.* 22
 Lightfootææ, 691
 Lightfootia, *Herit.* 691
 Lightfootia, *Schreb.* 765
 Lightfootia, *Swartz.* 328
 Lightia, *Schomb.* 364
 Ligularia, *Cass.* 713
 Ligularia, *Dunal.* 568
 Liguliflorææ, 703, 715
 Ligusticum, *Lagasc.* 778
 Ligusticum, *Linn.* 778
 Lignistrum, *Tourn.* 617
 Liliacææ, *Tourn.* 617
 Liliacææ, *Vent.* 622
 Lilia, *H. et B.* 144
 Lilia, *Bert.* 328
 Lilia, *Juss.* 200
 Liliaceæ, 195, 200^o
 Liliaceæ, *L. xxxiii*
 Liliales, 104, 195*
 Liliastrium, *Link.* 205
 Lilio-Narcissus, *Tourn.* 158
 Lilium, *Linn.* 205
 Lilyworts, 200
 Limacææ, *Lour.* 309
 Limacia, *Dicr.* 328
 Limatodes, *Blum.* 182
 Limbarda, *DC.* 710
 Limboria, *Achar.* 50
 Limboridææ, 23
 Limeum, *Forsk.* 282
 Limeum, *Linn.* 509
 Limia, *Vand.* 664
 Linnactis, *Ktz.* 10
 Limnauthææ, *R. Br.* 366, 367
 Limnauthemum, *Gm.* 614
 Limnanthes, *R. Br.* 367
 Limnas, *Trin.* 115
 Limnetis, *Rich.* 116
 Linnia, *Linn.* 501
 Limnium, *L. C. Rich.* 142
 Limnocharis, *H. et B.* 208
 Limnochlidææ, *Ktz.* 10
 Limnochlidææ, 10
 Limnodictyon, *Kützing.* 796
 Limnopence, *Vall.* 723
 Limnophila, *R. Br.* 685
 Limnoriidææ, 182
 Limodorum, *Tourn.* 182
 Limonia, *Gardn.* 328
 Limonia, *Linn.* 458
 Limonium, *Tourn.* 641

- Limosella, *Linn.* 685
 Linaceæ, 484, 485²
 Linagrostis, *Lam.* 119
 Linanthus, *Benth.* 636
 Linaria, *Tournef.* 684
 Liuconia, *Linn.* 785
 Liudackera, *Steb.* 358
 Liudackeria, *Blum.* 328
 Lindebergia, *L. et O.* 684
 Lindeublooms, 371
 Lindenia, *Benth.* 765
 Linderia, *Thunb.* 795
 Lindernia, *All.* 685
 Linderniæ, 685
 Lindleya, *H. B. K.* 565
 Lindleya, *Kunth.* 331
 Lindleya, *Nees.* 397
 Liudnera, *Reichb.* 372
 Lindsæa, *Dryand.* 80
 Linera, *DC.* 485
 Linhæra, *Arn.* 537
 Linkia, *Car.* 533
 Linkia, *Nich.* 18
 Linkia, *Pers.* 614
 Linnæa, *Grouv.* 767
 Linochilus, *Benth.* 796
 Linoçiera, *Swartz.* 617
 Linopsis, *Reichb.* 485
 Linostigma, *Klotzsch.* 365
 Linostoma, *Wall.* 531
 Linosyris, *Lobel.* 710
 Linostyris, *E.* 281
 Linscotia, *Adans.* 509
 Linum, *Linn.* 485
 Lioydia, *Neck.* 714
 Lipandra, *Moq.* 513
 Liparia, *Linn.* 553
 Liparidæ, 181
 Lipariæ, 553
 Liparis, *L. C. Rich.* 181
 Liperiza, *Herb.* 158
 Lipocarpa, *Nees.* 119
 Lipoçhæta, *DC.* 711
 Lipostoma, *Don.* 765
 Lipotactes, *Blum.* 791
 Lipotriche, *R. Br.* 711
 Lipozygis, *E. Mey.* 554
 Lippaya, *Endl.* 765
 Lippia, *Linn.* 664
 Liquidambar, *Linn.* 253
 Liquidambara, 248, 253
 Liquiritia, *Monch.* 554
 Liranthæ, *Spach.* 419
 Lirioidæ, *Bronq.* 11
 Liriodendron, *Linn.* 419
 Liriope, *Herb.* 158
 Liriope, *Lour.* 205
 Liriopais, *Reichb.* 158
 Liriopsis, *Spach.* 419
 Liriosma, *P. pp.* 444
 Lison, *Boiss.* 775
 Lisanthus, *Linn.* 614
 Lissanthe, *R. Br.* 449
 Lissochilus, *R. Br.* 1*1
 Lissostylis, *R. Br.* 555
 Listera, *R. Br.* 1*2
 Listeria, *Neck.* 765
 Listeridæ, *Lindl.* 1*2
 Listeria, *E. Mey.* 554
 Lisyanthus, *Aubl.* 614
 Lita, *Schreb.* 614
 Litanthea, *Harc.* 205
 Litchi, *Sonn.* 355
 Lithachne, *Patis.* 115
 Lithacrostis, *Girtl.* 115
 Lithobium, *Bong.* 725
 Lithocarpus, *Blum.* 291, 593
 Lithonema, *Huss.* 796
 Lithophila, *Swartz.* 659
 Lithophragma, *Nutt.* 548
 Lithophragmella, *Torr.* 568
 Lithophyllum, *Philip.* 25
 Lithosantles, *Blum.* 765
 Lithospermum, *Tournef.* 654
 Lithoxylon, *Endl.* 2*2
 Lithrea, *Miers.* 467
 Litobrochia, *Prest.* 80
 Litsæa, *Juss.* 537
 Litsæa, *Lam.* 537
 Littæa, *Tagliab.* 158
 Littorella, *Linn.* 643
 Liverworts, 58
 Livistona, *R. Br.* 139
 Lagunoa, *R. et P.* 385
 Laupauke, *Feuill.* 451
 Lithi, *Feuill.* 467
 Loydia, *Salisb.* 204
 Loasa, *Adans.* 745
 Loasacæ, 741, 744*
 Loasads, 744
 Loasæ, 745
 Loasæ, *Kunth.* 347
 Loasæ, *Juss.* 744
 Lobadium, *Rafin.* 467
 Lobaria, *Haw.* 568
 Lobaria, *Hoffm.* 50
 Lobelee, 693
 Lobelia, *Linn.* 693
 Lobelia, *Plum.* 695
 Lobeliacæ, 688, 692*
 Lobeliads, 692
 Lobocarpus, *W. et A.* 422
 Lobostemon, *Lehm.* 656
 Lobularia, *DC.* 354
 Locandi, *Adans.* 477
 Locaris, *Hamill.* 473
 Lochemia, *Arn.* 364
 Locheria, *Neck.* 711
 Lochmocydia, *Mart.* 677
 Lochnera, *Reichb.* 601
 Lochneria, *Srop.* 372
 Lockhartia, *Hook.* 181
 Loddigesia, *Sims.* 554
 Lodicularia, *Patis.* 116
 Lodoicea, *Labill.* 139
 Lœflingia, *Linn.* 499
 Lœselia, *Linn.* 636
 Loganæ, 604
 Logania, *R. Br.* 604
 Loganiaceæ, 594, 602*
 Loganids, 602
 Loganiæ, *R. Brown.* 602
 Logfia, *Cass.* 713
 Loghania, *Scop.* 404, 713
 Loiseleuria, *Desv.* 455
 Lolium, *Linn.* 116
 Lomagramma, *J. Sm.* 79
 Lomandra, *Labill.* 192
 Lomaria, *Willd.* 80
 Lomatia, *R. Br.* 534
 Lomatium, *Rafin.* 778
 Lomatocarum, *Fisch.* 778
 Lomatogonium, *A. Br.* 614
 Lomatolepis, *Cass.* 715
 Lomatophyllum, *Willd.* 205
 Lomentacæ, *L.* xxxiv
 Lomentaræ, 25
 Lomentaria, *Lyngh.* 11, 25
 Lonas, *Adans.* 712
 Louchitis, *Linn.* 79
 Lonchocarpus, *Kunth.* 555
 Lonchostoma, *Wickstr.* 639
 Londezia, *F. et M.* 513
 Longchampia, *Willd.* 713
 Lonicea, *Desf.* 767
 Lonicea, *Plum.* 791
 Loniceæ, 766, 767
 Loutarus, *Rumph.* 139
 Loosastries, 574
 Lopadoclyx, *Klotzsch.* 796
 Lopezia, *Car.* 725
 Lophandra, *Don.* 455
 Lophanthera, *A. de J.* 390
 Lophanthus, *Benth.* 651
 Lophanthus, *Forst.* 323
 Lophatherum, *Bronq.* 116
 Lophia, *Desv.* 672
 Lophidium, *Rich.* 81
 Lophlocarpus, *Kth.* 206
 Lophlocarpus, *Torr.* 524
 Lophiodon, *Hook. f. et Wils.* 796
 Lophiola, *Ker.* 205
 Lophiolepis, *Cass.* 714
 Lophira, *Banks.* 395
 Lophiracæ, *Endl.* 395
 Lophium, *Fries.* 43
 Lophocachrys, *DC.* 779
 Lophochlæna, *Nees.* 116
 Lophochloa, *Rehb.* 116
 Lophoclinium, *Endl.* 709
 Lophocolea, *Nees.* 60
 Lopholæna, *DC.* 713
 Lopholepis, *Dec.* 115
 Lopholoma, *Cass.* 714
 Lophopetalum, *Wight.* 588
 Lophophytidæ, 90
 Lophophytum, *Sch. et E.* 90
 Lophopterys, *A. de J.* 390
 Lophosciadium, *DC.* 779
 Lophospermum, *Don.* 684
 Lophostachys, *Pohl.* 679
 Lophostemon, *Schott.* 737
 Lophostylis, *Hochst.* 378
 Lophotænia, *Griseb.* 778
 Lophozia, *Dunn.* 60
 Lophura, *Kütz.* 11
 Lopimia, *N. et M.* 370
 Loranthacæ, 786, 789*
 Loranthæ, *Juss.* 789
 Loranthus, 789
 Loranthus, *Linn.* 791
 Lorea, *Stack.* 22
 Lorenten, *Lagasc.* 709
 Lorentea, *Orteg.* 711
 Loreya, *DC.* 733
 Loriglossum, *L. C. Rich.* 182
 Lotepetalum, *R. Br.* 784
 Lotee, 553, 556
 Loten, *Adans.* 18
 Lotononidæ, 554
 Lotononis, *DC.* 553
 Lotos, *DC.* 411
 Lotus, *Linn.* 554
 Loudonia, *Bert.* 554
 Loudonia, *Lindl.* 723
 Louichea, *Herit.* 499
 Lourea, *Neck.* 554
 Lourea, *Jaum.* 555
 Loureira, *Car.* 281
 Loureira, *Meisn.* 460
 Lowea, *Lindl.* 564
 Loxanthera, *Blum.* 791
 Loxanthus, *Nees.* 679
 Loxines, *Martius.* xlv
 Loxocarpus, *R. Br.* 672
 Loxocarya, *R. Br.* 121
 Loxodon, *Cass.* 714
 Loxogramma, *Blum.* 79
 Loxomeria, *Salisb.* 455
 Loxonia, *Jack.* 672
 Loxostylis, *Spreng.* 467
 Loxotis, *R. Br.* 672
 Loxsona, *R. Br.* 80
 Lozania, *Seb. Mut.* 380
 Lubiua, *Link et Olo.* 645
 Lubiua, *Vent.* 645
 Lucaea, *Kunth.* 116
 Lucernaria, *Bouss.* 18
 Lucifera, *DC.* 765
 Lucilia, *Cass.* 714
 Lucinum, *Pluken.* 460
 Luciola, *Smith.* 192
 Luculla, *Sweet.* 765
 Lucuma, *Mol.* 591
 Luceya, *DC.* 765
 Ludia, *Lamarck.* 328
 Ludollia, *Willd.* 116
 Ludovla, *Pers.* 132
 Ludwigin, *Linn.* 725
 Ludwigia, *DC.* 725
 Ludia, *Tournef.* 315
 Lugon, *DC.* 712
 Luhea, *H.* 372
 Luhea, *H. Schmidt.* 605
 Luha, *Ham.* 181

- Lunanaja, *Blanc.* 282
 Lumbricidia, *Feloz.* 555
 Lumnitzera, *Jacq. f.* 661
 Lumnitzera, *Willd.* 718
 Lunana, *DC.* 362
 Lunaria, *Hook.* 328
 Lunaria, *Linn.* 354
 Lunasia, *Blanc.* 282
 Lundia, *DC.* 677
 Lundia, *Thonn. et Schum.* 328
 Luutia, *Neck.* 281
 Luunlaria, *Michel.* 58
 Luperia, *DC.* 354
 Lupinaster, *Mönch.* 554
 Lupinus, *Linn.* 551
 Lupulus, *Tourn.* 265
 Luride, *L.* xxxiii
 Lusaccia, *Spreng.* 758
 Luteola, *Tourn.* 356
 Luthera, *C. H. Schultz.* 715
 Lütkea, *Bougard.* 586
 Lurostylis, *G. Don.* 653
 Luvunga, *Ham.* 458
 Luxemburgia, *St. Hil.* 313
 Luziola, *Juss.* 115
 Luzula, *DC.* 192
 Luzuriaga, *R. Br.* 205
 Luzuriaga, *Ruiz et P.* 205
 Lycaste, *Lindl.* 182
 Lychnanthus, *Gmel.* 498
 Lychnis, *Tourn.* 498
 Lychnocephalus, *Mart.* 709
 Lychnophora, *Mart.* 709
 Lyciobatos, *Endl.* 622
 Lycioperium, *Miers.* 622
 Lyciopsis, *Spach.* 725
 Lyciothunmus, *E.* 622
 Lycium, *Linn.* 622
 Lycopodium, *DC.* 428
 Lycopodia, *Michel.* 42
 Lycopodiaceae, *Ad. Brongr.* 29, 41
 Lycopodon, *Tourn.* 42
 Lycopersicum, *Tourn.* 622
 Lycopodales, 53, 68*
 Lycopodiaceae, 68, 69*
 Lycopodiineae, *Swartz.* 69
 Lycopodium, *Linn.* 70
 Lycopsis, *Linn.* 656
 Lycopus, *Linn.* 661
 Lycoris, *Herb.* 158
 Lycoseris, *Cass.* 714
 Lycurus, *Kunth.* 115
 Lydea, *Mölin.* 565
 Lyellia, *R. Br.* 67
 Lygeum, *Linn.* 115
 Lygia, *Pavan.* 531
 Lyginia, *R. Br.* 121
 Lygistum, *P. Br.* 765
 Lygodesmia, *Don.* 715
 Lygodictyon, *J. Sm.* 81
 Lygodium, *Swartz.* 81
 Lygodysodea, *Ruiz et Pav.* 764
 Lygodysodeaceae, *Bartl.* 761
 Lyncea, *Cham. et Schl.* 684
 Lynckia, *Lynnb.* 18
 Lyngbya, *Ag.* 10, 18
 Lyngbya, *Gaill.* 22
 Lyngbyeae, 10
 Lyngbyella, *Dory.* 22
 Lyonia, *Ell.* 626
 Lyonia, *Nutt.* 455
 Lyonia, *Rafin.* 504
 Lyonia, *Reichb.* 455
 Lyonettia, *Cass.* 712
 Lyousia, *R. Br.* 601
 Lyperanthus, *R. Br.* 182
 Lyperia, *Benth.* 684
 Lyrica, *Lindl.* 181
 Lyrocarpa, *Havv.* 354
 Lysigonium, *Link.* 13
 Lysiloma, *Benth.* 556
 Lysimachia, *Mönch.* 645
 Lysimachiae, *Juss.* 644
 Lysimachion, *Tausch.* 725
 Lysinema, *R. Br.* 419
 Lysionotus, *Bl.* 672
 Lysionotus, *Don.* 672
 Lysipoma, *H. B. K.* 693
 Lyssanthe, *Salisb.* 533
 Lysurus, *Fries.* 42
 Lythraceae, 556, 574*
 Lythraieae, *Juss.* 571
 Lythraea, 575
 Lythrum, *Linn.* 575
 Maba, *Forst.* 596
 Mabea, *Aubl.* 281
 Maburnia, *Thouars.* 172
 Macaglia, *Vahl.* 661
 Macabanea, *Aubl.* 402
 Macairea, *DC.* 733
 Macanea, *Juss.* 402
 Macaranga, *Thouars.* 281
 Macarthuria, *Hüg.* 795
 Macbridea, *Ell.* 662
 Macdonaldia, *Gunn.* 182
 Macfadyena, *A. DC.* 677
 Machaeranthera, *Nees.* 709
 Machaerina, *Vahl.* 119
 Macharium, *Pers.* 555
 Machaia, *Gray.* 22
 Machaonia, *Humb.* 764
 Macharisia, *Thouars.* 795
 Machilus, *Nees.* 537
 Machlys, *DC.* 712
 Mackaya, *Arn.* 745
 Macleania, *Hook.* 758
 Macledium, *Cass.* 714
 Macleaya, *R. Br.* 431
 Maclovina, *DC.* 714
 Maclura, *Nutt.* 268
 Macnabia, *Benth.* 455
 Macodes, *Lindl.* 183
 Macoubea, *Aubl.* 402
 Maconcoua, *Aubl.* 593
 Macquira, *Aubl.* 271
 Macradenia, *R. Br.* 182
 Macraea, *Lindl.* 365
 Macranthera, *Torr.* 685
 Macranthus, *Lour.* 555
 Macreightia, *A. DC.* 596
 Macria, *E. Mey.* 667
 Macrobotrys, *DC.* 714
 Macrocalyx, *Miers.* 764
 Macrocapnos, *Royle.* 436
 Macrocarpa, *Gries.* 614
 Macrocarphus, *Nutt.* 712
 Macrocarpus, *Bonum.* 22
 Macrocephalus, *Nutt.* 712
 Macroceratites, *Raddi.* 555
 Macroceratium, *DC.* 354
 Macrochilus, *Presl.* 693
 Macrochilus, *Kn.* 182
 Macrochiton, *Bl.* 464
 Macrochloa, *Kunth.* 115
 Macrocnemum, *P. Br.* 765
 Macrocnemum, *Vell.* 765
 Macrocyctis, *Ag.* 10, 22
 Macrodon, *Arnott.* 67
 Macrocnema, *Nutt.* 710
 Macrogynae, *L. et O.* 205
 Macrolepis, *A. Rich.* 181
 Macrolinum, *Kl.* 455
 Macrolinum, *Reichb.* 485
 Macrolobium, *Vahl.* 556
 Macrolomia, *Nees.* 119
 Macromeria, *Don.* 656
 Macromerum, *Burch.* 358
 Macromitrium, *Brid.* 67
 Macromax, *Raf.* 116
 Macroon, *Corda.* 44
 Macropetalum, *Burchell.* 627
 Macropiper, *Miq.* 518
 Macropodium, *R. Br.* 354
 Macrothynchium, *Rehb.* 715
 Macrothynchus, *Less.* 715
 Macroscelis, *H. B. K.* 626
 Macrosiphon, *Hochst.* 685
 Macrosolea, *Blum.* 791
 Macrosporium, *Fries.* 43
 Macrostema, *Pers.* 631
 Macrostigma, *Hooker.* 543
 Macrostonium, *Blum.* 181
 Macrostylis, *B. et W.* 471
 Macrostylis, *K. et H.* 183
 Macrosyphonia, *Duby.* 645
 Macrothecium, *Brid.* 67
 Macrothylrusus, *Spach.* 385
 Macrotonia, *DC.* 656
 Macrotopis, *DC.* 555
 Macrotyls, *Rafin.* 428
 Macrozaunia, *Miq.* 225
 Madaractis, *DC.* 713
 Madarella, *Nutt.* 712
 Madaria, *DC.* 712
 Madaroglossa, *DC.* 712
 Madia, *Mol.* 712
 Madiotheca, *Dum.* 59
 Madriopsis, *Nutt.* 712
 Merlesia, *DC.* 372
 Merua, *Forsk.* 358, 648
 Maesee, 648
 Magallana, *Cav.* 367
 Magallana, *Comm.* 419
 Magnolia, *Linn.* 419
 Magnoliaceae, 416, 417*
 Magnoliads, 417
 Magnolia, *Juss.* 417
 Magnolieae, 419
 Magonia, *St. Hil.* 385
 Magydaris, *Koch.* 779
 Magoni, *Adans.* 462
 Mahonia, *Linn.* 361
 Malhometia, *DC.* 710
 Mahonia, *Nutt.* 438
 Malurea, *Aubl.* 397
 Mainera, *Fl. Fl.* 282, 378
 Mairama, *Neck.* 455
 Maireana, *Moc. Tand.* 513
 Maïria, *DC.* 709
 Maiteu, *Fevill.* 588
 Majanthemum, *Mönch.* 205
 Majeta, *Aubl.* 733
 Majorana, *Mönch.* 661
 Malabaila, *Hoffm.* 778
 Malabaila, *Tausch.* 779
 Malabatirum, *Burm.* 537
 Malachadenia, *Lindl.* 182
 Malacharia, *Fée.* 44
 Malache, *Trew.* 370
 Malacium, *Fr.* 498
 Malachodendron, *Cav.* 397
 Malachra, *L.* 370
 Malacmaea, *Griseb.* 390
 Malacocarpus, *F. et M.* 479
 Malacocephalus, *Tsch.* 714
 Malacochete, *Nees.* 119
 Malacoueris, *Nutt.* 715
 Malacothrix, *DC.* 715
 Malaisia, *Blanco.* 262
 Malauca, *Aubl.* 764
 Malaspiuea, *Presl.* 648
 Malaxea, 179, 181
 Malaxis, *Swartz.* 181
 Malbrancia, *Neck.* 468
 Malcoima, *R. Br.* 354
 Malesherbia, *R. et P.* 335
 Malesherbiaceae, 326, 335*
 Malesherbieae, *DC.* 335
 Malistachys, *E.* 531
 Mallea, *A. Juss.* 464
 Mallocca, *Forst.* 372
 Mallogonum, *Fenzl.* 498
 Mallophora, *Endl.* 664
 Mallotus, *Lour.* 281
 Mallowworts, 368
 Malocelia, *Scv.* 555
 Malope, *L.* 370
 Malopeae, 370
 Malosma, *Nutt.* 467
 Malonetia, *A. DC.* 601
 Malpighia, *Phen.* 399
 Malpighiaceae, 373, 388*
 Malpighians, 388
 Malpighiae, *L. de J.* 390

- Maltebrunia, *Kunth*. 115
 Malus, *Fourc.* 560
 Malva, *L.* 370
 Malvaceæ, 359, 363, 368
 Malvales, 243, 244, 246, 359*
 Malvastraceæ, *Endl.* 370
 Malvastris, *Dill.* 570
 Malvastrum, 370
 Malvinda, *Medic.* 370
 Mamboya, *Blanco* 765
 Mammillaria, *Haw.* 748
 Mammea, *L.* 402
 Mammea, *J. Agh.* 25
 Mammillaria, *Stæck.* 25
 Manabea, *Aubl.* 664
 Manafila, *Bosc.* 648
 Mananilla, *Plum.* 281
 Mandevilla, *Lindl.* 601
 Mandioca, *Link.* 281
 Mandragora, *Tourn.* 622
 Manettia, *Mutis.* 765
 Manghas, *Burm.* 601
 Mangifera, *Linn.* 467
 Manglesia, *Endl.* 533
 Manglesia, *Lindl.* 737
 Manglietia, *Blum.* 419
 Mangilla, *Juss.* 643
 Mangostana, *Rumph.* 402
 Mangroves, 726
 Manguiba, *Pis.* 601
 Manicaria, *Gärtn.* 139
 Manihot, *DC.* 370
 Manihot, *Plum.* 281
 Manilkara, *Rheede.* 591
 Manina, *Scop.* 41
 Manisuris, *Linn.* 116
 Manitia, *Giescke.* 167
 Mannia, *Cord.* 53
 Mansoa, *DC.* 677
 Mantisalca, *Cuss.* 714
 Manisita, *Curt.* 167
 Manulea, *Linn.* 684
 Manulea, 684
 Manungala, *Blanc.* 477
 Mapa, *Fl. Fl.* 735
 Mapania, *Aubl.* 119
 Maples, 37
 Mapouria, *A. Rich.* 764
 Mappa, *A. J.* 281
 Mappia, *Schr.* 424
 Maprounea, *Aubl.* 281
 Maqueria, *Comm.* 473
 Maquina, *Mart.* 371
 Maralia, *Thouars.* 781
 Maranta, *Plum.* 169
 Marantaceæ, 162, 168*
 Marantese, *Brown.* 164
 Maranthes, *Blum.* 364
 Maranta, 168
 Marantia, *Fr.* 41
 Maranodes, *DC.* 712
 Marathrum, *H. B. K.* 483
 Marathrum, *Rafin.* 778
 Marattia, *Sweart.* 82
 Marattiaceæ, *Kaulf.* 82
 Marcellia, *Cuss.* 712
 Marcellia, *Mart.* 622
 Marcellia, *DC.* 723
 Maregravia, *Plum.* 404
 Maregraviaceæ, 392, 406*
 Marchantia, *M. Sch.* 54
 Marchantiaceæ, 56, 58*
 Marchantia, *Nees et Taylor.* 58
 Marekea, *L. C. Rich.* 621
 Marcellia, *Nees.* 582
 Marenga, *Salab.* 167
 Marenbergia, *Nor.* 422
 Marzanius, *Sch.* 622
 Marzaria, *DC.* 754
 Margarita, *Qu. d.* 760
 Margaritaria, *Linn. f.* 282
 Marzasperrum, *R. 1856*
 Marzaria, *A. K.* 22
 Marzaria, *P. d.* 71
 Marzaria, *Bosc.* 770
 Margraviads, 403
 Margyricarpus, *R. et P.* 562
 Maria, *DC.* 455
 Maria-Antonia, *Parlat.* 554
 Marialva, *Vand.* 402
 Marialva, *Mart.* 402
 Marianthemum, *Sch.* 691
 Mariauthus, *Hug.* 441
 Marica, *Schreb.* 161
 Mariguia, *Comm.* 460
 Marila, *Sw.* 397
 Maripa, *Aubl.* 632
 Mariscus, *Vahl.* 119
 Marlea, *Rozb.* 720
 Marliera, *St. Hil.* 738
 Marmoritis, *Benth.* 662
 Marquartia, *Hassk.* 132
 Marquartia, *Vog.* 555
 Marquisia, *A. Rich.* 764
 Marrubideæ, 692
 Marrubium, *Linn.* 662
 Marsana, *Sonn.* 458
 Marschallia, *Schr.* 712
 Marsdenia, *R. Br.* 627
 Marsilea, *Linn.* 73
 Marsileaceæ, 68, 71*
 Marsippospermum, *Desv.* 192
 Marsupella, *Dum.* 60
 Marsupia, *Dum.* 60
 Marsypianthes, *Mart.* 661
 Marsypocarpus, *Neck.* 354
 Martagon, *Tourn.* 205
 Martensia, *Her.* 25
 Martensia, *Giescke.* 167
 Martia, *Leand.* 555
 Martia, *Spr.* 406
 Martia, *Benth.* 555
 Martineria, *Fl. Fl.* 397
 Martinezia, *R. et P.* 139
 Martinieria, *Guill.* 489
 Martrasia, *Lag.* 714
 Martynia, *Linn.* 670
 Martyniaceæ, *Link.* 669
 Marumia, *Blum.* 733
 Marumia, *Reim.* 424
 Maruta, *Cass.* 712
 Mascagnia, *Bert.* 390
 Mascarenhasia, *A. DC.* 601
 Maschalauthe, *Blum.* 765
 Maschalanthus, *Schulz.* 67
 Maschalarrhen, *Spr.* 67
 Maschalocarpus, *Spr.* 67
 Masdevallia, *Fl. Per.* 181
 Massonia, *Linn.* 205
 Mastacanthus, *Endl.* 664
 Mastichonema, *Ktz.* 10
 Mastichtriebe, 10
 Mastichtroix, *Ktz.* 10
 Mastigobryum, *Nees.* 60
 Mastigophora, *Nees.* 60
 Mastigophorideæ, 60
 Mastigophorus, *Cuss.* 714
 Mastigoscleria, *Nees.* 119
 Mastixia, *Blum.* 783
 Mastocarpos, *Targ.* 10
 Mastutium, *Cuss.* 711
 Mastwort, 290
 Matamorica, *L. et L.* 709
 Matata, *Spr.* 712
 Matyba, *Aubl.* 385
 Mateatin, *Fl. Fl.* 362
 Matelea, *Aubl.* 626
 Mathea, *Pall.* 2684
 Matisia, *H. B.* 361
 Matonia, *R. Br.* 89
 Matouia, *Sw.* 167
 Matourea, *Aubl.* ? 65
 Matrella, *Pers.* 116
 Matricaria, *Linn.* 712
 Matthevalia, *Hook.* 351
 Matthiola, *R. Br.* 751
 Matthisonia, *Boddi.* 795
 Matthia, *Schult.* 656
 Matthiella, *Schub.* 217
 Matthiella, *Nees.* 77

- Maulnyta, *Comm.* 477
 Maulnia, *Thunb.* 205
 Mammella, *Thouars.* 795
 Mauraudia, *Orteg.* 684
 Mauria, *Kunth.* 467
 Mauritia, *Linn.* 139
 Mauroceua, *Mill.* 598
 Maxillaria, *Fl. Per.* 182
 Maxillaride, *Lindl.* 182
 Maximiliana, *Mart.* 139
 Maximiliania, *Schrank.* 350
 Mayaca, *Aubl.* 189
 Mayaceæ, 185, 189*
 Mayacs, 189
 Mayarsa, *DC.* 712
 Maycockia, *A. DC.* 601
 Maypea, *Aubl.* 617
 Mayna, *Aubl.* 306
 Mayna, *Raddi.* 328
 Maytenus, *Juss.* 588
 Mazeutoxeron, *Labill.* 471
 Mazus, *Lour.* 684
 Meadia, *Catesb.* 645
 Meborea, *Aubl.* 282
 Mecardonia, *Mart.* 685
 Meckelia, *Mart.* 390
 Mecconella, *Nutt.* 431
 Meconidium, *Spach.* 431
 Meconium, *Spach.* 431
 Meconopsis, *Vig.* 431
 Meconostigma, *Schott.* 129
 Mecopus, *Benn.* 554
 Mecosa, *Blum.* 182
 Medea, *Kl.* 282
 Medeola, *Gron.* 218
 Medicago, *Linn.* 554
 Medicusia, *Mösch.* 715
 Medinilla, *Gaud.* 733
 Medium, *Tourn.* 691
 Medusa, *Lour.* 364
 Medusea, *Lav.* 281
 Medusea, *Nutt.* 711
 Medusula, *Eschw.* 50
 Medusula, *Corda.* 44
 Meerburgia, *Mösch.* 490
 Meesia, *Ledw.* 67
 Meesia, *Gärtn.* 475
 Megacarpaea, *DC.* 354
 Megacalinum, *Lindl.* 181
 Megalangium, *Brid.* 67
 Megapterium, *Spach.* 725
 Megasanthus, *G. Don.* 691
 Megasea, *Haw.* 568
 Megastachya, *Palis.* 116
 Megastegia, *Don.* 554
 Meionectes, *R. Br.* 723
 Meisneria, *DC.* 733
 Meissarrhenia, *R. Br.* 680, 684
 Meistern, *Giescke.* 167
 Meistern, *Scop.* 709
 Meisneria, *Schrad.* 119
 Melaleuca, *Linn.* 737
 Melanopodiæ, 711
 Melanopodium, *Linn.* 711
 Melanopyraceæ, *Rich.* 681
 Melanopyrum, *Linn.* 685
 Melanchrysum, *Cuss.* 713
 Melanchryse, *Corda.* 12
 Melanconium, *Link.* 12
 Melandrium, *Fries.* 498
 Melnia, *Brid.* 67
 Melnium, *P. Br.* 575
 Melnium, *Rich.* 733
 Melnium, *Zipp.* 795
 Melnium, *Nees.* 116
 Melnionectris, *Nees.* 119
 Melnionectris, *Fahl.* 119
 Melnionectris, 119
 Melnionectris, *DC.* 710
 Melnionectris, *Corda.* 42
 Melnionectris, *Cuss.* 711
 Melnionectris, *Gla.* 765
 Melnionectris, *Hall.* 467
 Melnionectris, *Hoffm.* 739
 Melnionectris, *Decais.* 715
 Melnionectris, *Corda.* 13

- Melanosticta, *DC.* 555
 Melanostroma, *Corda.* 44
 Melanotrichum, *Corda.* 44
 Melanoxanthus, *Tul.* 43
 Melauoxyylon, *Schott.* 556
 Melanthaceæ, 195, 198*
 Melantheræ, *Batsch.* 198
 Melanthera, *Rohr.* 711
 Melanthesa, *Blum.* 282
 Melanthium, *Linn.* 199
 Melanths, 198
 Melansanthus, *Pohl.* 664
 Melasma, *Berg.* 684
 Melasphaerula, *Ker.* 161
 Melastemon, *Salisb.* 455
 Melastoma, *Burn.* 733
 Melastoma, *Juss.* 731
 Melastomaceæ, 716, 731*
 Melastomads, 731
 Melastomeæ, 733
 Melhania, *Forsk.* 364
 Melia, *L.* 464
 Meliaceæ, 456, 461, 463*
 Meliads, 463
 Meliæ, *Juss.* 463
 Meliantheræ, *Endl.* 178
 Melianthus, *L.* 479
 Melica, *Linn.* 116
 Melicurus, *R. Br.* 449
 Melicocca, *L.* 385
 Meliopoë, *Forst.* 471
 Melieyus, *Forst.* 328
 Melidapas, *Endl.* 449
 Melidium, *Eschw.* 43
 Melidora, *Salisb.* 455
 Meliæ, 464
 Meliglossus, *Schlecht.* 199
 Melilotus, *Tourn.* 554
 Melinla, *Dec.* 626
 Mellns, *Palis.* 115
 Melinospermum, *Walt.* 551
 Melinum, *Lk.* 115
 Meliocarpus, *Boiss.* 779
 Meliola, *Fries.* 43
 Meliosma, *Bl.* 385
 Meliosmæ, *Endl.* 382, 385
 Meliphlea, *Zucc.* 370
 Melissa, *Benth.* 661
 Melisseæ, 661
 Melistaunum, *Forst.* 331
 Melittidæ, 662
 Melittiosporium, *Corda.* 43
 Melittis, *Linn.* 662
 Mella, *Vand.* 685
 Melo, *Tourn.* 315
 Melobesia, *Lamx.* 10, 25
 Meloactidæ, 748
 Melocactus, *C. Buuh.* 748
 Melocanna, *Pop.* 116
 Melochia, *L.* 364
 Melodinus, *Forst.* 601
 Melodorum, *Lour.* 422
 Melolobium, *L. et Z.* 534
 Melougena, *Tourn.* 622
 Melopepo, *Tourn.* 315
 Melosira, *Ag.* 13
 Melosperma, *Benth.* 684
 Melothria, *Linn.* 315
 Melvilla, *And.* 575
 Membranifolia, *Stack.* 25
 Membranoptera, 25
 Memecylaceæ, 731
 Memecyleæ, *DC.* 731, 733
 Memecylon, *Linn.* 733
 Memecylon, *Mitch.* 455
 Memnoum, *Corda.* 44
 Memorialis, *Ham.* 262
 Menais, *Linn.* 653
 Menarda, *Comm.* 282
 Menastelma, *R. Br.* 628
 Mendezla, *DC.* 711
 Mendoncia, *Vel.* 679
 Mendozia, *Vel.* 679
 Meneghinia, *Endl.* 656
 Menestoria, *DC.* 765
 Menestrata, *Fl. Fl.* 537
 Menichea, *Som.* 755
 Menioeus, *Desv.* 354
 Meniscium, *Schreb.* 79
 Meniscosta, *Blum.* 309
 Menispermaceæ, *DC.* 297, 303, 307*
 Menispermads, 307
 Menispermals, 243, 244, 246, 297*
 Menispermæ, *Juss.* 307
 Menispermum, *Tourn.* 309
 Meuspora, *Pers.* 43
 Menkea, *Lehm.* 354
 Menoceras, *R. Br.* 695
 Menodora, *H. B. K.* 651
 Menonanthæ, *Haw.* 614
 Menonvillea, *DC.* 354
 Mentha, *Linn.* 661
 Mentheæ, 661
 Menthidæ, 661
 Mentzelia, *Linn.* 745
 Menyrantheræ, 614
 Menyranthes, *Linn.* 614
 Menziesia, *Smith.* 455
 Meoschium, *Palis.* 116
 Mephitidia, *Reinw.* 764
 Meratia, *Cass.* 711
 Meratia, *Nees.* 541
 Merciera, *A. DC.* 691
 Merckia, *Fisch.* 498
 Mercurialis, *Linn.* 281
 Merendera, *Ram.* 190
 Merenderæ, *Murb.* 198
 Meretricia, *Ner.* 765
 Meriana, *Fl. Fl.* 631
 Meriana, *Trew.* 161
 Meriandra, *Benth.* 661
 Meriandridæ, 661
 Meriania, *Swartz.* 733
 Merida, *Neck.* 501
 Meridema, *Don.* 572
 Meridiana, *Linn.* 501
 Meridion, *Ag.* 13
 Merimeæ, *Camb.* 481
 Meringium, *Prest.* 80
 Meriolix, *Raf.* 725
 Merismopadia, *Ktz.* 9
 Meristostigma, *Dietr.* 161
 Meristotropis, *Fisch. et Mey.* 554
 Merizouyria, *Poll.* 10, 18
 Merosporium, *Corda.* 44
 Merostachys, *Spr.* 116
 Merremia, *Dennst.* 631
 Merrettia, *Gray.* 18
 Mertensia, *H. B. K.* 580
 Mertensia, *Roth.* 25, 656
 Mertensia, *Willd.* 80
 Mernlius, *Hall.* 41
 Mesanthus, *Nees.* 121
 Mesembryaceæ, 523, 525*
 mesembryanthemæ, *Endl.* 525
 Mesembryanthemum, *L.* 526
 Mesembryon, *Adans.* 526
 Mesocarpus, *Hass.* 769
 Mesocentron, *Cass.* 714
 Mesoclastes, *Lindl.* 181
 Mesodactylus, *W.* 184
 Mesodetra, *Rafin.* 712
 Mesoglaea, *Ktz.* 10
 Mesoglæneæ, 10
 Mesogloia, *Ag.* 22
 Mesogramma, *DC.* 713
 Mesoua, *Blum.* 661
 Mesophylla, *Dum.* 60
 Mesoregma, *Corda.* 58
 Mesospermæ, 10
 Mesosphaeria, *Benth.* 661
 Mesosteirus, *DC.* 712
 Mesplodaphne, *Nees.* 537
 Mespilophora, *Neck.* 560
 Mespilus, *Lindl.* 560
 Messerschmidia, *Ass.* 656
 Messerschmidia, *Linn.* 653
 Mesototes, *Sol.* 583
 Mesua, *L.* 402
 Metahasis, *DC.* 715
 Metabolus, *Blum.* 765
 Metachilum, *Lindl.* 181
 Metagnanthus, *Endl.* 712
 Metadasia, *R. Br.* 713
 Metaplexis, *R. Br.* 626
 Metaxya, *Prest.* 80
 Metzianus, *Meyen.* 715
 Meteorina, *DC.* 712
 Meteorium, *Brid.* 67
 Meteoris, *Lour.* 755
 Methonica, *Herm.* 295
 Methorium, *Sch.* 361
 Methoscophyllum, *E. et Z.* 460
 Metopium, *P. Br.* 467
 Metroeynia, *Thouars.* 556
 Metrodorea, *St. Hil.* 471
 Metrosideros, *R. Br.* 737
 Metroxylon, *Rotb.* 139
 Metternichia, *Mik.* 621
 Metzgeria, *Raddi.* 59
 Metzgeridæ, 59
 Metzleria, *Prest.* 693
 Menm, *Tourn.* 778
 Meyenia, *Nees.* 679
 Meyenia, *Schlecht.* 621
 Meyenia, *Lk.* 764
 Meyera, *Schreb.* 711
 Meyeria, *DC.* 712
 Mezereum, *Meyer.* 531
 Merezouneuron, *Desv.* 555
 Miamomyces, *Corda.* 44
 Mibora, *Adans.* 115
 Micarea, *Fries.* 50
 Michauxia, *Herit.* 691
 Michelaria, *Dum.* 116
 Michelia, *Annan.* 664
 Michelia, *Linn.* 419
 Michoxia, *Fl. Fl.* 795
 Miconia, *Ruiz et P.* 733
 Miconiæ, 733
 Micractis, *DC.* 711
 Micraea, *Miers.* 614, 679
 Micraea, *Bias.* 18
 Micrandra, *R. Br.* 362
 Micrandia, *W. et A.* 765
 Micranthena, *Desf.* 282
 Micranthemum, *Prest.* 554
 Micranthemum, *Mich.* 685
 Micranthera, *A. DC.* 648
 Micranthera, *Chois.* 402
 Micranthes, *Tausch.* 568
 Micranthus, *Pers.* 161
 Micranthus, *Wendl.* 680
 Micrantheria, *Benth.* 685
 Microasterias, *Ag.* 9, 13
 Microclum, *Forsk.* 710
 Microceremia, *Benth.* 455
 Microblepharis, *W. et A.* 322
 Microcaebrys, *Hook. fl.* 229
 Microcala, *L. et H.* 614
 Microcala, *A. Rich.* 710
 Microcarpæa, *R. Br.* 685
 Microchæta, *Nutt.* 711
 Microchilus, *Prest.* 183
 Microchloa, *R. Br.* 115
 Microcladin, *Grev.* 10, 24
 Microcodon, *Alph. DC.* 691
 Microcælia, *Lindl.* 181
 Microcoleus, *Desm.* 18
 Microcoma, *DC.* 714
 Microcorys, *R. Br.* 661
 Microcos, *L.* 372
 Microcystis, *Kütz.* 9, 18
 Microderis, *DC.* 715
 Microderis, *DC.* 713
 Microdesmia, *Benth.* 543
 Microdietyon, *Decaisne.* 18
 Microdon, *Chois.* 667
 Microdonta, *Nutt.* 711
 Microdelus, *W. et A.* 282
 Microgenetes, *A. DC.* 639
 Microglossa, *DC.* 710
 Microglophus, *Benth.* 455
 Microgonium, *Prest.* 80
 Microgramma, *Prest.* 79

- Microgyne, *Less.* 710
 Microhaloa, *Ktz.* 9.
 Microlaena, *R. Br.* 115
 Microlaena, *Wall.* 364
 Microlepis, *Prest.* 80
 Microlepis, *DC.* 733
 Microlicia, *Don.* 733
 Microloma, *R. Br.* 626
 Microlouchus, *DC.* 714
 Microlophus, *Cass.* 714
 Microlotus, *Benth.* 554
 Micromega, *Ag.* 13
 Micromelum, *Bl.* 458
 Micromeria, *Benth.* 661
 Micropeltis, *Mont.* 43
 Micropera, *Lindl.* 181
 Micropetalum, *Tausch.* 568
 Micropiper, *Miq.* 518
 Micropleura, *Lagasc.* 778
 Micropodium, *DC.* 355
 Microopsis, *DC.* 710
 Microptelea, *Spach.* 580
 Micropteris, *Desv.* 79
 Micropus, *Linn.* 710
 Micropsis, *Duby.* 646
 Microptychus, *Less.* 715
 Microsaccus, *Blum.* 181
 Microsciadium, *Boiss.* 778
 Microsema, *Labill.* 397
 Microseris, *Don.* 715
 Microsoros, *Link.* 79
 Microspermum, *Lag.* 715
 Microspora, *Hass.* 796
 Microstachys, *A. J.* 281
 Microstegium, *Nees.* 116
 Microstephium, *Less.* 713
 Microstigma, *Trautv.* 796
 Microstylis, *Nutt.* 181
 Microtea, *Sac.* 509
 Microtheca, *Ktz.* 9
 Microthesium, *Corda.* 42
 Microthébe, *Dec.* 22
 Microthouarea, *Thouars.* 115
 Microthyrium, *Desm.* 42
 Microtis, *R. Br.* 182
 Microtrema, *Klotzsch.* 475
 Microtrichia, *DC.* 710
 Microtropis, *E. Mey.* 553
 Microtropis, *Wall.* 588, 645
 Micurus, *Endl.* 116
 Mida, *A. Cunn.* 788
 Middendorfa, *Trautv.* 575
 Midosis, *Fries.* 41
 Miegia, *Neck.* 715
 Miegia, *Perr.* 116
 Miegia, *Schreb.* 119
 Miellchhoferia, *Hornsch.* 67
 Mieria, *L. et L.* 712
 Mieria, *Lindl.* 197
 Mikania, *Willd.* 709
 Miliarium, *Mönch.* 115
 Miliam, *Linn.* 115
 Miliaria, *A. DC.* 422
 Milkworts, 375
 Milla, *Cav.* 205
 Millegrana, *Surian.* 527
 Milleporeum, *Sp.* 406
 Mileria, *Cass.* 711
 Mileria, 711
 Miletia, *W. et A.* 555
 Milingania, *Hook. fl.* 781
 Miliua, *Cass.* 715
 Milingtonia, *Linn.* 677
 Milingtonia, *Korb.* 345
 Milingtoniaceae, *W. et A.* 322
 Milingtoniæ, *Jack.* 322
 Miliota, *Cass.* 713
 Milnea, *Korb.* 344
 Miltizia, *A. DC.* 626
 Miltonia, *Lindl.* 182
 Miltus, *Lour.* 569
 Imetes, *Sattib.* 533
 Imosa, *Linn.* 556
 Imosee, 552, 556
 Imulna, *Linn.* 684
 Minusops, *Linn.* 591
 Miua, *Llav. et L.* 631
 Mindium, *Adans.* 691
 Minthidium, *Benth.* 661
 Minthostachys, *Benth.* 661
 Mnuartia, *Vogl.* 497
 Minuartiac, *DC.* 496
 Minuria, *DC.* 710
 Minutia, *Fs. Fl.* 617
 Minyrothannus, *DC.* 710
 Miocarpus, *Naud.* 733
 Miquelia, *Blum.* 672
 Miquelia, *Meisn.* 781
 Miquelia, *Nees.* 115
 Mirabilis, *Linn.* 507
 Mirbella, *Sm th.* 553
 Mirbellieae, 553
 Mircooa, *W. et A.* 575
 Misandra, *Dietr.* 148
 Misanteca, *Schlecht.* 537
 Miscellanæ, *L.* xxxiv
 Mischocarpus, *Bl.* 385
 Mischocaryon, *Endl.* 533
 Miscolobium, *Vog.* 555
 Misodendron, *Endl.* 791
 Mistyllus, *Prest.* 554
 Mitchellia, *Linn.* 764
 Mitella, *Tourn.* 568
 Mitellopsis, *Meisn.* 568
 Mithridatea, *Comm.* 299
 Mitina, *DC.* 713
 Mitopetalum, *Blum.* 181
 Mitostigma, *Dec.* 626
 Mitracarpum, *Zucc.* 674
 Mitrageyne, *Korth.* 765
 Mitraria, *Cav.* 672
 Mitrasmeme, *Lab.* 604
 Mitrastigma, *Harr.* 764
 Mitremyces, *Nees.* 42
 Mitreola, *Linn.* 604, 614
 Mitrephora, *Blum.* 422
 Mitriostigma, *Hochst.* 764
 Mitrophora, *Neck.* 698
 Mitrospora, *Nees.* 119
 Mitrula, *Fries.* 43
 Mitsa, *Chap.* 661
 Mitscherlichia, *Kunth.* 507
 Mnasium, *Schreb.* 187
 Mnasea, *Fl. Fl.* 795
 Mnemion, *Spach.* 339
 Mnemosilla, *Forsk.* 436
 Mnesiteon, *Rafin.* 715
 Mnesitheia, *Kunth.* 116
 Mniarum, *Forst.* 527
 Mniopsis, *Dum.* 60
 Mniopsis, *Mart.* 483
 Mniun, *Dill.* 67
 Moncurra, *Roxb.* 583
 Mocanera, *Juss.* 397
 Mocina, *DC.* 714
 Mocinna, *Lagasc.* 712
 Modecca, *Linn.* 322
 Modecece, *Endl.* 321
 Modiola, *Mönch.* 370
 Mœhinia, *Neck.* 713
 Moghanla, *Javon.* 555
 Mogiphanes, *Mart.* 511
 Mozorium, *Juss.* 651
 Mohlana, *Mart.* 509
 Mohria, *Swartz.* 81
 Mohringia, *L.* 498
 Moldavica, *Mönch.* 682
 Moldenhawera, *Spr.* 705
 Moldenhawera, *Schott.* 555
 Moita, *Cav.* 399
 Mollua, *Koiz et Pav.* 710
 Molluina, *Commerc.* 582
 Mollinea, *Bert.* 129
 Mollinea, *Juss.* 385
 Mollinea, *Colla.* 154
 Mollua, *Mönch.* 116
 Mollie, *Cuv.* 467
 Mollia, *Gmel.* 724
 Mollia, *Willd.* 499
 Mollia, *M. et Z.* 372
 Mollia, *Schrank.* 67
 Mollinedia, *Ruiz et Pav.* 299
 Mollugineae, *Fenzl.* 496
 Mollugo, *Linn.* 498
 Mollugineae, 498
 Molepospermum, *Koch.* 779
 Molpadia, *Cass.* 710
 Moltkia, *Lchm.* 656
 Molucca, *Tourn.* 662
 Mollucella, *Linn.* 662
 Moly, *Mönch.* 205
 Mombin, *Plum.* 467
 Momordica, *Linn.* 315
 Monachanthus, *Lindl.* 182
 Monachne, *Palis.* 115
 Monactineirma, *Bory.* 334
 Monactis, *H. B. K.* 711
 Monadenia, *Lindl.* 182
 Monanthes, *Haw.* 346
 Monarda, *Linn.* 661
 Monardeve, 661
 Monardella, *Benth.* 661
 Monarrhenus, *Cass.* 710
 Mönchia, *Ehrenb.* 498
 Mönchia, *Medik.* 205
 Mönchia, *Roth.* 354
 Moncluma, *Hochst.* 679
 Monella, *Herb.* 158
 Monema, *Grev.* 13
 Monoteles, *Labill.* 710
 Monerma, *Fatis.* 116
 Moneses, *Sattib.* 450
 Monetia, *Herit.* 598
 Mongesia, *Fl. Fl.* 755
 Mongestia, *Ktz.* 10
 Mongezia, *Fl. Fl.* 331
 Monilia, *A. Rich.* 22
 Monilia, *Hill.* 43
 Monilifera, *Stack.* 22
 Moniliformia, *Lamx.* 22
 Monilia, *Bory.* 22
 Monimia, *Thouars.* 299
 Monimiaceae, 297, 298*
 Monimiads, 298
 Monimieæ, *Juss.* 298
 Monniera, *R. Br.* 685
 Monnieria, *Linn.* 471
 Monnina, *Ruiz et Pav.* 378
 Monobotrium, *Hochs.* 614
 Monocaryum, *R. Br.* 199
 Monocentra, *DC.* 733
 Monocera, *Elliot.* 116
 Monocera, *Jack.* 372
 Monochetum, *DC.* 733
 Monochila, *Don.* 695
 Monochilus, *Fisch. et Mey.* 664
 Monochilus, *Blume.* 182
 Monochlæna, *Cass.* 712
 Monochlæna, *Gaud.* 80
 Mohochlamydeæ, *Pert.* xlii
 Monochoria, *Prest.* 296
 Monoclea, *Hook.* 60
 Monococsmia, *Fenzl.* 501
 Monocotyledoneæ, *DC.* 95
 Monocotyledones, *Juss.* 95
 Monocystis, *Lindl.* 167
 Monodon, *E. Mey.* 555
 Monodora, *Dunal.* 422
 Monodynams, *Gmel.* 604
 Monodynannus, *Pohl.* 467
 Monogonia, *Prest.* 80
 Monogramma, *Comm.* 79
 Monolepis, *Schrad.* 513
 Monolophus, *Wall.* 167
 Monolopia, *DC.* 712
 Monomeria, *Lindl.* 181
 Monophyllen, *R. Br.* 672
 Monoploca, *Bunp.* 355
 Monopogon, *Prest.* 116
 Monoporium, *J. S. Pr.* 317
 Monoporus, *A. DC.* 648
 Monopsis, *Sattib.* 633
 Monoptera, *C. H. Schultz.* 712
 Monoptilon, *Turr. et Gr.* 709
 Monorchis, *Mentz.* 141

- Monormin, *Berkel.* 18
 Monosis, *DC.* 709
 Monospora, *Kl.* 281
 Monotaxis, *Brongn.* 282
 Monothea, *A. DC.* 648
 Monothecium, *Hochst.* 630
 Monothera, *Rafin.* 116
 Moothylaeium, *Don.* 627
 Monotoca, *R. Br.* 449
 Monotospora, *Corda.* 43
 Monotris, *Lindl.* 182
 Monotropæ, *Nutt.* 452
 Monotropaceæ, 446, 452*
 Monotropæ, *Nutt.* 452
 Moutropsis, *Schweinitz.* 452
 Monoxora, *Wight.?* 738
 Mousouia, *Linn.* 494
 Monstera, *Adans.* 194
 Montagnea, *DC.* 711
 Montagnea, *Fr.* 42
 Montanoa, *Llav. et Lex.* 711
 Montbretin, *DC.* 161
 Montezuma, *Moc. et Sess.* 361
 Montia, *Houst.* 372
 Montia, *Michel.* 501
 Montineæ, 725
 Montinia, *Linn.* 725
 Montira, *Aubl.* 604
 Moonia, *Arn.* 711
 Moercroftia, *Chois.* 632
 Moquilea, *Aubl.* 543
 Moquilea, *Mart. et Zucc.* 543
 Moquinia, *DC.* 714
 Moquinia, *Spreng.* 791
 Mora, *Benth.* 556
 Moraceæ, 258, 266*
 Morads, 266
 Morea, *Linn.* 161
 Moranda, *Scop.* 364
 Morehella, *Dillen.* 43
 Morete, *Endl.* 266
 Morelia, *A. Rich.* 765
 Morella, *Lour.* 795
 Morelosia, *Lav.* 795
 Morelotia, *Gaud.* 119
 Morenia, *Ruiz et Pav.* 138
 Moreuon, *Llav. et Lex.* 631
 Morettia, *DC.* 354
 Morgauia, *R. Br.* 685
 Moricandia, *DC.* 355
 Moriera, *Boiss.* 354
 Morilandia, *Neck.* 562
 Morina, *Tournef.* 700
 Morinda, *Vahl.* 764
 Moringa, *Burm.* 337
 Moringaceæ, 326, 336*
 Moringads, 336
 Moringere, *H. Brown.* 336
 Morisia, *Gay.* 355
 Morisia, *Nees.* 119
 Morisonia, *Plum.* 358
 Moritzia, *DC.* 656
 Mormodes, *Lindl.* 182
 Morna, *Lindl.* 713
 Morocarpus, *Scopol.* 513
 Moronobea, *Aubl.* 402
 Moronobea, 402
 Morphixia, *Ker.* 161
 Morrenia, *Lindl.* 626
 Morus, *Tourn.* 268
 Morysia, *Cass.* 712
 Moscharia, *Ruiz et Pav.* 714
 Moschifera, *Molin.* 714
 Moschosma, *Reichb.* 661
 Moschosmidæ, 661
 Moschocydon, *Adr. J.* 464
 Mosigia, *Spreng.* 714
 Mosia, *Hamilt.* 661
 Mösslera, *Reichenb.* 785
 Motandra, *A. DC.* 601
 Mougeotia, *Ag.* 10, 18
 Moulinsia, *Camb.* 385
 Mourera, *Aubl.* 483
 Mouriri, *Aubl.* 733
 Mouriria, *Juss.* 733
 Mouririaceæ, *Gardn.* 731
 Mouroucoa, *Aubl.* 632
 Montabea, *Aubl.* 378
 Montabea, *Endl.* 375
 Moutouchia, *Aubl.* 555
 Mozinna, *Orteg.* 281
 Mozula, *Rafin.* 575
 Mucedineæ, *Ad. Brongn.* 29
 Mucedines, *Fr.* 43
 Mucizonia, *DC.* 346
 Mucor, *Michel.* 43
 Mucoraceæ, 41
 Mucorini, *Fr.* 43
 Mucrona, *Benth.* 504
 Mucuna, *Adans.* 555
 Mühlenbeekia, *Meisn.* 504
 Mühlenbergia, *Schreb.* 115
 Mukia, *Arn.* 315
 Mukopi, *Kämpf.* 397
 Muldera, *Miq.* 518
 Mulgedium, *Cass.* 715
 Mulinidæ, 778
 Mulinum, *Pers.* 778
 Mülleria, *Linn. f.* 555
 Mulli, *Peuill.* 467
 Multisiliquæ, *L.* xxxiii
 Münchhausia, *Linn.* 575
 Mundia, *Kunth.* 378
 Munnickia, *Reichb.* 794
 Munnicksia, *Dennst.* 324
 Munuzia, *Ruiz et P.* 715
 Munronia, *Wight.* 464
 Munchia, *Cass.* 709
 Muraltia, *Neck.* 378
 Murdannia, *Royle.* 188
 Muretia, *Boiss.* 778
 Muricaria, *Desv.* 355
 Muricata, *L.* xxxiii
 Muricia, *Lour.* 315
 Murraya, *Kön.* 458
 Murueja, *Tournef.* 334
 Musa, *Tournef.* 164
 Musaceæ, 162, 163*
 Musæ, *Juss.* 163
 Muscifolia, *Stack.* 22
 Musads, 163
 Musanga, *Chr. Smith.* 271
 Muscales, 53, 54*
 Muscari, *Tourn.* 205
 Muscaria, *Haw.* 568
 Musci, 54, 56, 64
 Musci, *L.* xxxiv
 Muscosæ, *Pert.* xlix
 Musenium, *Nutt.* 779
 Musineon, *Rafin.* 778
 Mussenda, *Linn.* 765
 Musschla, *Dumort.* 691
 Mussunia, *Willd.* 713
 Mulingia, *Linn.* 372
 Mutisia, *Linn.* 714
 Mutisinceæ, 703, 714
 Myacæ, 185
 Myagropsis, *Kütz.* 22
 Myagrum, *DC.* 354
 Myagrum, *Tourn.* 355
 Myanthus, *Lindl.* 182
 Mycaranthes, *Blum.* 181
 Mycelis, *Cass.* 715
 Mycena, *Fries.* 41
 Mycenastrum, *Desv.* 42
 Mycetanthæ, *Rehb.* 93
 Mycetia, *Reim.* 765
 Mycetis, *Spreng.* 29
 Mycoecium, *Ktze.* 9
 Mycoderma, *Pers.* 44
 Mycomater, *Fries.* 44
 Myconia, *Lapeyr.* 672
 Mycophyceæ, *Ktze.* 9
 Mycoporum, *Meyer.* 50
 Mycothamium, *Ktze.* 9
 Mydonosporium, *Corda.* 41
 Mydonotrichum, *Corda.* 41
 Mydomium, *Ktze.* 10
 Mygalurus, *Lk.* 116
 Myginda, *Jacq.* 588
 Mylauche, *Walk.* 611
 Mylinum, *Gandin.* 778
 Mylitta, *Fries.* 43
 Mylocaryum, *W.* 445
 Myoda, *Lindl.* 182
 Myogalum, *Link.* 205
 Myonima, *Comm.* 765
 Myoporaceæ, 649, 665*
 Myoporads, 665
 Myoporina, *R. Brown.* 665
 Myoporum, *Banks. et Sol.* 665
 Myopsia, *Presl.* 693
 Myoschilos, *Ruiz et Pav.* 788
 Myoseris, *Link.* 715
 Myosotis, *Linn.* 656
 Myosoton, *Mösch.* 498
 Myospyrum, *Bl.* 617
 Myosurus, *Dillen.* 428
 Myoxanthus, *Pöpp. et Endl.* 181
 Myra, *Salisb.* 455
 Myrcia, *DC.* 738
 Myriactis, *Less.* 10, 710
 Myriademus, *Desv.* 554
 Myriadenus, *Cass.* 710
 Myriandra, *Spach.* 406
 Myriangium, *Mont. et Berk.* 49
 Myriantheia, *Thouars.* 743
 Myrianthus, *Nutt.* 710
 Myrianthus, *Palis.* 271
 Myriaspore, *DC.* 733
 Myrica, *Linn.* 256
 Myricaceæ, 248, 256*
 Myricaria, *Desv.* 342
 Myricea, *Rich.* 256
 Myriocephalum, *Not.* 42
 Myriocephalus, *Benth.* 712
 Myriocheia, *DC.* 372
 Myriocladia, *J. Agh.* 22
 Myriococcum, *Fries.* 43
 Myriodactylon, *Desv.* 18
 Myriodesma, *Dec.* 22
 Myriogone, *Less.* 712
 Myriomeles, *Lindl.* 560
 Myriomena, *Grev.* 22
 Myrioneurou, *R. Br.* 765
 Myriophyllum, *Vahl.* 723
 Myriopterum, *Griff.* 626
 Myriostoma, *Desv.* 42
 Myriotheca, *Comm.* 82
 Myriotrema, *Lapyl.* 22
 Myriotrema, *Fée.* 50
 Myriotrichia, *Harvey.* 22
 Myrinois, *Bunge.* 714
 Myrlistica, *Linn.* 302
 Myristiceæ, 297, 301*
 Myristiceæ, *R. Br.* 301
 Myrmecia, *Schreb.* 614
 Myrmecodia, *Jacq.* 764
 Myrmecostylum, *Presl.* 80
 Myrmidone, *Mart.* 733
 Myrobalanæ, *Juss.* 717
 Myrobalans, 717
 Myrobalanus, *Gärtn.* 718
 Myrobtindum, *Vahl.* 664
 Myrodendron, *Schreb.* 447
 Myrodia, *Schreb.* 361
 Myrosma, *Linn.* 169
 Myrospermum, *Jacq.* 555
 Myrosporium, *Corda.* 44
 Myroxylon, *Nutt.* 555
 Myroxylon, *Forst.* 328
 Myrliidium, *DC.* 494
 Myrrhineæ, *Arnott.* 731
 Myrrhinium, *Schott.* 733
 Myrrhis, *Scopol.* 779
 Myrsidium, *Rafin.* 22
 Myrsinaceæ, 637, 647*
 Myrsine, *Linn.* 648
 Myrsinæ, *R. Brown.* 647
 Myrsiphyllum, *Willd.* 205
 Myrtaceæ, 716, 734*
 Myrtaceæ, *Ach. Richard.* 730
 Myrtaceæ, *DC.* 754
 Myrtales, 243, 246, 716*
 Myrtæ, 734, 738

- Myrti, *Juss.* 734
 Myrtillus, *Endl.* 738
 Myrtineæ, *DC.* 734
 Myrtiphyllum, *P. Br.* 764
 Myrtleblooms, 734
 Myrtoideæ, *Vent.* 734
 Myrtus, *Tourn.* 738
 Myscolus, *Cass.* 715
 Mysothecium, *Ditm.* 43
 Mystacidium, *Lindl.* 181
 Mystropetalum, *Hare.* 90
 Mystrosporium, *Corda.* 43
 Mystroxylon, *E. Z.* 588
 Myurus, *Endl.* 116
 Myxa, *Endl.* 629
 Myxaciium, *Fries.* 41
 Myxaciium, *Wallr.* 44
 Myxocladium, *Corda.* 44
 Myxogastres, 42
 Myxonaphalon, *Wallr.* 44
 Myxonema, *Corda.* 44
 Myxonema, *Fries.* 18
 Myxopuntia, *Mont. et Dur.* 40
 Myxosporium, *Corda.* 41
 Myxotrichum, *Kunze.* 43
 Myxotrix, *Fries.* 18
 Myzodendree, *R. Brown.* 789
 Myzodendron, *Sol.* 791
- Nabalus, *Cass.* 715
 Nabea, *Lehm.* 455
 Nahlonium, *Cass.* 712
 Naccaria, *Endl.* 10, 24
 Nacibea, *Aubl.* 765
 Næmatella, *Fries.* 42
 Nagassarium, *Rumph.* 402
 Nageia, *Gärtn.* 231, 282
 Nægelia, *Lindl.* 560
 Nahusia, *Schnezer.* 725
 Naiadaceæ, 140, 143*
 Naiadææ, *Agh.* 143
 Naiades, *Juss.* 143
 Naiads, 143
 Najas, *Willd.* 144
 Nama, *Linn.* 639
 Nananthea, *DC.* 712
 Nandlirobeæ, *Aug. de St. Hil.* 311
 Nandina, *Thunb.* 433
 Nandineæ, 438
 Nanzha, *Zippel.* 795
 Nani, *Adans.* 737
 Nanodela, *Banks.* 788
 Nanodes, *Lindl.* 181
 Nanophytum, *Less.* 513
 Napæa, *Linn.* 379
 Napeanthusa, *Gardn.* 672
 Napellus, *DC.* 428
 Napimoga, *Aubl.* 713
 Napoleona, *Palis.* 739
 Napoleoneæ, *Endl.* 723
 Napoleonowarts, 723
 Napus, *Tourn.* 355
 Narcissales, 192, 145*
 Narcissææ, *Agardh.* 155, 154
 Narcissi, *Juss.* 155, 200
 Narcissus, *Linn.* 154
 Narda, *Fl. Fl.* 795
 Nardophyllum, *Hook.* 711
 Nardosmia, *Cass.* 709
 Nardostachys, *DC.* 693
 Nardus, *Linn.* 116
 Nardzamia, *Wight. et Arn.* 464
 Nardheciium, *Gerard.* 131
 Nardheciium, *Mohring.* 132
 Narvalina, *Cass.* 711
 Nasella, *Trin.* 115
 Nasmythia, *Holt.* 122
 Nassonia, *Lindl.* 182
 Nassauvaceæ, 703
 Nassavia, *Coma.* 711
 Nassavia, *Fl. Fl.* 385
 Nassaviaceæ, 714
 Nassavieæ, 714
 Nassovia, *Pers.* 714
 Nastanthus, *Miers.* 701
- Nasturtioides, *Medik.* 355
 Nasturtiolium, *Gray.* 354
 Nasturtiolium, *Medik.* 355
 Nasturtium, *Boerh.* 354
 Nasturtium, *R. Br.* 354
 Nastus, *Juss.* 116
 Natalia, *Hochst.* 385
 Nathusia, *Hochst.* 617
 Natsatum, *Ham.* 271
 Nauchea, *Desv.* 555
 Nauclea, *Linn.* 765
 Nauclearia, *DC.* 765
 Naucoria, *Fries.* 41
 Nauemburgia, *Möneh.* 645
 Nauemburgia, *Willd.* 711
 Nauplius, *Cass.* 710
 Nautonia, *Dec.* 626
 Navæa, *Wobb. et Berth.* 370
 Navarretia, *Ruiz et Pav.* 636
 Navia, *Borkh.* 67
 Navia, *Mart.* 148
 Navicula, *Bory.* 13
 Navicularia, *Bert.* 115
 Navicularia, *Fabric.* 662
 Nebelia, *Neck.* 785
 Nebu, *Feuill.* 533
 Neckera, *Hedw.* 67
 Neckeria, *Gmel.* 499
 Neckeria, *Scopol.* 436
 Neetandra, *Berg.* 531
 Neetandra, *Rotb.* 537
 Nectarobothrium, *Ledeb.* 204
 Nectaroseordum, *Lindl.* 205
 Nectouxia, *DC.* 354
 Nectouxia, *H. B. K.* 621
 Neetris, *Schreb.* 413
 Neea, *Ruiz et Pav.* 507
 Needhamia, *Cass.* 711
 Needhamia, *R. Br.* 449
 Needhamia, *Scop.* 554
 Neesin, *Ehnm.* 361
 Nefflea, *Dent.* 684
 Negretia, *Ruiz et P.* 555
 Negundium, *Raf.* 387
 Negundo, *Möneh.* 387
 Nehemia, *Endl.* 372
 Neillia, *Don.* 565
 Neja, *G. Don.* 710
 Nelitris, *Gärtn.* 738
 Nelsonææ, 679
 Nelsonia, *R. Br.* 679
 Nelumbineæ, 408, 414*
 Nelumbium, *Juss.* 415
 Nelumbo, *Gärtn.* 415
 Nelumboneæ, *DC. et Mart.* 414
 Nemaconia, *Knowl.* 181
 Nemaion, *Targ.* 24
 Nemaspora, *Pers.* 42
 Nemastoma, *J. Agh.* 24
 Nemastomideæ, 24
 Nemastylis, *Nutt.* 161
 Nematanthera, *Miq.* 796
 Nematanthus, *Nees.* 121
 Nematanthus, *Schrad.* 672
 Nematococcus, *Ktz.* 9
 Nematophita, *Bory.* 13
 Nematospermum, *L. C. Rich.* 329
 Nematostigma, *Hedr.* 161
 Nematrix, *Fries.* 18
 Nemauchenæ, *Cass.* 715
 Nemaizoaires, *Gaillon.* 8
 Nemedra, *Juss.* 464
 Nemesia, *Vent.* 684
 Nemia, *Bey.* 684
 Nemochoa, *Palis.* 119
 Nemopanthes, *Rafin.* 594
 Nemophila, *Bart.* 639
 Nemum, *Palis.* 119
 Nenax, *Gärtn.* 761
 Nennular, *Hagn.* 411
 Neoceja, *Cass.* 713
 Neogayn, *Meisn.* 778
 Neolacia, *Chara.* 483
 Neolysis, *Humb.* 645
 Neomeris, *Lamar.* 21
- Neottææ, 179, 182
 Neottia, *R. Br.* 182
 Neottidium, *Link.* 182
 Neottiosporia, *Not.* 42
 Neottopteris, *J. Sm.* 80
 Neowedia, *Schrad.* 670
 Neowedia, *Schr.* 680
 Nepentheæ, 273, 287*
 Nepeutheæ, *Meisn.* 287
 Nepenthes, *Linn.* 288
 Nepenthineæ, *Link.* 287
 Nepenths, 287
 Nepeta, *Linn.* 662
 Nepetææ, 661
 Nepetideæ, 661
 Nephelaphyllum, *Ehnm.* 181
 Nephelium, *Linn.* 335
 Nephradenia, *Dec.* 626
 Nephranthera, *Coth.* 664
 Nephranthera, *Hassk.* 181
 Nephrodium, *Rich.* 80
 Nephroia, *Lour.* 309
 Nephrolepis, *Schott.* 80
 Nephroma, *Achar.* 50
 Nephrosis, *Rich.* 555
 Neptunia, *Louretr.* 556
 Neraudia, *Gaud.* 262
 Nereidea, *Stack.* 25
 Nereocystis, *Postels.* 10, 22
 Neriantra, *A. DC.* 601
 Nerija, *Roeb.* 588 -
 Nerine, *Herb.* 158
 Nerium, *L.* 601
 Nertera, *Banks.* 764
 Nervilia, *Comm.* 182
 Nesææ, *Comm.* 575
 Neseidia, *A. Rich.* 764
 Nesea, *Lamar.* 19
 Neslia, *Desv.* 355
 Nesophila, *Alph. DC.* 691
 Nestlera, *Spreng.* 713
 Nettleworts, 260
 Neuheria, *Eckl.* 161
 Neudorfia, *Adans.* 654
 Neumonia, *Brongn.* 148
 Neumannia, *A. Rich.* 328
 Neumayera, *Rehb.* 497
 Neuraanthos, *Nees.* 679
 Neuračne, *R. Br.* 115
 Neuraetis, *Cass.* 711
 Neurada, *B. Juss.* 565
 Neuradeæ, *DC.* 563
 Neuradeæ, 565
 Neurocalyx, *Hook.* 765
 Neurocarpa, *R. Br.* 765
 Neurocarpon, *W. et M.* 22
 Neurocarpum, *Desv.* 555
 Neuroglossum, *Ktz.* 11
 Neurogramma, *Presl.* 79
 Neuroliena, *R. Br.* 713
 Neurolineææ, 713
 Neuroloma, *Andrz.* 354
 Neuroloma, *Rafin.* 116
 Neuronia, *Don.* 80
 Neuropeltis, *Hall.* 631
 Neurophyllum, *Presl.* 80
 Neurophyllum, *Torr.* 778
 Neuroporon, *Nees.* 50
 Neuropora, *Comm.* 764
 Neuroscaplia, *Palasme.* 555
 Neurosperma, *Rafin.* 315
 Neurotropis, *DC.* 354
 Neuwiedia, *Humb.* 184
 Nhandiroba, *Phon.* 315
 Nhandirobeæ, 315
 Nira, *Dumst.* 648
 Nirra, *Rafin.* 685
 Nicandra, *Adans.* 622
 Nicandra, *Schreb.* 604
 Nicholsonia, *DC.* 554
 Nicotlemia, *Tenor.* 685
 Nicotiana, *Tournef.* 621
 Nidorella, *Cass.* 710
 Nidularia, *Pers.* 47
 Nidulariaceæ, 42

- Niebuhria, *DC.* 358
 Niebuhria, *Neck.* 711
 Nierenbergia, *Ruiz et Pav.* 621
 Nigella, *Tourn.* 428
 Nightshades, 618
 Nigrina, *Lin.* 684
 Nigrina, *Thunb.* 520
 Nigritella, *L. C. Rich.* 182
 Nima, *Hamill.* 477
 Nimmoia, *Wight.* 568
 Nintooa, *DC.* 767
 Niobæa, *Willd.* 154
 Niobe, *Salisb.* 205
 Niota, *Lam.* 477
 Niottout, *Adans.* 460
 Nipa, *Thunb.* 132, 139
 Niphæa, *Lindl.* 672
 Niphoholus, *Kaulf.* 79
 Niphus, *Raf.* 794
 Nirbisia, *G. Don.* 428
 Niruri, *Adans.* 282
 Nisa, *Noronh.* 743
 Nissolia, *Jacq.* 554
 Nissolia, *Tourn.* 554
 Nitelium, *Cass.* 714
 Nitella, *Ag.* 10, 28
 Nitophyllum, *Grev.* 25
 Nitraria, *L.* 390
 Nitrariaceæ, *Lindl.* 388
 Nitraria, *Hassall.* 796
 Nivaria, *Möneh.* 158
 Nivenia, *R. Br.* 533
 Nivenia, *Vent.* 161
 Noccæa, *Cav.* 709
 Noccæa, *Reichenb.* 354
 Nodularia, *Link.* 22
 Nodularia, *Mert.* 10, 18
 Noisetia, *Kunth.* 339
 Nolan, *Lin.* 654
 Nolanaceæ, 649, 654^o
 Nolanads, 654
 Nolanea, *Fries.* 41
 Nolina, *Rich.* 205
 Nollina, *Pers.* 205
 Nolleitia, *Cass.* 710
 Noltea, *Eckl.* 667
 Noltea, *Reichenb.* 582
 Noltia, *Schw.* 795
 Nonaphila, *Blum.* 679
 Nomisma, *DC.* 354
 Nomismia, *Wight. et Arn.* 555
 Nonatelia, *Aubl.* 765
 Nonnea, *Med.* 656
 Nopaleæ, *DC.* 746
 Norantea, *Aubl.* 404
 Nordmannia, *Fisch. et Mey.* 531
 Norna, *Wall.* 181
 Noronha, *Thouars.* 135
 Noronha, *Stadm.* 617
 Norta, *Adans.* 354
 Nortenia, *Thouars.* 685
 Norysea, *Spach.* 406
 Nosophilca, *Fries.* 44
 Nostoc, *Fauch.* 10, 18
 Nostocææ, 10, 18
 Notanthera, *G. Don.* 791
 Notarisia, *Coll.* 60
 Notelæa, *Vent.* 617
 Noterophila, *Mart.* 733
 Nothites, *Cass.* 709
 Nothium, *Lindl.* 182
 Nothochlæna, *R. Br.* 79
 Nothogenia, *Mont.* 25
 Nothonia, *DC.* 713
 Nothoscordum, *Kth.* 205
 Nothria, *Berg.* 340
 Noticastrum, *DC.* 710
 Notohasis, *Cass.* 714
 Notocarpia, *Presl.* 80
 Notoceras, *R. Br.* 354
 Notochæte, *Benth.* 662
 Notonia, *Wight. et Arn.* 555
 Notorhizææ, 354
 Notyha, *Lindl.* 182
 Notylidææ, 182
 Nowodworskya, *Presl.* 115
 Nucamentaceæ, *L.* xxxiii
 Nucamentaceæ, *Lindl.* 533
 Nullipora, *Lam.* 25
 Nuuezharia, *Ruiz et P.* 138
 Nunnezia, *Willd.* 138
 Nuphar, *Smith.* 411
 Nupharidææ, 411
 Nutmegs, 301
 Nuttallia, *DC.* 598
 Nuttallia, *Dicks.* 370
 Nuxia, *Vent.* 685
 Nuytsia, *R. Br.* 791
 Nyalelia, *Donst.* 464
 Nyctagella, *Reichenb.* 621
 Nyctaginaceæ, 506, 506*
 Nyctagines, *Juss.* 506
 Nyctag, *Juss.* 507
 Nyctagos, 506
 Nyctalis, *Fr.* 41
 Nyctanthes, *Juss.* 651
 Nyctelea, *Scop.* 639
 Nycteriua, *Don.* 684
 Nycterisitium, *Ruiz et Pav.* 591
 Nycterium, *Vent.* 622
 Nyctophylax, *Zipp.* 167
 Nylandtia, *Dumort.* 378
 Nymphaea, *Neck.* 411
 Nymphaeaceæ, 408, 409^o
 Nymphaeaceæ, *DC.* 414
 Nymphaeante, *Reichenb.* 614
 Nymphales, 244, 246, 408^o
 Nymphanthus, *Lour.* 282
 Nymphoides, *Tourn.* 614
 Nymphosanthus, *Rich.* 411
 Nypa, *Rumph.* 139
 Nyssa, *Lin.* 720
 Nyssaceæ, *Juss.* 719
 Nyssanthes, *R. Br.* 511
 Oakesia, *Tuckerm.* 285
 Obejaca, *Cass.* 713
 Obeliscaria, *Cass.* 711
 Obeliscotheca, *Vail.* 711
 Ohentonia, *Vell.* 471
 Oheronia, *Lindl.* 181
 Ohioue, *Gärtn.* 513
 Obletia, *Roz.* 664
 Oholaria, *Lin.* 611
 Oholaria, *Siegesb.* 767
 Ocalia, *Kl.* 282
 Ocampoa, *A. Rich.* 182
 Ocelluraria, *Meyer.* 50
 Ochanopappus, *Endl.* 714
 Ochtophila, *Popp.* 582
 Ochna, *Schreb.* 475
 Ochnaceæ, 456, 474^o
 Ochnads, 474
 Ochnææ, 475
 Ochradenus, *Dcl.* 356
 Ochranthaceæ, *Lindl.* 571
 Ochranthe, *Lindl.* 572
 Ochrocarpus, *Thouars.* 402
 Ochroma, *Sw.* 361
 Ochropteris, *J. Sm.* 79
 Ochrosanthus, *Don.* 695
 Ochrosia, *Juss.* 661
 Ochroxylum, *Schreb.* 473
 Ochrus, *Tourn.* 554
 Ochthocosmus, *Benth.* 397
 Ochthodium, *DC.* 354
 Ocimeæ, 661
 Ocium, *Lin.* 661
 Ockia, *Dictr.* 471
 Ocotæa, *Aubl.* 537
 Octadenia, *R. Br.* 354
 Octarillum, *Lour.* 788
 Octas, *Jack.* 795
 Octavia, *DC.* 765
 Octavianna, *Tul.* 42
 Octoblepharum, *Hedw.* 67
 Octodicerns, *Brid.* 67
 Octodon, *Thonn.* 764
 Octogonia, *Klotzsch.* 455
 Octomeria, *R. Br.* 181
 Octopera, *Benth.* 455
 Odestema, *Raf.* 438
 Odina, *Roxb.* 467
 Odonectis, *Rafin.* 182
 Odonia, *Bert.* 555
 Odonites, *Sprenq.* 778
 Odontadenia, *Benth.* 601
 Odontandra, *H. B. K.* 464
 Odontanthera, *Wight.* 626
 Odontarrhica, *C. A. M.* 354
 Odontella, *Ehr.* 13
 Odonthalia, *Lynob.* 11, 25
 Odontia, *Fr.* 41
 Odontites, *Hall.* 685
 Odontocarpa, *Neck.* 698
 Odontocarpa, *DC.* 709
 Odontocarya, *Miers.* 309
 Odontocyclus, *Turcz.* 354
 Odontoglossum, *H. B. K.* 184
 Odontognatia, *DC.* 714
 Odontolepis, *Boiss.* 714
 Odontoloma, *H. B. K.* 709
 Odontolophus, *Cass.* 714
 Odontoneia, *Nees.* 680
 Odontopetalum, *DC.* 494
 Odontophyllum, *DC.* 713
 Odontoptera, *Cass.* 713
 Odontopteris, *Bernh.* 81
 Odontosclisma, *Dum.* 60
 Odontosoria, *Presl.* 80
 Odontospermum, *Neck.* 710
 Odontostemma, *Benth.* 498
 Odontostylis, *Blum.* 181
 Odontotrichum, *Zucc.* 715
 Oecoclades, *Lindl.* 181
 Oechmea, *Juss.* 148
 Oedimium, *Fr.* 43
 Oedra, *Crantz.* 205
 Oedria, *DC.* 712
 Oedipachne, *Link.* 115
 Oedipodium, *Schwagr.* 67
 Edimannia, *Humb.* 553
 Oedonium, *Link.* 18
 Oenanthe, *Lam.* 778
 Oenocarpus, *Mart.* 138
 Oenoplia, *Schult.* 582
 Oenothera, *Lin.* 725
 Oenotherææ, *Endl.* 724
 Oenonia, *Lindl.* 181
 Oepata, *Rheed.* 665
 Oetia, *Adans.* 664
 Ogerostylus, *Cass.* 712
 Ogiera, *Cass.* 711
 Ogiera, *Sprenq.* 710
 Ogilfa, *DC.* 713
 O-ligginusia, *R. et P.* 765
 Ohlendorfia, *Lehm.* 684
 Oidium, *Link.* 43
 Oiospermum, *Less.* 709
 Okenia, *Diels.* 471
 Okeuia, *Schid.* 507
 Olacææ, 432, 443^o
 Olacads, 443
 Olacææ, *Benth.* 444
 Olacineæ, *Mirb.* 443
 Olax, *L.* 444
 Olbia, *Med.* 370
 Oldenburgia, *Less.* 714
 Oldenlandia, *Lin.* 765
 Olen, *Lin.* 617
 Oleaceæ, 615, 616^o
 Oleandra, *Cav.* 80
 Olearin, *Möneh.* 709
 Oleasters, 248, 257
 Oleiuceæ, *Hoffm. et Link.* 615
 Olfa, *Adans.* 423
 Olfersia, *Raddi.* 79
 Oligacoceæ, *Willd.* 698
 Oligacriou, *Cass.* 712
 Oligactis, *Cass.* 709
 Oligandra, *Less.* 513, 714
 Oliganthera, *Endl.* 513
 Oliganthes, *Cass.* 709
 Oligarrhena, *R. Br.* 449
 Oligocarpa, *Cass.* 710

- Oligocarpus, *Less.* 713
 Oligochaeta, *DC.* 714
 Oligodora, *DC.* 713
 Oligokyne, *DC.* 711
 Oligolepis, *Cass.* 710
 Oligomeris, *Camb.* 356
 Oligophyllon, *Less.* 714
 Oligosporus, *Cass.* 712
 Oligostemonæ, *Brongn.* 111
 Oligothrix, *Cass.* 713
 Oligotrichum, *DC.* 67
 Olinia, *Thunb.* 733
 Oliniæ, *Arnott.* 731, 733
 Olinthia, *Lindl.* 738
 Olisbea, *DC.* 733
 Oliveria, *Vent.* 779
 Oliveworts, 616
 Olivia, *Bert.* 19
 Olmedia, *R. et P.* 271
 Olympia, *Spach* 406
 Olyra, *Linn.* 115
 Omalanthus, *A. J.* 281
 Omalia, *Brid.* 67
 Omalocline, *Cass.* 715
 Omalotheca, *DC.* 713
 Ombrophytum, *Pöpp.* 90
 Ommatodium, *Lindl.* 1-2
 Omœa, *Blum.* 181
 Omphalandria, *P. Br.* 281
 Omphalea, *L.* 281
 Omphalia, *Fries.* 41
 Omphalidium, *Mey. et Flot.* 49
 Omphalium, *Foth.* 656
 Omphalobium, *Gärtn.* 468
 Omphalocarpum, *Beauv.* 591
 Omphalocaryon, *Kl.* 455
 Omphalococca, *Willd.* 664
 Omphalodes, *Tourn.* 656
 Omphalophora, *Brid.* 67
 Omphalospora, *Bess.* 685
 Omphalostigma, *Gr.* 614
 Onæpia, *Lindl.* 428
 Onagra, *Tourn.* 725
 Onagræ, *Juss.* 724
 Onagraceæ, 716, 724*
 Onagradæ, 724
 Onagraricæ, 722, 724
 Onacidium, *Swartz.* 181
 Oncinema, *W. Arn.* 626
 Oncinus, *Lour.* 648
 Oncoba, *Forsk.* 328
 Oncobyrsa, *Ag.* 13, 18
 Oncogastra, *Mart.* 672
 Oncophorus, *Brid.* 67
 Oncorhynchus, *Lehm.* 685
 Oncosperma, *Blum.* 138
 Oncosporium, *Pult.* 441
 Oncostemum, *Adr. Juss.* 648
 Oncostylis, *Mart.* 119
 Oncotylus, *Ktz.* 10
 Oncus, *Lour.* 205, 214
 Oneilia, *Ag.* 25
 Onobroma, *DC.* 714
 Onobrychis, *Tourn.* 575
 Onoclea, *Linn.* 59
 Ononis, *Linn.* 554
 Onopit, *Rafn.* 715
 Onopordon, *Vaill.* 714
 Onopteris, *Bernh.* 80
 Onoseris, *DC.* 714
 Onosma, *Linn.* 656
 Onosmodium, *L. C. R.* 656
 Onosuria, *Rafn.* 725
 Onotrophe, *Cass.* 714
 Onychium, *Blum.* 181
 Onychium, *Kawlf.* 50
 Onychium, *Rafn.* 70
 Onygena, *Pers.* 43
 Onyzeni, *Berk.* 43
 Oncephalus, *Benth.* 651
 Oocellulum, *DC.* 769
 Oococca, *DC.* 385
 Opa, *Lour.* 738
 Opegrapha, *Pers.* 50
 Opercularia, *A. Rich.* 764
 Opercularidæ, 764
 Operculina, *Manso.* 631
 Opetiola, *Gärtn.* 119
 Ophelia, *Don.* 614
 Ophelus, *Lour.* 861
 Ophiala, *Desv.* 77
 Ophlocaryon, *Endl.* 385
 Ophioderma, *Blum.* 77
 Ophioglossaceæ, 76, 77*
 Ophioglossæ, *R. Br.* 77
 Ophioglossum, *Linn.* 77
 Ophiopogon, *Ait.* 205
 Ophiopogonæ, *Endl.* 205
 Ophiopteris, *Reinv.* 80
 Ophiorrhiza, *Linn.* 765
 Ophioscorodon, *Waltr.* 205
 Ophiosperma, *Vent.* 647
 Ophiostachys, *Del.* 199
 Ophioxylon, *Linn.* 601
 Ophiria, *Linn.* 785
 Ophispermum, *Lour.* 579
 Ophurus, *Gärtn.* 116
 Ophyræ, 179, 182
 Ophryoscleria, *Nees.* 119
 Ophryosporus, *Mey.* 715
 Ophrys, *Swartz.* 182
 Ophthalmidium, *Eschw.* 50
 Opilææ, *Benth.* 444
 Opilia, *Roxb.* 444
 Opizia, *Presl.* 116
 Ophismenus, *Palis.* 115
 Opoidia, *Lindl.* 779
 Opopanax, *Koch.* 778
 Oporantbus, *Herb.* 158
 Oporinia, *Don.* 715
 Opospermum, *Rafn.* 22
 Opsianthus, *Lilja.* 725
 Opulus, *Tourn.* 767
 Opuntia, *Tourn.* 748
 Opuntiaceæ, *Juss.* 746
 Opuntidæ, 748
 Orania, *Zippel.* 138
 Orbignya, *Mart.* 139
 Orchidaceæ, 170, 173*
 Orchidales, 104, 170*
 Orchidææ, *L.* xxxiii
 Orchidææ, *R. Brown.* 173
 Orchides, *Juss.* 173
 Orchidium, *Swartz.* 181
 Orchidocarpum, *L. C. Rich.* 422
 Orchidofunkia, *A. Rich.* 182
 Orchids, 173
 Orchipeda, *Blum.* 601
 Orchipedum, *Kuhl.* 183
 Orchis, *Linn.* 182
 Oreanthes, *Benth.* 758
 Oreas, *Brid.* 67
 Oreas, *Cham.* 354
 Oregura, *Lindl.* 182
 Orelia, *Aubl.* 601
 Oreobolus, *R. Br.* 119
 Oreocallis, *R. Br.* 534
 Oreochlaris, *Decaimc.* 656
 Oreochlon, *Link.* 116
 Oreolaphne, *Nees.* 537
 Oreodoxa, *Willd.* 138
 Oreogonum, *Ser.* 545
 Oreomyrtilis, *Endl.* 779
 Oreophila, *Don.* 715
 Oreophila, *Nutt.* 548
 Oreophylax, *Endl.* 614
 Oreosciadium, *DC.* 778
 Oreoselinum, *Duby.* 778
 Oreoseris, *DC.* 714
 Orensplenium, *Zohler.* 563
 Oresigonia, *Willd.* 713
 Oresitrophe, *Bunge.* 568
 Orgya, *Stueckh.* 22
 Orinastrium, *Pöpp.* 714
 Oriza, *Adans.* 428
 Orizaba, *Schreb.* 765
 Orizablæ, 661
 Orizannum, *Linn.* 461
 Orizaria, *Rafn.* 774
 Oritea, *R. Br.* 534
 Orithalia, *Bl.* 672
 Orithya, *Don.* 204
 Ortitina, *R. Br.* 534
 Orium, *Desv.* 354
 Orixa, *Thunb.* 648
 Orlaya, *Hoffm.* 779
 Ornenis, *Cass.* 712
 Ormiscus, *DC.* 355
 Ormocarpus, *Pers.* 554
 Ormosciadium, *Boiss.* 779
 Ormosia, *Jacq.* 555
 Ormosolenia, *Tausch.* 778
 Ormycarpus, *Neck.* 355
 Ornithidium, *Salisb.* 182
 Ornithocephalus, *Hook.* 182
 Ornithochilus, *Wall.* 181
 Ornithogalodeum, *G. Don.* 205
 Ornithogalum, *Link.* 205
 Ornithoglossum, *Salisb.* 199
 Ornithopteris, *Bernh.* 80
 Ornithopus, *Linn.* 554
 Ornithoxanthum, *Link.* 204
 Ornitrophe, *Juss.* 385
 Ornus, *Pers.* 617
 Orobanchaceæ, 694, 609*
 Orobanchæ, *Linn.* 611
 Orobanchæ, *Juss.* 609
 Orobanchinæ, *Link.* 609
 Orobanchoides, *Tournef.* 452
 Orobium, *Reichb.* 354
 Orobus, *Tourn.* 554
 Orolanthus, *E. Mey.* 661
 Orontiacæ, 190, 193*
 Orontides, 193
 Orontieæ, 194
 Orontium, *Linn.* 194
 Orontium, *Pers.* 654
 Oropetium, *Trin.* 116
 Ororphanes, *Salisb.* 455
 Ororpha, *Blum.* 422
 Orostachys, *Fisch.* 346
 Oroxyllum, *Vent.* 677
 Orphium, *E. Mey.* 614
 Orsinia, *Bert.* 709
 Ortega, *DC.* 499
 Ortega, *Löfl.* 499
 Orthanthera, *Wight.* 627
 Orthocarpæa, *DC.* 361
 Orthocarpus, *Nutt.* 685
 Orthocentrum, *Cass.* 714
 Orthoceras, *R. Br.* 183
 Orthoclada, *Palis.* 116
 Orthodanum, *E. Mey.* 555
 Orthodon, *Bory.* 67
 Orthodon, *Ser.* 498
 Orthodontium, *Schw.* 67
 Orthoines, *Martius.* xlv
 Orthoplocææ, 355
 Orthopogon, *R. Br.* 115
 Orthopyxis, *Palis.* 67
 Orthoraphium, *Nees.* 115
 Orthosells, *DC.* 355
 Orthosia, *Dec.* 626
 Orthosiphon, *Benth.* 661
 Orthosporum, *R. Br.* 513
 Orthostemon, *R. Br.* 614
 Orthotheca, *Brid.* 67
 Orthothecium, *Sch.* 361
 Orthotrichum, *Hedw.* 67
 Orthotropis, *Benth.* 553
 Orthurosanthus, *Sweet.* 161
 Orvala, *Linn.* 662
 Orychophragma, *B.* 355
 Orygia, *Forsk.* 526
 Oryza, *Linn.* 115
 Oryzææ, 115
 Oryzopsis, *Rich.* 115
 Osbeckia, *Linn.* 733
 Osbeckiæ, 733
 Oscampila, *Mönch.* 656
 Oscillaria, *Bosc.* 9, 14
 Oscillariæ, 9
 Oscillatoreæ, 18
 Oscillatoria, *Bosc.* 18
 Oscillatoridæ, 18

Osmadenia, Nutt. 712
Osmanthus, Lour. 617
Osmites, Cass. 713
Osmitopsis, Cass. 713
Osmolinum, Raf. 656
Osmophytum, Lindl. 181
Osmorrhiza, Rafin. 779
Osmoscleria, Nees. 119
Osmothamnus, DC. 455
Osmunda, Linn. 81
Osmundaceæ, R. Br. 81
Osmundaria, Lamour. 22
Osmundea, 81
Osmundia, Stack. 25
Ospriosporium, Corda. 44
Osproleou, Wallr. 611
Ossæa, DC. 733
Osteomeles, Lindl. 560
Osteospermæ, 713
Osteospermum, Linn. 713
Osterdamia, Neck. 116
Osterdyckia, Burm. 572
Ostericium, Hoffm. 778
Ostodes, Blum. 281
Ostracococcum, Wallr. 44
Ostracoderma, Fries. 44
Ostroja, Fries. 44
Ostrya, Scop. 291
Ostryodium, Desf. 555
Oswalda, Cass. 711
Osyricera, Blum. 181
Osyridææ, Juss. 787
Oayrinæ, Link. 787
Osyris, Linn. 788
Otachyrium, Nees. 115
Otandra, Salisb. 182
Otanthera, Blum. 733
Otanthus, Link. 712
Oteiza, Llac. 715
Othæra, Thunb. 648
Othlis, Schott. 424
Othonna, Linn. 713
Othonnææ, 713
Othrya, Noronh. 358
Otidia, Sweet. 494
Otiona, Corda. 58
Otlophora, Zucc. 764
Otites, Oth. 498
Otochilus, Lindl. 181
Otochlamys, DC. 712
Otophylla, Benth. 685
Otoptera, DC. 555
Otostegia, Benth. 662
Ototropis, Schauer. 554
Ottelia, Pers. 142
Ottilis, Gärtn. 440
Otton, H. B. K. 778
Ottonia, Kunth. 518
Oudneya, R. Br. 354
Ouracoccus, Hass. 796
Ouratea, Aubl. 475
Ourisia, Conam. 685
Ouroparia, Aubl. 765
Onstropis, Don. 554
Outea, Aubl. 556
Onvirandra, Thouars. 210
Ovieda, Linn. 161, 664
Ovilla, Adans. 631
Oxalidacææ, 484, 488*
Oxalidææ, DC. 488
Oxalids, 488
Oxalis, Linn. 489
Oxandra, A. Rich. 422
Oxera, Labill. 622
Oxerææ, Fenzl. 659, 662
Oxleya, A. C. 462
Oxyandra, DC. 372
Oxyanthera, Brongn. 183
Oxyanthus, DC. 765
Oxyhaphus, Herit. 507
Oxybasis, Karst. 513
Oxycarpus, Lour. 402
Oxycaryum, Nees. 119
Oxyceros, Lour. 765
Oxycoccus, Tourm. 758

Oxydendron, DC. 455
Oxydenia, Nutt. 115
Oxydium, Benn. 554
Oxydon, Less. 714
Oxygonium, Presl. 80
Oxygomum, Burch. 504
Oxygraphis, Bunge. 428
Oxylepis, Benth. 712
Oxylobium, Andr. 553
Oxylobus, Moc. 709
Oxyloma, B. 455
Oxymeris, DC. 733
Oxymitra, Bisch. 57
Oxymitra, Blum. 422
Oxypappus, Benth. 712
Oxypetalum, R. Br. 626
Oxypogon, Rafin. 554
Oxypolis, Rafin. 778
Oxyramphus, Woll. 554
Oxyria, Hill. 504
Oxyspermum, Eckl. 764
Oxyspora, DC. 733
Oxystelma, R. Br. 626
Oxystoma, Eschwr. 50
Oxystophyllum, Blum. 131
Oxytropis, DC. 554
Oxyura, DC. 712
Oyedæa, DC. 711
Ozodia, W. et A. 779
Ozonium, Link. 44
Ozophyllum, Schreb. 471
Ozoroa, Del. 467
Ozothalia, Dec. et Th. 22
Ozothamnus, R. Br. 713

Pachira, Aubl. 361
Pachites, Lindl. 182
Pachycalyx, Klotzsch. 455
Pachycarpus, E. Mey. 10
Pachycentria, Blum. 733
Pachychilus, Blum. 181
Pachydendron, Hauc. 205
Pachyderma, Blum. 617
Pachyderris, DC. 710
Pachydium, Fisch. et Mey. 725
Pachylæna, Don. 714
Pachylepis, Brongn. 229
Pachylepis, Less. 715
Pachylobus, Don. 460
Pachyloma, DC. 733
Pachyloplis, Spach. 725
Pachyma, Fries. 44
Pachymeria, Benth. 733
Pachyna, Salisb. 181
Pachynema, R. Br. 424
Pachyneurum, Bunge. 354
Pachynotum, DC. 354
Pachyphlæus, Tul. 43
Pachyphragma, DC. 354
Pachyphyllidææ, 182
Pachyphyllum, H. B. K. 182
Pachyphytum, Kl. 346
Pachypleuria, Presl. 80
Pachyplenridææ, 778
Pachypleurum, Ledeb. 778
Pachypodium, Lindl. 691
Pachypodium, Nutt. 354
Pachyptera, DC. 677
Pachypteris, Kar. 355
Pachypterum, Steetz. 713
Pachypterygium, Bunge. 355
Pachyrhizus, Rich. 555
Pachyrhynchus, DC. 713
Pachysa, Don. 455
Pachysandra, Michx. 282
Pachystemon, Bl. 281
Pachystigma, Hooker. 471
Pachystigma, Hookst. 765
Pachystima, Raf. 588
Pachystoma, Blum. 181
Pachystylum, DC. 355
Pachysurus, Steetz. 712
Pacouria, Aubl. 601
Pacourina, Aubl. 709
Pacourinopsis, Cass. 709

Padiua, Adans. 22
Padinella, Aresch. 22
Padus, Endl. 588
Pæderia, Linn. 761
Pæderida, 764
Pæderota, Linn. 685
Pæonia, L. 428
Pæpalanthus, Mart. 122
Pæsin, St. Hil. 80
Pætra, Griseb. 614
Pægmea, Aubl. 604
Pægapate, Somner. 738
Pægia, Raf. 685
Pæjanella, DC. 677
Pælafoxia, Lagase. 709
Pælaquium, Blanco. 591
Pælava, Car. 370
Pælava, B. et P. 424
Pælava, Monch. 370
Pæleolaria, Cass. 709
Pæletuveria, Thouars. 727
Pæletviers, Savigny. 726
Pælavina, Velloz. 672
Pæliconea, Aubl. 764
Pælimbia, Besser. 778
Pælisota, Reicheb. 188
Pælinrus, Tourm. 582
Pælladia, Lamour. 795
Pælladina, Monch. 615
Pællasia, Houtt. 471
Pællasia, Linn. 504
Pællasia, Herit. 711
Pællavia, Fl. Fl. 507
Pællenis, Cass. 710
Pælmacææ, 134
Pælmæ, Juss. 134
Pælmæ, L. xxxiii
Pælmæles, 103, 133*
Pælmæria, Link. 22
Pælmæria, Stack. 25
Pælmella, Luggb. 9, 18
Pælmellew, Kütz. 9, 18
Pælnia, Endl. 631
Pælnijuncus, Rumph. 139
Pælmoglea, Kütz. 9
Pælnus, 134
Pælovea, Aubl. 556
Pæltouophora, Kütz. 13
Pæltorin, K. et Pav. 598
Pælundna, Giescke. 167
Pælundella, Ehrh. 67
Pælnra, Hauc. 593
Pæmphalen, Lagase. 714
Pæmphilla, Mart. 593
Pæmpillacææ, A. DC. 593
Pæmpæolus, Fr. 41
Pæmpetia, Cass. 713
Pænnaria, Delis. 50
Pæanax, Linn. 781
Pænciatica, Veech. 555
Pæncovia, Willd. 556
Pæncrasia, DC. 764
Pæncratium, Linn. 158
Pændacææ, Thouars. 601
Pændanacææ, 123, 130*
Pændanacææ, R. Br. 130, 132
Pændanophyllum, Hassk. 119
Pændauns, Linn. fil. 132
Pænderia, Fisch. et M. 513
Pænetos, Rafin. 765
Pængiacææ, 320, 323*
Pængiads, 323
Pængium, Rumph. 324
Pænicastrella, Michel. 115
Pænicææ, 115
Pænicularia, Coll. 80
Pænicum, Linn. 115
Pænissea, Lindl. 181
Pænke, Feuill. 781
Pænopia, Nor. 281
Pænus, Fr. 41
Pænzera, Willd. 556
Pænzeria, Monch. 662
Pæpaver, Tourm. 431
Pæpaveracææ, 416, 430*

- Papaya, *Tourn.* 322
 Papayaceæ, 320, 321*
 Papayads, 321
 Papayæ, *Jg.* 321
 Papayæ, 244, 246, 320*
 Papeda, *Hæsk.* 458
 Paphnia, *Lindl.* 182
 Papilionaceæ, *L.* xxxiv
 Papilionaceæ, 547, 553, 556
 Papiria, *Thunb.* 158
 Pappæ, *Eckl.* 385
 Pappochroma, *Nutt.* 710
 Pappophoreæ, 115
 Pappophorum, *Schreb.* 115
 Papularia, *Forsk.* 527
 Papularia, *Fries.* 44
 Papyraceæ, *Stack.* 25
 Papyrus, *Lam.* 268
 Papyrus, *Willd.* 119
 Paquerina, *Cass.* 710
 Paracarpeæ, 10
 Paragmathis, *Spreng.* 182
 Paragramme, *Blum.* 79
 Paralea, *Aubl.* 596
 Paramesus, *Presl.* 554
 Paramignya, *Wight.* 458
 Paranebelius, *Pöpp.* 709
 Paranoimus, *Salisb.* 533
 Parapetalifera, *Wendl.* 471
 Parapodinn, *E. Mey.* 625
 Pararhysis, *DC.* 714
 Paraspermeæ, 10
 Parastemon, *A. DC.* 444
 Parastranthus, *G. Don.* 693
 Parastrephia, *Nutt.* 710
 Paratropia, *DC.* 781
 Pardanthus, *Ker.* 161
 Pardisium, *Burm.* 714
 Pardoglossa, *Lindl.* 182
 Parentucellia, *Viv.* 685
 Pariana, *Aubl.* 116
 Paridææ, *Link.* 218
 Parids, 218
 Parietaria, *Tourn.* 262
 Parilium, *Gärtn.* 651
 Parilla, *Dennst.* 588
 Parinari, *Aubl.* 543
 Parinarium, *Juss.* 543
 Paris, *Linn.* 218
 Pariti, *Rheed.* 370
 Paritium, *Adr. Juss.* 370
 Parivoa, *Aubl.* 556
 Parkeria, *Hook.* 80
 Parkia, *R. Br.* 556
 Parkiezæ, 556
 Parkinsonia, *Plum.* 555
 Parmelia, *Fries.* 50
 Parmeliaceæ, 50
 Parmeliadææ, 50
 Parmentaria, *Fée.* 50
 Parmentiera, *DC.* 674
 Parmassia, *L.* 496
 Parochetus, *Hamill.* 554
 Parolinia, *Endl.* 229
 Parolinia, *Webb.* 354
 Paronychia, *Juss.* 499
 Paronychiaceæ, *Meian.* 499
 Paronychieæ, *A. St. Hil.* 49
 Paropsis, *Noronh.* 334
 Parosella, *Car.* 554
 Partheniastrum, *Néesol.* 711
 Parrotia, *C. A. Meyer.* 784
 Parrya, *R. Br.* 354
 Parsonia, *P. Br.* 575
 Parsonseæ, 691
 Parsonsia, *R. Br.* 691
 Partheniææ, 711
 Parthenium, *Linn.* 711
 Parvati, *DC.* 204
 Pascalia, *Orteg.* 711
 Paschanthus, *Burch.* 322
 Pasithea, *Don.* 205
 Paspalum, *Linn.* 115
 Passalia, *Solan.* 339
 Passerina, *Linn.* 531
 Passiflora, *Juss.* 334
 Passifloraceæ, 326, 332*
 Passifloreæ, *DC.* 335
 Passifloreæ, *Juss.* 332
 Passionworts, 332
 Passoura, *Aubl.* 339
 Pasiuaca, *Tourn.* 778
 Patæba, *Aubl.* 764
 Patagonium, *Schrank.* 554
 Patagoula, *Linn.* 664
 Patania, *Presl.* 80
 Patellaria, *Pers.* 50
 Patellaria, *Fries.* 43, 50
 Patersonia, *R. Br.* 161
 Patima, *Aubl.* 765
 Patmauworts, 93
 Patonia, *Wight.* 422
 Patrinia, *Juss.* 698
 Patrisia, *L. C. Rich.* 334
 Patrisia, *Rohr.* 583
 Pauletia, *Cav.* 556
 Paulia, *Fée.* 49
 Paullinia, *Linn.* 385
 Paulowilhelminia, *Hochst.* 364
 Paulowuia, *Zucc.* 684
 Pauridia, *Harv.* 154
 Pautsavia, *Juss.* 720
 Pavate, *Ray.* 764
 Pavetta, *Linn.* 764
 Pavia, *Böerh.* 385
 Pavinda, *Thunb.* 785
 Pavonia, *Cru.* 370
 Pavonia, *Ruiz.* 200
 Paxillus, *Fr.* 41
 Paxtonia, *Lindl.* 181
 Payena, *A. DC.* 591
 Peautia, *Comm.* 570
 Peckia, *Fl. Fl.* 648
 Pectidææ, 709
 Pectidium, *Less.* 709
 Pectidopsis, *DC.* 709
 Pectinaria, *Benth.* 661
 Pectinistrum, *Cass.* 714
 Pectinellum, *DC.* 709
 Pectis, *Linn.* 709
 Pectocarya, *DC.* 656
 Pectophytum, *H. B. K.* 778
 Pedaleæ, 670
 Pedaliaceæ, 649, 668, 669*
 Pedaliads, 669
 Pedalineæ, *R. Br.* 669
 Pedalium, *Linn.* 670
 Pediasium, *Meyen.* 13
 Pedicellaria, *DC.* 358
 Pedicella, *Lour.* 385
 Pedicularæ, *Juss.* 681
 Pedicularæ, *Linn.* 685
 Pedilanthus, *Neck.* 281
 Pedilea, *Lindl.* 181
 Pedilonia, *Presl.* 205
 Pedilonum, *Blume.* 181
 Peddica, *Harv.* 531
 Peganum, *Linn.* 479
 Pegia, *Colubr.* 467
 Pegoletia, *Cass.* 710
 Peixotoa, *A. de J.* 390
 Pekea, *Aubl.* 359
 Peleargonium, *Herit.* 494
 Pelecinus, *Tournef.* 554
 Pelecynthis, *E. Mey.* 553
 Pelecyphora, *C. Ehrenb.* 748
 Pelexia, *Poit.* 182
 Pelosanthus, *Andrews.* 205
 Pellostomum, *Benth.* 684
 Pellucalyx, *Korthals.* 572
 Pelletiera, *A. St. Hil.* 645
 Pella, *Raddi.* 59
 Pellionia, *Gaud.* 262
 Pelostoma, *Salisb.* 475
 Peltandra, *Rafin.* 129
 Peltanthera, *Roth.* 601
 Peltaria, *Linn.* 354
 Peltæa, *Achar.* 50
 Peltidium, *Zollk.* 715
 Peltigera, *Willd.* 59

- Peltobryon, *Kl.* 518
 Peltocarpus, *Zipp.* 795
 Peltodon, *Pohl.* 661
 Peltogyne, *Vogel.* 556
 Peltophorum, *Vog.* 555
 Peltophorus, *Desv.* 116
 Peltophyllum, *Gardner.* 213
 Peltopsis, *Raf.* 210
 Pelvetia, *Dec. et Th.* 22
 Pemphidium, *Mont.* 43
 Pemphis, *Forst.* 575
 Penæa, *Linn.* 578
 Penæa, *Plum.* 378
 Peucecææ, 576, 577*
 Penicillaria, *Swartz.* 115
 Penicillium, *Link.* 43
 Penicillus, *Lamx.* 19
 Pennantia, *Forst.* 467
 Pennisetum, *Rich.* 115
 Pentacæna, *Bartl.* 499
 Pentacalia, *Cass.* 713
 Pentacarya, *DC.* 653
 Pentaceros, *E. F. W. Meyer.* 795
 Pentachæta, *Nutt.* 710
 Pentachoudra, *R. Br.* 449
 Pentaclothra, *Bertol.* 315
 Pentaclethra, *Benth.* 556
 Pentacoryne, *DC.* 765
 Pentacrypta, *Lehm.* 779
 Pentadactylon, *Gärtn.* 533
 Pentadesma, *R. Br.* 402
 Pentaglossum, *Forsk.* 575
 Pentaglottis, *Tausch.* 656
 Pentaglottis, *Wall.* 364
 Pentagonaster, *Kl.* 737
 Pentagonium, *Schauer.* 626
 Peotaloba, *Lour.* 339
 Peutameris, *Palks.* 116
 Pentameris, *E. M.* 370
 Pentamone, *Mq. et Ses.* 473
 Pentanema, *Cass.* 710
 Pentanisia, *Harv.* 764
 Pentanthera, *Don.* 455
 Pentanthus, *Hook. et Arn.* 113
 Pentanthus, *Less.* 714
 Pentapeltis, *Endl.* 778
 Pentapera, *Klotzsch.* 455
 Pentapetes, *Linn.* 364
 Pentaphitrum, *Rehb.* 622
 Pentaphorus, *Don.* 714
 Pentaphragma, *Wall.* 691
 Pentaphylloides, *Tourn.* 564
 Pentaphyllum, *Pers.* 554
 Pentapogon, *R. Br.* 115
 Pentaptera, *Roxb.* 718
 Pentapteris, *Hall.* 723
 Pentarrhaphia, *Lindl.* 672
 Pentarrhaphis, *H. B. K.* 116
 Pentarrhinum, *E. Mey.* 626
 Pentas, *Benth.* 765
 Pentasacme, *Wall.* 627
 Pentaspermium, *DC.* 370
 Pentasteris, *Ehr.* 9, 13
 Pentatropis, *R. Br.* 626
 Penthea, *Lindl.* 182
 Penthea, *Don.* 714
 Penthorum, *Linn.* 346
 Pentoretia, *Dec.* 626
 Pentotis, *Tour.* 765
 Pentstemon, *Lher.* 684
 Pentzia, *Thunb.* 712
 Peperdia, *Reichb.* 520
 Peperidium, *Lindl.* 167
 Peperomia, *Ruiz. et P.* 518
 Peperoniadææ, 618
 Peplidium, *Delil.* 685
 Peplis, *Linn.* 575
 Peplonia, *Dec.* 626
 Pepp, *Tourn.* 315
 Peppeworts, 71, 515
 Pera, *Mutis.* 281
 Peralteæ, *H. B. K.* 554
 Perenna, *Aubl.* 764
 Perannius, *Raf.* 711
 Peranema, *Don.* 80

- Peraphyllum, *Nutt.* 560
 Pereursaria, *Bowen.* 18
 Pereursaria, *Bory.* 19
 Pardiium, *Lagase.* 714
 Perebea, *Aubl.* 271
 Pereilema, *Presl.* 115
 Pereiria, *Lindl.* 309
 Pereskia, *Phan.* 748
 Pereskia, *Fl. Fl.* 585
 Pereskidæ, 748
 Pereuphora, *Hoffmans.* 714
 Perezia, *Lag.* 714
 Perforatæ, *L.* xxxiv
 Pergularia, *Linn.* 627
 Periandra, *Camb.* 498
 Periandra, *Mart.* 555
 Perianthopodus, *Sib. M.* 315
 Peribæa, *Kth.* 205
 Periballia, *Trin.* 116
 Periblesteæ, 10
 Periblema, *DC.* 674
 Peribotryon, *Fries.* 44
 Pericallis, *Don.* 713
 Pericalymma, *Endl.* 737
 Perichæna, *Fries.* 42
 Perielistia, *Benth.* 331
 Periclymeum, *Tourn.* 767
 Periconia, *Tode.* 43
 Pericycla, *Blume.* 139
 Peridera, *Webb.* 712
 Perideridia, *Reichb.* 779
 Peridium, *Schott.* 281
 Periglossum, *Dec.* 626
 Perigynous, 241, 243
 Perigynous Exogens, 245, 246, 522*
 Perilla, *Linn.* 661
 Perjonia, *H. B. K.* 661
 Periola, *Fries.* 43
 Periphragmos, *Ruiz et Pav.* 636
 Periplegmaticum, *Ktz.* 10
 Periploca, *Linn.* 626
 Periploceæ, 626
 Periptera, *DC.* 370
 Peripterygium, *Hassk.* 231
 Perisporiacei, *Fries.* 43
 Perisporium, *Fries.* 43
 Peristera, *DC.* 494
 Peristeria, *Hook.* 182
 Peristrophe, *Nees.* 680
 Peristylus, *Blum.* 182
 Peritoma, *DC.* 358
 Peritium, *Vogel.* 556
 Perityle, *Benth.* 710
 Perizoma, *Miers.* 622
 Perlebia, *DC.* 779
 Perlebia, *Mart.* 556
 Pernetia, *Gaud.* 455
 Pernetia, *Scop.* 691
 Peroa, *Pers.* 449
 Perobache, *Presl.* 116
 Perojoa, *Cav.* 449
 Peromnion, *Schw.* 67
 Peronema, *Jack.* 664
 Peronia, *DC.* 169
 Peronia, *Wall.* 795
 Perotis, *Ait.* 116
 Perotriche, *Cass.* 713
 Perovskia, *Karst.* 661
 Perpensum, *Burm.* 781
 Perrotetia, *DC.* 554
 Perrotetia, *H. B. K.* 588
 Persen, *Gärtn.* 537
 Persica, *Tourn.* 558
 Persicaria, *Tourn.* 504
 Personaria, *Lam.* 713
 Personatæ, *L.* xxxlv
 Personatæ, *DC.* 609, 681
 Persoonia, *Mich.* 712
 Persoonia, *Smith.* 533
 Persoonia, *W.* 464
 Persoonidæ, 533
 Pertusaria, *DC.* 50
 Perularia, *Lindl.* 182
 Pervillæa, *Dec.* 627
 Pervinca, *Tourn.* 601
 Perymenium, *Schrad.* 711
 Peschiera, *A. DC.* 601
 Pesomeria, *Lindl.* 181
 Pestalozzia, *Not.* 42
 Petagnana, *Gmel.* 554
 Petagnia, *Rafin.* 795
 Petagnia, *Gusson.* 778
 Petalacte, *Don.* 713
 Petalauthera, *Nees.* 537
 Petalanthera, *Torr.* 745
 Petalidium, *Nees.* 679
 Petalolepis, *Less.* 713
 Petaloma, *DC.* 727
 Petaloma, *Roeb.* 718
 Petaloma, *Swartz.* 733
 Petalophyllum, *Nees.* 58
 Petalopogon, *Reiss.* 582
 Petalostemma, *R. Br.* 795
 Petalostemon, *L. C. Rich.* 554
 Petalostylis, *Griseb.* 614
 Petalotoma, *DC.* 755
 Petameues, *Salisb.* 161
 Petasiteæ, 709
 Petasites, *Tourn.* 709
 Petesia, *Barth.* 765
 Petesia, *P. Br.* 765
 Petesioides, *Jacq.* 648
 Petilium, *Linn.* 204
 Petitia, *Gay.* 778
 Petitia, *Jacq.* 664
 Petiveria, *Linn.* 385
 Petiveriaceæ, 373, 386°
 Petiveriads, 386
 Petiveriæ, *Agardh.* 386
 Petraca, *Houst.* 664
 Petrocallis, *R. Br.* 354
 Petrocarui, *Tausch.* 779
 Petrocarya, *Schreb.* 543
 Petroceoptis, *Braun.* 498
 Petrogeton, *Eckl. et Zeyh.* 316
 Petromarula, *Alph. DC.* 691
 Petromeles, *Jacq.* 560
 Petrophila, *R. Br.* 533
 Petrophila, *Brid.* 63
 Petrophile, *Endl.* 533
 Petrophye, *W. et B.* 346
 Petunga, *DC.* 765
 Petunia, *Juss.* 621
 Peucedanide, 778
 Peucedanum, *Linn.* 778
 Peumus, *Nees.* 537
 Peumus, *Pers.* 299
 Pexisperma, *Rafin.* 19
 Peyremondia, *Barneoud.* 355
 Peyrousea, *DC.* 712
 Peyrousia, *Sweet.* 161
 Peyrusa, *Rich.* 758
 Peysounellia, *Dec.* 25
 Peziza, *Dillen.* 43
 Pfaffia, *Mart.* 511
 Phaen, *Linn.* 554
 Phacelia, *Juss.* 639
 Phacelocarpus, *Endl. et Dies.* 796
 Phacidinæ, *Fr.* 43
 Phacidium, *Fries.* 43
 Phacocarpus, *Bernh.* 436
 Phacosperma, *Haw.* 501
 Phæcasium, *Cass.* 715
 Phædranassa, *Herb.* 158
 Phænicocircus, *Mart.* 677
 Phænocarpus, *M. et Z.* 385
 Phænocoma, *Don.* 713
 Phænopoda, *Cass.* 713
 Phænopus, *DC.* 715
 Phæocordylis, *Griff.* 90
 Phæonema, *Ktz.* 9
 Phæonemæ, 9
 Phæopappus, *DC.* 714
 Phæostoma, *Spach.* 725
 Phæctusa, *Gärtn.* 711
 Phagnalon, *Cass.* 710
 Phajus, *Lour.* 181
 Phalacrea, *DC.* 709
 Phalacrocarpum, *DC.* 712
 Phalacroderis, *DC.* 715
 Phalacrodiscus, *Less.* 712
 PhalacroGLOSSUM, *DC.* 712
 Phalacroloma, *Cass.* 710
 Phalacrocomum, *Cass.* 710
 Phalacropis, *Blum.* 181
 Phalangium, *Burm.* 161
 Phalangium, *Houtt.* 161
 Phalangium, *Juss.* 205
 Phalareæ, 115
 Phalaridium, *Nees.* 116
 Phalaris, *Linn.* 115
 Phaleria, *Jack.* 579
 Phaleroearpus, *Don.* 455
 Phallaria, *Schum.* 765
 Phalloidel, *Fr.* 41
 Phallus, *L.* 42
 Phallocalis, *Herb.* 161
 Phaloc, *Dumort.* 497
 Phalolepis, *Cass.* 714
 Phanera, *Lour.* 556
 Phanerocotyledoneæ, *Agardh.* 235
 Phanerogames, *A. Brong.* 221
 Phanerophlebia, *Presl.* 80
 Phania, *DC.* 709
 Pharbitis, *Chois.* 631
 Pharium, *Herb.* 205
 Pharnaceum, *Linn.* 498
 Pharus, *P. Br.* 115
 Phasem, *Linn.* 67
 Phaseoleæ, 555, 556
 Phayloopsis, *Willd.* 680
 Phebalium, *Vent.* 471
 Phecolithis, *Gärtn.* 591
 Phegopteris, *Fr.* 79
 Phegipæa, *Desv.* 611
 Pheclandrium, *Linn.* 778
 Phecline, *Labill.* 473
 Pheolocarpus, *Benth.* 555
 Pheborinia, *Bark.* 42
 Phelepa, *Thunb.* 92
 Phephyæceæ, *Horan.* 609
 Phephananthus, *Rafin.* 501
 Phephospermum, *Endl.* 796
 Phepotriehis, *Dec.* 626
 Phialis, *Spreng.* 712
 Phialactis, *Schrad.* 711
 Philadelphææ, 749, 753°
 Philadelphææ, *Don.* 753
 Philadelphus, *Linn.* 753
 Philagonia, *Blum.* 473
 Philenoptera, *Fenzl.?* 554
 Philesia, *Comm.* 217
 Philesiaceæ, 212, 217°
 Philesiads, 217
 Philippia, *Klotzsch.* 455
 Philippodendrea, *Endl.* 363, 364
 Philippodendron, *Poit.* 364
 Phillyrea, *Tournef.* 617
 Philoerena, *Bong.* 483
 Philodendron, *Schott.* 129
 Philodie, *Mart.* 122
 Philoglossa, *DC.* 711
 Philogyne, *Haw.* 158
 Philomeda, *Noronh.* 475
 Philonomia, *DC.* 656
 Philonotis, *Brid.* 67
 Philonotis, *Reichb.* 428
 Philostizus, *Cass.* 714
 Philotheca, *Rudg.* 471
 Philotria, *Rafin.* 142
 Philoxerus, *R. Br.* 511
 Philydreae, 185, 186*
 Philydrea, *R. Br.* 186
 Philydreum, *Banks.* 186
 Philyra, *Kl.* 282
 Phippia, *R. Br.* 115
 Phleorhiza, *Ktz.* 10
 Phlebia, *Fries.* 41
 Phlebidia, *Lindl.* 182
 Phleboanthe, *Tausch.* 662
 Phleboearva, *R. Br.* 153
 Phlebochitou, *Wall.* 467
 Phlebotidium, *R. Br.* 79
 Phlephora, *Lev.* 41
 Phlebophyllum, *Nees.* 679

- Phlebothamnion, *Ktz.* 10
 Phledinium, *Spach.* 428
 Phlegmacium, *Fr.* 41
 Phleum, *Linn.* 115
 Phlogacanthus, *Nees.* 679
 Phloiocarpos, *Turcz.* 778
 Phlomidopsis, *Link.* 662
 Phlomis, *Linn.* 662
 Phlomoidea, *Mönch.* 662
 Phlox, *Linn.* 636
 Phloxworts, 635
 Phlyctidium, *Nol.* 42
 Phlyctis, *Waltz.* 50
 Phloheros, *Lour.* 328
 Phœbe, *Nees.* 537
 Phœnicanthemum, *Bl.* 791
 Phœnicaulis, *Nutt.* 354
 Phœnicidæ, 139
 Phœnicoidææ, *Brongn.* 11
 Phœnix, *Linn.* 139
 Phœnixopus, *Koch.* 715
 Pholeosanthæ, *Blume.* 266
 Pholidandra, *Neck.* 471
 Pholidia, *R. Br.* 665
 Pholidorpus, *Blume.* 139
 Pholidota, *Lindl.* 181
 Pholiota, *Fries.* 41
 Pholisma, *Nuttall.* 452, 795
 Pholiurus, *Trin.* 116
 Phoma, *Fries.* 42
 Phoracis, *Rafin.* 25
 Phormidium, *Ktz.* 9
 Phormium, *Forst.* 205
 Phorolobus, *Desv.* 80
 Photinia, *Lindl.* 560
 Photinopteris, *J. Sm.* 79
 Phragmites, *Trin.* 115
 Phragmites, *Adans.* 116
 Phragmotrichacei, 42
 Phragmotrichum, *Kunze.* 42
 Phreatia, *Lindl.* 181
 Phrisotrichia, *Brid.* 67
 Phryganocydia, *Murt.* 677
 Phrygia, *Gray.* 714
 Phryma, *Linn.* 664
 Phrynium, *Willd.* 169
 Phthoispermum, *B.* 685
 Phthirusa, *Mart.* 791
 Phu, *DC.* 698
 Phyceæ, *Endl.* 20
 Phycees, *Mont.* 8
 Phycei, *Ach.* 8
 Phycella, *Lindl.* 158
 Phycobotrys, *Ktz.* 10
 Phycocastanum, *Ktz.* 10
 Phycodrya, *Ktz.* 11
 Phycolapathum, *Ktz.* 10
 Phycomyces, *Ag.* 43
 Phycomyces, *Kunze.* 43
 Phycophila, *Ktz.* 10
 Phycopteris, *Ktz.* 10
 Phycoseridæ, 10
 Phycoseria, *Ktz.* 10
 Phyzanthus, *Popp.* 161
 Phyzelina, *E. Mey.* 684
 Phyla, *Lour.* 684
 Phylacia, *Lorell.* 796
 Phylacium, *Bonn.* 554
 Phyllica, *Linn.* 582
 Phyllacantha, *Ktz.* 10
 Phyllachne, *Forst.* 696
 Phyllactidium, *Ktz.* 10
 Phylactis, *Pers.* 698
 Phyllædium, *Fr.* 41
 Phyllacanthis, *Blum.* 733
 Phyllamphora, *Lour.* 289
 Phyllanthæ, 282
 Phyllanthera, *Blum.* 626
 Phyllantherum, *Rafin.* 218
 Phyllanthoidæ, 718
 Phyllanthus, *Linn.* 282
 Phyllanthron, *DC.* 674
 Phyllaurea, *Lour.* 281
 Phyllis, *Linn.* 764
 Phyllites, *Ktz.* 10
 Phylloblastæ, *Reichenbach.* 235
 Phyllobryon, *Miq.* 518
 Phyllocactus, *Link.* 748
 Phyllocalymma, *Benth.* 712
 Phyllocarpus, *Tulasne.* 556
 Phyllocephalum, *Bl.* 709
 Phyllocladus, *L. C. Rich.* 231
 Phylloides, *Lour.* 169
 Phylloidea, *Salisb.* 455
 Phyllogium, *Brid.* 67
 Phylloglossum, *Kunze.* 70
 Phyllogouium, *Brid.* 67
 Phyllokena, *Endl.* 531
 Phyllobolium, *Fisch.* 554
 Phylloma, *Ker.* 205
 Phyllonoma, *W.* 19
 Phyllopappus, *Watsp.* 715
 Phyllophora, *Grev.* 10, 25
 Phyllopodium, *Benth.* 684
 Phyllopterus, *Nutt.* 779
 Phyllopus, *DC.* 733
 Phyllospadix, *Hook.* 144
 Phyllospora, *Ag.* 22
 Phyllostachys, *Sieb.* 116
 Phyllostegia, *Benth.* 662
 Phyllostema, *Neck.* 477
 Phyllota, *DC.* 553
 Phyllotylus, *Ktz.* 10
 Phyllophora, *Ktz.* 10
 Phymaspermum, *Less.* 712
 Phymatidium, *Lindl.* 181
 Phymatodes, *Prest.* 79
 Phymatostroma, *Corda.* 44
 Phymosia, *Desv.* 370
 Phyonatanthus, *Sweet.* 494
 Physa, *Thouars.* 526
 Physactis, *Ktz.* 10
 Physalis, *Linn.* 622
 Physanauthus, *Læbg.* 59
 Physanthillis, *Boiss.* 554
 Physaria, *Nutt.* 354
 Physarum, *Pers.* 42
 Physcia, *DC.* 50
 Physconitrium, *Brid.* 67
 Physcophora, *Ktz.* 11
 Physedium, *Brid.* 67
 Physematium, *Kaulf.* 80
 Physena, *Noronh.* 795
 Physianthus, *Mart.* 626
 Physicarpos, *Poir.* 553
 Physichilus, *Nees.* 679
 Physidium, *Schrad.* 684
 Physinga, *Lindl.* 181
 Physiotium, *Nees.* 60
 Physiphora, *Sotand.* 339
 Physikum, *Lour.* 142
 Physocalycium, *Vest.* 346
 Physocalymma, *Pohl.* 575
 Physocalyx, *Pohl.* 684
 Physocarpidium, *R.* 427
 Physocarpuni, *DC.* 427
 Physocarpus, *Camb.* 565
 Physocaulon, *Ktz.* 10
 Physochlæna, *G. Don.* 621
 Physocladia, *A. DC.* 629
 Physoderma, *Waltz.* 41
 Physodimn, *Prest.* 364
 Physolepidium, *Schrk.* 351
 Physolobium, *Benth.* 555
 Physomyces, *Berk.* 43
 Physoplexis, *Lindl.* 691
 Physopodium, *Desv.* 575
 Physosiphon, *Lindl.* 181
 Physospermum, *Cass.* 779
 Physospermum, *Vcl.* 779
 Physostegia, *Benth.* 662
 Physostelma, *Wight.* 627
 Physostemon, *M. et Z.* 358
 Physuride, *Lindl.* 182
 Physurus, *L. C. Rich.* 183
 Physydnum, *Rafin.* 22
 Phytelphantæ, *Mart.* 134
 Phytelphas, *R. et P.* 139
 Phytisma, *Linn.* 630
 Phytisma, *Lour.* 767
 Phyteuopsis, *Juss.* 712
 Phytocœnis, *Bory.* 18, 50
 Phytocrene, *Walt.* 271
 Phytolacca, *Tourn.* 509
 Phytolaccææ, 505, 508*
 Phytolaccææ, *R. Br.* 508
 Phytolaccads, 508
 Phytoxys, *Molin.* 662
 Piaranthus, *R. Br.* 627
 Picconia, *A. DC.* 617
 Picea, *Link.* 229
 Pickeringia, *Nutt.* 553, 648
 Picnocomon, *Dal.* 714
 Picnoman, *Lob.* 714
 Picon, *Vitt.* 43
 Picotia, *R. et Sch.* 656
 Picradenia, *Hook.* 712
 Piceæna, *Lindl.* 477
 Picramnia, *Swartz.* 460
 Picrasma, *Bum.* 477
 Piceria, *Lour.* 672, 685
 Piceridium, *Desf.* 715
 Piceris, *Linn.* 715
 Picerium, *Schreb.* 614
 Picrophlæus, *Blum.* 604
 Picrorhiza, *Royte.* 685
 Picrosia, *Don.* 715
 Picrothamnus, *Nutt.* 711
 Pictetia, *DC.* 554
 Piddingtonia, *DC.* 693
 Pierardia, *Blum.* 383
 Pierardia, *Jack.* 385
 Piferis, *Don.* 455
 Pigen, *DC.* 339
 Pilacra, *Fries.* 42
 Pilanthus, *Poit.* 555
 Pilea, *Lindl.* 262
 Pileanthus, *Labill.* 721
 Pilearia, *Lindl.* 181
 Pileolaria, *Castg.* 42
 Pileocordia, *A. DC.* 629
 Piliidium, *Kunze.* 42
 Pilia, *Ktz.* 10
 Piliophytum, *Kl.* 281
 Pilipogon, *Brid.* 67
 Pilitis, *Lindl.* 449
 Pilleria, *Endl.* 555
 Pilibolus, *Tode.* 43
 Pilocarpeæ, 471
 Pilocarpus, *Vahl.* 471
 Pilocereus, *Lem.* 748
 Pilogyne, *Schrad.* 315
 Pilophora, *Jacq.* 139
 Piloselloides, *Less.* 714
 Pilostyles, *Gull.* 93
 Pilotrichum, *Palis.* 67
 Pimelandra, *A. DC.* 648
 Pilularia, *Linn.* 73
 Pilmuna, *Lindl.* 181
 Pimclea, *P. et Sol.* 531
 Pimelea, *Lour.* 460
 Pimenta, *Lindl.* 738
 Pimpinella, *Linn.* 778
 Pinnæce, 222, 226*
 Pinnalia, *Hamill.* 181
 Pinnuga, *Romph.* 138
 Pinnarda, *Vell.* 685
 Pinnardia, *Cass.* 712
 Pinnarla, *DC.* 351
 Pinaropappus, *Less.* 715
 Pinstella, *Dill.* 723
 Pinckneya, *L. C. Rich.* 765
 Pindulia, *Piso.* 422
 Pineda, *Britz et P.* 328
 Pinnellia, *Tenor.* 129
 Pinnellosia, *Ossa.* 711
 Pinguera, *Cass.* 710
 Pinguicula, *Tourn.* 686
 Pinnaria, *Endl. et Dies.* 796
 Pinnonia, *Gand.* 80
 Pimus, *Linn.* 229
 Pimzuam, *M. et Z.* 424
 Pionandra, *Miers.* 622
 Pipara, *Aubl.* 331
 Piparidæ, 518

- Piper, *Miq.* 518
 Piperaceæ, 514, 515*
 Piperales, 245, 246, 514*
 Piperella, *Presl.* 661
 Piperitæ, *L.* xxxiii
 Pipeworts, 122
 Piptanthus, *Don.* 553
 Piptatherum, *Palis.* 115
 Piptocarpha, *Hook.* 714
 Piptocarpha, *R. Br.* 715
 Piptoceras, *Cass.* 714
 Piptochætium, *Presl.* 115
 Piptochlamys, *Meyer.* 531
 Piptochlamia, *G. P.* 653
 Piptocoma, *Cass.* 709
 Piptoleua, *Harv.* 601
 Piptolepis, *Benth.* 795
 Piptopogon, *Cass.* 715
 Piptostegia, *Hoffm.* 631
 Piptostemma, *Don.* 714
 Piqueria, *Cav.* 709
 Piratinera, *Aubl.* 271
 Pircunia, *Berl.* 509
 Pirigara, *Aubl.* 755
 Piringa, *Juss.* 765
 Piripea, *Aubl.* 685
 Piriqueta, *Aubl.* 347
 Pisaura, *Bonaf.* 725
 Piscidia, *Linn.* 555
 Pisomyxa, *Corda.* 43
 Pisonia, *Plum.* 507
 Pistacia, *Linn.* 467
 Pistia, *Linn.* 125
 Pistiaceæ, 123, 124*
 Pistiacæ, *Agardh.* 91
 Pistillaria, *Fries.* 42
 Pistolochia, *Raf.* 794
 Pistolochinæ, *Link.* 792
 Pistorinia, *DC.* 346
 Pisum, *Linn.* 554
 Pitavia, *Molin.* 473
 Pitcairnia, *Herit.* 148
 Pitcheria, *Nutt.* 555
 Pithecoctenium, *Mart.* 677
 Pithecolobium, *Mart.* 556
 Pithecoseris, *Mart.* 709
 Pithecurus, *Willd.* 116
 Pithocarpa, *Lindl.* 712
 Pithosillum, *Cass.* 713
 Pithyranthus, *Viv.* 778
 Pitonia, *DC.* 765
 Pittonia, *Kunth.* 653
 Pittosporaceæ, 432, 441*
 Pittosporads, 441
 Pittosporæ, *R. Brown.* 441
 Pittosporum, *Sol.* 441
 Pitumba, *Aubl.* 331
 Pityopsis, *Nutt.* 710
 Pityrodia, *R. Br.* 664
 Pityrosperma, *Sieb.* 428
 Placca, *Miers.* 158
 Placodium, *Fries.* 50
 Placoma, *Pers.* 764
 Placostigma, *Blum.* 181
 Placus, *Lour.* 710, 715
 Pladaroxylon, *Endl.* 713
 Pladera, *Sol.* 614
 Plagianthus, *Forst.* 361
 Plagiobothrys, *F. et M.* 656
 Plagiochasma, *Lehm.* 58
 Plagiochila, *Nees. et Mont.* 60
 Plagiochilus, *Arn.* 712
 Plagiolytrum, *Nees.* 116
 Plagioloba, *C. A. M.* 354
 Plagiolobium, *Sweet.* 553
 Plagiophyllum, *Schl.* 733
 Plagiopoda, *R. Br.* 533
 Plagiopteron, 282
 Plagiopus, *Brid.* 67
 Plagiostemon, *Kl.* 455
 Plagiotaxis, *Wall.* 462
 Plagiotis, *Benth.* 661
 Plagioteme, *DC.* 713
 Plagiurus, *Herit.* 712
 Planaria, *Desv.* 554
 Plancia, *Neck.* 715
 Planera, *Giescke.* 167
 Planera, *Gmel.* 580
 Planes, 272
 Plautaginaceæ, 637, 642*
 Plantaginæ, *R. Br.* 642
 Plantaginæ, *Juss.* 642
 Plantago, *Linn.* 643
 Plantia, *Herberl.* 161
 Plappertia, *Reichenb.* 583
 Platanaceæ, 258, 272*
 Platanaria, *Gray.* 126
 Platanæ, *Lestib.* 272
 Platauocarpum, *E.* 765
 Platanthera, *L. C. R.* 182
 Platanus, *Linn.* 272
 Platea, *Bl.* 444
 Plathymentia, *Benth.* 556
 Platisma, *Hoffm.* 50
 Platonía, *Kunth.* 116
 Platonía, *Mart.* 402
 Platonía, *Rafin.* 664
 Platostoma, *Palis.* 661
 Platunium, *Juss.* 662
 Platycapnos, *DC.* 436
 Platycarpha, *Less.* 709
 Platycarpum, *H. B. K.* 677
 Platycerium, *Desv.* 79
 Platycheilus, *Cass.* 714
 Platycheilum, *Del.* 553
 Platycladus, *Spach.* 229
 Platycodon, *A. DC.* 691
 Platycrater, *S. et Z.* 570
 Platygramma, *M.* 50
 Platygyria, *Mercier.* 281
 Platylepidea, *DC.* 709
 Platylepis, *A. Rich.* 182
 Platylepis, *Kunth.* 119
 Platylepis, *Less.* 709
 Platylodium, *Smith.* 553
 Platyloma, *Benth.* 455
 Platyloma, *J. Sm.* 80
 Platylophus, *Cass.* 714
 Platylophus, *Don.* 572
 Platyuene, *DC.* 656
 Platymerium, *Bartl.* 765
 Platymscium, *Vogel.* 555
 Platynema, *Wight. et A.* 390
 Platynoblastere, 11
 Platypetalum, *R. Br.* 354
 Platyphyllum, *Vent.* 50
 Platypodium, *Vogel.* 555
 Platypteris, *DC.* 711
 Platyrrhaphium, *Cass.* 714
 Platysace, *Bunge.* 778
 Platysema, *Benth.* 555
 Platsma, *Bl.* 181
 Platyspermum, *Hoffm.* 779
 Platyspermum, *Hook.* 354
 Platyspora, *Salisb.* 455
 Platystegia, *Sweet.* 554
 Platystemma, *Wall.* 672
 Platystemon, *Benth.* 431
 Platystemon, *Benth.* 431
 Platystemon, *R. Br.* 795
 Platystylis, *Blum.* 181
 Platythalia, *Sonder.* 796
 Platytheca, *Stuetz.* 374
 Platyzoma, *R. Br.* 80
 Platzia, *R. et P.* 715
 Plaubelia, *Brid.* 67
 Plazerium, *Willd.* 116
 Plectostigma, *Traut.* 204
 Plectostoma, *Desv.* 42
 Plectotricum, *Corda.* 44
 Plectancia, *Thouars.* 601
 Plectanthera, *M. et Z.* 343
 Plectocarpon, *Fée.* 50
 Plectocephalus, *DC.* 714
 Plectocomia, *Mart.* 139
 Plectranthidæ, 661
 Plectranthus, *Herit.* 661
 Plectritis, *DC.* 698
 Plectrocarpa, *Gill.* 479
 Plectrona, *Linn.* 764
 Plectronia, *Lour.* 781
 Plectrotropis, *Schum.* 555
 Pleea, *L. C. R.* 199
 Plegorhiza, *Molin.* 795
 Pleiacanthus, *Nutt.* 715
 Pleiomeris, *A. DC.* 648
 Pleionactis, *DC.* 709
 Pleione, *Don.* 181
 Pleockia, *Rafin.* 526
 Pleocarpus, *Don.* 714
 Pleocnemia, *Presl.* 79
 Pleopeltis, *H. et B.* 79
 Pleurothyrium, *Nees.* 537
 Pleotheca, *Wall.* 765
 Pleurama, *Don.* 733
 Pleurachne, *Schrad.* 119
 Pleurandra, *Labill.* 424
 Pleurandra, *Rafin.* 725
 Pleuranthe, *Salisb.* 533
 Pleuranthus, *Rich.* 119
 Pleurhaphis, *Torr.* 116
 Pleuridium, *Brid.* 67
 Pleuridium, *Presl.* 79
 Pleurocallis, *Sal.* 455
 Pleurocephalum, *Cass.* 713
 Pleurochiton, *Radd.* 58
 Pleurococcus, *Mcnegh.* 18
 Pleurodesmia, *Arn.* 424
 Pleurogonium, *Presl.* 79
 Pleurogramma, *Presl.* 79
 Pleurogyne, *Eschsch.* 614
 Pleurogyrata, *Bern.* 80
 Pleurogyra, *Don.* 575
 Pleurophyllum, *Hook. fil.* 712
 Pleurophlitis, *Trin.* 116
 Pleuropogon, *R. Br.* 116
 Pleuropogon, *Corda.* 43
 Pleurorhizæ, 354
 Pleuroschisma, *Dum.* 60
 Pleuroschismatypus, *Dumort.* 60
 Pleurospermum, *Hoffm.* 779
 Pleurostachys, *Br.* 119
 Pleurostemon, *Raf.* 725
 Pleurostyllia, *W. Arn.* 588
 Pleurothallidæ, *Lindl.* 181
 Pleurothallis, *R. Br.* 181
 Pleurotus, *Fr.* 41
 Plexaure, *Endl.* 182
 Plinia, *Linn.* 738
 Plinthine, *Rehb.* 493
 Plocama, *Ait.* 764
 Plocameæ, 11
 Plocamium, *Grev.* 25
 Plocandra, *E. Mey.* 614
 Plocaria, *Nees.* 25
 Plocoglotis, *Blum.* 181
 Plocislea, *Endl.* 460
 Ploiarium, *Korth.* 397
 Plosslea, *Endl.* 385
 Plotia, *Adans.* 648
 Plucheia, *Cass.* 710
 Plucheinæ, 710
 Plukeuetia, *Plun.* 281
 Plumaria, *Stack.* 24
 Plumbaginaceæ, 637, 640*
 Plumbagineæ, *R. Brown.* 640, 641
 Plumbagineæ, *Juss.* 640
 Plumbago, *Tourn.* 641
 Plume Nutmegs, 300
 Plumleræ, 601
 Plumleria, *Tourn.* 601
 Pluridens, *Neck.* 711
 Plurigrania, *Dumort.* xxxvii
 Pluteus, *Fr.* 41
 Pneoophyllum, *Ktz.* 10
 Pneumonanthæ, *Bung.* 614
 Poa, *Linn.* 116
 Poarium, *Desv.* 685
 Pooceekia, *Ser.* 554
 Poochorum, *Neck.* 467
 Podagraria, *Rivin.* 778
 Podagraria, *Neck.* 467
 Podalyria, *Lam.* 553
 Podalyriæ, 553, 556
 Podanthus, *R. Br.* 710
 Podaxinei, *Mont.* 42

- Podaxon, *Desv.* 42
 Podellema, *R. Br.* 80
 Podereunia, *Benth.* 455
 Podia, *Neck.* 714
 Podianthus, *Schnittl.* 214
 Podisoma, *Link.* 42
 Podocalyx, *Cl.* 282
 Podocarpus, *L'Her.* 231
 Podochilus, *Blum.* 181
 Podocoma, *Cass.* 709
 Podolepis, *Labill.* 713
 Podolobium, *R. Br.* 553
 Podolobus, *Rafin.* 354
 Podolotus, *Benth.* 554
 Podopappus, *Hook.* 709
 Podophyllaceæ, *DC.* 412, 425
 Podophylleæ, *DC. et Mart.* 425
 Podophyllum, *Linn.* 428
 Podopogon, *Ehrenb.* 116
 Podopterus, *H. et B.* 504
 Podoria, *Pers.* 358
 Podosænum, *Kunth.* 115
 Podosperma, *Labill.* 713
 Podospermum, *DC.* 715
 Podosporium, *Schw.* 43
 Podostachys, *Cl.* 282
 Podostemaceæ, 496, 482^o
 Podostemads, 482
 Podostemeæ, *Rich. et Kunth.* 482
 Podostemon, *L. C. R.* 483
 Podostigma, *Eu.* 626
 Podostromium, *Kze.* 44
 Podotheca, *Cass.* 713
 Pœcilodermis, *Schott.* 362
 Pœcilopteris, *E.* 79
 Pogochilus, *Falcon.* 182
 Pogogyne, *Benth.* 661
 Pogonandra, *A. DC.* 695
 Pogonanthera, *Blum.* 733
 Pogonanthera, *Don.* 695
 Pogonantherum, *Palis.* 116
 Pogonatum, *Palis.* 67
 Pogonetes, *Lindl.* 695
 Pogonia, *Andr.* 665
 Pogonia, *Juss.* 182
 Pogonidæ, 182
 Pogonolepis, *Steetz.* 712
 Pogonopsis, *Presl.* 116
 Pogonostigma, *Boiss.* 554
 Pogonura, *DC.* 715
 Pogopetalum, *Benth.* 444
 Pogostemidæ, 691
 Pogostemon, *Desf.* 661
 Pogostoma, *Schrad.* 695
 Pohlia, *N. et M.* 473
 Pohlia, *Hebe.* 67
 Poldium, *Nees.* 116
 Poikadenia, *Lil.* 554
 Poinciana, *Juss.* 555
 Poinsettia, *Graham.* 281
 Poiretia, *Cav.* 449
 Poiretia, *Gmel.* 765
 Poiretia, *Smith.* 553
 Poiretia, *Vent.* 594
 Poiretia, *DC.* 554
 Polivraea, *Comm.* 718
 Polaniata, *Rafin.* 354
 Polemannia, *F. et Z.* 778
 Polembryum, *A. Juss.* 471
 Polemonia, *Juss.* 685
 Polemoniaceæ, 615, 625^o
 Polemoniæ, *DC. et Duby.* 625
 Polemonium, *Tourn.* 636
 Polianthes, *Linn.* 265
 Polifolia, *Desf.* 455
 Polium, *Tourn.* 662
 Polla, *Ad.* 67
 Pollalesta, *Kunth.* 766
 Pollemannia, *Berg.* 205
 Pollexfaxia, *Horn.* 25
 Pollia, *Thunb.* 184
 Pollichia, *Mert.* 636
 Pollichia, *Soland.* 499
 Pollichia, *Willd.* 662
 Pollinaceæ, *Dumort.* xxxvii
 Pollinia, *Spreng.* 116
 Peloa, *DC.* 709
 Polypoda, *Presl.* 498
 Polyanantha, *Gray.* 714
 Polyachyridæ, 714
 Polyachyrus, *Lag.* 714
 Polyactidium, *DC.* 710
 Polyactis, *Less.* 710
 Polyactis, *Link.* 43
 Polyactium, *DC.* 494
 Polyadenia, *Nees.* 537
 Polyalthia, *Blum.* 422
 Polyanglum, *Link.* 42
 Polyantherix, *Nees.* 116
 Polyanthrena, *Cass.* 709
 Polybotrya, *H. et B.* 79
 Polycardia, *Juss.* 588
 Polycarena, *Benth.* 684
 Polycarpæa, *Lam.* 499
 Polycarpon, *Læffl.* 499
 Polycenia, *Chois.* 667
 Polycephalos, *DC.* 710
 Polychætia, *Less.* 713
 Polychætia, *Tausch.* 715
 Polychilos, *K. et H.* 181
 Polychlæna, *Don.* 370
 Polychroa, *Lour.* 511
 Polychroma, *Bonnem.* 24
 Polynemeæ, *Moq.* 510
 Polynenum, *Linn.* 511
 Polycoccus, *Ktz.* 9
 Polycodou, *Benth.* 455
 Polycoma, *Palis.* 22
 Polycyrtus, *Schlecht.* 778
 Polydesmia, *Benth.* 455, 661
 Polydicia, *Don.* 621
 Polydonta, *Blum.* 558
 Polyechma, *Hochst.* 679
 Polygala, *Linn.* 378
 Polygalaceæ, 373, 375^o
 Polygaleæ, *Juss.* 375
 Polygaster, *Fries.* 42
 Polygonaceæ, 495, 502^o
 Polygonastrum, *Mœnch.* 205
 Polygonatum, *Tourn.* 205
 Polygonæ, *Juss.* 502, 504
 Polygonella, *Mich.* 504
 Polygonifolia, *Vaill.* 499
 Polygonoides, *Tourn.* 504
 Polygonum, *Linn.* 504
 Polyides, *Ag.* 24
 Polylepis, *R. et P.* 562
 Polylobium, *E. et Z.* 554
 Polylophium, *Boiss.* 779
 Polymeria, *Linn.* 631
 Polymorpha, *Stack.* 25
 Polymnia, *Linn.* 711
 Polymniastrum, *Lam.* 711
 Polyodoa, *H. B. K.* 116
 Polyosma, *Blum.* 751
 Polyothus, *Nutt.* 626
 Polyozus, *Lour.* 764
 Polypappus, *Less.* 710
 Polypara, *Lour.* 521
 Polyphacma, *Ag.* 22
 Polyphæna, *Lour.* 271
 Polyphragmoa, *Desf.* 765
 Polyphyllon, *Less.* 714
 Polyphysa, *Lam.* 10, 19
 Polyphysæ, 10
 Polyplodium, *Derk.* 42
 Polypodæ, *Lindl.* 79
 Polypodiaceæ, 76, 78^o
 Polypodioides, *Stack.* 22
 Polypodium, *Linn.* 79
 Polypogon, *Desf.* 115
 Polypotampholyx, *Lchm.* 686
 Polyporei, *Fr.* 11
 Polyporus, *Mich.* 41
 Polypremna, *Adans.* 608
 Polypremnum, *Linn.* 685
 Polypsteria, *Less.* 712
 Polypteris, *Nutt.* 709, 712
 Polyrhaphis, *Trin.* 115
 Polysacum, *Desp.* 42
 Polyscalis, *Wall.* 511
 Polyschiidia, *Stack.* 22
 Polyschismium, *Corda.* 42
 Polyschistis, *Presl.* 116
 Polyscias, *Forst.* 761
 Polysiphonia, *Grev.* 11, 25
 Polysiphoniceæ, 11
 Polysperma, *Vauch.* 18
 Polyspora, *Sweet.* 397
 Polystachya, *Hook.* 182
 Polystegia, *Reichb.* 158
 Polystemma, *Dec.* 626
 Polystemon, *Don.* 572
 Polystemonæ, *Brongn.* lii
 Polystichum, *Both.* 80
 Polystigma, *Meisn.* 598
 Polystorthia, *Blum.* 558
 Polystroma, *Clem.* 50
 Polytaenia, *DC.* 778
 Polytænium, *Desv.* 79
 Polytaxis, *Bunge.* 714
 Polytétrincium, *Kunze.* 43
 Polytoca, *R. Br.* 115
 Polytichum, *Linn.* 67
 Polytropia, *Presl.?* 554
 Polyxena, *Kth.* 205
 Polyzone, *Endl.* 721
 Polyzonia, *Suhr.* 25
 Ponnacæ, 599, 559^o
 Pomaceæ, *L. xxxiii*
 Pomaderris, *Lab.* 582
 Pomangium, *Rebn.* 765
 Pomaria, *Cav.* 555
 Pomatia, *Nees.* 537
 Pomatoderis, *Schult.* 582
 Pomax, *Soland.* 764
 Pombalia, *Vand.* 339
 Pombe, *Cald.* 795
 Pometia, *Fl. Fl.* 795
 Pometia, *Forst.* 385
 Pommeroulla, *Lin. fil.* 116
 Pompadoura, *Bouch.* 541
 Pomea, *Schreb.* 385
 Ponceletia, *R. Br.* 449
 Pongatelia, *Thouars.* 116
 Ponera, *Lindl.* 181
 Pongamia, *Lour.* 555
 Pongatieæ, *Endl.* 689
 Pongatium, *Juss.* 691
 Pontederaceæ, 195, 206^o
 Pontederads, 206
 Pontederea, *Kunth.* 206
 Pontederia, *Linn.* 206
 Pontieva, *R. Br.* 182
 Pontoppidana, *Scop.* 740
 Pootia, *Dennst.* 614
 Pöppigia, *Bert.* 664
 Pöppigia, *Kunze.* 161
 Pöppigia, *Presl.* 555
 Poppovia, *Endl.* 422
 Poppya, *Neck.* 315
 Populago, *DC.* 428
 Populus, *L.* 255
 Poppyworts, 430
 Porana, *Burm.* 631
 Poranthera, *Rudg.* 262
 Poraqueiba, *Aubl.* 795
 Porcella, *R. et P.* 422
 Porcellites, *Cass.* 715
 Porella, *Dicks.* 69
 Poreworts, 374
 Porlin, *Achar.* 60
 Porlin, *Ruiz et P.* 479
 Porodotidium, *Fries.* 50
 Porophora, *Meyer.* 50
 Porophyllicæ, 711
 Porophyllum, *Gaud.* 568
 Porophyllum, *Willd.* 711
 Poropterides, *Willd.* 82
 Porostemum, *Schreb.* 537
 Porothellum, *Fries.* 41
 Porothellum, *Lchm.* 50
 Porotrichum, *Brid.* 67
 Porpa, *Blum.* 372
 Porpax, *Lindl.* 796

- Porphyra, *Ag.* 10, 19
 Porphyra, *Lour.* 664
 Porphyrantha, *F.* 498
 Porphyranthus, *Don.* 695
 Porphyraea, 10
 Porphyriou, *Tausch.* 568
 Porphyrocoma, *Hooker.* 673
 Porrum, *Tourn.* 205
 Portalesia, *Meyen.* 714
 Portenschlagia, *Tratt.* 588
 Portesia, *Cav.* 464
 Portlandia, *P. Br.* 765
 portula, *Dill.* 575
 portulaca, *Tourn.* 501
 portulacaceae, 495, 500*
 portulacaria, *Jacq.* 501
 portulacææ, *Juss.* 500
 posanthus, *Rafin.* 765
 posidonia, *Kön.* 145
 posidonieæ, *Knoth.* 145
 posoqueria, *Aubl.* 765
 Posoria, *Rufa.* 765
 Potalia, *Aubl.* 556, 604
 Potaliaceæ, *Brown.* 602
 Potallieæ, *Martius.* 602
 Potameæ, *Juss.* 143
 Potameia, *Thouars.* 533
 Potamochloa, *Griff.* 115
 Potamogeton, *Linn.* 210
 Potamogetoneæ, *Rehb.* 210
 Potamophila, *R. Br.* 115
 Potamophila, *Schrank.* 509
 Potamophila, *Rich.* 143
 Potamoptys, *Burb.* 481
 Potareus, *Rafin.* 13
 Potentilla, *Linn.* 561
 Potentillidæ, 564
 Poteranthera, *Bong.* 733
 Poterium, *Linn.* 562
 Pothomorphe, *Miq.* 518
 Pothos, *Linn.* 194
 Potima, *Pers.* 764
 Pottia, *Ehrh.* 67
 Pottsia, *Hooker.* 601
 Pouchetia, *A. Rich.* 765
 Poupertia, *Comm.* 467
 Poureitia, *Kuiz et P.* 148
 Pourouma, *Aubl.* 271
 Pourretia, *W.* 361
 Pouteria, *Aubl.* 591
 Pouzolzia, *Gaud.* 262
 Pozoa, *Lagasc.* 778
 Prangos, *Lindl.* 799
 Prasanthea, *DC.* 672
 Prasieæ, 662
 Prasiola, *Menogh.* 10, 19
 Prasiuum, *Linn.* 662
 Prasophyllum, *R. Br.* 183
 Pratia, *Gaud.* 693
 Praxelis, *Cass.* 709
 Preauxia, *C. H. Schultz.* 712
 Precie, *L.* xxxiv
 Preissia, *Nees.* 58
 Premua, *Linn.* 664
 Prenanthes, *Gärtn.* 715
 Preonantes, *Ehrh.* 428
 Prepusa, *Mart. et Zucc.* 614
 Prescottia, *Lindl.* 182
 Preslea, *Mart.* 653
 Preslia, *Opitz.* 661
 Prestonia, *R. Br.* 601
 Pretrea, *Gay.* 670
 Prevostea, *Chois.* 631
 Priestleya, *Meyen.* 18
 Priestleya, *DC.* 553
 Prieurea, *DC.* 725
 Primitive Vegetation, *Mart.* xlv
 Priuula, *Linn.* 645
 Primula, *Lour.* 570
 Primulaceæ, 637, 644*
 Primulidæ, 645
 Primworts, 644
 Prinopsis, *Nutt.* 710
 Prinos, *Linn.* 598
 Prinsepla, *Royle.* 543
 Printzia, *Cass.* 714
 Priouachne, *Nees.* 115
 Prionanthes, *Schrank.* 714
 Prionitis, *Delabr.* 778
 Prionium, *E. Mey.* 192
 Prionodon, *K. Mull.* 67
 Prionopteris, *Wall.* 80
 Prionotes, *R. Br.* 449
 Prionotophyllum, *Less.* 714
 Priotropis, *Wight, et Arn.* 554
 Prismaticarpeæ, 691
 Prismaticarpus, *Herit.* 691
 Pristocarpha, *E. Mey.* 712
 Pritzelia, *Walpers.* 778
 Priva, *Adans.* 664
 Proboscidea, *Rich.* 670, 733
 Prockææ, 328
 Prockia, *P. Br.* 328
 Procrassula, *Gris.* 346
 Procris, *Comm.* 262
 Proiphys, *Herb.* 158
 Prolifera, *Stuck.* 25
 Prolongoa, *Boiss.* 712
 Promenæa, *Lindl.* 182
 Prouaeron, *Cass.* 711
 Pronaya, *Hüg.* 441
 Propolis, *Corda.* 43
 Prosaptia, *Prest.* 80
 Prosartes, *Don.* 199
 Proselia, *Don.* 714
 Proserpinaea, *Linn.* 723
 Prosopidoclineæ, *Klotzsch.* 281
 Prosopis, *Linn.* 556
 Prostanthera, *Labill.* 661
 Prostanthereæ, 661
 Prosten, *Camb.* 385
 Prosthemium, *Künze.* 42
 Prosthesis, *Blum.* 339
 Protea, *Linn.* 533
 Protencere, 529, 532*
 Proteads, 532
 Proteidae, 533
 Proteina, *Ser.* 498
 Proteopsis, *Mart.* 799
 Protium, *Burm.* 460
 Protococcidæ, 18
 Protococcus, *Ag.* 9, 18
 Protoderma, *Kütz.* 10
 Protomyces, *Unger.* 41
 Protoneuma, *Ag.* 10
 Protoneura, 10
 Protophyte, *Perl.* xlix
 Protosphaeria, *Turp.* 18
 Proustia, *Lagasc.* 714, 778
 Prunella, *Linn.* 661
 Prunophora, *Neck.* 558
 Prunus, *Linn.* 558
 Psacalium, *DC.* 713
 Psalliota, *Fries.* 41
 Psamma, *Patis.* 115
 Psammochloa, *Endl.* 116
 Psammophila, *Fenzl.* 498
 Psammotropa, *Eckl. et Zeyh.* 498
 Psammocetum, *DC.* 712
 Psathyra, *Comm.* 764
 Psathyra, *Fries.* 41
 Psathyrella, *Fr.* 41
 Psaturocheta, *DC.* 711
 Pseliuum, *Lour.* 309
 Psephellus, *Cass.* 714
 Pseudachue, *Endl.* 115
 Pseudais, *Decaisne.* 579
 Pseudaleia, *Thouars.* 444
 Pseudaleioides, *Th.* 444
 Pseudantheæ, *Endl.* 274
 Pseudanthus, *Sieb.* 282
 Pseudarthria, *W. et A.* 555
 Pseudelephantopus, *Rohr.* 709
 Pseudereunia, *Benth.* 455
 Pseudosua, *Adr. Juss.* 473
 Pseuditea, *Hassk.* 752
 Pseudocapsicum, *Mönch.* 622
 Pseudocistus, *Dunal.* 350
 Pseudocotyledoneæ, *Ag.* 51, 54
 Pseudodictamnus, *Mönch.* 602
 Pseudoscordum, *Herbert.* 205
 Pseudospermeæ, *Hor.* xlv
 Pseudothlaspi, *Magnol.* 354
 Pseudotunica, *Fenzl.* 498
 Pseudo-Vanda, *Lindl.* 181
 Pseva, *Rafin.* 459
 Psiadia, *Jacq.* 710
 Psidieæ, 710
 Psychobornium, *Kütz.* 10
 Psidium, *Linn.* 738
 Psidopodium, *Neck.* 80
 Psiguria, *Neck.* 315
 Psilachenia, *Nutt.* 715
 Psilathera, *Link.* 116
 Psilobium, *Jacq.* 765
 Psilocarpha, *Nutt.* 710
 Psilocarya, *Torr.* 119
 Psilocybe, *Fries.* 41
 Psilogyue, *DC.* 664
 Psilonema, *C. A. Mey.* 354
 Psilonia, *Fries.* 43
 Psilopilium, *Brid.* 67
 Psilostachys, *Turez.* 281
 Psilosteuaon, *DC.* 656
 Psilostoma, *Klotzsch.* 764
 Psilostrophe, *DC.* 715
 Psilostylis, *Andrz.* 354
 Psilostylis, *DC.* 354
 Psilothamnus, *DC.* 712
 Psilotrichium, *Bhenc.* 511
 Psilotum, *Swartz.* 70
 Psiloxylon, *Thouars.* 685
 Psilurus, *Trin.* 116
 Psittacanthus, *Mart.* 791
 Psittacoglossum, *Llac.* 182
 Psolanum, *Neck.* 622
 Psophocarpus, *Neck.* 555
 Psora, *Hoffm.* 50
 Psoralea, *Linn.* 554
 Psoralieæ, 554
 Psorophytum, *Spach.* 406
 Psorospermium, *Spach.* 406
 Psychanthus, *Raf.* 378
 Psychechilus, *Kahl.* 183
 Psycheia, 355
 Psychne, *Desfont.* 355
 Psychotria, *Linn.* 764
 Psychotridæ, 764
 Psychotrophum, *P. Br.* 764
 Psychrophila, *DC.* 428
 Psydraz, *Gärtn.* 764
 Psygmatella, *Kütz.* 13
 Psygminum, *Prest.* 79
 Psyllium, *Tourn.* 643
 Psyllocarpus, *Mart.* 764
 Psylloxylon, *Nerard.* 575
 Psythirisma, *Herb.* 161
 Pteroxylon, *E. Z.* 385
 Ptarmica, *Tourn.* 712
 Ptelea, *Linn.* 473
 Ptelidium, *Thouars.* 588
 Pteracanthus, *Nees.* 679
 Pterandra, *A. de J.* 390
 Pteranthus, *Forsk.* 499
 Pterichis, *Lindl.* 182
 Pteridophyllum, *Sieb.* 436
 Pterigospermium, *Targ.* 25
 Pteriguandrium, *Hedw.* 67
 Pterilema, *Reimo.* 293
 Pteris, *Linn.* 80
 Pterisanthes, *Blum.* 440
 Pterium, *Pesv.* 116
 Pterixia, *Nutt.* 779
 Pterandra, *Jack.* 733
 Pterobryon, *Hörnseh.* 67
 Pterocarpus, *Linn.* 555
 Pterocarya, *Nutt.* 293
 Pterocaryon, *Spach.* 252
 Pterocaulon, *Elliot.* 10, 710
 Pterocelastrus, *Meisn.* 588
 Pterocephalus, *Vaill.* 700
 Pteroceras, *Hass.* 181
 Pterochata, *Steetz.* 713
 Pterochilus, *Hook.* 881
 Pterochlamys, *Fisch.* 513

- Pterococcus*, *Pall.* 504
Pterococcus, *Hassk.* 281
Pterocoma, *DC.* 714
Pterocymbium, *R. Br.* 362
Pterodiscus, *Hooker.* 670
Pterodon, *Vogel.* 555
Pterozonium, *Swartz.* 67
Pterogyne, *Tulasne.* 556
Pterolæna, *DC.* 364
Pterolepis, *DC.* 119, 733
Pterolobium, *Andrz.* 354
Pterolobium, *R. Br.* 555, 711
Pteroloma, *Steud.* 358
Pterolophus, *Cass.* 714
Pteromarathrum, *Koch.* 779
Pteroneuron, *DC.* 354
Pteronia, *Linn.* 710
Pteronospora, *Corda.* 43
Pteropappus, *Less.* 709
Pterophora, *Neck.* 710
Pterophoras, *Vaill.* 710
Pterophylla, *Don.* 572
Pterophyllum, *Nutt.* 428
Pterophyllum, *Léveill.* 41
Pterophyton, *Cass.* 711
Pteropodium, *DC.* 677
Pteropogon, *DC.* 713
Pteropsis, *Presl.* 79
Pteroscleria, *Nees.* 119
Pteroselinum, *Reichb.* 778
Pteroselinum, *Hoffm.* 778
Pterospermum, *Schreb.* 364
Pterospora, *Nutt.* 452
Pterostegia, *Fisch. et Mey.* 504
Pterostelma, *Wight.* 627
Pterostigma, *Benth.* 685
Pterostæchas, *Ging.* 661
Pterostylis, *R. Br.* 182
Pterosyrax, *Sieb. et Z.* 593
Pterota, *P. Br.* 473
Pterotheca, *Cass.* 715
Pterotheca, *Presl.* 119
Pterothrix, *DC.* 713
Pterotropis, *DC.* 354
Pterotum, *Lour.* 795
Pterula, *Fries.* 43
Pterygium, *Corr.* 394
Pterygocarpus, *Hochs.* 627
Pterygodium, *Siez.* 132
Pterygophyllum, *Brid.* 67
Pterygota, *Sch.* 362
Ptillepis, *Rafin.* 712
Ptilidae, 69
Ptilidium, *Nees.* 69
Ptilimnium, *Rafin.* 773
Ptilina, *Nutt.* 575
Ptilochæta, *Nees.* 119
Ptilochæta, *Turcz.* 562
Ptilocladia, *Sonder.* 736
Ptilocnema, *Don.* 181
Ptilomeris, *Nutt.* 712
Ptilonella, *Nutt.* 712
Ptilophyllum, *Nutt.* 723
Ptilostemon, *Cass.* 714
Ptilostephium, *H. B. K.* 712
Ptilota, *Ag.* 16, 24
Ptilotrichum, *C. A. Mey.* 354
Ptilotus, *R. Br.* 511
Ptilurus, *Don.* 714
Ptycanthera, *Dec.* 626
Ptychanthus, *Nees.* 59
Ptychocarpa, *R. Br.* 533
Ptychocarya, *R. Br.* 119
Ptychochilus, *Schauer.* 123
Ptychodea, *Willd.* 765
Ptychodon, *Klotzsch.* 575
Ptychogaster, *Corda.* 42
Ptychophyllum, *Presl.* 80
Ptychosema, *Benth.* 554
Ptychosperma, *Labill.* 123
Ptychostigma, *Hochst.* 764
Ptychostomum, *Hornsch.* 67
Ptychotis, *Koch.* 778
Ptyxanthus, *Don.* 632
Ptyxostoma, *Vahl.* 785
Puccinia, *Pers.* 42
Pucciniæ, 42
Pueraria, *DC.* 555
Pugionium, *Gärtn.* 513
Pulkatorin, *Raoul.* 783
Pulicarin, *Gärtn.* 710
Pulina, *Adans.* 50
Pulmouaria, *Hoffm.* 50
Pulmouaria, *Tourn.* 656
Pulsatilla, *Tourn.* 427
Pulsatilloides, *DC.* 428
Pultenea, *Smith.* 553
Pulveraria, *Achar.* 56
Pulveraria, *Willd.* 50
Pulverariæ, 50
Pumila, *P. Br.* 347
Punctaria, *Grev.* 22
Puuica, *L.* 738
Pupalia, *Mart.* 511
Purkingia, *Presl.* 648
Purshia, *DC.* 565
Purshia, *Denust.* 685
Purshia, *Rafin.* 723
Purshia, *Spren.* 656
Purslanes, 500
Puschkinia, *Adans.* 205
Putaminea, *L.* xxxiii
Putoria, *Pers.* 764
Putranjiva, *Wall.* 282
Putranjivæ, *Endl.* 274
Putterlickia, *Endl.* 588
Puya, *Molin.* 148
Pycnanthemum, *Benth.* 661
Pycnapophysium, *Reichb.* 67
Pycnocephalum, *DC.* 709
Pycnocomon, *Waltr.* 700
Pycnocycla, *Royle.* 779
Pycnoneurum, *Dec.* 626
Pycnophycus, *Kütz.* 10
Pycnopodium, *Corda.* 43
Pycnosorus, *Benth.* 712
Pycnospermæ, 10
Pycnospora, *R. Br.* 555
Pycnostachys, *Hook.* 661
Pycnostelma, *Bunge.* 601
Pycnostelma, *Dec.* 626
Pycnothelia, *Achar.* 50
Pygeum, *Gärtn.* 538
Pyliailia, *Bory.* 22
Pyliaisæa, *Desv.* 67
Pyramia, *Cham.* 733
Pyramidium, *Brid.* 67
Pyramidula, *Brid.* 67
Pyrarda, *DC.* 710
Pyrcuacantha, *Hook.* 271
Pyrenaria, *Blum.* 397
Pyrenastrum, *Eschw.* 50
Pyrenium, *Tode.* 44
Pyrenothæa, *Fries.* 50
Pyrenotrichum, *Mont.* 42
Pyreutha, *Fée.* 59
Pyrethrum, *Gärtn.* 712
Pyrgosea, *Sweet.* 346
Pyrgus, *Lour.* 648
Pyrochroa, *Eschw.* 50
Pyrola, *Tourn.* 450
Pyrolacææ, 446, 450*
Pyroleæ, *Lindl.* 450
Pyroliflorum, *Herb.* 158
Pyronium, *Sal.* 455
Pyroplorum, *Neck.* 560
Pyrostoma, *C. F. W. M.* 664
Pyrostria, *Comm.* 765
Pyrostria, *Roxb.* 764
Pyrrhanthus, *Jack.* 718
Pyrrhopappus, *DC.* 715
Pyrrhosa, *Blum.* 309
Pyrrhosia, *Mirb.* 79
Pyrrhotrichia, *Wight et Arn.* 555
Pyrrrocoma, *Hook.* 710
Pyrrularia, *L. C. Rich.* 788
Pyrus, *Linn.* 569
Pythagorea, *Lour.* 743
Pythæorea, *Rafin.* 575
Pythion, *Mart.* 129
Pythium, *Nees.* 18
Pythionium, *Schott.* 129
Pyxidanthera, *Nichx.* 606
Pyxidaria, *Bory.* 50
Pyxidium, *Ehrens.* 67
Pyxidium, *Schreb.* 50
Pyxideæ, *Fries.* 50
Pyxioidæ, 50
Pyxiopma, *Fenzl.* 527

Quadrella, *DC.* 358
Quadria, *Ruiz et Pav.* 533
Qualen, *Aubl.* 380
Quamoclit, *Tourn.* 631
Quapira, *Aubl.* 665
Quapira, *Aubl.* 402
Quararibea, *Aubl.* 361
Quartinia, *Endl.* 575
Quartinia, *A. Rich.* 555
Quassia, *DC.* 477
Quassiads, 476
Quekettia, *Lindl.* 182
Queltia, *Haw.* 158
Quelusia, *Vand.* 725
Quercinææ, *Juss.* 290
Quercus, *Linn.* 291
Queria, *Lüpf.* 497
Queriææ, *DC.* 496
Quernales, 243, 246, 289*
Quilamum, *Blanc.* 795, 796
Quillaie, 565
Quillaja, *Molin.* 565
Quillesia, *Blanc.* 444
Quinaria, *Lour.* 458
Quinchamalium, *Juss.* 788
Quinetia, *Cass.* 712
Quinquefolium, *Tourn.* 564
Quintilia, *Endl.* 672
Quintinia, *Alph. DC.* 732
Quisqualis, *Rumph.* 718
Quivisia, *Comm.* 464
Quoya, *Ner.* 582
Quoya, *Gaud.* 664
Quuna, *Aubl.* 795

Rabdosia, *Hassk.* 661
Rabenhorstia, *Rehb.* 785
Racaria, *Aubl.* 385
Rack, *Bruce.* 665
Racka, *Gmel.* 665
Racomitrium, *Brid.* 67
Racopilum, *Patib.* 67
Racoubea, *Aubl.* 743
Rabelaisia, *Planchon.* 796
Radamua, *Benth.* 685
Raddia, *Bertol.* 115
Raddisia, *Leandr.* 585
Rademachia, *Thunb.* 271
Radia, *A. Rich.* 153
Radiana, *Itaf.* 527
Radicula, *Dill.* 354
Radiola, *Dill.* 485
Radiula, *Reichb.* 555
Radula, *Dumort.* 59
Radiolotypus, *Dumort.* 59
Radulum, *Fries.* 41
Rafflesia, *R. Br.* 93
Rafflesinææ, 88, 93*
Rafflesia, *R. Br.* 93
Rafflesquin, *Nutt.* 715
Rafnula, *Thunb.* 553
Ragatellis, *Presl.* 80
Raglopterus, *Presl.* 80
Raillarda, *Gaud.* 713
Rahnaria, *Not.* 67
Rajania, *Linn.* 214
Raleghia, *Gardn.* 572
Ralfsa, *Berk.* 22
Ranacina, *Achar.* 50
Ranaticella, *H. B. K.* 718
Ranuncula, *Not.* 67
Ranondia, *L. C. Rich.* 672
Ranondia, *Mirb.* 81
Ranotilla, *DC.* 711
Ranularia, *Roux.* 19

Ranularia, *Unger*. 44
 Ramusia, *E. M.* 680
 Ranales, 243, 244, 246, 416*
 Ranaria, *Cham.* 685
 Rancagua, *Pöpp. et E.* 712
 Randalia, *Petit.* 122
 Randia, *Houtt.* 765
 Rannanissa, *Endl.* 358
 Rannunculaceæ, 416, 425*
 Ranunculastrum, *DC.* 428
 Ranunculeæ, 428
 Ranunculi, *Juss.* 425
 Ranunculus, *L.* 428
 Rapa, *Tourn.* 355
 Rapanen, *Aubl.* 648
 Rapatea, *Aubl.* 187
 R. pateae, *Endl.* 187
 Raphanidæ, 355
 Raphanis, *Mönch.* 354
 Raphanistrum, *Tourn.* 355
 Raphanus, *Tourn.* 355
 Raphia, *Palis.* 139
 Raphionacme, *Harv.* 627
 Raphisanthe, *Libosch.* 745
 Rapinia, *Lour.* 691
 Rapistrum, *Haller.* 355
 Rapourea, *Aubl.* 795
 Rapunculus, *Tourn.* 691
 Rapuntium, *Cheval.* 691
 Rapuntium, *Lobcl.* 691
 Rapuntium, *Tourn.* 693
 Rapuntia, *Aubl.* 471
 Raspailia, *Brongn.* 785
 Raspailia, *Presl.* 115
 Rathkea, *Schum.* 554
 Ratibida, *Rafn.* 711
 Rantonin, *DC.* 385
 Ratzehurgia, *Kunth.* 116
 Rauwolfia, *Plum.* 601
 Rauwolfia, *Ruiz et Pav.* 604
 Ravenala, *Adans.* 164
 Ravensara, *Sonner.* 537
 Ravia, *Nees. et Mart.* 471
 Razoumowskia, *Hoffm.* 791
 Razumovia, *Spreng.* 685, 712
 Reaumuria, *Hasselq.* 407
 Reaumuriceæ, 392, 407*
 Reaumurids, 407
 Reaumurice, *Ehrenberg.* 407
 Rebis, *Spach.* 751
 Rebouillia, *Raddi.* 58
 Reboulea, *Kunth.* 116
 Rechia, *Sessé et Moc.* 424
 Receveura, *Fl. Fl.* 406
 Rectembryæ, 621
 Redoutea, *Vent.* 370
 Redowskia, *Cham. et Schlecht.* 355
 Reevesia, *Lindl.* 361
 Rehmanna, *Libosch.* 672
 Reichardia, *Dennst.* 601
 Reichardia, *Roth.* 555, 715
 Reichelia, *Schreb.* 639
 Reichenbachia, *Spreng.* 50, 507
 Reifferscheidia, *Presl.* 424
 Reimaria, *Flugg.* 115
 Reineria, *Mönch.* 554
 Reinwardtia, *Dum.* 485
 Reinwardtia, *Korth.* 397
 Reinwardtia, *Nees.* 424
 Reinwardtia, *Spreng.* 631
 Reissekia, *Endl.* 582
 Rejouia, *Gand.* 601
 Relhania, *Gmel.* 783
 Relhania, *Herit.* 713
 Relhanleæ, 713
 Remijia, *DC.* 765
 Remirea, *Aubl.* 119
 Remusatia, *Schott.* 129
 Renanthera, *Lour.* 181
 Renealmia, *Pavill.* 148
 Renealmia, *Houtt.* 614
 Renealmia, *Linn.* 167
 Renealmia, *Plum.* 148
 Renealmia, *R. Br.* 161
 Renggeria, *Metsn.* 402

Reugifa, *Pöpp.* 402
 Renssleria, *Beck.* 129
 Repandra, *Lindl.* 182
 Reptonia, *A. DC.* 648
 Requienia, *DC.* 554
 Reseda, *Linn.* 356
 Resedaceæ, 348, 356*
 Resedella, *Webb. et B.* 356
 Restiaceæ, 105, 121*
 Restiaceæ, *Agardh.* 187
 Restiaceæ, *Bartl.* 120
 Restio, *Linn.* 121
 Restrepia, *Kunth.* 181
 Retama, *Bois.* 554
 Retanilla, *Brongn.* 582
 Reticularia, *Baumg.* 50
 Reticularia, *Bull.* 42
 Retinaria, *Gärtn.* 582
 Retiniphyllum, *Humb.* 765
 Retinispora, *Zucc.* 229
 Retinodendron, *Korth.* 394
 Retosæ, *Ed.* 211
 Rettbergia, *Raddi.* 116
 Retzia, *Linn.* 621
 Retziaceæ, *Bartl.* 618
 Reussia, *Dennst.* 764
 Reussia, *Endl.* 795
 Reuters, *Boiss.* 778
 Reynaudia, *Kunth.* 115
 Rhabarbarum, *Tourn.* 504
 Rhabdia, *Mart.* 653
 Rhabdium, *Waltr.* 13
 Rhabdocalyx, *A. DC.* 629
 Rhabdocrinum, *Reichb.* 204
 Rhabdosciadium, *Boiss.* 779
 Rhabdothermus, *A. Cunningham.* 672
 Rhabdotheca, *Cass.* 715
 Rhachicallis, *DC.* 765
 Rhaciocarpon, *Cord.* 58
 Rhacoma, *DC.* 714
 Rhacomia, *Linn.* 588
 Rhadinocarpus, *Vog.* 554
 Rhagadiolus, *Tournef.* 715
 Rhagodia, *R. Br.* 513
 Rhingrostis, *Burb.* 513
 Rhamnaceæ, 576, 581*
 Rhamnads, 581
 Rhamnales, 245, 246, 576*
 Rhamneæ, *DC.* 581
 Rhamni, *Juss.* 581
 Rhamnopsis, *Reichb.* 328
 Rhamnus, *Juss.* 582
 Rhamphicarpon, *Benth.* 685
 Rhamphospermum, *Andrz.* 355
 Rhanterium, *Desf.* 710
 Rhaphidophora, *Hassk.* 194
 Rhaphidophyllum, *Hassk.* 685
 Rhaphidospora, *Nees.* 680
 Rhaphiodon, *Schauer.* 661
 Rhaphirolepis, *Lindl.* 560
 Rhaphis, *Linn.* 139
 Rhaphis, *Lour.* 116
 Rhamphospermum, *Benth.* 685
 Rhaponticum, *DC.* 714
 Rhaptostylum, *Humb. et Bonpl.* 508
 Rhazya, *Decaisne.* 601
 Rhea, *Bertr.* 715
 Rheedea, *Linn.* 402
 Rhegmatodon, *Brid.* 67
 Rhetsa, *Wight et Arn.* 471
 Rheum, *Linn.* 504
 Rhexia, *R. Br.* 733
 Rhexieæ, 733
 Rhigiophyllum, *Hochst.* 691
 Rhigiophyllum, *Less.* 713
 Rhigiothermus, *Less.* 714
 Rhigozum, *Burch.* 677
 Rhinacanthus, *Nees.* 680
 Rhinnetina, *Less.* 710
 Rhinactina, *Willd.* 714
 Rhinanthaceæ, *DC.* 681
 Rhinanthera, *Blum.* 328
 Rhinanthideæ, *Benth.* 685
 Rhinanthus, *Linn.* 685
 Rhinnum, *Schreb.* 424

Rhiuocarpus, *Bert.* 467
 Rhinobolium, *W. Arn.* 626
 Rhinopetalum, *Fisch.* 205
 Rhinostegia, *Turc.* 788
 Rhinotrichum, *Corda.* 43
 Rhipidium, *Berth.* 81
 Rhipidopteris, *Sch.* 79
 Rhipidosiphon, *Mont.* 1
 Rhiposcephalus, *Kutz.* 10
 Rhipozonium, *Kutz.* 10, 19
 Rhiposalidæ, 748
 Rhipsalis, *Gärtn.* 748
 Rhizanthæe, *Blum.* 83
 Rhizina, *Fries.* 43
 Rhizobolaceæ, 392, 398*
 Rhizoboleæ, *DC.* 398
 Rhizobols, 398
 Rhizobolus, *Gärtn.* 399
 Rhizobotrya, *Tausch.* 354
 Rhizocarpus, *Balsch.* 71
 Rhizocarpon, *Ramond.* 50
 Rhizoclonium, *Kutz.* 10
 Rhizococcum, *Desmaz.* 22
 Rhizoctouia, *Fr.* 44
 Rhizogens, 4, 83*
 Rhizomorpha, *Ach.* 44
 Rhizonium, *Brid.* 67
 Rhizophora, *Lam.* 727
 Rhizophoraceæ, 716, 726*
 Rhizophora, *R. Br.* 726
 Rhizopsis, *Ehrenb.* 43
 Rhizospermum, *Meyen.* 71
 Rhizospermeæ, *Roth.* 71
 Rhodamia, *Jack.* 738
 Rhodanthe, *Lindl.* 713
 Rhodax, *Spach.* 350
 Rhodex, *Roth.* 205
 Rhodiola, *Linn.* 348
 Rhodoccephalus, *Corda.* 43
 Rhodochiton, *Zucc.* 684
 Rhodocistus, *Spach.* 350
 Rhodocoma, *Nees.* 121
 Rhododendra, *Juss.* 453
 Rhododendrea, 455
 Rhododendron, *Linn.* 455
 Rhododermis, *Harv.* 24
 Rhodoliena, *Thouars.* 487
 Rhodomela, *Agh.* 25
 Rhodomelææ, 25
 Rhodomenia, *Grev.* 25
 Rhodomartyrus, *DC.* 738
 Rhodomenia, *Mart.* 25
 Rhodopsis, *Ledeb.* 564
 Rhodopsis, *Lilj.* 501
 Rhodora, *Linn.* 455
 Rhodoraceæ, *DC.* 453
 Rhodorhiza, *Webb.* 631
 Rhodostoma, *Scheidw.* 765
 Rhodothermus, *Reichb.* 455
 Rhodotypos, *Zucc.* 565
 Rheades, *L. xxxiii*
 Rheadium, *Spach.* 431
 Rhombifolium, *Rich.* 555
 Rhopaln, *Schreb.* 534
 Rhopalocnemis, *Jaugh.* 90
 Rhopalomyces, *Corda.* 43
 Rhinacophila, *Blum.* 205
 Rhus, *Linn.* 467
 Rhyacophila, *Hochst.* 575
 Rhyma, *Scop.* 402
 Rhynchanthra, *Bl.* 184
 Rhynchnuthera, *DC.* 733
 Rhynchelytrum, *Nees.* 115
 Rhynchoearpa, *Schrad.* 315
 Rhynchoearpus, *Less.* 713
 Rhynchococceæ, 10
 Rhynchococcos, *Kutz.* 10
 Rhynchocorys, *Griseb.* 685
 Rhynchoglossum, *Bl.* 672
 Rhyncholepis, *Miq.* 518
 Rhynchoperna, *Klotzsch.* 181
 Rhynchopetalum, *Fries.* 693
 Rhyuchopsidium, *DC.* 713
 Rhyuchosia, *DC.* 555
 Rhyuchosiæ, 555

- Rhychospermum, *A. DC.* 710
 Rhychospermum, *Reinc.* 601
 Rhynchospora, *Vahl.* 119
 Rhynchosporæ, 119
 Rhychostylis, *Blum.* 181
 Rhychoctecum, *Bl.* 672
 Rhynchotheca, *Ruiz et Pav.* 489
 Rhychothecæ, *Endl.* 488
 Rhynea, *DC.* 712
 Rhyssospermum, *Gärtn.* 617
 Rhyssocarpus, *Endl.* 765
 Rhyssolobium, *E. Mey.* 627
 Rhyssostelma, *Dec.* 626
 Rhytidanthe, *Benth.* 713
 Rhytidophyllum, *Mart.* 672
 Rhytiglossa, *Nees.* 680
 Rhytis, *Lour.* 282
 Rhytisma, *Fries.* 43
 Rhytispermum, *Link.* 656
 Riana, *Aubl.* 339
 Ribes, *Burm.* 643
 Ribes, *Linn.* 751
 Ribesiaceæ, *Endl.* 750
 Ribesiodes, *Linn.* 648
 Ribwort, 642
 Riccia, *Michel.* 57
 Ricciaceæ, 56, 57*
 Ricciæ, *Nees.* 57
 Ricciella, *A. Braun.* 57
 Ricciocarpus, *Corda.* 57
 Richæia, *Thouars.* 605
 Richardia, *Kunth.* 129
 Richardia, *Roth.* 715
 Richardia, *Linn.* 764
 Richardsonia, *Kunth.* 764
 Richea, *Labill.* 449, 712
 Richeria, *Vahl.* 282
 Richeria, *Karst.* 712
 Ricinocarpus, *Boerh.* 281
 Ricinocarpus, *Desf.* 281
 Ricinoides, *Tourn.* 281
 Ricinus, *Tourn.* 281
 Ricotia, *Linn.* 354
 Ridan, *Adans.* 711
 Riddellia, *Nutt.* 711
 Ridolfia, *Moric.* 778
 Riedelia, *Cham.* 116, 664
 Riedlea, *Vent.* 364
 Riedlea, *DC.* 364
 Riencouria, *Cass.* 711
 Riesenbachia, *Presl.* 725
 Rigidella, *Lindl.* 161
 Rigocarpus, *Neck.* 315
 Rigodinium, *Kunze.* 796
 Rindera, *Pall.* 556
 Rinorea, *Aubl.* 329
 Rioerenxia, *Dec.* 627
 Ripidium, *Trin.* 116
 Ripidodendron, *Willd.* 205
 Ripogonum, *Forst.* 216
 Rissou, *Arn.* 458
 Ritchlea, *H. Br.* 358
 Rittera, *Schreb.* 556
 Rivea, *Chois.* 651
 Riveria, *H. B. K.* 556
 Rivina, *L.* 509
 Rivinaceæ, *Agh.* 508
 Rivularia, *Roth.* 19, 18
 Rivulariæ, *Kützling.* 19
 Rixia, *Mocres.* 796
 Rizoa, *Can.* 661
 Robbia, *A. DC.* 601
 Robbergia, *Schreb.* 468
 Robertia, *DC.* 715
 Robertia, *Mérel.* 423
 Robertia, *L. C. Rich.* 231
 Robertia, *Scop.* 591
 Robertsonia, *Haw.* 568
 Robinia, *Linn.* 551
 Robinsonia, *DC.* 713
 Robinsonia, *Schreb.* 701
 Rohiquetia, *Gardl.* 101
 Robsonia, *Berland.* 751
 Rocama, *Forsk.* 527
 Rocella, *DC.* 59
 Rochea, *DC.* 346
 Rochefortia, *Swartz.* 795
 Rochelia, *Röm. et Sch.* 656
 Rochouia, *DC.* 710
 Rock-Roses, 349
 Rodigia, *Sprenq.* 715
 Rodriguezia, *Ruiz et P.* 182
 Rodschiedia, *Gärtn.* 354
 Rodschiedia, *Miq.* 796
 Roën, *Mügel.* 553
 Roelara, *Commers.* 391
 Röella, *Linn.* 691
 Rømeria, *Medik.* 431
 Rømeria, *Zea.* 116
 Røperia, *Sprenq.* 281
 Røstlinia, *Mönch.* 614
 Røstelia, *Rebent.* 42
 Rogeria, *Gay.* 670
 Röhlingia, *Deunst.* 424
 Rohria, *Schreb.* 583
 Rohria, *Vahl.* 713
 Roia, *Scop.* 462
 Rokej-ka, *Forsk.* 498
 Rolandrea, 709
 Roldana, *Llav. et Lex.* 713
 Rolfinkia, *Zenk.* 709
 Rotlandia, *Gaud.* 693
 Rollinia, *St. Hil.* 422
 Rolofa, *Adans.* 526
 Romana, *Fl. Fl.* 795
 Romanzovia, *Cham.* 639
 Römeria, *Rad.* 59
 Römeria, *Tratt.* 358
 Römeria, *Thunb.* 467
 Romneya, *Harv.* 431
 Romulea, *Maratti.* 161
 Ronaben, *Aubl.* 764
 Rondachine, *Bosc.* 413
 Rondeletia, *Blum.* 765
 Rootia, *Neck.* 498
 Røpera, *Adr. Juss.* 579
 Rophostemon, *Blum.* 182
 Rorella, *Rupp.* 434
 Rorida, *Röm. et Sch.* 358
 Roridula, *Linn.* 434
 Roridula, *Forsk.* 358
 Roripa, *Scop.* 354
 Rosa, *Tourn.* 564
 Rosaceæ, 539, 557, 559, 561, 563*
 Rosaceæ, *Bartl.* 542
 Rosaceæ, *Juss.* 563
 Rosalesia, *Llav. et Lex.* 715
 Rosales, 215, 246, 539*
 Roscoa, *Rorb.* 664
 Roscoea, *Smith.* 167
 Roscyna, *Spach.* 406
 Rosea, *Mart.* 511
 Rosenia, *Thunb.* 713
 Rosetangles, 23
 Roseworts, 563
 Rosidæ, 564
 Rosilla, *Less.* 712
 Rosmarinidæ, 661
 Rosmarinus, *Linn.* 661
 Rospidios, *A. DC.* 596
 Rosscula, *Fl. Fl.* 471
 Rossmællera, *Rehb.* 636
 Ros Solis, *Tourn.* 434
 Rostallaria, *Gärtn.* 591
 Rostellaria, *Nees.* 680
 Rostellularia, *Reichb.* 679
 Rostkovin, *Desf.* 192
 Rostriaria, *Trin.* 116
 Rosularia, *DC.* 346
 Rotaceæ, *L.* xxxiv
 Rotula, *Lour.* 658
 Rotula, *Linn.* 575
 Rotheria, *Meyen.* 764
 Rothia, *Lam.* 712
 Rothia, *P. rs.* 554
 Rothia, *Schreb.* 715
 Rothmannia, *Thunb.* 765
 Rothmannia, *Neck.* 556
 Rottbælia, *Forsk.* 115
 Rottbæliæ, 116
 Rottbællia, *R. Br.* 116
 Rottbællia, *Scop.* 444
 Rottlera, *Rorb.* 281
 Rottlerin, *Brid.* 67
 Rotula, *Lour.* 795
 Roubieva, *Mog.* 513
 Roucela, *Dunort.* 691
 Rouhamon, *Aubl.* 691
 Roulinia, *Dec.* 626
 Roulinia, *Brongn.* 148
 Roumea, *Poit.* 328
 Roupala, *Aubl.* 534
 Rouren, *Aubl.* 468
 Rousseau, *Smith.* 573
 Rousseaceæ, *DC.* 573
 Rousseauvia, *Boj.* 573
 Rousseauxia, *DC.* 733
 Roussetia, *Gaud.* 262
 Roussoa, *Röm. et Sch.* 573
 Roxburghia, *Kön.* 444
 Roxburghia, *Dryand.* 220
 Roxburghiaceæ, 212, 219*
 Roxburghworts, 219
 Roydsia, *Rorb.* 358
 Royena, *Houst.* 636
 Royena, *Linn.* 596
 Roylea, *Wall.* 662
 Rubæola, *Mönch.* 771
 Rubia, *Tourn.* 771
 Rubiaceæ, *Cham. et Sch.* 768
 Rubiaceæ, *Juss.* 761
 Rubus, *Linn.* 564
 Ruckeria, *DC.* 713
 Rudbeckia, *Adans.* 718
 Rudbeckia, *Linn.* 711
 Rudbeckiæ, 711
 Rudgen, *Saltisb.* 764
 Rudolphia, *Willd.* 555
 Rudolpho-Romeria, *Scud.* 205
 Ruellia, *Linn.* 679
 Ruellidæ, 679
 Rueworts, 469
 Rugendasia, *Schiede.* 199
 Ruizia, *Cav.* 364
 Ruizia, *Pav.* 299
 Rulingia, *R. Br.* 364
 Rulingia, *Ehrh.* 501
 Rumex, *Linn.* 504
 Rumifordia, *DC.* 711
 Rumia, *Hoffm.* 778
 Rumohria, *Raddi.* 80
 Rumphia, *Linn.* 467
 Rungia, *Nees.* 680
 Ruppifraga, *Orth.* 498
 Ruppia, *Linn.* 210
 Ruppia, *Corda.* 57
 Ruppia, *Linn. fl.* 58
 Rupprechtia, *Meyer.* 504
 Ruscus, *Tourn.* 205
 Ruses, 191
 Russeggera, *Endl.* 679
 Russelia, *Jacq.* 684
 Russelia, *Linn.* 568
 Russula, *Fries.* 41
 Ruta, *Tournef.* 471
 Rutaceæ, 456, 469*
 Ruta, *Juss.* 469
 Rutales, 244, 246, 456*
 Ruter, *Atl. de Juss.* 469, 471
 Ruteria, *DC.* 471
 Ruterin, *Mönch.* 554
 Rutidocarpus, *DC.* 712
 Rutidosia, *DC.* 712
 Rutilla, *Fl. Fl.* 795
 Ruyschia, *Jacq.* 404
 Ruyschiana, *Mill.* 662
 Ryanih, *Vahl.* 334
 Rymia, *Endl.* 596
 Ryparia, *Bl.* 282
 Ryparosa, *Blum.* 282
 Ryssopterys, *Bl.* 390
 Rytacline, *Desf.* 116
 Rytiden, *DC.* 764
 Rytidostylis, *H. et A.* 315
 Rytidiplan, *Aq.* 11, 25

Rytipluaceae, 11

- Sabadilla, *Brandt.* 199
 Sabal, *Adans.* 139
 Sabalidæ, 139
 Sabazia, *Cass.* 710
 Sabbatia, *Adans.* 614
 Sabdnriffa, *DC.* 370
 Sabia, *Colebr.* 467
 Sabicea, *Aubl.* 765
 Sabinea, *DC.* 554
 Sabulina, *Reichb.* 447
 Saccharina, *Stack.* 22
 Saccharophorum, *Neck.* 116
 Saccharum, *Linn.* 116
 Saccidium, *Lindl.* 182
 Saccochilus, *Blum.* 181
 Saccoglottis, *Mart.* 447
 Saccogyna, *Dum.* 60
 Saccolabium, *Lindl.* 161
 Saccoloma, *Kaulf.* 80
 Saccoma, *Endl.* 764
 Saccopetalum, *Bonn.* 422
 Saccophorum, *Pulis.* 67
 Saccothecium, *Mont.* 43
 Saccellium, *Kunth.* 629
 Saccidium, *Nees.* 42
 Sacmthus, *Don.* 621
 Sadleria, *Kaulf.* 80
 Saclautlus, *Forsk.* 440
 Sagedia, *Achar.* 50
 Sagenia, *Prest.* 80
 Sageretia, *Brongn.* 582
 Sagina, *L.* 497
 Saguella, *Fenzl.* 497
 Sagittaria, *Linn.* 209
 Sagonia, *Aubl.* 639
 Sagraea, *DC.* 733
 Saguicrus, *Rumph.* 133
 Sagus, *Gärtn.* 139
 Salintmorysia, *Endl.* 712
 Saivala, *Wall.* 142
 Sajor, *Rumph.* 281
 Salacia, *Linn.* 585
 Salixis, *Salisb.* 455
 Saldanha, *N. P.* 795
 Saldinia, *A. Rich.* 764
 Salicaceæ, 248, 254*
 Salicaria, *Tourn.* 575
 Salicariæ, *Juss.* 574
 Salicariinae, *Link.* 574
 Salicariæ, *L. C. Rich.* 254
 Salicornia, *Tourn.* 512
 Salisburia, *Smith.* 231
 Salsia, *Lindl.* 737
 Salvaria, *DC.* 711
 Salix, *L.* 255
 Saluacis, *Dory.* 18
 Salualia, *Schott.* 361
 Salmasia, *Schreb.* 328
 Salua, *DC.* 710
 Salmia, *Gav.* 205
 Salmia, *Willd.* 132
 Salmouia, *Neck.* 380
 Salomonina, *Lour.* 378
 Salpianthus, *II. et B.* 507
 Salpichæna, *J. Sm.* 80
 Salpichron, *Miers.* 622
 Salpiglossideæ, *Benth.* 684
 Salpiglossis, *R. et P.* 684
 Salpinga, *Mart.* 733
 Salpianthus, *Hooker.* 679
 Salsola, *Linn.* 513
 Sallia, *R. Br.* 499, 511
 Salvadoria, *Linn.* 652
 Salvadoraceæ, 649, 652*
 Salvadorads, 652
 Salvertia, *St. Hil.* 380
 Salvia, *Linn.* 661
 Salvidæ, 661
 Salvinia, *Mich.* 73
 Salviniaecæ, *Barth.* 71
 Salvinere, *Juss.* 71
 Salvinella, *Hüb.* 57
 Salvinia, *Griß.* 71
 Salzmaunia, *DC.* 764
 Samadera, *Gärtn.* 477
 Samandura, *Linn.* 361, 477
 Samara, *L.* 582
 Samara, *Swartz.* 648
 Sambuceæ, 767
 Sambucus, *Tourn.* 767
 Sameraria, *Desv.* 355
 Samodia, *Baudo.* 646
 Samolidæ, 646
 Samolus, *Tourn.* 646
 Sampaca, *Rumph.* 419
 Samudra, *Endl.* 632
 Samyda, *Linn.* 331
 Sauyaceæ, 326, 330*
 Sanydeæ, *Vent.* 330
 Sanyds, 330
 Sanchezia, *R. et P.* 685
 Sandalworts, 787
 Sandoricum, *Cav.* 464
 Sanguinaria, *Linn.* 431
 Sanguisorba, *Linn.* 562
 Sanguisorbaceæ, 539, 561°
 Sanguisorbeæ, *Juss.* 561, 563
 Sanguisorbs, 561
 Sanhilaria, *Leandr.* 714
 Sanicula, *Tourn.* 778
 Saniculidæ, 778
 Sanseviella, *Reichb.* 205
 Sanseviera, *Thunb.* 205
 Santalaceæ, 530, 786, 787°
 Santalaria, *DC.* 555
 Santaloides, *Linn.* 468
 Sautalum, *Linn.* 788
 Sautia, *W. et A.* 764
 Santolina, *Tourn.* 712
 Sanvitalia, *Juss.* 711
 Sapiudaceæ, 373, 382*
 Sapindales, 244, 246, 373°
 Sapiudeæ, 385
 Sapindi, *Juss.* 382
 Sapindus, *Linn.* 385
 Sapium, *Jacq.* 281
 Saponaria, *L.* 498
 Sapota, *Plum.* 591
 Sapotaceæ, 576, 590°
 Sapotads, 590
 Sapotæ, *Juss.* 590
 Sapria, *Griffith.* 93
 Saprolegmia, *Nees.* 18
 Saprolegnieæ, 9
 Saproma, *Brid.* 67
 Saprosmia, *Blum.* 764
 Saraca, *Burm.* 556
 Saracha, *Raiz et Pav.* 622
 Sarcanthemum, *Cass.* 710
 Sarcantbidæ, *Lindl.* 181
 Sarcanthus, *Lindl.* 181
 Sarcobatus, *Nees.* 513
 Sarcocalyx, *Walp.* 554
 Sarcocalyx, *Zipp.* 795
 Sarcocarpus, *DC.* 436
 Sarcocarpum, *Blum.* 306
 Sarcocaulon, *DC.* 494
 Sarcococca, *Lindl.* 282
 Sarcoccephalus, *Afz.* 765
 Sarcocchilus, *R. Br.* 181
 Sarcocolla, *Kunth.* 578
 Sarcocollads, 577
 Sarcodactylis, *Gærtn.* 458
 Sarcoderma, *Ehr.* 18
 Sarcoglottis, *Prest.* 182
 Sarcographa, *Fée.* 50
 Sarcologia, *Thouars.* 487
 Sarcolipes, *E. et Z.* 346
 Sarcobolus, *R. Br.* 627
 Sarcomeria, *Souler.* 796
 Sarcomitrium, *Cord.* 59
 Sarcomphaloides, *DC.* 582
 Sarcophycus, *Ktz.* 10
 Sarcophyllis, *Ktz.* 10
 Sarcophyllum, *E. Mey.* 554
 Sarcophyllum, *Thunb.* 554
 Sarcophyte, *Sparm.* 90
 Sarcophytidæ, 90
 Sarcopyramis, *Wall.* 733
 Sarcoseyphus, *Corda.* 60
 Sarcostemma, *R. Br.* 628
 Sarcostigma, *W. et A.* 531
 Sarcostoma, *Blum.* 181
 Sarcostyles, *Prest.* 570
 Sarcosygium, *Bunge.* 479
 Sarca, *Fries.* 43, 44
 Sargasseæ, 10
 Sargassum, *Ag.* 10, 22
 Sariava, *Reinw.* 397
 Saribus, *Rumph.* 139
 Sarissus, *Gærtn.* 764
 Sarjanja, *Fl. Fl.* 795
 Sarmantaceæ, *L. xxxiii*
 Sarmantaceæ, *Vent.* 439
 Sarmienta, *R. et P.* 672
 Sarsanthera, *Korth.* 397
 Sarotes, *Lindl.* 364
 Sarothamum, *Wimm.* 554
 Sarothra, *Linn.* 406
 Sarothrostachys, *Kt.* 281
 Sarpedonia, *Adans.* 428
 Sarraceiua, *Linn.* 429
 Sarraceniaceæ, 416, 422°
 Sarraceniads, *Torp.* 429
 Sarraceniads, 429
 Sarreta, *DC.* 714
 Sarsaparillas, 215
 Sarsanqua, *Nees.* 397
 Sassafras, *Nees.* 537
 Sassaia, *Molin.* 795
 Satureia, *Linn.* 661
 Satureiæ, 661
 Satureia, *Maratt.* 205
 Satiyriads, 182
 Satiyridium, *Lindl.* 182
 Satiyrium, *Swartz.* 182
 Saurauja, *Willd.* 424
 Sauraglossum, *Lindl.* 182
 Sauropus, *Blum.* 282
 Saururaceæ, 514, 521°
 Saururads, 521
 Saurureæ, *Rich.* 521
 Saururus, *Linn.* 521
 Saussurea, *Mönch.* 662
 Saussurea, *DC.* 713
 Saussurea, *Salisb.* 205
 Sauteria, *Nees.* 58
 Sauteria, *Dec.* 680
 Sauvagea, *Neck.* 343
 Sauvageads, 343
 Sauvageæ, *DC.* 343
 Sauvagesia, *Linn.* 343
 Sauvagesiaceæ, 326, 343°
 Sauvagesieæ, *Barth.* 343
 Savastania, *Neck.* 733
 Savia, *Rafin.* 555
 Savia, *Willd.* 282
 Savignya, *DC.* 355
 Saviniouia, *W. et B.* 370
 Saxifraga, *Haw.* 568
 Saxifraga, *Linn.* 568
 Saxifragaceæ, 566, 567°, 752, 772
 Saxifragaceæ, *Endl.* 569
 Saxifragales, 243, 245, 246, 566°
 Saxifrageæ, *Juss.* 567
 Saxifrageæ, 567
 Scaberia, *Grex.* 10, 22
 Scabiosa, *R. et Sch.* 700
 Scabridæ, *L. xxxiii*
 Scabrila, *Linn.* 651
 Scævola, *Linn.* 695
 Scævoleæ, *Lindl.* 694
 Scævoleæ, 694, 695
 Scælemosses, 59
 Scælesia, *Arn.* 711
 Scælia, *Sims.* 713
 Scæligera, *Adans.* 554
 Scæligeria, *DC.* 779
 Scæliopsis, *Walp.* 713
 Scæudalida, *Neck.* 554
 Scandiciads, 779
 Scændix, *Gærtn.* 779
 Scæpaulia, *Dum.* 60

- Scapha, Noronh.* 424
Scaphis, Eschsch. 50
Scaphium, Sch. et E. 362
Scaphyglottis, P. et E. 182
Scaredederis, Thours. 183
Sciaria, Endl. 715
Scelochilus, Klotzsch. 182
Scenedesmus, Meyen. 9, 13
Scopa, Lindl. 283
Scopaceæ, 273, 283°
Scopads, 283
Scopasma, Blum. 282
Scopinia, DC. 710
Scopseothamnus, Ch. 765
Scopranthus, Grah. 158
Scopromyces, Corda. 43
Scoura, Forsk. 665
Schoefferia, Jacq. 582
Schoenleinia, Klotzsch. 182
Schoenolæna, Bunge. 778
Schoanginia, C. A. M. 513
Schasmaria, Achar. 50
Schaueria, Nees. 537
Schaueria, Hassk. 661
Schaueria, Nees. 680
Schedonorus, Palis. 116
Scheffera, Forst. 781
Schelhammera, R. Br. 190
Schelhammeria, Heisl. 119, 354
Schelveria, Nees. 684
Schepperia, Neck. 358
Scheuchzeria, Linn. 210
Schiedea, A. Rich. 764
Schiedea, Ch. et Schl. 498
Schiekia, Meisn. 295
Schillera, Reichb. 364
Schillera, Kunth. 518
Schima, Reinw. 397
Schimpera, St. et H. 355
Schizus, Linn. 467
Schizua, Demsl. 282
Schisma, Duna. 60
Schismatopera, Kl. 281
Schismatopterides, Willd. 80
Schismoceras, Presl. 181
Schismus, Palis. 116
Schistanthe, Kunze. 684
Schistidium, Brid. 67
Schistocarpha, Less. 711
Schistogyne, H. et A. 626
Schistophragma, Benth. 685
Schistophyllum, Palis. 67
Schistostega, W. 67
Schistostephium, Kr. 712
Schiwereckia, Andrz. 354
Schizachyrium, Nees. 116
Schizæa, Smith. 81
Schizææ, Mart. 80
Schizandra, L. C. Rich. 396
Schizandraceæ, 297, 395°
Schizangium, Bartl. 764
Schizanthus, Haec. 158
Schizanthus, H. et P. 684
Schizilema, Hook. f. 778
Schizocæna, J. S. 89
Schizocarpm, Schrad. 315
Schizocarya, Spach. 725
Schizochiton, Spr. 46
Schizochlæna, J. Sm. 80
Schizocodon, Zucc. 634
Schizoderma, Kunze. 41
Schizodietyon, Ktz. 19
Schizodium, Lindl. 182
Schizodon, Presl. 498
Schizodon, Sw. 67
Schizoglossum, E. M. 11, 626
Schizogonium, Ktz. 19
Schizogyne, Cava. 719
Schizolæna, Thours. 4-7
Schizolepis, Schr. 119
Schizolobium, Vog. 555
Schizoloma, Gaud. 80
Schizomeria, Don. 572
Schizomeris, Ktz. 10
Schizoneuma, Ag. 13
Schizonotus, Lindl. 565
Schizopetalidæ, 355
Schizopetalou, Hook. 355
Schizophragma, S. et Z. 570
Schizophyllum, Nutt. 711
Schizophyllum, Fries. 41
Schizopleura, Lindl. 737
Schizosphou, Ktz. 10
Schizostachyum, Nees. 116
Schizostephanium, Rehb. 158
Schizostigma, Arn. 315, 765
Schizotechium, Fenzl. 498
Schizotheca, C. A. M. 513
Schizothecium, Corda. 42
Schizothrix, Ktz. 10
Schizoxylon, Fr. et P. 42
Schkuhria, Roth. 712
Schluhria, Monch. 710
Schlechtendalin, Less. 714
Schlechtendalia, Spr. 372
Schlechtendalia, Willd. 711
Schlegelia, Miq. 674
Schleichera, W. 385
Schleidenia, Endl. 653
Schlotheimia, Brid. 67
Schmalzia, Desv. 467
Schmidelia, L. 385
Schmidtia, Monch. 715
Schmidtia, Tralt. 115
Schnella, Radd. 556
Schmitzleinia, Steud. 778†
Schobera, Scop. 653
Schoheria, C. A. M. 513
Schoenefeldia, Kunth. 115
Schoenidiæ, 119
Schoenidium, Nees. 119
Schoenobiblos, Mart. 531
Schoenocaulon, A. Gr. 199
Schoenoprasum, K. 205
Schoenopsis, Lestib. 119
Schoenorchis, Blum. 181
Schoenoxypium, Nees. 119
Schoenus, Linn. 119
Schollera, Rohl. 758
Schollera, Sw. 509
Schollera, Willd. 206
Schomburgkia, DC. 712
Schomburgkia, Lindl. 181
Schonia, Steetz. 713
Schöphia, Wall. 444
Schorigeram, Adans. 281
Schotia, Jacq. 556
Schousbæa, Schum. 795
Schousbæa, Willd. 718
Schoutensia, Endl. 441, 464
Schouwia, DC. 355
Schradera, Vahl. 765
Schraderia, Monch. 661
Schrankia, Med. 355
Schrankia, Willd. 556
Schrebera, Th. 588
Schreibersia, Pohl. 765
Schrenkia, Fisch. 779
Schubertia, Blum. 778
Schubertia, M. et Z. 626
Schubertia, Mirb. 229
Schubleria, Mart. 614
Schuchia, Endl. 380
Schuffia, Spach. 725
Schultesia, Mart. et Zucc. 614
Schultesia, Roth. 691
Schultesia, Schrad. 511
Schultesia, Spreng. 115
Schultesia, Radd. 59
Schultzia, Spreng. 778
Schumacheria, Spreng. 340
Schumacheria, Vahl. 424
Schwabea, Endl. 679
Schwagerichenia, Spr. 153
Schwagerichenia, Rehb. 460
Schwalbea, Linn. 685
Schwannia, E. 390
Schwarzia, H. Fl. 404
Schweggera, Mart. 402
Schweiggeria, Spreng. 339
Schweinitzia, Ell. 452
Schwenkfeldia, Willd. 765
Schwenkia, Linn. 684
Schweyckheria, C. C. Gmel. 614
Schychowskyia, Endl. 262
Sciadophyllum, P. Br. 781
Sciadopophysium, Endl. 67
Sciadopitys, Zucc. 229
Sciaphila, Blum. 271
Scilla, Linn. 205
Scilleæ, Bartl. 205
Scindapsus, Schott. 194
Sciohia, Rehb. 262
Sciophila, Gaud. 262
Sciophannus, Endl. 778
Scirpææ, 119
Scirpidium, Nees. 119
Scirpus, Endl. 119
Scitamina, L. xxxiii
Scitamineæ, R. Brown. 165
Scirius, Schreb. 471
Scitarea, Tournef. 661
Sclerachne, R. Br. 115
*Sclerantheææ, 523, 528**
Scleranthea, Link. 528
Scleranthus, 528
Scleranthus, Linn. 528
Sclereteæ, 119
Scleria, Berg. 119
Sclerobasis, Cass. 713
Sclerocarpus, Jacq. 711
Sclerochaetium, Nees. 119
Sclerochloa, Palis. 116
Sclerococcum, Fries. 44
Sclerococcus, Bartl. 765
Scleroderma, Pers. 42
Scleroderma, Fr. 43
Sclerodontium, Schwægr. 67
Sclerolæna, R. Br. 513
Sclerolepis, Cass. 709
Sclerolepis, Moen. 715
Sclerolobium, Vog. 555
Scleromitrium, W. et A. 765
Sclerodon, Lindl. 664
Sclerophora, Chev. 50
Sclerophyton, Eschw. 50
Scleropteris, Scheidw. 183
Scleropus, Schrad. 511
Scleropyron, Arn. 788
Sclerosciadium, Koch. 778
Sclerostemma, Schott. 700
Sclerostylis, Blum. 458
Sclerothamnus, R. Br. 553
Sclerotheca, DC. 693
Sclerothrix, Presl. 745
Sclerotium, P. 44
Scleroxylon, Willd. 648
Scollecotrichum, Berk. 42
Scollecotrichum, Jk. 43
Scollecotrichum, Ktanz. 44
Scolobus, Raf. 553
Scolochloa, Koch. 115
Scolopacium, E. et Z. 491
Scolopendrium, Smith. 80
Scoloph, Schreb. 328
Scolosanthus, Vahl. 764
Scolosperrnum, Less. 711
Scolymanthus, Willd. 715
Scolymanus, 715
Scolymocephalus, Herm. 533
Scolymus, Cass. 715
Scoparia, L. 685
Scoprinææ, Link. 681
Scopolia, Adans. 354
Scopolia, Forst. 795
Scopolia, Jacq. 622
Scopolia, Linn. fil. 531
Scopolia, Smith. 473
Scopolina, Schult. 622

† This, which is a synonym of *Trochisanthis*, has been omitted at the above page, by an oversight.

- Scopularia, *Lindl.* 182
 Scopulina, *Dum.* 59
 Scordium, *Tourn.* 662
 Scorias, *Fries.* 43
 Scrodonia, *Tourn.* 662
 Scorodoprasum, *Michx.* 205
 Scropiurus, *Linn.* 551
 Scorzonella, *Nutt.* 715
 Scorzonera, *Linn.* 715
 Scorzonerea, 715
 Scotanum, *Adans.* 428
 Scottia, *R. Br.* 553
 Scouleria, *Hook.* 67
 Screwpines, 130
 Scribaea, *Fl. W.* 498
 Scrobicaria, *Cass.* 713
 Scrophularia, *Tourn.* 684
 Scrophulariaceae, 668, 681*
 Scrophularia, *Juss.* 681
 Scrophularineae, *R. Brown* 681
 Scurgia, *Rafn.* 119
 Scurrula, *G. Don.* 791
 Scutellareæ, 661
 Scutellarin, *Linn.* 661
 Scutellinea, *Dumort.* xxxvii
 Scutia, *Comm.* 582
 Scuticaria, *Lindl.* 182
 Scutula, *Lour.* 733
 Scybalium, *Sch. et E.* 90
 Scyphæa, *C. B. Pr.* 397
 Scyphanthus, *Don.* 745
 Scyphiphora, *Gärtn.* fl. 764
 Scyphogyne, *Brongn.* 455
 Scyphophorus, *DC.* 50
 Scytala, *E. M.* 714
 Scytalia, *Gärtn.* 385
 Scytalis, *E. M.* 555
 Scytanthus, *Hook.* 627
 Scytonema, *Ag.* 10, 18
 Scytonemæ, 10
 Scytopteris, *Presl.* 79
 Scytosiphon, *Ag.* 22
 Scytothalia, *Grev.* 10, 22
 Scytothamnus, *Hook. f.* 796
 Seanforthia, *R. Br.* 138
 Seawracks, 20, 145
 Sebrea, *R. Br.* 614
 Sebastiania, *Spreng.* 281
 Sebastiania, *Bert.* 711
 Sebestena, *Gärtn.* 629
 Sebestenes, 628
 Sebifera, *Lour.* 537
 Sebipira, *Mart.* 555
 Sebiphora, *Neck.* 302
 Secale, *Linn.* 116
 Secamone, *R. Br.* 626
 Secamoneæ, 626
 Sechium, *P. Br.* 315
 Secondary Vegetation, *Martius.* xlv
 Secundatia, *A. DC.* 601
 Secotium, *Kze.* 42
 Securidaca, *L.* 378
 Securigera, *DC.* 554
 Securinegn, *Comm.* 282
 Seddera, *St. et H.* 631
 Sedæ, *Spreng.* 344
 Sedges, 117
 Sedgwickia, *Griff.* 784
 Sedgwickia, *Bisch.* 58
 Sedoidea, *Stak.* 25
 Sedum, *Linn.* 346
 Seetzenia, *R. Br.* 479
 Segestrella, *Fries.* 50
 Segestrin, *Fries.* 50
 Seguiera, *L.* 386
 Sehima, *Forsk.* 116
 Seidlia, *Kostel.* 394
 Seimatoposium, *Corda.* 42
 Seiridium, *Nees.* 42
 Seirococcus, *Grev.* 22
 Selagids, 666
 Selaginaceæ, 649, 666*
 Selaginæ, *Juss.* 666
 Selaginella, *Spreng.* 70
 Selago, *H. et G.* 70
 Selago, *Linn.* 667
 Selenaca, *Nitsch.* 13
 Selonia, *Nutt.* 354
 Selenidæ, 354
 Selenocarpus, *DC.* 355
 Sclerosporium, *Corda.* 42
 Selinum, *Gärtn.* 778
 Selliera, *Cav.* 695
 Scelliguea, *Bory.* 79
 Selloa, *H. B. K.* 711
 Selloa, *Spreng.* 710
 Sellowia, *Roth.* 499
 Semarillaria, *R. et P.* 385
 Semecarpus, *Linn.* 467
 Semeiandra, *Hook. et Arn.* 725
 Semeionotis, *Schott.* ? 555
 Seminiferæ, *Agardh.* 235
 Semonvillea, *Gay.* 509
 Sempervivæ, *Juss.* 344
 Sempervivum, *Linn.* 346
 Senckenbergia, *Fl. Wet.* 355
 Seudtnera, *Endl.* 60
 Senebiera, *Poir.* 355
 Senebieridæ, 355
 Senecillis, *Gärtn.* 713
 Senecio, *L.* 713
 Senecioneæ, 713
 Senecionidæ, 703, 710
 Seneciotypus, *DC.* 713
 Senega, *DC.* 378
 Senna, *Tourn.* 555
 Sennebiera, *Neck.* 537
 Sennefeldera, *Kl.* 281
 Senra, *DC.* 370
 Senraa, *Willd.* 370
 Senticosæ, *L.* xxxiii
 Sentis, *Commers.* 582
 Sepedoniæ, *Fr.* 43
 Sepedonium, *Link.* 43
 Sepiuræ, *L.* xxxiii
 Septas, *Lour.* 680, 685
 Septus, *Linn.* 346
 Septonema, *Corda.* 42
 Septoria, *Fries.* 42
 Septosporium, *Corda.* 43
 Septotrichum, *Corda.* 44
 Seraphyta, *Fisch.* 181
 Serapiadæ, 182
 Serapins, *Linn.* 182
 Serpilus, *Gärtn.* 710
 Seriam, *Schum.* 385
 Serianthes, *Benth.* 556
 Seriocarpus, *Nees.* 709
 Sericocoma, *Fenzl.* 511
 Sericophorum, *DC.* 713
 Sericeura, *Hassk.* 115
 Seringia, *Gay.* 364
 Seringia, *Spr.* 588
 Serinia, *Rafn.* 715
 Seriola, *Gärtn.* 715
 Seriphida, *Less.* 712
 Seriphidium, *Bess.* 712
 Seriphicæ, 713
 Seriphium, *Less.* 713
 Seris, *Willd.* 714
 Serissa, *Comm.* 764
 Serjania, *Plum.* 385
 Serophyton, *C. B.* 281
 Serpentaria, *Raf.* 794
 Serpentinaria, *Gray.* 18
 Serpiculn, *Linn.* 723
 Serræa, *Cav.* 370
 Ferraria, *Burm.* 533
 Serratuln, *DC.* 714
 Serratulæ, 714
 Serronia, *Guill.* 518
 Serruria, *Salisb.* 533
 Sersalsia, *R. Br.* 591
 Serturnera, *Mart.* 511
 Sesamæ, *Kunth.* 669, 670
 Sesmella, *Reichb.* 356
 Sesamoides, *Tourn.* 356
 Sesamopteris, *Endl.* 670
 Sesamum, *Linn.* 670
 Sesbania, *Perr.* 534
 Seseli, *Linn.* 778
 Sesleria, *Ard.* 116
 Seselinidæ, 778
 Sessa, *R. et P.* 621
 Sestinia, *Boiss.* 662
 Sestochilus, *K. et H.* 181
 Sesuveæ, 527
 Sesuviaceæ, *Wight.* 527
 Sesuvier, *Endl.* 527
 Sesuvium, *Linn.* 527
 Sefaria, *Palis.* 115
 Sethia, *Kunth.* 391
 Seubertia, *Kth.* 205
 Seubertia, *Wats.* 710
 Seutera, *Reichb.* 626
 Severinia, *Tenor.* 458
 Seyeria, *Pursh.* 685
 Shallowium, *Rafn.* 455
 Shewia, *Forst.* 709
 Sheffieldia, *Forst.* 616
 Shepherdia, *Nutt.* 257
 Sherardia, *Dill.* 771
 Shorea, *Roxb.* 394
 Shortia, *Torr. et Gr.* 450
 Shuteria, *Chois.* 631
 Shuteria, *W. et A.* 555
 Shuttleworthia, *Meisn.* 665
 Siagonanthus, *Pöppig.* 182
 Siagonarthen, *Mart.* 661
 Sinlodes, *E. et Z.* 527
 Sibaldia, *Linn.* 564
 Sibia, *DC.* 575
 Sibourmtia, *Thouars.* 648
 Sibthorpæ, 685
 Sibthorpiæ, *Linn.* 685
 Sibthorpiaceæ, *Don.* 681
 Sicææ, 315
 Sicellium, *P. Br.* 765
 Sicelum, *P. Br.* 585
 Sickingia, *Willd.* 765
 Sicydium, *Schlecht.* 315
 Sicyocarpus, *Boj.* 627
 Sicyoides, *Tourn.* 315
 Sicyos, *Linn.* 315
 Sida, *Linn.* 370
 Sideræ, 370
 Sideranthus, *Fraser.* 710
 Sideritis, *Linn.* 662
 Siderodendron, *Schr.* 764
 Sideroxyton, *Burm.* 783
 Sideroxyton, *Linn.* 591
 Siebera, *Gay.* 713
 Siebera, *Reichb.* 778
 Siebera, *Schrad.* 497
 Sieberia, *Spreng.* 182
 Siegesbeckia, *Linn.* 710, 711
 Siegingia, *Bernh.* 116
 Siemssenia, *Steetz.* 713
 Sieversia, *Willd.* 565
 Sigillarin, *Rafn.* 205
 Silaus, *Bess.* 778
 Silenales, 244, 246, 495*
 Silenanthe, *Fenzl.* 498
 Silene, *Linn.* 498
 Silenæ, 496, 498
 Siler, *Scop.* 778, 779
 Sileridæ, 778
 Siliquaria, *Gray.* 22
 Siliquaria, *Forsk.* 358
 Siliquosa, *L.* xxxiv
 Silphicæ, 711
 Silphiosperma, *Steetz.* 712
 Silphium, *Linn.* 711
 Silvia, *Vell.* 684
 Silybere, 714
 Silybum, *Faill.* 714
 Simaba, *Aubl.* 477
 Simaruba, *Aubl.* 477
 Simarubacæ, 455, 476*
 Simarubæ, *DC.* 476
 Simblocline, *DC.* 710
 Simbuln, *Klotzsch.* 42
 Simbuleta, *Forsk.* 684
 Simethis, *Kth.* 205
 Smirca, *Aubl.* 764

- Simmondsia, Nutt. 281
 Simochilus, Benth. 459
 simplitegula, Dumort. xxxvii
 Simsia, Pers. 711
 Simsia, R. Br. 533
 Sinapideudron, Loew. 255
 Sinapis, Tourn. 355
 Sinapistrum, Mönch. 358
 Sinapistrum, Reichb. 355
 Sinclairia, Hook. 709
 Singana, Aubl. 358
 Sinistrophorum, Schr. 355
 Sinningia, Nees. 672
 Sipanea, Aubl. 765
 Siphanchera, Pohl. 753
 Siphisia, Rafin. 794
 Siphoc, Endl. 794
 Siphocalyx, DC. 751
 Siphocampylus, Pohl. 693
 Sip oderna, Kt. 10
 Siphomeris, Boj. 372
 Siphonanthus, Linn. 664
 Siphonea, Kt. 18
 Siphonia, Rich. 281
 Siphonia, Benth. 765
 Siphonodon, Grif. 598
 Siphonolochia, Reichb. 794
 Siphonomorpha, Oth. 498
 Siphonostegia, Benth. 685
 Siphocorys, Boj. 662
 Siphula, Fries. 50
 Sijonima, Aubl. 593
 Sirium, Linn. 788
 Sirococcus, Kt. 10
 Sirocrosis, Kt. 10
 Sirogonium, Kt. 10
 Sirophysalis, Kt. 10
 Sirostiphon, Kt. 10
 Sisarum, Adans. 778
 Sison, Lagasc. 778
 Sistotrema, Fries. 41
 Sisymbride, 354
 Sisymbrium, Magnol. 354
 Sisymbrium, Linn. 354
 Sisyranthus, E. Mey. 627
 Sisyrrinchium, Tourn. 161
 Sitanion, Raf. 116
 Sitodium, Banks. 271
 Sitolobium, Desv. 80
 Sinn, Adans. 778
 Skimmi, Kämp. 419
 Skimmia, Thunb. 598
 Skinnera, Chois. 631
 Skinnera, Forst. 725
 Skirrhophorus, DC. 712
 Skytanthus, Meyen. 601
 Skytophyllum, Eckl. et Zeyh. 583
 Slateria, Desv. 205
 Slevogtia, Reichb. 614
 Sloanea, Linn. 372
 Sloanite, 372
 Smeathmannia, Soland. 331
 Smeathamnium, E. 458
 Smeagadermos, Ruiz et Pav. 565
 Smezmanthe, Fenzl. 498
 Smelowskia, C. A. Mey. 354
 Smilacaceæ, 212, 215
 Smilacina, Desf. 295
 Smilax, L. 216
 Smithia, Ait. 554
 Smithia, Gmel. 632
 Smyrniaceæ, 779
 Smyrniopsis, Boiss. 779
 Smyrniun, Elliot. 778
 Smyrniun, Linn. 779
 Soapworts, 382
 Sobralia, Ruiz et Pav. 182
 Sobrya, Pers. 711
 Soecus, Rumph. 271
 Solala, Forst. 354
 Solalgina, Cass. 712
 Solalgina, Steud. 712
 Solanaceæ, 615, 618*, 619
 Solja, Mönch. 555
 Solanales, 245, 246, 615*, 668
 Solandra, Linn. f. 778
 Solandra, Murr. 270
 Solandra, Swartz. 621
 Solandra, Roth. 709
 Solanææ, Juss. 618
 Solanoides, Tourn. 509
 Solanum, Linn. 622
 Soldauella, Tourn. 645
 Soldevilla, Lagasc. 715
 Solea, Spreng. 339
 Soleirolia, Gaud. 262
 Solena, Loureir. 315
 Solena, Willd. 765
 Solenandria, Palis. 450
 Solenantha, G. Don. 582
 Solenanthus, Kunth. 693
 Solenanthus, Ledeb. 656
 Solenia, Pers. 43
 Soleniscia, DC. 449
 Solenocarpus, Wight. et Arn. 467
 Solenogyne, Cass. 710
 Solenogynææ, 710
 Solenomelus, Miers. 161
 Solenophora, Benth. 672
 Solenopsis, Presl. 693
 Solenostemma, Hayn. 626
 Solenostemon, Schum. 661
 Solenostigma, Endl. 580
 Solenotheca, Nutt. 711
 Solenotus, DC. 767
 Solidaginææ, 710
 Solidago, Linn. 710
 Solieria, J. Agh. 10, 25
 Soligrania, DuRoi. xxxvii
 Solitegmia, Dumort. xxxvii
 Soliva, Ruiz et P. 712
 Solivea, Cass. 712
 Sollya, Lindl. 441
 Solori, Adans. 555
 Solorina, Achar. 50
 Sommea, Bory. 701
 Sommera, Schlecht. 765
 Sommerauera, Hopp. 497
 Sommerfeldtia, Schum. 555
 Sommerfeltia, Flörk. 50
 Sommerfeltia, Less. 710
 Sommeringia, Mart. 554
 Sonchus, Linn. 715
 Soncorus, Rumph. 167
 Sondera, Lehmann. 434
 Sonerila, Roxb. 733
 Sonneratia, Comm. 588
 Sonneratia, Linn. f. 738
 Sonninia, Reichb. 626
 Sophia, Haller. 354
 Sophera, Linn. 555
 Sopherææ, 555, 556
 Sopheranthææ, Benth. 685
 Sopheronia, Lichtensl. 161
 Sopheronitis, Lindl. 181
 Soperbia, Hamill. 685
 Sorania, Aubl. 424
 Soranthe, Salisb. 533
 Soranthera, Postels. 22
 Soranthus, Ledeb. 778
 Sorbaria, Ser. 565
 Sorbus, Linn. 560
 Sorediosporium, Corda. 44
 Soreua, Lindl. 654
 Sorghum, Pers. 116
 Soria, Adans. 351
 Sorindeia, Thouars. 467
 Sorocea, St. Hil. 271
 Sorocephalus, R. Br. 523
 Soroospora, Huss. 796
 Sotor, Fenzl. 796
 Souala, Blanc. 492
 Souari, Aubl. 290
 Soulaia, Lam. 378
 Soulaia, Endl. 375
 Soulaugia, Brongn. 542
 Souroben, Aubl. 404
 Southwellia, Salisb. 362
 Sowerbaia, Smith. 205
 Soverin, Moench. 715
 Soyaida, Adr. Juss. 462
 Spachia, A. de J. 390
 Spachin, Lilja. 725
 Spadactis, Cass. 714
 Spadonia, Fries. 43
 Spadonia, Less. 714
 Spadostyles, Benth. 553
 Spædonææ, Desf. 555
 Spætalumææ, Nuttall. 525
 Spætalumæ, Jack. 718
 Spallanzania, Neck. 755
 Spallanzania, Pollin. 535
 Spananthe, Jacq. 778
 Spaniophilon, Less. 714
 Spanotrichum, E. Mey. 713
 Sparassis, Fries. 42
 Sparatospërma, Mart. 677
 Sparaxis, Ker. 161
 Sparganium, L. 126
 Sparganioidææ, Link. 126
 Sparganophorus, Vaill. 709
 Sparmannia, Thunb. 372
 Spartianthus, Link. 554
 Spartalia, Schreb. 116
 Spartium, Linn. 554
 Spartothalmus, A. Cunn. 665
 Spatalanthus, Sweet. 161
 Spatalia, Salisb. 533
 Spathaceæ, L. xxxiii
 Spathandra, Guill. et P. 733
 Spathanthus, Desv. 187
 Spathe, P. Br. 473
 Spathelia, Linn. 473
 Spathicarpa, Hook. 129
 Spathiostemon, Blum. 281
 Spathiphyllum, Schott. 194
 Spathium, Lindl. 181
 Spathium, Lour. 210
 Spathodea, Beauv. 677
 Spathoglottis, Blum. 181
 Spatholobus, Hassk. 555
 Spathularia, Haw. 586
 Spathularia, St. Hil. 339
 Spathulea, Fries. 43
 Spathyema, Rafin. 194
 Spathysia, Nees. 58
 Spatoglossum, Kt. 10
 Specklinia, Lindl. 181
 Specularia, Heist. 619
 Speira, Corda. 42
 Spelta, Endl. 116
 Spennera, Mart. 733
 Spergella, Fenzl. 497
 Spergula, L. 499
 Spergularia, Pers. 499
 Spertlingia, Vahl. 627
 Spermacocæ, Linn. 764
 Spermacocidææ, 764
 Spermadietion, Roxb. 764
 Spermagonia, Bonnem. 19
 Spermatochus, Kt. 10
 Spermatura, Reichb. 779
 Spermaxyrum, Lab. 444
 Spermodon, Palis. 119
 Spermolepis, Fries. 44
 Spermogonia, Bonnem. 13
 Spermolepis, Raf. 778
 Spermophorææ, Hor. xlv
 Spermophylla, Neck. 712
 Spermoptera, DC. 712
 Spermosira, Kt. 10
 Spermocarpus, L. 10, 22
 Sphacelariææ, 22
 Sphacelaria, L. 22
 Sphacelaria, Benth. 662
 Sphacelata, St. Hil. 370
 Sphærangium, Presl. 693
 Sphæranthe, 710
 Sphæractina, Vaill. 710
 Sphærostrum, Meyen. 9, 13
 Sphærella, Sommier. 18
 Sphæria, L. 43
 Sphæriaceæ, Fr. 43
 Sphæridiophorum, Desv. 554
 Sphærine, Herb. 158

- Sphaerobolus*, *Tode*. 42
Sphaerocarpus, *DC*. 436
Sphaerocarpha, *Grisch*. 614
Sphaerocarpus, *Gawl*. 167
Sphaerocarpus, *Huss*. 796
Sphaerocarpus, *Michx*. 57
Sphaerocarpha, *Wall*. 788
Sphaerocephalus, *Lag*. 714
Sphaerochloa, *Palis*. 122
Sphaerococca, *DC*. 385
Sphaerococcæ, 10, 25
Sphaerococcus, *Grev*. 25
Sphaerococcus, *Stackh*. 10
Sphaerocyonium, *Presl*. 80
Sphaerogona, *Link*. 18
Sphaerolobium, *Smith*. 553
Sphaeroma, *DC*. 370
Sphaeromeria, *Nutt*. 712
Sphaeromorphaea, *DC*. 712
Sphaeromphale, *Reichb*. 50
Sphaeroneura, *Fries*. 42
Sphaeroneuri, *Corda*. 42
Sphaerophora, *Hassall*. 796
Sphaerophoridae, 50
Sphaerophorou, *Pers*. 50
Sphaerophysa, *DC*. 554
Sphaeroplea, *Ag*. 10, 18
Sphaeroplethia, *Duby*. 18
Sphaeropsis, *Leveill*. 796
Sphaeropteris, *R. Br*. 80
Sphaeroscinc, *Wall*. 464
Sphaerosoma, *Klotzsch*. 43
Sphaerosporium, *Schw*. 43
Sphaerostachys, *Miq*. 518
Sphaerostema, *Bhan*. 306
Sphaerostephanus, *J. S.* 79
Sphaerostigma, *Sering*. 725
Sphaerotele, *Presl*. 153
Sphaerothalia, *Nees*. 50
Sphaerotherca, *Cham*. 685
Sphaerotilus, *Kütz*. 9, 18
Sphaerozyga, *Ag*. 10, 18
Sphagnaceæ, *Endl*. 61
Sphagnum, *Dill*. 67
Sphallerocarpus, *Bess*. 779
Sphenandra, *Benth*. 634
Sphenantha, *Schrad*. 745
Sphenocarpus, *Rich*. 718
Sphenoclea, *Görtn*. 691
Sphenocleaceæ, *Mart*. 689
Sphenodesme, *Jack*. 664
Sphenogyne, *R. Br*. 712
Sphenogyneæ, 712
Sphenophorn, *Kütz*. 13
Sphenopus, *Trin*. 116
Sphenostyles, *E. Mey.* ? 555
Sphenotoma, *R. Br*. 449
Sphinctanthus, *Benth*. 765
Sphincterostigma, *Sch*. 129
Sphinctocystis, *Hassall*. 796
Sphinctolobium, *Vog*. 555
Sphinctrina, *Fries*. 44
Sphingium, *E. Mey.* 554
Sphondylastrum, *Torr*. 723
Sphondylium, *Tourn*. 778
Sphondylococcum, *Mit*. 664
Sphondylophyllum, *T. et A. Gr.* 723
Sphyridium, *Plot*. 50
Sphyrospermum, *Pöppig*. 758
Spicaria, *Benth*. 661
Spicillaria, *A. Rich*. 765
Spicula, *Lindl*. 182
Spielmannia, *Guss*. 778
Spielmannia, *Med*. 664
Splesia, *Neck*. 554
Spiae words, 188
Spigeteæ, 604
Spigelia, *Linn*. 604
Spigeliaceæ, *Martius*. 602
Spilacron, *Cass*. 714
Spilanthes, *Jacq*. 711
Spilocrea, *Fries*. 42
Spinacia, *Tourn*. 513
Spindle-trees, 586
Spinifex, *Linn*. 115
Spiracantha, *H. B. K.* 709
Spiradialis, *Blum*. 765
Spiraea, *Linn*. 565
Spiræidæ, 565
Spiralepis, *Don*. 713
Spiranthera, *Boj*. 631
Spiranthera, *St. Hil.* 471
Spiranthera, *Hook*. 441
Spiranthes, *L. C. R.* 182
Spiranthidæ, *Lindl*. 182
Spirastigma, *Herit*. 143
Spirhymentia, *Dec*. 25
Spiridanthus, *Fenzl*. 712
Spiridens, *Nees*. 67
Spirocarpha, *DC*. 361
Spirodia, *Schleid*. 125
Spirogyra, *Link*. 10
Spirogyra, *Nees*. 18
Spirolobææ, 355
Spronema, *Hochst*. 664
Spronema, *Lindl*. 188
Spirospermum, *Thouars*. 795
Spirostylis, *Presl*. 791
Spirotropis, *Tulasne*. 555
Spirulina, *Turp*. 9, 18
Spitzelia, *Schultz*. 715
Spixia, *Leandr*. 281
Spixia, *Schrauk*. 709
Spilachnidium, *Grev*. 10, 22
Spilachnum, *Linn*. 67
Splanchnomyces, *Cord*. 42
Splanchnonema, *Corda*. 43
Spiligerbera, *Miq*. 262
Splitmosses, 63
Spodiopogon, *Trin*. 116
Spondiaceæ, *Kunth*. 465
Spondias, *Linn*. 467
Spondylocadium, *Mart*. 44
Sponglocarpidæ, 24
Sponglocarpus, *Grev*. 24
Spongiteæ, 10
Spongites, *Kütz*. 10, 25
Spongocarpus, *Kütz*. 10, 22
Spongodium, *Lamx*. 22
Spongomorpha, *Ktz*. 10
Spongopsis, *Ktz*. 10
Spongostemma, *R.* 700
Spongotrichum, *Nees*. 709
Sponia, *Comm*. 580
Sporendonema, *Desm*. 44
Sporidismium, *Lk*. 42
Sporidiiferi, 43
Sporiferi, 41
Sporisorium, *Ehrenb*. 42
Sporledera, *Benth*. 670
Sporobolus, *R. Br*. 115
Sporochneæ, 10
Sporochnidae, 22
Sporochnus, *Ag*. 10, 22
Sporocybe, *Fries*. 43
Sporodinia, *Link*. 43
Sporodum, *Corda*. 43
Sporomega, *Fr*. 43
Sporophleum, *Nees*. 43
Sporophoræ, *Hor.* xlv
Sporotrichum, *Link*. 43
Sprekalia, *Heist*. 158
Sprengelia, *Smith*. 449
Sprengelia, *Schull*. 364
Sprucea, *Hook. f. et Wils.* 796
Spumaria, *Pers*. 42
Spurgeworts, 274
Spyridia, *Harv*. 24
Spyridium, *Fenzl*. 582
Spyrogyra, *Lk*. 18
Squamaria, *DC*. 50
Squamaria, *Hall*. 611
Squamaria, *Zanard*. 25
Squilla, *Nees*. 205
Staavia, *Thunb*. 785
Staberoha, *Kunth*. 121
Stacheæ, 662
Stachyanthus, *DC*. 709
Stachybotrys, *Corda*. 43
Stachygyandraum, *Ps.* 70
Stachymorpha, *Oth*. 498
Stachyobiun, *Lindl*. 181
Stachys, *Benth*. 662
Stachystemon, *Planchon*. 796
Stachytarpheta, *Vahl*. 664
Stachyurus, *S. et Z.* 441
Stackhousee, *R. Br*. 589
Stackhousia, *Lamx*. 22
Stackhousia, *Smith*. 589
Stackhousiaceæ, 576, 589°
Stackhousiads, 589
Stadmnunia, *Lam*. 385
Stæchas, *Tournef*. 661
Stachospermum, *Ktz*. 10
Stæhelina, *DC*. 713
Stæhelina, *Hall*. 635
Stelia, *Cham*. 764
Stagmaria, *Jack*. 467
Stalagmites, *Murr*. 402
Staminacia, *Dumort.* xxxvii
Stammarium, *Willd*. 709
Stanhopea, *Frost*. 182
Stanleya, *Nutt*. 354
Stapelia, *Linn*. 627
Stapeliæ, 626
Staphylea, *L.* 381
Staphyleaceæ, 373, 381*
Staphylocladon, *Tournef.* 381
Staphysagria, *DC*. 428
Starbin, *Thouars*. 684
Starkea, *Willd*. 709
Starworts, 284
Staticæ, *L.* 641
Staticææ, 641
Statuminate, *L.* xxxiv
Stautonin, *DC*. 304
Stauracanthus, *Link*. 554
Stauranthera, *Benth*. 672
Staurastrum, *Meyen*. 9, 13
Stauroglotis, *Schauc*. 181
Staurogyne, *Wall*. 680
Stauronatum, *Schott*. 129
Staurorhallus, *Mont*. 796
Staurorhagm, *Fisch. et Mey.* 634
Staurospermum, *Thom*. 10
Stæchmannia, *DC*. 713, 764
Steenhammaria, *Reichb*. 656
Steffensia, *Kunth*. 518
Stegania, *R. Br*. 80
Steganotropis, *Lehm*. 555
Steganotus, *Cass*. 713
Stegasma, *Corda*. 42
Stegia, *Fries*. 43
Stegia, *Mönch*. 370
Stegogramma, *Blum*. 79
Stegonema, *Benth*. 609
Stegobolus, *Mont*. 42
Stegosporium, *Corda*. 42
Stegosia, *Lour*. 116
Steinhelia, *Dec*. 626
Steiractis, *DC*. 710
Steirodiscus, *Less*. 712
Steiroglossa, *DC*. 712
Steironema, *Raf*. 645
Stelechocarpum, *Blum*. 402
Steleocorys, *E.* 182
Stelephurus, *Adans*. 115
Stelis, *Suartz*. 181
Stellanthe, *Benth*. 455
Stellaria, *Fisch*. 611
Stellaria, *L.* 498
Stellaria, *Mönch*. 205
Stellatæ, *L.* xxxiv
Stellatæ, *Ray*. 768
Stellatæ, 768
Stellera, *Turcz*. 614
Stellern, *Linn*. 531
Stellulina, *Link*. 18
Stematospermum, *Palis*. 116
Stemmacantha, *Cass*. 714
Stemmadenia, *Benth*. 601
Stemmatosiphon, *Pohl*. 593
Stemmodontia, *Cass*. 711
Stemodia, *Linn*. 685
Stemona, *Lour*. 220

- Stemonitis, *Oled.* 42
 Stemonurus, *Bl.* 444
 Stemphylium, *Walt.* 13
 Stenactis, *Cuss.* 710
 Stenandrium, *Nees.* 679
 Stenanthera, *R. Br.* 449
 Stenanthium, *A. Gr.* 199
 Stenia, *Lindl.* 182
 Stenocarpa, *Lindl.* 182
 Stenocarpus, *R. Br.* 534
 Stenochilus, *R. Br.* 665
 Stenochlora, *J. Sm.* 79
 Stenoclina, *DC.* 713
 Steuocœlium, *Ledeb.* 778
 Stenocoryne, *Lindl.* 182
 Stenodon, *Naud.* 733
 Stenoglossum, *H. B. K.* 181
 Stenoglossis, *Lindl.* 182
 Stenogramma, *Harr.* 25
 Stenogyne, *Benth.* 662
 Stenolobium, *Benth.* 555
 Stenolobium, *Don.* 677
 Stenolobus, *Presl.* 80
 Stenolophus, *Cuss.* 714
 Stenomesson, *Herb.* 158
 Stenopetalum, *R. Br.* 354
 Stenophyllum, *Less.* 715
 Stenoptera, *Lindl.* 182
 Stenoptera, *Presl.* 182
 Stenorhynchus, *L. C. Rich.* 182
 Stenosemia, *Presl.* 67
 Stenosiphon, *Spach.* 725
 Stenosiphonium, *Nees.* 679
 Stenosolenium, *Turcz.* 656
 Stenostemum, *Juss.* 764
 Stenostomum, *Gärtn.* 764
 Stenotenia, *Boiss.* 778
 Stenotaphrum, *Trin.* 115
 Stenotheca, *Mom.* 715
 Stenotium, *Presl.* 693
 Stenotus, *Nutt.* 710
 Stenygra, *Barbo.* 646
 Stephanandra, *Zucc.* 565
 Stephananthus, *Lehm.* 710
 stephania, *Lour.* 309
 stephania, *Willd.* 353
 stephanium, *Schreb.* 764
 Stephanocarpus, *Sp.* 350
 Stephanocoma, *Less.* 713
 Stephanopappus, *Less.* 713
 Stephanophyllum, *Guill.* 122
 Stephanophyllum, *Pohl.* 679
 Stephanopodium, *Pöpp.* 583
 Stephanostoma, *Zipp.* 795
 Stephanotis, *Thouars.* 627
 Stereaceæ, 362
 Sterculia, *L.* 362
 Sterculiaceæ, 359, 360^o
 Sterculiada, 360
 Sterebeckia, *Schreb.* 354
 Stereocaulon, *Schreb.* 50
 Stereocladon, *Hook. f.* 796
 Stereococcus, *Ktz.* 14
 Stereodermis, *Blum.* 617
 Stereodon, *Brid.* 67
 Stereonema, *Ktz.* 9
 Stereophyllum, *Brid.* 67
 Stereospermum, *Cham.* 677
 Stereoxylon, *R. et P.* 752
 Stereum, *Lk.* 41
 Sterigma, *DC.* 355
 Sterigmotemon, *M. B.* 355
 Steripha, *Sol.* 622
 Steriphoma, *Speng.* 353
 Steria, *Burm.* 629
 Sternbergia, *W. et K.* 158
 Stendelia, *Mart.* 323
 Stendelia, *Presl.* 478
 Stendelia, *Speng.* 291
 Stendellia, *Fenzl.* 496
 Stevartia, *Forsk.* 370
 Stevensia, *Andrz.* 354
 Stevensia, *F. et A.* 354
 Stevensia, *Poir.* 765
 Stevnia, *Cav.* 769
 Stibas, *Comm.* 696
 Sticherus, *Presl.* 80
 Stichocarpus, *Ag.* 25
 Sticta, *Schreb.* 50
 Stictis, *Pers.* 43
 Stictosiphon, *Ktz.* 10
 Stiffia, *Mik.* 714
 Stiffia, *Nardo.* 22
 Stigmatanthus, *Lour.* 765
 Stigmaphyllon, *A. de J.* 390
 Stigmatota, *Lour.* 328
 Stigmatanthus, *Röm. et Sch.* 765
 Stigmatidium, *Meyer.* 50
 Stigmatococca, *Willd.* 622
 Stigmatotheca, *C. H. Sch.* 712
 Stigmaea, *Fr.* 43
 Stigonema, *Ag.* 18
 Stilaginacæ, 258, 259^o
 Stilagineæ, *Ag.* 259
 Stilago, *Linn.* 259
 Stilbaceæ, 594, 607^a
 Stilbacei, 43
 Stilbe, *Berg.* 608
 Stilbids, 607
 Stilbinere, *Kunth.* 607
 Stilbospora, *Pers.* 42
 Stilbum, *Tole.* 43
 Stilipus, *Raf.* 565
 Stillingfleetia, *Boj.* 281
 Stillingia, *Gard.* 281
 Stilophora, *J. Agh.* 22
 Stilpnogyne, *DC.* 713
 Stilpnopappus, *Mart.* 709
 Stilpnophyllum, *Less.* 712
 Stipa, *Linn.* 115
 Stipagrostis, *Nees.* 115
 Stipeæ, 115
 Stipocaulon, *Ktz.* 10
 Stipopodium, *Ktz.* 10
 Stipularia, *Haw.* 499
 Stipularia, *Palis.* 765
 Stipularia, *L. C. R.* 499
 Stirlingia, *Endl.* 533
 Stissera, *Giescke.* 167
 Stixis, *Lour.* 795
 Stiza, *E. Mey.* 554
 Stizolobium, *Pers.* 555
 Stizolopius, *Cass.* 714
 Stobæa, *Thunb.* 713
 Stœbe, *Less.* 713
 Stokesia, *Herit.* 709
 Stomandra, *R. Br.* 604
 Stomarrhena, *DC.* 449
 Stomatechium, *Lehm.* 656
 Storarworts, 592
 Storkia, *Crantz.* 205
 Strabonia, *DC.* 710
 Stramonium, *Tourn.* 621
 Strangweia, *Bertoloni.* 205
 Stranvæsia, *Lindl.* 560
 Stratifotæ, *Link.* 141, 142
 Stratiotes, *Dill.* 142
 Stratiotes, *Vail.* 646
 Strassia, *DC.* 764
 Stravadia, *Pers.* 755
 Stravadium, *Juss.* 755
 Strehanthus, *Rafin.* 778
 Strebilanthera, *Steud.* 656
 Strebildia, *Link.* 119
 Strebilocarpus, *Arnott.* 358
 Strebilrhiza, *Endl.* 554
 Strebilrichium, *Palis.* 67
 Strebilna, *Lour.* 271
 Streckera, *Schultz.* 715
 Strelitzia, *Banks.* 164
 Strepelia, *A. Rich.* 764
 Strepellum, *Palis.* 67
 Strepidium, *Schrad.* 115
 Strepiphodon, *Ser.* 494
 Strepisla, *Nutt.* 148
 Streptachne, *R. Br.* 115
 Streptanthera, *Sussel.* 161
 Streptanthus, *Nutt.* 344
 Streptium, *Rehb.* 634
 Streptocarpus, *Lindl.* 672
 Streptocaulon, *W. et A.* 626
 Streptochæta, *Nees.* 116
 Streptogyne, *Palis.* 116
 Streptopetalum, *Hochst.* 310
 Streptopus, *Rich.* 109
 Streptostachys, *Palis.* 115
 Streptothrix, *Corda.* 43
 Striaria, *Grev.* 10, 22
 Striatella, *Ag.* 13
 Strigaria, *DC.* 685
 Strigia, *DC.* 709
 Strigilia, *Cav.* 593
 Strobila, *G. Don.* 656
 Strobilanthes, *Blum.* 679
 Strobilocarpus, *Kl.* 785
 Strobilorachis, *Kl.* 679
 Strobocalyx, *Blum.* 709
 Stroganovia, *Kar.* 355
 Strömia, *Pahl.* 358
 Strombosia, *Blum.* 582
 Strongylodon, *Vog.* 555
 Strongyloperma, *Less.* 712
 Strophia, *Norrmh.* 520
 Strophanthus, *DC.* 601
 Strophostoma, *Turcz.* 656
 Strophopappus, *DC.* 709
 Strophostyles, *Ell.* 555
 Struchium, *P. Br.* 709
 Struckeria, *Fl. Fl.* 380
 Strumaria, *Jaeg.* 158
 Strumpfia, *Jaeg.* 765
 Struthianthus, *Mart.* 791
 Struthiola, *Linn.* 531
 Struthiopteris, *Willd.* 80
 Struthium, *Ser.* 498
 Struvea, *Sonder.* 796
 Strychnacæ, *Blume.* 602
 Strychnæ, *DC.* 602, 604
 Strychnodaphne, *Nees.* 537
 Strychnos, *Linn.* 604
 Stryphnodendron, *M.* 556
 Stuartia, *Catesb.* 765
 Stuebendorfia, *Schr.* 355
 Sturmia, *Gärtn.* 764
 Sturmia, *Hoppe.* 115
 Sturmia, *Reichb.* 181
 Stygeoclonium, *Ktz.* 10
 Stylandra, *Nutt.* 626
 Stylesia, *Nutt.* 712
 Styleworts, 696
 Stylidæ, *R. Br.* 696
 Stylidiaceæ, 688, 696^o
 Stylidium, *Lour.* 720
 Stylidium, *Swartz.* 696
 Stylimum, *Rafin.* 631, 710
 Stylis, *Poir.* 720
 Stylisma, *Rafin.* 631
 Stylaria, *Ag.* 13
 Stylobasium, *Schw.* 18
 Stylobasium, *Desf.* 513
 Stylohates, *Fr.* 41
 Styloceras, *A. J.* 281
 Stylochæton, *Lepr.* 129
 Stylocline, *Nutt.* 710
 Stylocolumbium, *Brid.* 67
 Stylocoryne, *Cav.* 765
 Stylococcus, *Benn.* 282
 Styloglossum, *K. et H.* 182
 Stylogyne, *A. DC.* 648
 Stylolepis, *Lehm.* 713
 Styloncerus, *Labill.* 712
 Stylonema, *DC.* 354
 Stylopappus, *Nutt.* 715
 Styloporum, *Nutt.* 431
 Stylosanthus, *Linn.* 554
 Stylurus, *Sulph.* 633
 Stylurus, *Rafin.* 427
 Stypandra, *R. Br.* 205
 Stypelia, *Smith.* 449
 Stypellia, 449
 Stypidium, *Rafin.* 18
 Stypidolobium, *Schott.* 559
 Stypheonia, *Nutt.* 467
 Syraceacæ, 574, 592
 Syraceæ, *Rich.* 592, 593

- Styracine, *Rich.* 592, 593
 Styrax, *Tourn.* 593
 Stysanus, *Corda.* 43
 Suæda, *Forsk.* 513
 Suardia, *Schrank.* 115
 Suiber, *Tourn.* 291
 Sublimia, *Comm.* 138
 Subularia, *DC.* 355
 Subulnridæ, 355
 Succisa, *Vahl.* 700
 Succowia, *Med.* 355
 Succowia, *Deunsl.* 390
 Succulentæ, *Vent.* 344
 Succulentæ, *L.* xxxiv
 Suchtelenia, *Karel.* 656
 Suffrenia, *Bell.* 575
 Suhria, *J. Agh.* 25
 Suillus, *Mich.* 41
 Sulipa, *Blanc.* 765
 Sullivantia, *Torr.* 568
 Sulzeria, *R. et Sch.* 604
 Sumac, *DC.* 467
 Sundews, 433
 Sunipa, *Lindl.* 181
 Suprago, *Gürtl.* 709
 Suregada, *Roxb.* 282
 Surenus, *Rumph.* 462
 Surianaceæ, *Wight et Arn.* 509
 Surubea, *Mey.* 404
 Susum, *Blum.* 192
 Suteria, *Roth.* 684
 Suteria, *DC.* 764
 Sutherlandia, *Gmel.* 362
 Sutherlandia, *R. Br.* 554
 Sutrina, *Lindl.* 182
 Suttonia, *A. Rich.* 648
 Svitramia, *Cham.* 733
 Swainsona, *Salisb.* 554
 Swammerdamia, *DC.* 713
 Swartzia, *Ehrh.* 67
 Swartzia, *Willd.* 556
 Swartzia, *Gmel.* 621
 Swartzia, 555
 Sweetia, *Spr.* 555
 Swertia, *Linn.* 615
 Swertia, *Ludlow.* 715
 Swietenia, 462
 Swietenia, *L.* 462
 Syagrus, *Mart.* 139
 Syalita, *Adans.* 424
 Syama, *Jones.* 511
 Sychinium, *Desv.* 268
 Syckorea, *Cord.* 60
 Sycoidæ, *Link.* 266
 Sycomorphe, *Miq.* 268
 Syena, *Schreb.* 189
 Sykesia, *Arn.* 604
 Sylitra, *E. Mey.* 554
 Syllisium, *Schauer.* 738
 Sylvia, *Benth.* 685
 Symblomeria, *Nutt.* 709
 Spubolanthus, *Don.* 614
 Symmetria, *Blum.* 575
 Synpachne, *Palis.* 122
 Sympagis, *Nees.* 679
 Symphandra, *Alph. DC.* 691
 Symphocalyx, *Bert.* 751
 Symphouia, *L. f.* 402
 Symphorema, *Roxb.* 661
 Symphoria, *Pers.* 767
 Symphoricarpus, *Dill.* 767
 Symphyllanthus, *Vahl.* 583
 Symphyodon, *Mont.* 67
 Symphyogyna, *N. et M.* 59
 Symphyolepis, *E.* 533
 Symphyoloma, *C. A. Mey.* 778
 Symphyomyrtus, *Schz.* 737
 Symphyonema, *R. Br.* 533
 Symphyosiphon, *Ktzt.* 10
 Symphyostemon, *Miers.* 161
 Symphyothrix, *Ktzt.* 10
 Symphyotrichum, *Nees.* 709
 Symphysis, *Presl.* 758
 Symphysodon, *Dozy.* 67
 Symphytum, *Linn.* 656
 Sympieza, *Licht.* 455
 Symplocarpus, *Salisb.* 194
 Symplocæ, 593
 Symplocinæ, *Don.* 592
 Symplocos, *Jacq.* 593
 Sympodium, *Koch.* 778
 Syna-dryas, *Lindl.* 291
 Synalysiss, *Fr.* 49
 Synnumia, *Presl.* 79
 Synandra, *Nutt.* 662
 Synandra, *Schrad.* 679
 Syuanthereie, *Rich.* 702
 Syuaphea, *R. Br.* 533
 Synaphlebium, *J. Sm.* 80
 Synarthena, *Fisch.* 591
 Synarthrum, *Cass.* 713
 Synaspisma, *E.* 281
 Synassa, *Lindl.* 182
 Syncarpha, *DC.* 713
 Syncarpia, *Tenor.* 737
 Syncephalanthus, *Bartl.* 711
 Syncephalum, *DC.* 713
 Synchacta, *Ktzt.* 10
 Synchodeudron, *Boj.* 709
 Syncollostemon, *E. M.* 661
 Syndesmanthus, *Kl.* 455
 Syndesmis, *Wall.* 467
 Syndesmon, *Ilfing.* 427
 Syndonisee, *Radd.* 58
 Synechophyta, *Schleiden.* 255
 Syuedrella, *Gürtl.* 711
 Synucleoseindium, *Boiss.* 778
 Syngonium, *Schott.* 129
 Syngamma, *J. Sm.* 796
 Syuueua, *Benth.* 685
 Syngorgana, *Schultz.* xl
 Synorgana dichorganoidea, *Sch.* xl
 Synorhiza, *Rich.* 235
 Synuotia, *Svecl.* 161
 Syuotoma, *Don.* 691
 Synóum, *A. Juss.* 464
 Synphyllium, *Griff.* 685
 Synpoca, *Ktzt.* 10
 Synsporeæ, *Decaisne.* 14
 Synterisma, *Schrad.* 115
 Syntylris, *Benth.* 685
 Syntriehia, *W. et M.* 67
 Syuzyganthera, *Ruiz et Pav.* 329
 Syorhynchium, *Hoffm.* 161
 Syrenia, *Andrz.* 354
 Syrenopsis, *Jaub.* 354
 Syringa, *Linn.* 617
 Syringa, *Tourn.* 753
 Syringas, 753
 Syrifugodea, *Benth.* 455
 Syringosinn, *Mart.* 601
 Syrmatium, *Vog.* 554
 Syrrhopodon, *Schwägr.* 67
 Syspone, *Grisch.* 554
 Systylium, *Hornsch.* 67
 Syurus, *Endl.* 116
 Syzigites, *Ehrenb.* 43
 Syzygium, *Gärtl.* 738
 Szovitsia, *F. et M.* 779
 Tabacina, *Reichb.* 621
 Tabacum, *Reichb.* 621
 Tabacus, *Monch.* 621
 Tabebuia, *Gom.* 677
 Tabellaria, *Rafis.* 13
 Tabernæmoutann, *Plum.* 601
 Tacazza, *Dec.* 626
 Tacca, *Forst.* 150
 Tacaceæ, 146, 149*
 Taccads, 149
 Taceæ, *Presl.* 149
 Tuchia, *Aubl.* 614
 Tachia, *Pers.* 556
 Tachiadenus, *Grisch.* 614
 Tachibota, *Aubl.* 328
 Tachigalia, *Aubl.* 556
 Taesonia, *Juss.* 334
 Tænocarpus, *Desv.* 555
 Taniophyllum, *Blum.* 181
 Taniopsis, *J. Sm.* 79
 Taniostema, *Spach.* 350
 Tanitiss, *Swartz.* 79
 Teetsia, *Medik.* 205
 Tafalla, *Ruiz et Pav.* 520
 Tagetæ, 711
 Tagetes, *Tourn.* 711
 Tailworts, 213
 Tainia, *Blum.* 181
 Tala, *Blanco.* 685
 Talamua, *Juss.* 419
 Talerodictyon, *Endl.* 18
 Talguenea, *Miers.* 582
 Taliera, *Mart.* 139
 Taliglea, *Aubl.* 664
 Talinastrum, *DC.* 501
 Tallinellum, *DC.* 501
 Talinum, *Adans.* 501
 Talisia, *Aubl.* 385
 Tamaricaceæ, 326, 341*
 Tamarindus, *Linn.* 556
 Tamariscinæ, *Desv.* 341
 Tamarisks, 341
 Tamarix, *L.* 342
 Tamboirissa, *Sonner.* 239
 Tamnus, *Juss.* 214
 Tamonea, *Aubl.* 664
 Tampon, *Aubl.* 795
 Tamus, *Linn.* 214
 Tannacetum, *Linn.* 712
 Tancæcium, *Swartz.* 674
 Tanghinia, *Thouars.* 674
 Tanibouca, *Aubl.* 718
 Tankervillea, *Link.* 181
 Tapeianthus, *Herb.* 158
 Tapeinia, *Comm.* 161
 Tapeinotes, *DC.* 672
 Taphrospermum, *C. A. Mey.* 364
 Tapina, *Mart.* 672
 Tapianthus, *Blum.* 791
 Tapiria, *Juss.* 460
 Tapirgomea, *Juss.* 764
 Taponana, *Adans.* 468
 Tapura, *Aubl.* 583
 Tara, *Molin.* 555
 Taralea, *Aubl.* 555
 Taraxacum, *Juss.* 715
 Tarchonanthæ, 710
 Tarchonanthus, *Linn.* 710
 Tareuna, *Gürtl.* 765
 Targionia, *Michel.* 58
 Targionineæ, *Emdl.* 58
 Targionieæ, *Nees.* 58
 Tarrietin, *Blum.* 385
 Tasmaunia, *R. Br.* 419
 Tassadia, *Dec.* 626
 Tatlia, *Scopol.* 743
 Tauscheria, *Fischer.* 355
 Tauschia, *Presl.* 758
 Tauschia, *Schlecht.* 779
 Taverniera, *DC.* 554
 Taxaceæ, 222, 230*
 Taxads, 280
 Taxanthema, *Neck.* 641
 Taxidæ, *Rich.* 230
 Taxodium, *L. C. Rich.* 229
 Taxostiche, *DC.* 713
 Taxus, *L.* 231
 Tayloria, *Hook.* 67
 Tayotum, *Blanc.* 601
 Tazetta, *DC.* 158
 Tchudya, *DC.* 733
 Tcelzelworts, 699
 Teclen, *Del.* 473
 Tecmarsis, *DC.* 709
 Tecoum, *Juss.* 677
 Tecomaria, *Fenzl.* 677
 Tecophilæa, *Bert.* 161
 Tectaria, *Cavan.* 80
 Teetoua, *Linn.* 664
 Teedia, *Rud.* 684
 Teesdalia, *R. Br.* 354
 Tegania, *Schmid.* 654
 Tegneria, *Lilj.* 501
 Tegularia, *Reimw.* 80
 Teilmeyera, *Scop.* 755

- Telamouha, *Fries*. 41
 Teleiaudra, *Nees*. 537
 Teleianthera, *R. Br.* 511
 Telekia, *Baumg.* 710
 Teleophyta, *Schl.* 95
 Teleozoma, *R. Br.* 80
 Telephastrium, *Dill.* 501
 Telephium, *Tourm.* 499
 Telesia, *E. Mey.* 554
 Telfairia, *Hook.* 315
 Telfairia, *Neem.* 364
 Telipogon, *H. B. K.* 182
 Tellima, *R. Br.* 568
 Telmatophace, *Schleid.* 125
 Telmissa, *Fenzl.* 346
 Telopea, *R. Br.* 534
 Telopea, *Soland.* 281
 Teloxys, *Moq.* 513
 Temachium, *Walfr.* 13
 Temnocydia, *Mart.* 677
 Templetonia, *R. Br.* 553
 Temus, *Molina.* 419
 Tenagocharis, *Hochst.* 298
 Tenaris, *E. Mey.* 626
 Tenorea, *Rafin.* 795
 Tenoria, *Bert.* 714
 Tenoria, *Spreng.* 778
 Tenoria, *Denh.* 679
 Tepesia, *Gärtn.* 765
 Tephrauthus, *Neck.* 282
 Tephrodes, *DC.* 709
 Tephrosia, *Pers.* 554
 Teramnus, *P. Br.* 555
 Terebinthaceæ, *Juss.* 459, 468, 472,
 Terebinthaceæ, *Kunth.* 465
 Terebinthus, 465
 Terebinthus, *Juss.* 467
 Terminalæ, 718
 Terminalia, *Linn.* 718
 Terminaliaceæ, *J. St. Hil.* 717
 Ternaria, *Perl.* xlix
 Ternatea, *Tourm.* 555
 Ternstromia, *Mut.* 397
 Ternstroemia, 392, 396*
 Ternstroemiæ, *Mirb.* 396
 Terpanthus, *Nees. et Mart.* 471
 Terræna, *Coll.* 710
 Terra, *DC.* 764
 Tessarandra, *Miers.* 617
 Tessaria, *Ruiz et Pav.* 710
 Tessarhira, *Turrp.* 9, 13
 Tesselina, *Dum.* 57
 Tessella, *Ehr.* 13
 Tessiera, *DC.* 764
 Tescularia, *Klotzsch.* 42
 Testudinaria, *Salisb.* 214
 Teta, *Rozb.* 205
 Tetanosia, *Rich.* 444
 Tetilla, *DC.* 451
 Tetmemorus, *Rufa.* 796
 Tetracarpæa, *Hook.* 424
 Tetracarpum, *Mech.* 712
 Tetracellium, *Turcz.* 354
 Tetracera, *Lian.* 424
 Tetraceratium, *DC.* 354
 Tetrachne, *Nees* 116
 Tetrachne, *Bunge.* 354
 Tetracmis, *Brid.* 67
 Tetractis, *Beiov.* 711
 Tetracyclus, *Rufa.* 13
 Tetradenia, *Benth.* 661
 Tetradenia, *Nees* 577
 Tetradia, *R. Br.* 362
 Tetradiels, *Steen.* 181
 Tetradium, *Lour.* 67
 Tetradontium, *Schw.* 63
 Tetradymia, *DC.* 713
 Tetragnastria, *Görln.* 281, 469
 Tetraglechin, *Pöpp.* 362
 Tetragnanthis, *Stell.* 614
 Tetragnonæ, 527
 Tetragnonella, *Miq.* 527
 Tetragnonia, *Linn.* 527
 Tetragnoniaceæ, 523, 527*
 Tetragnolonus, *Scop.* 554
 Tetragnonotheca, *Dill.* 711
 Tetrabit, *Mench.* 662
 Tetrabobus, *A. DC.* 686
 Tetrameles, *R. Br.* 317
 Tetramerium, *DC.* 764
 Tetraucira, *Lindl.* 181
 Tetrauclopium, *Nees.* 709
 Tetrauraphæa, *DC.* 714
 Tetrauræna, *Benth.* 684
 Tetrantha, *Poit.* 711
 Tetranthera, *Jacq.* 537
 Tetranthus, *Swartz.* 711
 Tetrapatheæ, *DC.* 334
 Tetrapatheæ, *Ravoul.* 522
 Tetrapeltis, *Wall.* 181
 Tetraphis, *Hedw.* 67
 Tetraphyle, *E. et Z.* 346
 Tetrapillis, *Hedw.* 67
 Tetrapilus, *Lour.* 617
 Tetraphasium, *Kunze.* 451
 Tetrapleura, *Benth.* 556
 Tetrapogon, *Desf.* 115
 Tetrapoima, *Turcz.* 354
 Tetrapomidæ, *Turcz.* 354
 Tetrapterygium, *F. et M.* 355
 Tetrapteryx, *Cav.* 390
 Tetraria, *Palis.* 119
 Tetrarrhena, *R. Br.* 115
 Tetraspora, *Ag.* 9
 Tetrastemon, *Hook.* 733
 Tetratænium, *DC.* 778
 Tetratheca, *Smith.* 374
 Tetrathylacium, *Pöpp.* 339
 Tetrathylax, *Don.* 695
 Tetratome, *Pöpp.* 299
 Tetraulacium, *Turcz.* 685
 Tetrazygia, *Rich.* 733
 Tetrazygos, *Rich.* 733
 Tetrodus, *DC.* 712
 Tetrocium, *Willd.* 144
 Tetrochidium, *Pöpp.* 281
 Tetrochiza, *Roucalm.* 614
 Teucrium, *Linn.* 662
 Teucropsis, *Ging.* 662
 Texieria, *Jaub.* 355
 Thacha, *Spach.* 428
 Thalamanthæ, *Perl.* xlix
 Thalamaulia, *Dumort.* xxxvii
 Thalamia, *Spreng.* 231
 Thalamiflora, *Dumort.* xxxvii
 Thalamitragma, *Dumort.* xxxvii
 Thalamitubia, *Dumort.* xxxvii
 Thalamopetale, *Perl.* xlix
 Thalamungulia, *Dumort.* xxxvii
 Thalassia, *Soland.* 145
 Thalassiophyta, *Lamaroux.* 8
 Thalassiophyllum, *Post.* 10, 22
 Thalassium, *Spreng.* 115
 Thalia, *Linn.* 169
 Thalictrælla, *A. Rich.* 428
 Thalictrum, *Tourm.* 427
 Thallogens, 5
 Thallophyta, *Endl.* 5
 Thamnacantha, *DC.* 714
 Thamnea, *Sobind.* 785
 Thannia, *P. Br.* 328
 Thannium, *Klotzsch.* 455
 Thamulum, *Pent.* 50
 Thammocarpus, *Ktz.* 11
 Thannochortus, *Berg.* 121
 Thannoclonium, *Ktz.* 10
 Thammomyces, *Fhrab.* 43
 Thammophora, *Ag.* 11, 26
 Thammopteris, *Pestal.* 80
 Thammus, *Klotzsch.* 455
 Thapsandra, *Grisch.* 684
 Thapsin, *Tournef.* 778
 Thapsin, *Nutt.* 779
 Thapsidæ, 778
 Thapsium, *Nutt.* 778
 Thammusa, *Ag.* 25
 Thammuria, *Thond.* 262
 Thea, *Linn.* 397
 Theaceæ, *Mirb.* 396
 Theads, 396
 Thebesia, *Neck.* 428
 Thecacoris, *Adr. Juss.* 282
 Thecanthes, *Wikstr.* 531
 Thecocrypus, *Boiss.* 779
 Theis, *Salisb.* 455
 Theka, *Rhœd.* 664
 Thela, *Lour.* 641
 Thelactis, *Mour.* 43
 Thelasis, *Blum.* 181
 Thelobolus, *Tode.* 42
 Thelecarpea, *DC.* 714
 Theliphora, *Ehr.* 41
 Theleporon, *Roth.* 116
 Thelesperma, *Less.* 711
 Thelotrema, *Achar.* 50
 Thelychiton, *Endl.* 181
 Thelygonum, *Linn.* 513
 Thelymitra, *Forst.* 183
 Thelymitridæ, *Lindl.* 183
 Thelypodium, *Endl.* 354
 Thelypteris, *Schott.* 80
 Thelyra, *Thouars.* 543
 Thelythamos, *Spreng.* 712
 Themedæ, *Forsk.* 116
 Thénardia, *Kth.* 601
 Theobroma, *Linn.* 364
 Theodora, *Medik.* 556
 Theodorea, *DC.* 713
 Theodoren, *Neck.* 362
 Theophrasta, *Linn.* 648
 Theophrastaceæ, *A. DC.* 647
 Theophrastææ, 648
 Theriophoum, *Blum.* 129
 Thernia, *Nutt.* 553
 Thermocellium, 10
 Thermopsis, *R. Br.* 553
 Therogeron, *DC.* 710
 Thesiosyris, *Reichb.* 788
 Thesium, *Linn.* 788
 Thespesia, *Cav.* 370
 Thespis, *DC.* 710
 Thevenotia, *DC.* 714
 Thevetia, *Fl. Fl.* 795
 Thevetia, *Linn.* 601
 Thezera, *DC.* 467
 Thibaudia, *Pav.* 758
 Thiebaudia, *Colla.* 181
 Thiga, *Molin.* 390
 Thileo, *Fœuil.* 725
 Thileodoxa, *Cham.* 765
 Thimogeton, *Benth.* 622
 Thiodia, *Benn.* 328
 Thisantha, *Eckl. et Z.* 346
 Thismia, *Griff.* 92
 Thlidiantha, *Bunge.* 315
 Thlaspi, *Dillen.* 354
 Thlaspidæ, 354
 Thlaspidium, *Andrz.* 354
 Thlaspidium, *Medik.* 354
 Thoa, *Anbl.* 234
 Thomasia, *Gay.* 364
 Thompsonia, *R. Br.* 334
 Thomsonia, *Hall.* 129
 Thonungia, *Schum.* 90
 Thora, *DC.* 428
 Thoracosperma, *Klotzsch.* 455
 Thorea, *Ag.* 10
 Thorea, *Bory.* 22
 Thoria, *Bory.* 22
 Thorntonla, *Reichb.* 370
 Thottæ, *Roth.* 794
 Thouarea, *Pers.* 115
 Thammophora, *Synt.* 710
 Thoulia, *Dumby.* 304
 Thoulia, *Poit.* 385
 Thoulia, *Smith.* 632
 Thoulia, *Swartz.* 617
 Thoulia, *Kunth.* 115
 Threlledia, *R. Br.* 513
 Thriolen, *Dum.* 60
 Thrinax, *Linn.* fl. 139
 Thrinax, *Roth.* 715
 Thrixypernum, *Lour.* 181
 Throublum, *Hall.* 18, 50
 Thryallis, *Linn.* 390

- Thrypiomene, *Endl.* 721
 Thuacearum, *Trautv.* 229
 Thuja, *Tourn.* 229
 Thuajopsis, *Zucc.* 229
 Thunbergæ, 679
 Thunbergia, *Linn.* 679
 Thunbergia, *Mont.* 765
 Thuretia, *Dec.* 24
 Thurnheissera, *Pöhl.* 614
 Thyana, *Hamilt.* 385
 Thylacantha, *Nees.* 684
 Thylacanthus, *Tulasnc.* 556
 Thylacites, *Reenalm.* 614
 Thylacium, *Lour.* 358
 Thylacosperma, *Fenzl.* 498
 Thymbra, *Linn.* 661
 Thymelacæe, 529, 530^o
 Thymelæa, *Scop.* 531
 Thymelæa, *Juss.* 330
 Thymelina, *Hoffm.* 531
 Thymophylla, *Lagasc.* 711
 Thymus, *Linn.* 661
 Thyridostachyum, *Nees.* 116
 Thyrsanthus, *Benth.* 601
 Thyrsanthus, *Ell.* 554
 Thyrsanthus, *Schrank.* 645
 Thyrsine, *Gled.* 92
 Thyrsopteris, *Kunze.* 80
 Thyrsanachne, *Presl.* 116
 Thyrsanocladia, *Endl.* 25
 Thyrsanolana, *Nees.* 115
 Thysanomitrium, *Schw.* 67
 Thysanotus, *R. Br.* 205
 Thysanus, *Lour.* 483
 Thyselium, *Adans.* 778
 Thysselinum, *DC.* 778
 Tinanthus, *Herb.* 158
 Tinarella, *Linn.* 568
 Tinariidum, *Lehm.* 653
 Tibouchina, *Aubl.* 723
 Ticorea, *Aubl.* 471
 Tiedmannia, *DC.* 778
 Tigarea, *Aubl.* 424
 Tigarea, *Parsh.* 565
 Tigridia, *Juss.* 161
 Tikante, *Adans.* 555
 Tildeuia, *Miq.* 518
 Tileæ, 372
 Tilesia, *F. W. Mey.* 711
 Tilia, *Linn.* 372
 Tiliacæe, 359, 371*
 Tiliacora, *Colebr.* 309
 Tillæa, *Michx.* 346
 Tillandsia, *Linn.* 148
 Tillandsiæ, *Ad. Juss.* 147
 Tiloblastæe, *Kütz.* 9
 Timandra, *Kl.* 282
 Timemorus, *Rafn.* 13
 Timmia, *Gmel.* 158
 Timmia, *Hecht.* 67
 Timonius, *Rumph.* 764
 Timutua, *DC.* 378
 Tina, *R. Sch.* 385
 Tinguarra, *Part.* 778
 Tinjaria, *Meisn.* 504
 Tinantia, *Scheidt.* 188
 Tinus, *Linn.* 455
 Tinus, *Tourn.* 767
 Tjularia, *Chev.* 44
 Tipularia, *Nutt.* 182
 Tiqulia, *Pers.* 653
 Tiresins, *Bory.* 18
 Tita, *Scop.* 605
 Titanephyllum, *Nardo.* 25
 Titania, *Endl.* 181
 Tithouia, *Desf.* 711
 Tithymaloides, *Tournef.* 281
 Tithymalus, *Tournef.* 281
 Tittmannia, *Brongn.* 785
 Tittmannia, *Reichb.* 685
 Tmesipteris, *Beenrh.* 70
 Toanabo, *Aubl.* 397
 Tobinia, *Desv.* 473
 Tococa, *Aubl.* 743
 Tococyca, *Aubl.* 765
 Todara, *A. Rich.* 181
 Todara, *Part.* 778
 Toddalia, *Juss.* 473
 Todea, *Willd.* 81
 Tofieldia, *Huds.* 199
 Tollatia, *Endl.* 712
 Tolmiea, *Hook.* 450
 Tolmiea, *Torr. et A. Gr.* 568
 Tolpis, *Adans.* 715
 Toluifera, *Linn.* 555
 Toluifera, *Lour.* 460
 Tolypanthus, *Blum.* 791
 Tolypeuma, *E. Mey.* 575
 Tolyptothrix, *Kütz.* 10
 Tomanthea, *DC.* 714
 Tomex, *Forsk.* 795
 Tomex, *Thunb.* 537
 Tonabea, *Juss.* 397
 Tonca, *Rich.* 740
 Touguea, *Endl.* 354
 Tonia, *Aubl.* 122
 Tonsella, *Schreb.* 585
 Tontanea, *Aubl.* 765
 Tontela, *Aubl.* 585
 Toona, *Endl.* 462
 Topabea, *Aubl.* 733
 Tophora, *Fries.* 44
 Tordylioides, *Wall.* 778
 Tordyliopsis, *DC.* 778
 Tordylium, *Tourn.* 773
 Torenia, *Linn.* 685
 Torilis, *Adans.* 779
 Tormentilla, *Tourn.* 564
 Terminaria, *DC.* 560
 Torpesia, *Endl.* 464
 Torreya, *Arn.* 231
 Torreya, *Rafn.* 119
 Torreya, *Spreng.* 664
 Torricella, *DC.* 781
 Torrubia, *Fl. Fl.* 507
 Tortula, *Hecht.* 67
 Tortula, *Roxb.* 664
 Torula, *Pers.* 42
 Torulacæi, *Corda.* 42
 Torulmia, *Bonnem.* 22
 Torulinum, *Desv.* 119
 Touchiroa, *Aubl.* 556
 Tonlichira, *Adans.* 555
 Toulicia, *Aubl.* 385
 Tounatea, *Aubl.* 556
 Tournefortæe, 653
 Tournefortia, *R. Br.* 653
 Tournesolia, *Scop.* 282
 Touroulia, *Aubl.* 781
 Tourretia, *Juss.* 677
 Tovaria, *Neck.* 205
 Tovaria, *Rütz. et P.* 358
 Tovomita, *Aubl.* 402
 Towara, *Adans.* 504
 Townsendia, *Hook.* 709
 Toxicodendron, *Gärtn.* 385
 Toxicodendron, *Thunb.* 282
 Toxicodendron, *Tourn.* 467
 Toxicophleæa, *Harv.* 601
 Toxocarpus, *Wight. et Arn.* 626
 Toxophœnix, *Scholl.* 139
 Tozzetta, *Sav.* 115
 Tozzia, *Linn.* 685
 Trachelium, *Linn.* 691
 Trachilia, *Fr.* 50
 Trachinga, *Endl.* 711
 Trachodes, *Don.* 715
 Trachyandra, *Kth.* 205
 Trachycarpus, *DC.* 713
 Trachycaryon, *Kl.* 281
 Trachydium, *Lindl.* 778
 Trachylobium, *Havn.* 556
 Trachyloma, *Brid.* 67
 Trachyloma, *Nees.* 119
 Trachymene, *Rudge.* 778
 Trachymia, *Link.* 116
 Trachynotia, *Michx.* 116
 Trachyosus, *Reichb.* 115
 Trachyphytum, *Nutt.* 745
 Trachypleurum, *Reichb.* 778
 Trachypodium, *Brid.* 67
 Trachypogon, *Nees.* 116
 Trachys, *Pers.* 115
 Trachysciadium, *DC.* 778
 Trachysperma, *Rafn.* 614
 Trachyspermum, *Link.* 778
 Trachystachys, *Diétr.* 115
 Trachystemon, *Don.* 656
 Trachytella, *DC.* 424
 Tradescantia, *Linn.* 188
 Tragantha, *Wallr.* 709
 Traganthus, *Kl.* 281
 Tragantus, *Del.* 513
 Tragia, *Plum.* 281
 Tragium, *Spreng.* 778
 Tragoceras, *Less.* 711
 Tragopogon, *Linn.* 715
 Tragopyrum, *Bieberst.* 504
 Tragoselinum, *Tourn.* 778
 Tragus, *Hall.* 115
 Trallia, *Lindl.* 355
 Tralliana, *Lour.* 588
 Trametes, *Fr.* 41
 Trapa, *Linn.* 723
 Trapeæ, *Endl.* 723
 Trasus, *Gray.* 119
 Tratinickia, *Pers.* 712
 Tratinickia, *Web.* 22
 Tratinickia, *Willd.* 460
 Trautvetteria, *Fisch. et Mey.* 428
 Treclonates, *Miers.* 622
 Treisia, *Hav.* 281
 Tremandra, *R. Br.* 374
 Tremandraceæ, 373, 374^o
 Tremanthus, *Pers.* 593
 Trematocarpus, *Ktz.* 10
 Trematodon, *Rich.* 67
 Trembley, *DC.* 733
 Tremellini, 42
 Tremella, *Dillen.* 42
 Tremepohlia, *Hoffm.* 67
 Treteupohlia, *Roth.* 355
 Treprocarpus, *Nutt.* 778
 Trepposa, *Link.* 19
 Treptacantha, *Ktz.* 10
 Trevesia, *Vis.* 781
 Trevirana, *Willd.* 672
 Trevon, *Gill.* 582
 Trevonixia, *Scop.* 315
 Trewia, *L.* 281
 Trewiacæe, *Lindl.* 274
 Triachne, *Cass.* 714
 Triadenia, *Spach.* 406
 Triadica, *Lour.* 281
 Triana, *H. B. K.* 116
 Trianoptiles, *Fenzl.* 119
 Trinnosperma, *Torr. et Gr.* 315
 Triantlia, *Nutt.* 199
 Trianthea, *DC.* 709
 Triantliema, *Savag.* 527
 Trias, *Lindl.* 181
 Trispis, *Burch.* 390
 Triathera, *Roth.* 116
 Triblennum, *Mart.* 733
 Triblidium, *Fries.* 43
 Tribonanthæe, *Endl.* 153
 Tribrachia, *Lindl.* 181
 Tribuleæ, 479
 Tribuloïdes, *Tourn.* 723
 Tribulus, *Tourn.* 479
 Tricalysia, *A. Rich.* 765
 Tricaryum, *Lour.* 282
 Tricentrum, *DC.* 733
 Tricera, *Swartz.* 282
 Triceran, *Willd.* 585
 Triceran, *Andrz.* 354
 Tricerastes, *Presl.* 317
 Triceran, *Lour.* 460
 Trichacne, *Nees.* 115
 Trichægnum, *Corda.* 43
 Trichæta, *Paris.* 116
 Trichamphora, *Wugh.* 42
 Trichantha, *Hooker.* 672
 Trichanthera, *Kunth.* 679
 Trichanthera, *Ehrenb.* 479

- Trichasma, *Walp.* 554
 Trichasterophyllum, *W.* 350
 Trichaurus, *Arn.* 342
 Trichelostylis, *Less.* 119
 Trichera, *Schrud.* 760
 Trichia, *Hall.* 42
 Trichilia, *Linn.* 464
 Trichilicee, 464
 Trichinium, *R. Br.* 498, 511
 Trichipteris, *Prest.* 80
 Trichlis, *Hall.* 499
 Trichoa, *Pers.* 309
 Trichoblastee, 10
 Trichocarpæa, *DC.* 779
 Trichocarpus, *Nees.* 558
 Trichocarpus, *Schreb.* 372
 Trichocentrum, *Pöppig.* 182
 Trichocephalus, *Reiss.* 582
 Trichoceros, *H. B. K.* 182
 Trichochila, *Lindl.* 182
 Trichochloa, *Trin.* 115
 Trichocladius, *Pers.* 784
 Trichocline, *Cass.* 714
 Trichocolea, *Nees.* 60
 Trichocoma, *DC.* 713
 Trichocrepis, *Vis.* 715
 Trichoderma, *Link.* 656
 Trichoderma, *Pers.* 44
 Trichodes, *DC.* 713
 Trichodesma, *R. Br.* 656
 Trichodesmium, *Ehrenb.* 18
 Trichodium, *Auct.* 115
 Trichogamila, *P. Br.* 593
 Trichogastres, 42
 Trichoglottis, *Blum.* 181
 Trichogonea, *Palis.* 22
 Trichogonia, *DC.* 709
 Trichogonium, *DC.* 778
 Trichogyne, *Less.* 713
 Tricholena, *Schrud.* 116
 Tricholeconium, *Corda.* 43
 Tricholepis, *DC.* 714
 Tricholoma, *Fries.* 41
 Tricholoma, *Benth.* 685
 Trichomanes, *Linn.* 80
 Trichomanidee, 60
 Trichonema, *Ker.* 161
 Trichoon, *Roth.* 115
 Trichopetalum, *Lindl.* 205
 Trichophora, *Bonn.* 18
 Trichophorum, *Pers.* 119
 Trichophyllum, *Nutt.* 712
 Trichopilia, *Lindl.* 181
 Trichopodium, *Lindl.* 794
 Trichopteris, *Park.* 89
 Trichopterya, *Nees.* 116
 Trichopus, *Gürt.* 794
 Trichormus, *Alm.* 18
 Trichosandra, *Dec.* 627
 Trichosanthes, *Linn.* 315
 Trichoscytale, *Corda.* 42
 Trichosiphon, *Schott.* 352
 Trichosma, *Lindl.* 181
 Trichospermum, *Palis.* 711
 Trichospermum, *Blum.* 328
 Trichosphæria, *Benth.* 661
 Trichospira, *H. B. K.* 709
 Trichosporum, *Don.* 672
 Trichostema, *Cass.* 711
 Trichostemma, *Linn.* 682
 Trichostenma, *R. Br.* 715
 Trichostephium, *Cass.* 711
 Trichostephus, *Cass.* 711
 Trichostomum, *Hobc.* 67
 Trichostroma, *Corda.* 44
 Trichostularia, *Nees.* 119
 Trichostylium, *Corda.* 59
 Trichothalamus, *Lehm.* 564
 Trichothamnion, *Ktz.* 10
 Trichostoma, *Blum.* 181
 Tricladia, *Dec.* 14
 Triclema, *DC.* 340
 Triclisperma, *Rafin.* 378
 Tricocceæ, *L.* xxxiii
 Tricomaria, *Hook. et Arn.* 370
 Tricondylus, *Salisb.* 534
 Tricoryne, *R. Br.* 205
 Tricratus, *Herit.* 507
 Tricuspidaria, *R. P.* 372
 Tricuspis, *Palis.* 116
 Tricuspis, *Pers.* 372
 Treycia, *Cavan.* 507
 Treycrtis, *Wall.* 199
 Tridactylina, *DC.* 712
 Tridax, *Linn.* 712
 Tridens, *R. et Sch.* 116
 Tridesmis, *Spach.* 406
 Tridesmus, *Lour.* 281
 Tridia, *Korth.* 481
 Tridontium, *Hook.* 67
 Trientalis, *Linn.* 645
 Trifoliae, 554
 Trifolium, *Linn.* 554
 Trifurcaria, *Herb.* 161
 Trifurcarium, *DC.* 733
 Trigemma, *Sal.* 455
 Trigenea, *Sonder.* 796
 Triglochin, *Linn.* 210
 Trigglossum, *Fisch.* 116
 Trigonella, *Linn.* 554
 Trigonia, *Aubl.* 378
 Trigoniacee, *Martius.* 375
 Trigomidium, *Lindl.* 182
 Trigonis, *Jacq.* 385
 Trigonocapsa, *Blum.* 733
 Trigonocarpus, *Fl. Fl.* 385
 Trigonocarpus, *Wall.* 677
 Trigonocystis, *Hassall.* 796
 Trigonophyllum, *Gaud.* 568
 Trigonosciadium, *Boiss.* 773
 Trigonospermum, *Less.* 711
 Trigonostemon, *Blum.* 282
 Trigonotheca, *Hochst.* 585
 Trigostemon, *Bl.* 282
 Triguera, *Cav.* 370, 622
 Trigula, *Noranh.* 427
 Triguëia, *Schlecht.* 422
 Trihilate, *L.* xxxiv
 Triplepis, *Nees.* 119
 Triplepisium, *Thouars.* 543
 Trilisa, *Cass.* 700
 Trilix, *Linn.* 328, 372
 Trulliacæe, 212, 218*
 Trillium, *Mill.* 218
 Trilophus, *Fischer.* 309
 Trilophus, *Lestib.* 167
 Trilopus, *Mitch.* 784
 Trimatium, *Fröhl.* 67
 Trimeria, *Harv.* 743
 Trimeris, *Prest.* 693
 Trimeriza, *Lindl.* 794
 Trimeriza, *Salisb.* 161
 Trimesia, *Herberl.* 161
 Trimetra, *Moc.* 715
 Trimnatostroma, *Corda.* 42
 Trimorphæa, *Cass.* 710
 Trinacte, *Gürt.* 714
 Trinchinettia, *Endl.* 712
 Trineuron, *Hook. fil.* 712
 Trinia, *Hoffm.* 778
 Trinitaria, *Bory.* 22
 Triodallus, *Raf.* 691
 Triolea, *Rafin.* 119
 Triodia, *Palis.* 116
 Triodon, *DC.* 119, 764
 Trionum, *Med.* 370
 Trionychion, *Wallr.* 611
 Triopterys, *Linn.* 399
 Triosteum, *Linn.* 767
 Tripetalela, *Seb.* 444
 Tripetaloidæe, *L.* xxxiii
 Tripetalus, *Lindl.* 767
 Triphasia, *Lour.* 392, 454
 Triphelia, *R. Br.* 721
 Triphora, *Nutt.* 182
 Triphragmium, *Link.* 42
 Triphysaria, *Fisch.* 685
 Triplina, *Lour.* 674
 Tripinnaria, *Pers.* 674
 Triphadentia, *Don.* 169
 Tripiandron, *Benth.* 402
 Triplaree, *Meyer.* 504
 Triplaris, *Linn.* 504
 Triplaxis, *Palis.* 116
 Triplateia, *Bartl.* 498
 Triplatera, *Endl.* 116
 Triplectrum, *Don.* 733
 Tripleura, *Lindl.* 182
 Tripterium, *Gaud.* 568
 Triplocarpea, *DC.* 712
 Triplocentron, *Cass.* 714
 Triplocoma, *La-Pylaie.* 67
 Triplostegia, *Wall.* 698
 Tripogon, *R. et Sch.* 116
 Triplonium, *Nees.* 709
 Triposporium, *Corda.* 43
 Triprotichia, *Corda.* 42
 Tripsacum, *Linn.* 116
 Tripterella, *Rich.* 172
 Tripterellee, *Nutt.* 171
 Tripteris, *Less.* 713
 Tripterium, *DC.* 427
 Tripterocarpace, *Meisn.* 385
 Tripterococcus, *Endl.* 589
 Tripterosperrum, *Blum.* 614
 Triptilion, *R. et Pav.* 714
 Triptolemaa, *Mart.* 555
 Triphaphis, *R. Br.* 115
 Trischidium, *Tulasne.* 556
 Triscus, *Willd.* 795
 Trisetaria, *Forsk.* 116
 Trisetum, *Kunth.* 116
 Trisela, *Raf.* 116
 Trismegista, *Endl.* 281
 Tristachya, *Nees.* 116
 Tristagma, *Pöpp.* 205
 Tristania, *R. Br.* 737
 Triesteca, *Palis.* 70
 Tristegia, *Reichb.* 158
 Tristegis, *Nees.* 115
 Tristellatae, *Thouars.* 390
 Tristemma, *Juss.* 733
 Tristemon, *Kl.* 455
 Tristemom, *Rafin.* 210
 Tristerix, *Mart.* 791
 Tristicha, *Thouars.* 483
 Tristichis, *Ehr.* 67
 Tritamidium, *Endl.* 691
 Tritaleja, *Hook.* 205
 Tritheca, *W. et A.* 575
 Trithrinax, *Mart.* 139
 Tritichum, *Linn.* 116
 Tritoma, *Ker.* 205
 Tritomanthe, *Hfsg.* 205
 Tritomium, *Link.* 205
 Tritonia, *Ker.* 161
 Triumphæta, *Phom.* 372
 Triuracæe, *Gardner.* 213
 Triuridacæe, 212, 213*
 Triuris, *Miers.* 213
 Triuris, *Link. et H.* 662
 Trixago, *Stev.* 685
 Trixideæ, 714
 Trixidium, *DC.* 711
 Trixis, *P. Br.* 714
 Trixis, *Mitch.* 723
 Trixis, *Swartz.* 711
 Trizeuxis, *Lindl.* 182
 Prochantin, *Bong.* 614
 Prochera, *Rich.* 115
 Trochetia, *DC.* 364
 Trochisanthes, *Koch.* 778
 Trochoarpa, *R. Br.* 449
 Trochodendron, *S. et Z.* 419
 Trochoseria, *Pöppig.* 715
 Trochostigma, *Seb.* 424
 Trogia, *Fr.* 41
 Trollius, *Linn.* 428
 Trommsdorffia, *Mart.* 511
 Trommsdorffia, *Blum.* 672
 Tronquea, *Steud.* 614
 Tropæolacæe, 359, 366*
 Tropæolæe, *Juss.* 366, 367
 Tropæolum, *Linn.* 367
 Tropæanthus, *Schrad.* 182

- Trophis, *P. Br.* 271
 Tropidia, *Lindl.* 183
 Tropidocarpum, *Hook.* 354
 Tropololepis, *Tausch.* 709
 Trotnla, *Comm.* 575
 Troximeria, *Nutt.* 715
 Troximom, *Gärtn.* 715
 Trujanoa, *Llav. et Lex.* 735
 Truncaria, *DC.* 733
 Trygonanthus, *Endl.* 791
 Trymalium, *Fenzl.* 582
 Trymatococcus, *Pöpp.* 271
 Trymenium, *Lindl.* 181
 Trypcephalon, *Forstl.* 119
 Trypethelide, 50
 Trypethelium, *Spreng.* 50
 Tryphane, *Fenzl.* 497
 Tryphera, *Blum.* 511
 Tryphia, *Lindl.* 182
 Tsinoma, *Hernand.* 711
 Tsiouvana, *Rheede.* 601
 Tsjana, *Gmel.* 167
 Tubanthera, *Comm.* 582
 Tuber, *Mich.* 43
 Tubera, *Blum.* 181
 Tuberaei, *Fr.* 43
 Tubercaria, *Dun.* 350
 Tubercularia, *Toed.* 43
 Tubifloria, *Dumort.* xxxvii
 Tubilium, *Cass.* 710
 Tubularia, *Rouss.* 19
 Tubulifloræ, 709
 Tubulifloræ, 703
 Tuburcinia, *Fries.* 42
 Tuckermannia, *Klotzsch.* 285
 Tuckermannia, *Nutt.* 711
 Tula, *Adans.* 765
 Tulasnea, *Naud.* 733
 Tulbaghia, *Linn.* 205
 Tulipa, *Tourn.* 204
 Tulipacete, *DC.* 200
 Tulipastrum, *Spach.* 419
 Tulipææ, *DC.* 204
 Tulipifera, *Herm.* 419
 Tullia, *Llav.* 661
 Tulocarpus, *H. et A.* 711
 Tulostoma, *Pers.* 42
 Tunica, *Scop.* 498
 Tupa, *Don.* 693
 Tupcia, *Ch. et Schl.* 791
 Tupelo, *Adans.* 720
 Tupistra, *Ker.* 205
 Turbinaria, *Bory.* 10, 22
 Turbith, *Tausch.* 778
 Turczaninowia, *DC.* 709
 Turgenia, *Hoffm.* 779
 Turgeniopsis, *Boiss.* 779
 Turgosea, *Haw.* 346
 Turia, *Forsk.* 315
 Turnera, *Plum.* 347
 Turncraceæ, 326, 347*
 Turncrads, 347
 Turpinia, *H. B. K.* 714
 Turpiuia, *L. et L.* 70
 Turpinia, *Pers.* 554
 Turpinia, *Rafin.* 467
 Turpinia, *Vent.* 381
 Turraea, *Linn.* 464
 Turreta, *Fl. Fl.* 795
 Turrigera, *Dec.* 626
 Turritella, *C. A. Mey.* 354
 Turritis, *Dill.* 354
 Tursenia, *Cass.* 710
 Tussuca, *Rafin.* 182
 Tussucia, *Reichb.* 672
 Tussilago, *Tourn.* 709
 Tutsans, 405
 Tylanthus, *Reiss.* 582
 Tyloma, *Don.* 714
 Tylocarpææ, 10
 Tylocarpus, *Ktz.* 10
 Tylochilus, *Nees.* 182
 Tylodiscus, *DC.* 713
 Tyloglossa, *Hochst.* 680
 Tyloium, *Prest.* 693
 Tylophora, *R. Br.* 626
 Tylostylis, *Blum.* 181
 Tympanochetus, *Martius.* xlv
 Tyndaridea, *Bory.* 18
 Typalia, *Donst.* 473
 Typha, *L.* 126
 Typhaceæ, 123, 126*
 Typhads, 126
 Typhææ, *Juss.* 126
 Typhalea, *DC.* 370
 Typhineæ, *Agardh.* 126
 Typhoideæ, *Link.* 126
 Typhoides, *Mönch.* 115
 Typhonium, *Schott.* 129
 Typhula, *Fries.* 42
 Tyrbaa, *A. DC.* 648
 Tyrimnus, *Cass.* 714
 Tytonia, *Don.* 492
 Ubium, *Rumph.* 214, 220
 Uceææ, *Cass.* 710
 Ucin, *Targ.* 125
 Ucriana, *Willd.* 765
 Udora, *Nutt.* 142
 Udotea, *Lamar.* 19
 Uebelina, *Hochst.* 498
 Ugena, *Cuv.* 81
 Ula, *Rheede.* 234
 Ulantha, *Hook.* 183
 Ulassium, *Rumph.* 282
 Ulex, *Linn.* 554
 Ulloa, *Pers.* 622
 Ullobus, *DC.* 764
 Ulucus, *Loz.* 501
 Ulucææ, 576, 580*
 Ulnaria, *Tourn.* 565
 Ulmeæ, 580
 Ulmus, *Linn.* 580
 Uloptera, *Fenzl.* 778
 Ulosperrnum, *Link.* 778
 Ulota, *Mohr.* 67
 Ulotrix, *Kütz.* 18
 Ulotrichææ, 10
 Ulnxia, *Juss.* 760
 Ulva, *Lamar.* 10
 Ulva, *Ag.* 19
 Ulvacææ, 10
 Ulvastrum, *DC.* 19
 Ulvina, *Ktz.* 10
 Umbellacææ, *Lindl.* 773
 Umbellales, 246, 772*
 Umbellaria, *Benth.* 661
 Umbellate, *L.* xxxiii
 Umbelliferæ, *Juss.* 773
 Umbellifers, 773
 Umbellularia, *Nees.* 537
 Umbilicaria, *Hoffm.* 50
 Umbilicææ, *DC.* 346
 Unanua, *Ruiz et Pav.* 685
 Uncaria, *Burch.* 670
 Uncaria, *Schr.* 765
 Uncinia, *Pers.* 119
 Uudina, *Fries.* 18
 Uuedo, *Link.* 455
 Uugeria, *Sch. et E.* 361
 Unguandia, *Endl.* 385
 Ungulifloria, *Dumort.* xxxvii
 Unifolium, *Hall.* 205
 Uniola, *Linn.* 116
 Unisena, *Rafin.* 206
 Unona, *Linn.* 422
 Unxia, *Linn.* 711
 Urachne, *Trin.* 115
 Uralepis, *DC.* 714
 Uralepis, *Nutt.* 116
 Urganthe, *Gaud.* 614
 Urancææ, 164
 Urania, *Schreb.* 164
 Uranthera, *Naud.* 733
 Uraria, *Desv.* 554
 Uraspermm, *Nutt.* 779
 Urccola, *Roeb.* 601
 Urceolaria, *Achar.* 50
 Urceolaria, *Penill.* 672
 Urceolaria, *Herb.* 158
 Urceolaria, *Willd.* 765
 Urceolina, *Reichb.* 158
 Uredinacææ, 41
 Uredinææ, *Ad. Brongn.* 20
 Uredo, *Pers.* 42
 Urena, *Linn.* 370
 Urera, *Gaud.* 262
 Urinea, *Steinh.* 205
 Urmosses, 64
 Urochlana, *Nees.* 116
 Urochloa, *Palis.* 115
 Uropappus, *Nutt.* 715
 Uropodium, *Lindl.* 796
 Uropetalum, *Ker.* 205
 Urophyllum, *Jack.* 765
 Urospermum, *Juss.* 715
 Urostelma, *Bunge.* 626
 Ursinia, *Gärtn.* 712
 Urtica, *Tourn.* 262
 Urticacææ, 253, 260*
 Urticales, 243, 246, 258*
 Urticææ, *Juss.* 260
 Urvillea, *H. B. K.* 385
 Usnea, *Hoffm.* 50
 Usneidææ, 50
 Ustalia, *Fries.* 50
 Usteria, *Clav.* 684
 Usteria, *Donst.* 281
 Usteria, *Willd.* 604
 Ustilago, *Link.* 42
 Usubis, *Burm.* 385
 Utania, *Don.* 604
 Uteroveria, *Bert.* 358
 Utricularia, *Linn.* 686
 Utriculariææ, *Endl.* 686
 Utricularina, *Hoffm et Link.* 686
 Uva Ursi, *Tourn.* 455
 Uvaria, *Linn.* 422
 Uvedalia, *DC.* 711
 Uvedalia, *R. Br.* 684
 Uvularia, *Linn.* 199
 Uvulariææ, *A. Gray.* 199
 Uwarovia, *Bunge.* 664
 Vaccaria, *Med.* 498
 Vacciniacææ, 756, 757*
 Vaccinlææ, *DC.* 757
 Vaccinium, *Linn.* 758
 Vaccellia, *Arn.* 556
 Vage, *L.* xxxiv
 Vagneria, *Herb.* 158
 Vaginales, *L.* xxxiii
 Vaginaria, *Bory.* 182
 Vaginaria, *L. C. R.* 119
 Valica, *Lam.* 601
 Valilia, *Dahl.* 364
 Vallia, *Thunb.* 568
 Vaillantia, *DC.* 771
 Valantia, *Tourn.* 771
 Valdesia, *R. et P.* 733
 Valentiniana, *Rafin.* 767
 Valentinia, *Sw.* 385
 Valentymia, *Neck.* 556
 Valenzuela, *Bert.* 385
 Valenzuela, *S. Mut.* 795
 Valerandia, *Neck.* 614
 Valeriana, *Neck.* 698
 Valerianacææ, 688, 697*
 Valerianetææ, *DC.* 697
 Valerianella, *Mönch.* 698
 Valerianworts, 697
 Valikaha, *Adans.* 733
 Vallaris, *Burm.* 601
 Vallen, *Mut.* 372
 Vallsia, *R. et P.* 601
 Vall-Flix, *Thouars.* 81
 Vallisneria, *Mich.* 142
 Vallisneriacææ, *Link.* 144
 Vallisnerceæ, 142
 Vallota, *Herb.* 158
 Valonia, *Ginn.* 10, 22
 Valordia, *Hochst.* 641
 Valua, *Fr.* 44
 Vanalphimia, *Lesch.* 424
 Vancouveria, *Dec.* 438

- Vanda, *R. Br.* 181
 Vandeev, 179, 181
 Vandellia, *Linn.* 685
 Vangueria, *Comm.* 764
 Vanguiera, *Pers.* 764
 Vanhalla, *Schult. f.* 794
 Vaniera, *Lour.* 262
 Vanilla, *Scartz.* 182
 Vanillaceae, *Lindl.* 173
 Vanillide, 182
 Vanillosmia, *Less.* 709
 Van-Rhedia, *Plum.* 402
 Vantanea, *Aubl.* 372, 447
 Vareca, *Gürtl.* 334
 Vareca, *Roxb.* 339
 Vargasia, *Bert.* 385
 Vargasia, *DC.* 712
 Varonthe, *Juss.* 795
 Yarrowia, *DC.* 629
 Varthemia, *DC.* 710
 Vascoa, *DC.* 378, 553
 Vasconcella, *St. Hil.* 322
 Vasconcellia, *Mart.* 677
 Vataira, *Aubl.* 555, 556
 Vateria, *L.* 394
 Vatica, *L.* 394
 Vauanthes, *Haw.* 346
 Vaucberia, *DC.* 10, 22
 Vancheriere, 10, 22
 Vanquelinia, *Corr.* 565
 Vauthiera, *A. Rich.* 119
 Vavæa, *Benth.* 462
 Vavanga, *Rohr.* 764
 Velica, *DC.* 779
 Velaga, *Adans.* 364
 Velago, *Gürtl.* 364
 Velarum, *DC.* 354
 Velasqueziz, *Bertol.* 504
 Velizia, *L.* 493
 Vella, *DC.* 355
 Velleja, *Smith.* 695
 Vellidie, 355
 Vellozia, *Mart.* 153
 Vellozies, *D. Don.* 151, 153
 Veltheimia, *Gled.* 295
 Venana, *Lam.* 573
 Venegasia, *DC.* 712
 Venelia, *Commerz.* 391
 Venidium, *Less.* 713
 Ventenata, *Körl.* 116
 Ventenatia, *Pallas.* 397
 Ventenatia, *Smith.* 696
 Ventenatia, *Cuv.* 449
 Ventillago, *Gürtl.* 582
 Veprecula, *L.* xxxiv
 Vepria, *Comm.* 473
 Veratreæ, *Saltz.* 198, 199
 Veratrum, *Tourn.* 199
 Verbaceæ, 684
 Verbascum, *Linn.* 634
 Verbena, *Linn.* 664
 Verbenaceæ, 649, 663
 Verbenes, 663
 Verbesina, *Less.* 711
 Verbesinæ, 711
 Verba, *Willd.* 346
 Verhællia, *Miq.* 518
 Vermicularia, *Toole.* 12
 Vermifuga, *R. et P.* 711
 Vermontea, *Comm.* 743
 Vernicia, *Lour.* 281
 Vernonia, *Schreb.* 709
 Vernonaceæ, 703, 709
 Veronica, *Linn.* 685
 Veronicæ, 685
 Verpa, *Swartz.* 43
 Verrucaria, *Hoffm.* 59
 Verrucaria, 59
 Verrucularia, *A. de J.* 399
 Verrulamia, *DC.* 764
 Vertebraria, *Roux.* 22
 Vertebrata, *Gray.* 25
 Verticillaria, *R. et P.* 402
 Verticillatus, *L.* xxxiv
 Verticillium, *Nees.* 43
 Verticordia, *DC.* 721
 Verutia, *Cass.* 714
 Vesicaria, *Lam.* 354
 Vesiculifera, *Hass.* 13
 Veslingia, *Fabric.* 527
 Veslingia, *Vis.* 711
 Vestia, *Willd.* 621
 Vexillaria, *Benth.* 555
 Vialia, *Vis.* 364
 Vibio, *Mönch.* 504
 Viborgia, *Thunb.* 554
 Vit-rissea, *Fries.* 43
 Vilornum, *Linn.* 767
 Vicatia, *DC.* 779
 Vicia, *Linn.* 554
 Vicieæ, 554
 Vicoa, *Cass.* 710
 Victoria, *Lindl.* 411
 Vieræa, *Webb.* 710
 Vieusseuxia, *Roche.* 161
 Vicia, *Fl. Fl.* 795
 Vigiera, *Fl. Fl.* 725
 Vigna, *Sav.* 555
 Vignea, *Palis.* 119
 Viguiera, *H. B. K.* 711
 Vilfa, *Aubl.* 115
 Villanova, *Lag.* 712
 Villanova, *Orteg.* 711
 Villaresia, *Ruiz et Pav.* 593
 Villarsia, *Guetl.* 713
 Villarsia, *Vent.* 614
 Vilmorinia, *DC.* 555
 Viminaria, *Smith.* 553
 Vinca, *Linn.* 601
 Vincæ, *DC.* 599
 Vincentia, *Boj.* 372
 Vincutia, *Gaud.* 119
 Vincetoxicum, *Mönch.* 626
 Vineworts, 439
 Vinifera, *Juss.* 439
 Viola, *Linn.* 339
 Violaceæ, 326, 338*, 343
 Violaeoides, *Michx.* 339
 Violales, 243, 244, 246, 326*
 Violariæ, *DC.* 338
 Violetworts, 338
 Viorna, *Pers.* 427
 Viraya, *Gaud.* 713
 Virea, *Adans.* 715
 Virecta, *Linn.* 765
 Vireya, *Blume.* 455
 Vireya, *Raf.* 672
 Virga-aurea, *Tourn.* 710
 Virgilia, *Herit.* 711
 Virgilia, *Linn.* 555
 Virgularia, *R. et P.* 685
 Virola, *Aubl.* 302
 Viscaria, *Röhl.* 493
 Viscoides, *Jacq.* 764
 Viscum, *Tournef.* 791
 Visenia, *Lott.* 364
 Visiania, *A. DC.* 617
 Vismia, *Vell.* 496
 Visnaga, *Gürtl.* 778
 Visnea, *L. f.* 397
 Visnea, *Swed.* 153
 Vitaceæ, 432, 439*, 772
 Vitaliana, *Sessl.* 615
 Viter, 449
 Vitellaria, *Gürtl.* 591
 Vites, *Juss.* 439
 Vitex, *Linn.* 664
 Viticella, *Dill.* 427
 Viticella, *Mitch.* 459
 Vitices, *Juss.* 653
 Vitis, *Linn.* 440
 Vitis Idæa, *Tournef.* 758
 Vittadina, *A. Rich.* 710
 Vittaria, *Smith.* 89
 Vittmannia, *Tuss.* 507
 Vittmannia, *Vahl.* 477
 Vittmannia, *Wright.* 582
 Viviana, *Cer.* 395
 Viviana, *Gyba.* 765
 Viviana, *Rohr.* 761, 795
 Viviania, *Willd.* 709
 Vivianiaceæ, 359, 365*
 Vivianids, 365
 Vlamingia, *Fries.* 693
 Vleckia, *Rafin.* 661
 Voacanga, *Thouars.* 601
 Voaudzeia, *Thouars.* 555
 Vocasou, *Adans.* 711
 Voehy, *Aubl.* 380
 Voehya, *Vand.* 380
 Voehyaceæ, 373, 379*
 Voehyads, 379
 Voehysia, *Juss.* 380
 Voehysiaceæ, *Mart.* 379
 Voehysieæ, *A. St. Hil.* 379
 Vogelina, *Gmel.* 172
 Vogelina, *Lam.* 641
 Vogelina, *Medik.* 355
 Volhria, *Juss.* 614
 Voigtia, *Roth.* 715
 Voigtia, *Spreng.* 714
 Voitia, *Hornsch.* 67
 Volkameria, *Linn.* 664
 Volkameria, *R. Br.* 455
 Volubularia, *Lamx.* 25
 Volutarella, *Cass.* 714
 Volutaria, *Cass.* 714
 Volutella, *Forsk.* 538
 Volutella, *Tode.* 43
 Volvaria, *Fries. f.* 41
 Vossia, *W. et Gr.* 116
 Votomita, *Aubl.* 556, 733
 Vouarana, *Aubl.* 385
 Vouay, *Aubl.* 139
 Voucapoua, *Aubl.* 555
 Voyra, *Aubl.* 614
 Vriesia, *Lindl.* 148
 Vriesia, *Hassk.* 685
 Vrolika, *Spreng.* 684
 Vulpia, *Gmel.* 116
 Wachendorferæ, *Herbert.* 205
 Wachendorfia, *Burm.* 205
 Wahlbomia, *Thunb.* 424
 Wahlbergia, *Bhum.* 765
 Wahlbergia, *R. Br.* 583
 Wahlbergia, *Schrad.* 691
 Wahlbergia, *Schum.* 710
 Waitzia, *Wendl.* 713
 Waizia, *Reichb.* 161
 Walafridia, *E. Mey.* 667
 Waldschmidia, *Figg.* 614
 Waldschmidia, *Neck.* 556
 Waldsteinia, *Willd.* 565
 Walkera, *Schreb.* 475
 Walkeria, *Ehret.* 654
 Wallenia, *Scartz.* 648
 Wallichia, *DC.* 364
 Wallichia, *Rebnw.* 765
 Wallichia, *Roxb.* 138
 Wallothia, *DC.* 778
 Wallothia, *Roth.* 664
 Walpersia, *Reiss.* 582
 Walsura, *Roxb.* 464
 Walteriana, *Fras.* 445
 Waltheria, *Linn.* 364
 Wangenheimia, *Diétr.* 781
 Wangenheimia, *Monch.* 116
 Wardia, *Hook. et Harv.* 67
 Warea, *Nutt.* 351
 Warin, *Aubl.* 422
 Warneria, *Mill.* 428
 Warren, *Lindl.* 182
 Water-Benus, 414
 Water-Lilies, 409
 Water-Peppers, 480
 Watershields, 412
 Waterworts, 186
 Watsonia, *Mill.* 161
 Webbia, *DC.* 709
 Webbia, *Spreng.* 406
 Welborn, *Hector.* 67
 Wedelia, *Jacq.* 711
 Wedelia, *Loffl.* 507
 Weigela, *Thunb.* 767

- Woigenia, *Alph. DC.* 648
 Weihea, *Eckl.* 161
 Weihea, *Spreng.* 605
 Weingartneria, *Bernh.* 116
 Weinmannia, *Linn.* 572
 Weinreichia, *Reichb.* 555
 Weissia, *Hedw.* 67
 Weldenia, *Schult. f.* 199
 Weldworts, 356
 Wellingtonia, *Meisn.* 385
 Welwitschia, *Reichb.* 636
 Wenderothia, *Schlecht.* 555
 Wendlandia, *Barl.* 765
 Wendlandia, *Willd.* 309
 Wendtia, *Hoffm.* 778
 Wendtia, *Meyen.* 489
 Wensia, *Wendl.* 661
 Werneria, *H. B. K.* 713
 Werauseckia, *Scop.* 447
 Westia, *Vahl.* 556
 Westringia, *Smith.* 661
 Wettinia, *Pöpp.* 132
 Whitfieldia, *Hooker.* 679
 Whittia, *Burm.* 672
 Whitleya, *Sweet.* 622
 Wibelia, *Bernh.* 80
 Wibelia, *Hopp.* 715
 Wierborgia, *Roth.* 712
 Wickströmia, *Endl.* 531
 Wickströmia, *Schrad.* 397
 Wickströmia, *Spreng.* 709
 Wiedemannia, *Fisch.* 662
 Wiegmannia, *Meyen.* 764
 Wierzbicka, *Rehb.* 497
 Wigandia, *Kunth.* 639
 Wiggersia, *Fl. Wetter.* 544
 Wightia, *Spreng.* 709
 Wightia, *Wall.* 684
 Wilbraadia, *Manso.* 315
 Wildeaowa, *Cav.* 711
 Willdenowia, *Gmel.* 765
 Willdenowia, *Thunb.* 121
 Willemetia, *Bronq.* 582
 Willemetia, *Neck.* 715
 Willemetia, *R. Br.* 513
 Willemetia, *E. Z.* 582
 Willibaldia, *Stern.* 115
 Willichia, *L.* 685
 Willowworts, 248, 254
 Willughbeia, *Roxb.* 601
 Willughbeia, 601
 Wilsonia, *Hook.* 664
 Wilsonia, *R. Br.* 631
 Wimmeria, *Schlecht.* 588
 Winchia, *A. DC.* 601
 Windmannia, *P. Br.* 572
 Windsoria, *Nutt.* 116
 Wintera, *Murray.* 419
 Winterana, *Soland.* 419
 Winterania, *Linn.* 442
 Winterea, *R. Br.* 417, 419
 Wintergreens, 450
 Winteria, *Demst.* 458
 Winteria, *Mösch.* 598
 Winteria, *Spreng.* 499
 Wirtgenia, *Jungb.* 467
 Wisenia, *Gmel.* 364
 Wissandula, *Medik.* 370
 Wisteria, *Nutt.* 554
 Witch-hazels, 784
 Withania, *Pauq.* 622
 Withemisia, *Reichb.* 498
 Witheringia, *Herit.* 622
 Witsenia, *Thunb.* 161
 Wittelsbachia, *Mart.* 350
 Wodier, *Anders.* 467
 Wolfia, *Hork.* 125
 Wollstonia, *DC.* 711
 Woodfordia, *Salisb.* 575
 Woodsia, *R. Br.* 80
 Woodvillea, *DC.* 710
 Woodwardia, *Smith.* 80
 Wormia, *Rottb.* 424
 Wormia, *Vahl.* 718
 Wormskioldia, *Spreng.* 25
 Wormskioldia, *Thon. et Sch.* 340
 Wrangelia, *Ag.* 10, 24
 Wredowia, *Eckl.* 161
 Wrightea, *Roxb.* 133
 Wrightea, 601
 Wrightia, *R. Br.* 601
 Wrightia, *Soland.* 733
 Wulfenia, *Jacq.* 685
 Wulfia, *Neck.* 711
 Wurfbainia, *Giescke.* 167
 Wurmbea, *Thunb.* 199
 Wyderia, *DC.* 778
 Wyethia, *Nutt.* 711
 Wylia, *Hoffm.* 779
 Xanthanthus, *Griseb.* 614
 Xaube, *Schreb.* 402
 Xanthea, *Reichb.* 614
 Xanthidium, *Kütz.* 9, 13
 Xanthiophlea, *Mart.* 661
 Xanthiopsis, *DC.* 711
 Xanthisma, *DC.* 709
 Xanthium, *Tourn.* 711
 Xanthocephalum, *Willd.* 712
 Xanthocerus, *Bung.* 385
 Xanthochymus, *Roxb.* 402
 Xanthocoma, *H. B. K.* 710
 Xanthogalum, *Lallem.* 778
 Xanthoglossa, *DC.* 712
 Xantholepis, *Willd.* 709
 Xantholinum, *Reichb.* 485
 Xanthomeria, *Presl.* 693
 Xanthophyllum, *Roxb.* 378
 Xanthophytum, *Burm.* 765
 Xanthopsis, *DC.* 714
 Xanthorrhiza, *Marsh.* 428
 Xanthorrhoea, *Smith.* 205
 Xantbosia, *Rudge.* 778
 Xanthosoma, *Schott.* 129
 Xanthoxylaceae, 456, 472^a
 Xanthoxylea, *Nees et Mart.* 472
 Xanthoxylon, *Kunth.* 473
 Xanthoxyls, 472
 Xatardia, *Meisn.* 778
 Xenismia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Yermolofia, *Belang.* 662
 Yerva Mora, *Ludw.* 580
 Youngia, *Cass.* 715
 Yucca, *Linn.* 205
 Yulania, *Spach.* 419
 Zacyntha, *Fl. Flum.* 648
 Zacyntia, *Tourn.* 715
 Zailbrucknera, *Reichb.* 568
 Zala, *Lour.* 125
 Zalanca, *Reinv.* 139
 Zaleya, *Burm.* 527
 Zaluzania, *Comm.* 765
 Zanthorhiza, *Pers.* 711
 Zaluzianskia, *Neck.* 73
 Zaluzianskya, *J. W. Schm.* 684
 Zannaria, *Rafin.* 765
 Zamia, *Lindl.* 225
 Zanthoxylon, *Kunth.* 473
 Zanthoxyls, 472
 Zantardia, *Meisn.* 778
 Zanisnia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Yermolofia, *Belang.* 662
 Yerva Mora, *Ludw.* 580
 Youngia, *Cass.* 715
 Yucca, *Linn.* 205
 Yulania, *Spach.* 419
 Zacyntha, *Fl. Flum.* 648
 Zacyntia, *Tourn.* 715
 Zailbrucknera, *Reichb.* 568
 Zala, *Lour.* 125
 Zalanca, *Reinv.* 139
 Zaleya, *Burm.* 527
 Zaluzania, *Comm.* 765
 Zanthorhiza, *Pers.* 711
 Zaluzianskia, *Neck.* 73
 Zaluzianskya, *J. W. Schm.* 684
 Zannaria, *Rafin.* 765
 Zamia, *Lindl.* 225
 Zanthoxylon, *Kunth.* 473
 Zanthoxyls, 472
 Zantardia, *Meisn.* 778
 Zanisnia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Yermolofia, *Belang.* 662
 Yerva Mora, *Ludw.* 580
 Youngia, *Cass.* 715
 Yucca, *Linn.* 205
 Yulania, *Spach.* 419
 Zacyntha, *Fl. Flum.* 648
 Zacyntia, *Tourn.* 715
 Zailbrucknera, *Reichb.* 568
 Zala, *Lour.* 125
 Zalanca, *Reinv.* 139
 Zaleya, *Burm.* 527
 Zaluzania, *Comm.* 765
 Zanthorhiza, *Pers.* 711
 Zaluzianskia, *Neck.* 73
 Zaluzianskya, *J. W. Schm.* 684
 Zannaria, *Rafin.* 765
 Zamia, *Lindl.* 225
 Zanthoxylon, *Kunth.* 473
 Zanthoxyls, 472
 Zantardia, *Meisn.* 778
 Zanisnia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Yermolofia, *Belang.* 662
 Yerva Mora, *Ludw.* 580
 Youngia, *Cass.* 715
 Yucca, *Linn.* 205
 Yulania, *Spach.* 419
 Zacyntha, *Fl. Flum.* 648
 Zacyntia, *Tourn.* 715
 Zailbrucknera, *Reichb.* 568
 Zala, *Lour.* 125
 Zalanca, *Reinv.* 139
 Zaleya, *Burm.* 527
 Zaluzania, *Comm.* 765
 Zanthorhiza, *Pers.* 711
 Zaluzianskia, *Neck.* 73
 Zaluzianskya, *J. W. Schm.* 684
 Zannaria, *Rafin.* 765
 Zamia, *Lindl.* 225
 Zanthoxylon, *Kunth.* 473
 Zanthoxyls, 472
 Zantardia, *Meisn.* 778
 Zanisnia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Yermolofia, *Belang.* 662
 Yerva Mora, *Ludw.* 580
 Youngia, *Cass.* 715
 Yucca, *Linn.* 205
 Yulania, *Spach.* 419
 Zacyntha, *Fl. Flum.* 648
 Zacyntia, *Tourn.* 715
 Zailbrucknera, *Reichb.* 568
 Zala, *Lour.* 125
 Zalanca, *Reinv.* 139
 Zaleya, *Burm.* 527
 Zaluzania, *Comm.* 765
 Zanthorhiza, *Pers.* 711
 Zaluzianskia, *Neck.* 73
 Zaluzianskya, *J. W. Schm.* 684
 Zannaria, *Rafin.* 765
 Zamia, *Lindl.* 225
 Zanthoxylon, *Kunth.* 473
 Zanthoxyls, 472
 Zantardia, *Meisn.* 778
 Zanisnia, *DC.* 711
 Xeoacarpus, *Cass.* 713
 Xenochloa, *Licht.* 116
 Xenodochus, *Schlecht.* 42
 Xenopoma, *Willd.* 661
 Xeranthemum, 713
 Xeranthemum, *Tourn.* 713
 Xeranthus, *Miers.* 501
 Xerobius, *Cass.* 712
 Xerocarpus, *Guillem. et Perr.* 554
 Xerochloa, *DC.* 713
 Xerochloa, *R. Br.* 116
 Xerolepis, *DC.* 712
 Xeroloma, *Cass.* 713
 Xeropappus, *Wall.* 714
 Xeropetalon, *Hook.* 365
 Xeropetalum, *Del.* 364
 Xeropetalum, *R. Br.* 553
 Xerophyllum, *Rich.* 199
 Xerophyta, *Comm.* 153
 Xerosiphon, *Tweez.* 511
 Xerostole, *Endl.* 533
 Xerotes, *R. Br.* 192
 Xerothermus, *DC.* 710
 Xerotidea, *Endl.* 191
 Xerotium, *Bluff. et Fingerh.* 713
 Xerotus, *Fr.* 41
 Ximenia, *Plum.* 444
 Ximenesia, *Cav.* 711
 Xiphidium, *Aubl.* 205
 Xiphion, *Tourn.* 161
 Xiphocarpus, *Presl.* 554
 Xiphocheta, *Pöpp.* 709
 Xiphophora, *Moutagn.* 22
 Xiphopteris, *Kaulf.* 79
 Xiphotheca, *E. et Z.* 553
 Xolisua, *Rafin.* 455
 Xnarezia, *Reiz et Pav.* 685
 Xyladenius, *Desv.* 323
 Xylia, *Benth.* 556
 Xylobium, *Lindl.* 182
 Xylocarpus, *Schreb.* 464
 Xylomelum, *Smith.* 534
 Xylon, *Tourn.* 370
 Xylopea, *Endl.* 422
 Xylophylla, *Linn.* 282
 Xylopia, *Linn.* 422
 Xylopicon, *P. Br.* 422
 Xylopleurum, *Spach.* 725
 Xylorrhiza, *Nutt.* 709
 Xylosma, *Forst.* 328
 Xylosteon, *Tourn.* 767
 Xylothea, *Hochst.* 328
 Xypherus, *Rafin.* 555
 Xyridaceae, 184, 187^a
 Xyridales, 104, 185^a
 Xyridanthe, *Lindl.* 713
 Xyrideae, *Kunth.* 187
 Xyrids, 187
 Xyris, *Linn.* 187
 Xysmalobium, *R. Br.* 626
 Xystidium, *Trin.* 116
 Yanus, 214
 Y

Zollernia, Nees. 555	Zuccagnia, Cass. 555	Zygodon, Hooker. 67
Zollikoferia, DC. 715	Zuccagnia, Thunb. 205	Zygoglossum, Reinw. 181
Zonaria, J. Agh. 22	Zuccarinia, Spreng. 765	Zygomenes, Salisb. 188
Zonotrichia, J. Agh. 18	Zuechellia, Dec. 626	Zygomeres, Moc. et Sess. 554
Zoospermæ, J. Agh. 14	Zuelania, A. R. 328	Zygonium, Ktze. 10
Zornia, Gmel. 554	Zuzygina, P. Br. 738	Zygopeltis, Fenzl. 354
Zornia, Monch. 662	Zwingera, Hofer. 654	Zygopetalum, Hook. 182
Zostera, Linn. 145	Zwingera, Schreb. 477	Zygophyllaceæ, 456, 478°
Zosteraceæ, 140, 145°	Zygadenus, Rich. 199	Zygophylleæ, R. Br. 478, 479
Zosteræ, Kunth. 145	Zygia, R. Br. 556	Zygophyllum, Linn. 479
Zosterina, Nees. 145	Zygis, Desv. 661	Zygostates, Lindl. 182
Zosterospermum, Patis. 119	Zygnemidæ, 18	Zygotigma, Griseb. 614
Zosterostylis, Blum. 182	Zygnema, Ag. 10, 18	Zygotrichia, Brid. 67
Zoysia, Willd. 116	Zygnemæ, 10	Zymum, Nor. 390
Zozimia, Hoffm. 778	Zygodemus, Corda. 43	Zyrrhelis, Cass. 709
Zucca, Comm. 315		

A LIST OF THE

PRINCIPAL ABBREVIATIONS EMPLOYED IN THE
FOREGOING INDEX.

<i>A. Br.</i> — <i>A. Brongn.</i> = Adolphe Brongniart.	<i>Bert.</i> = Bertero.
<i>A. C.</i> — <i>A. Conn.</i> — <i>A. Cunningh.</i> = Allan Cunningham.	<i>Bertol.</i> = Bertoloni.
<i>A. DC.</i> — <i>Alph. DC.</i> = Alphonse De Candolle.	<i>Bess.</i> = Besser.
<i>A. Gr.</i> = Asa Gray.	<i>Bieb.</i> — <i>Bieberst.</i> = Bieberstein.
<i>A. J.</i> — <i>A. de J.</i> — <i>A. Juss.</i> — <i>Ad. de Juss.</i> = Adrien de Jussieu.	<i>Big.</i> — <i>Bigel.</i> = Bigelow.
<i>A. R.</i> — <i>A. Rich.</i> — <i>Ach. Rich.</i> = Achille Richard.	<i>Bisch.</i> = Bischoff.
<i>Ach.</i> — <i>Achar.</i> = Acharius.	<i>Bl.</i> — <i>Blum.</i> = Blume.
<i>Ad. Brongn.</i> = Adolphe Brongniart.	<i>Blackw.</i> = Blackwell.
<i>Ad.</i> — <i>Adans.</i> = Adanson.	<i>Blanc.</i> = Blanco.
<i>Afz.</i> — <i>Afzel.</i> = Afzelius.	<i>Bluff et F.</i> = Bluff and Fingerhult.
<i>Ag.</i> — <i>Agh.</i> = Agardh.	<i>Boehm.</i> = Bochner.
<i>Ait.</i> = Aiton.	<i>Borh.</i> = Bœrhaave.
<i>Alb.</i> — <i>Alberl.</i> = Albertini.	<i>Boiss.</i> — <i>Bois.</i> = Boissier.
<i>All.</i> — <i>Allion.</i> = Allioni.	<i>Boj.</i> = Bojer.
<i>Amm.</i> = Amman.	<i>Bonat.</i> = Bonati.
<i>Andr.</i> = Andreæ.	<i>Bong.</i> = Bongard.
<i>Andrz.</i> = Andrzejowski.	<i>Bonnem.</i> = Bonnemaison.
<i>Arđ.</i> = Arduini.	<i>Bonpl.</i> = Bonpland.
<i>Aræsch.</i> = Aræschoug.	<i>Bork.</i> — <i>Borkh.</i> = Borkhausen.
<i>Arn.</i> = Arnolt.	<i>Bouch.</i> = Bouché.
<i>Arrab.</i> = Arrabida.	<i>Bowd.</i> = Bowditch.
<i>Arrud.</i> = Arruda.	<i>Br.</i> = Bridel.
<i>Aubl.</i> — <i>Aubl.</i> = Aublet.	<i>Br.</i> = Brown.
<i>Auct.</i> = Auctorum.	<i>Brbis.</i> = Brebisson.
<i>Aug. de St. Hil.</i> — <i>Auguste de St. Hilaire.</i>	<i>Brid.</i> = Bridel.
	<i>Brign.</i> = Brignoli.
<i>B. et F.</i> = Bluff and Fingerhult.	<i>Brongn.</i> = Brongniart.
<i>B. et Mont.</i> = Berkeley and Montagne.	<i>Brot.</i> — <i>Brotcr.</i> = Brotero.
<i>B. et W.</i> = Bartling and Wendland.	<i>Bth.</i> = Bentham.
<i>Bab.</i> = Babington.	<i>Buch.</i> — <i>Buchan.</i> = Buchanan.
<i>Banc.</i> = Bancroft.	<i>Bull.</i> = Bulliard.
<i>Barn.</i> = Barnoud.	<i>Bung.</i> = Bunge.
<i>Bart.</i> = Barton.	<i>Burch.</i> = Burchell.
<i>Bartl.</i> = Bartling.	<i>Burm.</i> = Burmann.
<i>Batt.</i> = Battarra.	<i>Büttn.</i> = Büttner.
<i>Bauh.</i> = Bauhin.	<i>Buxb.</i> = Buxbaum.
<i>Baumg.</i> = Baumgarten.	
<i>Beauv.</i> = Paillet de Beauvois.	<i>C. A. M.</i> — <i>C. A. Mey.</i> = C. A. Meyer.
<i>Bel.</i> — <i>Belang.</i> = Belanger.	<i>C. Bauh.</i> = Caspar Bauhin.
<i>Benn.</i> = Bennett.	<i>C. Ehrenb.</i> = Charles Ehrenberg.
<i>Benth.</i> = Bentham.	<i>C. F. W. M.</i> — <i>C. W. M.</i> = C. W. Meyer.
<i>Berg.</i> = Bergius.	<i>C. G. Gmel.</i> = C. G. Gmelin.
<i>Berk.</i> — <i>Berkei.</i> = Berkeley.	<i>Cabrer.</i> = Cabrera.
<i>Berl.</i> = Berlandier.	<i>Calcl.</i> = Caldas.
<i>Bernh.</i> — <i>Bertholdi.</i>	<i>Camb.</i> — <i>Cambess.</i> = Cambessèdes.
	<i>Casar.</i> = Casaretto.

Cass. = Cassini.
Castg. = Castiglione.
Cat. Hort. Par. = *Catalogus Horti Parisiensis*.
Catesb. = *Catesby*.
Cav. = *Cavan*. = *Cavanilles*.
Cav. et Sech. = *Cavatier and Sechier*.
Ch. = *Cham*. = *Chamisso*.
Ch. et Sch. = *Chamisso and Schlechtendahl*.
Chap. = *Chapman*.
Chav. = *Chavannes*.
Chev. = *Chevat*. = *Chevalier*.
Chois. = *Choisy*.
Cl. Gay. = *Claude Gay*.
Clem. = *Clement*.
Clus. = *Clusius*.
Col. = *Colebr.* = *Colebrooke*.
Coll. = *Colla*.
Comm. = *Commers*. = *Commerson*.
Commet. = *Commelyn*.
Cord. = *Corde*.
Corr. = *Correa da Serra*.
Cunning. = *Cunningham*.
Cuss. = *Cusson*.
Cyritt. = *Cyritli*.

D. Don. = *David Don*.
Dal. = *Daléchamp*.
DC. = *De Candolle*.
Dec. = *Déc.* = *Décaisne*.
Dec. et Th. = *Décaisne and Thuret*.
Del. = *Délit.* = *Delile*.
Delabr. = *Delabre*.
Delavn. = *Delannay*.
Dennst. = *Dennstedt*.
Desc. = *Descourtilz*.
Desf. = *Desfont.* = *Desfontaines*.
Desm. = *Desmaz.* = *Desmazières*.
Desp. = *Despretz*.
Desv. = *Desvaux*.
Dies. = *Diesing*.
Dietr. = *Dietrich*.
Dill. = *Dillen.* = *Dillenius*.
Dilm. = *Diltm.* = *Diltmar*.
Pomb. = *Dombey*.
Dong. = *Douglas*.
Dryand. = *Dryander*.
Duf. = *Dufour*.
Duham. = *Duhamel*.
Dum. = *Dumort.* = *Dumortier*.
Dun. = *Dunal*.
Dup. Th. = *Dup. Thouars.* = *Dupetit Thouars*.
Dur. = *Durazz.* = *Durazzo*.
Duv. = *Duvau*.

E. = *End.* = *Endl.* = *Endlicher*.
E. M. = *E. Mey.* = *Ernst Meyer*.
E. Z. = *E. et Z.* = *Eck. et Zey.* = *Ecklon and Zeyher*.
Eckl. = *Ecklon*.
Ed. pr. = *Editio prior*.
Ed. prim. = *Editio prima*.
Ehr. = *Ehrenb.* = *Ehrenberg*.
Ehrh. = *Ehrhart*.
Ell. = *Elliott*.
Engelm. = *Engelmann*.
Eschw. = *Eschweiler*.

F. = *Fischer*.
F. et M. = *F. et Mey.* = *Fischer and Meyer*.
Fabric. = *Fabricius*.
Falc. = *Falconer*.
Fenill. = *Fenillé*.
Fisch. = *Fischer*.
Fl. Fl. = *Flora Fluminensis*.
Fl. Mex. = *Flora Mexicana*.
Fl. Wett. = *Flora Wetteravensis*.
Flörk. = *Flörke*.
Flot. = *Flotoz*.
Flugg. = *Flügge*.
Forsk. = *Forskahl*.
Forst. = *Forster*.
Fr. = *Fries*.
Fr. Syst. = *Fries Systema*.
Fres. = *Ersen.* = *Fresenius*.
Fral. = *Fralich*.
Frör. = *Frörich*.

Fürnr. = *Fürnrohr*.

G. B. = *George Bentham*.
G. D. = *G. Don.* = *George Don*.
Gaill. = *Gaillon*.
Gard. = *Gardn.* = *Gardner*.
Gärtn. = *Gærtner*.
Gaud. = *Gaudich.* = *Gaudichaud*.
Gawl. = *Gawler*.
Ging. = *De Gingins*.
Ginn. = *Ginnanni*.
Gill. = *Gillies*.
Gled. = *Gleditsch*.
Gmel. = *Gmelin*.
Gom. = *Gomez*.
Grah. = *Graham*.
Gratel. = *Grateloup*.
Gren. = *Grenier*.
Grev. = *Greville*.
Gries. = *Gris.* = *Griseb.* = *Griseb.*
Griff. = *Griffith*.
Gron. = *Gronov.* = *Gronovius*.
Guetl. = *Guetlard*.
Guil. = *Guillemin*.
Guill. et P. = *Guillemin and Perrottel*.
Gusson. = *Gussone*.

H. = *Humb.* = *Humboldt*.
H. B. K. = *Humboldt, Bonpland, and Kunth*.
H. et A. = *Hooker and Arnott*.
H. et B. = *H. et Bonpl.* = *Humboldt and Bonpland*.
H. et G. = *Hooker and Greville*.
H. et J. = *Hombroton and Jacquinot*.
Hall. = *Haller*.
Ham. = *Hamill.* = *Hamilton*.
Hartm. = *Hartmann*.
Harv. = *Harvey*.
Hass. = *Hassall*.
Hasselq. = *Hasselquist*.
Hassk. = *Hasskarl*.
Haw. = *Haworth*.
Hayn. = *Hayne*.
Hedw. = *Hedwig*.
Heist. = *Heister*.
Hellen. = *Hellenius*.
Herb. = *Herbert*.
Herit. = *L'Heritier*.
Hernand. = *Hernandez*.
Hfsg. = *Hffing.* = *Hoffmancz*.
Hochs. = *Hochst.* = *Hochstetter*.
Hoffm. = *Hoffmann*.
Hon. Bell. = *Honorius Belli*.
Hook. = *Hooker*.
Hook. et Arn. = *Hooker and Arnott*.
Hook. f. = *Hooker the younger*.
Hopp. = *Hoppe*.
Hor. = *Horan.* = *Horaninow*.
Hork. = *Horkel*.
Horn. = *Hornem.* = *Hornemann*.
Hornsch. = *Hornschuch*.
Hort. Hisp. = *Hortus Hispanicus*.
Hort. = *Hortorum*.
Houst. = *Honston*.
Houtt. = *Houttuyn*.
Hskl. = *Hasskarl*.
Hst. = *Hochstetter*.
Hüb. = *Hubert*.
Huds. = *Hudson*.
Hng. = *Hngel*.

Isn. = *Isnard*.

J. = *Jussieu*.
J. Ag. = *J. Agdh.* = *Agardh the younger*.
J. J. B. = *J. J. Bemctt*.
J. Sm. = *John Smith*.
J. St. Hil. = *Jacque St. Hilaire*.
J. W. Schm. = *J. W. Schmidt*.
Jacq. = *Jacquin*.
Janb. = *Janbert*.
Janb. et Spch. = *Janbert and Spach*.
Jon. = *Jones*.
Jungh. = *Jungbruns*.
Juss. = *Jussieu*.

K. Mull. = Karl Muller.
 K. et H. = Kuhl et H. = Kuhl and Hasselt.
 Ka. = Kar. = Karel. = Karelin.
 Kæmpf. = Kæmpfer.
 Kauf. = Kaufzuss.
 Koch. = Koch.
 Kl. = Klz. h. = Klotzsch.
 Kæl. = Kæler.
 Kön. = König.
 Korth. = Korthals.
 Kostel. = Kostelecky.
 Kth. = Kunth.
 Ktz. = Ktzing. = Kutz. = Kutzling.
 Kze. = Kunze.

L. = Linnæus.
 L. C. R. = L. C. Rich. = Louis Claude Richard.
 L. et Z. = Lehmann and Zeyher.
 L. et Lex. = Llav. and Lexarsa.
 L. f. = Linnæus the younger.
 L. et O. = Lk. et O. = Link and Otto.
 Labill. = Lab. = Labillardière.
 Lag. = Lagasc. = Lagasca.
 Lallein. = Lallemand.
 Lam. = Lamark.
 Lamb. = Lamberl.
 Lamx. = Lamouroux.
 Lapeyr. = Lapeyroue.
 Lavråd. = Lavrado.
 Lawe. = Lowson.
 Leandr. = Leandro da Sacramento.
 Ledeb. = Ledebour.
 Lchm. = Lehmann.
 Lem. = Lemair. = Lemaire.
 Lepr. = Leprieur.
 Lesch. = Leschen. = Leschenaull de la Tour.
 Less. = Lessing.
 Lestib. = Lestiboudois.
 Lee. = Leveill. = Léveillé.
 Lher. = L'Heritier.
 Lib. = Libert or Libosch.
 Licht. = Lichtenstein.
 Lilj. = Lilja.
 Lindl. = Lindley.
 Linn. = Linnæus.
 Linn. f. = Linnæus the younger.
 Ll. = Llav. = Llave.
 Ll. et L. = Llave and Lexarsa.
 Lk. = Link.
 Lodd. = Loddiges.
 Löst. = Loeffling.
 Loud. = Loudon.
 Lour. = Loureir. = Loureiro.
 Ludw. = Ludwig.
 Lyngb. = Lyngbye.

M. = Mönch.
 M. B. = Marschall von Bieberstein.
 M. O. Curt. = M. O. Curtis.
 M. et D. = Morren and Decaisne.
 M. et S. = Moçino and Sesse.
 M. et Z. = Martius and Zuccarini.
 Macfad. = Macfadyen.
 Mans. = Manso.
 Mariti. = Maratti.
 Maregr. = Maregraaf.
 Mart. = Martius.
 Med. = Medik. = Medikus.
 Meim. = Meisner.
 Men. = Mengh. = Meneghini.
 Mentz. = Mentzel.
 Mert. = Meertens.
 Mey. = Meyen.
 Mich. = Michx. = Michaux.
 Michel. = Micheli.
 Mik. = Miksa.
 Mill. = Miller.
 Miqu. = Miquel.
 Mirb. = Mirbel.
 Mit. = Mitch. = Mitchell.
 Moç. et Sesse. = Moç. et S. = Moçino and Sesse.
 Mol. = Molin. = Molina.
 Mon. = Mönch.
 Monn. = Monnier.
 Mont. = Montagne.

Moq. = Moquin Tandon.
 Mor. = Morison.
 Moric. = Moricand.
 Morr. = Morren.
 Muhl. = Mühlenb. = Muhlentberg.
 Murr. = Murray.
 Mut. = Mutis.

N. et M. = Nees and Marlius.
 N. Burm. = N. Burmann.
 Naud. = Naudo.
 Neck. = Necker.
 Nees ab Esou. = Nees von Esenbeck.
 Ner. = Neraud.
 Neum. = Newman.
 Nor. = Noron. = Noronh. = Noronha.
 Not. = Notar. = Notaris.
 Null. = Nuttall.

Op. et C. = Opiz and Corda.
 Ort. = Orteg. = Ortega.
 Ott. = Otto.

P. = Pers. = Persoon.
 P. Alp. = Prosper Alpinus.
 P. Br. = Patrick Broene.
 P. et E. = Pappig and Endlicher.
 Pal. = Palisol de Beauvois.
 Pall. = Pallas.
 Panz. = Panzer.
 Parl. = Parlat. = Parlatore.
 Pauq. = Pauquy.
 Pav. = Pavon.
 Perl. = Perleb.
 Pers. = Persoon.
 Pet. = Petiv. = Peliver.
 Pfeiff. = Pfeiffer.
 Picci. = Piccioli.
 Pl. = Plum. = Plumier.
 Pluk. = Pluken. = Plukenet.
 Poir. = Poiret.
 Poit. = Poiteau.
 Pollin. = Pollini.
 Ponted. = Pontedera.
 Pöpp. = Pappig.
 Pr. = Presl.
 P's. = Persoon.

R. Br. = R. Brown. = Robert Brown.
 R. et P. = R. et Pav. = Ruiz and Pavon.
 R. et S. = R. et Sch. = Romer and Schultes.
 Radd. = Radd. = Raddi.
 Raf. = Rafin. = Rafinesque.
 Rehb. = Reichenbach.
 Rehent. = Rebenstisch.
 Ren. = Renealm.
 Reich. = Reichenb. = Reichb. = Reichenbuch.
 Reinw. = Reinwardt.
 Rh. = Rheed. = Rheedt.
 Rich. = L. C. Richard.
 Riv. = Rivin. = Rivinus.
 Rob. et Cast. = Robillard et Castagne.
 Robill. = Robillard.
 Robins. = Robinson.
 Rodrig. = Rodrigues.
 Rohl. = Rohling.
 Roland. = Rotander.
 Rom. et Sch. = Römer and Schultes.
 Rothb. = Rothball.
 Ronss. = Ronssel.
 Roxb. = Roxburgh.
 Roz. = Rozier.
 Rudg. = Rudge.
 Ruiz et P. = Ruiz et Pav. = Ruiz and Pavon.
 Rumph. = Rumphius.
 Rupp. = Ruppins.
 Russ. = Russegger.

S. et Z. = Siebold and Zuccarini.
 S. Hil. Aug. de St. Hilair.
 S. Mans. = Silva Manso.
 S. Mut. = Sebastian Mutis.
 Sal. = Satis. = Salish. = R. A. Salisbury.
 Sauv. = Sauvay. = Sauvages.
 Sav. = Savigny.

Sch.—*Schr.* = *Schrader*.
Sch. et E. = *Schott and Endlicher*.
Scheidw. = *Scheidweiler*.
Schied. et D. = *Schiede et Deppc*.
Schk. = *Schrank*.
Schl.—*Schlecht.* = *Schlechtendahl*.
Schleid. = *Schleidcn*.
Schmid. = *Schmidel*.
Schnev. = *Schneevoght*.
Schnitzl. = *Schnitzlein*.
Schomb. = *Schomburgk*.
Schr.—*Schrad.* = *Schrader*.
Schreb. = *Schreiber*.
Schrk. = *Schrenck*.
Scht. = *Schott*.
Schult. = *Schultz*.
Schult. f. = *Schultes the younger*.
Schum. = *Schumacher*.
Schw. = *Schweinitz*.
Schwægr. = *Schwægrichen*.
Schwein. = *Schweinitz*.
Scop.—*Scopol.* = *Scopoli*.
Seb. M. = *Sebastian Mutis*.
Seid. = *Seidel*.
Ser. = *Seringe*.
Sesse et Mof. = *Sesse and Mofino*.
Sessl. = *Sesster*.
Sieb. et Z.—*Sieb. et Zucc.* = *Siebold and Zuccarini*.
Siegesb. = *Siegesbeck*.
Silv. M. = *Silva Manso*.
Sol.—*Soland.* = *Solander*.
Sommerf. = *Sommerfelt*.
Son.—*Sonn.*—*Sonner.* = *Sonnerat*.
Sp.—*Spr.*—*Spreng.* = *Sprengel*.
Sparrn. = *Sparrmann*.
Splily. = *Spliltgerber*.
St. Hil. = *Auguste de Saint Hilaire*.
St. et H. = *Stuedel and Hochstetter*.
Stack.—*Stackh.* = *Stackhouse*.
Stadm. = *Stadtman*.
Stc. = *Steven*.
Steinh. = *Steinheil*.
Steph. = *Stephan*.
Sternb. = *Sternberg*.
Stead. = *Steucl*.
Stev. = *Steven*.
Sw.—*Swz.* = *Swartz*.

T. = *Tournefort*.
T. et A. G.—*T. et Gr.* = *Torrey and Asa Gray*.
Tagliab. = *Tagliabuc*.
Targ. = *Targioni Tozzetti*.
Tayl. = *Taylor*.
Ten.—*Tenor.* = *Tenore*.
Th.—*Thunb.* = *Thunberg*.
Thienem. = *Thienemann*.

Thonn. et Schum. = *Thonning and Schumacher*.
Thou. = *Thouars*.
Torr. = *Torrey*.
Torr. et Gr. = *Torrey and Gray*.
Tourn.—*Tournef.* = *Tournefort*.
Tratt.—*Trattin.* = *Trattinnick*.
Traut. = *Trautvetter*.
Trev. = *Treviranus*.
Trin. = *Trinius*.
Trotzk. = *Trotzky*.
Trttv. = *Trautvetter*.
Tul. = *Tulasne*.
Turcz. = *Turczaninow*.
Turp. = *Turpin*.
Tuss. = *Tussac*.

Vaill. = *Vaillant*.
Vand. = *Vandelli*.
Vauch. = *Vaucher*.
Velloz.—*Vcll.* = *Vellozo*.
Vent. = *Venelat*.
Vill. = *Villars*.
Vis.—*Visian.* = *Visiani*.
Vittad.—*Vill.* = *Vittadini*.
Viv. = *Viviani*.
Vog. = *Vogel*.

W. = *Willdenow*.
W. Arn.—*W. et A.* = *Wight and Arnott*.
W. H. = *W. Herbert*.
W. et Berth. = *Webb and Berthelot*.
W. et Gr. = *Wilson and Greville*.
Wahl.—*Wahlenb.* = *Wahlenberg*.
Wall. = *Wallich*.
Wallr. = *Wallroth*.
Walp. = *Walpers*.
Walt. = *Walter*.
Wats. = *Watson*.
Web. et M. = *Weber and Mohr*.
Weig. = *Weigel*.
Wendl. = *Wendland*.
Wigg. = *Wiggers*.
Wikstr. = *Wikstrom*.
Willd. = *Willdenow*.
Wils. = *Wilson*.
Wimm. = *Wimmer*.
Wulf. = *Wulfen*.

Z. = *Zuccarini*.
Zahlbr. = *Zahlbruckner*.
Zanard. = *Zanardini*.
Zenk. = *Zenker*.
Zippel.—*Zipp.* = *Zippelius*.
Zoltik. = *Zollikofer*.
Zucc. = *Zuccarini*.

A SUPPLEMENT OF ADDITIONAL GENERA.

[* These are for the most part referred to their places in the system, upon the authority of their respective Authors.]

- p. 9. AL GALES.
Limnodietyon, *Ktzing.* in Palmellæ.
Erebonema, *Röm.* in Leptomitæ.
Inomeria, *Ktzing.* in Rivulariæ.
Chnamatophora, *Ktzing.* in Leptotrichææ.
- p. 13. DIATOMACEÆ.
Aulacocystis, *Hassall.* } near Frustulia.
Gyrosigma, *Id.* }
Nitzschia, *Id.* }
Sphinctocystis, *Id.* }
Holocystis, *Id.* near Micrasterias.
Trigonocystis, *Id.* } to Staurostrum.
Gouliocystis, *Id.* }
Sphaerophora, *Id.* to Lysigouium.
- p. 18. CONFERVACEÆ.
Cladophora, *Kütz.* } near Conferva.
Microspora, *Hass.* }
Aplonema, *Hass.* }
Lithonema, *Id.* to Rivularia.
Ouracoccus, *Id.* to Hæmatococcus.
Sorospora, *Id.* near Palmella.
Arthronema, *Id.* near Scytonema.
Mesocarpus, *Id.* } near Zygnema.
Sphaerocarpus, *Id.* }
Cladothale, *Hook. f.* among Siphonææ.
Thwaitesia, *Mont.* near Zygnema.
- p. 22. FUCACEÆ.
Struvea, *Sonder,* next Bryopsis.
Derbesia, *Solier,* near Bryopsis.
Platythalia, *Sonder,* near Fucus.
Pinnaria, *Endl.* near Dictyosiphon.
Contarinia, *Id.* near Cystoseira.
Phacelocarpus, *Id.* near do.
Stereocladon, *Hook. f. et Harv.* near Dictyosiphon.
Scytothamnus, *Hook. f. et H.* } near Epineum. *Harv.* } Chordaria.
Adenocystis, *Hook. f.* near Scytosiphon.
- p. 24. CERAMIACEÆ.
Gelinaria, *Sonder,* near Polyides.
Hanowia, *Id.* } near Griffithsia.
Ptilocladia, *Id.* }
Dasyphila, *Id.* }
Acanthococcus, *Hook. f. et Harv.* near Plocamium.
Bostrychia, *Mont.* near Polysiphonia.
Clathymenia, *Harv.* near Laurencia.
Apophiza, *Harv.* near Ctenodus.
Lenormandla, *Sonder,* } near Polysiphonia.
Kutzingia, *Id.* }
Trigenea, *Id.* }
Sarcotaria, *Id.* } near Sphaerococcus.
Dicranema, *Id.* }
- p. 41. &c. FUNGALIA.
Hymenochete, *Lév.* near Thelephora.
Solenodonta, *Gant.* near Puccinia.
Dinemasporium, *Lév.* near Selenosporium.
Polynema, *Lév.* do.
Melasnia, *Lév.* near Cytispora.
Ascospora, *Fr. Lév.* near Melasnia.
Stigmella, *Lév.* near Ascospora.
Micropera, *Lév.* near Stigmella.
Ypsilonia, *Lév.* near Asteroma.
Parmularia, *Lév.* near Discoria.
Scopulina, *Lév.* near Parmularia.
Rhizopogon, *Fr.* next Hydangium.
Dictyophallus, *Corda,* next Phallus.
- Staurophallus, *Corda,* next Dictyophallus.
Hymenophallus, *Corda,* next Staurophallus.
Ascrophallus, *Lep. et Mont.* next Lysurus.
Xylopodium, *Mont.* next Phellorinia.
Hyporhamma, *Corda,* next Trichia.
Stegobolus, *Mont.* should be placed amongst Lichenales, near Parmelia.
Acroscyphus, *Lév.* near Sphæria.
Artotrogus, *Mont.* near Sepedonium.
Phylacia, *Leveill.*
Sphaeropsis, *Id.* } near Sphæria.
Venturia, *Notaris,* }
Massaria, *do.* }
Rosellinia, *do.* }
Bertia, *do.* }
Asterina, *Leveill.* } near Hysterium.
Lembosia, *Id.* }
Ailographa, *Libert.* }
Didymaria, *Corda,* next Dactylium.
Polydesmus, *Mont.* next Septosporium.
Actinospira, *Corda,* near Myxotrichum.
Lasioderma, *Mont.* near Penicillium.
Sphaeromyces, *Mont.* near Penicillium.
Mitrophora, *Lév.* next Morchella.
Pyronema, *Mont.* next Peziza.
Hymenoholus, *Dier. et Mont.* next Ceuangium.
Hydnotrya, *Berk. et Broome,* next Hydnobolites.
Hydnocystis, *Tul.* next Genæa.
Geuabea, *Tul.* near Genæa.
Stephensia, *Tul.* near Genæa.
Eucampitodon, *Mont.*
- The views of the affinities of *Mucorini* mentioned in the note have lately been singularly confirmed by a structure which has been detected by Tulasne in the genus *Hymenangium*. *M. I. B.*
- p. 50. LICHENALES.
Thysanothecium, *Mont. et Berk.* near Stereocaulon.
Stegobolus, *Mont.* near Parmelia.
- p. 60. JUNGERMANNIACEÆ.
Zoopsis, *Hook. fil.*
- p. 67. BRVACEÆ.
Sprucea, *Hook. f.* near Holomitrium.
Lophiodon, *Id.* } near Campylopus.
Cynodon, *Brid.* }
Rigidium, *Kunze,* near Hypnum.
Cryptocarpus, *Dozy.*
Eriodon, *Mont.* near Leskea.
Leptochloa, *do.* near Bryum.
Aschistodon, *do.* near Trichostomum.
Diplostichum, *do.* near Fissidens.
Bartramidula, *Bruch.* near Bartramia.
Philonotula, *do.* do.
Hedwigidium, *do.* near Hedwigia.
Campylostellum, *do.* near Dicranum.
Garckea, *Müller,* near Phascum.
Brachymitrium, *Taylor,* near Encalypta.
- p. 77. OPHIOGLOSSACEÆ.
Ridzoglossum, *Presl.*
Chetroglossa, *Id.*
- p. 79. POLYPODIACEÆ.
Syogramma, *J. Sm.* near Gymnogramma.

- Leptopteris, *Presl.* near Toden.
Aneimidictyum, *Presl.* near Aneimia.
Spathopteris, *Presl.* near do.
- p. 82. DANÆACEÆ
Psilodochea, *Presl.* near Angiopteris.
Discostegia, *Presl.* }
Gymnothea, *do.* } to Marattia.
Stibasia, *do.* }
Heterodanæa, *do.* } to Danæa.
Danæopsis, *do.* }
- p. 90. BALANOPHORACEÆ.
Cynopsolc = Balanophora.
- p. 115. GNAMINACEÆ.
Didactylon, *Zollinger,* near Oropetium.
Myrliacteta, *do.* near Digitaria.
Padia, *do.* near Oryza.
Antinoria, *Parlat.* next Aira.
Serrafalcus, *do.* next Bromus.
Psaumphilula, *Fries.* = Amnophila.
Donacium, *do.* = Douax.
- p. 119. CYPRACEÆ.
Hydros hænus, *Zollinger,* near Kyllinga.
- p. 129. ABACEÆ.
Ariopsis, *J. Gray,* near Remusalia.
- p. 161. IADACEÆ.
Kustylis, *Gray,* near Nemostylis.
- p. 164. MUSACEÆ.
Phenakospermum, *Endl.*
- p. 169. MARANTACEÆ.
Eurystylus, *Bouché,* = *Canna flaccida.*
Distemon, *do.* = *Canna denudata.*
- p. 181. ORCHIDACEÆ.
Porpax, *Lindl.* next Trias.
Uropedium, *Lindl.* next Cypripedium.
Borborchis, *Zollinger,* near Pleione ?
Lindblomia, *Fries.* = *Cœloglossum.*
Schizochilus, *Sander,* near Disa ?
Chondrorhyncha, *Lindl.* near Hclcia.
Solenidium, *Lindl.* near Brassia.
- p. 192. JUNCACEÆ.
Gondotia, *Decaisne?*
- p. 194. ORONTIACEÆ.
Schismatoglottis, *Zollinger,* near Calla.
- p. 218. TRILLIACEÆ.
Streptolirion, *Edgew.?* ?
- p. 225. CYCADACEÆ.
Ceratozamia, *Ad. Br.*
Platyzanium, *Zucc.* = *Dion.*
- p. 229. PINACEÆ.
Actinostrobos, *Miq.* near Callitris.
- p. 262. URTICACEÆ.
Myrlocarpa, *Benth.*
- p. 268. MORACEÆ.
Caprifilens, }
Tenorea, }
Urostigma, } *Gasparrini,* all out of
Visiania, } *Picus.*
Cystogyne, }
Galoglychia, }
Covellia, }
- p. 271. ANTOCARPACEÆ.
Leucosyke, *Zollinger.*
- p. 281. EUPHORBACEÆ.
Lopadocalyx, *Klotz.* = *Otax.*
Bertya, *Planchon,* near Calyptrostigma.
Stachystemon, *Id.* near Pseudanthus.
Aphora, *Nutt.* = *Serophyton,* *Benth.*
Galeria, *Zollinger.*
Alectorocotnum, *Schlecht.* near Euphorbia.
- p. 293. JUGLANDACEÆ.
Fortunea, *Lindl.*
- p. 296. HELWINGIACEÆ.
Quadrifida, *Sieb. et Zucc.?*
- p. 315. CUCURBITACEÆ.
Pestalozzia, *Zollinger,* near Telfairia.
Gomphogyne, } *Griffith,* near Zanonia.
Enkylia, }
Cucurbitella, *Wtprs.* = *Schizostigma.*
- p. 319. BEONACEÆ.
Meziera, *Gaudich.*
- p. 322. PAPAVACEÆ
Botryosicyos, *Hochst.* next Ceratiosicyos.
- p. 328. FLACOURTIACEÆ.
Aberia, *Hochst.*
Monospora, *Hochst.* near Erythrospermum.
- p. 334. PASSIFLORACEÆ.
Tetraphathea, *Raoul.?*
- p. 354. BASSIACEÆ.
Zygopeltis, *Fenzl.* next Cynocardamum.
Physolepidium, *Schrenk.* before Lepididium.
Microstigma, *Trautv.* next Oudneya.
Pringlen, *Hook. f.* near Alyssum.
- p. 358. CAPPARIDACEÆ.
Beautempsia, *Gaudich.*
Dstrugenia, *do.*
- p. 361. STERCULIACEÆ.
Boschia, *Krthls.* near Pachira.
- p. 367. TROPEOLACEÆ.
Rixia, *Morren.*
- p. 370. MALVACEÆ.
Sida, *Linn.* should be in Roman letters.
- p. 372. TILIACEÆ.
Abstrutheria, *Gardner,* near Friesia.
- p. 378. POLYGLACEÆ.
Purdiea, *Planchon?*
Cardiophora, *Benth.* = *Soulamea.*
- p. 385. SAPINDACEÆ.
Plagiopterou, *Griffith?*
- p. 406. HYPERICACEÆ.
Thymopsis, *Jaub.* } next Hypericum.
Adenotris, *Jaub.* }
- p. 419. MAGNOLIACEÆ.
Burgeria, *Siebold et Zuccarini.*
- p. 428. RANUNCULACEÆ.
Barneodia, *Gay,* near Branthis.
Psychrophila, *do.* near Callith.
Triquadria, *Lindl.* a § ? of *Clematis.*
Bahuanthem, *Edgew.* a § ? of *do.*
Glandidium, *Zucc.* near *Picouin?*
Podostaurus, *Junghaus.*
- p. 436. FIMBRIACEÆ.
Aplectrocappos, *Boiss.* near Sarcocapnos.
- p. 440. VITACEÆ.
Rhamnus, *Meyen,* } near Bersama.
Natalia, *Hochst.* }
- p. 444. OLACACEÆ.
Strombosia, *Bl.* from Rhamnaceæ.
Bursinopetalum, *Wight.*
Lopadocalyx, *Klotzsch.* = *Otax.*
- p. 464. MELIACEÆ.
Heynichia, *Kth.* near Mallea.
Schizocalyx, *Hochst.*
- p. 467. ANACARDIACEÆ.
Sclerocarya, *Hochst.*
- p. 471. RUTACEÆ.
Rabelaisia, *Planchon,* next Evodia.
Peltostigma, *Wtprs.* = *Pachystigma.*
- p. 475. OCHNACEÆ
See for some peculiar views of the genera of this order, a paper by M. Planchon in the *Lond. Journ. of Bot.*, vol. 5, p. 591; where is added the genus
Blasthemanthus, *Planchon.*
Walkeria = *Gomphia*, on the same authority.
- p. 477. SIMARUBACEÆ.
Hannon, *Planchon.*
Pierodendron, *Id.*
According to M. Planchon *Castela*, *Thorp.*, *Ailanthus*, *Desf.* (*Tarrietia?* *Bl.*), *Brucea*, *Mill.*, *Sonlana*, *Lam.*, *Picramnia*, *Siez.*, *Spathelia*, *L.*, *Dictyoloma*, *D.C.* (*Benjaminia*, *Fl. flum.*), and *Eurycoma*, *Jack.* should also be referred to this place. The same author states that *Picramnia*, *Lindl.*, *Müntersia*, *Walpers.*, and *Æschryon*, *Fl. Flum.* are all synonyms of *Picrasma*, *Bl.*
- p. 496. CAROPHYLLACEÆ.
Rhodalsine, *Gay,* } near Alsine.
Greniera, *Gay,* }
Wahlbergella, *Ruppr.* near *Lycelinis.*
Ammodenia, *Gmel.* near *Sagina.*

- p. 499. ILLICIACEAE.
Sclerocephalus, *Boissier*, near Paronychia.
- Bicheranthus, *Webb*, near Pteranthus.
- p. 501. PORTULACACEAE.
Pleuronotum, *J. Hook.*
- p. 504. POLYGONACEAE.
Conopyrum, *Fisch.* = Polygonella.
Thysanella, *A. Gray*, near Polygonum.
Sarcogonum, *Kunze* = Muhlenbeckia.
- p. 518. PIPERACEAE.
Neumatanthra, *Miq.* after Peltobryon.
- p. 520. CHLORANTHACEAE.
Sarcandra, *Gardner.*
- p. 531. THYMELACEAE.
Gymnococca, *C. Mey.* }
Calyptrostegia, *C. Mey.* } near Pimelia.
Heteroloma, *C. Mey.* }
- p. 534. PROTEACEAE.
Agnostus, *A. Cunn.* = Stenocarpus, *R. Br.*
- p. 533. FABACEAE.
Dendrospartum, *Spach*, near Spartium.
Cyanobotrys, *Zucc.* near Andira.
Rodschedia, *Miq.* after Vouropa.
- p. 570. HYDRANGEACEAE.
Quilamum, *Blanco*, } = Henslovian ?
Crypteronia, *Blume*, } according to
Planchon.
- p. 579. AQUILARIACEAE.
Leucosmia, *Benth.*
- p. 582. RHAMNACEAE.
Crypteronia, *Bl.* = Henslovian ?
Nagelia, *Zollinger.*
- p. 604. LOGANIACEAE.
Chaetosus, *Benth.* near Pierophilus.
- p. 622. SOLANACEAE.
Sickiera, *Soultner*, near Lycium.
- p. 626. AMELIADACEAE.
Belostemma, *W. All.*
Trichosacme, *Zucc.*
- p. 632. CONVULVACEAE.
Dieranostylis, *Benth.* near Evolvulus.
Lysistylis, do. do.
- p. 634. CUSCUTACEAE.
Epihuella, }
Eugelanmia, } *Pfeiffer.*
- p. 639. HYDROPHYLLACEAE.
Whitlavia, *Hareey.*
Pholistoma, *Lilja*, near Nemophila.
- p. 645. PRIMULACEAE.
Oscarin, *Lilja*, a § of Primula ?
Armerina, *Lindl.* a § of Primula ?
- p. 648. MYRSINACEAE.
Grammadenia, *Benth.* near Cybianthus.
- p. 656. BOKARNIACEAE.
Buglossites, *Moria*, near Anclusa.
- p. 662. LAMIACEAE.
Brazoria, *A. Gray*, near Physostegia.
- p. 672. GERANIACEAE.
Championia, *Gardn.* near Isanthera.
- p. 679. ACANTHACEAE.
Sclerocalyx, *Nees*, near Frichanthera.
Tetranerium, *do.* near Franchetium.
Henrya, *do.* near Dichytera.
Lankesteria, *Lindl.* near Eranthemum.
- p. 684. SCROPHULARIACEAE.
Danubimiculus, *Sailer*, = Linosella.
Duganpha, *Benth.* near Chelone.
- p. 709, &c. ASTERACEAE.
Homostylum, *Nees*, near Aster.
Linoschilus, *Benth.* near Muthia.
Hofmeisteria, *Wiprz.*
Heloague, *Benth.*
Brachactis, *Led.* near Solidago.
Pteroclaste, *Boiss.* near Epidora.
Grantia, *Boiss.* near Umba.
Linnogonneton, *C. H. Schultz.* near
Cryptospermum.
Wartheimia, *Boiss.* near Aster.
Cyclachona, *Frez.* near Iva.
- Warmuschmittia, }
Prestliaria, } *C. H. Schultz*, near
Stipula, } *Coreopsis.*
- Prionolepis, *Pöpp.* near Verbesina.
Decanenrum, *C. H. Sch.* nr. Tannacetum.
Acanthocephalus, *Fisch.* near Lactuca.
Myopordon, *Boiss.* near Onopordon.
Sclerolema, *Hook. f.* near Trineuron.
Mehlenn, *do.* near Gnaphalium.
Trianthus, *do.* near Panargyrum.
Macraclenium, *do.* near Chubrea.
Leucotis, *Edgew.* §? of Inula.
Stictophyllum, *Edgew.* near Serratula.
Fibera, *C. H. Sch.*, near Hypochaeris.
- p. 723. HALORAGACEAE.
Hydrospodylus, *Hsckl.*
- p. 733. MELASTOMACEAE.
Monochetum, *Naudin*, near Arthro-
stemma.
Cycnopedium, *do.* *Miconia.*
Octomeris, *do.* *do.*
Stephanotrichum, *do.* ??
Chiloparus, *do.* *Miconia.*
Americlestus, *Krtls.* near Davya.
Briessenia, *do.* near Sarcopyrum.
Poteranthera, *Don.* near Dicrananthera.
Dalenia, *Krtls.* near Dissochaeta.
Hartigia, *Miq.* near Miconia.
Lijndenia, *Zollinger?* *Dioc!* near
Menecylon ?
- p. 745. LOASACEAE.
Microsperma, *Hook.* }
Ancyrostemma, *Poppig.* } nr. Mentzelia.
Eucide, *Zucc.*
- p. 748. CACTACEAE.
Pfeifferia, *Salm.* near Rhipsalis.
- p. 764. CINCHONACEAE.
Wigumia, *Meyen.* near Putoria.
Diphragmus, *Prest.* near Spermaceo.
Otiophora, *Zucc.* do. do.
Eucopa, *Prest.* do. Coffea.
Pachysanthus, *Prest.* do. do.
Cleisocratera, *Krtls.* do. Kraussia.
Pentodon, *Hochst.* do. Hedyotis.
Selenocera, *Zippel.* do. Rondeletia.
Bathysa, *Prest.* do. do.
Ladenbergia, *Kltzsch.* do. Cinchona.
Rustia, *Kltzsch.* do. Cinchona.
Voigtia, *Kltzsch.* do. do.
Schoenleinia, *Kltzsch.* do. do.
Stephegyna, *Krtls.* do. Nauclea.
Meganephra, *Hochst.* do. Randia.
Anisomeris, *Prest.*
- p. 766. CAPHYLLACEAE.
Vesalea, *Martens*, = Abelia.
Chlaniodocarpus, *Daub.* near Lonicera.
- p. 771. GALIACEAE.
Meriarpaea, *Boiss.* near Vaillantia.
Microphylla, *Schrenk.* near Asperula.
- p. 778. AMARACEAE.
Lithoscladium, *Thurz.* near Chlidium.
Czetonia, *Thurz.* near Confoselinum.
Tomassinia, *Bertol.* near Angelica.
Lophotenia, *Grisb.* near Hradicum.
Agrocharis, *Hochst.* near Cumium.
Gytania, *Munz.* do. near Baucis.
Chasaya, *Bertoloni.* }
Eremodaurus, *Eng.* near Prangos.
Petroselinum, *Edgew.* }
Aerocoma, *Falc.* } near Anmi.
Narthex, *Falc.* near Ferula.
Grococoma, *Edgew.* near Angelica.
Psammogton, *Edgew.* near Caulalis.
Scaphospermum, *Edgew.* near Corian-
drum.
- p. 783. COMACEAE.
Quadrinli, *Sieb. et Zucc.* ? see Helwini
naga.
- p. 788. SANTALACEAE.
Barhya, *A. Gray.* ?? ?
- p. 791. LOGANIACEAE.
Lubiacina, *Hook. f.* near Viicum.



LONDON :
BRADBURY AND EVANS, PRINTERS, WHITEFRIARS.





