THIRTY-FIRST ANNUAL REPORT

ON THE

NEW YORK STATE MUSEUM OF NATURAL HISTORY

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

[EX-OFFICIO TRUSTEES OF THE MUSEUM.]

TRANSMITTED TO THE LEGISLATURE APRIL 17, 1878.

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IN SENATE,

April 18, 1878.

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University of the State of New York:
Office of the Regents,
Albany, *April* 16, 1878.

To the Hon. William Dorsheimer,
President of the Senate:

Sir—I have the honor to transmit the Thirty-first Annual Report on the State Museum of Natural History by the Regents of the University.

I remain, very respectfully,
Your obedient servant,
E. C. BENEDICT,
Chancellor of the University.

REGENTS OF THE UNIVERSITY.

[*Ex-Officio Trustees of the State Museum of Natural History.*]

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit this their Thirty-first Annual Report:

The reports of the Director and of the Botanist, hereto appended, exhibit the condition of the Museum and the work of the year. In the department of Paleontology large collections have been made, principally of the corals.

The work of preparing sections of fossils for exhibiting their internal structure has been very successfully prosecuted. These sections, made very thin, may be photographed, and, by the stereopticon, shown on a screen in very impressive forms. It is believed that the success of this work in the Museum is more positive than had been elsewhere secured.

The arrangement of the collections in nearly all the departments has been perfected, and it is believed to be all that can be desired for the purposes of study.

Attention is specially called to the importance of printing the reports on the Museum soon after they are presented to the Legislature. These reports embody important scientific facts, and results of investigations are earnestly sought for by citizens of the State, and are profitably used in exchange with individuals and societies in other States and in foreign countries. Their value is greatly diminished by delay of publication.

All of which is respectfully submitted.

By order of the Regents,

E. C. BENEDICT,

Chancellor of the University.

S. B. WOOLWORTH,

Secretary.

REPORT ON THE STATE MUSEUM.

CONTENTS.

REPORT OF THE DIRECTOR.

Albany, *January*, 1878.

To the Honorable the Board of Regents of the University of the State of New York:

Gentlemen—I have the honor to communicate herewith the Annual Report upon the State Museum of Natural History, embracing a statement of the conditions of the collections in the several departments; the additions made thereto; and the work done in the institution and in field collections during the past year; together with special communications upon subjects under investigation by the persons connected with the Museum.

In every department the collections of the Museum are in good order and condition, and every available space is filled; and in many instances so crowded as to interfere with the proper exhibition of the specimens. For the geological and palæontological collections alone, we need an additional area equal to another floor of the present building. Since, therefore, the collections made and studied cannot be placed on exhibition with the present accommodations, it should be remembered that it becomes quite impossible to present to the Board of Regents, or to the public, the evidences of work accomplished.

The changes authorized to be made upon the upper floor of the Museum have afforded space for the arrangement of the additions to the zoölogical collections mentioned in my report of last year; and the skins of Walrus and young, the Giraffe, the Rhinoceras and skeleton; the latter having been placed in position within a few months past.

These changes, however, do not leave sufficient space for the exhibition of the ethnological and historical collections, a considerable part of which remain packed, or laid in drawers.

The present disposition of these collections will be given under the proper head.

Distribution of Duplicate Fossils and Minerals.

The occupation of the Agricultural Hall by the census department, in 1876, interrupted the work then in progress, and has since prevented anything from being done in the actual arrangement for distribution of the duplicate collections; but the preparatory labor of cleaning, ticketing and recording specimens, has been constantly going on in another building appropriated for that purpose; and these collections will be available whenever time and opportunity shall be offered for their final disposition.

Of the collections previously prepared by the Museum for distribution to the institutions of our State, but one has been sent out during the past year. A request for a collection made by the Alfred University, of Alfred, N. Y., accompanied by the statement that they were prepared to receive it, having been approved by the Board of Regents, there was forwarded to that University, in January last, a collection of over five hundred labeled and catalogued fossils and minerals.

There are still eight arranged and labeled collections remaining in the Museum, which properly should be distributed as soon as they can be placed in institutions where they will be appreciated, and used for the advancement of the sciences which they illustrate.

Museum Publications.

The only publications made during the year are the following papers by Mr. C. D. Walcott, special assistant, published in advance of the Museum report and included in the present communication.

Notes on Sections of Trilobites from the Trenton Limestone. 6 pp., 1 pl.
Note upon the Eggs of the Trilobite. 3 pp.
Descriptions of New Species of Fossils from the Chazy and Trenton Limestones. 7 pp. (Describes eight species of Trilobites.)

It is a matter of deep regret to the Director and to all interested in the institution, that the publication of the annual reports of the Museum, which had been continued without interruption for more than a quarter of a century from the first issue in 1848, should have been for the last three years omitted. The twenty-ninth and thirtieth reports; for the years 1875 and 1876, have not yet been printed, even as a State document. Of the twenty-eighth report, for the year 1874, only the usual documentary edition was printed, and for the few copies of this report which we have been able to distribute (about fifty), we are indebted to the kindness of the Secretary of State. Some copies have also been obtained at the office of the Secretary of State, on personal application, by parties desiring to obtain them.

The comparatively small number of copies of the reports, which the Legislatures had annually directed to be printed for the use of the Regents of the University and for the Museum, has been entirely suspended for the past four years.

The value of these reports is sufficiently attested by the numerous applications made for them, and the character of the sources from which these applications are received. The editions issued have speedily been exhausted or so diminished in number that very few remain. Every effort has been made to sustain the reputation and character of these reports. Not one has been presented, of late years, which does not contain papers which are valuable contributions to science, and the result of original investigation. The non-publication of these reports cannot but operate seriously to the disadvantage of the Museum. No such institution, at the present day, can have a position in the world of science, which it does not command by the actual work it accomplishes; and deprived of publication, it is essentially deprived of almost its only means of communication with the scientific public. Even delay in publication is often an injustice to an author, whose rightful priority is superceded by another who has earlier facilities of announcement.

Additions to the Museum by Donation.

The donations made to the Museum during the past year have not been as many as usual.

To the Botanical department, twenty-one contributions have been made of (in the aggregate) two hundred and sixteen species.

To the Zoölogical department contributions have been made by twenty donors of one hundred and fifteen specimens.

To the Geological and Mineralogical departments, there have been eight contributors.

To the Archæological department, two contributions are recorded.

To the Library, contributions have been made from twenty-three individuals and societies, of forty-seven pamphlets, and twenty-three bound volumes.

The whole number of contributors to the several departments and the Library is seventy-four.

The Work of the Museum.

Botany. In the Botanical department, a special report on the subject of his investigations will be made by the botanist, Mr. C. H. Peck.

Zoölogy. The collections in this department having been nearly all arranged in preceding years, we have not much special work upon them to report for the last year. Of the donations, several specimens have been mounted, and, together with the others of value, added to the collections. A number of Reptilia in alcohol, principally from the Southern States, have been determined and labeled; and all the alcoholic specimens of reptiles and fishes not belonging to the New York fauna, have been separately arranged in one of the wall-cases.

Geology and Mineralogy. The labeling of the Museum collections, preparatory to the compilation and publication of a general catalogue, has been continued through the year.

The geological collections contained in the wall-cases have been re-arranged, and labeled as far as the Devonian rocks. For want of other space, these cases have frequently been made the receptacle for rock specimens, without due regard to their value. The removal of all specimens not important to the completeness of the series has relieved the over-crowded cases, and made room for the proper exhibition of the collections. Each specimen is now accompanied by a card-label, indicating its name, geological position and locality; and a transcript of the card is attached to the specimen. The specimens withdrawn from the cases have been placed in drawers beneath the table-cases, with memoranda of their removal.

The mineralogical specimens were arranged and properly labeled during the previous year (1876). During the past year, a large number of minerals have been incorporated in the general collection, derived from a more critical examination of specimens which had been laid aside as duplicates from collections made in the field, and from various contributions; notably one from Prof. Albert R. Leeds, of beautiful and valuable specimens from Bergen Tunnel, and other localities in New Jersey and Pennsylvania.

After the selection from the duplicate minerals, the remainder have been arranged in drawers within the enclosure on the second floor, in two series: the first in sixty-five drawers beneath the tables, in which are all those of known localities; second, in the case of trays in the same enclosure, containing all those of unknown localities, the larger number of which are from the old collections of the Museum, which have been obtained from various sources, many of them being of little value.

In the Van Rensselaer collection, presented to the Museum in 1872, to which reference has heretofore been made, there were a large number of volcanic specimens, which had undoubtedly been collected with a view of presenting a full representation of the Vesuvian products. These have been arranged in four table-cases on the second floor of the Museum, with labels indicating the contained minerals, so far as they have been determined.

Four additional table-cases on the second floor contain an arranged collection of claystones; a series of Cumberland, Eng. rocks, and miscellaneous rock specimens of the Brazilian collection. The drawers beneath these cases contain Jurassic and Cretaceous fossils, which have been mainly derived from the Van Rensselaer collection, and not previously arranged.

The collection of minerals, chiefly crystals, formerly belonging to Dr. E. Emmons, which was purchased some years since by Hon. Erastus Corning, and deposited in the Museum, has been obtained and added to the Museum collections, by the payment of its original cost from the Museum appropriation.

Palæontology, etc. The Palæontological series, through the lower and upper Silurian and Devonian formations, has been reviewed and in part re-arranged; some errors in determination have been corrected; and fifty labels changed in conformity to the present nomenclature. A few additions have been made to the collections in the cases.

On the second floor the collection of British fossils, of the Silurian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous and Tertiary formations, have been rearranged in the table-cases; and fossils of the same formations which had occupied eighteen drawers have been incorporated with them, filling the entire space; while the remaining part of the Jurassic and Cretaceous fossils are arranged in drawers beneath the table-cases.

Three additional table-cases, mainly filled with arrow-heads, have been added to the collection of stone implements. The entire collections of this character now occupy fourteen table-cases.

MECHANICAL FACILITIES FOR WORK IN THE MUSEUM.

The importance of a more thorough knowledge of the structure of rocks, minerals and fossils than can be obtained by superficial examination, even when aided by an ordinary magnifier or microscope, has long been felt in the course of our Museum work. This has been found especially true in the study of the fossil Sponges, the Bryozoa, in all forms of Corals, the shells of Brachiopoda, etc. Even where minute or microscopic structure is not sought for, as in the Cephalopoda and other forms, means for examining the interior structure by artificial sections is of the utmost importance.

To accomplish this work, a small turning-lathe had, during the year 1876, been arranged in one of the basement working-rooms, but it required excessive labor and a wasteful expenditure of human strength to accomplish even a moiety of the work needed. Upon application to the Board of Regents, in 1877, I was authorized to purchase and place in this working-room a small steam-engine, with the necessary apparatus for cutting and polishing specimens. The whole has been established, and has been working in a most satisfactory manner since May last. The work accomplished has been of various kinds, including specimens from all the classes mentioned above, but chiefly Sponges, Bryozoa, Corals and Brachiopoda. These have been cut in thin sections, polished and attached to glass plates, and ground down so as to be translucent or semi-transparent, and are thus fitted for microscopic slides, or for a critical examination under an ordinary magnifier.

The value and importance of this work cannot be too highly estimated. With our present facilities, we are able in a few hours to obtain translucent sections of any fossil form, cut from the original body in different directions, and presenting the details of structure far more perfectly than could be obtained by any other process. The same is also true of rock specimens and minerals, where the structure is brought out in a most satisfactory manner.

The specimens thus prepared are susceptible of being photographed, and are reproduced in great exactness by the Albertype process. Some examples of this mode of representing the minute structure of fossil sponges have already been laid before you. Other specimens are illustrated in the volumes entitled "Illustrations of Devonian Fossils," published in 1876. The absolute accuracy obtained by this process renders it of the utmost value, as it precludes any chance of misrepresentation.

This process of preparation of rock specimens has been long in use in the laboratories of Europe; and in the hands of Professor Zirkel, of Leipsic, and others, has contributed most important results to our knowledge of petrology.

The same processes have been adopted in some of the museums and laboratories of our own country, and especially by Dr. J. J. Woodward, in the study of the tissues of living forms, in the Museum attached to the War Department in Washington. Much work of similar character has also been accomplished in the Museum of Comparative Zoölogy at Cambridge, Mass.

In our own case, it has already proved of invaluable service, and promises to be still more important in future investigations. Up to the present time, sections have been made of rocks, minerals and fossils, numbering over 560, of which more than 325 are polished, translucent cuttings of large size, and adapted to microscopic study and photography. This work has been under the charge of Dr. J. W. Hall, who has devised and arranged the machinery now in use. Among this collection are a considerable number of specimens of Tentaculites, Stromatopora and European petrospongia which have been prepared by Dr. Fritz-Gaertner. Each one of the sections has been carefully recorded, noting the locality and geological formation. A catalogue of these specimens has been prepared, containing all the information possessed regarding the specimen at the time the work was done, indicating its geological position and the place in the Museum of the specimen from which the sections have been cut, and bearing a number corresponding to the section.

In continuing this work, it is intended to prepare a series of cuttings of specimens representing all the varieties of rock formations within the State of New York, as well as of those fossil forms where such treatment will elucidate their intimate and characteristic structure.

In speaking of this subject, I should not omit an important feature in the application of these preparations to educational uses. The translucent sections attached to glass by Canada balsam, are not only susceptible of being photographed and printed from the glass plate, but these plates may be used in the stereopticon or magic lantern, and the figures, projected upon a screen, magnified to any desired degree; thus affording the student an opportunity of learning, in a general way, the structure of any class of objects which cannot be advantageously studied from the exterior characters.

FIELD COLLECTIONS OF FOSSILS AND MINERALS.

The accumulating collections of rocks and fossils, resulting from the field-work of the Museum, have been temporarily placed in a building especially devoted to preparatory work upon the same. Here the fossils of the lower Helderberg group, Oriskany sandstone, Upper Helderberg, Hamilton, Portage and Chemung groups, were first separated and arranged, this work occupying four or five months; subsequently the Brachiopoda of the Hamilton and Chemung groups, and the Lamellibranchiata of the Hamilton group, have been carefully separated, and notes made upon each species. In a book arranged for that purpose, the record of every species is given, as to the number of specimens from each locality, the condition of preservation, the character of the rock, its manner of weathering and consistency, and also the associated species. The arrangement of the Lamellibranchiata of the Hamilton group is nearly completed, but it will require several months longer to finish the fossils of the order from the Chemung group. This work has been done by Mr. Lee E. Brown.

The object of this work is to give a comprehensive view of the comparative abundance of each species, its geographical distribution and vertical range, and the character of the sediment in which it lived. The notes mark the peculiarities or characteristics of particular specimens or of the species itself. When completed, this work will be especially important in showing the geographical range of species; and the results may be represented on any geographical or geological map of the State.

From the amount of work necessary to be done upon the fossils collected during the year, in their preparation, determination, labeling and recording, before incorporating them with the collections, they cannot now be included in the list of additions herewith presented, except in a very general statement. I can only say of them at the present time, that they are of great value and importance to the Museum, and in their extent surpass the collections of many of the previous years.

The following statement will, in some measure, indicate the nature of the material and the quantity collected during the past year.

Mr. C. D. Walcott with Mr. C. Vandeloo were occupied for a considerable time in making Collections from the corniferous limestone of Western New York. The results are as follows: From Caledonia, N. Y., four barrels and two boxes; from Leroy, ten barrels; from Falkirk, three barrels. These collections are chiefly of fossil corals which are in a good state of preservation.

For the purpose of comparison with the New York forms, five barrels of corals were collected from the limestone of the same horizon, in Southern Indiana. At Pendleton, Ind., a sandstone at the base of the corniferous limestone, bears a fauna which is characteristic of the Schoharie grit of New York; and from this formation were obtained three barrels of specimens. Besides these, an extensive collection was made from the Niagara group, at Waldron, Ind., of about 7,000 pounds. This will be a very valuable addition to the Museum, since the beds of corresponding age at Lockport, N. Y., are now difficult of access.

Dr. R. Fritz-Gaertner has collected four boxes of minerals and fossils in the valley of the Mohawk. The fossils are from the Calciferous sandstone, Birdseye and Trenton limestones. From the Trenton limestone the fossils are chiefly minute bryozoans, which will be an important addition to the Museum collections. The minerals derived from the calciferous sandstone are quartz crystals in druses, with rhombohedral forms of calcite and indurated bitumen; pyrites and sphalerite. The Trenton limestone furnished large specimens of galenite and pyrites, the sphalerite and calcite coming together in veins. Several instructive specimens of slickensides were likewise derived from the same locality.

Dr. J. W. Hall has collected sixty-four boxes of fossils, which are nearly all in a good state of preservation. The collections were made in the counties of Albany, Schoharie, Otsego and Onondaga. They consist, principally, of fossil corals, derived from the upper Helderberg limestone formation. Some new and valuable collections were made from the goniatite limestone; and a large collection of Lamellibranchiata and other shells from the Hamilton group of Onondaga county.

It would be quite impossible to enumerate in detail all the work done in the Museum. In an institution like this, open at all times to visitors, much time of the assistants and often of the Director is occupied in answering questions or giving information. Specimens in every department of Natural History are sent in with inquiries regarding their nature and value; and the information thus asked is always cheerfully given. It has been my earnest desire to make the Museum not only a scientific organization in the true sense of the term, but at the same time an educational institution of the higher order in all the departments of science represented therein. The work is carried on not only for present use and needs of the Museum, but with a view to the future, and it is believed that the work done and the collections accumulated will be so arranged and placed in such a condition, that they will be available and their value will be appreciated in all the future working of the institution.

I am, very respectfully,

Your obed't servant, JAMES HALL.

ADDITIONS TO THE STATE MUSEUM

DURING THE YEAR 1877.

I. BOTANICAL.

Specimens of sixteen species of California plants. From Miss S. P. MONKS, Coldspring, N. Y.

Five specimens of Ferns; among them *Botrychium lunaria* Sw. From Mrs. S. M. RUST, Syracuse, N. Y.

Twenty-eight species of plants; most of them "ballast" plants, from near Philadelphia. From J. C. MARTINDALE, Camden, N. J.

Specimens of the yellow pine—*Pinus mitis* Mx. From N. L. BRITTON, New Dorp, N. Y.

Forty-six species of plants; one of them a new and rare fungus. From E. S. MILLER, Wading River, N. Y.

Eleven species of Mosses and Fungi, mostly from Colorado. From E. A RAU, Bethlehem, Pa.

Four species of Fungi. From W. R. GERARD, New York city.

Nine species of plants. From Rev. H. WIBBE, Oswego, N. Y.

A specimen of *Carex panicea* L. From Prof. P. A. PUISSANT, Troy, N. Y.

Four species of Ferns; among them *Scolopendrium vulgare* Sm. From L. M. UNDERWOOD, Syracuse, N. Y.

A specimen of *Arthonia polymorpha* Ach. From H. WILLEY, New Bedford, Mass.

Fourteen species of plants; some of them new species. From Hon. G. W. CLINTON, Buffalo, N. Y.

Twelve species of Fungi. From C. C. FROST, Brattleborough, Vt.

Six species of Fungi; some of them new. From H. A. WARNE, Oneida, N. Y.

Four species of Ferns. From B. D. GILBERT, Utica, N. Y.

Five species of plants; among them the rare *Pogonia affinis* Aust. From M. W. VANDENBERG, Fort Edward, N. Y.

A specimen of *Polyporus Beatiei* Bann. From G. S. WATKINS, Wilmust, N. Y.

Specimens of *Polyporus Beatiei* Bann. and *Impatiens fulva* Nutt. From G. T. FISH, Rochester, N. Y.

Forty-three species of Fungi, from New Jersey. From J. B. ELLIS, Newfield, N. J.

Specimen of the wood of *Kalmia latifolia* L. From C. DEVOL, M. D., Albany, N. Y.

Specimens of California hickory nuts. From P. C. BROWER, Albany, N. Y.

II. ZOÖLOGICAL.

A Field-mouse. From ANDREW M. BENDER, Adamsville, N. Y.

A Woodchuck—*Arctomys monax* (Linn.). From SETH E. PARSONS, Albany, N. Y.

A New York Ermine (*Putorius Noveboracensis*). From JOHN H. BURNS, Cedar Hill, N. Y.

A Northern Tree-toad—*Hyla versicolor* Le Conte, taken at Center, N. Y., feeding on the sugar-bait spread on pine trees for Lepidoptera. From W. W. HILL, Albany, N. Y.

A large slug—Tebennophorus ———sp ? from a cellar of a house in Albany. From W. W. HILL, Albany N. Y.

A Pickerel—*Esox reticulatus* Le Sueur, 45 inches long, weighing 19 pounds, taken on Friend's Lake, Chester, Warren Co., by Mrs. H. A. Ferguson of Troy, N. Y. From Mrs. FERGUSON.

A fish from Banda Sia; a Snake, known as "Kutonki" by the natives. Sunda Dio, Java. Four examples of Medusæ, from the North Pacific Ocean. From HOWARD TREADWELL, Albany, N. Y.

A scarlet Tanager—*Pyranga ruber* (Linn.)—shot in Bainbridge, N. Y., Aug. 13th. From G. A. DODGE.

A humming-bird—*Trochilus colubris* (Linn.). From S. BIRCH, Albany, N. Y.

A red-tailed Buzzard—*Buteo borealis* (Gm.) Vieill—of 50 inches expanse of wings. From E. E. WANDS, New Scotland, N. Y.

A Butcher-bird—*Colluris borealis* (Vieill) Bd.—said to have killed a number of pigeons. From Miss AMELIA HARTMANN, Watervliet, N. Y.

A hen's egg of abnormal form. From JOHN O'HARE, Albany.

An egg of very elongate form from a black Spanish hen. From WM. J. ROSS, Albany, N. Y.

An egg-yolk of solid consistence and sublaminate structure, and entirely destitute of an albuminous envelope; dropped in this condition by a white Leghorn hen. From WM. P. BUELL, JR., Albany, N. Y.

A case containing *Vespa diabolica*, *Halictus ligatus*, *Pelopæus cœruleus*, *Ceratina dupla*, and other Hymenoptera. (About 50 species in 74 examples.)

Twelve specimens of Hymenoptera (nine species), viz.:
Apis mellifica Linn., ♂, ♀, ☿; *Megachile femorata* Say; *Andrena vicina* Smith; *Pompilus ?atrox* Dahlb.; *Vespa crabo* Linn., Kings Co., N. Y.; *Sphex Pennsylvanica* Linn.; *Sphex ichneumonea* F., Fishers' Island, N. Y.; *Melissodes pruinosa* Say; *Melissodes binotata* Say, ♂, ♀.

Vertebral joint, detached spinal process and two epiphyses of a fin-back Whale, stranded at Fisher's Island in 1870. From Rev. J. L. ZABRISKIE, New Baltimore, N. Y.

An Owl-Beetle—*Alaus oculatus* (Linn.). From Thomas Doyle, Albany.

A Pine-Beetle—*Monohammus titillator* (Fabr.). From Joseph Fry, Albany, N. Y.

A Cecropia Moth—*Samia Cecropia* (Linn.). From Frederick Fink, Albany, N. Y.

A shell from Syria (undetermined). From Miss E. E. Dickinson, Schenectady, N. Y.

Skeleton of a Rhinoceros—*Rhinoceros Indicus* L.—mounted by Prof. H. A. Ward, Rochester.

An American Goshawk—*Astur atricapillus* (Wils.) Jard., shot in New Scotland December 30. From John L. Moak, New Scotland.

A Gold-Fish—*Cyprinus auratus*—in a new preservative liquid. From Erastus Corning, Jr., Albany.

III. GEOLOGICAL AND MINERALOGICAL.

A rolled specimen of Hamilton sandstone, composed mainly of *Spirifera granulifera* Hall. From J. H. Brooks, Albany, N. Y.

Chætetes lycoperdon; calcareous concretions around rootlets, and a concretion in slate. From Edward Chandler, Fort Plain, N. Y.

A block of Marmolite; a block of Dolemite, with Talc in Clinochlore; a block of Magnetite. From the Tillie Foster Iron Mine, Putnam county, near Brewster's, N. Y. From Prof. James Hall.

A block of Calcite, with groups of crystals; Mineville, Essex county, N. Y. Purchased for the Museum.

Nineteen species of minerals, viz.: Calamine, Franklin, N. J.; Franklinite, Franklin, N. J.; Willemite, Franklin, N. J.; Stilbite, Bergen Tunnel; Natrolite, Bergen Tunnel; Datholite, Bergen Tunnel; Anthophyllite, Bucks county, Pa.; Pectolite, Bergen Tunnel; Clinochlore, nr. Westchester, Pa.; Nemalite, Hoboken, N. J.; Vermiculite, Conshocken, Pa.; Jefferisite, nr. Westchester, Pa.; Marmolite, Hoboken, N. J.; Hydromagnesite, Hoboken, N. J.; Oligoclase, Bucks county, Pa.; Oligoclase, nr. Westchester, Pa.; White Quartz, Bergen, N. J.; Calcite, Bergen Tunnel; Celestite, Tyrone, Pa. From Prof. Albert R. Leeds, Stevens' Institute of Technology, Hoboken, N. J.

Sphalerite and Galenite, Spraker's Basin, N. Y. By collection of Dr. R. Fritz-Gaertner.

Specimens of *Atrypa reticularis.* From N. B. Wheeler, West Winfield, N. Y.

Ten specimens of *Saxicava rugosa*, of the Champlain epoch, Clinton county, N. Y. From G. P. Chapman, Albany.

IV. ARCHÆOLOGICAL

A collection of arrow-heads (principally of flint), made at Loudonville, Albany county, N. Y., consisting of ninety-four examples (fifty-one perfect or nearly so); four knives, imperfect; a fragment of stone utensil; chips from the manufacture of the flint implements. From F. E. Aspinwall, M. D., Loudonville, N. Y.

Nine pieces of pottery, and jaw-bone of deer and other bones of deer, collected at Minden, Montgomery county, N. Y., on the site of ancient Indian villages.
Cast of a stone Totem, believed to represent the Tribe of the Bear of the Mohawks, found in Root, Montgomery county, N. Y. (see figure in American Naturalist, Vol. xii, p. 779). From A. G. Richmond and S. L. Frey, Canajoharie, N. Y.

V. TO THE LIBRARY.

1. By Donation.

Laws of the State of New York, passed at the Ninety-ninth Session of the Legislature. 2 Vols. Albany: 1876. From the Regents of the University.

Annual Report of the Department of Mines, New South Wales, for the year 1875. Sydney: 1876. sm. 4to, pp. 167.—Mines and Mineral Statistics of New South Wales, etc. By Hon. John Lucas, M. P. Sydney: 1875. 8vo, pp. 252.—New South Wales, its progress and Resources. By authority of the Commissioners. Sydney: 1876. Pamph., 12mo, pp. 31.—Mineral Map and General Statistics of New South Wales. Sydney: 1876. Pamph., 12mo.—New South Wales, the Oldest and Richest of the Australian Colonies. By Charles Robinson. Sydney: 1873. Pamph., 12mo, pp. 110. From Dr. R. W. Forbes, New York.

Report of the Botanist [Charles H. Peck] for the year 1873. From the 27th Ann. Rep. on the N. Y. St. Mus. of Nat. Hist. Albany: 1877. Pamph., 8vo, pp. 73–116.

Report of the Botanist [Charles H. Peck]. From the 28th Ann. Rep. on the N. Y. State Mus. of Nat. Hist., for the year 1874. Albany: 1876. Pamph., 8vo., pp. 31–88, plates 1 and 2.
From the Author.

The Grotto Geyser of the Yellowstone National Park. From Prof. F. V. Hayden.

Report of the Commissioners of Education for the year 1875. Washington: 1876. 8vo, pp. CLXXIII+1016. From the Commissioner, John Eaton.

Bulletin of the American Geographical Society. Session of 1876–77. Nos. 2, 3 and 4. New York: 1877. 3 pamphlets. From the Society.

Second Geological Survey of Pennsylvania, 1875, C. C. Report of Progress in the counties of York, Adams, Cumberland, and Franklin. By Persifer Frazer, Jr. Harrisburg: 1877. 8vo., pp. 201–400.
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REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D.,

Secretary of the Board of Regents of the University:

Sir—Since the date of my last report, specimens of one hundred nnd eighty-nine species of plants have been mounted and placed in the Herbarium of the State Museum of Natural History, of which one hundred and sixty-two were not before represented therein. Twenty-seven are improved specimens or new varieties not before represented. A list of the specimens mounted is marked (1).

Specimens have been collected in the counties of Albany, Columbia, Delaware, Essex, Rensselaer, Saratoga, Schoharie and Ulster. These represent one hundred and twenty-seven species new to the Herbarium, fifty-eight of which are believed to be new or hitherto undescribed. A list of the specimens collected is marked (2).

Specimens of twenty New York species, new to the Herbarium, and not among my collections of the past season, have been contributed by, or been obtained in naming specimens for, correspondents. These added to the collected species make the whole number of additions one hundred and forty-seven species. A list of contributors and their contributions is marked (3).

Previously unreported species and descriptions of new species are given in a part of the report marked (4). New stations of rare plants, remarks and observations will be found in a part marked (5). A few discoveries of special interest are herewith narrated.

It is a well-known fact that various insects are subject to the attacks of parasitic fungi, which prove fatal to them. The common house-fly is destroyed by one, the silk-worm by another, and the pupæ of different moths by others.

Another noticeable instance of this kind was observed the past season. It was found that the "Seventeen-year Locust," *Cicada septendecim*, which made its appearance in the Hudson River Valley early in the summer, was affected by a fungus. The first specimen of this kind that I saw was taken in New Jersey, and sent to me by Rev. R. B. Post. Examination revealed the fact that the Cicadas, or "Seventeen-year Locusts," in this vicinity, were also affected by it. The fungus develops itself in the abdomen of the insect, and consists almost wholly of a mass of pale-yellowish or clay-colored spores, which, to the naked eye, has the appearance of a lump of whitish clay. The insects attacked by it become sluggish and averse to flight, so that they can easily be taken by hand. After a time some of the posterior rings of the abdomen fall away, revealing the fungus within. Strange as it may seem, the insect may, and sometimes does live for a time even in this condition. Though it is not killed at once, it is manifestly incapacitated for propagation, and, therefore, the fungus may be said to prevent, to some extent, the injury that would otherwise be done to the trees by these insects in the deposition of their eggs. For the same reason, the insects of the next generation must be less numerous than they otherwise would be, so that the fungus may be regarded as a beneficial one. In Columbia county, the disease prevailed to a considerable extent. Along the line of the railroad between Catskill and Livingston stations many dead cicadas were found, not a few of which were filled by the fungoid mass. As the insect makes its appearance only at intervals of seventeen years, and consequently will not be seen here again till 1894, it will scarcely be possible to make any further observations on it and its parasite for some time to come, yet it would be interesting to know how the fungus is propagated, or where its germs remain during the long interval between the appearance of two generations. Do the fungus germs enter the ground in the body of the larva, and slowly develop with its growth, becoming mature when it is mature, or do they remain quiescent on or near the surface of the ground, waiting to enter the body of the pupa as it emerges seventeen years hence? Or, again, is it possible that the fungus is developed annually in some closely related species as the "Harvest-fly," *Cicada canicularis*, and that it passes over from its usual habitat to the seventeen-year cicada whenever it has the oportunity? These questions are merely suggestive. They cannot yet be answered.*

While in the Adirondack region numerous clumps of alders were noticed that had their leaves nearly all skeletonized by the larvæ of some unknown insect. The larvæ were nearly black in color and scarcely half an inch long. They were seen in countless numbers feeding upon the leaves and threatening by their numbers, even if but half of them should come to maturity, in another year to completely defoliate the alders of that region. Upon looking under the affected bushes for the pupæ of the insect, in order, if possible, to have the means of ascertaining the species, what was my astonishment to find the ground thickly flecked with little white floccose masses of mold, and that each one of these tufts of mold was the downy fungoid shroud of a dead larva from the alders. Not a single living pupa could be found, but there were hundreds of dead and moldy larvæ killed without doubt by the fungus, which is nature's antidote to an over-production of this insect, and nature's agency for protecting the alders from utter destruction.

While on the way from Summit to Jefferson in Schoharie county, an apple tree was observed on which much of the fruit was discolored, and appeared as if beginning to decay. Some of the passengers in the stage remarked that they "never before knew of apples rotting on the tree." Some of the fruit was procured, and found to be affected by a fungus known to botanists by the name *Sphæropsis Malorum*, or apple Sphæropsis. It has been described as attacking "apples lying on the ground" in winter. Here was an instance in which the apples were attacked while yet on the tree, and that, too, as early as September. The apples attacked by the fungus are rendered worthless, and experiments recently made indicate that the disease is contagious, and may be communicated from one apple to another. For example, a perfectly sound apple was placed in a drawer with one that was affected by the fungus. In a few days the sound apple began to show signs of decay. Its whole surface had assumed a dull brown color as if beginning to rot. Two or three days later small pale spots made their appearance, and in the center of each there was a minute rupture of the epidermis. An examination of the substance of the apple in these pale spots revealed fungoid filaments that had permeated the cells of the apple. In two or three days more, numerous minute black pustules or papillæ had appeared. They were thickly scattered over nearly the whole surface of the apple. These constitute the Sphæropsis. When microscopically examined, each one of these black papillæ is found to contain several oblong pale fungus spores (seeds) supported on a short stem or foot-stalk, from which they soon separate. It would be well, therefore, whenever this fungus-rot makes its

* Since this was written, I have found in the Smithsonian Contributions, Vol. v, p. 53, a very good account of this fungus, by Dr. Leidy, of Philadelpia, but as no name was given to it, a name and description will be published.

appearance, to remove the affected apples at once from the presence of the others, whether they are on the tree or not. It is not enough to throw them on the ground by themselves, for this would not prevent the fungus from maturing and scattering its seeds. They should be buried in the ground, or put in some place where it will not be possible for the fungus to perfect itself and mature its seed. In this way the multiplication of the spores and the spread of the disease may be prevented.

The importance of the balsam fir, *Abies balsamea*, as an ornamental evergreen and as a source of balsam, renders a brief account of it and its enemies desirable.

It prefers wet or marshy soil, in cold, hilly, or mountainous regions, yet it is quite at home on comparatively dry upland, and will thrive in almost any soil. Its growth is rapid, but the tree seldom attains a very large size, the trunk rarely exceeding one foot in diameter at the base. Its usual diameter is six to eight inches, with a height of thirty to forty feet. It has a straight, gradually tapering trunk, giving off, at intervals of one or two feet, circles of branches, each one of which is a little shorter than the one next below it. This gives to the head or spray a very regular form, resembling in outline an elongated cone. The branches are given off at a wide angle with the trunk. They are generally a little ascending, but sometimes horizontal, or slightly deflexed. The branchlets are numerous, and given off with considerable regularity at each node, though scattering or adventitious branches and branchlets are of frequent occurrence, both on the trunk and branches. There are usually three regular branchlets at each node, two spreading laterally (one from each side of the branch), and one extending downwards and outwards beneath the branch. The leaves have been described in some botanical works as two-ranked. They are, however, scattered on all sides of the leading shoots and branchlets, and are more or less spirally arranged in their insertion; but those on the lower side of the branchlets are so curved and directed upwards and outwards that they appear, as a whole, to be somewhat two-ranked. They are flattened like the leaves of the hemlock, but are usually longer than those of either the hemlock or spruce. The lower surface is marked by a prominent midrib, and has a silvery or glaucous lustre, which, combined with the deep green of the upper surface, gives to the foliage a richness and beauty unequaled by that of any other of our evergreens. They remain upon the tree four or five years, so that all the shorter branches are clad with rich, dense foliage, throughout their whole extent. The cones or fruit of the balsam are produced on the upper and, consequently, on the shorter and younger branches. I have never seen them on branches below the middle of the tree. They stand erect on the branches, and in this respect differ essentially from the pendulous cones of the spruce and hemlock. On the very short branches, near the top of the tree, they are often so close together that they appear crowded or clustered. Before maturity, they are more or less tinged with bluish, or violet and purplish hues, but their beauty is generally impaired by copious exudations of resin. When quite young they are bristly with the long, slender points of the bracts, but these are at length nearly concealed by the overlapping scales. The cones have been described as three to four inches long, but I have never seen them so long. Their usual length with us is one and a half to two and a half inches. Sometimes, on the mountains, small trees four to six feet high bear a few cones. This tree, like the spruce, in some situations varies considerably from the typical form. In the Catskill Mountains I have seen it dwarfed to a diffusely spreading bush, similar to the ground hemlock. Near the summit of the high peaks of the Adirondacks it loses its beauty and thrift, and forms dense thickets in which the trunks are but a few feet high, rapidly tapering, and coated with lichens; the branches are long, straggling, crooked, and interlaced, the whole forming a hedge-like mass through which anything larger than a rabbit would find great difficulty in passing. Starved by the lack of soil; stunted in its growth by the short, cold seasons; pressed down by the weight of accumulating snow; and bruised and cut back by masses of ice and frozen snow hurled against it by fierce blasts of wind, it can no longer attain its usual size and its natural symmetry of form. These mountain thickets of balsam are of interest to the botanist, because they show the hardy character of the tree, and its ability to live where few other trees can live; but they are the constant dread of tourists who visit the unfrequented peaks of the Adirondacks, for they are passed only with the utmost difficulty and labor.

The wood of the balsam is of little value for lumber owing to the small size of the tree. It contains resin and burns freely, but with a crackling noise. The smoke is very penetrating and irritating to the eyes. Near the summits of the mountains, however, it is almost the only available wood for camps and camp-fires. The bark of this tree furnishes the well-known "Canada balsam," a clear viscid resin of considerable repute in medicine and much used in mounting objects for the microscope. The resin is obtained from small vesicles or "blisters" in the bark. It is generally more abundant in the thrifty smooth-barked trees of low damp lands than in the stunted growths of the mountains. Because of the value of this tree as a producer of balsam, and because of its beauty and fitness to adorn parks and pleasure grounds, it ought to be cherished and preserved. But like its companion, the spruce, it has its insect and fungoid foes. While at Summit, in Schoharie county, in September, I noticed in a small grove of balsams that a dozen or more of the trees had recently been killed or were then dying. The leaves had nearly all changed their color, but for the most part yet remained on the trees. An investigation showed pretty conclusively that an insect was the cause of the death of the trees. A minute bark-mining beetle, both in its mature and in its larval state, was found between the bark and the wood. The beetle perforates the bark, excavates its furrow along the inner surface in a horizontal direction, and deposits its eggs along the sides of the furrow which is less than one-sixteenth of an inch in diameter. As soon as the eggs are hatched, the larvæ begin to mine furrows of their own at right angles to the original gallery, one part eating their way upward and another downward between the bark and the wood. These larval galleries are nearly parallel to each other, and are at their beginning so minute that they are scarcely perceptible to the naked eye; but as the larva advances in its course, it increases in size and the diameter of its furrow increases in like manner. The larvæ were found (in some instances transformed to the mature beetle) each in the larger end of its own furrow. It will be observed from the direction of the original furrow, how powerful an agent for mischief this minute beetle is. Its work is carried on in the most vital part of the tree. Three or four beetles attacking the trunk at or about the same height, and on different sides of the tree, would completely and effectually girdle it and destroy its life. Even a single beetle, by extending its furrow entirely around the trunk, would accomplish the same result, but no furrows were found thus extended. The length of the original furrows appeared to be less than four inches. The beetle itself is scarcely more than one line long, and belongs to the genus *Tomicus*. The species is probably undescribed. In the case of the spruce-destroying beetle more workers are necessary to kill the tree because the main furrows are excavated longitudinally or parallel to the axis of the trunk, while in the case of the balsam-destroying beetle the original furrow is excavated at right angles to this axis, and therefore cuts off or destroys the vital action over a much broader space.

The destruction of the balsams was not limited to the single grove in which it was first observed. In several places along the road between Summit and Jefferson, dead and dying balsams were noticed; but the affected trees were not very numerous, and it would not be a difficult matter, with prompt and united action, to arrest the progress of the mischief. If each man, on whose land the balsams grow, would, as soon as signs of the presence of the trouble are manifest, cut the affected trees, strip off the bark and burn it, he would, by so doing, destroy the colonies of larvæ, and prevent the further spread of the mischief. It is not at all probable that trees once attacked and showing signs of death can be saved, and it would be far better to cut them immediately than to allow them to remain as nurseries for these tiny marauders.

Four species of fungi are now known that attack the leaves of our balsams. None of these, so far as I am aware, actually kill the tree, but all of them necessarily detract somewhat from the vigor and the beauty of it. One of them, a kind of cluster-cup fungus, known as *Peridermium elatinum*, or fir-tree Peridermium, consists of minute whitish cups, filled with a deep yellow or orange-colored powder, which is the spores or seeds of the fungus. These cups burst forth from and occupy the whole of the lower surface of the leaf. This fungus is very thorough in its work, for every leaf on the affected branches is made to support its share of the cups. It detracts so much from the vigor of the leaves that they have a sickly, yellowish-green color, and do not attain more than half the size of healthy leaves. Still they are not killed at once. They remain on the tree during the summer, but fall sometime before the next succeeding crop of leaves is developed, for on the affected branches, only the leaves of a single season can be found, and these are always on the terminal shoots, and always affected by the fungus. From this, it appears that the disease is in the branch, and bursts out and makes itself visible in each successive crop of leaves. The branches affected by it are deformed, irregular, contorted and massed together, forming that peculiar dense and intricate growth, commonly known as "crow's nest." It is not often that more than one or two branches of a tree, with the branchlets, are attacked, consequently it is an easy matter to cut off the affected branches and relieve the tree from this incumbrance.

Another similar fungus, the *Peridermium balsameum*, attacks the leaves in a sort of hap-hazard manner, affecting some here and some there. This fungus, like the other, consists of minute cups that burst forth from the lower surface of the leaves, but the cups are generally longer and cylindrical, and filled with a pale or whitish powder. The affected leaves in this case attain their normal size, but they lose their green color and become pale yellowish or almost white, and being scattered everywhere among the green leaves, they give a singular variegated appearance to the foliage. I have never met with this fungus except on small balsams in the Adirondack wilderness, and near Summit, and it is not very likely to prove detrimental to transplanted or cultivated trees.

In a grove of young balsams, near Summit, patches or groups of dead leaves were observed on many of the branches of some of the trees. An examination showed that these leaves were affected by two fungi, which, in some instances, were associated together in the same group of leaves, and even on the same leaf; in other cases each fungus occupied exclusively its own group of leaves. One of them is known to botanists by the name *Hypoderma nervisequum*, or nerve-following Hypoderma. It forms a black line along the midrib of the leaf, being more prominent and uniform on the lower surface. This thick black line or ridge at length ruptures along the center. It contains within a multitude of microscopic, nearly cylindrical, membranous sacks, each of which contains eight long narrow spores.

The other fungus, which does not appear to have been previously known, and to which I have given the name *Dermatea phyllophila*, or leaf-loving Dermatea, consists of minute shallow cups, which break forth from the lower surface of the leaf, rupturing the epidermis, and sometimes throwing off a little scale of it. These cups, when moist, are of a dingy-white color, but when dry are contracted, irregular, and of a darker hue. Like the preceding species, they contain many minute sacks and spores. Though these fungi kill the leaves that they attack, there is no evidence that they kill the trees, yet, if the attack should extend to all or nearly all the leaves on a tree at any one time, it is evident the life of the tree would be in danger.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Hamamelis Virginica *L.*
Claytonia Caroliniana *Mx.*
Rosa micrantha *Sm.*
Daucus Carota *L.*
Aster corymbosus *Ait.*
A. miser *L.*
A. simplex *Willd.*
Solidago squarrosa *Muhl.*
S. Canadensis *L.*
S. gigantea *Ait.*
Helianthus tuberosus *L.*
Ilex verticillata *L.*
Lycopus Virginicus *L.*
Potamogeton natans *L.*
Habenaria psychodes *Gr.*
Eleocharis Robbinsii *Oakes.*
Scirpus subterminalis *Torr.*
Eriophorum gracile *Koch.*
Carex Buxbaumii *Wahl.*
C. utriculata *Boott.*
Leersia oryzoides *Sw.*
L. Virginica *Willd.*
Festuca elatior *L.*
Panicum glabrum *Gaud.*
Andropogon scoparius *Mx.*
Adiantum pedatum *L.*
Aspidium acrostichoides *Sw.*

New to the Herbarium.

Trifolium hybridum *L.*
Lonicera Tartarica *L.*
Artemisia Absinthium *L.*
Hieracium aurantiacum *L.*
Datura Tatula *L.*
Smilax hispida *Muhl.*
Agaricus striatifolius *Pk.*
A. apertus *Pk.*
A. flavidellus *Pk.*
A. peltigerinus *Pk.*
A. conigenoides *Ellis.*
A. delicatellus *Pk.*
A. odorifer *Pk.*
A. subareolatus *Pk.*
A. striatulus *Fr.*
A. longistriatus *Pk.*
A. indecens *Pk.*
A. contrarius *Pk.*
A. lacrymabundus *Fr.*
Agaricus Candolleanus *Fr.*
A. limophilus *Pk.*
A. umbonatescens *Pk.*
A. arenulinus *Pk.*
A. polytrichophilus *Pk.*
A. graciloides *Pk.*
Cortinarius ophiopus *Pk.*
C. craticius *Fr.*
C. regularis *Pk.*
Marasmius præacutus *Ellis.*
Panus torulosus *Fr.*
Boletus viscosus *Frost.*
Polyporus dualis *Pk.*
P. nidulans *Fr.*
P. fragrans *Pk.*
P. albellus *Pk.*
P. connatus *Weinm.*
P. balsameus *Pk.*
P. obducens *Pers.*

Polyporus callosus *Fr.*
P. farinellus *Fr.*
Hydnum Weinmanni *Fr.*
Irpex sinuosus *Fr.*
I. fuscoviolaceus *Fr.*
I. obliquus *Fr.*
Radulum orbiculare *Fr.*
Phlebia merismoides *Fr.*
Thelephora speciosa *Fr.*
Hymenochæte spreta *Pk.*
H. agglutinans *Ellis.*
Corticium quercinum *Pers.*
C. lacteum *Fr.*
C. Sambuci *Fr.*
C. cæruleum *Fr.*
C. Martianum *B. & C.*
C. suffocatum *Pk.*
Cyphella griseopallida *Wein.*
Clavaria typhuloides *Pk.*
C. amethystina *Bull.*
Pistillaria coccinea *Cd.*
Tremella intumescens *Sow.*
Næmatelia encephala *Fr.*
Dacrymyces minor *Pk.*
Amaurochæte atra *A. & S.*
Physarum luteolum *Pk.*
P. albicans *Pk.*
Diachæa splendens *Pk.*
Trichia fallax *Pers.*
Perichæna irregularis *B. & C.*
Clathroptychium rugulosum *Wallr.*
Nidularia pulvinata *Schw.*
Leptostroma lineare *Pk.*
Phoma strobilina *P. & C.*
P. stercoraria *P. & C.*
Sphærónema Robiniæ *B. & C.*
S. aurantiacum *Pk.*
Sphæropsis Pennsylvanica *B. & C.*
S. minima *B. & C.*
S. Syringæ *P. & C.*
Diplodia thujina *P. & C.*
Excipula lanuginosa *Pk.*
Discella Canadensis *Pk.*
D. arida *Pk.*
Melanconium intermedium *Pk.*
Torula curvata *Pk.*
Septonema dichænoides *P. & C.*
Puccinia orbicula *P. & C.*
P. Hydrophylli *P. & C.*
Uredo Cassandræ *P. & C.*
Melampsora Epilobii *Fckl.*
Æcidium Saniculæ *Carm.*
Helminthosporium Absinthii *Pk.*
Macrosporium sarcinula *Berk.*
Cladosporium nodulosum *Cd.*
C. depressum *B. & Br.*
Ramularia brunnea *Pk.*
Cercospora Symplocarpi *Pk.*
C. Chenopodii *Fckl.*
Verticillium pulvereum *P. & C.*
Peronospora infestans *De By.*
Polyactis cana *Berk.*
Trichoderma viride *Pers.*
Dactylium sublutescens *Pk.*
Oidium fasciculatum *Berk.*
O. albipes *Pk.*
Capillaria Sphæriæ-typhinæ *Cd.*
Menispora ciliata *Cd.*
Zygodesmus pannosus *B. & C.*
Z. rubiginosus *Pk.*
Fusisporium rimosum *Pk.*
Erysiphe Liriodendri *Schw.*
Morchella bispora *Sor.*
M. semilibera *DC.*
M. deliciosa *Fr.*
Verpa digitaliformis *Pers.*
Peziza sulcata *Pers.*
P. Warnei *Pk.*
P. bicolor *Bull.*
P. myricacea *Pk.*
P. sulphurella *Pk.*
P. capitata *Pk.*
P. distincta *Pk.*
P. maculincola *Schw.*
P. chameleontina *Pk.*
P. deligata *Pk.*
P. Polygoni *Rehm.*
P. macrospora *Fckl.*
Helotium caricinellum *Pk.*
H. bryogenum *Pk.*
Dermatea carpinea *Fr.*
D. inclusa *Pk.*
Patellaria leptosperma *Pk.*
P. lignyota *Fr.*
Tympanis turbinata *Schw.*
Ascobolus viridis *Curr.*
A. crenulatus *Karst.*
Stictis cylindricarpa *Pk.*
Hysterium australe *Duby.*
H. Thuiarum *C. & P.*
H. Desmazierii *Duby.*
Glonium simulans *Ger.*
Hypomyces ochraceus *Tul.*
Hypoxylon suborbiculare *Pk.*
Dothidea Rimincola *Schw.*
D. episphæria *Pk.*
D. Caricis *Fr.*
D. Osmundæ *P. & C.*

Valsa innumerabilis *Pk.*
Cucurbitaria Berberidis *Gr.*
Lophiostoma obtecta *Pk.*
Sphæria Clintonii *Pk.*
S. xestothele *B. & C.*
S. exigua *C. & P.*
S. Clasterium *B. & C.*
S. sphærelloides *Pk.*
Sphæria exercitalis *Pk.*
S. virens *Pk.*
S. scapophila *Pk.*
S. onosmodina *P. & C.*
S. herbarum *Pers.*
Sphærella Vaccinii *Ck.*
S. Impatientis *P. & C.*
Pyrenophora phæocomes *Fr.*

(2.)

PLANTS COLLECTED.

Solidago humilis *Pursh.*
Potamogeton lonchitis *Tuckm.*
Salix purpurea *L.*
Graphis eulectra *Tuckm.*
Calicium curtum *T. & B.*
C. brunneolum *Ach.*
Sirosiphon Crameri *Brugg.*
Agaricus cristatellus *Pk.*
A. fumescens *Pk.*
A. pinophilus *Pk.*
A. rubromarginatus *Fr.*
A. radicatellus *Pk.*
A. chrysophyllus *Fr.*
A. abscondens *Pk.*
A. septicus *Fr.*
A. albogriseus *Pk.*
A. micropus *Pk.*
A. undulatellus *Pk.*
A. rhodocalyx *Lasch.*
A. squarrosoides *Pk.*
A. limonellus *Pk.*
A. vermifluus *Pk.*
A. paludinellus *Pk.*
A. lenticeps *Pk.*
A. hymenocephalus *Pk.*
A. camptopus *Pk.*
Coprinus macrosporus *Pk.*
C. rotundosporus *Pk.*
Cortinarius Copakensis *Pk.*
C. lapidophilus *Pk.*
Marasmius calopus *Fr.*
Boletus Satanus *Leur.*
Polyporus pallidus *Schulz.*
P. Weinmanni *Fr.*
P. planus *Pk.*
P. subiculosus *Pk.*
P. semitinctus *Pk.*
Trametes suaveolens *L.*
Solenia villosa *Fr.*
Hydnum sulphurellum *Pk.*
Mucronella calva *A. & S.*
M. aggregata *Fr.*
Craterellus dubius *Pk.*
Stereum sanguinolentum *A. & S.*
Cyphella sulphurea *Batsch.*
Clavaria fumigata *Pk.*
C. corynoides *Pk.*
Tremella lutescens *Pers.*
Guepinia Peziza *Tul.*
Hymenula olivacea *Pk*
Lycoperdon glabellum *Pk.*
L. calyptriforme *Berk.*
Physarum psittacinum *Dittm.*
P. atrorubrum *Pk.*
P. ornatum *Pk.*
P. inæqualis *Pk.*
Badhamia affinis *R.*
Didymium eximium *Pk.*
D. angulatum *Pk.*
Chondrioderma difforme *Pers.*
Diachæa subsessilis *Pk.*
Comatricha æqualis *Pk.*
C. Friesiana *DeBy.*
C. pulchella *Bab.*
Lamproderma violaceum *Fr.*
Trichia scabra *R.*
T. inconspicua *R.*
Arcyria pomiformis *Roth.*
Lycogala flavofuscum *Ehr.*
Sacidium Pini *Fr.*
Septoria Waldsteiniæ *P. & C.*
S. Verbascicola *B. & C.*
Phyllosticta Loniceræ *Desm.*
Sporidesmium sicynum *Thum.*
Massospora cicadina *Pk.*
Ustilago Salvei *B. & Br.*

Phragmidium bulbosum *Fr.*
Isaria tenuipes *Pk.*
Stilbum rigidum *Pers.*
S. flavipes *Pk.*
Sporocybe abietina *Pk.*
Cladosporium graminum *Lk.*
Helminthosporium interseminatum
H. Hydropiperis *Thum.*
Botryosporium pulchrum *Berk.*
Aspergillus flavus *Lk.*
Fusidium canum *Pass.*
Peronospora simplex *Pk.*
Mucor caninus *Pers.*
M. ramosus *Bull.*
Peziza succosa *Berk.*
P. vulcanalis *Pk.*
P. sulphurea *Pers.*
P. viridicoma *Pk.*
P. brunneola *Desm.*
P. Osmundæ *C. & E.*
Helotium albopunctum *Pk.*
Dermatea carnea *C. & E.*
D. phyllophila *Pk.*
D. Xanthoxyli *Pk.*
Hæmatomyces orbicularis *Pk.*
Cenangium Cassandræ *Pk.*
Cenangium pezizoides *Pk.*
Tympanis acerina *Pk.*
Patellaria olivacea *Batsch.*
Phacidium brunneolum *Pk.*
Triblidium morbidum *Pk.*
Hypoderma nervisequum *DC.*
Rhytisma maximum *Fr.*
Hypocrea viridis *Tode.*
Hypoxylon xanthocreas *B. & C.*
Dothidea Epilobii *Fr.*
Valsa Cratægi *Curr.*
V. translucens *De Not.*
V. Xanthoxyli *Pk.*
Lophiostoma scelestum *C. & E.*
L. prominens *Pk.*
Massaria gigaspora *Desm.*
Sphæria pulchriseta *Pk.*
S. sorghophila *Pk.*
S. Typhæ *Schw.*
S. curvicolla *Pk.*
S. Gnomon *Tode.*
S. phellogena *B. & C.*
S. Crepini *West.*
S. Marciensis *Pk.*
Venturia Dickiei *De Not.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Miss S. P. MONKS, Cold Spring, N. Y.

Viola pedunculata *T. & G.*
V. Nuttallii *Pursh.*
Claytonia perfoliata *Don.*
Ribes sanguineum *Pursh.*
Hosachia strigosa *Nutt.*
Astragalus trichocarpus *Gr.*
A. hypoglottis *L.*
Œnothera parvula *Nutt.*
Gilia tricolor *Benth.*
G. ciliata *Benth.*
G. Californica *Benth.*
G. androsacea *Steud.*
G. dianthoides *Endl.*
Plantago Patagonica *Jacq.*
Pellæa densa *Hook.*
Cystopteris fragilis *R. Br.*

Mrs. S. M. RUST, Syracuse, N. Y.

Aspidium spin. v. dumetorum
Onoclea sens. v. obtusilobata
Botrychium Lunaria *Sw.*
Botrychium ternatum *Sw.*
B. gracile *Pursh.*

I. C. MARTINDALE, Camden, N. J.

Alyssum calycinum *L.*
Senebiera didyma *Pers.*
Viola tricolor v. arvensis.
Lechea major *Mx.*
Hypericum prolificum *L.*
Drosera long. v. densiflorum.

Drosera filiformis *Raf.*
D. rotundifolia *L.*
Brassica tenuifolia *Boisd.*
Lychnis diurna *Sibth.*
Melilotus parviflora *Desf.*
Sesuvium pentandrum *Ell.*
Heliotropium Europæum *L.*
Potentilla reptans *L.*
Silene inflata *Sm.*
Jussiæa repens *L.*
Senecio Jacobæa *L.*
Cacalia reniformis *Muhl.*
Linaria elatine *Mill.*
L. Spuria *Mill.*
Leonurus glaucescens *Bange.*
Helmintha echioides *Gært.*
Heterotheca scabra *DC.*
Vigna glabra *Savi.*
Richardsonia scabra *St. Hil.*
Euphorbia hiberna *L.*
Gentiana angustifolia *Mx.*
Tribulus terrestris *L.*

N. L. BRITTON, New Dorp, N. Y.

Pinus mitis *Mx.*
Pinus inops *Ait.*

E. S. MILLER, Wading River, N. Y.

Barbarea præcox *R. Br.*
Sagina apetala *L.*
Spergularia rub. v. campestris.
Lathyrus palustris *L.*
L. myrtifolius *Muhl.*
Lespedeza vio. v. sessiliflora.
Vicia Caroliniana *Walt.*
Eupatorium teucrifolium *Willd.*
Aster undulatus *L.*
A. lævis *L.*
Œnothera pumila *L.*
Œ. chrysantha *Mx.*
Galium circæzans *Mx.*
Erigenia bulbosa *Nutt.*
Vaccinium corymbosum *L.*
Pyrola rotundifolia *L.*
Teucrium Canadense *L.*
Myosotis verna *Nutt.*
Plantago Virginica *L.*
Utricularia gibba *L.*
U. subulata *L.*
Potamogeton Oakesiana *Robbins.*
Lemna polyrrhiza *L.*
Lemna perpusilla *Torr.*
Sagittaria variabilis *Engelm*
Muscari racemosum *L.*
Eriophorum Virginicum *L.*
Fuirena squarrosa *Mx.*
Eleocharis obtusa *Schultes.*
E. melanocarpa *Torr.*
E. tricostata *Torr.*
Carex scoparia *Schk.*
C. polytrichoides *Muhl.*
C. stipata *Muhl.*
C. fœnea *Willd.*
C. stellulata *L.*
C. Pennsylvanica *Lam.*
C. granularis *Muhl.*
C. lanuginosa *Mx.*
C. hystricina *Willd.*
Festuca ov. v. duriuscula.
Glyceria nervata *Trin.*
Eragrostis reptans *Mx.*
Panicum verrucosum *Muhl.*
P. depauperatum *Muhl.*
Milleria herbatica *Pk.*

E. A. RAU, Bethlehem, Pa.

Discelium nudum *Brid.*
Æcidium hemisphæricum *Pk.*
Æ. porosum *Pk.*
Æ. Brandagei *Pk.*
Æ. abundans *Pk.*
Æcidium Bigeloviæ *Pk.*
Uromyces hyalinus *Pk.*
Lecythea speciosa *Pk.*
Sphæropsis Raui *Pk.*
Chætomium elatum *Kze.*

W. R. GERARD, New York, N. Y.

Glonium parvulum *Ger.*
Ailographum Pinorum *Desm.*
Hysterium hyalosporum *Ger.*
H. Cookeänum *Ger.*

Rev. H. WIBBE, Oswego, N. Y.

Drosera longifolia *L.*
Habenaria ciliaris *R. Br.*
H. leucophæa *Nutt.*
Houstonia pur. v. ciliolata.
Trillium erythrocarpum *Mx.*
Erythrea Centaurium *Pers.*
Scirpus Eri. v. cyperinus.
Rhynchospora macrostachya *Torr.*
Botrychium simplex *Hitch.*

Prof. P. A. PUISSANT, Troy, N. Y.

Carex panicea *L.*

L. M. UNDERWOOD, Syracuse, N. Y.

Scolopendrium vulgare *Sm.*
Asplenium Rutamuraria *L.*
Aspidium marginale *Sw.*
Cystopteris fragilis *Bernh.*

H. WILLEY, New Bedford, Mass.

Arthonia polymorpha *Ach.*

Hon. G. W. CLINTON, Buffalo, N. Y.

Triticum caninum *L.*
Aspid. crist. v. Clintoniana.
Meliola Macowani *Thum.*
Melanconium Americanum *P. & C.*
Septoria Waldsteiniæ *P. & C.*
Vermicularia trichella *Grev.*
V. albomaculata *Schw.*
Puccinia spreta *Pk.*
Uromyces Trifolii *Fckl.*
U. polymorphus *P. & C.*
Uredo transversalis *Thum.*
Polyactis vulgaris *Lk.*
Peziza planodisca *P. & C.*
Sphæria cladosporiosa *Schw.*

C. C. FROST, Brattleboro, Vt.

Cortinarius Spraguei *B. & C.*
Russula compacta *Frost.*
Boletus Satanus *Lenz.*
Polyporus tomentosus *Fr.*
Clavaria arbori-similis *Frost.*
Michenera Artocreas *B. & C.*
Lycogala flavofuscum *Ehr.*
Sphæropsis Sumachi *Schw.*
Patellaria nigrocinnabarina *Schw.*
Hypoxylon marginatum *Fr.*
Diatrypella Frostii *Pk.*

J. B. ELLIS, Newfield, N. J.

Lenzites vialis *Pk.*
Sphæropsis Ribicola *C. & E.*
S. Alni *C. & E.*
Septoria stictica *Ellis.*
Septosporium maculatum *C. & E.*
Pestalozzia stellata *B. & C.*
Vermicularia compacta *C. & E.*
Sporidesmium hysterioideum *C. & E.*
S. polymorphum *Cd.*
S. aurantiacum *B. & C.*
Periconia Azaleæ *Pk.*
Epicoccum scabrum *Cd.*
Fusisporium episphæricum *C. & E.*
Clasterisporium caricinum *Schw.*
Cercospora concentrica *C. & E.*
C. grisea *C. & E.*
Peziza coccinella *Somm.*
P. fuscidula *Ck.*
P. ilicifolia *C. & E.*
P. bullata *Ellis.*
Hysterium subrugosum *C. & E.*
Colpoma Andromedæ *Duby.*
Stictis quercifolia *C. & E.*
S. fimbriata *Schw.*
Nectria microspora *C. & E.*
Dothidea tetraspora *B. & Br.*

Valsa rugiella *C. & E.*
V. obscura *Pk.*
Massaria epileuca *B. & C.*
Lophiostoma scelestum *C. & E.*
Sphæria salviæcola *C. & E.*
S. luteobasis *Ellis.*
S. vexata *C. & E.*
S. melanotes *B. & Br.*
S. minima *Awd.*
Sphæria microtheca *C. & E.*
S. orthoceras *Fr.*
S. tumulata *C. & E.*
S. soluta *C. & E.*
S. dissiliens *C. & E.*
S. surrecta *Ck.*
S. sepelibilis *B. & C.*
S. aculeata *Schw.*

H. A. WARNE, Oneida, N. Y.

Polyporus induratus *Pk.*
Lycoperdon giganteum *Batsch.*
Diatrype asterostoma *B. & C.*
Peziza Umbrorum *Fckl.*
P. gallinacea *Pk.*
Sphæria fimiseda *C. & N.*

B. D. GILBERT, Utica, N. Y.

Aspidium spinulosum *Desv.*
A. Boottii *Tuckm.*
Asplenium resectum *Sm.*
Cystopteris frag. v. dentata.

M. W. VANDENBURG, Fort Edward, N. Y.

Rhus aromatica *Ait.*
R. typhina *L.*
Solidago latifolia *L.*
Utricularia subulata *L.*
Pogonia affinis *Aust.*

G. S. WATKINS, Wilmurt, N. Y.

Polyporus Beatiei *Banning.*

G. T. FISH, Rochester, N. Y.

Impatiens fulva *Nutt.*
Polyporus Beatiei *Banning.*

C. DEVOL, M. D., Albany, N. Y.

Section of stem of Kalmia latifolia *L.*

P. C. BROWER, Albany, N. Y.

California hickory nuts.

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(4)

PLANTS NOT BEFORE REPORTED.

SOLIDAGO HUMILIS *Pursh.*

Gravelly bank at the outlet of Lower Ausable Pond, Adirondack Mountains. Aug.

The smaller heads, shorter flowers, whiter pappus and sharper serratures of the leaves, induce me to report this as a distinct species.

UTRICULARIA SUBULATA *L.*

Fort Edward. *M. W. Vandenburg.* Wading River, Long Island. *E. S. Miller.*

SALIX PURPUREA *L.*

Low grounds. Albany and Bethlehem. An introduced willow, which has run wild in some places.

POTAMOGETON LONCHITIS *Tuckm.*

Ticonderoga. Aug.

LISTERA AUSTRALIS *Lindl.*

Lily Marsh, Oswego. *Rev. H. Wibbe.* This is an interesting addition to our flora.

POGONIA AFFINIS *Aust.*

Fort Edward. *Vandenburg.*

MUSCARI RACEMOSUM *L.*

Wading River. *Miller.* A stray from cultivation.

ELEOCHARIS TRICOSTATA *Torr.*

Wading River. *Miller.* This is probably the northern limit of this plant.

WOODSIA HYPERBOREA *Br.*

Crevices of rocks. Adirondack Mountains. Small forms of this fern closely resemble *W. glabella*, and it is, perhaps, questionable whether they should be regarded as two distinct species. In our specimens the chaffy scales of *W. hyperborea* are present, but not in abundance. The specimens were formerly referred to *W. glabella.*

ARTHONIA POLYMORPHA *Ach.*

Bark of trees. Geneseo. *H. Willey.*

GRAPHIS EULECTRA *Tuckm.*

Bark of arbor-vitæ. Newcomb, Essex county. Aug.

CALICIUM BRUNNEOLUM *Ach.*

Decaying balsam trunks. Mount Marcy. Aug.

CALICIUM CURTUM *Turn. & Bor.*

Decaying prostrate trunks of hemlock trees. Catskill Mountains. Sept.

CHLOROSTYLIUM CATARACTARUM *Kutz.*

Granite pebbles in running streams. Caledonia. *G. W. Clinton.*

SIROSIPHON CRAMERI *Brugg.*

Wet surface of rocks. Mt. Marcy. Aug.

AGARICUS (LEPIOTA) CRISTATELLUS *Pk.*

Pileus convex, subumbonate, minutely mealy, especially on the margin, white, the disk slightly tinged with pink; lamellæ close, rounded behind, free, white; stem slender, whitish, hollow; spores subelliptical, .0002′ * long. Plant about 1′ high, pileus 2″–4″ broad.

Mossy places in woods. Copake, Columbia County. Oct.

The relationship of this very small species appears to be with *A. cristatus.* The margin of the pileus is sometimes appendiculate with the minute fragments of the veil. The annulus is obsolete.

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* One accent signifies inch or inches, two accents signify line or lines.

AGARICUS (TRICHOLOMA) FUMESCENS *Pk.*

Pileus convex or expanded, dry, clothed with a very minute appressed tomentum, whitish; lamellæ narrow, crowded, rounded behind, whitish or pale cream color, changing to a smoky blue or blackish color when bruised; stem short cylindrical, whitish; spores oblong-elliptical, .0002–.00025′ long.

Plant 1′–2′ high, pileus 1 broad, stem 2′–3′ thick.

Ground in woods. Copake. Oct.

The species is remarkable for the smoky or blackish hue assumed by the lamellæ when bruised, and also in drying.

AGARICUS (CLITOCYBE) PINOPHILUS *Pk.*

Pileus thin, convex, umbilicate or centrally depressed, glabrous, moist, pale tan-color, paler or alutaceous when dry; lamellæ moderately close, subarcuate, adnate or slightly decurrent, whitish; stem equal, stuffed or hollow; glabrous or subpruinose, colored like the pileus; spores nearly elliptical, .0002–.00025′ long; odor and taste resembling that of fresh meal.

Plant 1–2 high, pileus about 1′ broad, stem 1″–2″ thick.

Ground under pine trees. Albany and Ticonderoga. July and August.

AGARICUS RUBROMARGINATUS *Fr.*

Ground under spruce trees. Adirondack Mountains. August.

Our specimens when fresh had a slight alkaline odor; otherwise they agree well with the description of the species.

AGARICUS (MYCENA) RADICATELLUS *Pk.*

Pileus thin, campanulate, glabrous, obtuse or subumbonate, whitish, when dry striate on the margin; lamellæ ascending, narrow, close, white; stem firm, glabrous, slender, whitish, deeply rooting; spores subglobose, rough, .0003′–.00035 long.

Plant 1.5–2 high, pileus 4′′–6′′ broad.

Mossy ground in woods. Griffins. Delaware County. Sept.

This species is easily known by the long radicular portion of the stem, which penetrates the earth after the manner of *A. radicatus*.

AGARICUS CHRYSOPHYLLUS *Fr.*

Decaying wood. Adirondack Mountains, Summit and Sandlake. Aug. and Sept.

AGARICUS (PLEUROTUS) ABSCONDENS *Pk.*

Pure white; pileus compact, convex or slightly depressed on the disk, glabrous, dry; lamellæ thin, crowded, emarginate, with a decurrent tooth; stem eccentric, curved, stuffed, slightly mealy at the top; spores minute, elliptical, .0002 long, usually with a shining nucleus; odor distinct, farinaceous.

Stem about 2′ long, pileus 2′–3′ broad.

In hollow stumps. Griffins. Sept.

AGARICUS SEPTICUS *Fr.*

Decaying wood. Adirondack Mountains. Aug.

AGARICUS (CLITOPILUS) ALBOGRISEUS *Pk.*

Pileus firm, convex or slightly depressed in the center, smooth, pale-gray; lamellæ moderately close, adnate or slightly decurrent, grayish, then flesh-colored; stem solid, colored like the pileus; spores angular, irregular, .0004–.0005 long, .0003′ broad; odor farinaceous.

Plant 2–3′ high, pileus 6′–12″ broad, stem 1″–2″ thick.

Ground in woods. Adirondack Mountains. Aug.

AGARICUS (CLITOPILUS) MICROPUS *Pk.*

Pileus thin, fragile, convex or centrally depressed, umbilicate, silky, gray, usually with one or two narrow zones on the margin; lamellæ narrow, close, adnate or slightly decurrent, gray; stem short, solid, slightly thickened at the top, gray, pruinose, with white mycelium at the base; spores angular, irregular, .0004′ long, .00025′ broad; odor farinaceous.

Plant 1′ high, pileus 6″–12″ broad.

Ground under trees. Ticonderoga. Aug.

AGARICUS (LEPTONIA) UNDULATELLUS *Pk.*

Pileus membranaceous, convex, minutely scurfy, squamulose on the disk, hygrophanous, grayish-brown and striatulate when moist, wavy on the margin; lamellæ rounded behind, nearly free, subdistant, whitish, then tinged with flesh-color; stem slender, glabrous, colored like the pileus, usually curved; spores irregular, .0004′ long, .0003′ broad.

Plant about 1′ high, pileus 6″–8″ broad.

Decaying prostrate trunks of trees. Pine Hill. Sept.

When dry, the pileus is somewhat shining, and the disk a little darker.

AGARICUS RHODOCALYX *Lasch.*

Ground in woods. Adirondack Mountains. Aug.

AGARICUS (PHOLIOTA) SQUARROSOIDES *Pk.*

Pileus firm, convex, viscid when moist, at first densely covered by erect papillose or subspinose tawny scales, which soon separate from each other, revealing the whitish color and viscid character of the pileus; lamellæ close, emarginate, at first whitish, then pallid or dull cinnamon color; stem equal, firm, stuffed, rough with thick squarrose scales, white above the thick floccose annulus, pallid or tawny below; spores minute, elliptical, .0002′ long, .00015′ broad.

Densely cæspitose, 3′–6′ high, pileus 2′–4′ broad, stem 3″–5″ thick.

Dead trunks and old stumps of maple. Adirondack and Catskill Mountains. Autumn.

This is evidently closely related to *A. squarrosus*, with which it has, perhaps, been confused, but its different colors and viscid pileus appear to warrant its separation.

AGARICUS (PHOLIOTA) LIMONELLUS *Pk.*

Pileus thin, convex or expanded, subumbonate, viscid, rough with scattered erect reddish-brown scales, lemon-yellow; lamellæ narrow, close, rounded behind, whitish; stem equal, solid, rough with revolute or recurved scales, pallid or yellowish, smooth above the lacerated annulus, dusted with yellow particles at the insertion of the lamellæ; spores elliptical, .0003′–.00035′ long, .0002′–.00025′ broad.

Plant cæspitose, 2′–3′ high, pileus 1′–2′ broad, stem 2″–3″ thick.

Prostrate beech trunks in woods. Griffins. Sept.

This is one of our most beautiful species. It is easily separated from its allies by its lively lemon-yellow color. It is allied to *A. flammans.*

AGARICUS (PHOLIOTA) VERMIFLUUS *Pk.*

Pileus convex or expanded, smooth, white, often tinged with yellow, sometimes areolate-rimose, especially on the disk, the margin decurved, and sometimes floccose-squamose from the remains of the veil; lamellæ close, white, then ferruginous-brown, usually minutely eroded on the edge; stem hollow, striated at the top where it is sometimes thickened, white; annulus lacerated or evanescent; spores ferruginous-brown, .00045′–.0005′ long, .0003′ broad.

Plant 2′–4′ high, pileus 2′–4′ broad, stem 3″–5″ thick.

Fields among oat-stubble. Ticonderoga. Aug.

This species is evidently closely related to *A. præcox*, but its larger size, larger spores, late appearance, etc., induce me to separate it. When moist, the pileus appears to be slightly viscid. It is so liable to the attacks of insect larvæ that it is difficult to dry a specimen before it is badly eaten.

AGARICUS (INOCYBE) PALUDINELLUS *Pk.*

Pileus thin, plane or slightly convex, umbonate, subfibrillose, whitish or pallid; lamellæ narrow, close, whitish then subferruginose; stem slender, equal, colored like the pileus, with an abundant white mycelium at the base; spores subelliptical, nodulose, .0003′ long, .0002′ broad.

Plant gregarious, 1′–2′ high, pileus 5″–10″ broad, stem nearly 1″ thick.

In low grounds and wet places under bushes. Sandlake. Aug.

This species is easily recognized by its pale, umbonate pileus and nodulose spores.

AGARICUS (NAUCORIA) LENTICEPS *Pk.*

Pileus thin, convex or nearly plane, dingy-ochre or subolivaceous, the disk brown or blackish-brown; lamellæ plane, subdistant, adnate, with a decurrent tooth, whitish or pallid; stem slender, hollow, paler above and slightly squamulose; spores large, variable in size, .0005′–.00075′ long, .0003′–.0004′ broad.

Plant 1′–1.5′ high, pileus 6″–10″ broad, stem scarcely 1″ thick.

Sandy soil along railroads. Center. Oct.

AGARICUS (HYPHOLOMA) HYMENOCEPHALUS *Pk.*

Pileus thin, fragile, campanulate then expanded, sometimes umbonate, hygrophanous, brown and striatulate when moist, pallid or whitish and radiately rugulose when dry, subatomate, the whitish appendiculate veil soon evanescent; lamellæ narrow, close, dingy then brown; stem slender, brittle, hollow, striate and slightly mealy at the top, white; spores brown, elliptical, .0003′ long, .00016′ broad.

Plant 3′–4′ high, pileus 1′–2′ broad, stem 1″–1.5″ thick.

Ground under alders. Adirondack Mountains. Aug.

It belongs to the section *Appendiculati*, and is remarkable for the fragile character of the pileus and stem.

AGARICUS (PSILOCYBE) CAMPTOPUS *Pk.*

Pileus thin, broadly convex, glabrous, hygrophanous, brown and striatulate when moist, whitish when dry; lamellæ narrow, close, whitish becoming brown; stem equal, smooth, generally curved, slightly pruinose or mealy at the top, with a white strigose mycelium at the base; spores elliptical, .00025′ long, .00016′ broad.

Plant about 1′ high, pileus 4″–10″ broad.

Prostrate trunks of trees in woods. Catskill Mountains. Sept.

This plant bears some resemblance in color to *A. appendiculatus*, but I find no trace of a veil. The stem is solid, and the pileus is even when dry.

COPRINUS MACROSPORUS *Pk.*

Pileus ovate, then expanded, rimose-striate, obscurely floccose-squamulose, white, the small even brownish disk squamose; lamellæ crowded, free, white then black; stem glabrous, white, with traces of an annulus near the thickened or subbulbous base; spores very large, elliptical, .0008′–.001′ long, .0005′–.00065′ broad.

Plant cæspitose, 2–3′ high, pileus 1′–2′ broad, stem 1″ thick.

Ground in open fields. Ticonderoga. Aug.

The prominent characters of this species are the rimose pileus, squamose disk, free lamellæ, and large spores. In its early state it resembles some species of Lepiota. It seems to be intermediate between the sections *Atramentarii* and *Micacei.*

COPRINUS ROTUNDOSPORUS *Pk.*

Pileus thin, campanulate, whitish or pale cinereus with a thin floccose subpersistent tomentum, even; lamellæ free; stem slightly tapering upward, white; spores subglobose, .0003–.00035′ long, nearly as broad.

Plant 2′–3′ high, pileus about 1′ broad.

About the roots of trees in woods. Catskill Mountains. Sept.

This species is apparently related to *C. niveus*, and is remarkable for its nearly globose spores. All the specimens seen were old and partly dried, so that the description is not as full as could be desired.

CORTINARIUS (PHLEGMACIUM) COPAKENSIS *Pk.*

Pileus convex then expanded, often crowded and irregular, viscid, corrugated, pale-ochre, slightly tinged with red; lamellæ sub-distant, broad behind, at first violaceous, toothed or eroded on the margin, the interspaces sometimes veiny; stem equal or tapering upwards, stuffed, silky, whitish; spores broadly elliptical, rough, .0003′–.00035′ long.

Plant subcæspitose, 2–3 high, pileus 1.5′–3′ broad, stem 2″–4″ thick.

Ground in woods. Copake. Oct.

The pileus when dry is glabrous and shining.

Cortinarius (Phlegmacium) lapidophilus *Pk.*

Pileus at first hemispherical and cinereous, then convex or expanded and tinged with ochre, often crowded and irregular, virgate with appressed fibrils; lamellæ crowded, at first dark violaceous then argillaceous-cinnamon; stem solid, equal or slightly thickened at the base, whitish; flesh of the pileus whitish; spores unequally elliptical, rough, .0003′ long, .00025′ broad.

Plant subcæspitose, 2′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Rocky soil in woods. Ticonderoga. Aug.

Marasmius calopus *Fr.*

Twigs and stems among fallen leaves in woods. Ticonderoga. Aug.

This might easily be mistaken for *M. scorodonius*, but it is without odor, and has a different insertion of the lamellæ. It is sometimes cæspitose. The pileus in our specimens is whitish.

Boletus Satanus *Lenz.*

Borders of woods in grassy ground. Ticonderoga. Aug.

Polyporus pallidus *Schulz.*

Adirondack Mountains. Aug.

Polyporus (Merisma) Beatiei *Banning in litt.*

Pilei few, springing from a common, often tuber-like base, spreading out into a suborbicular mass often a foot or more in diameter, nearly plane above or centrally depressed and imperfectly funnel-shaped, variously confluent and imbricated, sometimes single, subzonate, rough with little radiating elevations or wrinkles, which sometimes form imperfect reticulations towards the base, subpulverulent and strigose-villose in zones or almost evenly scabrous-villose, alutaceous, the margin often irregular and lobed; pores of medium size, decurrent on the stem-like base, unequal, angular, lacerated, toothed and even lamellated, generally about equal in length to the thickness of the flesh of the pileus, subconcolorous; flesh pallid or pale alutaceous, of a firm, but cheesy texture; spores globose, rough, .00025–.0003′ in diameter, colorless.

"Ground" in woods. Wilmurt, Herkimer County. *G. S. Watkins* and *W. D. Edmonds.*

Ground under an oak tree. Brighton, Monroe County. *G. T. Fish.*

Both gentlemen from whom I have received specimens of this fungus, speak of it as growing on the ground, but it is quite probable that it starts from some decaying wood or tree root buried in the earth. I have also received a specimen of this plant from Miss M. E. Banning, of Baltimore, Md., who sent it under the name here given.

The species seems closely related to *P. subgiganteus* B & C., but as I am unable, from the description of that species, to satisfy myself that our plants belong to it, I have thought best to describe them under another name. The Baltimore plant has a single pileus seven inches in diameter and four inches high. The New York specimens are compound, the one from Wilmurt being ten inches broad and nine inches high, the one from Brighton, fifteen inches broad and six inches high. These are the dimensions of the shrunken, dried plants. When fresh, they were very much larger. The dimensions of the Wilmurt plant, when fresh, were given me by Mr. Edmonds, as follows:

Height, eighteen inches; circumference, fifty-seven inches; thickness of pileus about one inch. From this it will be seen that the dried plants are only about half their size when fresh. The flesh resembles in color and texture that of *P. sulphureus*, to which the species is allied, but it is a little harder. The dried plants have a decided and peculiar odor.

POLYPORUS (ANODERMEI) WEINMANNI *Fr.*

Decaying hemlock trunks. Pine Hill. Sept.

The whole plant sometimes acquires a reddish hue in drying. The pileus is two or three inches broad. A tendency to form narrow zones on the margin is manifest.

POLYPORUS (INODERMEI) PLANUS *Pk.*

Pileus thin, coriaceous, plane, suborbicular, about 1′ broad, sometimes confluent, dorsally attached, minutely villose or velvety, brown or brownish fawn-colored, variegated with narrow darker glabrous zones, margin whitish; pores minute, obtuse, short, subrotund, whitish or pallid; flesh pallid.

Dead branches. North Greenbush.

This has the colors of *P. scutellatus*, but the thin plane pileus and short pores are so unlike that species that I am compelled to regard it as distinct.

POLYPORUS (RESUPINATI) SUBICULOSUS *Pk.*

Subiculum widely effused, dense, but soft and downy-tomentose, tawny-cinnamon; pores forming patches upon the subiculum, short, unequal, sometimes slightly labyrinthiform, cinereo-ferruginous, ferruginous-brown when bruised, the dissepiments when young whitish and pruinose-villose.

Creeping over mosses, decaying wood, and even stones, in sheltered places. Copake. Oct.

The patches are several inches in extent. The pores have a paler hue than the subiculum, but they become darker when bruised.

POLYPORUS (RESUPINATI) SEMITINCTUS *Pk.*

Subiculum thin, soft, cottony, separable from the matrix, whitish, more or less tinged with lilac, sometimes forming branching creeping threads; pores very short, unequal, whitish or pale cream-color, the dissepiments at first obtuse, then thinner, toothed on the edge.

Under surface of maple chips. Griffins. Sept.

This is a soft, delicate species, with merulioid pores, similar to those of *P. violaceus*. The lilac stains appear on the subiculum only.

POLYPORUS (RESUPINATI) INDURATUS *Pk.*

Effused, hard, determinate, 1″–2″ thick, inseparable from the matrix, almost wholly composed of minute subrotund vesicular pores, yellowish or pale-ochre, the surface slightly pruinose and tinged with flesh-color; the yellowish mycelium or subiculum penetrating the matrix.

Decaying wood. Oneida. *H. A. Warne.*

This species is remarkable for the peculiar character of the pores which form little cells or cavities instead of tubes, so that in whatever direction the mass is cut or broken, the section appears equally porous. Perhaps this character will necessitate the formation of a new genus.

Trametes suaveolens *L.*

Decaying wood. Center. Oct.

Solenia villosa *Fr.*

Decaying wood. Summit. Sept.

Hydnum sulphurellum *Pk.*

Subiculum thin, effused, definite, sometimes rimose, pale sulphur-yellow; aculei scattered, conical, subobtuse, sometimes compound, colored like the subiculum; spores oblong, slightly curved, .0002′–.00025′ long.

Dead branches of mountain maple, *Acer spicatum.* Griffins. Sept.

The small suborbicular patches are sometimes elongated by confluence. The color is of a clear whitish sulphur hue. The teeth appear like little conical papillæ.

Mucronella calva *A. & S.*

Prostrate hemlock trunks. Griffins. Sept.

Mucronella aggregata *Fr.*

Decaying wood of deciduous trees. Oneida. *Warne.*

Craterellus dubius *Pk.*

Pileus infundibuliform, subfibrillose, lurid-brown, pervious to the base, the margin generally wavy and lobed; hymenium dark cinereous, rugose when moist, the minute crowded irregular folds abundantly anastomosing, nearly even when dry; stem short; spores broadly elliptical or subglobose, .00025′–.0003′ long.

Plant simple or cæspitose, 2′–3′ high, pileus 1′–2′ broad.

Ground under spruce trees. Adirondack Mountains. Aug.

In color this species bears some resemblance to *Cantharellus cinereus.* From *Craterellus sinuosus*, it is separated by its pervious stem, and from *C. cornucopioides* by its more cæspitose habit, paler color and smaller spores.

Stereum sanguinolentum *A. & S.*

Prostrate hemlock trunks. Griffins. Sept.

The pileus is sometimes hairy and distinctly zoned with darker bands; the hymenium is even or radiately-wrinkled.

Cyphella sulphurea *Batsch.*

Living stems of herbs in damp places. Griffins. Sept.

Some of the specimens were white when collected, but in drying, these assumed the yellow color of the others.

Clavaria fumigata *Pk.*

Stem short, thick, branching from near the base, whitish; branches numerous, forming a dense mass, smoky-ochraceous, sometimes tinged with lilac; tips obtuse; spores .0003′–.0005′ long.

Ground in woods. Ticonderoga. Aug.

The tufts are 4′–5′ high and remarkable for their smoky or dingy color.

Clavaria corynoides *Pk.*

Small, simple, clavate; club obtuse, yellowish, or cream colored, gradually narrowed below and losing itself in the short white stem.

Gregarious, about half an inch high.
Damp ground by roadsides. Adirondack Mountains. Aug.

Tremella lutescens *Pers.*

Dead poplar branches. Adirondack Mountains. Aug.

Guepinia Peziza *Tul.*

Cup-shaped, single or clustered, erumpent, stipitate, at first nearly closed, then open and concave, 1‴–3″ broad, yellow, often irregular, base stem-like, concolorous or slightly whitish-pruinose, longitudinally wrinkled, the ridges extending upwards on the base of the cup; substance tremelloid, rather tough; spores oblong-elliptical, at first simple, then one to three-septate, .0004′–.0005′ long, borne on spicules at the tips of rather thick subclavate sporophores.

Dead alder. Center. Sept.
In the dried specimens the color inclines to orange. The general appearance is not unlike that of a clustered Peziza. As our specimens exhibit some characters not mentioned in the description of the species to which we have referred them, we have given a full description of them.

Hymenula olivacea *Pk.*

Thin, closely applied to the matrix, olive-green, shining, subviscid, definite or subconfluent, with a narrow raised margin which is sometimes whitish; spores minute, cylindrical, straight, trinucleate, colorless, .0002′ long.
Dead stems of *Eupatorium ageratoides.* Catskill Mountains. Sept.

Lycoperdon glabellum *Pk.*

Subglobose or subturbinate, 1′–1.5′ broad, sometimes narrowed below into a short stem-like base, furfuraceous with very minute nearly uniform persistent warts, which appear to the naked eye like minute granules or papillæ, yellow, opening by a small aperture; inner mass purplish-brown, capillitium with a central columella; spores purplish-brown, globose, rough, .0002′–.00025′ in diameter.

Ground in copses and in pine woods. West Albany and North Greenbush. Autumn.
The verrucæ or spinules are so minute, that at first sight, they are scarcely visible, the peridium appearing nearly smooth. They persist even in the old and flaccid condition of the plant. The species is manifestly closely related to *L. atropurpureum*, but that is described as "at first rough with minute spines," thus indicating that it becomes smooth afterwards. It is also said to be "dingy-rufous," but our plant is constantly yellow.

Lycoperdon calyptriforme *Berk.*

Moss-covered rocks. Adirondack Mountains. Aug.
This species is remarkable for its peculiar shape and singular habitat. It is evidently rare. But two specimens were found.

MILLERIA *gen. nov.*

Peridium membranaceous, enclosing numerous minute sporangium-like bodies bearing upon the surface a stratum of spores.

This is a genus of Gasteromycetes, near Polysaccum. It is respectfully dedicated to its discoverer. *Mr. E. S. Miller.*

MILLERIA HERBATICA *Pk.*

Peridia oval or ovate-conical, subobtuse, firm, externally minutely warty or mealy-furfuraceous, whitish, inclosing a mass of minute subglobose or slightly angular sporangioles adhering together, black externally, pallid within; spores superficial on the sporangioles, globose, colored, .0005′–.00065′ in diameter.

Panicles of *Rhynchospora macrostachya.* Wading River. *Miller.*

This rare, but interesting fungus resembles in size and color the preceding species, but its interior structure is wholly different. The sporangioles appear to be composed of densely compacted or reticulated threads and cellular matter. I have not been able to detect any investing membrane, the spores appearing to rest directly upon the surface to which they give the black color. The peridium does not appear to have been ruptured naturally in any of the specimens. The cavity is only partly filled by the mass of sporangioles.

PHYSARUM PSITTACINUM *Dittm.*

Fallen leaves, decaying wood, bark and effete Hypoxylon. Adirondack Mountains. Aug.

PHYSARUM ORNATUM *Pk.*

Sporangia depressed or hemispherical, plane or slightly concave beneath, greenish-cinereous, dotted with small yellow granules, the empty walls whitish; stem short, black or blackish-brown, generally longitudinally wrinkled when dry; columella none; capillitium with numerous yellow knot-like thickenings; spores globose, smooth, violet-brown in the mass, .0004′–.0005′ in diameter.

Decaying wood. Albany. Aug.

PHYSARUM ATRORUBRUM *Pk.*

Scattered or gregarious, stipitate; sporangia globose, even or somewhat wrinkled, dark-red; stem cylindrical, even, blackish or subconcolorous; capillitium when cleared of the spores whitish, sometimes with a slight pinkish tinge; columella none; spores globose, smooth, dark-brown in the mass, dark-red when separated, .0003′–.00035′ in diameter.

Decaying wood. Adirondack Mountains. Aug.

The plants are scarcely one line high. The capillitium is very delicate, and when cleared of the spores, the knot-like thickenings are seen to be very small and of a dark-red color, to which probably is due the pinkish tinge—sometimes observed. A part only of the thickenings are filled with lime granules. The dark-red granules of the sporangium walls are abundant, and appear to form a continuous crust.

PHYSARUM INÆQUALIS *Pk.*

Sporangia sessile, subglobose or irregular, sometimes elongated and confluent, red, abundantly dotted with minute scarlet granules; capillitium lemon-yellow; spores brown in the mass, globose or subglobose, smooth, very unequal in size, .0003′–.0012′ in diameter.

Decaying wood. Griffins. Sept.

This is a most singular fungus, and but little of it was found. The capillitium though abundantly charged with lime granules, does not appear to have them continuous throughout its whole extent, and the plant would, therefore, seem to belong to the genus Physarum. On the other hand, the larger bodies which I have regarded as spores, give indications that they may be really an investing membrane, which encloses the true spores, for they are often found ruptured, though I have not been able to see them discharging spores or containing them. They are colored like the spores, and there are all manner of intermediate sizes between the largest and smallest. It thus appears to be neither a good Physarum nor a good Badhamia, though with close relations to both. For the present, I leave it in the genus Physarum. *P. rubiginosum* is said to have the sporangia walls and the granules of lime—both scarlet—which is not the case with our plant.

Badhamia affinis *R.*

Twigs and leaves. Sandlake. Aug.

Didymium eximium *Pk.*

Sporangia subglobose, slightly umbilicate beneath, whitish or subcinereous, mealy with numerous granules; stem slender, erect, even, pallid or subrufescent, blackish at the base; columella orbicular, discoid, dull-yellowish or pallid; capillitium whitish; spores globose nearly smooth, blackish in the mass, .00035′–.0004′ in diameter.

Fallen leaves. Adirondack Mountains. Aug.

I have not seen the full description of *D. discoideum*, which is also said to have a discoid columella, but as its capillitium is said to be brown, it is probably distinct from this species. In our plant the sporangium, after bursting at the top, sometimes breaks loose from the stem and slides downwards, thus protruding and revealing to sight the flattened disk-like columella.

Didymium angulatum *Pk.*

Sporangia delicate, subglobose, whitish, externally mealy with numerous granules and crystals of lime; stem short, whitish; columella subglobose, white or pale yellow; capillitium sparse, delicate, whitish or slightly colored; spores irregular, angular, blackish in the mass, .00035′–.0005′ long.

Fallen leaves. Adirondack Mountains. Aug.

Chondrioderma difforme *Pers.*

Fallen leaves, bark and fern stems. Adirondack Mountains. Aug.

Diachæa subsessilis *Pk.*

Gregarious or crowded; sporangia subglobose, sessile or with a very short white stem, the walls delicate, iridescent with various metallic tints; columella obsolete; capillitium and mass of spores violet-brown; spores globose, rough, .0004′–.0005′ in diameter.

Fallen leaves. Adirondack Mountains. Aug.

This is a most singular species, and apparently very rare. In its lack of a distinct columella, it departs from the generic character, but it cannot be placed in the genus Lamproderma, for the same objection would hold there, and besides that, another is found in the presence of lime granules in the stem. Even when no distinct stem is present, a small whitish mass of granules can generally be seen at the point of attachment. The capillitium appears to originate at the base of the sporangium. The spores are larger, but less rough than those of *D. splendens.*

Comatricha æqualis *Pk.*

Gregarious or loosely clustered, about three lines high, arising from a thin hypothallus; sporangia cylindrical, obtuse, fugacious, wholly falling away; capillitium brown or blackish-brown, forming an intricate net-work; stem slender, smooth, black, penetrating the capillitium as a columella and extending nearly or quite to the apex, the free portion about equal in length to one-half the altitude of the entire plant; spores globose, smooth, violet-black, .0003′–.00035′ in diameter.

Decaying wood. Catskill Mountains. Sept.

In color this species is almost exactly like *Stemonitis fusca*, from which its more lax habit, proportionally longer stem and different capillitium separate it. The larger size, both of the plant itself, and of the spores, will separate it from *Comatricha typhina.* The length of the stem and of the capillitium are nearly equal, hence the specific name.

Comatricha Friesiana *De By.*

Decaying wood. Adirondack Mountains. Aug.

This is a variety with the sporangia generally globose.

The variety *oblonga* was found on the Catskill Mountains.

Comatricha pulchella *Bab.*

Decaying stems of herbs. Adirondack Mountains. Aug.

Lamproderma violaceum *Fr.*

Dead stems of herbs. Catskill Mountains. Sept.

Our specimens have a brownish capillitium and spores .0003′–.00035′ in diameter, but they are probably a mere variety of the species.

Trichia scabra *R.*

Decaying wood. Griffins. Sept.

Trichia inconspicua *R.*

Bark of buttonwood, *Platanus occidentalis.* Bethlehem.

Arcyria pomiformis *Roth.*

Decaying wood and bark. Mechanicville. Oct.

Lycogala flavofuscum *Ehr.*

Decaying wood and stumps. Griffins and Bethlehem. Sept. and Oct.

Oligonema brevifila *Pk.*

Bright ochery-yellow throughout; sporangia crowded, forming clusters or effused patches, shining, variable in shape; threads few, very short, cylindrical or subfusiform, not septate; spores globose, rough, .00045′ in diameter.

Mosses. Oneida. *Warne.*

This species differs from *O. flavida* (*Perichæna flavida* Pk.) in its darker color and shorter, more strongly marked threads.

SACIDIUM PINI *Fr.*

Dead balsam leaves. Adirondack Mountains and Summit. Aug. and Sept.

SEPTORIA WALDSTEINIÆ *P. & C.*

Spots small, unequal, suborbicular, arid, gray with a purple-brown or blackish margin, perithecia minute, few, epiphyllous, black; spores straight, .001′ long.

Leaves of dry strawberry, *Waldsteinia fragarioides.* Portage. *G. W. Clinton.* Helderberg Mountains. May.

SEPTORIA VERBASCICOLA *B. & C.*

Leaves of mullein, *Verbascum blattaria.* Albany. July.

I find no description of this fungus, and take the name from specimens received from Dr. Curtis.

PHYLLOSTICTA LONICERÆ *Desm.*

Living leaves of fly honeysuckle, *Lonicera ciliata.* Catskill and Adirondack Mountains. July and Aug.

VERMICULARIA TRICHELLA *Grev.*

Ivy leaves. Buffalo. *Clinton.*

VERMICULARIA ALBOMACULATA *Schw.*

Leaves of carrion flower, *Smilax herbacea.* Buffalo. Sept. *Clinton.*

MELANCONIUM AMERICANUM *P. & C.*

Pustules small, grouped or circinating on orbicular spots; stroma none or obsolete; spores compact, oozing out in subconical masses, staining the matrix black, subglobose or broadly elliptical, .0002′–.0003′ long.

In conservatories on dead leaves of the American century plant, *Agave Americana.* Buffalo. Feb. *Clinton.*

SPORIDESMIUM SICYNUM *Thum.*

Dead alder branches. Adirondack Mountains. Aug.

PHRAGMIDIUM BULBOSUM *Fr.*

Leaves of *Potentilla fruticosa.* Copake. Oct.

The spores are darker colored than in European specimens, and therefore the septa are soon very obscure.

UROMYCES TRIFOLII *Fckl.*

Leaves of *Medicago lupulina.* Buffalo. *Clinton.*

UROMYCES POLYMORPHUS *P. & C.*

Spots brownish; sori blackish-brown, prominent, surrounded by the ruptured epidermis; spores large, polymorphous, subglobose, elliptical, ovate, oblong or clavate, often angular, the apex acute, obtuse, truncate or even emarginate, .0014′–.002′ long; pedicel equaling or exceeding the spore in length.

Lower surface of leaves of *Lathyrus ochroleucus.* Buffalo. Nov. *Clinton.*

USTILAGO SALVEI *B. & Br.*

Leaves of *Calamagrostis Pickeringii.* Mt. Marcy. Aug.

This fungus forms long discolored lines or patches on the leaves, closely resembling those formed by *Urocystis Agropyri* and *Urocystis occulta.* The spores in our specimens, as well as in those received from Europe under this name, are quite uniformily globose, not obovate as given in the description. They are generally .0004′–.0006′ in diameter, but occasionally they attain a diameter of .001′. I am not aware that this species has been before detected in this country.

MASSOSPORA, *gen. nov.*

Spores numerous, loosely adhering together and forming a pulverulent mass without any evident peridium. *Insecticolous.*

This is a peculiar genus, apparently belonging to the Coniomycetes, but its affinities are doubtful.

MASSOSPORA CICADINA *Pk.*

Spore mass occupying the abdominal cavity, whitish or pale cream-color, at length exposed by the falling away of the terminal rings of the abdomen; spores subglobose or broadly elliptical, granular within, sometimes containing one to three unequal nucleoli or oil globules, .00065′–.00085′ in diameter.

In the abdomen of the "Seventeen-year Locust," *Cicada septendecim.* Livingston, Columbia county, and Albany. June.

A specimen was also received from *Rev. R. B. Post*, which was taken at South Amboy, New Jersey.

This is a singular fungus, unlike any other known to me. In its early stage it is wholly concealed in the body of the insect, but just before, or soon after the death of the insect, the terminal rings of the abdomen fall away, revealing the pulverulent mass of spores within, which, by a superficial observer, might easily be mistaken for a lump of pale-yellow or whitish clay. I have not been able to detect any proper peridium, nor does any seem to be necessary, the walls of the abdomen answering as a substitute. In one or two examples, the spore mass was less fully developed, and of a brighter color. The spores, in this case, were much larger, being .0015′–.002′ in diameter, with the epispore roughly reticulated. This is probably an earlier condition of the same species, and is another indication that the proper position of the fungus is among the Coniomycetes, where there are several genera, with spores of two orders. The position of the genus, as it seems to me, is in the vicinity of the genus Protomyces, which has the spores developed in the living tissues of plants, as this has in the tissues of insects. This fungus is noticed, but not named, in Smithsonian Contributions, Vol. v, p. 53.

ISARIA TENUIPES *Pk.*

Stem very slender, elongated, glabrous, lemon-yellow, one to one and a half inches high, divided above into a few irregular branches, which are wholly covered by the white mealy coating of conidia; conidia oblong-elliptical, .00016′–.0002′ long.

Dead pupæ buried under fallen leaves. Center. Sept.

This is probably only a condition of some Torrubia; but, as it does not agree with any described form, I have thought best to designate it, for the present, by a name of its own.

STILBUM RIGIDUM *Pers.*

Decaying wood. Adirondack Mountains. Aug.

STILBUM FLAVIPES *Pk.*

Stem villose, tapering upward, less than a line high, buff-yellow; head small, subglobose or hemispherical, whitish; spores minute, elliptical, .0001′–.00012′ long.

Decaying wood. Center. Oct.

SPOROCYBE ABIETINA *Pk.*

Very minute; stems slender, distinctly septate, nearly black, terminating above in a minute obovate or subglobose yellowish head; spores minute, oblong, spermatoid.

Bark and wood of spruce, *Abies nigra.*

Specimens of spruce bark and wood, showing the work of the spruce mining beetle were collected in the Adirondack Mountains. These were wrapped in paper, brought to Albany, and laid away. Upon examining them some months afterward, the fungus was found upon them, having evidently developed since the collection of the bark. It is about the size of *S. byssoides.*

CLADOSPORIUM GRAMINUM *Lk.*

Dead leaves of grass and sedges. Center and North Greenbush. May.

HELMINTHOSPORIUM INTERSEMINATUM *B. & R.*

Dead stems of stone root, *Collinsonia Canadensis.* North Greenbush. Oct.

HELMINTHOSPORIUM HYDROPIPERIS *Thum.*

Living leaves of smart weed, *Polygonum Hydropiper.* Albany. Sept.

POLYACTIS VULGARIS *Lk.*

On carnation pink in conservatories. Buffalo. Dec. *Clinton.*

BOTRYOSPORIUM PULCHRUM *Berk.*

Dead grass leaves. Center. Sept.

In our specimens the tips of the branches are swollen; otherwise they agree with the description of the species.

ASPERGILLUS FLAVUS *Lk.*

On excrement of caterpillars in damp places. North Greenbush and Sandlake. July and Aug.

FUSIDIUM CANUM *Pass.*

Leaves of *Erigeron Canadensis.* North Greenbush. Sept.

PERONOSPORA SIMPLEX *Pk.*

Flocci somewhat tufted, short, .004′–.006′ long, simple, bearing on the swollen obtuse apex five to fifteen cylindrical spicules, whose length is about half the diameter of the acrospores; acrospores borne on the spicules, globose, generally with a broad umbo at the apex, and a minute projecting point of attachment at the base, .0008′–.0012′ in diameter.

Living and languishing leaves of the New England Aster, *Aster Novæ-Angliæ.* North Greenbush. Sept.

Mucor ramosus *Bull.*

Decaying fungi. Albany. Sept.

Mucor caninus *Pers.*

Excrement of dogs. Ticonderoga. Aug.

Peziza succosa *Berk.*

Damp shaded soil in woods. Albany and North Greenbush. July.

Peziza vulcanalis *Pk.*

Burnt ground under spruce trees. Adirondack Mountains. Aug.

This is regarded by some as equivalent to *P. cupularis*, but if the figure and description of *P. cupularis* in Mycographia are correct, our plant should be kept separate. It is not "subsessile," but it always, so far as I have seen, has a distinct stem. Its color, externally, is brown or ochraceous-brown, and the disk is orange or yellow-orange, not of a uniform cervine color without and within as figured. Neither is it "externally farinose;" and finally the spores are considerably smaller and destitute of nuclei. Indeed, our plant approaches nearer to *P. pulchra* than to *P. cupularis* as given in Mycographia, and I would not be averse to regarding it equivalent to that species. But if these two are the same, the name *P. vulcanalis* antedates the other and should be retained.

Peziza (Humaria) gallinacea *Pk.*

Cups whitish or yellowish, expanded, sessile, attached by a slight projecting point, externally slightly furfuraceous, the margin often wavy or irregular, the hymenium smooth, sometimes uneven; asci long, slender, cylindrical; spores elliptical, smooth, uniseriate, occupying the upper part of the ascus, .0003′–.0004 long; paraphyses slender, slightly clavate at the tips.

Partridge dung. Oneida. July. *Warne.*

Peziza Umbrorum *Fckl.*

Clay soil. Oneida. *Warne.*

Peziza sulphurea *Pers.*

Dead stems of herbs in damp places. Albany. Sept.

Peziza (Dasyscyphæ) viridicoma *Pk.*

Cups minute, sessile, villose, yellowish-green; asci oblong clavate; spores crowded or biseriate, oblong or subfusiform, .0005′–.0006′ long, .0002′–.00025′ broad.

Decaying wood. Sandlake. Aug.

The peculiar color of this minute species renders it an attractive object.

Peziza brunneola *Desm.*

Fallen leaves. Center. June.

Peziza Osmundæ *C. & E.*

Near the base of Osmunda stems. Center. Sept.

Peziza (Mollisia) planodisca *P. & C.*

Cups minute, sessile, whitish, the disk plane or slightly convex, obliterating the margin; asci short; spores crowded or biseriate, subfusiform, .0003′–.00035′ long.

Dead leaves of grass, *Andropogon scoparius*. Buffalo. Nov. *Clinton.*

HELOTIUM ALBOPUNCTUM *Pk.*

Cups very minute, scattered, white, the disk soon plane or slightly concave, margin generally distinct; asci cylindrical; spores biseriate, oblong, narrow, generally binucleate, .0006′–.0007′ long.

Fallen beech leaves in woods. Adirondack Mountains. Aug.

This is an exceedingly minute species. In drying it acquires a yellowish tinge, and it is then scarcely visible to the naked eye. The stem is so short that the plant appears sessile.

HÆMATOMYCES ORBICULARIS *Pk.*

About one line in diameter, sessile, pulvinate, orbicular, subtremelloid, gyrose-convolute, blackish-brown, minutely dotted with rufous particles, as is also the moist pallid or subrufous spot on which it is seated; asci narrowly clavate, subacute; spores oblong-fusiform, simple, .0006′–.0007′ long, .00015′ broad; paraphyses numerous, filiform.

Decaying chestnut wood. Mechanicville. Oct.

I have seen no description of this genus, and refer our specimens to it, because of their congeneric relation to *Hæmatomyces vinosus* C. & E.

DERMATEA CARNEA *C. & E.*

Dead Viburnum stems. West Albany. Oct.

DERMATEA PHYLLOPHILA *Pk.*

Cups minute, suborbicular, often with a flexuous margin, dry, somewhat fibrous in texture, brownish and slightly hairy externally, erumpent, surrounded and partly concealed by the ruptured epidermis, sometimes throwing off a fragment of it, when moist, expanded and revealing a plane pallid or dingy-white disk; asci oblong-clavate, obtuse, sessile; spores broadly elliptical, nearly colorless, .0003′–.00035′ long, .0002′–.00025′ broad, generally containing a large shining nucleus; paraphyses thickened above, often a little longer than the asci.

Lower surface of balsam leaves while yet on the tree. Summit. Sept.

At first sight this fungus might be taken for some effete Peridermium, such is its general external appearance. When moist the cups are swollen and become more distinct. Under a lens the disk has a pruinose appearance. The leaves that are attacked are killed by the fungus, all those bearing it being dead, though in the immediate vicinity of living ones.

DERMATEA XANTHOXYLI *Pk.*

Cups densely tufted, minute, often irregular from mutual compression, brownish-lilac, externally and on the margin whitish with a villose pruinosity, disk plane or slightly concave; asci short, clavate; spores crowded, simple, slightly curved, subcylindrical, obtuse, colorless.

Dead branches of prickly ash, *Xanthoxylum Americanum.* West Troy. Oct.

The tufts are scarcely a line broad and easily overlooked, yet they sometimes contain a dozen cups each.

CENANGIUM CASSANDRÆ *Pk.*

Oblong or hysteriiform, erumpent, closely surrounded by the ruptured epidermis, black; asci oblong-clavate; spores linear, curved, involved in mucus, slightly colored, .0011′–.0012′ long.

Dead stems of leather leaf, *Cassandra calyculata.* Center. June.

CENANGIUM PEZIZOIDES *Pk.*

Cups scattered, minute, erumpent, sessile or attached by a narrowed base, smooth, black; asci oblong-clavate; spores crowded oblong-elliptical, .0008′–.001′ long, often containing a single large nucleus, sometimes slightly curved.

Dead stems of leather leaf, *Cassandra calyculata.* Center. June.

This was associated with *C. Cassandræ*, but the two are easily distinguished.

TYMPANIS ACERINA *Pk.*

Cups subcæspitose, obconic, erumpent, black with a distinct often flexuous margin, disk concave; asci oblong-cylindrical; spores oblong, colored, .0005′–.0008′ long, containing a granular endochrome, at length quadrinucleate or triseptate.

Bark of maple trees. Adirondack and Catskill Mountains. Aug. and Sept.

The cups often manifest a tendency to form lines or grow in linear tufts. They are usually accompanied by *Sphæronema acerina*, which is probably one condition of the species. Both frequently grow from the same chink in the bark.

PATELLARIA OLIVACEA *Batsch.*

Decaying wood. Adirondack and Catskill Mountains. July and Sept.

A form of this species occurs which is hispid with straight rigid black hairs or setæ.

PHACIDIUM BRUNNEOLUM *Pk.*

Perithecia small, innate, brown or blackish-brown, with four or five rather broad teeth; disk dingy-white; asci cylindrical or clavate, narrow; spores small, colorless, sublanceolate or oblong-ovate, often binucleate, .0003′–.0004′ long.

Fading leaves of *Galium trifidum.* Summit. Sept.

I have seen no description of *Phacidium autumnale* Fckl., but according to my European specimens of that species, our plant is quite different.

TRIBLIDIUM MORBIDUM *Pk.*

Perithecia seated on a thin black crust, irregular, elliptical or oblong, rugose, black, at length widely gaping or even suborbicular, revealing the dingy-white or cinereous disk; asci narrowly lanceolate, tapering towards the base; spores filiform, .003′–.004′ long.

Decaying prostrate trunks of spruce. Sandlake. Aug.

The general appearance of the perithecia is such as to suggest the idea that they are diseased or badly developed. They indicate that the plant is a Triblidium, but the spores are like those of Colpoma.

Glonium hyalosporum *Ger. in litt.*

Decaying wood. Willowemoc. *W. R. Gerard.*

Hypoderma nervisequum *DC.*

Leaves of balsam. Mt. Marcy and Summit.

The specimens are without fruit, but so closely resemble European specimens that I have no hesitation in referring them to this species.

Rhytisma maximum *Fr.*

Living stems of willows, *Salix sericea.* Stamford, Delaware county. Sept.

This is also without fruit, but so characteristic in other respects, that there can scarcely be a doubt of its identity. It kills the stems and branches it attacks.

Hypocrea viridis *Tode.*

Maple chips. Griffins. Sept.

This is so unlike our ordinary forms of *H. gelatinosa*, that it seems best to keep them distinct, though some botanists unite them.

Hypoxylon xanthocreas *B. & C.*

Prostrate dead alders. Center. Sept.

Our specimens agree with those received from Dr. Curtis under this name, but they do not agree with the description of the species as published in Grevillea. In our specimens the young plant is covered with a compact yellow conidiiferous stratum bearing elliptical conidia .00016 –.0002 long. As the stroma increases in size, it becomes naked above, and of a purple-brown or chestnut color, which contrasts beautifully with the yellow margin. When old it becomes darker, but I have not seen it "black" as described. The surface is generally irregular or uneven. The stroma is whitish or pallid within, but near the surface it is yellow. The spores vary from .0004′–.0006′ in length. I find none, neither in our specimens, nor in those of Dr. Curtis, as small as stated in the description. But for the examples of Dr. Curtis, I should have regarded our plant as a different species, so widely does it differ from the description.

Diatrype asterostoma *B. & C.*

Birch bark. Oneida. *Warne.*

Dothidea Epilobii *Fr.*

Dead stems of willow herb, *Epilobium angustifolium.* Adirondack Mountains. Aug.

Valsa translucens *De Not.*

Dead willow branches. West Albany. Apr.

Valsa Xanthoxyli *Pk.*

Pustules slightly prominent, erumpent, with a yellowish or tawny furfuraceous disk which is dotted by the ostiola; perithecia two to fifteen, rarely single, fragile, pale, surrounded by a tawny tomentum, which is sometimes agglutinated into a kind of spurious receptacle; ostiola distinct, short, obtuse, black, at first suffused with a yellowish-green powder; asci subcylindrical; spores crowded or biseriate, oblong, obtuse, straight or slightly curved, .0008′–.001′ long, .0003′ broad, three to five-septate with an occasional longitudinal septum, at first colorless, then yellowish.

Dead branches of prickly ash, *Xanthoxylum Americanum.* West Troy. Oct.

The species belongs to the Pseudovalsa series.

VALSA CRATÆGI *Curr.*

Dead ash branches. Catskill Mountains. Sept.

Our specimens do not fully agree with the description of the species to which we have referred them, but the differences are not very decided.

LOPHIOSTOMA SCELESTUM *C. & E.*

Decaying wood of apple tree. Helderberg Mountains. May.

LOPHIOSTOMA PROMINENS *Pk.*

Perithecia very prominent, hemispherical, adnate at the base, .07′–.08′ broad, smooth, black; ostiola distinct, compressed, black, shining; asci subclavate; spores biseriate, oblong or subfusiform, straight or slightly curved, colored, five-septate, .0008–.001′ long.

Dead twigs of button-bush, *Cephalanthus occidentalis.* Center. June.

The species is related to *L. bicuspidatum*, but the perithecia are not immersed, and the spores are destitute of cuspidate points and longitudinal septa.

MASSARIA GIGASPORA *Desm.*

Dead branches of sheep-berry, *Viburnum Lentago.* Albany. May.

The spores in our specimens are .003′ long, and quadrilocular with the two central cells shorter than the terminal ones.

SPHÆRIA (VILLOSÆ) PULCHRISETA *Pk.*

Perithecia very minute, .003′–.004′ in diameter, superficial, numerous, at length collapsing, black, beautifully hispid with straight diverging black setæ; asci narrowly fusiform or lanceolate; spores narrow, subfusiform, colorless, .00025′–.0003′ long, the endochrome sometimes parted in the middle.

Chips in woods. Griffins. Sept.

Externally this fungus has the appearance of some species of Venturia, but it appears to have paraphyses among the asci.

SPHÆRIA FIMISEDA *Ces. & De Not.*

Excrement of cows. Oneida. *Warne.*

SPHÆRIA CLADOSPORIOSA *Schw.*

Old *Polyporus sulphureus.* Buffalo. Apr. *Clinton.*

This, as Berkeley remarks, is not a true Sphæria, but as the specimens are not in condition to show its true relations, it is left where Schweinitz placed it.

SPHÆRIA PHELLOGENA *B. & C.*

Corky bark of elm. Bethlehem. May.

SPHÆRIA (CAULICOLÆ) CURVICOLLA *Pk.*

Perithecia small, .03′–04′ broad, scattered or two to three confluently crowded, erumpent, at length naked, hemispherical, black; ostiola short, subcylindrical, slightly curved; asci oblong; spores crowded or biseriate, colorless, .0006′–.0009′ long, .0003′ broad.

Dead stems of *Polygonum articulatum.* Center. Oct.

The noticeable character of this species is its short curved ostiolum, which is usually bent upwards toward the top of the stem on which the Sphæria grows. It is generally cylindrical, but sometimes slightly attenuated, sometimes a little compressed.

SPHÆRIA (CAULICOLÆ) SORGHOPHILA *Pk.*

Perithecia very minute, immersed, erumpent through a longitudinal chink, elliptical, black; asci elongated, clavate; spores biseriate, oblong-cylindrical, triseptate, constricted at the septa, pale when young, then colored, .0011′–.0012′ long.

On the brush of an old broom. North Greenbush. June.

The ostiola are so obscure that they can with difficulty be seen.

SPHÆRIA TYPHÆ *Schw.*

Decaying leaves of *Typha latifolia*. Greenbush. May.

SPHÆRIA GNOMON *Tode.*

Fallen leaves of *Ostrya Virginica*. West Troy. June.

SPHÆRIA CREPINI *West.*

Spikes of club-moss, *Lycopodium annotinum*. Mount Marcy. Aug.

The affected spikes become conspicuous by reason of the discoloration produced by the parasite. The scales appear slightly thickened or the epidermis a little elevated by the tomentose stratum beneath it.

SPHÆRIA MARCIENSIS *Pk.*

Perithecia minute, punctiform, covered by the epidermis, which is ruptured by the distinct slightly prominent blunt ostiola; asci oblong-cylindrical, sessile; spores crowded, subfusiform, blunt, slightly colored, triseptate, .001′–.0011′ long, .0003′ broad, the cells generally nucleate.

Leaves of club-moss, *Lycopodium annotinum* and *L. Selago*. Mount Marcy. Aug.

This species, though closely related to the preceding, is clearly distinct. It inhabits only the leaves, has no investing tomentum, has a more decided ostiolum and longer spores. The matrix is not discolored by it.

VENTURIA DICKIEI *De Not.*

Leaves of twin-flower, *Linnea borealis*. Mount Marcy. Aug.

I am not aware that this interesting little fungus has before been detected in this country.

(5.)

NEW STATIONS, NOTES AND OBSERVATIONS.

CIMICIFUGA RACEMOSA *Ell.*

Schodack, Rensselaer county. *Rev. H. Wibbe.* All the specimens of this plant that I have seen have the pods supported on a short stalk or pedicel, as figured and described by Dr. Torrey in the New York State Botany, although they are described in both the Manual and Class Book as sessile.

VIOLA CANADENSIS *L.* was observed in flower near Griffins, as late as the middle of September.

HYPERICUM PYRAMIDATUM *Ait.*

Near "Ball's Head," Rensselaer county. *Wibbe.*

ELATINE CLINTONIANA *Pk.*

Having recently reëxamined and compared the seeds of this plant and *E. Americana*, I find that the seeds vary somewhat, and that the differences which I formerly observed vanish when many specimens are compared. I am, therefore, of the opinion that the former is merely a dwarf state of the latter.

IMPATIENS FULVA *Nutt.*

A white-flowered form. Irondequoit. *G. T. Fish.*

RHUS TYPHINA *L.*

Apparently a hybrid between this and *R. glabra.* Fort Edward. *M. W. Vandenburg.*

POTENTILLA RECTA *L.*

Oswego. *Wibbe.*

LYTHRUM SALICARIA *L.*

River banks, near Oswego. *Wibbe.*

LONICERA CÆRULEA *L.*

Plentiful on the borders of Lake Tear. Mount Marcy.

NARDOSMIA PALMATA *Hook.*

Guilderland, Albany county.

SOLIDAGO LATIFOLIA *L.*

Apparently a hybrid between this and *S. cæsia.* Fort Edward. *Vandenburg.*

SOLIDAGO RIGIDA *L.*

Plentiful along the Harlem railroad at Copake. This is probably one of its most northern stations.

HIERACIUM AURANTIACUM *L.*

Meadows near Oswego. *Wibbe.* This plant appears to be rapidly spreading over the State.

VACCINIUM CORYMBOSUM *L.* V. ATROCOCCUM *Gr.*

This strongly marked variety occurs in Sandlake.

ATRIPLEX HASTATA *L.*

Spreading and becoming rather common about Albany.

MONTELIA TAMARISCINA *Nutt.*

Shore of Lake Champlain at Ticonderoga.

ULMUS AMERICANA *L.*

A corky-bark form of this tree occurs in the vicinity of Albany. The corky portion is in layers parallel to the surface of the trunk. I have not observed it on the branches.

SALIX MYRTILLOIDES *L.*

Marshes near Center, Albany county.

POTAMOGETON OAKESIANUS *Robbins.*

Wading River. *Miller.*

HABENARIA CILIARIS *R. Br.*

This most beautiful plant was detected near Manlius, by *Mr. Wibbe.*

TRILLIUM ERYTHROCARPUM *Mx.*

A monstrosity in which all the parts, except the stem and stigmas, appear to be double. There are six leaves, six sepals, six petals, twelve stamens, and apparently two ovaries closely united. The stigmas are numerous, but I have not been able to count them accurately. Oswego. *Wibbe.*

CHAMÆLIRIUM LUTEUM *L.*

Near Nassau, Rensselaer county. *Wibbe.*

SCIRPUS ERIOPHORUM *Mx.* v. CYPERINUS *Gr.*

Oswego. *Wibbe.*

RHYNCHOSPORA MACROSTACHYA *Torr.*

Shore of "Mud Pond," five miles southwest of Oswego. *Wibbe.*

BROMUS TECTORUM *L.*

Along the Hudson River railroad. Greenbush.

TRITICUM CANINUM *L.*

Buffalo. *Clinton.* This is a remarkable variety in which the leaves are involute and the sheaths hairy.

ASPIDIUM SPINULOSUM *Sw.* v. DUMETORUM *Sm.*

Syracuse. *Mrs. S. M. Rust.*

ASPIDIUM CRISTATUM *Sw.* v. CLINTONIANUM *Eaton.*

Buffalo. *Clinton.*

ASPIDIUM ACULEATUM *Sw.* v. BRAUNII. *Koch.*

This beautiful fern proves to be more common than was at first supposed. I have observed it in three new localities the past season. Near Summit, Schoharie county; near Griffins, Delaware county; and in the Catskill Mountains, near Big Indian.

ONOCLEA SENSIBILIS *L.* v. OBTUSILOBATA *Torr.*

Syracuse. *Mrs. Rust.*

BOTRYCHIUM LUNARIA *Sw.*

Mrs. Rust sends specimens of this interesting fern from the original locality near Syracuse, where she first discovered it. She writes that the plants occur in but one little spot, and, with most commendable care for the preservation of the fern, she says that she cautiously plucks a few without taking them up by the roots. We sincerely hope that others who may possess the knowledge of this single New York locality, may be equally careful not to destroy it. It is greatly to be regretted that the locality of *Woodsia glabella*, at Little Falls, has been exhausted, and its loss should stimulate all true lovers of nature to be careful of such rare gifts.

Mrs. Rust finds, in Onondaga county, thirty-seven of the fifty species of ferns that have been detected in the State.

BOTRYCHIUM SIMPLEX *Hitch.*

Near Oswego. *Wibbe.*

BOTRYCHIUM LANCEOLATUM *Angst.*

Pine Hill, Ulster county.

AGARICUS RADICATUS *Relh.*

Two forms of this species occur here, one with a rather stout smooth stem, the other with a more slender stem covered with minute scurfy particles. The former agrees with the description of the species, the latter does not. This last is the most common form with us.

AGARICUS RUGOSODISCUS *Pk.*

This Agaric, when wounded, exudes a serum-like juice. It belongs to the subgenus Collybia rather than to Omphalia, and should be placed near *A. succosus.*

AGARICUS LACCATUS *Scop.*

This wonderfully variable species sometimes has the lamellæ notched behind precisely as in the subgenus Tricholoma.

AGARICUS HÆMATOPUS *Pers.*

I find a non-cæspitose form of this species with red-margined lamellæ. Its red juice, however, will serve to distinguish it and show its true relations.

AGARICUS SARCOPHYLLUS *Pk.*

This species, which was discovered in 1869, and had not since been found by me, reappeared this season in a pasture near Ticonderoga. It is very rare.

AGARICUS ARVENSIS *Schæff.*

In an oat field. Ticonderoga.

AGARICUS SEROTINOIDES *Pk.*

I am satisfied that this is a mere variety of *A. serotinus*, and should not be kept distinct. It is probable also that *A. perplexus* Pk. is only an American variety of *A. sublateritius*, from which it scarcely differs except in the color of the lamellæ.

COPRINUS ANGULATUS *Pk.*

The description of this species was drawn up from dried specimens, and is therefore inaccurate. It is here revised.

Pileus thin, campanulate or convex, rimose-sulcate, sub-fuscous, disk squamose, with a few brownish sub-persistent verrucæ ; lamellæ narrow, close, free stem equal or slightly tapering upward, hollow, white ; spores black, triangular-ovate, compressed, .0003′–.0004′ long, .0003′ broad, .0002′ thick.

CANTHARELLUS AURANTIACUS *Fr.*

Center. A variety with the lamellæ nearly white.

TROGIA ALNI *Pk.*

The spores are very minute, narrow, cylindrical, slightly curved, colorless, .0002′–.00025′ long.

POLYPORUS SCUTELLATUS *Schw.*

This species, as it occurs with us, is generally dimidiate, and more or less ungulate. The pores are not distinctly rhomboidal in most cases, nor have I seen them changed to a black color. In ungulate specimens they are elongated, and, in length, much exceed the thickness of the hymenophorum. In the young state the pileus is clothed with a minute velvety villosity, but this disappears with age, and the pileus becomes either uniformly black or blackish variegated with paler zones, rarely wholly pale. I have met with it both on alder and witch-hazel.

RETICULARIA UMBRINA *Fr.*

In Dr J. Rostafinski's Monograph of the Myxogasters, *Reticularia lycoperdon* Bull, has been substituted for the name in common use. This Monograph, being based on an entirely new system of Classification, necessitates a change of name in numerous instances. How thoroughly different the system, and how wide spread the change of names therein inaugurated, may be inferred from the following facts. Of the hundred or more species given in the Handbook of British Fungi less than one-fourth remain under their old names. Three out of the four species of Reticularia are referred to as many different genera, leaving one species only in the genus and another specific name is given to that one. The generic name Fuligo takes the place of Æthalium, and the two supposed species, *Æ. septicum* and *Æ. vaporarium*, help make up a page of synonyms under the name *Fuligo varians*. The genus Diderma is discarded and its thirteen species are distributed among three genera, Chondrioderma taking the largest share. In several instances two, and in one or two cases three supposed species have been united in one. The genus Physarum has had its characters so modified that it now comprehends species that before were found in Diderma, Didymium and Angioridium; and one of its species, *Physarum nutans*, with its varieties, has been transferred to Tilmadoche and separated into two species.

The adoption of so many new names at once will necessarily be attended by some disadvantages, yet we think the advantages to be derived from the adoption of this new method of classification will more than compensate for the temporary inconvenience. One thing is quite evident to my mind, and that is, that the species may be more satisfactorily referred to their proper places by this system and by the descriptions, given by Rostafinski than they possibly could be by the old system and descriptions.

The following is a list of the New York Myxogasters at present known. The names in the first or left hand column are those required by and arranged according to the new system; those in the second column are the old names, applied to such of the species as have before been reported and published as New York species:

Present Names.	*Former Names.*
Physarum cinereum *Batsch.*	Didymium cinereum *Fr.*
P. contextum *Pers.*	Diderma flavidum *Pk.*
P. flavidum *Pk.*	Didymium flavidum *Pk.*
P. sinuosum *Bull.*	Angioridium sinuosum *Grev.*
P. polymorphum *Mont.*	Didymium connatum *Pk.*
P. albicans *Pk.*	D. subroseum *Pk.*
P. citrinellum *Pk.*	Diderma citrinum *Fr.*
P. luteolum *Pk.*	
P. inæqualis *Pk.*	
P. ornatum *Pk.*	
P. atrorubrum *Pk.*	
P. psittacinum *Dittm.*	
P. pulcherripes *Pk.*	Physarum pulcherripes *Pk.*
Tilmadoche nutans *Pers.*	P. nutans *Pers.*
T. mutabile *R.*	

Present Names.	*Former Names.*
Craterium leucocephalum *Pers.*	Craterium leucocephalum *Dittm.*
Leocarpus fragilis *Dicks.*	Leocarpus vernicosus *Lk.*
Fuligo varians *Sommf.*	Æthalium septicum *Fr.*
	Æ. ferrincola *Schw.*
F. ochracea *Pk.*	Licea ochracea *Pk.*
Badhamia hyalina *Pers.*	
B. magna *Pk.*	Dictydium magnum *Pk.*
B. rubiginosa *Chev.*	Craterium obovatum *Pk.*
B. affinis *R.*	
Didymium farinaceum *Schrad.*	Didymium farinaceum *Fr.*
D. squamulosum *A. & S.*	D. squamulosum *A. & S.*
D. microcarpum *Fr.*	D. xanthopus *Fr.*
D. eximium *Pk.*	
D. angulatum *Pk.*	
Chondrioderma radiatum *L.*	Diderma umbilicatum *Pers.*
C. spumarioides *Fr.*	D. farinaceum *Pk.*
C. crustaceum *Pk.*	D. crustaceum *Pk.*
C. testaceum *Fr.*	D. Mariæ-Wilsoni *Clinton*
C. difforme *Pers.*	
C. Michelii *Lib.*	
Diachæa leucopoda *Bull.*	Diachæa elegans *Fr.*
D. splendens *Pk.*	
D. subsessilis *Pk.*	
Spumaria alba *Bull.*	Spumaria alba *DC.*
Stemonitis fusca *Roth.*	Stemonitis fusca *Roth.*
S. ferruginea *Ehr.*	S. ferruginea *Ehr.*
S. herbatica *Pk.*	
Comatricha æqualis *Pk.*	
C. typhina *Roth.*	S. typhoides *DC*
C. Friesiana *DeBy.*	
C. pulchella *Bab.*	
Lamproderma physaroides *A. & S.*	
L. violaceum *Fr.*	
L. arcyrioides *Sommf.*	S. oblonga *Fr.*
Amaurochæte atra *A. & S.*	
Tubulina cylindrica *Bull.*	Licea cylindrica *Fr.*
Clathroptychium rugulosum *Wallr.*	
Dictydium cernuum *Pers.*	Dictydium umbilicatum *Schrad.*
Cribraria intricata *Schrad.*	Cribraria intricata *Schrad.*
C. purpurea *Schrad.*	C. purpurea *Schrad.*
Reticularia lycoperdon *Bull.*	Reticularia umbrina *Fr.*
Trichia fallax *Pers.*	
T. varia *Pers.*	Trichia varia *Pers.*
T. scabra *R.*	T. chrysosperma *DC.*
T. chrysosperma *Bull.*	T. turbinata *With.*
T. reniformis *Pk.*	
T. inconspicua *R.*	
Hemiarcyria rubiformis *Pers.*	T. rubiformis *Pers.*
	T. pyriformis *Hoffm.*
H. clavata *Pers.*	T. clavata *Pers.*
H. serpula *Scop.*	T. serpula *Pers.*

Present Names.	*Former Names.*
Arcyria punicea *Pers.*	Arcyria punicea *Pers.*
A. incarnata *Pers.*	A. incarnata *Pers.*
A. cinerea *Bull.*	{ A. cinerea *Fl. Dan.* A. digitata *Schw.*
A. nutans *Bull.*	A. nutans *Fr.*
A. pomiformis *Roth.*	
Lachnobolus globosus *Schw.*	A. globosa *Schw.*
Oligonema flavida *Pk.*	Perichæna flavida *Pk.*
O. brevifila *Pk.*	
Perichæna cæspitosa *Pk.*	Physarum cæspitosum *Pk.*
P. corticalis *Batsch.*	
P. irregularis *B. & C.*	
Lycogala epidendrum *Bux.*	Lycogala epidendrum *L.*
L. flavo-fuscum *Ehr.*	

Didymium oxalinum Pk. is probably only a form of *Physarum cinereum*, and is therefore omitted. *Dictydium microcarpum* received from Dr. Howe, is *Lamproderma physaroides* A. & S., and *Didymium simulans* Howe, is *Badhamia hyalina* Pers.

Of *Physarum sinuosum*, two varieties have occurred; one with the outer walls of the sporangium ochraceous, the other, with them nearly black.

Physarum citrinellum appears to be quite distinct from *Diderma citrinum*, to which it was referred. The following is a description of it:

Sporangia subglobose, double-walled, the outer wall crustaceous, yellow, the inner very delicate, whitish; stem very short, reddish; capillitium whitish or slightly tinged with yellow, its knots numerous, large; spores blackish in the mass, globose, minutely rough, .0004′–.0005 in diameter.

Mosses. Catskill Mountains.

The stem is so short that the sporangia appear sessile. The doublewall of the sporangium prevents the reference of the species to *Physarum Schumacheri*.

FULIGO VARIANS *Sommf.*

The widely variant forms that are brought together under this name by Dr. Rostafinski, present to the eye such diverse appearances, that it is difficult to believe that they should all be united. The forms with a floccose æthalium like the old *Æ. septicum*, *Æ. vaporarium* and *Æ. ferrincola* are readily united, but those with a crustaceous æthalium would appear rather to constitute another species, while the form with a naked gyrose surface seems still more worthy of specific distinction. Aside from its external peculiarities, its internal structure strengthens the idea of its specific validity. Nevertheless, it must be admitted that the spores are so nearly alike in all the forms, that they do not confirm the differences exhibited externally. I am of the opinion, however, that the last-mentioned form will yet be separated from the others, and also that *Fuligo ochracea* does, and will equally merit specific distinction, and for this reason I have not united it with the others. *Æthalium geophilum* Pk. is not an Æthalium, nor even a Myxogaster. It is probably *Hyphelia terrestris* Fr.

BADHAMIA MAGNA *Pk.* (*Dictydium magnum* Pk.).

Perhaps some may regard this as a form of the very variable *Badhamia utricularis*. It approaches *B. utricularis* v. *Schimperiana*, but differs clearly in its larger size and *globose* sporangia, with *reticulately corrugated* walls.

Didymium microcarpum *Fr.*

D. nigripes Fr. and *D. xanthopus* Fr. have been united under this name. To an observer of their external characters they appear quite distinct. Both forms occur with us, the former on fallen leaves, the latter on living Sphagnum.

Chondrioderma testaceum *Fr.*

A form of this species, with the outer walls of the sporangium a clear white with no tinge of pink, is quite common.

Chondrioderma spumarioides *Fr.*

Our specimens (*Diderma farinaceum* Pk.) abound in lime granules, and belong to the variety *carcerina.*

Stemonitis herbatica *Pk.*

Though resembling *S. ferruginea* in color, this species is easily distinguished from it by the comparatively shorter stem, larger meshes of the capillitium and decidedly larger spores, which frequently attain a diameter of .0004 inch, nearly twice the usual dimensions of the spores of *S. ferruginea.* There is a small form of *S. ferruginea*, which is nearly equal to *S. herbatica* in size, but it is true to the characters of its own species, and would not be confounded wlth *S. herbatica* after an examination of its spores.

Hemiarcyria clavata *Pers.*

The threads of the capillitium in our specimens are much larger than is indicated in the description of the species. Their diameter is about equal to the diameter of the spores, and about twice the diameter ascribed in the description.

Sphæropsis Malorum *Berk.*

This sometimes attacks apples while yet hanging on the tree.

Pestalozzia Peckii *Clinton.*

Acccrding to specimens received from Europe, this is not distinct from *P. monochæta* Desm.

Coniothecium toruloideum *B. & C.*

The fungus thus referred in the Twenty-third Report, and more recently regarded at different times as *Torula stilbospora* Cd. and *Trimmatostroma Salicis* Cd., has recently been published as *Trimmatostroma Americana* Thumen. We hope it has finally found a permanent resting place under this name. It forms numerous small black dusty dots on dead branches of willows, and stains or crocks the fingers handling it.

Septonema bicolor *Pk.*

Owing to the delay in the issue of the Twenty-eighth Report, this name is antedated by *Sporidesmium Peziza C. & E.*

Bactridium flavum *Kze.*

The specimens formerly referred to this species fall more properly under the more recent species *Bactridium Ellisii* Berk.

Puccinia Menthæ *Pers.*

On *Pycnanthemum incanum.* Bethlehem.

PUCCINIA SPRETA *Pk.*

Leaves of *Mitella nuda.* Buffalo. *Clinton.* Leaves of *Mitella diphylla.* Griffins.

PUCCINIA STRIOLA *Lk.*

Leaves of *Carex irrigua.* Summit.

USTILAGO URCEOLORUM *Tul.*

Fruit of *Carex irrigua.* Mount Marcy. The spores in these specimens are large and much less angular and unequal than usual.

STILBUM GIGANTEUM *Pk.*

I find this associated with *Patellaria leptosperma Pk.* in such a way as to suggest the probability, at least, that it is a form of the latter species.

HELVELLA SULCATA *Afz.*

The prominent character in this species, as indicated by the name, is the sulcate stem. The furrows are very deep, and extend, without interruption, the entire length of the stem. The whole stem, as shown by a cross-section, is made up of the costæ intervening between these furrows. I do not find the stem "stuffed," as required by the description in *Syst. Myc.* Vol. ii, p. 15. The pileus is generally darker than that of *H. crispa.*

Our New York species of Helvella readily fall into three groups depending on the character of the stem. The following tabular arrangement will exhibit this feature, and aid in tracing the species.

New York Species of Helvella.

Stem even, stout, three lines or more in diameter.	
Pileus inflated, gyrose-lobate.	
Spores elliptical	H. esculenta *Pers.*
Spores globose	H. sphærospora *Pk.*
Pileus deflexed, lobate, spores elliptical	H. Infula *Schæff.*
Stem costate-sulcate, stout.	
Pileus white	H. crispa *Fr.*
Pileus colored	H. sulcata *Afz.*
Stem even, slender, less than two lines thick.	
Stem glabrous	H. gracilis *Pk.*
Stem velvety-pruinose	H. elastica *Bull.*

The first and second species in the table belong to the more recent genus Gyromitra. The last one, *H. elastica,* is sometimes nearly black, and is, perhaps, then, *H. atra.* These two, according to the descriptions, have the pileus free, but in our plant it is sometimes adnate to the stem. *H. lacunosa* and *H. ephippium* have not yet occurred with us.

CENANGIUM CERASI *Fr.*

This is not limited to cherry in its habitat, but occurs also on birch.

XYLARIA DIGITATA *Grev.*

One of our most common Xylarias agrees with the characters ascribed to this species, except in the size of the spores. These are described as .0007′–.0008′ long. In our plant they are about .0005 long. Because of its short spores, it has sometimes been referred to *X. Hypoxylon;* but in this species the stem should be villose, a character which our plant does not exhibit. The difference between its spores and those of *X. digitata* is so marked and so constant that it should not be disregarded. I therefore propose to distinguish our plant as a variety, giving it the name *X. digitata* var. *Americana*. It is frequent on decaying wood and old prostrate mossy trunks.

The following tabular arrangement will exhibit the principal distinguishing features of the New York species thus far reported :

New York Species of Xylaria.

Club everywhere fertile, obtuse.	
Spores .0008′-.0012′ long	X. polymorpha *Grev.*
Spores .0004′ long	X. corniformis *Fr.*
Club sterile above, subacute or attenuated.	
Sterile apex short, subacute.	
Club irregular, subovate, large	X. grandis *Pk.*
Club regular, subcylindrical	X. acuta *Pk.*
Sterile apex acuminate or attenuated.	
Stem short, villose.	X. Hypoxylon *Grev.*
Stem not villose.	
Perithecia numerous, little prominent.	
Stems generally connate at the base or digitately branched	X. digitata *Grev.*
Stems always simple	X. graminicola *Ger.*
Perithecia few, very prominent	X. filiformis *A. & S.*

In *X. acuta* the short, sterile apex sometimes appears like a short mucronate point, and sometimes it is quite obsolete, so that the plant might be mistaken for *X. corniformis*, but for its larger spores. Its thicker club, simpler habit, and peculiar apex, separate it from *X. digitata*.

X. graminicola might easily be taken for a simple form of *X. digitata* v. *Americana*. *X. Hypoxylon* is extremely rare with us.

SPHÆRIA EXIMIA *Pk.*

Owing to the delay in the issue of the Twenty-eighth Report, the name of this species was antedated by *S. amphicornis* Ellis.

SPHÆRIA MORBOSA *Schw.*

This deleterious fungus was found on branches of the wild black cherry, *Prunus serotina*, in Keene Valley, Essex county. It is now known to occur on *Prunus domestica*, *P. Americana*, *P. Cerasus*, *P. Virginiana*, *P. Pennsylvanica* and *P. serotina*. Two of these are plum-trees—one introduced, the other native—and the remaining four are cherry trees, of which the three last are indigenous.

In the preceding pages, when no name is added to the station or stations, the plant has been found therein by the writer. Dates signify the time when the specimens were collected, and therefore indicate, to some extent, the time of the occurrence of the plant.

Grateful acknowledgements are rendered to those Botanists who have kindly aided me by contributions of specimens. Their names appear in the preceding pages.

Respectfully submitted,

CHARLES H. PECK.

ALBANY, *January* 4, 1878.

NOTES ON SOME SECTIONS OF TRILOBITES

FROM THE TRENTON LIMESTONE.*

By C. D. Walcott.

In a former article,† the writer expressed the view that the perfect state of preservation of the delicate branchial appendages and ventral membrane of the Trilobite, precluded the idea of the destruction of anything of a stronger texture than fleshy, swimming lobes attached to the axial appendages. Within a month after the above was written, a section was obtained, showing that not only was the axial appendage articulated to the ventral surface, but, also, that it was a jointed appendage. Six months later, the branchial appendages were found. Although the structure of the Trilobite, in detail, is not yet determined, evidence of great interest has been obtained. Numerous sections of *Calymene senaria* show axial appendages with three joints. The coxa or basal joint is about as broad at the upper end as long; it has a slight projection upon its upper outer side for the attachment of the branchial arm. In a longitudinal section of the Trilobite, it is articulated to the ventral surface by a narrow process at or near its posterior margin. Transverse sections show the articulation to be at or near the center. The second joint is broadest at the base, and tapers toward the lower end, to which the third joint is attached. The third joint, in all appendages of this species seen (seventy-seven in number), terminates in a round, blunt end. As yet, no transverse sections showing more than one joint have been obtained. In transverse sections of *Ceraurus pleurexanthemus*, the fifth joint terminates in a short claw.‡ There may be six joints in the leg. In the sections five only can be distinguished. Longitudinal sections of this species show a few appendages terminating at the third joint, as in *Calymene senaria*. The finding of good transverse sections of the latter species will probably prove that the legs had five or six joints, with a terminal claw. Longitudinal sections cannot show the number of joints, as the leg extends obliquely downward, and only an oblique section of two or three joints is obtained. Attached to the basal joint of the leg there is a slender, jointed arm of two, and probably three joints. Portions of pinnulæ are attached to the terminal joint. Whether they are branchial tubes cannot be satisfactorily determined from the section. In other sections, rows of pinnulæ are shown, which are undoubtedly branchial tubes. From the character of the remaining portion of the respiratory apparatus, they must have been attached to the arm. It is also quite probable that a branchia was attached to the basal joint of the arm. It may be that its occurrence in this position, in the section, is owing to the displacement of one of the branchiæ attached to the thoracic cavity. These branchiæ are attached above the basal joint of the leg. The branchia in *Calymene senaria* projects out a short distance, and then bifurcates, sending two spirals nearly to the edge of the dorsal shell. In some sections the base appears to be a portion of the ribbon or band forming the spiral,

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* This paper (with the exception of the Note on the Legs of Trilobites, and the two figures of the same, plate 1, figs. 6, 7) and the two following papers, were published and distributed, in pamphlet form, September 20th, 1877, in advance of the present Report.

† Preliminary Notice of the Discovery of Natatory and Branchial Appendages of Trilobites, and Additional Evidence upon the same. Twenty-eighth Annual Report New York State Museum of Natural History, December, 1876.

‡ As yet seen only beneath the central segments of the thorax. As in this species the axial appendage occurs upon each segment of the pygidium, and its first, second and third joints are similar to those beneath the thorax, it is probable that there is little change from the modified appendages beneath the head to the posterior segment of the pygidium.

straightened out, while in others it is a closely-coiled spiral. At the bifurcation the outer spiral springs from the base, which continues on to form the inner spiral. The spirals are most ventricose at the center, tapering toward both extremities. Their curvature follows that of the dorsal shell. The ribbon or band forming the spiral is slightly flattened and somewhat loosely coiled. In several sections the spiral has been pulled out, so that the plane of the section passes through it, as in fig. 5*e* of Plate 1 Generally they present the appearance of fig. 5*f* of Plate 1, where the section appears to pass through the spiral in its normal condition. A section cut obliquely from the posterior margin of the glabella to below a line with the eyes in front, and between the dorsal shell and hypostoma, shows one side of four pair of setiferous appendages. They appear to consist of a short projection from the mass of calc-spar filling the cavity of the glabella, to which a short joint is articulated. From the best preserved one, eighteen setæ radiate from the side and end of the outer joint. The setæ average two mm. in length. A transverse section of the head of an *Acidaspis Trentonensis*, from near the posterior margin across the posterior end of the hypostoma, gives an opposite section of the setiferous appendage. It is essentially the same as those in Calymene. It is situated beneath the dorsal shell, on a line with the branchial appendages of the thorax, and is a modified continuation of the branchial series of appendages.* A narrow layer of calc-spar connects the visceral cavity with the doublure of the head. A transverse section of the head of a Calymene, cut so as to cross the hypostoma just within the posterior end, shows the upper half of the space beneath the glabella to be filled with calc-spar. This space is the continuation of the visceral cavity of the thorax. From the lower lateral margin of each side, a jointed appendage extends outward and downward. The basal joint is large—twice as long as broad; from the lower slightly concave surface a slender joint projects, which is followed by one, and, when the appendage is entire, by three or four joints. A narrow band of spar unites the upper visceral space with the spar filling the concavity of the hypostoma. Between the upper pair of appendages and the glabella three pair of appendages project. Their basal joint is slender; and, in two sections, closely resemble the maxillary joint of the leg of the Eurypterus, modified in form, but undoubtedly subservient to the same use as a part of the mouth. Two sections show three long, slender joints, but not a terminal one in position. In three detached joints the terminal one is small and sharp-pointed. In one beautiful transparent section the observer looks into what appears to be the opening of the mouth. The basal joints of the manducatory legs have their upper inner margins truncated, and are slightly convex; four on each side, forming an elongate opening above the hypostoma, the upper end of which is closed by the approximation of the upper margins of the broad coxal joints of the upper pair of appendages.†

Sections of *Asaphus platycephalus* furnish evidence that it has axial appendages of essentially the same structure as those of Calymene and Ceraurus, as the basal and second joints in the section are the same as seen in those genera, and the basal joint of the leg is attached in the same manner to the body. The visceral cavity is attached to the shallow dorsal groove.

From the above described and other sections, the following conclusions upon the structure of the Trilobite may be given, as based upon the knowledge now at

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* These appendages are probably attached to the manducatory legs. The thoracic spiral branchiæ are absent, or else simple projections. Sections, partially confirmatory of this, are at hand.

† Upper appendage is here used instead of posterior appendage, in the sense that the mouth, in this species, was situated between the ventral surface of the visceral cavity and the hypostoma, and opened posteriorly instead of directly downward. This would necessitate the curving of the alimentary canal beneath the glabella to pass to the mouth.

hand. Future discoveries will undoubtedly add to and change them somewhat—these notes being intended to show the progress made up to the present time, and not as a final publication.

First. The Trilobite had a thin ventral membrane beneath the visceral cavity, strengthened by arches, which supported the appendages beneath. The membrane extended outward from the main visceral cavity, and joined the edge of the doublure of the head, thoracic segments and pygidium, somewhat as the sternum of LIMULUS is connected to the margins of its shell by a membraneous crust.

Second. Attached to the ventral surface, on a line with the outer edges of the alimentary canal, there is a row of articulated appendages on each side—the leg consisting of five or more joints, the terminal joint being provided with a claw, and the basal joint with a point of attachment for a jointed arm.

Third. The jointed appendage attached to the basal joint of the leg is homologous with the epipodite of recent crustaceans. (This statement is made with some reserve, as the evidence is not positive. The basal joint, as seen in all the sections showing it distinctly, is large and articulated to the ventral surface. Should this basal joint ultimately prove to be formed of two joints—too closely segmented to be separated in the present sections, and the arm attached to the second joint—the homology will be with the expodite. And, as it is a gill-bearing organ, it may be homologized with that organ in MYSIS.)

Fourth. The respiratory apparatus consists of a gill-bearing appendage attached to the thoracic leg and a bifed spiral gill attached to the side of the thoracic cavity. The setiferous appendages attached to, or above, the manducatory legs are modified thoracic branchiæ.

Fifth. The mouth is posterior to the hypostoma, and consists of the four pairs of manducatory jaws, formed by the basal joints of the smaller appendages and the larger pair of the posterior pair of appendages. (An oblique section of what may prove to be the swimming-appendage was found in a section of the same species of Trilobite, from which the parts of the mouth have been obtained. It has three slender joints attached. A small spine projects from one towards the terminal joint. It was probably attached to one of the posterior manducatory legs as a portion of the swimming apparatus of the Trilobite.)

Sixth. Admitting the third conclusion to be correct, in regard to the attachment of the jointed arm to the basal joint, we can homologize the leg and epipodite with that of the thoracic leg of the larval lobster. Its relation to MYSIS, in the event of its being the expodite, is mentioned in the third conclusion. The homology between the parts about the mouth of the Trilobite and the same organs in the Eurypterida and Zyphosura is very direct, and relates the families closely. In view of these relations, the following arrangement is made. Taking Prof. Henry Woodward's classification of Zyphosura and Eurypterida under Gnathopoda, and adding the Trilobita, we have :

Class—CRUSTACEA.
Subclass—GNATHOPODA.
Legion—MEROSTOMATA.
Order 1—Zyphosura.
" 2—Eurypterida.
" 3—Trilobita.

NOTE UPON THE LEGS OF TRILOBITES.

Some months since, I received from Mr. S. A. Miller, of Cincinnati, O., a small slab of stone, from the Hudson River group, at Cincinnati, upon which there is a slender six-jointed leg of some crustacean, and fragments of three other legs. More recently, Dr. C. A. Miller has kindly loaned me a slab, obtained at the same locality, which has the remains of ten legs upon it. The legs are scattered among fragments of Trilobites of the genera ASAPHUS, CALYMENE, ACIDASPIS, and TRINUCLEUS, and remains of Brachiopods and Bryozoans. The test forming the joints is thin, and differs from the test of the Trilobite in being crushed without breaking, and in a generally more membraneous appearance. Four of the legs have six joints each. Figures 6 and 7, Plate 1, show two of these legs enlarged to two diameters. The joints are somewhat flattened. With the exception of the terminal one, each joint is slightly contracted at its lower end, and then expands, forming the articulation for the succeeding joint. The only crustacean known to have existed at the time of the deposition of the rocks of this group, that could have had such legs, is the Trilobite. Judging from the size of the legs, they must have belonged to an individual of the genus ASAPHUS or CALYMENE. To the legs figured by the late Prof. E. Billings (*Quart. Journ. Geol. Soc.*, Vol. xxvi, pl. xxvi, Nov. 1870, January, 1879), in a specimen of *Asaphus platycephalus*, they have a strong resemblance.

A discussion of the views of various authors upon the structure and relations of the Trilobite is reserved for a future article, in which, also, the structure of the mouth and branchiæ of the Trilobite will be given more fully than in the preceding article.

PLATE 1.

EXPLANATION OF PLATE I.

FIG. 1. Transverse section of the head of *Calymene senaria*, passing directly do wn ward, so as to cut the hypostoma just within its posterior margin.
a Dorsal shell.
b Visceral cavity.
c Hypostoma.
d Terminal joints of manducatory leg.
1 Coxa of posterior manducatory leg.
2, 3, 4 Manducatory appendages or legs.

FIG. 2. Another transverse section of the head of *Calymene senaria*.
e Membraneous crust connecting visceral cavity and doublure.
o Base of fourth pair of manducatory legs.

FIG. 3. Section of the leg or axial appendage of *Ceraurus plurexanthemus*.
1, 2, 3, 4. Joints of leg.
a Terminal claw.
b Edge of section.

FIG. 4. Supposed swimming foot or terminal joint of posterior manducatory leg.
a Terminal joint.
b Three small joints and spine.
c Restored outline of terminal joint.

FIG. 5. Transverse section of the thorax of *Calymene senaria* partially restored.
a Dorsal shell.
b Visceral cavity.
c Legs restored.
d Epipodite.
e Spiral gills, as seen in detached condition in other sections.
f Actual section of spiral gill.
g Same restored.

FIGS. 6 and 7. Legs of six joints, each enlarged to two diameters. From Dr. C. A. Miller, of Cincinnati, O.

FIGS. 1–5 (with the exception of portions of the latter) are copies of the original sections.

NOTE ON THE EGGS OF THE TRILOBITE.

By C. D. Walcott.

Prof. Joachim Barrande gives a description of the supposed eggs of the Trilobite, in the first volume of the Palæontology of Bohemia.* He describes them as having the form of black spherules; some two-thirds, and others four or six millimetres in diameter. They occur mingled in the same beds with fragments of Trilobites, and correspond in size with the first stages of development of the species of Trilobites with which they are associated. In the supplement to Volume I, 1874, illustrations are given of groups of eggs, or ova, which were found on the surface of the rock. In one instance, a group of cylindroid-shaped ova was found within the glabella of a Trilobite—*Barrandia crassa* (Plate II, fig. 6). In the description of the plate, the author states that he considers their occurrence in this position purely accidental, and that they have the appearance of the small bodies named *Parca decipiens* Flem., which have been considered as the eggs of Gasteropods. The small bodies, forming the clusters or groups, vary in form from ovoid, cylindroid, to discoid—retaining the same form in each individual group. The mode of occurrence of the groups of ova indicates that they were deposited by the animal in the place and position found. Barrande states that they are probably the ova of some Crustacean.

The spheroidal bodies first mentioned are the only ones that have been considered as the ova of the Trilobite, the proof being their occurrence with the fragments of Trilobites, and their correspondence in size with embryo forms of the species with which they are associated.

When cutting sections through the body of a Trilobite, *Ceraurus pleurexanthemus*, I noticed, on an opaque, central, longitudinal section, numerous dark, round and oblong, minute spots on the light-colored back-ground of calc-spar, which filled the visceral cavity between the dorsal shell, hypostoma and ventral membrane. Upon cutting off a section, and rendering it transparent, I saw that the dark spots were the ova of the Trilobite. Subsequently several sections were obtained, showing the ova in various positions within the visceral cavity. In section Number 1, the Trilobite rests on its back, with the head and three anterior segments of the thorax curving upward The hypostoma is in place, separated, at the posterior end, from the dorsal shell of the head by a distance of four mm. A thin membrane is attached to the posterior margin; it passes one-half the distance toward the dorsal shell, where it joins the ventral membrane, which extends beneath the thorax five mm., terminating at the third segment. The remaining portion of the visceral cavity having been destroyed, the rock fills the space to the dorsal shell. The ventral membrane is corrugated or folded beneath each segment. The space between the dorsal shell and the ventral membrane, two mm. wide, is filled with the ova, which, also, has pressed into the cavity of the head, between the dorsal shell and the hypostoma, filling about one-fourth of it. Over two hundred eggs are to be seen in this section. The transverse section of an egg is round, averaging one-fourth of a mm. in diameter. The longitudinal section is oblong-oval or cylindroid, half of a mm. in diameter. Those cut obliquely show various intermediate forms. A second section of the same Trilobite, cut on a line with the pleural lobes, shows

* Système Silurien du Centre de la Boheme. Par Joachim Barrande. 1e. Partie. Recherches Paleontologiques, vol. 1; Crustaces; Trilobites, 1852.

over fifty eggs scattered more loosely in the spar. In a longitudinal section of another individual, a cluster of eggs, closely agglomerated, occurs within the visceral cavity, between the eight posterior segments of the thorax and the ventral membrane. Three transverse sections, from different individuals, show the ova within the visceral cavity. In one, cut just posterior to the hypostoma, the ova are near the dorsal shell. The other two are cut across the thorax. The ova are in the spar which fills the axial appendages and visceral cavity. They seem to be scattered, as if the organic matter, now replaced by the spar, was in such a condition as to permit of their passing from the visceral cavity down into the cavities of the axial appendages.

The method of aggregation of the ova, and the close resemblance in form of the individual bodies forming the clusters, as figured by Barrande,* to the ova found within the Trilobites, indicates that both are the ova of the Trilobite. If the above view is sustained, then the manner of the oviposition of the Trilobite is different from what has hitherto been supposed, as the clusters of ova must have been deposited something as the Argulus deposits its eggs, and not dropped into the water, as by Simulus or Branchipus. The relation of the ova to the position they occupied in the living animal will be spoken of in a future article, as most of the sections thus far obtained show that they have been displaced, and forced into the various positions in which they are found.

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* Op. cit. ; Supplement, Pl. 11, Fig. 6 ; Pl. 18, Figs. 30, 32 ; Pl. 35, Figs. 21, 23.

DESCRIPTIONS OF NEW SPECIES OF FOSSILS

FROM THE CHAZY AND TRENTON LIMESTONES.*

By C. D. WALCOTT.

ARIONELLUS, *Barrande*, 1846.

ARIONELLUS PUSTULATUS *n. sp.*

Glabella very convex ; separated from the fixed cheeks by a strong dorsal furrow ; short glabellar furrows outline a frontal lobe at the anterior third ; a lateral lobe is indicated, on each side, by a short depression or furrow parallel to the longitudinal axis of the glabella. Fixed cheeks depressed beneath the level of the glabella. The strong dorsal furrow, extending all around in front of the glabella, and the rapidly sloping outer margin gives them a prominent rounded, almost tumid appearance. Occipital segment broad, depressed, separated from the glabella by a narrow furrow. One segment of the thorax is preserved in one specimen. It is strongly arched on the axial lobe ; pleuræ with an elevated posterior ridge, and depressed anterior margin. Surface pustulose or finely tuberculated. Eyes, movable cheeks and pygidium unknown.

Formation and locality. Chazy Limestone, Chazy, N. Y.

CERAURUS, *Green*, 1832.

CERAURUS RARUS *n. sp.*

Glabella subturbinate, convex ; broadly rounded in front, separated from the fixed cheeks by strong dorsal furrows ; frontal lobe large, occupying the anterior half of the glabella ; middle and posterior lobes small, diminishing regularly in size toward the occipital segment ; glabellar furrows deeply impressed. Occipital segment rounded, separated by a well defined furrow from the glabella. Fixed cheeks crushed. Surface ; fixed cheeks and frontal lobe of glabella pustulose ; posterior or glabellar lobes finely granulated.

Formation and locality. Trenton Limestone, Beloit, Wisconsin.

ENCRINURUS, *Emmrich*, 1844.

ENCRINURUS TRENTONENSIS *n. sp.*

Pygidium triangular, convex ; length and breadth about equal ; axial lobe rounding, tapering toward and terminating within the posterior margin ; marked by twenty-three rings, beyond which are several, too indistinct to be counted ; the first anterior ring has a node at its center ; then, in order, the third, sixth, tenth, fourteenth, eighteenth and twenty-second have a similar node at the center. Lateral lobes slope rapidly to the margin ; each has nine elevated costæ running obliquely backward to the margin.

Formation and localities. Trenton Limestone, Clifton, Grant Co., Wisconsin, and two miles above Dunlith, Ill., north of State Line monument.

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*Erroneously cited in Miller's Catalogue of Palæozoic Fossils, as from the Twenty-ninth Regents' Report N. Y. State Museum of Natural History.

ENCRINURUS RARICOSTATUS *n. sp.*

Pygidium subtriangular, convex; length and breadth about equal; anterior lateral angles truncated so that the lateral margins commence opposite the center of the pygidium; axial lobe not very prominent; crossed by about sixteen smooth rings—the anchylosing of the posterior rings renders it difficult to determine the exact number. The lateral lobes are marked by six broad, distinct, costæ—the posterior pair unite back of the posterior termination of the axial lobe.

Formation and localities. Trenton Limestone, Mineral Point, Beloit, and north of Janesville, Wisconsin.

ACIDASPIS, *Murchison*, 1839.

ACIDASPIS PARVULA, *n. sp.*

Body small, broadly elliptical, somewhat convex. Head semicircular in outline, lateral angles terminating in slender spines. Glabella oblong; owing to the granulose character of the surface, and the slight glabellar furrows, the lateral lobes and cheeks are scarcely defined. Eyes small, prominent. Thorax strongly trilobate; axial lobe two-thirds the width of the pleural; segments rounded on the axial lobe; each one has four prominent tubercles upon the upper surface, two each side of the center; segments of the pleural lobes consist of a posterior, rounded, elevated ridge, which has four strong tubercles upon it, and a depressed anterior portion; upon the free pleuræ or spinous extension of the elevated ridge of the pleural segment, two smaller tubercles occur.

Pygidium, too imperfect for description; its strongly granulose surface, and the prolongation of the lateral segments into long spines, are the only characters clearly defined.

Entire surface granulose, which, with the larger granules or tubercles upon the head, the twelve rows of tubercles upon the thorax, and the continuation of the central rows on the pygidium, gives this species a strikingly peculiar appearance that distinguishes it from the associated *Acidaspis Trentonensis*, and all described species of the genus.

Formation and locality. Trenton Limestone, Trenton Falls, N. Y.

DALMANITES, *Barrande*, 1852.

DALMANITES INTERMEDIUS, *n. sp.*

General form narrow, ovate, moderately convex. Head subcrescentiform, with a narrow margin, which is slightly produced in front of the glabella; posterior lateral angles terminating in short spines. Frontal lobe of glabella subrhombic, slightly convex; anterior lobes subtrigonal, separated from the frontal and middle lobes by well-defined glabellar furrows, which penetrate from each side one-third the distance across the glabella; middle lobes subrectangular, shorter and smaller than the anterior lobes; posterior pair as rudimentary tubercles upon the anterior margin of the occipital furrow. Occipital segment comparatively broad and elevated posteriorly above the highest point of the glabella, narrowed toward the dorsal furrows, angular, and abruptly turned downward, at the posterior margin. Occipital furrow regularly concave, extending on the cheeks as a marginal furrow to the lateral rim. Eyes prominent, palpebral lobe depressed, except at the outer margin, which forms a rim around the top of the eye.

Thorax tapers rapidly from about the center towards the pygidium; axial lobe convex, about two-thirds the width of the lateral lobes; lateral lobes strongly geniculate; segments nearly transverse on the axial lobe; pleural grooves strongly marked. Pygidium subtriangular, strongly convex; anterior margin a little more than one-half as wide as the posterior margin of the head; axial lobe very prominent, tapering from the anterior margin to about half the width at its posterior termination; lateral lobes slope rapidly to the margin; fourteen segments are indicated on the axial, and eight on each of the lateral lobes; those on the lateral lobes extend nearly to the margin, and have slight pleural grooves on the anterior three.

Glabella slightly pustulose; surface of thorax and pygidium apparently smooth.

This species is allied to *D. callicephalus* Hall, *D. breviceps* Hall, and *D. Carleyi* Meek. From the first it differs in the general outline, posterior lateral spines of the head, shape of the glabellar lobes, smaller size of the pygidium in proportion to the head, distinct character of the lateral segments of the pygidium, and the absence of pleural grooves upon these segments, with the exception of the first three. The difference in the glabella readily distinguishes it from *D. breviceps*. The more rhombic frontal lobe, rudimentary posterior lobes of the glabella, larger palpebral lobes, greater proximity of the eyes to the glabella, separate it from *D. Carleyi;* and, if the pygidium referred to the species, by its author, is the one belonging to it, the differences with *D. Carleyi* are still greater.

Formation and localities. Trenton Limestone. Two miles north of Dunlith, Ill.; Clifton, Grant county, and Plattsville, Wisconsin.

ILLÆNUS, *Dalman*, 1826.

ILLÆNUS INDETERMINATUS *n. sp.*

General form, elongate elliptical, strongly convex. Head convex; broadly rounded in front; length two-thirds the width. Glabella moderately convex, curves gently from the posterior margin to the anterior portion, where it abruptly curves downward. The dorsal furrow is marked at its central portion, by a strong oblong depression, anterior to a line with the eyes, and one-quarter the distance between the eyes, from the palpebral lobe; the anterior extension extends obliquely forward toward the lateral margin terminating in a rounded pit, which has a tubercle at the center; posteriorly the furrow is strongly defined, it passes obliquely backward nearly to the posterior margin, where it curves and running a short distance, cuts the margin on a line with outer margin of the eye.* Eyes broken away with the movable cheeks; palpebral lobes indicate that they were of medium size, situated a short distance from the posterior margin. Facial sutures terminating on the posterior margin outside a line with the outer margin of the eye; anteriorly terminating on a line with it.

Thorax uniformly arched, not trilobed; nine segments only can be counted; the crushing together of the segments may have forced one beneath the head.

Pygidium parabolic, very convex, almost tumid along the center; width a little greater than the length, broadly and uniformly rounded anteriorly; anterior lateral angles depressed to admit of their passing beneath the posterior segment of the thorax, when the animal was enrolled.

Surface; anterior margin of head with a band of strong lamellose striæ

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* The general course of the dorsal furrow, from the anterior termination, to the posterior margin, is similar to that of the facial suture in the genus ASAPHUS.

parallel to the margin; the posterior margin has a narrower and less well-defined band of striæ; remaining portion of head minutely punctate. Thorax minutely punctate; striate on the outer pleural portion on each side. Pygidium marked by strong lamellose striæ, which have their origin near the anterior lateral angles and diverge in different directions over the surface, running subparallel to each other around the posterior side; a row of punctures occur between the striæ near the margin; surface otherwise finely punctate. The removal of the test shows that the shell was very thin, and covered on the inside with minute and coarse punctures or shallow depression. The lower surface of the doublure is striate.

This species is allied to the group of Illæni, described by Prof. Hall, from the Niagara group of Wisconsin and Illinois; especially to the species *Illænus insignis* and *I. annatus*. To *Illænus Trentonensis*, it has many points in common. As far as I can judge from the figures and descriptions, it is a distinct species.

Dimensions of specimens described.

Total length	$6\frac{3}{4}$ inches.
Length of head	2 "
Breadth of head	3 "
Distance between the eyes	$2\frac{1}{2}$ "
Length of thorax	2 "
Length of pygidium	$2\frac{3}{4}$ "
Breadth of pygidium	3 "

Formations and localities. Black River Limestone, Buck's Quarry, Russia, Herkimer Co., N. Y.; Trenton Limestone, Plattsville, Wisconsin.

ILLÆNUS MILLERI, *Billings.*

Illænus Milleri occurs in the same beds with *I. indeterminatus*, both in New York and Wisconsin. It also occurs in the upper beds of the Trenton Limestone at Trenton Falls. Perfect specimens show ten thoracic segments. The original type specimens had but nine; one was probably pushed beneath the head, as in all other particulars, the species agrees with that from Canada, where it occurs in the Black River and Trenton Limestones.

ASAPHUS, *Brongniart*, 1822.

ASAPHUS HOMALONOTOIDES *n. sp.*

Glabella elongate, pointed in front; broadest at the anterior third. The dorsal furrows and occipital furrow give a subquadrate form to the central portion of the glabella similar to that in species of the genus HOMALONOTUS. The occipital segment is defined, back of the glabella, by a slight depression which is more strongly marked behind the eyes. A pair of glabellar furrows are indicated by shallow depressions between the eyes.

Pygidia, associated with specimens of the above glabella, have a subtriangular outline, prominent axial lobe, marked convexity, anterior margin with a distinct pleural groove, and a shallow depression between the external margin and the outlined pleural lobes. The subtriangular form and strongly marked axial lobe, relate the pygidia to the equally distinct associated glabellae.

A large pygidium referable to this species, is three inches in length, by three and one-half in breadth, at the anterior margin.

Formation and locality. Trenton Limestone, two miles above Dunlith, Ill., north of State Line monument.

NOTES ON PHLOGOPYTE.

By R. FRITZ-GAERTNER, PH. D.

The mineralogical characteristics of Phlogopyte have been repeatedly described by Breithaupt, Dana, Zirkel, and many other authors.

In bringing this short notice before the public, I would state that the following lines will treat mainly of phlogopyte of the State of New York, with particular reference to phlogopyte of Warwick, Orange county, and Pope's Mills, St. Lawrence county.

Examples of phlogopyte were also examined and compared, which were derived from Oxbow and Antwerp, Jefferson county; O'Niel Mine, Orange county; Edenville, Orange county; Edwards, Somerville, Natural Dam, and Gouverneur, St. Lawrence county.

The specimens which the writer examined belong to the mineralogical collection of New York State, and are exhibited in the Museum at Albany.

The main object of these notes is to give some contribution to our knowledge of the microscopical structure of phlogopyte; but as the microscopical habitus is closely allied to some microscopical features of this mineral, it will be necessary to treat, also, of its general characteristics.

Crystallographic system.—Phlogopyte of the above localities has a hexagonal appearance, and usually occurs in six-sided prisms, with base (*o*) perpendicular to the lateral faces. Base (*o*) is uneven and bent, principally when it assumes a large extension.

On a specimen from Pope's Mills, (*o*) is covered with small crystals, which lie entirely in the plane of the laminæ. These crystals, though minute, can be detected without the aid of a magnifier. They are of a light-bronze color, and cross each other at an angle of sixty degrees.

The lateral sides of the prism are uneven and corroded; only in a few specimens could polished faces be perceived. Usually the lateral faces are tapering towards the base,

Thin laminæ, parallel to the base, produce, in Norenberg's Polariscope, or in the tourmaline, tongue lemniscates, which are symmetrical on the left and right, and which differ from the symmetrical front and back. This indicates the orthorhombic system of phlogopyte.

Having no apparatus at hand to measure the angle of the optical-axial divergence, I refer to Dana's Mineralogy (1870), where it is reported as varying between 3 and 20 degrees. The optical-axial angles of biotite vary from 1 to 5 degrees. It will be seen that, in optical characters, phlogopyte and biotite, both magnesia micas, approach each other very closely, and in some special cases this will cause difficulties in their discrimination according to their optical appearance.

Quenstedt, in his Mineralogy, states that thin laminæ of biotite present, in the Norenberg's Polariscope, an hexagonal appearance in their lemniscates, whilst thicker laminæ of the same mica give the orthorhombic one.

Thick laminæ of phlogopyte, under the micro-polariscope, polarize in a bright, yellowish color, in the darkened field, whilst thin laminæ give a very faint luminous effect.

Cleavage.—Parallel to base (*o*) considerable. On specimens which are in a state of methamorphic alteration, the cleavage is nearly obsolete. It will be found that in such altered specimens, and principally in those which change to steatite, scarcely a lamina can be separated, which is thin enough for a microscopical examination. Its flexibility is likewise lost, as it will break to pieces by bending.

On some specimens of phlogopyte, and principally on those of Pope's Mills, St. Lawrence County, the basal plane (o) is marked with two systems of parallel lines of separation or cleavage, which cross at an angle of 60 degrees. Another series of parallel lines sometimes is noticeable, crossing the first two series at an angle of 60 degrees. A hexagon, crystallographically regular, will be formed by three pairs of the three series.

In order to show in a graphical manner these lines of separation, and also the phenomenon of Asterism, which will be discussed in the following lines, figure 1 is given: a, b, c, d, e, f, represents the crystallographic hexagon in its equilibrium, $a\,d$, $b\,e$, $c\,f$, are its diagonals or axes, which all meet in the central point (O). They give the direction of the separation marks.

The whole hexagon being rotated in its plane for 90 degrees, will be in the position a, b, c', d', e, f'. Then its diagonals ($a'\,d'$) ($b'\,e'$) ($c'\,f'$) will be the perpendicular axes of the first one, and the diagonals of the first one will represent the direction of the perpendicular axes of the second.

The various angles formed by the diagonals of the two hexagons, will be met with on specimens on base (o) as lines of separation. The directions ($a\,d$) ($b\,e$) ($c\,f$) or ($a'\,d'$) ($b'\,e'$) ($c'\,f'$) give the angles at which the small crystals or base cross each other. Figure 1 will be referred to again.

V. Rensch's "Schlagfigures" could be produced in some cases with unaltered laminæ of phlogopyte of Warwick and Edenville, as those specimens were the least altered, having kept their original elasticity. It was found best to use a thin lamina, and a fine round point of a needle. The figures or lines caused by the quick piercing of the laminæ presented a fine round aperture caused by the point of the needle around which three short lines were visible, diverging under angles of 120 degrees. These lines correspond with (bO) (fO) and (dO), or ($b'O$) ($f'O$) ($d'O$), and if continued they would answer to the diagonals of the hexagon, or to the direction according to which laminæ of phlogopyte can be separated.

The existence of an indistinct cleavage, according to those lines, in phlogopyte, can, therefore, be regarded as established.

Lustre.—Base (o) has on fresh surfaces a submetallic bronze lustre. If exposed for sometime to the air, it changes to a pearly one. The lateral faces are usually of a fatty or pearly appearance.

Color.—Base (o) in compact masses has usually a brownish-red, yellowish-red or brownish color.

Specimens which are wholly or partly altered have on base (o) a whitish, greyish color, sometimes stained with a number of dark-brownish patches, which spreading over the whole surface give to it a dentritic appearance. The lateral faces are of a brownish or greyish color.

Asterism.—Thin laminæ of phlogopyte are transparent, and allow a yellowish light to pass through them.

Specimens from Edwards and Edenville, which are of a white silvery color, do not give a very sharp picture of the object looked at, and are surpassed by the brownish-red variety. The cause is in the alteration of the whitish phlogopyte, which doubtless formerly has been of a brownish color.

Rose, in his *Monatsberichten der Berliner Akademie*, 1869, drew attention to the fact that some mica has the optical property of decomposing a ray of light into six or twelve beams, when looked at through a thin lamina. It appears to the observer as if the light would throw out from its nucleus six or, in some favorable case, twelve beams, which cross each other, in the center of the light, at angles of 60 degrees, or if twelve rays appear, at angles of 30 degrees.

The star thus produced resembles the 6+6 diagonals of figure 1, and is based upon their crystallographic direction and value. It will be observed, with twelve-sided stars, that six beams are of greater intensity, whilst the intermediate ones are less luminous. The capacity of certain mica to present to the eye this star-like figure is called asterism.

Zirkel, in his famous work, *Mikroskopische Beschafferheit der Mineralien und Gesteine*, 1871, reports likewise a phlogopyte of South Burgess, Canada, which shows asterism. Zirkel explains this phenomenon by the presence of a number of microscopical crystals which are disseminated through the mica in directions making with one another an angle of 60 degrees.

The phlogopytes of the above-named New York State localities, with the exception of that of Monroe, Orange county, present, in unaltered specimens, asterism, but in a less degree than those from South Burgess and Perth, Canada, which latter ones are of an even and smooth surface, whilst the above-named phlogopytes are uneven, bent, and partly altered.

In a lamina from Pope's Mill's, St. Lawrence county, not larger than one square inch, one part of it presents asterism, while the other altered one does not. It is, however, difficult to determine, with a limited number of specimens of phlogopyte lacking asterism, whether this is to be attributed to a molecular alteration, or whether the phenomenon never has been present even in fresh, unaltered pieces.

The investigations which the writer has made with various micas, and other minerals, in regard to their asterism, induce him to suggest that asterism is not due to microscopical enclosures, arranged in a hexagonal direction; but, on the contrary, that the crystals, in the moment of their origin, were compelled, by the crystallographical, molecular arrangement of phlogopyte, to which asterism is due, to place themselves in a manner conforming to the crystalline architecture of the mineral. The reasons for this view are:

1. Some laminæ of phlogopyte show asterism in a distinct manner, without having the microscopical crystals.
2. Some laminæ of phlogopyte show asterism in six-sided beams, and contain, also, those microscopical, prismatic crystals, the direction of which is a parallel one
3. According to Zirkel's explanation, only one beam should be seen, as only one direction of crystals occurs in phlogopyte.
4. Some altered phlogopyte laminæ contain those crystals, nearly unaltered, and no asterism could be seen.
5. Jeffersite presents asterism in a brillant manner, and has no microscopical enclosures to which this optical quality might be attributed.

The phenomenon of asterism is best observed with thin laminæ, holding them near to the eye, parallel to the source of the light. The size of the laminæ should not be too small, as, in the latter case, the lamina has to be brought close to the eye to observe it, which might lead to some deception. The light of a candle is best; observations should be made in a dark room, where only the candle-light is burning, though asterism will be shown in daylight, but less distinctly. If the laminæ (unaltered) are thin, uniform, and of a large surface, a twelve-sided star will be seen, its beams being fine, distinct lines, crossing at the centre of the light, and losing their intensity towards their outer zone. In advancing the phlogopyte toward the light, the rays will appear to pass into broad lines, which taper out towards their less luminous part. The broad beams have bright lines on their borders, whilst the interior is. dark, or transversely striated with prismatic colors. If a thicker lamina is used, as a rule, only a six-sided star will present itself, having in its center short lines, the direction of which corresponds to the rays of the other system. See fig 1 ($a\ d$) ($b\ e$) ($c\ f$), or ($a'\ d'$) ($b'\ e'$) ($c'\ f'$).

A still thicker lamina shows sometimes only two lines, crossing each other at 90 degrees. The direction of those two lines corresponds to the lines $b\ e$ and $b'\ e'$, or to any two perpendicular to each other (figure 1).

It is the opinion of the writer that most of the phlogopyte laminæ are built up in the following manner: + — + — + . . . The (+) and (—) indicate thin laminæ, + being related in the plane (o) towards (—) for 90 degrees, which will be partly confirmed by the examination under the micropolariscope. On some laminæ, the six-sided star is characterized by a stronger intensity of one of its beams.

Laminæ of phlogopyte, which were exposed for some time to a white heat, showed asterism when cooled down again. Also cold, diluted acids did not produce any change in regard to their asterism.

Hardness.—Base (o) usually 2.5. Lateral faces harder, nearly 3., if the streak is perpendicular to base (o).

Spec. Gravity.—From 2.5 to 2.90. Specimens from Orange county, as an average, 2.60.

Streak.—White, grey.

Electricity.—Laminæ of phlogopyte rubbed with a woolen cloth become electric (—). In breaking them or hammering them in a dark room, a number of electric sparks will be seen.

Chemical Composition.—The following three analyses of Phlogopyte are given in *Dana's Mineralogy*:

	$\ddot{\text{Si}}$.	$\dddot{\text{Al}}$.	$\dot{\text{Fe}}$.	$\dot{\text{Mn}}$.	$\dot{\text{Mg}}$.	$\dot{\text{Ca}}$.	$\dot{\text{Na}}$.	$\dot{\text{K}}$.	$\dot{\text{H}}$.	F.	
Edwards ...	40.36	16.45	——	——	29.55	——	4.94	7.23	0.95	——	*Crawe.*
Edwards ...	40.36	16.08	——	——	30.25	——	4.39	6.07	——	2.65	*Crawe.*
Gouverneur,	41.96	13.47	.2.12	0.55	27.12	0.34	trace	9.37	0.60	2.93	*Ramm.*

Phlogopyte from Pope's Mills and Edwards, gave reaction of Manganase and Fluorine. The writer detected Titanium in form of Menaccanite in examples from the same locality; and also obtained a strong reaction of oxide of iron.

Alteration.—Phlogopyte usually undergoes metamorphic alteration to steatite. Specimens from Vrooman's lake, St. Lawrence county, which have a fresh appearance, have the interior corroded and marked with patches of steatite. In specimens from Edwards, an alteration of phlogopyte to magnetite (menaccanite) goes on—the first decomposing again to hydrated oxide of iron.

Occurrence.—Usually with serpentine, limestone, and dolomite. In the Swiss Alps it is found in dolomite with menaccanite.

Microscopical examination.—Laminæ of various degrees of thickness were mounted in Canada balsam in the usual manner. Care was taken to press down the bent lamina with the cover-glass, in order to have the whole lamina in the plane of the objective glass.

Phlogopyte of Orange county, viewed with a magnifying power of about 120 diameters, presents a clear light yellowish mass, through which various crystals and enclosures are disseminated.

The most prominent of these foreign particles consist of a number of long primastic crystals, which have been already mentioned in the lines treating of asterism. Sometimes these crystals are so similar in color to the phlogopyte-basis itself, that they can only be detected by their outlines forming dark lines.

Using polarized light for the following observations, the crystals will present themselves as richly colored bands, and are therefore more readily detected from the phlogopyte itself, which only polarizes in various brownish-yellowish shades.

The form of these crystals is usually a parallelogram of which one pair of parallel sides has a long extension, whilst the other pair, crossing the first at an angle of about 60 degrees, is short (fig. 2). Sometimes, as it is represented in fig. 3, another pair of parallel lines occurs forming a hexagon. Fig. 4 presents a form in which the lines cross each other at 90 degrees. There are still other combinations occurring as given in figs. 5 and 6. It will be noticed in nearly all the preparations that the prisms are gradually altering in breadth, sometimes tapering to the thinnest line, which afterwards slowly assumes again its prismatic form (fig. 7.)

By means of the micropolariscope, it will be perceived that nearly all of those long crystals are not single, but are in twin position. The parallelograms present a series of colored lines and bands, arranged parallel to the long sides of the prismatic figures. The bands are in certain relations to each other. One system will polarize most brilliantly, whilst the other presents scarcely any color.

In the Canadian mica of South Burgess, of which Zirkel has given a description in his previously mentioned work, the prismatic crystals are more frequent, but much smaller. Zirkel does not mention the occurrence of twins in those crystals. He pronounces them to be monaxial mica, lying with their bases in that of phlogopyte.

It seems to the writer more likely that these crystals are mica sections, through their lateral sides, crossing the base of phlogopyte at an angle of 90 degrees. In large phlogopyte specimens, sometimes even to the naked eye, plates of mica are visible, which lie with their base in the lateral faces of phlogopyte.

In regard to the position of the above-mentioned, long band-shaped crystals, it will be observed that they follow a law peculiar to themselves, and of which figure 1 is a graphical representation. The crystals are placed towards each other parallel to the diagonals $(a\ d)$ $(b\ e)$ $(c\ f)$ or $(a'\ d')$ $(b'\ e')$ $(c'\ f')$.

Figure 8 presents two crystals crossing each other at 60 degrees, and figure 9, two crystals crossing at 30 degrees. Both prisms appear dark in a certain position of the analyser towards the polariser, whilst the part where they cross each other is luminous, which indicates that the crystals lie in various mica planes.

In figure 10 are shown two prisms at 90 degrees to each other having complimentary colors. After rotating the polariser for 90 degrees, the colors will be reversed.

Figure 11 represents three prisms crossing at 60 degrees, which answers to the diagonals $(a\ d)$ $(b\ e)$ $(c\ f)$ or $(a'\ d')$ $(b'\ e')$ $(c'\ f')$.

In figures 12 and 13 three prisms form a rectangular triangle, the ratio of the perpendicular sides being, in fig. 13, 1:1 or fig. 12, 1:2, as can be easily deduced from figure 1.

The second group of enclosures, in phlogopyte from Orange county, are a number of black, round or needle-shaped bodies (figure 14), which, even with a magnifying power of 670 diameters, appears as a fine dust. They occur in zones with a dark nucleus in the center, which is a greater accumulation point of these *microlites*. This name was proposed by Rosenbusch for such minute bodies as are difficult to discriminate.

The microlites appear also in straight lines and curves. Sometimes they occur even in the center of the long band-shaped crystals, but generally they penetrate the phlogopyte basis. The writer is convinced that the first cause of the alteration in the chemical and physical molecules of phlogopyte, is due to the development of these microlites. Their negative chemical affinity towards hot hydrochloric acid, indicates that these microlites are not magnetites (as was supposed by many), but most likely menaccanite.

The third group of enclosures consists of large colorless bodies, the form of which is represented in fig. 15. They occur in lines, circles, and are more frequent in biotite and muscovite. Zirkel figures a series of these strange enclosures found in European mica, and give them the name *crystallites*.

The examination of the phlogopyte basis in regard to its dichroism, was made by the aid of the microscope and polariser. Rotating the latter, various shades of yellowish-brown color could be seen.

In the phlogopyte of Pope's Mills and Edwards, the basal plane (*o*) is of a bronze-brown color, similar to that of Edenville; but in examining thin slices or laminæ of the first two localities, we will find that the coloring-matter is not uniformly spread through the whole mass, but that it occurs in patches, formed by bronze-red microlites—sometimes with an amethystine color. The phlogopyte basis presents a greyish color, and seems to be in a changed condition, as its flexibility is partly lost, having assumed a certain brittleness. It polarizes in a faint bluish-white between the crossed Nicols. Laminæ of moderate thickness of Pope's Mills' phlogopyte show asterism.

The coloring matter is due to microlites, which occur in the most variegated outlines; sometimes in form of a rhombohedron of about 120° and 60 , or in hexagons of about 120°, but most of the microlites occur in very irregular and most bizarre forms. Some assume a dendritic or arborescent shape; some again present a very irregular star. Another form of these microlites presents partly straight outlines of a hexagonal habitus, whilst the other part is of the most irregular shape.

Zirkel, in his *Mikroscopische Berchafferheit der Mineralien und Gesteine*, pictures similar microlites as belonging to mica specular iron ore, and which have greatest resemblance with those of Pope's Mills.

He describes, also, similar forms occurring in a mica, as hematite crystals, to which the Pope's Mills' microlites may belong. Treated in cold acids for a length of time, they do not show any alteration.

The color of the hematite crystals is between the lightest shade of yellow and brown-black, the color increasing with their thickness, or, as it is usually the case, with the amount of laminæ which are piled upon each other. In regard to their position, no particular law seems to exist, but the writer has observed, in some preparations from the above locality, that a number of the hexagonal laminæ were arranged in parallel position, the outlines of the hexagon running in three directions.

Zirkel mentions a similar occurrence of parallel-arranged hexagons in a mica of Greenville. Under the polariscope, they polarize very distinctly in brownish-red colors; even those dark-colored, which appeared entirely opaque towards reflected light, polarized in bright, dark-red hues. In regard to dichroism they appear to be indifferent.

A great number of the hematite laminæ appeared to be filled up with fine, needle-shaped microlites, arranged in a hexagonal manner, but sometimes only one series of parallel lines is seen. They polarize with a strong light, but showing no colors, resembling the above needle-shaped enclosures of the Canada Mine. Their length was about 0.5 mm.

These needle-shaped enclosures should not be taken for fissures or holes of the hematite laminæ, through which the white phlogopyte basis is visible. The latter fissures appear frequently; sometimes as holes, straight lines or curves, but only polarize similar to the phlogopyte basis, which they really present.

Another form of microlites, in form of laminæ, and most likely a mica, is presented and best viewed under the dark field of the crossed Nicols. These mica laminæ are likewise spread through the hematite microlites, and seem to form one crystal, but on account of their vivid polarization in azure-blue and yellowish colors, are easily separated from them.

Most of the minute mica scales present lines of twin-formation in such a sharp and well-defined manner, that they resemble the plagioclose-lines (lines of twin-formation), under the polariscope, and cause some doubt in regard to their being mica.

In most of the preparations of Pope's Mills and Edwards phlogopyte, the bronze color of the base is due to the above-described mica-hematite microlites; in all those sections seen, a want of the long band-shaped mica crystals is characteristic. They may occur in a few crystals, but polarize less intensely than those which occur in phlogopyte, the base of which is uniformly colored by a brownish-yellow coloring-matter.

The decomposition of the phlogopyte of Pope's Mills seems to be due to the presence of the mica-hematite microlites. They change into a hydrated oxide of iron, which becomes dissolved and carried away by water, which may come in contact with it.

[NOTE.—The above paper is published from manuscript communicated by the author, without the proof-sheets having been submitted to him, owing to his present residence in Honduras. The accompanying plate is given as originally sketched by him, containing some unnumbered figures not referred to in the text.]

THIRTY-SECOND ANNUAL REPORT

ON THE

NEW YORK STATE MUSEUM OF NATURAL HISTORY

BY THE

REGENTS OF THE UNIVERSITY

OF THE

STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE MARCH 10, 1879.

ALBANY:
CHARLES VAN BENTHUYSEN & SONS.
1879.

STATE OF NEW YORK.

No. 89.

IN ASSEMBLY,

March 10, 1879.

THIRTY-SECOND ANNUAL REPORT.

ON THE STATE MUSEUM OF NATURAL HISTORY BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

University of the State of New York:
Office of the Regents,
Albany, *March* 10, 1879.

To the Hon. Thomas G. Alvord,
Speaker of the Assembly:

Sir — I have the honor to transmit the Thirty-second Annual Report on the State Museum of Natural History by the Regents of the University.

I remain, very respectfully,
Your obedient servant,
E. C. BENEDICT,
Chancellor of the University.

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University, as trustees of the State Museum of Natural History, respectfully submit this their Thirty-second Annual Report.

The condition of the Museum, and the work of the last year, are exhibited in the reports of the Director and of the Botanist hereto appended.

Respectfully submitted in behalf of the Regents,

E. C. BENEDICT,

Chancellor of the University.

S. B. Woolworth,

Secretary.

Albany, *March* 10, 1879.

REPORT

ON THE

STATE MUSEUM OF NATURAL HISTORY.

1879.

By JAMES HALL, LL. D., Director.

CONTENTS.

REPORT OF THE DIRECTOR.

ALBANY, *January*, 1879.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN — I have the honor to communicate herewith the Annual Report of the State Museum of Natural History, giving some general account of the conditions of the collections in the several departments, the additions which have been made, and the work done in the Institution during the past year; together with special communications upon subjects under investigation by persons connected with the Museum.

I am able to report that the collections of the Museum in every department are in good condition, and satisfactorily arranged for the purposes of examination and study. The labeling and rearrangement of the geological collection, which in my last report I mentioned as in progress, has been completed, and the entire series is now presented in satisfactory order.

The want of room for the arrangement of the rapidly increasing collections in geology and palæontology is every year more severely felt by the Director and by those aiding in the work. Under existing circumstances it is quite impossible to present any tangible evidence of the progress of our work, and it is nearly impracticable to find the means of putting on exhibition any portion of the collections which have been made, or specimens which have been specially prepared for the Museum during several years past. We are also suffering many inconveniences for the want of proper working rooms attached to the Museum, where the work of progress in all departments could be witnessed by the trustees, and by any parties interested in the prosperity of the Institution.

I beg to repeat what I have said in a previous report, that we need at this time, for the proper exhibition of the geological and palæontological collections acquired during the past few years, a space equal to another story or floor of the same area as those of the present Museum; while also the crowded condition of the skeletons and osteological collections is such that we need as much more space as is now occupied by them.

I call attention to these points, while knowing that it is not, at present, in the power of the Regents to grant any relief, but in order that they may appreciate the necessity which exists of doing much of the work beyond the walls of the Museum building.

In the general zoölogical arrangement, it is a matter of very great interest and importance that the collection of birds should be rearranged, the wanting species supplied, and the whole collection labeled according to the present state of our knowledge of the subject. Beyond this, moreover, some new information is desirable regarding the general and local distribution, the migration, habits, breeding, etc., of the birds which are known as the birds of New York, as well as of those which only pass through the State in their migrations north and south. While so much attention is being given to this subject in some of the States, and especially in the Western States and territories, it is scarcely becoming that a State which gave the lead in such investigations, and in the diffusion of a knowledge of natural history, should any longer remain inert in this special department of natural science.

I shall have the pleasure of presenting to your honorable body a special communication upon this subject, from which you will be able to learn in a more satisfactory manner the nature of the work to be done, and which when done will give an important rank to our ornithological collection, which at present is of little value to science. At the same time, the facts thus obtained and published will be a valuable source of information to the people of the State.

Details of the additions to the Museum in its several departments will be found appended. The donations have been unusually few during the past year.

To the Botanical department contributions have been received from seventeen persons, making in all fifteen hundred and fifty-two species.

To the Zoölogical department contributions have been made by twelve persons.

To the Ethnological department two contributors only are recorded.

In this department, contributors to the Museum have greatly diminished in number during the past few years, from the fact that such subjects have come to have a pecuniary value; and, also, that there are numerous collectors and institutions in the State who are competitors with the State Museum.

This condition of things will continue; and if it be thought desirable to increase the collections in this department, it will be necessary to make special collections, or to purchase from those who have made them. Several offers of the sale of collections have been made to the Museum during the year, but having no means at our disposal for such purposes, no present encouragement has been given to the applicants.

To the Mineralogical and Palæontological department four donors are recorded.

To the Library, contributions have been made by twenty societies and eight individuals, of twenty-three bound volumes, and eighty-nine in paper covers and pamphlets, all but thirteen of these being serials. From all sources, the additions to the Library have been forty-two bound volumes, and of volumes in paper and pamphlets (chiefly serials), one hundred and forty-one.

A donation of the extensive botanical collection of the late Dr. Anthony Gescherdt has been kindly made to the Museum by Madame Gescherdt, through Hon. Alexander Thain, of New York. The collection contains 1,479 species, all of which are labeled. These are chiefly European species, but there are some from the United States, the West Indies, etc. A list of the species, as they were arranged in the twenty-two packages when received, has been made by Mr. Peck. This list, when fully classified, will be communicated with the report upon the State Museum.

GENERAL WORK OF THE MUSEUM.

In the Botanical department the accompanying report of the Botanist, Mr. C. H. Peck, will indicate the work done by himself, and the addition to the Herbarium of one hundred and sixty-five mounted species of plants which were not previously represented in the collection.

To the Zoölogical department some interesting specimens of worms, insects, crustaceans and fishes have been added, through the collections of Mr. Lintner, at Caledonia creek, made at the request of the State Commissioners of Fisheries. Such of the animal forms as could be obtained during the winter season at this interesting locality, were carefully collected and critically studied, with especial reference to their value as fish food, and the practicability of their transplantation into other streams of the State which are less prolific in the forms so remarkably abundant at Caledonia. The results of this examination have been published in the Tenth Annual Report of the State Commissioners of Fisheries.

The alcoholic collection of specimens has been in part relabeled, the jars replenished with fresh alcohol, and the recent donations and collections incorporated.

To the Osteological collection there have been added about fifty specimens, including thirty-three prepared skulls.

A large number of recent shells have been cut into sections for illustrating their internal structure, and about one hundred specimens of this character have been added to the collection.

The additions to the Ethnological collections, filling nearly two cases, have been arranged and labeled. The series of Table-cases, containing stone or Terra-cotta specimens, occupies one hundred and thirty-six square feet of area. Several additional cases are necessary for a proper exhibition of the material.

In the Mineralogical department additional work has been done upon the general collection, by the incorporation of other material belonging to the Museum. The arrangement and labeling has been completed, and the collection is now ready for cataloguing.

A series of Volcanic rocks and minerals, from the Van Rensselaer collection, has been labeled and arranged in three Table-cases.

The Emmons collection of crystallized minerals has been fully labeled, in conformity with the other mineralogical collections. A considerable number of duplicate minerals, derived from various sources, still remain in the drawers.

The work of rearranging and labeling the geological series contained in the wall cases of the first floor, which was in progress at my last report, has been completed during the year. The collection is now accessible for examination and study. The smaller specimens have been mounted, uniformly with the mineralogical collection. The labels indicate the number of the specimen, its geological position, name, contained fossils in many instances, and locality. This collection is especially intended to illustrate the geological formations of the State, exclusive of the palæontological collections, and some idea may be formed of the extent to which this object is carried, by a glance at the schedule below, which shows the number of labeled specimens in each formation:

System.	Group.	Formation.	No of specimens.
Laurentian	Lower		99
	Upper		101
Huronian			84
Lower Silurian. (Cambrian of Sedgwick)	Potsdam		60
	Quebec	Calciferous Sandstone	65
		Shales and Sandstone	108
		Chazy Limestone	70
	Trenton	Birds-eye Limestone	45
		Black-river Limestone	32
		Trenton Limestone	122
	Hudson River	Utica Slate	55
		Hudson-river Shales	101
		Gray Sandstone	15
		Shawangunk Conglomerate,	15
		Medina Sandstone	100
Middle Silurian	Clinton		110
	Niagara	Niagara Shaly Limestone	105
		Guelph	10
		Coralline Limestone	32
Upper Silurian	Onondaga Salt		110
	Waterlime		58
	Lower Helderberg	Tentaculite Limestone	47
		Lower Pentam. Limestone,	56
		Shaly Limestone	109
		Upper Pentam. Limestone	15

System.	Group.	Formation.	No. of specimens.
Devonian	Upper Helderberg	Oriskany Sandstone	86
		Cauda-galli Grit	23
		Schoharie Grit	51
		Onondaga Limestone	30
		Corniferous Limestone	92
	Hamilton	Marcellus Shale	67
		Arenaceous and other Shales,	146
		Tully Limestone	59
		Genessee Slate	14
	Portage		75
	Chemung		149
	Catskill		74
Carboniferous			73
	New Red Sandstone		47
Quaternary			90

A colored Geological Section, exhibiting the order of succession of the New York formations, has been placed above the wall-cases, extending around the room, and so arranged that the representation of the succession of the formations corresponds with the series in the cases. The section is distinctly lettered with the names and subdivisions of each formation, and, in connection with the series immediately beneath it, affords a source of instruction to the student or amateur which has not before been presented in the Museum.

Duplicate Collections of Fossils and Minerals.

Pursuant to the direction of the Secretary of the Board of Regents, one of the duplicate series of specimens prepared for the Norman Schools has been sent to the State Normal and Training School at Cortland. Six of the Normal Schools of the State have now received the collections; others still remain, subject to application to the Board of Regents, and their direction.

Collections in the Field.

Extensive collections have been made in the field during the past season. In the western part of the State, during May and June, Mr. C. D. Walcott, assisted by Mr. Vandeloo, made large collections of corals and other fossils from the upper Helderberg limestone and the Hamilton group. At a later period Mr. Walcott continued collecting, especially fossil corals, in the limestones of Genesee and Erie counties; and also in the same limestones in Canada West, and at Kelly's Island in Lake Ontario.

During the months of July and August, Dr. J. W. Hall, assisted by Martin Sheehy, made extensive collections, chiefly of fossil corals, from the Upper Helderberg limestones of Albany county. Dr. Hall has also made a geological examination along the Hudson river as far as Poughkeepsie, making sections and extensive and instructive collections of the rocks from fifty-one localities. These collections will be of important aid in the study of the rocks of the Hudson River Valley, and in the determination of their geological age and relations.

The entire collections made during the past season will number at least thirty thousand specimens.

The work of cutting sections of rocks and fossils, chiefly of the latter, has been continued with great success; and the machinery, and work of this kind, have become a necessity in the Museum organization. A large amount of work has been done in cutting and preparing transparent sections of corals, stromatopora, sponges, etc. Between three and four hundred specimens have been prepared. About one hundred and fifty specimens of corals, orthoceratites and other fossils have been ground and polished, to show the internal structure. So long as the fossils of the Museum are being studied and illustrated, this machinery will be of constant and important use.

In addition to the work of cutting and preparing sections of fossils, the machinery has been applied to the cutting of recent shells, and more than one hundred specimens have been prepared, giving a most instructive exhibition of the internal structure. Preparations of this kind are of the greatest interest and importance in the study of the characters of recent shells, especially of the Gasteropoda, and this collection cannot fail to be appreciated by every student of natural history who visits the State Museum. This department is under the management of Dr. J. W. Hall.

The extensive collections made during 1877, and already communicated in a previous report, have been partially examined, and selections made as far as practicable, and as far as we have drawers for their reception. The large collection of Niagara fossils from Waldron, made in that year, has been unpacked and cleaned, the species separated, and a large part of them ticketed. The Bryozoa of this collection have been carefully studied, in connection with those of the Lower Helderberg group, by Mr. G. B. Simpson. Mr. C. E. Beecher has also spent a much longer time upon the Waldron collection in the careful study and separation of the species of all the other classes, and the selection of a large series for the State Museum collections.

Although these collections are now arranged in drawers, it will be necessary to repack a considerable portion for want of proper accommodations. In the meantime many new species have been selected and determined, which will be illustrated and described in future reports of the Museum.

The large collections from the Lower Helderberg limestone have furnished many new species, which will be included in the plates now being lithographed for the Palæontology of the State.

In conclusion, I beg leave to say, that the field collections in Geology and Palæontology, and the work done upon them in preparing specimens for the Museum and for study, is in every way satisfactory, and more than equals my expectations. I would therefore most earnestly, and respectfully, urge upon the Board of Regents the desirableness and importance of continuing the same system of work, and in the same hands, for the ensuing year.

I am, very respectfully, your obedient servant,

JAMES HALL,

Director of the State Museum.

ADDITIONS TO THE STATE MUSEUM DURING THE YEAR 1878.

I. BOTANICAL.

A specimen of *Solidago virgaurea* L. From Prof. P. A. PUISSANT, Troy, N. Y.

Seven flowering plants; two new to the State Herbarium. From ADDISON BROWN, New York.

Specimens of *Cynophallus caninus* Fr. From H. A. WARNE, Oneida, N. Y.

Two rare Fungi—*Polyporus Morgani* Frost and *Agaricus Morgani* Peck. From A. P. MORGAN, Dayton, O.

Polyporus tomentosa-quercinus Johns. From A. M. JOHNSON, Minneapolis, Minn.

Podaxon Warnei Peck. From W. F. BUNDY, Sauk City, Wis.

Lentinus Lecontei Fr. and *Lycoperdon leprosum* B. & R. From H. W. RAVENEL, Aiken, S. C.

Zygadenus glaucus Nutt. From L. M. UNDERWOOD, Syracuse, N. Y.

Listera australis Lindl. and *Botrychium simplex* Hitch. From Rev. H. WIBBE, Oswego, N. Y.

Micromitrium Austinii Sulliv. From C. A. AUSTIN, Closter, N. J.

Salix petiolaris Sm. From M. S. BEBB, Fountaindale, Ill.

Tramates suaveolens Fr. and *Polyporus cuticularis* Fr. From W. C. STEVENSON, Philadelphia, Pa.

Six species of flowering plants; one new to the State Herbarium. From S. H. WRIGHT, M. D., Penn Yan, N. Y.

Twenty-three species of Fungi. From J. B. ELLIS, Newfield, N. J.

Three species of flowering plants and ten species of Fungi; eight species new to the State Herbarium. From Hon. G. W. CLINTON, Buffalo, N. Y.

Nine species of Fungi. From E. A. RAU, Bethlehem, Pa.

One hundred and sixty-five species of plants, new to the State Herbarium. Collected by the Botanist, C. H. PECK.

A collection of 1,479 species of plants, principally European, made by Dr. Anthony Gescherdt.

II. ZOÖLOGICAL.

Right mandible of the lower jaw (13 ft. 4 in. long) of a Greenland whale (*Balæna mysticetus*), which floated ashore at Rockaway Beach in 1875. From E. GEE, Albany, N. Y.

A blunt-nose shiner—*Vomer setapinnis* (Mitch.). New York coast. From J. B. HOTALING, Albany, N. Y.

A gold-fish—*Cyprinus auratus* L., with greatly enlarged abdomen from an ovarian tumor; length of body, 9.5 inches; circumference, 11.5 inches. From EDWARD SEIB, Albany, N. Y.

A hen's egg of abnormal form (*gourd-shaped*). From H. GERMOND, Nassau, N. Y.

Two specimens of Carrara marble honeycombed by a boring sponge—*Cliona sulphurea* Verrill—taken from the hold of a vessel wrecked on the coast of Long Island in 1871. From E. R. McCARTY, Hotel Brunswick, New York, per Prof. D. S. Martin.

Ascaris———sp? in 35 examples, taken from a piece (4x4 inches) of a salted codfish. From C. DEVOL, M. D.

An ichneumon-fly — *Rhyssa atrata* (Fabr.). From ANDREW HUTTON, Albany, N. Y.

Eggs (in soil) of the Rocky Mountain locust—*Caloptenus spretus* Thomas. Minnesota. Large spider—*Nephila plumipes*, from Florida. From J. A. LINTNER.

Pupa of Sphinx at pupation, Albany, N. Y.
Larvæ (4) of *Samia Cecropia* (Linn.), Albany, N. Y.
Larvæ (15) of *Datana ministra* from birch, Albany, N. Y.
Larvæ (4) of *Dryocampa rubicunda* (Sm.-Abb.), New York city.
Larva of *Cœlodasys unicornis* (Sm.-Abb.), Albany, N. Y.
Larva of *Thyreus Abbotii* Swains., Albany, N. Y.
Larva of *Danais Archippus* (Fabr.), Albany, N. Y.
Larvæ (5) of *Orgyia leucostigma* (Sm.-Abb.), Albany, N. Y.
Larvæ (25) of *Chironomus* sp., Caledonia creek, N. Y.
Larvæ (33) of Ephemeridæ—*Cloë* sp., Caledonia creek.
Larvæ (3) of *Æschna verticalis*, Caledonia creek.
Larvæ (8) of Limnophilidæ, near *Hallesus* (caddis worms), Caledonia creek.
Caddis-worm from a hollowed stem case, Caledonia creek.
Larva-cases (18) of one of the Hydroptilæ, *Phixocoma* sp., Caledonia creek.
Larva-cases (37) of a species of the Limnophilidæ, Caledonia creek.
Larvæ (2) of a Dytiscid beetle—*Gaurodytes* sp., Caledonia creek.
Pupæ (many) of a fly, from water, Warren Co., N. Y.
Fresh-water craw fish (6)—*Cambarus Bartonii* (Fabr.), Caledonia creek.
Fresh-water shrimp (86) *Gammarus fasciatus* Say.,* Caledonia creek.
Miller's thumbs (6)—*Cottus gracilis* Heckel, Caledonia creek.
Sticklebacks (23)—*Gasterosteus inconstans* Kirtl., Caledonia creek.
Collection by J. A. LINTNER.

Honey-bees—*Apis mellifica* Linn., drones, workers and (3) queens. From WILLIAM HALL, Middletown, Delaware Co., N. Y.

A red-shouldered buzzard—*Buteo lineatus* (Gm.), taken at Canajoharie, N. Y., Dec. 19th. From A. G. RICHMOND, Canajoharie, N. Y.

Strombus gigas Linn. (4) and *Cypræa tigris* Linn. (3), for cutting sections. From JAMES HALL.

A hermit crab—*Eupagurus longicarpus* (Say.), in a new preservative liquid. From ERASTUS CORNING, JUN.

Twenty-three species of Mollusca and one of Vermes, as follows: *Helix Californica* Lea, California; *H. Stearnsiana* Gabb, San Deigo; *H. facta* Newcomb, Santa Catelina; *H. Yatesii* Cooper, California; *H. Bowditch-*

* For the illustration of, and remarks upon, this and several of the above Caledonia forms, see Report on the Insect and other Animal forms of Caledonia creek.

iana Feer., Madeira; *H. delphinula* Lowe, Madeira; *H. undata* Lowe, Madeira; *H. armillata* Lowe, Madeira; *H. erebescens* Lowe, Madeira; *H. Maderensis* Wood, Madeira; *H. polymorpha* Lowe, Madeira; *H. subtilis* Lowe, Madeira; *H. paupercula* Lowe, Madeira; *H. abjecta* Lowe, Madeira; *H. bifrons* Lowe, Madeira; *H. lurida* Lowe, Madeira; *H. Stephenaphora* Dillwyn, Madeira; *H. thiarella* Webb, Madeira; *Stenoradia Magdalensis* Hinds, Cal.; *Ringicula conformis* Montero Sante, Madeira; *Argyope decollata*, Chenu; *Bulimus nigrofasciata* Pfeif., Sante Fe de Bogota; *B. veranyi* Pfeif., Santa Fe de Bogota; *Ditrupa acuta* Hayes. From W. NEWCOMB, M. D., Ithaca, N. Y.

III. MINERALOGICAL AND PALÆONTOLOGICAL.

Blue calcite; Pitkin, St. Lawrence Co., N. Y. Hexagonite; Edwards, St. Lawrence Co., N. Y. Purchased of P. P. PECK.

Two specimens of Selenite; Yawger's quarries, near Springport, Cayuga Co., N. Y. From Messrs. J. C. & H. YAWGER.

A block of Magnetite, 52x18x20 inches, from the Tilly-Foster Mine, Putnam Co., N. Y. From H. T. DURANT.

Four crystals of Gypsum; Camillus, N. Y. A slab of Gypsum, with crystallized native Sulphur; Marcellus, N. Y. From FREDERICK STAR, Auburn, N. Y.

Rock borings from an Artesian well at Wyoming, N. Y., arranged in a glass tube to show the comparative thickness of the beds traversed. Purchased for the Museum.

The Emmons Collection of Crystals and Crystallized Minerals, principally from Northern New York. (Purchased in 1877, but not included in the list of additions in that year.)

Columnaria sulcata; Jefferson Co. (? Theresa), N. Y. From R. S. PALMER, North Lawrence, St. Lawrence Co., N. Y.

IV. ARCHÆOLOGICAL.

Indian pottery (twelve pieces), Loudonville, Albany county, N. Y.
Indian pottery (fifteen pieces), Guilderland, Albany county, N. Y.
Pieces of chert from a locality in Loudonville, to which they had probably been brought for working into arrow-heads.
Four gun-flints.
Chert chips from an Indian arrow-head locality, near New Albany, Ind. From F. E. ASPINWALL, M. D., Loudonville, N. Y.

A copper hand-axe, of aboriginal manufacture, dug up on the farm of the donor. From E. V. COLLINS, Stuyvesant, N. Y.

Four trays of Indian arrow and spear heads, as follows:
No. 1. Fifteen arrow and spear heads of chert, Loudonville, N. Y.
No. 2. Seventeen arrow and spear-heads of chert, etc., Guilderland, N. Y.
No. 3. Twenty arrow-heads of chert, Guilderland, N. Y.
No. 4. Thirteen arrow and spear heads of chert, etc., near New Albany, Ind.
A piece of sandstone (? a hammer stone) with pittings and excavations on two opposite sides, near West Albany, N. Y.
Deposited in the collection by F. E. ASPINWALL, M. D., subject to call.

V. TO THE LIBRARY.

1. By Donation.

Department of the Interior. Bulletin of the United States National Museum. No. 10. Contributions to North American Ichthyology, No. 2. By David S. Jordan. Washington: 1877. 8 vo., pp. 120, plates 45.

Do.—————. Bulletin of the U. S. Geological and Geographical Survey of the Territories. Vol. IV, Nos. 1 and 2. Washington: Feb. 5, 1878, and May 3, 1878. 8 vo., pp. 543.

Do.—————. Miscellaneous Publications, No. 9. Descriptive Catalogue of Photographs of North American Indians. By W. H. Jackson. Washington: 1877. 8 vo., pp. 124.

Do.—————. Miscellaneous publications, No. 10. Bibliography of North American Palæontology. By C. A. White, M. D., and H. A. Nicholson. Washington: 1878. 8 vo., pp. 132.

Do.—————. Preliminary Report of the Field Work of the U. S. Geological and Geographical Survey of the Territories, for the Season of 1867, under direction of Prof. F. V. Hayden. Washington: 1877. Pamph., 8 vo., pp. 35.

Do.—————. Report on the Geographical and Geological Survey of the Rocky Mountain Region. By J. W. Powell. Washington: 1877. Pamph., 8 vo., pp. 19.

Do.—————. U. S. Geological and Geographical Survey of the Territories. Geological and Geographical Atlas of Colorado and Portions of Adjacent Territory. By F. V. Hayden, U. S. Geologist-in-charge. 1877. Folio, 20 sheets.

Do.—————. U. S. Geographical and Geological Survey of the Rocky Mountain Region. J. W. Powell, in charge. Contributions to North American Ethnology. Vol. III. Washington: 1877. Quarto, pp. 635.

Do.—————. Report of the U. S. Geological Survey of the Territories. F. V. Hayden, U. S. Geologist-in-charge. Vol. VII. Contributions to the Fossil Flora of the Western Territories. Part 2. The Tertiary Flora. By Leo Lesquereux. Washington: 1878. Quarto, pp. 366, plates lxv.

From the Department of the Interior.

Fifty-eighth and Ffty-ninth Annual Reports of the Trustees of the New York State Library, for the years 1875 and 1876. Albany: 1876 and 1877. Two pamphlets, 8 vo., pp. 171, 181.

Address of Erastus C. Benedict, LL. D., at his taking the chair at the University Convocation, at the Capitol, in the city of Albany, July 9, 1878. Albany: 1877. 8 vo., pamph. pp. 19.

Laws of the State of New York, passed at the 100th and 101st Sessions of the Legislature. Albany: 1877 and 1878. 3 vols., 8 vo.

Eighty-eighth, Eight-ninth and Ninetieth Annual Reports of the Regents of the University. Albany: 1875, 1876 and 1877. 3 vols., 8 vo., cloth pp. 776, 761, 786.

From the Regents of the University.

Smithsonian Miscellaneous Collections. No. 283. Catalogue of the Fishes of the East Coast of North America. By Theodore Gill, M. D., Ph. D. Washington: 1873. Pamph., 8 vo., pp. 50.

Annual Report of the Board of Regents of the Smithsonian Institution, for the year 1876. Washington: 1877. 8 vo., pp. 488.
From the Smithsonian Institution.

Report of the Commissioner of Agriculture, for the year 1872. Washington: 1874. 8 vo., pp. 524.
Report of the Commissioner of Agriculture, for the year 1876. Washington: 1877. 8 vo., pp. 447.
Report upon Forestry. By Franklin B. Hough. Washington: 1878. 8 vo., pp. 650.
From the Department of Agriculture.

Circulars of Information of the Bureau of Education:
No. 1—1877. Reports on the System of Public Instruction in China. Washington: 1877. 8 vo., pamph., pp. 28.
No. 2—1877. Reports on the System of Public Instruction in Finland, the Netherlands, etc, Washington: 1877. 8 vo., pamph., pp. 77.
No. 1—1878. The Training of Teachers in Germany. Washington: 1878. 8 vo., pamph., pp. 36.
Report of the Commissioner of Education, for the year 1876. Washington: 1878. 8 vo., cloth, pp. 982.
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U. S. Commission of Fish and Fisheries. Part III. Report of the Commissioner for the years 1873–4 and 1874–5. Washington: 1876. 8 vo., pp. LI+777.
Do.————————. Part IV. Report of the Commissioner for 1875–1876. Washington: 1878. 8 vo., pp. 50*+1029.
From the Commissioner, Spencer C. Baird.

Bulletin of the Minnesota Academy of Natural Sciences for 1877. Minneapolis: 1877. 8 vo., pp. 197–324. From the Society.

Bulletins of the American Geographical Society. New York: 1877. Session 1876–77. Nos. 4 and 5. 2 pamphs., 8 vo., pp. 105, 59.
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Journal of the American Geographical Society of New York, 1875 and 1876. Vols. VI and VII. Albany: 1876 and 1878. 2 vols., 8 vo., cloth, pp. 396 and 311.
From the Society.

Proceedings of the Cincinnati Society of Natural History, No. 1. Jan. 1876.
From the Society.

Proceedings of the Davenport Academy of Natural Sciences. Volume II. Part I. Davenport: 1877. 8 vo., pamph., pp. 148, plates 3. From the Academy.

Transactions of the New York State Agricultural Society. Vol. XXXII, 1872–1876. Albany: 1878. 8 vo., cloth, pp. 533. From the Society.

Proceedings of the California Academy of Sciences. Vols. I, III, IV, V, VI, Part I of VII. San Francisco: 1873–1877. From the Academy.

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Report of progress in the Fayette and Westmoreland District. Part III. The Ligonier Valley. By J. J. Stevenson. Harrisburg: 1877. 8 vo., cloth, pp. 331KKK.

Do.—————————. Elevations above Tide Levels. By Charles Allen. Harrisburg: 1878. 8vo., cloth, pp. 279 N.
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From J. B. Pearse, Secretary of Commissioners of the Survey.

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Bulletin of the Imperial Botanical Club of St. Petersburg. Vol. IV. St. Petersburg: 1876. 8vo., 2 pamphs., pp. 438. From the Society.

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From the Society.

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Additions to the Insect Fauna of the Tertiary Beds at Quesnal (British Columbia). By Samuel H. Scudder. From the Report of Progress, 1876–77, Geological Survey of Canada. 8vo., pamph., pp. 8.
Psyche. Jan.–Feb., 1878. Recent progress of Entomology in America. By S. H. Scudder. 8vo., pamph., pp. 97–116.
From the Author.

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The Hydraulic Beds and Associated Limestones at the Falls of the Ohio. By James Hall. In advance of the Transactions of the Albany Institute, Vol. IX, pp. 169–180. 8vo., pamph., pp. 12.
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On the Geology of the Southern Counties of New York and Adjacent Parts of Pennsylvania, especially with reference to the Age and Structure of the Catskill Mountain Range. By James Hall. From Proceed. Amer. Assoc. Adv. Science, Detroit Meeting. Salem Press, March, 1876. 8vo., pamph., pp. 80–84.
From the Author.

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The Geological and Natural History Survey of Minnesota. Sixth Annual Report for the year 1877. Minneapolis: 1878. 8vo., pp. 225. From N. H. Winchell, State Geologist.

The General History of Cephalopoda, Recent and Fossil. By Miss Agnes Crane. From the Geological Magazine, Decade II, Vol. V, No. 11, November, 1878. From the Author, per Prof. James Hall.

First, Fourth, Eighth and Ninth Annual Reports of the American Museum of Natural History. New York: 1870–1878. 8vo., in 4 pamphs., pp. 30, 24, 35, 62. From the Museum.

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Report of the Botanist [Charles H. Peck]. In advance of the 30th Annual Rep. of the N. Y. St. Mus. Nat. Hist., for the year 1876. Albany: September, 1878. 8vo., pamph., pp. 23–78, 2 plates. From the Author.

Entomological Contributions, No. IV. By J. A. Lintner. From the 30th Ann. Rep. of the N. Y. St. Mus. Nat. Hist., for the year 1876. Albany: June, 1878. 8vo., pamph., pp. 144.

Report on the Insect and other Animal Forms of Caledonia Creek, New York. By J. A. Lintner. From the 10th Report of the N. Y. State Commissioners of Fisheries. Albany: 1878. 8vo., pamph., pp. 25, 3 plates.

Tenth Annual Report of the New York Fishery Commissioners, for the year 1877. Albany: 1878. 8vo., pamph., pp. 47, 3 plates.

From J. A. Lintner.

2. By Purchase.

The Geological Record for 1875. By Wm. Whitaker. London: 1877. 8vo., cloth, pp. 443.

The United States: Historical, Descriptive and Statistical. To accompany Case's Map of the United States. Hartford: 1878. 12mo., cloth, pp. 111.

The Naturalists' Directory for 1878. Salem: 1878. 12mo., pp. 184.

The Albany Directory for the year 1878. 800 pp., half cloth.

The Museum of Natural History. By Sir John Richardson and others. New York: 1878. Quarto, Parts 1–24.

Bulletin of the Buffalo Society of Natural Sciences. Vol. III, No. 5.

The American Naturalist. Vol. XI. Boston: 1877. 8vo., pp. 762. Vol. XII. Philadelphia: 1878. 8vo., pp. 850.

The American Journal of Science and Arts. New Haven: 1878. Vols. XV and XVI.

REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D., *Secretary of the Board of Regents of the University:*

Sir — Since the date of my last report, specimens of two hundred and thirteen species of plants have been mounted and placed in the Herbarium, of which one hundred and forty-six were not before represented therein. A list of these is marked (1).

Specimens have been collected in the counties of Albany, Hamilton, Montgomery, Onondaga, Oswego, Rensselaer, Saratoga, Schoharie and Ulster. These represent *one hundred and sixty-six species* new to the Herbarium, one hundred and sixty-two of which are fungi. Of these seventy-five are regarded as new or previously undescribed species. A list of plants collected is marked (2).

Specimens of fourteen New York species, new to the Herbarium, and not among my collections of the past season, have been furnished by correspondents. These, added to those collected, make the whole number of additions *one hundred and eighty.* There are, besides, a considerable number of extra-limital contributions. A list of the contributors and their contributions is marked (3).

New species, with their descriptions, and previously unreported species, are given in a section marked (4).

New stations of rare plants, remarks and observations are given in a section marked (5).

The general fruitfulness of the past season extended to the domain of fungi. Toward the end of summer the frequent showers and warm weather brought out these lowly plants in great abundance. In some localities species of Lycoperdon, commonly known as "Puff-balls," were very plentiful. One correspondent, in speaking of the Engraved puff-ball, *L. cælatum*, and the Cup-shaped puff-ball, *L. cyathiforme*, says: "Of these we have freely eaten for several weeks. They are most excellent. Within the limits of our town more than a ton of them rotted on the ground." The number of species of puff-balls now known to inhabit our State is sixteen. The published descriptions of these are scattered and not always accessible. In some instances the descriptions are very imperfect and unsatisfactory, and technical terms are employed in them, which, without explanation, are scarcely intelligible to persons unaccustomed to the language of scientific description. These facts, together with the importance of these fungi as an article of food, and the desirability of bringing them more into public notice and of enabling people generally to recognize the species, if they wish, have induced me to prepare a monograph of our New York species, in which the descriptions have been rewritten and the more technical terms fully explained. Copious remarks have been added to the descriptions, and the principal distinctive features of the species have been specially mentioned. The monograph on the genus Lycoperdon is marked (6). By its aid, it is thought, that any person, whether botanist or not, will be able to identify our species.

Specimens of puff-balls, when sliced and pressed, as they sometimes are, and mounted on herbarium sheets in the usual manner, lose much of their natural beauty and often have their distinctive specific characters impaired. I have, therefore, collected and preserved a series of specimens in paper boxes. By this method of preservation the natural colors, shape and other characters are all retained as well as it is possible to preserve them in the dried state. With such specimens for study and comparison, clear ideas of the specific characters can be obtained, and all difficulty in the identification of the species is avoided.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Thalictrum purpurascens *L.*
Spergularia rub. v. campestris *Gr.*
Rhus aromatica *Ait.*
R. typhina *L.*
Medicago lupulina *L.*
Amphicarpæa monoica *Nutt.*
Gleditschia triacanthus *L.*
Robinia Pseudacacia *L.*
Potentilla recta *L.*
Cratægus tomentosa *L.*
Ribes prostratum *L'Her.*
Penthorum sedoides *L.*
Sanicula Marilandica *L.*
Pastinica sativa *L.*
Aster cordifolius *L.*
Xanthium spinosum *L.*
Arctostaphylos Uva-ursi *Spreng.*
Vaccinium corymbosum *L.*
Utricularia gibba *L.*
Verbena bracteosa *Mx.*
Lithospermum arvense *L.*
Fraxinus pubescens *Lam.*
Montelia tamariscina *Nutt.*
Polygonum Hydropiper *L.*
Ulmus Americana *L.*
U. fulva *Mx.*
Ostrya Virginica *Willd.*
Alnus viridis *DC.*
A. serrulata *Ait.*
A. incana *Willd.*
Betula populifolia *Ait.*
Arisæma triphyllum *Torr.*
A. Dracontium *L.*
Lemna minor *L.*
Lemna perpusilla *Torr.*
Potamogeton Oakesianus *Robbins.*
Sagittaria het. v. augustifolia.
Habenaria leucophæa *Gr.*
Trillium erythrocarpum *Mx.*
T. erectum *L.*
Lilium Canadense *L.*
Scirpus Eri. v. cyperinus *Gr.*
Eleocharis palustris *R. Br.*
E. melanocarpa *Torr.*
Carex str. v. aperta *Gr.*
Triticum caninum *L.*
Poa trivialis *L.*
Glyceria aquatica *Sm.*
G. Canadensis *Trin.*
Calamagrostis Pickeringii *Gr.*
Poa laxa *Hænke.*
P. alsodes *Gr.*
P. compressa *L.*
Brachyelytrum aristatum *Bv.*
Dicksonia punctilobula *Kze.*
Polypodium vulgare *L.*
Aspidium spinulosum *Sw.*
A. acrostichoides *Sw.*
A. crist. v. Clintonianum.
Cystopteris fragilis *Bernh.*
Onoclea sens. v. obtusilobata.
Scolopendrium vulgare *Sm.*
Asplenium Rutamuraria *L.*
Botrychium Lunaria *Sw.*
B. simplex *Hitch.*
B. lanceolatum *Angst.*
B. Virg. v. gracile.

New to the Herbarium.

Solidago humilis *Pursh.*
Utricularia subulata *L.*
Salix purpurea *L.*
Pinus mitis *Mx.*
Potamogeton lonchitis *Tuckm.*
Muscari racemosum *L.*
Pogonia affinis *Aust.*
Eleocharis tricostata *Torr.*
Hypnum rusciforme *Weis.*
Calicium curtum *T. & B.*

Calicium brunneolum *Ach.*
Arthonia polymorpha *Ach.*
Graphis eulectra *Tuckm.*
Sirosiphon tomentosum *Kutz.*
Chlorostylium cataractarum *Kutz.*
Agaricus cristatellus *Pk.*
A. fumescens *Pk.*
A. pinophilus *Pk.*
A. rubromarginatus *Fr.*
A. radicatellus *Pk.*
A. chrysophyllus *Fr.*
A. abscondens *Pk.*
A. septicus *Fr.*
A. albogriseus *Pk.*
A. micropus *Pk.*
A. undulatellus *Pk.*
A. rhodocalyx *Lasch.*
A. vermifluus *Pk.*
A. limonellus *Pk.*
A. squarrosoides *Pk.*
A. mycenoides *Fr.*
A. paludinellus *Pk.*
A. lentiformis *Pk.*
A. hymenocephalus *Pk.*
A. camptopus *Pk.*
Coprinus rotundosporus *Pk.*
C. macrosporus *Pk.*
Cortinarius Copakensis *Pk.*
C. lapidophilus *Pk.*
Marasmius calopus *Fr.*
Boletus Satanus *Lenz.*
Polyporus pallidus *Schultz.*
P. induratus *Pk.*
P. subiculosus *Pk.*
P. semitinctus *Pk.*
Hydnum sulphurellum *Pk.*
Mucronella calva *A. & S.*
M. aggregata *Fr.*
Solenia villosa *Fr.*
Craterellus dubius *Pk.*
Cyphella sulphurea *Batsch.*
Stereum sanguinolentum *A. & S.*
Clavaria fumigata *Pk.*
C. corynoides *Pk.*
Tremella lutescens *Pers.*
Guepinia Peziza *Tul.*
Hymenula olivacea *Pk.*
Physarum inæqualis *Pk.*
P. ornatum *Pk.*
P. atrorubrum *Pk.*
P. psittacinum *Dittm.*
Badhamia affinis *Rost.*
Didymium eximium *Pk.*
D. angulatum *Pk.*
Chondrioderma difforme *Pers.*
Diachæa subsessilis *Pk.*
Comatricha Friesiana *De By.*
C. pulchella *Bab.*
Lamproderma violaceum *Fr.*
Arcyria pomiformis *Rost.*
Oligonema brevifila *Pk.*
Trichia inconspicua *Rost.*
Lycogala flavofuscum *Ehr.*
Sacidium Pini *Fr.*
Septoria Verbascicola *B. & C.*
S. Waldsteiniæ *P. & C.*
Phyllosticta Loniceræ *Desm.*
Vermicularia trichella *Grev.*
V. albomaculata *Schw.*
Melanconium Americanum *P. & C.*
Sporidesmium sicynum *Thum.*
Phragmidium bulbosum *Schl.*
Uromyces polymorphus *P. & C.*
U. Trifolii *Fckl.*
Ustilago Salvei *B. & Br.*
Massospora cicadina *Pk.*
Isaria limonipes *Pk.*
Stilbum flavipes *Pk.*
S. rigidum *Pers.*
Sporocybe abietina *Pk.*
Helminthosporium Hydropiperis *Thum*
H. interseminatum *B. & C.*
Cladosporium Graminum *Lk.*
Botryosporium pulchrum *Berk.*
Polyactis vulgaris *Lk.*
Aspergillus flavus *Lk.*
Peronospora pygmæa *Ung.*
Peronospora simplex *Pk.*
Mucor ramosus *Bull.*
M. caninus *Pers.*
Peziza Acetabulum *L.*
P. succosa *Berk.*
P. vulcanalis *Pk.*
P. gallinacea *Pk.*
P. sulphurea *Pers.*
P. viridicoma *Pk.*
P. Osmundæ *C. & E.*
P. umbrorum *Fckl.*
P. planodiscus *P. & C.*
P. brunneola *Desm.*
Helotium albopunctum *Pk.*
H. phyllophilum *Pk.*
Hæmatomyces orbicularis *Pk.*
Patellaria olivacea *Batsch.*
Dermatea carnea *C. & E.*
D. phyllophila *Pk.*
D. Xanthoxyli *Pk.*
Tympanis acerina *Pk.*

Cenangium Cassandræ *Pk.*
C. pezizoides *Pk.*
Rhytisma maximum *Fr.*
Phacidium brunneolum *Pk.*
Hysterium hyalospermum *Ger.*
Triblidium morbidum *Pk.*
Hypoderma Corni *Fr.*
H. nervisequum *DC.*
Hypocrea viridis *Tode.*
Hypoxylon xanthocreas *B. & C.*
Diatrype asterostoma *B. & C.*
Dothidea Epilobii *Fr.*
Valsa Xanthoxyli *Pk.*
V. translucens *De Not.*
Massaria gigaspora *Desm.*
Lophiostoma prominens *Pk.*
L. scelesta *C. & E.*
Sphæria pulchriseta *Pk.*
S. curvicolla *Pk.*
S. sorghophila *Pk.*
S. fimiseda *C. & D.*
S. phellogena *B. & C.*
S. cladosporiosa *Schw.*
S. Marciensis *Pk.*
S. Crepini *West.*
S. Typhæ *Schw.*
S. Gnomon *Tode.*
Venturia Dickiei *De Not.*

(2.)

PLANTS COLLECTED.

Plantago Rugelii *Decaisne.*
Zygnema insigne *Hassal.*
Chantransia violacea *Ktz.*
Glœotrichia Pisum *Thuret.*
Agaricus spretus *Pk.*
A. impolitoides *Pk.*
A. alboides *Pk.*
A. patuloides *Pk.*
A. subhirtus *Pk.*
A. dealbatus *Sow.*
A. leptolomus *Pk.*
A. odorus *Bull.*
A. anisarius *Pk.*
A. hygrophoroides *Pk.*
A. lentinoides *Pk.*
A. atratoides *Pk.*
A. cremoraceus *Pk.*
A. luteopallens *Pk.*
A. Epichysium *Pers.*
A. tomentosulus *Pk.*
A. umbrosus *Pers.*
A. dysthales *Pk.*
A. muricatus *Fr.*
A. carbonarius *Fr.*
A. sapineus *Fr.*
A. aquatilis *Fr.*
A. eutheloides *Pk.*
A. nodulosporus *Pk.*
A. infelix *Pk.*
A. trechisporus *Berk.*
A. Artemisiæ *Pass.*
A. modestus *Pk.*
Cortinarius iodes *B. & C.*
C. cærulescens *Fr.*
C. amarus *Pk.*
C. crystallinus *Fr.*
C. opimus *Fr.*
C. furfurellus *Pk.*
C. bivelus *Fr.*
C. armeniacus *Fr.*
Lactarius pubescens *Fr.*
L. corrugis *Pk.*
Russula nigricans *Fr.*
R. compacta *Frost.*
R. delica *Fr.*
R. olivascens *Fr.*
R. flavida *Frost.*
Hygrophorus lividoälbus *Fr.*
Marasmius archyropus *Pers.*
Boletus punctipes *Pk.*
B. sensibilis *Pk.*
B. Roxanæ *Frost.*
B. rubinellus *Pk.*
Polyporus circinatus *Fr.*
P. parvulus *Klotzsch.*
P. simillimus *Pk.*
P. Morgani *Frost.*
P. cuticularis *Bull.*
P. chrysoloma *Fr.*
P. molluscus *Fr.*
Trametes Trogii *Berk.*
Hydnum alutaceum *Fr.*
Craterellus Cantharellus *Schw.*
C. clavatus *Fr.*

Corticium subrepandum *B. & Ck.*
Thelephora radiata *Holmsk.*
Clavaria formosa *Pers.*
C. fastigiata *L.*
C. corrugata *Karst.*
C. flaccida *Fr.*
Pterula divaricata *Pk.*
Tremella subcarnosa *Pk.*
Dacrymyces conglobatus *Pk.*
Phallus Ravenelii *B. & C.*
Geaster Capensis *Thum.*
Melanogaster variegatus *Tul.*
Rhizopogon rubescens *Tul.*
Enerthenema papillata *Pers.*
Cribraria vulgaris *Schrad.*
Depazea juglandina *Fr.*
Vermicularia compacta *C. & E.*
Septoria Populi *Desm.*
S. Canadensis *Pk.*
Sphæropsis cornina *Pk.*
S. typhina *Pk.*
S. Peckiana *Thum.*
Synchytrium Anemones *DC.*
Protomyces conglomeratus *Pk.*
Puccinia Scirpi *Lk.*
Torula anomala *Pk.*
Acrospermum album *Pk.*
Isaria fulvipes *Pk.*
Tubercularia hirtissima *Pk.*
T. floccosa *Lk.*
Periconia albiceps *Pk.*
Septosporium velutinum *C. & E.*
Helminthosporium obovatum *Berk.*
Cladosporium compactum *B. & C.*
Heterosporium Ornithogali *Kl.*
Fusicladium dendriticum *Wallr.*
Polyactis cinerea *Berk.*
Oidium destruens *Pk.*
Ramularia effusa *Pk.*
R. albomaculata *Pk.*
R. lineola *Pk.*
R. Fragariæ *Pk.*
R. Norvegicæ *Pk.*
R. Plantaginis *Pk.*
R. variabilis *Fckl.*
R. angustata *Pk.*
Cercospora Rosæcola *Pass.*
C. Apii *Fres.*
Glomerularia Corni *Pk.*
Peronospora Ficariæ *De By.*
P. Corydalis *De By.*
Peronospora gangliformis *Berk.*
Sporotrichum larvatum *Pk.*
S. sulphureum *Grev.*
S. alutaceum *Schw.*
Spondylocladium tenellum *Pk.*
Penicillium bicolor *Fr.*
Acremonium flexuosum *Pk.*
Sepedonium cervinum *Dittm.*
S. brunneum *Pk.*
Morchella angusticeps *Pk.*
Gyromitra curtipes *Fr.*
Geoglossum irregulare *Pk.*
Peziza euplecta *Ck.*
P. melastoma *Sow.*
P. apiculata *Ck.*
P. tetraönalis *Pk.*
P. humosoides *Pk.*
P. longipila *Pk.*
P. aurata *Fckl.*
P. melaleuca *Fr.*
P. urticina *Pk.*
P. Typhæ *Pk.*
P. enterochroma *Pk.*
Helotium palustre *Pk.*
H. fraternum *Pk.*
H. lutescens *Fr.*
H. vibrisseoides *Pk.*
Dermatea minuta *Pk.*
Patellaria pusilla *Pk.*
Bulgaria bicolor *Pk.*
B. deligata *Pk.*
Hypomyces luteövirens *Fr.*
Exoascus Pruni *Fckl.*
Taphrina aurea *Fr.*
Hypoxylon udum *Fr.*
Dothidea reticulata *Fr.*
Diatrype verrucoides *Pk.*
Valsa pulviniceps *Pk.*
V. Sorbi *Fr.*
Lophiostoma bicuspidata *Ck.*
Sphæria squamulata *Schw.*
S. albidostoma *Pk.*
S. subiculata *Schw.*
S. intricata *Pk.*
S. scopula *C. & P.*
S. subdenudata *Pk.*
S. livida *Fr.*
S. humulina *Pk.*
S. clavarilna *Pk.*
Sphærella Peckii *Spegaz.*
S. septorioides *Pk.*

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Rev. H. Wibbe, Oswego, N. Y.

Listera australis *Lindl.*
Botrychium simplex *Hitch.*

Prof. P. A. Puissant, Troy, N. Y.

Solidago Virgaurea *L.*

Addison Brown, New York City, N. Y.

Lepidium Draba *L.*
L. ruderale *L.*
Thlaspi arvense *L.*
Alliaria officinalis *DC.*
Asperugo procumbens *L.*
Matricaria Chamomilla *L.*
Aster memoralis *Ait.*

E. S. Miller, Wading River, N. Y.

Glaucium luteum *Scop.*
Hypericum adpressum *Barton.*

N. L. Britton, New Dorp, N. Y.

Pinus mitis *Mx.*
Pinus inops *Ait.*

H. A. Warne, Oneida, N. Y.

Cynophallus caninus *Fr.*

L. M. Underwood, Syracuse, N. Y.

Zygadenus glaucus *Nutt.*

Hon. G. W. Clinton, Buffalo, N. Y.

Aster Novæ-Angliæ *L.*
A. ericoides *L.*
Gentiana puberula *Mx.*
Hydnum cinnabarinum *Schw.*
H. fuscoätrum *Fr.*
Clathrus cancellatus *L.*
Sphæropsis pulchrispora *P. & C.*
Tubercularia subdiaphana *Schw.*
Verticillium lateritium *Ehr.*
Sporotrichum virescens *Lk.*
Peziza Sphærella *P. & C.*
Helotium Sarmentorum *Fr.*
Sphæria pulviscula *Curr.*
S. infectoria *Fckl.*
Grandinia membranacea *P. & C.*

W. Doolittle, Medusa, N. Y.

Lycoperdon giganteum *Batsch.*

S. H. Wright, M. D., Penn Yan, N. Y.

Potamageton crispus *L.*
Desmodium nudiflorum *DC.*
Aster puniceus *L.*
Ulmus racemosa *Thomas.*
Polygonum amphibium *L.*
P. Hartwrightii *Gr.*

A. P. Morgan, Dayton, Ohio.

Agaricus Morgani *Pk.*
Polyporus Morgani *Frost.*

Prof. A. M. JOHNSON, Minneapolis, Minn.

Polyporus tomentoso-quercinus *Johns.*

H. W. RAVENAL, Aiken, S. C.

Lentinus Lecomtei *Fr.*
Phallus rubicundus *Bosc.*
Lycoperdon leprosum *B. & Rav.*

C. F. AUSTIN, Closter, N. J.

Micromitrium Austinii *Sulliv.*
Agaricus chlorinosmus *Pk.*

M. S. BEBB, Fountaindale, Ill.

Salix petiolaris *Smith.*

W. C. STEVENSON, JR., Philadelphia, Pa.

Trametes suaveolens *Fr.*
Polyporus cuticularis *Fr.*

W. F. BUNDY, Sauk City, Wis.

Podaxon Warnei *Pk.*

Prof. W. G. FARLOW, Cambridge, Mass.

Synchytrium Myo. v. Potentillæ.
S. papillatum *Far.*
Peronospora Ficariæ *Tul.*
P. obducens *Schroet.*
P. Potentillæ *De By.*
P. nivea *Ung.*
Ramularia macrospora *Fres.*
Cenangium pythium *B. & C.*
Podisoma Ellisii *Berk.*
Uromyces Junci *Schw.*
U. Dactylidis *Otth.*
Puccinia Epil. v. Proserpinaceæ.
Taphrina aurea *Fr.*
T. alnitorqua *Tul.*
Ascomyces deformans *Berk.*
Dothidea vorax *B. & C.*

E. A. RAU, Bethlehem, Pa.

Puccinia Grindeliæ *Pk.*
P. Kuhniæ *Schw.*
P. cladophila *Pk.*
Accidium gracilens *Pk.*
Uromyces sanguineus *Pk.*
U. Brandegei *Pk.*
U. simulans *Pk.*
U. plumbarius *Pk.*

J. B. ELLIS, Newfield, N. J.

Trametes suaveolens *Fr.*
Polyporus volvatus *Pk.*
Uromyces Junci *Schw.*
Helicosporium olivaceum *Pk.*
H. ellipticum *Pk.*
H. lilacinum *Ellis.*
Diplodia ilicicola *Desm.*
Vermicularia compacta *C. & E.*
Hymenula æruginosa *C. & E.*
Corticium subrepandum *B. & Cke.*
Septosporium prælongum *Sacc.*
Cercospora grisea *C. & E.*
Polyactis streptothrix *C. & E.*
Chætostroma olivaceum *C. & E.*
Peziza fuscidula *C. & E.*
P. regalis *C. & E.*
P. pulverulenta *Lib.*
P. atrocinerea *Ck.*
P. Pinastri *C. & P.*
Meliola amphitricha *Fr.*
Lophiostoma cyclopeum *Ellis.*
Sphæria barbirostris *Duf.*
S. Eriophora *Ck.*
S. soluta *C. & E.*
S. distributa *C. & E.*
S. Desmodii *Pk.*
S. Ogilviensis *B. & Br.*

(4.)

PLANTS NOT BEFORE REPORTED.

GLAUCIUM LUTEUM *Scop.*

Shore of Fort Pond Bay, Montauk Point. *E. S. Miller.*

ALLIARIA OFFICINALE *DC.*

Hunter's Point, Westchester County. *Addison Brown.*

HYPERICUM ADPRESSUM *Bart.*

Between Sag Harbor and East Hampton. *Miller.*

ASTER NEMORALIS *Ait.*

Long island and Hitchings Pond, Adirondack Mountains. *Brown.*

PLANTAGO RUGELII *Decaisne.*

Not uncommon about Albany, but often confused with *Plantago major.*

GENTIANA PUBERULA *Mx.*

Buffalo *G. W. Clinton.*

POTAMOGETON CRISPUS *L.*

Keuka Lake, Yates County. *S. H. Wright.*

CHANTRANSIA VIOLACEA *Ktz.*

Wet rocks in rapid streams. Sprakers. June.

This alga forms soft mats or cushions of a dark-red or purplish color on rocks kept wet by rapidly flowing water.

ZYGNEMA INSIGNE *Hassel.*

Standing water in ditches. North Greenbush. June.

GLŒOTRICHIA PISUM *Thuret.*

Floating and submerged leaves of water plants. Brewerton. Sept.

MICROMITRIUM AUSTINII *Sulliv.*

Ground. Rockland County. *C. F. Austin.*

AGARICUS (AMANITA) SPRETUS *n. sp.*

Pileus subovate, then convex or expanded, smooth or adorned with a few fragments of the volva, substriate on the margin, whitish or pale-brown; lamellæ close, reaching the stem, white; stem equal, smooth, annulate, stuffed or hollow, whitish, finely striate at the top from the decurrent lines of the lamellæ, not bulbous at the base, but the volva rather large, loose, subochreate; spores elliptical, generally with a single large nucleus, .0004′–.0005′ long, .00025′–.0003′ broad.

Plant 4–6′ high, pileus 3′–5′ broad, stem 4″–6″ thick.

Ground in open places. Sandlake and Gansevoort. Aug.

This species belongs to the Phalloidean section, and is related to *A. porphyrius* and *A. recutitus.* The margin of the pileus is generally clearly, though sometimes obsoletely, striate. The absence of a bulbous base separates it from *A. mappa.*

AGARICUS (TRICHOLOMA) IMPOLITOIDES *n. sp.*

Pileus convex, then expanded, obtuse, dry, fibrillose-tomentose, becoming squamose on the disk, sometimes distantly striate on the margin, whitish, the disk usually brownish; lamellæ close, emarginate, whitish; stem equal, solid, slightly fibrillose, white; spores elliptical, .00025′ long, .0002′ broad; flesh white, taste farinaceous.

Plant 3′–4′ high, pileus 2′–3′ broad, stem 3″–5″ thick.

Ground in woods. Gansevoort. Aug.

This plant is closely related to *A. impolitus*, but I do not find the stem squamose nor the taste salty or peppery as in that species. It sometimes grows in circles. The scaly disk at first sight is suggestive of species of Lepiota.

AGARICUS (TRICHOLOMA) ALBOIDES *n. sp.*

Pileus compact, firm, convex, glabrous, white, the disk tinged with yellow or brown; lamellæ crowded, rounded behind, subfree, white; stem nearly equal, solid, firm, squamulose at the apex, white; spores subelliptical, .0002′–.00025′ long, .00016′ broad; taste at first bitter, then very acrid, odor strong, earthy or subfetid.

Plant 3′–4′ high, pileus 2–3′ broad, stem 3′–6′ thick.

Ground in woods. Brewerton. Sept.

This species is very near to *A. albus*, but its compact pileus, peppery taste and strong odor seem to require its separation. The stem sometimes penetrates the earth quite deeply.

AGARICUS (CLITOCYBE) SUBHIRTUS *n. sp.*

Pileus convex or expanded, sometimes slightly depressed, at first tomentose-hairy and pale-yellow or buff colored, then nearly glabrous and whitish, the margin incurved; lamellæ close, adnate or decurrent, whitish or pale yellow; stem subequal, stuffed or hollow, whitish; spores subglobose, or broadly elliptical, .00025′ long.

Plant 1′–3′ high, pileus 1′–3′ broad, stem 2″–4″ thick.

Ground in woods. Brewerton. Sept.

The species is apparently related to *A. subalutaceus*. The pileus becomes smoother and paler with age. The spores sometimes present an irregular form.

AGARICUS (CLITOCYBE) PATULOIDES *n. sp.*

Pileus compact, convex or expanded, glabrous, the cuticle sometimes breaking up into small appressed scales, whitish or pale-yellow, the margin incurved; lamellæ thin, crowded, decurrent and reticulately connected in thin lines; stem equal, solid, firm, glabrous, whitish; spores subglobose or broadly elliptical, .00025′–.0003′ long; flesh pure white.

Plant gregarious or circinating, 2′–4′ high, pileus 1′–4′ broad, stem 4″–10″ thick.

In groves and open woods. Brewerton. Sept.

The reticulations of the narrowly decurrent lamellæ at the top of the stem indicate a relationship with *A. patulus*, but it appears to be a Clitocybe, not a Tricholoma, and therefore must be distinct.

Agaricus dealbatus *Sow.*

Grassy pastures. Brewerton. Sept.

Agaricus odorus *Bull.*

Ground in woods. Gansevoort. Aug.

In our specimens the lamellæ are close and white, and the pileus loses its green color with age.

Agaricus (Clitocybe) anisarius *n. sp.*

Pileus convex, then expanded, greenish-gray with the margin incurved, then grayish or whitish, adorned with minute innate fibrils, slightly pruinose and substriate on the margin; lamellæ adnate or decurrent, narrow, crowded, white; stem subequal, firm, hollow, whitish; spores subelliptical, .00025′ long; odor weak but pleasant, anise-like.

Plant 2′–4′ high, pileus 1.5′–3′ broad, stem 2″–3″ thick.

Ground in woods. Gansevoort. Aug.

This is closely related to *A. connexus*, from which it is easily separated by the hollow stem.

Agaricus (Clitocybe) leptolomus *n. sp.*

Pileus thin, plane or infundibuliform, umbilicate, hygrophanous, smooth, creamy-white when moist, white when dry, the margin very thin; lamellæ thin, narrow, crowded, some of them forked, decurrent, white; stem equal, smooth, generally curved or flexuous, stuffed, colored like the pileus, white-villous at the base; spores very minute, subelliptical, .00012′ long.

Plant gregarious or subcæspitose 2′–3′ high, pileus about 2′ broad, stem 1″–2′ thick.

Decaying prostrate trunks in woods. Indian Lake. Aug.

The width of the lamellæ is about equal to the thickness of the flesh of the pileus. They taper gradually toward each end, where they are very narrow. The species may be distinguished from *A. truncicola* by its hygrophanous umbilicate pileus. The stem is sometimes eccentric.

Agaricus (Collybia) cremoraceus *n. sp.*

Pileus thin, submembranaceous, convex or campanulate, obtuse, dry, slightly silky, dingy cream color, the margin sometimes wavy; lamellæ broad, ascending, ventricose, with a decurrent tooth, whitish; stem slender, slightly silky, stuffed or hollow, pallid or subconcolorous; spores broadly elliptical or subglobose, .00025′ long, .0002′ broad.

Plant 1.5′–2′ high, pileus 6″–12″ broad, stem about 1″ thick.

Ground in woods. Gansevoort. Aug.

Agaricus (Collybia) hygrophoroides *n. sp.* (Plate II, figs. 21–24.)

Pileus subconical, then convex or expanded, smooth, hygrophanous, reddish or yellowish-red when moist, paler when dry; lamellæ sub-distant, rounded behind or deeply emarginate, eroded on the edge, whitish; stem nearly equal, striate, stuffed or hollow, whitish; spores subelliptical, .0002′–00025′ long, .00016′ broad.

Plant subcæspitose, 2′–3′ high, pileus 1′–1.5′ broad, stem 2″–3″ thick.

Decaying half-buried wood. Knowersville. May.

At first sight the young pileus is suggestive of the pileus of *Hygrophorus conicus*, both in shape and color. When dry the color is pallid or subochraceous.

AGARICUS (COLLYBIA) LENTINOIDES *n. sp.*

Pileus thin, convex, obtuse, smooth, hygrophanous, reddish-brown or chestnut color when moist, reddish-alutaceous when dry; lamellæ narrow, close, adnexed, serrate on the edge, white; stem equal, substriate, slightly pruinose at the apex, white.

Plant about 2′ high, pileus 6″–10″ broad, stem 1″ thick.

Ground in wooded swamps. Root, Montgomery County. June.

The serrated lamellæ and white substriated stem will serve to distinguish this species from *A. dryophilus*.

AGARICUS (COLLYBIA) ATRATOIDES *n. sp.*

Pileus thin, convex, subumbilicate, glabrous, hygrophanous, blackish-brown when moist, grayish-brown and shining when dry; lamellæ rather broad, adnate, subdistant, grayish-white, often venulose-connected and transversely marked above with slender veins; stem equal, hollow, smooth, grayish-brown, with a whitish tomentum at the base; spores nearly globose, about .0002′ across.

Plant gregarious or subcæspitose, about 1′ high, pileus 6″–10″ broad, stem .5″–1″ thick.

Decaying mossy sticks and logs in woods. Gansevoort. Aug.

The species belongs to the section Tephrophanæ, and is apparently related to *A. atratus*.

AGARICUS (MYCENA) LUTEOPALLENS *n. sp.*

Pileus thin, convex, smooth, striatulate on the margin when moist, bright yellow, becoming paler when dry; lamellæ moderately close, subarcuate, yellow; stem equal or slightly tapering upward, smooth, hollow, yellow, with yellow hairs and fibrils at the base.

Plant single or cæspitose, 2′ high, pileus 3″–6″ broad, stem about 1″ thick.

Among fallen leaves in woods. Adirondack Mountains. Aug.

This species may be distinguished from *Hygrophorus parvulus* by its subcæspitose habit, and the yellow hairs at the base of the stem.

AGARICUS EPICHYSIUM *Pers.*

Decaying prostrate trunks of trees. Indian Lake. Aug.

AGARICUS (PLUTEUS) TOMENTOSULUS *n. sp.*

Pileus thin, convex or expanded, subumbonate, dry, minutely squamulose-tomentose, white, sometimes pinkish on the margin; lamellæ rather broad, rounded behind, free, crowded, white, then flesh-colored; stem equal, solid, striate, slightly pubescent or subtomentose, white; spores subglobose, .0003′ in diameter, generally containing a single large nucleus.

Plant 2′–5′ high, pileus 1′–3′ broad, stem 2″–4″ thick.

Decaying wood. Catskill Mountains and Gansevoort. July and August.

Agaricus umbrosus *Pers.*

Decaying wood. Indian Lake. Aug.

Agaricus (Entoloma) dysthales *n. sp.*

Pileus submembranaceous, subconical, then convex or expanded, obtuse, striate, furfuraceous or squamulose, lurid-brown, becoming paler with age; lamellæ broad, subdistant, ventricose, brown or grayish-brown, then flesh-colored; stem equal, hollow, slender, tomentose-squamulose, brownish; spores irregularly oblong-elliptical, .0006′–.00065′ long, about half as broad, usually containing a single large nucleus.

Plant about 2′ high, pileus 3″–6″ broad, stem about 1″ thick.

Damp ground in woods. Catskill Mountains. July.

The species belongs to the section Leptonidei. It has a peculiar starved deformed appearance, whence the specific name. To the naked eye the pileus appears to be clothed with minute branny scales, but under a lens these are seen to be jointed matted filaments which form a kind of thin squamulose tomentum. In some specimens it is more dense than in others, both on the pileus and stem. The general outline of the spores is narrowly elliptical, but they are somewhat pointed at the base and they also have the angular projections, which are generally present on the spores of species of Entoloma. The adornment of the pileus and stem indicates an affinity with *A. jubatus*, but our plant is much smaller than that and is very different in its habit.

Agaricus muricatus *Fr.*

Decaying wood of deciduous trees. Carlisle and Indian Lake. June and August.

Agaricus trechisporus *Berk.*

Ground in woods. Brewerton. Sept.

Only a single specimen was found. The pileus is nearly white and the plant odorless, but in other respects it agrees well with the description of the species to which we have referred it.

Agaricus (Inocybe) nodulosporus *n. sp.*

Pileus thin, hemispherical or convex, obtuse, floccose-squamose, dark cervine-brown or umber color, the scales of the disk usually erect; lamellæ rounded behind, adnexed, ventricose, pallid, then ferruginous-cinnamon, white and minutely toothed on the margin; stem equal, solid, tomentose-squamulose, colored like the pileus; spores rough, .0003′–.00035′ long.

Plant about 1′ high, pileus 4″–8″ broad, stem scarcely 1″ thick.

Decaying wood in woods. Gansevoort. Aug.

This species agrees very closely with the description of *A. lanuginosus*, to which I should have referred it but for the rough spores. It is smaller than *A. stellatosporus*, of a paler color and a more soft and woolly appearance. Both belong to the section Squarrosi.

AGARICUS (INOCYBE) EUTHELOIDES *n. sp.*

Pileus thin, conic or campanulate, then expanded, distinctly umbonate, silky-fibrillose, subrimose, varying in color from grayish-cervine to chestnut-brown, the disk sometimes squamulose; lamellæ moderately close, rather broad, ventricose, narrowed or rounded behind, adnexed, whitish, then ferruginous-brown, white and denticulate on the edge; stem equal, subflexuous, solid, whitish-fibrillose, pallid; spores even, uninucleate, gibbous or unequally elliptical, .00035′–.0004′ long; flesh of the pileus white.

Plant 1′–2′ high, pileus 6′–12′ broad, stem 1″–2″ thick.

Ground in woods. Brewerton. Sept.

The species seems to be closely related to *A. eutheles*, from which it differs in the character of the lamellæ, which are rather abruptly and strongly narrowed behind, in the absence of a farinaceous odor and in the character of the spores. The stem is paler then the pileus, sometimes being nearly white. The species belongs to the section Rimosi.

AGARICUS (INOCYBE) INFELIX *n. sp.*

Pileus campanulate, convex or expanded, subumbonate, fibrillose-squamulose, grayish-brown or umber; lamellæ close, emarginate, ventricose, rather broad, whitish, then ferruginous-brown; stem equal, solid, pallid or whitish, sometimes darker toward the base, silky fibrillose, white and pruinose at the top; spores oblong, .0004′–.0005′ long, about .0002′ broad; flesh of the pileus white, odor none.

Plant 1′–2′ high, pileus 6′–12′ broad, stem 1″–2″ thick.

Sterile mossy ground in open places. Indian Lake. Aug.

The species belongs to the section Laceri. In wet weather the pileus becomes more lacerated than in dry. It generally becomes paler with age. A small form occurs in which the pileus is scarcely umbonate and 4″–6″ broad, with the stem about half an inch high. The oblong spores afford a ready character by which to separate this species from the preceding.

AGARICUS SAPINEUS *Fr.*

Decaying prostrate trunks. Brewerton. Sept.

AGARICUS CARBONARIUS *Fr.*

Burnt ground. Sandlake. May.

AGARICUS AQUATILIS *Fr.*

In wet moss along rivulets. Catskill Mountains. July.

AGARICUS FLAVIDUS *Schæff.*

Decaying wood. Indian Lake. Aug.

AGARICUS ARTEMISIÆ *Pass.*

Damp ground in woods. Brewerton. Sept.

AGARICUS (HYPHOLOMA) MODESTUS *n. sp.*

Pileus thin, convex or subconical, then expanded, rarely slightly umbonate, hygrophanous, reddish-brown or pale chestnut-colored when moist, dingy or ochraceous-brown when dry, smooth, the margin whitened when young by the flocculent evanescent veil, sometimes striate; lamellæ plane, broad, adnate or slightly emarginate, usually with a decurrent tooth, grayish or clouded, becoming purplish-brown, the edge white; stem equal, rather firm, hollow, fibrillose, brownish; spores purple-brown, broadly ovate, compressed, .00025′–.0003′ long.

Plant gregarious, about 1′ high, pileus 4″–10″ broad, stem about 1″ thick.

Bark and branches lying on the ground in woods. Adirondack Mountains. Aug.

The species belongs to the section Appendiculati. In drying the disk changes its color first.

CORTINARIUS CÆRULESCENS *Fr.*

Ground in woods and groves. Brewerton. Sept.

Our specimens were violet rather than blue, but they were not very young and may have lost some of their original color.

CORTINARIUS CRYSTALLINUS *Fr.*

Mossy ground in low woods. Sandlake. Oct.

The specimens are much smaller than the dimensions given in the description, and the habitat is different, but they agree very well with the figures of the species.

CORTINARIUS (PHLEGMACIUM) AMARUS *n. sp.*

Pileus convex or expanded, often irregular, smooth, glutinous in wet weather, yellow, the disk sometimes tinged with red, pale-yellow when dry, the margin whitish; lamellæ close, rounded behind, whitish, then ochraceous-cinnamon; stem soft, tapering upward, solid, whitish, at first clothed with white silky fibrils; flesh white, taste very bitter.

Plant gregarious or subcæspitose, 1′–2 high, pileus about 1′ broad, stem 2′–4″ thick.

Ground under spruce and balsam trees. Adirondack Mountains. Aug.

In wet weather the stem is sometimes viscid, apparently from the gluten of the pileus running down upon it.

CORTINARIUS IODES *B. & C.*

Ground in woods. Sandlake. Aug.

This is a small but beautiful species, the pileus, lamellæ and stem being of a bright-violet or purplish-violet hue. The spores are subelliptical, generally uninucleate, .0004′ long, .00025′ broad.

CORTINARIUS OPIMUS *Fr.*

Ground in woods. Catskill Mountains. July.

CORTINARIUS BIVELUS *Fr.*

In woods about the margin of swamps. Center. Sept.

The margin is often whitish with superficial fibrils which sometimes form a continuous zone and sometimes are collected in patches

CORTINARIUS (TELAMONIA) FURFURELLUS *n. sp.*

Pileus thin, convex, furfuraceous with minute squamules, hygrophanous, watery-tawny when moist, pale ochraceous when dry; lamellæ broad, thick, distant, adnate or slightly emarginate, tawny-yellow, then cinnamon; stem equal, peronate, colored like the pileus, with a slight annulus near the top; spores subelliptical, minutely rough, 0003 –.0004′ long, .00025′ broad.

Plant 1′–2 high, pileus 1′–2′ broad, stem 2″–4″ thick.

Moist ground in open places. Gansevoort. Aug.

CORTINARIUS ARMENIACUS *Fr.*

Ground in woods. Gansevoort. Aug.

HYGROPHORUS LIVIDOALBUS *Fr.*

Ground in woods. Brewerton. Sept.

LACTARIUS PUBESCENS *Fr.*

Ground in open woods. Sandlake and Gansevoort. Aug.

Our specimens have the margin of the pileus obsoletely pubescent, and generally narrowly zonate. The stem is white, and either equal or tapering downward; it is sometimes spotted, but I have not seen it with incarnate tints. In other respects they agree so well with the description of *L. pubescens*, that I have concluded to refer them to that species.

LACTARIUS CORRUGIS *n. sp.*

Pileus fleshy, compact, firm, convex, then expanded or centrally depressed, merulioid or corrugated with gyrose-reticulate wrinkles, dark reddish-brown or chestnut-colored, becoming paler with age, suffused as if with a slight pruinosity; lamellæ close, dark creamy-yellow or sub-cinnamon, becoming paler, often distilling drops of moisture, sordid or brownish where bruised; stem equal, solid, firm, paler than the pileus, sub-pruinose; spores large, sub-globose, .00045 –.0005′ in diameter, intermixed with small acicular points or spicules, .0016 –.002′ long; flesh whitish or cream-colored, milk copious, white, mild.

Plant 4 –6′ high, pileus 3′–5′ broad, stem 6″–12″ thick.

Ground in woods. Sandlake, Gansevoort and Brewerton. August and September.

This remarkable species is related to *L. volemus*. It is, however, of a darker color, and the surface of the pileus is very uneven from the presence of rugæ or folds, which present an appearance much like that of the hymenium of some species of Merulius. The spicules of the lamellæ too are a peculiar feature. They are so numerous that under a lens they give a pubescent appearance to the edge of the lamellæ.

RUSSULA NIGRICANS *Bull.*

Ground in woods. Gansevoort and Brewerton. Aug. and Sept.

Our specimens agree with the description in every respect except that the lamellæ are not distant.

RUSSULA DELICA *Fr.*

Ground in woods. Center and Brewerton.

This very closely resembles *Lactarius vellereus*, from which it may be distinguished by its mild taste, and the absence of a milky juice. From the juiceless variety of *L. vellereus* its mild taste alone furnishes a separating character.

RUSSULA COMPACTA *Frost MS.*

Pileus fleshy, compact, convex, sometimes centrally depressed, dry, whitish, sometimes tinged or spotted with reddish or yellowish hues, becoming dingy or reddish alutaceous when old or dry, the margin thin but even; lamellæ broad, sub-distant, unequal, a few of them forked, nearly free, white, becoming brown when bruised or dried; stem equal, firm, rather short, solid, white, changing color like the pileus; spores subglobose, nearly smooth, .00035′ in diameter; flesh whitish or subalutaceous, taste mild, odor when drying very disagreeable

Plant 2–4′ high, pileus 3′–5′ broad, stem 8′′–12′′ thick.

Ground in open woods. Sandlake and Brewerton. Aug. and Sept.

Our specimens do not fully agree with Mr. Frost's manuscript description, but they approach so near an agreement that we have not thought best to separate them. The pileus is sometimes split on the margin. The change of color in the pileus and stem is nearly the same, but the lamellæ become darker than either. The disagreeable odor is retained a long time by the dried specimens. The species belongs to the section Compactæ.

RUSSULA OLIVASCENS *Fr.*

Ground in woods. Gansevoort. Aug.

RUSSULA FLAVIDA *Frost MS.*

Pileus fleshy, convex, slightly depressed in the center, not polished, yellow, the margin at first even, then slightly striate-tuberculate; lamellæ nearly entire, venose-connected, white, then cinereous or yellowish; stem firm, solid, yellow, sometimes white at the top; spores yellow, subglobose, .00025′–.0003′ in diameter; flesh white, taste mild.

Plant 2′–3′ high, pileus 2′–3′ broad, stem 4′′–6′′ thick.

Ground in woods. Sandlake. Aug.

MARASMIUS ARCHYROPUS *Pers.*

Ground in woods and swamps. Albany, Adirondack Mountains, etc. This is one of our most common species. It was formerly confused with *M. velutipes*. The latter is generally smaller and has the pileus darker colored and usually with a slight umbilicus. The stem is more slender and its velvety covering inclining to a tawny or subochraceous hue. Both species occur in our State.

BOLETUS PUNCTIPES *n. sp.*

Pileus convex or expanded, glutinous in wet weather, yellow, the thin margin at first minutely grayish-pulverulent, at length recurved; tubes short, nearly plane, adnate, small, subrotund, at first brownish, then sordid-yellow;

stem firm, thickened at the base, glandular-dotted, exannulate, solid, rhubarb-yellow; spores .00035′–.0004′ long, .00016′ broad, flesh yellowish, inclining to grayish in the stem.

Plant 2′–4′ high, pileus 2′–3′ broad, stem 3′′–5′′ thick.

Ground in woods. Gansevoort. Aug.

This species belongs to the section Viscipelles. It is related to such species as *B. albus*, *B. granulatus*, etc. Its rhubarb-colored stem thickened at the base and the brownish color of the young hymenium are its distinguishing features.

Boletus rubinellus *n. sp.* (Plate II, figs. 18–20.)

Pileus at first broadly conical or subconvex, then expanded, subtomentose, red, becoming paler with age; tubes convex, adnate or somewhat depressed around the stem, rather large, subrotund, pinkish-red, then sordid-yellow; stem equal, smooth, yellow with reddish stains; spores oblong, .0005′–.0006′ long, .00016′ broad; flesh of both pileus and stem bright-yellow.

Plant about 2′ high, pileus 1′–2′ broad, stem 1′′–2′′ thick.

Ground in woods. Gansevoort. Aug.

The species belongs to the section Subtomentosi, and is apparently related to *B. rubinus*.

Boletus sensibilis *n. sp.*

Pileus at first firm, convex, pruinose-tomentose, brick-red, then expanded, paler or ochraceous-red, glabrous, soft; tubes at first plane or concave, bright-yellow, then tinged with green, finally sordid-yellow, small, subrotund; stem firm, smooth, lemon-yellow, narrowed at the top when young, and sometimes slightly cribrose from the decurrent walls of the tubes, often stained with red or rhubarb-color; spores greenish-brown, .0005′ long, .00016′ broad; flesh of the pileus pale-yellow, of the stem brighter colored and marbled, both flesh and tubes quickly changing to blue when wounded.

Plant scattered or cæspitose, 4′–6′ high, pileus 3′–8′ broad, stem 6′′–12′′ thick.

Ground in woods. Gansevoort. Aug.

The species belongs to the section Subpruinosi. The specific name is suggested by the ease and rapidity with which the change of color is produced. Merely handling the specimens produces the blue color where they are pressed by the fingers. The species seems near *B. miniato-olivaceus*, but the difference in the color of the pileus and in the character of the stem and its susceptibility to change of color seem to require its separation.

Boletus roxanæ *Frost.*

Ground in woods. Sandlake. Aug.

The margin of the pileus in our specimens is conspicuously involute when young. The stem is sometimes yellow at the top. The species belongs to the section Edules.

Polyporus parvulus *Klotsch* (*P. connatus* Schw.).

Burnt ground. Brewerton. Sept.

Either a closely related species or else a variety of this one sometimes occurs on shaded banks by roadsides. It has the large pores and spores of

P. parvulus, but the ferruginous or tawny color of *P. perennis*. I have seen only poor deformed specimens, and for the present prefer to consider it a variety of the above under the name *P. parvulus* var. *deformatus*.

√ POLYPORUS SIMILLIMUS *n. sp.*

Pileus thin, coriaceous, convex or expanded, umbilicate, zonate, cinereous-brown or livid-chestnut color, slightly silky-tomentose and radiately-fibrillose; pores minute, angular, not at all or but slightly decurrent, cinnamon-color, the dissepiments thin, acute, toothed or lacerated; stem slender, equal, sometimes slightly bulbous at the base, slightly velvety-tomentose, brownish; spores elliptical, usually uninucleate, .00025′-.0003′ long, .0002′ broad.

Plant about 1′ high, pileus 6″–12″ broad.

Burnt ground. Brewerton. Sept.

This plant occurred in company with the preceding species, and was at first taken to be a mere variety of it. Looking at the upper surface of the pileus alone it is not possible to separate one species from the other. But there is such a marked difference in the size of the pores and in the length of the spores that it scarcely seems right to lump the two together as one species. The spores are scarcely as large as in *P. splendens* and *P. perennis*, and they sometimes exhibit a slight incarnate tinge. In all the four species mentioned the pilei are sometimes confluent and sometimes have the margin fimbriate. *P. pictus*, another closely related species, but one which has not yet occurred with us, may be distinguished from the others by its glabrous stem.

The prominent characters of our four species may be expressed as follows:

Pileus plane or convex, umbilicate, opake.
Pores large, rather long, scarcely decurrent.................... P. parvulus *Klotsch.*
Pores small, rather long, scarcely decurrent.................... P. simillimus *Pk.*
Pileus plane or convex, umbilicate, shining, pores small, scarcely decurrent.................................... P. splendens *Pk.*
Pileus plane or infundibuliform, opake, pores short, small, decurrent.. P. perennis *Fr.*

POLYPORUS CIRCINATUS *Fr.*

Ground in the borders of woods. Brewerton. Sept.

√ POLYPORUS MORGANI *Frost MS.*

Pileus fleshy, plane or convex, hairy-tomentulose, subsquamulose, reddish or brownish, the margin thin; pores short, medium size, subrotund, decurrent, white; stem subequal, elastic, solid, radicating, the subterranean portion black or blackish-brown, the exposed part whitish or pallid, inclining to tawny, velvety or somewhat reticulated, central or eccentric; spores oval, pointed at one end, .0005′ long, .0003′ broad; flesh white.

Plant 3′–5′ high, pileus 3′–4′ broad, stem 3″–5″ thick.

Ground in woods. Buffalo *Clinton.* Brewerton. Sept.

This species is evidently closely allied to *P. radicatus* Schw., and *P. melanopus* Fr., but it is in some respects quite diverse from the figure and description of the latter species. The stem sometimes penetrates the earth to a considerable depth, and is quite probably attached to decaying roots or buried pieces of wood. The flesh of the pileus is sometimes quite thick.

The species is very rare, but variable. The Brewerton specimens have the stem central and decidedly velvety, and it may be advisable to separate them as *P. Morgani* var. *velutipes*.

Polyporus cuticularis *Bull.*

Old hickory stumps. Brewerton. Sept.

I have seen no specimens with blackened pileus nor with a fimbriate margin. In other respects our plant agrees essentially with the description of the species.

Polyporus chrysoloma *Fr.*

Decaying wood in shaded places. Gansevoort. Aug.

Polyporus molluscus *Fr.*

Decaying wood. Brewerton. Sept.

Trametes Trogii *Berk.*

Decaying trunks of poplar, *Populus monilifera.* Albany. Sept.

Hydnum fuscoätrum *Fr.*

Decaying wood. Buffalo. *Clinton.*

Hydnum cinnabarinum *Schw.*

Under side of a decaying pine log in woods. Tonawanda. *Clinton.*

Hydnum alutaceum *Fr.*

Decaying wood and bark. Adirondack Mountains. Aug.

Grandinia membranacea *P. & C., n. sp.*

Effused, thin, membranaceous, whitish or subalutaceous, sometimes slightly tinged with greenish-yellow or olivaceous; granules numerous, crowded, unequal; spores broadly elliptical or subglobose, slightly rough, .00025′–.0003′ long.

Much decayed wood, leaves, etc. Tonawanda. Oct. *Clinton.*

Apparently allied to *G. papillosa.*

Craterellus Cantharellus *Schw.*

Ground in bushy places. Sandlake. Aug.

This was placed by Schweinitz in the genus Thelephora, section Craterellæ. Our specimens are quite as large as the ordinary form of *Cantharellus cibarius*, which they so closely resemble that they might easily be mistaken for a deformed condition of it. They are not quite as bright-colored as the cantharellus, and sometimes have a slight reddish tint. The margin is generally more lobed and irregular than in *C. cibarius*, and the spores, though yellowish as in that species, have a slight incarnate tint.

Craterellus clavatus *Pers.*

Ground in woods. Brewerton. Sept.

The resemblance of this is with *Clavaria pistillaris.*

The five species now known to occur in our State may be tabulated as follows:

Stem hollow or pervious to the base:
  Hymenium and stem yellow, spores .0004′–.0005′ long... C. lutescens *Pers.*
  Hymenium and stem subcinereous or brown.
    Pileus tubiform, spores .0005′–.0007′ long............ C. cornucopioides *L.*
    Pileus expanded or funnelform, spores .00025′–.0003′ long.. C. dubius *Pk.*
Stem solid:
  Hymenium and stem similarly colored, spores .0003′ long, C. Cantharellus *Schw.*
  Hymenium darker than the stem, spores .0004′–.0005′ long.. C. clavatus *Pers.*

CORTICIUM POLYPOROIDEUM *B. & C.*

Decaying wood. Buffalo. *Clinton.*

CORTICIUM SUBREPANDUM *B. & Cke.*

Dead branches. Center. Sept.

THELEPHORA RADIATA *Holmsk.*

Ground under pine trees. Center and Providence. Aug. and Sept.

CLAVARIA FASTIGIATA *L.*

Among mosses and under pine trees. Adirondack Mountains and Gansevoort. Aug.

CLAVARIA FORMOSA *Pers.*

Ground in woods. Sandlake and Gansevoort. Aug.

CLAVARIA CORRUGATA *Karst.*

Ground in pine woods. West Albany. Sept.

CLAVARIA FLACCIDA *Fr.*

Ground in woods, also under spruce trees. Sandlake, Center and Adirondack Mountains. Common.

A form sometimes occurs with the tips of the branchlets white.

PTERULA DIVARICATA *n. sp.*

Tufts lax, whitish or rufescent, about one inch high; stems slender, irregularly branched; branches widely diverging, slender and gradually tapering to a long slender subulate point.

Among fallen leaves and on half-buried decaying wood. South Corinth, Saratoga County. Aug.

The lax habit and slender widely diverging branches distinguish this species from its allies.

TREMELLA SUBCARNOSA *n. sp.*

Small, tufted, compressed, irregular, wavy or contorted, subcarnose, whitish or pinkish-alutaceous, brownish-incarnate and more or less glaucous when dry; spores obovate, pointed at the base, .0002′–.0003′ long, .00016′ broad.

Tufts 2″–4″ high and broad.

Decaying wood of deciduous trees. Carlisle, Schoharie County. June.

The affinities of this species are doubtful. It is provisionally referred to the genus Tremella, although the central portion of the substance is fleshy rather than gelatinous. The external portion, however, is gelatinous and the plants revive upon the application of moisture, and are then somewhat tremelloid, though not very tenacious. Usually two or more are clustered together and form beautiful little rosettes.

DACRYMYCES CONGLOBATUS *n. sp.* (Plate I, figs. 1–4.)

Scattered, sessile, even, pezizoid, about one line broad, with the thin margin incurved, pink-red, paler within, dark-red when dry, with the margin plicate-lobed; threads slender, branched, minutely rough; spores collected in subglobose tufts at the tips of the branches, oblong, obtuse, curved, sometimes nucleate, .0003′–.0004′ long.

Bark of arbor-vitæ, *Thuja occidentalis.* Adirondack Mountains. July.

Our plant does not well agree with the generic character of the Dacrymyces in its fruit, but its external appearance is so similar to other species of the genus that it seems best for the present to place it here. The specific name has reference to the arrangement of the spores.

MELANOGASTER VARIEGATUS *Tul.*

Ground in shaded roads in woods. Sandlake. Aug.

RHIZOPOGON RUBESCENS *Tul.*

Sandy soil. Center. Sept.

CYNOPHALLUS CANINUS *Fr.*

Ground about an old stump. Oneida. *H. A. Warne.*

This species is described as odorless, yet according to Mr. Warne these specimens had a very disagreeable odor.

PHALLUS RAVENELII *B. & C.*

Ground in woods. Thurman. Oct.

The description of this species is very imperfect. The specimens were identified by comparison with Mr. Ravenel's notes which he kindly submitted to my inspection. The stem is four or five inches long, the denuded pileus is porous, the pores or cavities of the under or inner surface being larger than the others and giving a somewhat reticulate-pitted or cellular appearance, and there is a short veil at the top of the stem, but concealed beneath the pileus.

The following synoptical tables will exhibit the prominent distinctive features of the species of Phallus of this State and the United States, so far as I am able to get them from the published descriptions and the specimens at my command:

New York Species of Phallus.

Denuded pileus reticulate with coarse deep pits or cells.	
Veil exposed, reticulate with small perforations........	P. Dæmonum *Rumph.*
Veil none	P. impudicus *L.*
Denuded pileus porous, veil not perforate, concealed	P. Ravenelii *B. & C.*

United States Species of Phallus.

Denuded pileus reticulate with coarse deep pits or cells.	
Veil exposed.	
Large and reticulate with large perforations..........	P. indusiatus *Vent.*
Smaller and reticulate with small perforations..........	P. Dæmonum *Rumph.*
Smaller and plicate..........................	P. duplicatus *Bosc.*
Veil none..............................	P. impudicus *L.*
Denuded pileus even or merely porous.	
Veil short, concealed beneath the pileus..............	P. Ravenelii *B. & C.*
Veil none..............................	P. rubicundus *Bosc.*

CLATHRUS CANCELLATUS *L.*

Buffalo. *Clinton.*

GEASTER CAPENSIS *Thum.*

Ground in woods. Sterling, Cayuga County. Aug.

ENERTHENEMA PAPILLATA *Pers.*

Decaying hemlock wood. Catskill Mountains. July.

CRIBRARIA VULGARIS *Schrad.*

Decaying wood. Catskill Mountains. July.

ACROSPERMUM ALBUM *n. sp.*

White, subfusiform, subcompressed, pointed at the apex, narrowed below into a short terete stem-like base; spores numerous, elongated, filiform.

Dead stems of spikenard, *Aralia racemosa.* Catskill Mountains. July.

This is about the size of *A. compressum*, but is at once distinguished from that species by its white color.

SPHÆROPSIS PECKIANA *Thum.*

Dead grape vines. Albany. May.

SPHÆROPSIS PULCHRISPORA *P. & C.*, *n. sp.*

Perithecia small, scattered, slightly prominent, covered by the epidermis, black; spores oblong or cylindrical, obtuse, straight or curved, three to five-nucleate, hyaline, .0006′–.0008′ long, .0002′–.00025′ broad.

Dead stems of Polygonum. Buffalo. Oct. *Clinton.*

SPHÆROPSIS TYPHINA *n. sp.*

Perithecia scattered, subconical, slightly prominent, often compressed, black; spores fusiform, pointed at each extremity, colored, .0006′ long, .00016′ broad.

Dead leaves of *Typha latifolia.* Sprakers. June.

The fusiform pointed spores are a noticeable character in this species.

SPHÆROPSIS CORNINA *n. sp.*

Perithecia numerous, not crowded, minute, nearly covered by the stellately ruptured epidermis, black, mouth large; spores oblong, obtuse, hyaline, .0012′–.0016′ long, .0005′–.00055′ broad.

Dead branches of green osier, *Cornus circinata*. Sprakers. June.

The species is allied to *S. Pennsylvanica*, but the spores are considerably larger than in that species.

Depazea juglandina *Fr.*

Living leaves of butternut, *Juglans cinerea*. Albany. Aug.

The perithecia occur on greenish-gray or brown spots which are sometimes large and confluent.

Septoria Albaniensis *Thum.*

Living leaves of the shining willow, *Salix lucida*. Sandlake. Aug.

Septoria Canadensis *n. sp.*

Spots large, sometimes confluent, pallid or subalutaceous, surrounded by a darker purplish border; perithecia epiphyllous, small, scattered, black; spores filiform, nearly straight, .001′–.0015′ long.

Living leaves of dwarf cornel, *Cornus Canadensis*. Sandlake. May.

Vermicularia compacta *C. & E.*

Dead stems of raspberry, *Rubus strigosus*. Green Island. June.

This form is referred to var. *Ruborum*.

Torula ramosa *n. sp.*

Effused, thin, black, threads septate, bearing terminal and lateral strings of globose colored spores, .0003′ in diameter, one or two of the lower ones sometimes elliptical or pyriform.

Decaying pine wood. North Greenbush. Sept.

Septosporium velutinum *C. & E.*

Bark of maple and wood of hornbeam. Copake and Mechanicsville. Oct.

Two forms occur, one effused and the other tufted.

Puccinia Scirpi *Lk.*

Culms of *Scirpus cæspitosus*. Mount Marcy. July.

Synchytrium Anemones *DC.*

Living stems and leaves of *Anemone nemorosa*. West Albany. April.

Protomyces conglomeratus *n. sp.*

Spores imbedded in the tissues of the stems, large, globose, colored, .0016′–.002′ in diameter, collected together in groups or clusters and forming small protuberances or tubercles on the dry stems.

Stems of the common saltwort, *Salicornia herbacea*. Syracuse. Sept.

This species is remarkable for the large size of the spores and their clustered mode of growth.

Isaria fulvipes *n. sp.*

Scattered or rarely cæspitose, clavate, one or two lines high; club whitish or cinereous, farinose, obtuse; stem short, orange-tawny or bright ochraceous;

spores minute, ovate or subelliptical, about .0001′ long, interspersed among short threads which often bear short widely diverging processes.

Dead stems of herbs. North Greenbush. June.

It may be separated from *I. clavata* and other similar species by its bright-colored stem.

TUBERCULARIA HIRTISSIMA *n. sp.*

Tubercles small, one-half to one line broad, orbicular, depressed, yellow or pale orange, clothed with long wooly hairs, which usually conceal them; spores elongated, cylindrical, colorless, .0008′ long, about one-sixth as broad.

Fallen ash leaves, *Fraxinus sambucifolia*. South Corinth. Aug.

This species is remarkable both for its hairy investment and its elongated spores.

TUBERCULARIA SUBDIAPHANA *Schw.*

Dead stems of grape vines. Buffalo. *Clinton.*

TUBERCULARIA FLOCCOSA *Lk.*

Dead branches of sumach, *Rhus typhina*. Catskill Mountains. July.

PERICONIA ALBICEPS *n. sp.* (Plate I, figs. 8–11.)

Stems short, .02′–.03′ high, equal or slightly tapering upwards, black, head white, subglobose; spores oblong or subfusiform, colorless, .0003′–.0006′ long.

Dead stems of snake-head, *Chelone glabra*. Sandlake. May.

It sometimes occurs in great abundance, surrounding the stems on all sides nearly their entire length.

HELMINTHOSPORIUM OBOVATUM *Berk.*

Decaying chestnut wood. Copake. Oct.

CLADOSPORIUM COMPACTUM *B. & C.*

Dead or languishing leaves of rye. Carlisle. June.

At first sight this might be taken for some small Sphæria, so well do the small black compact tufts simulate sphæriaceous perithecia. The spores vary in length from .001′–.0016′. They sometimes equal the flocci in length, and in shape are either elliptical, obovate or oblanceolate.

HETEROSPORIUM ORNITHOGALI *Klotsch.*

Dead or languishing leaves of garlic, *Allium vineale*. North Greenbush. May.

FUSICLADIUM DENDRITICUM *Wallr.*

On apples. Catskill Mountains. July.

This attacks the apples while yet on the tree, and forms orbicular brown or greenish-brown velvety spots on them. It also occurs on the leaves.

CERCOSPORA ROSÆCOLA *Pass.*

Living rose leaves. Albany. June.

CERCOSPORA APII *Fres.*

Living parsnip leaves. Richmondville. Sept.

PERONOSPORA FICARIA *Tul.*

Living leaves of crowfoot, *Ranunculus recurvatus.* Center. April.

PERONOSPORA CORYDALIS *De By.*

Living leaves of squirrel-corn, *Dicentra Canadensis.* Helderberg Mountains. May.

This form varies somewhat from the European form on leaves of Corydalis, but perhaps not sufficiently to warrant its separation as a species. It usually occupies the whole lower surface of the leaves.

PERONOSPORA GANGLIFORMIS *Berk.*

Living leaves of milkweed, *Mulgedium leucophæum.* Central Bridge and Catskill Mountains. June and July.

VERTICILLIUM LATERITIUM *Ehr.*

Decaying wood. Buffalo. Oct. *Clinton.*

POLYACTIS CINEREA *Berk.*

Dead stems of herbs. Greenbush. May.

The fungus was found growing from a black Sclerotium.

PENICILLIUM BICOLOR *Fr.*

Decaying fungi, leaves, etc. Sandlake. Aug.

SPONDYLOCLADIUM TENELLUM *n. sp.*

Patches thin, effused, subolivaceous; flocci somewhat tufted, erect, slender, simple or rarely branched, septate, brown, .006′–.014′ high; spores in verticels of two to four at the septa, oblong, simple, pale, .00045′–.0005′ long, .00016′–.0002′ broad.

Dead stems of stone root, *Collinsonia Canadensis.* North Greenbush. October.

This species is distinguished from *S. fumosum* by its simple spores and the olivaceous hue of the patches, which to the naked eye appear like a thin floccose tomentum.

OIDIUM DESTRUENS *n. sp.*

Effused on large brown spots, odorous, whitish or pale cinereous; flocci of two kinds, the sterile spreading, much branched, closely appressed to the matrix, the fertile erect or decumbent, somewhat branched, forming moniliform strings of spores; spores unequal in size and variable in shape, elliptical subglobose or angular, sometimes with an apiculus at each end, .0002′–.0006′ long.

Living leaves of *Amelanchier Canadensis* and *Prunus serotina.* Center and Sandlake. May and June.

This fungus quickly destroys the vitality of the leaves it attacks, but fortunately its ravages are not extensive, only a few leaves on a tree being attacked. Usually a large brown spot is produced by the fungus in the center of the leaf, the margin of the leaf remaining green. The affected leaves soon shrivel and wither. In the case of the cherry leaves scarcely any green margin was left, and so rapid was the spread of the fungus that nearly the entire leaf was discolored while it yet remained soft and flexible. A peculiar and decided odor is diffused either by the affected leaves or the fungus. This odor is perceptible in the dried specimens for a long time. The leaves of the shad-bush are attacked along the midvein and veins. Sometimes the unripe fruit is also attacked, the fungus causing it to rot quickly. Its destructive character has suggested the specific name.

RAMULARIA EFFUSA *n. sp.*

Hypophyllous, effused, whitish; spores very variable, globose, obovate, elliptical, oblong or cylindrical, .00016–.0011′ long, about .0002′ broad, occasionally uniseptate.

Living leaves of black huckleberry, *Gaylussacia resinosa.* Center. July.

This species seems to be intermediate between Oidium and Ramularia. It occupies the whole lower surface of the leaves, and often affects all the leaves on a branch. The same or a similar species occurs on leaves of *Cassandra calyculata.*

RAMULARIA VARIABILIS *Fckl.*

Living leaves of mullein, *Verbascum Thapsus.* Catskill Mountains. July.

The spots are rather small in proportion to the size of the leaf, and when fertile are beautifully frosted on both sides by the fungus.

RAMULARIA ALBOMACULATA *n. sp.*

Spots suborbicular, two to three lines in diameter, sometimes confluent, pale yellowish-green on the upper surface, whitened by the fungus on the lower surface, at length becoming purplish or brown; spores oblong or elliptical, generally binucleate, .0003′–.0004′ long, .00016′ broad.

Living leaves of hickory, *Carya alba.* Albany and Greenbush. June and July.

The spots are sometimes limited by the veinlets of the leaf and consequently angular. The fungus is thus far limited to the lower surface. In some instances there appeared to be creeping filaments indicating an intimate affinity with Oidium.

RAMULARIA ANGUSTATA *n. sp.*

Spots small, orbicular, sometimes confluent, pale greenish-yellow, frosted beneath by the fungus; flocci minute; spores narrowly fusiform or subcylindrical, .0003′–.0004′ long, about .0001′ broad, often containing two or three nucleoli.

Living leaves of pinxter plant, *Azalea nudiflora.* Central Bridge and Carlisle. June.

The specific name has reference to the very narrow spores.

Ramularia Norvegicæ *n. sp.*

Spots irregular, often confluent, brown or reddish-brown; flocci tufted, short, blunt; spores narrow, oblong or cylindrical, straight, .0005′–.0012′ long, .00015′ broad, the longer ones sometimes uniseptate.

Living leaves of Norwegian cinquefoil, *Potentilla Norvegica.* West Albany. June.

Ramularia Fragariæ *n. sp.* (Plate II, figs. 15–17.)

Spots small, suborbicular, arid, whitish surrounded by a purplish boarder; flocci short, tufted; spores cylindrical, straight or slightly curved, .0008′–.0012′ long.

Living leaves of the common strawberry, *Fragaria Virginiana.* Knowersville, Center and Carlisle. May and June.

The spots are often sterile, so that it is sometimes difficult to find the spore-bearing fungus.

Ramularia lineola *n. sp.*

Spots suborbicular, sometimes confluent, brown, adorned with fine concentric lines; flocci obscure, tufted, hypophyllous; spores slender, cylindrical, obtuse, often uniseptate, .0005′–.0008′ long.

Living leaves of dandelion, *Taraxacum Dens-leonis.* Greenbush. July.

The fungus is extremely minute and scarcely visible to the naked eye.

Ramularia Plantaginis *n. sp.*

Spots suborbicular, sometimes confluent, brown; flocci tufted, amphigenous; spores oblong or cylindrical, obtuse, .0008′–.0016′ long, .0002′–.00025′ broad, sometimes uniseptate.

Living leaves of English plantain, *Plantago lanceolata.* Carlisle. June.

Glomerularia *gen. nov.*

Flocci short; spores adhering together in masses.

This is a genus of Hyphomycetes, order Mucedines, and is apparently allied to the genus Ramularia, from which it is distinct not only by the shape of the spores, but also by their peculiar habit of adhering together in heaps or masses. Although but the single species here described is known to me, it is so unlike any other fungus with which I am acquainted that I am compelled to make a genus for it.

Glomerularia Corni *n. sp.* (Plate II, figs. 10–14.)

Spots orbicular, sometimes confluent, brown, surrounded by a purplish margin; flocci short, obscure, hypophyllous, bearing irregular suboval masses of white spores; spores globose, rough, .0004′–.0005′ in diameter, the masses .0012′–.0016′ long, .0008′–.001′ broad, usually containing about six spores each.

Living leaves of dwarf cornel, *Cornus Canadensis.* Catskill and Adirondack Mountains. July.

In the small spots the whole under surface is whitened by the masses of spores, in the large ones the spore masses form marginal bands or patches.

Sporotrichum sulfureum *Grev.*

Fallen oak leaves. North Greenbush. June.

Sporotrichum virescens *Lk.*

Decaying wood. Buffalo. *Clinton.*

Sporotrichum alutaceum *Schw.*

Decaying elm wood. Bethlehem. Oct.

Sporotrichum larvatum *n. sp.*

Tufts confluent, dense, soft, white or yellowish, coating the whole matrix; threads very slender, simple or branched; spores abundant, minute, globose, .00008 –.00012′ in diameter.

Dead larvæ under alder bushes. Adirondack Mountains. July.

This species is remarkable for its peculiar habitat. In some specimens nearly the whole mass of flocci appears to have been transformed into spores, in which cases the surface is quite pulverulent.

Acremonium flexuosum *n. sp.* (Plate I, figs. 16–18.)

Effused, thin, soft, woolly, white, sometimes tinged with yellow or cream-color; threads branched, the branches widely diverging, sometimes opposite, narrowed and flexuous toward the tips and armed with alternate pointed spicules; spores oval or elliptical, colorless, .0005′–.0008′ long, .0003′–.0005′ broad.

Decaying wood. Griffins, Delaware County. Sept.

Apparently allied to *A. album*, but distinct from it by the flexuous terminal portions of the branches and their alternate pointed teeth or spicules.

Sepedonium cervinum *Dittm.*

Parasitic on *Peziza macropus*. Brewerton. Sept.

In the typical form the spores are said to be yellowish-brown. In our specimens they are of a dull flesh color, globose, rough, .0005′–.0006′ in diameter, with a short blunt appendage. It seems to be worthy of separation as a variety at least, and may be called *S. cervinum* var. *subincarnatum.*

Sepedonium brunneum *n. sp.*

Effused, pulverulent, brown; spores globose, rough, .0008′–.001′ in diameter.

Decaying fungi. Gansevoort. Aug.

The snuff-brown color and large spores destitute of an appendage are the distinctive features of this species.

Morchella angusticeps *n. sp.* (Plate I, figs. 19–21.)

Pileus oblong-conical and subobtuse or narrowly conical and acute, adnate to the stem, one to two inches high, and about half as broad at the base; ribs longitudinal, here and there anastomosing or connected by transverse veins; stem subequal, hollow, whitish, furfuraceous without and within, even or rarely rough with irregular longitudinal furrows; asci cylindrical; spores elliptical, whitish tinged with ochre, .0008′–.001′ long, .0005′–.0007′ broad; paraphyses short, clavate, with one or two septa near the base.

Sandy soil in the borders of woods and in open places. West Albany and Center. April and May.

Two forms occur, one with the pileus oblong-conical, rather obtuse, often tipped with a slight umbo or papilla, and with a diameter a little surpassing that of the stem from which the base is separated by a slight groove; the other with the pileus narrowly conical, rather acute, scarcely exceeding the stem in diameter, and without any separating groove. The stem and fruit are alike in both forms. The stem is usually about equal in length to the pileus. The species is related to *M. conica* and *M. elata*, but may be separated from both by the size of the spores and the character of the paraphyses. In our plant I have never seen these as long as the asci. Large forms appear also to approach *M. rimosipes*, but that species has the margin of the pileus more free, the stem proportionately longer, and the paraphyses as long as the asci, if we may rely upon the figure of it. Our plant is edible.

GYROMITRA CURTIPES *Fr.*

Wet banks. Knowersville. May. Also Buffalo. *Clinton.*

The spores in our specimens are often trinucleate, the central nucleus being the largest. The species may be separated from *G. esculenta* by its paler color, shorter stem and different spores.

GEOGLOSSUM IRREGULARE *n. sp.* (Plate I, figs. 5–7.)

Glabrous, yellow, solid, fleshy, soft but rather tough, clavate; club subcompressed, obtuse, irregular, often lobed, curved or twisted, tapering below into the short, paler or whitish solid distinct stem; asci cylindrical, often two or three united together at the base; spores uniseriate, elliptical, colorless, .0003′–.0004′ long, .0002′ broad; flesh white.

Plant 1′–2′ high. Damp mossy ground in woods. Sandlake. Oct.

This species is allied to *G. luteum*, from which its irregular club and glabrous stem readily distinguish it. *Mitrula crispata*, of which we have seen no authentic specimens, is said to have similar spores; but if that species is properly referred to the genus Mitrula, it must be different from our plant, which is a true Geoglossum, agreeing fully with the description of that genus, but not agreeing with the published characters of the genus Mitrula, for the club is neither "ovate," "capitate" nor "inflated." This species, with *G. luteum*, *G. rufum* and *G. pistillare*, forms a natural group of closely related and clearly congeneric forms.

PEZIZA EUPLECTA *Ck.*

Shaded banks in ravines. Knowersville. May.

Our specimens vary somewhat from the characters expressed by the figure and description of this species, but scarcely enough to warrant their separation.

PEZIZA MELASTOMA *Sow.*

Mossy sticks on the ground. Catskill Mountains. July.

Our specimens are black without and within, and do not show any rubiginous color or orange-colored granules, but in other respects they agree with the description of the species.

Peziza apiculata *Ck.*

Decaying wood. Stamford, Delaware County Sept.

The specimens differ from the type in being blackish-brown, in having the tips of the spores colored and in their habitat. Possibly they should constitute a distinct species, but the agreement with the description is so good in other respects, that for the present I have concluded to refer them to this species.

Peziza (Humaria) tetraonalis *n. sp.*

Cups sessile, one to two lines broad, externally cinereous, the margin sometimes wavy or flexous, the disk blackish or blackish-brown; asci cylindrical, truncate at the apex; spores uniseriate, elliptical, smooth, colorless, .0006′–.0007′ long, .0003′ broad.

Partridge dung. Catskill Mountains. July.

This plant is about equal in size to *P. gallinacea*, which also has the same habitat, but its darker disk and longer spores require its separation. It does not harmonize well in color with other species of Humaria. It is a rare species with us.

Peziza (Humaria) humosoides *n. sp.*

Cups small, scarcely more than half a line broad, sessile, scattered or crowded, orange inclining to vinous-red, the disk plane or slightly convex, scarcely margined; asci short, cylindrical or clavate; spores crowded, elliptical, smooth, .0008′–.001′ long, .0005′ broad; paraphyses filiform, slightly thickened at the apex.

Dung of some wild animal. Catskill Mountains. July.

The cups are attached to the matrix by a few whitish filaments. The peculiar habitat and small size indicate its distinctness from *P. humosa*.

Peziza (Dasyscyphæ) longipila *n. sp.*

Cups gregarious, small, .014′–.02′ broad, narrowed below into a short stem, hirsute with long septate brown hairs; disk whitish, when dry concealed by the hairs of the margin; asci cylindrical; spores oblong, hyaline, straight or slightly curved, .00033′ long, .00012′ broad.

Dead stems of *Eupatorium maculatum*. Adirondack Mountains. July.

Peziza (Dasyscyphæ) urticina *n. sp.*

Cups minute, .007′–.014′ broad, sessile, subglobose and hyaline when moist, with the mouth contracted, whitish when dry, pulverulent-hairy; asci subfusiform; spores crowded or biseriate, fusiform, .0004′–.0005′ long; paraphyses filiform.

Dead stems of nettle, *Urtica Canadensis*. Catskill Mountains. July.

The species is apparently near *P. translucida*. The hairs in our plant are appressed and arranged in such a manner that when moist the cups appear somewhat longitudinally striate. When dry the disk is generally concealed. The plants are so small that to the naked eye they appear like mere white grains.

Peziza aurata *Fckl.*

Decaying wood and bark. Catskill Mountains. July.

Peziza melaleuca *Fr.*

Decaying wood. Summit. Sept.

The plant of Fries is regarded by some as a Patellaria. Our specimens, though agreeing tolerably well with the description of *P. melaleuca*, clearly belong to the genus Peziza. There is therefore some doubt concerning their identity, but for the present we thus refer them. It is to be regretted that the description of *P. melaleuca* makes no mention of the fruit, otherwise all doubt might be removed.

Peziza (Mollisia) Typhæ *n. sp.*

Cups scattered, small, .008′–.014′ broad, sessile, nearly plane, black, the disk dingy-whitish; asci subcylindrical, short, .0012′–.0016 long; spores minute, sublanceolate, .0003′ long.

Dead leaves of *Typha latifolia.* Carlisle June.

Peziza (Mollisia) Sphærella *P. & C., n. sp.*

Cups minute, .005′–.0055′ broad, sphæriform or subglobose, sessile, glabrous, black, at first closed, then opening by a small poriform mouth; asci subcylindrical, .0012′–.0014′ long; spores crowded or biseriate, oblong, usually binucleate, .0004′–.0005′ long; paraphyses filiform.

Dead stems of red clover, *Trifolium pratense.* Buffalo. Oct. *Clinton.* At first sight the plants might be taken for some small black Sphæria.

Peziza (Mollisia) enterochroma *n. sp.*

Cups scattered or gregarious, at first cylindrical or clavate, then expanded, plane, about one line broad, subtremelloid, scarcely margined, supported on a short stem, yellowish, becoming reddish-brown or chestnut-colored when dry; asci cylindrical; spores fusiform, yellowish, .0008–.001′ long, .00025′–.0003′ broad; paraphyses filiform, thickened at the tips.

Fallen twigs of arbor-vitæ, *Thuja occidentalis.* Adirondack Mountains. July.

This species belongs to the subsection Claviformes, or perhaps better to the modern genus Ombrophila, being allied to *O. subaurea*, from which it differs in its color and larger spores. When dry the cups become quite concave. When crushed and moistened the flesh is greenish-yellow.

Helotium lutescens *Fr.*

Fallen spruce branches. Summit. Sept.

Helotium fraternum *n. sp.* (Plate I, figs. 12–15.)

Cups stipitate, plane or slightly concave, .5–1′ broad; disk pallid or yellowish, becoming more concave and dull red in drying, externally paler; stem about equal in length to the diameter of the cup; asci clavate or cylindrical; spores crowded, cylindrical or subfusiform, .00065′–.0008′ long; paraphyses filiform, numerous, scarcely thickened at the tips; flesh rather thick and firm.

Petioles of fallen maple leaves. Adirondack Mountains. July.

This species is closely related to *H. gracile* and *H. fastidiosum*, which relationship suggests the specific name. It imitates the latter species in its habitat, but I have not found it except on the petioles and occasionally the midveins of maple leaves.

Helotium palustre *n. sp.*

Cups stipitate, plane or slightly convex, pallid or whitish; stem 3″–6″ long, slightly thickened at the base; asci subclavate; spores oblong, .0004′–.0005′ long.

Fallen leaves in wet places. Sandlake. May.

In the dried specimens the hymenium assumes a dark reddish-brown or chestnut color. The stem is long in proportion to the size of the cup.

Helotium vibrisseoides *n. sp.* (Plate II, figs. 7–9.)

Cups sessile, 1″–2″ broad, immarginate, externally blackish or blackish-green, the disk plane or convex, livid-white or blackish-green; asci very long, linear; spores elongated, filiform, very slender, sometimes becoming coiled, bursting forth and covering the disk with a whitish webby stratum.

Decaying sticks lying in water. Sandlake and Catskill Mountains. May and July.

Externally this fungus has the appearance of a Helotium, but the fructification is exactly that of a Vibrissea. It seems to me that it really belongs to the genus Vibrissea, but I am prevented from placing it there because in the absence of a stem it fails to meet fully the published characters of that genus. I am fully persuaded that some of the genera of fungi are imperfectly characterized, and that we cannot have a satisfactory arrangement of our species until these defective descriptions are modified or revised.

Patellaria pusilla *n. sp.*

Cups sessile, small, .014′–.028′ broad, slightly margined, the disk plane or convex when moist, slightly concave when dry, black; asci clavate; spores crowded or biseriate, lanceolate or subclavate, 6–8-nucleate, .00065′–.0008′ long, .0001′–.00012′ broad; paraphyses numerous, filiform, not thickened at the apex.

Decaying beech wood. Catskill Mountains. July.

The spores in shape are similar to those of *P. atrata*. They are extremely narrow and probably become 5–7-septate when fully mature.

Dermatea minuta *n. sp.*

Cups minute, .009′–.017′ broad, numerous, scattered or sometimes two or three crowded together, attached by a small point, grayish, the disk subochraceous, margin obsolete, disk plane or convex; asci oblong-clavate; spores crowded, oblong-elliptical, .0008′–.001′ long, colorless, simple; paraphyses filiform, thickened at the apex.

Dead stems of hobble-bush, *Viburnum lantanoides*. Catskill Mountains. July.

This is the smallest species of Dermatea known to me.

BULGARIA BICOLOR *n. sp.* (Plate II, figs. 4–6.)

Cups irregular, expanded, sessile, appressed, about an inch broad, externally gelatinous, whitish or subolivaceous, the disk reddish-brown or dark watery-chestnut; asci cylindrical; spores uniseriate, elliptical, .0009′–.0011′ long, .00045′–.0005′ broad; paraphyses filiform, thickened at the tips, brownish.

Wet decaying birch wood Brewerton. Sept.

The spores are generally furnished with one or two large nuclei. The contrast between the dark color of the disk and the light color of the cup suggests the specific name.

BULGARIA DELIGATA *n. sp.* (Plate II, figs. 1–3.)

Cups small, 1 –2 broad, plane or convex, scattered or crowded, sessile, the margin obliterated, purplish-black when moist, black and more or less angular when dry, surrounded at the base by whitish filaments which bind them to the matrix; spores elliptical, uniseriate, binucleate, .001′–.0013′ long, .0006′–.0007′ broad; paraphyses numerous, filiform, thickened above, slightly colored.

Wet decaying hemlock wood. Catskill Mountains. July.

The numerous white filaments that appear to bind the cups to the matrix, constitute a marked feature in this species, and suggest the specific name.

EXOASCUS PRUNI *Fckl.*

Immature fruit of sand cherry and wild plum, *Prunus pumila* and *P. Americana.* Center and Carlisle. May and June. Also Buffalo. *Clinton.*

When the fruit of the sand cherry is attacked by this fungus, it enlarges in size, becomes elongated and pointed, soft and discolored. Sometimes it assumes a bright-red hue, but usually a pale whitish-green or yellowish-green varied somewhat by red or pinkish tints. The pit even is destroyed, and the whole texture of the pulp is changed. Rarely the leaves also are attacked, in which case they become swollen, distorted and discolored.

The fruit of the wild plum, when attacked, becomes enlarged and soft, and assumes a whitish or pale green color, but does not become elongated or pointed. Of course, its value as a fruit is wholly destroyed. At Carlisle, one tree was observed which had been cultivated in a court-yard, and which had all of its fruit affected by this fungus.

TAPHRINA AUREA *Fr.*

On catkins of poplar, *Populus grandidentata.* Albany and North Greenbush. May.

The propriety of keeping this and the preceding species generically distinct is perhaps doubtful, but I give the names as I find them.

HYPOMYCES LUTEOVIRENS *Fr.*

On decaying Russula. Center. Sept.

The spores in our specimens are longer than required by the description of the species to which we have referred them. They are .0012′–.0015′ in length, acuminate at each end, and at length uniseptate. The asci are very long and slender.

DOTHIDEA RETICULATA *Fr.*

Dead leaves of some liliaceous plant, apparently *Smilacina bifolia*. Summit. Sept.

HYPOXYLON UDUM *Fr.*

Decaying poplar wood. Gansevoort. Aug.

DIATRYPE VERRUCOIDES *n. sp.*

Pustules small, verruciform, covered by the epidermis, which is longitudinally or stellately split, the laciniæ closely adhering; stroma blackish externally, whitish within, sometimes coated above with a thin cinerous tomentum; ostiola black, depressed, stellately sulcate; perithecia three to eight in a pustule; asci clavate; spores simple, cylindrical, straight or slightly curved, .0008′ long, .00016′ broad.

Dead beech twigs. Stamford. Sept.

The pustules bear some resemblance to those of *Diatrype verrucæformis*, but they are generally smaller. They penetrate to the wood, and are surrounded by a more or less distinct black line.

VALSA PULVINICEPS *n. sp.*

Perithecia 8–12 in a pustule, sunk to the wood, covered by the bark; ostiola erumpent, crowded, prominent, black, forming an orbicular cushion-shaped mass; asci clavate; spores crowded, subelliptical or broadly fusiform, multinucleate, slightly colored, .0004′–.0006′ long.

Dead stems of elder, *Sambucus Canadensis*. Richmondville. Sept.

This is apparently very unlike *V. abnormis*, which is said to inhabit Sambucus.

VALSA SORBI *Fr.*

Dead branches of mountain ash, *Pyrus Americana*. Adirondack Mountains. July.

LOPHIOSTOMA BICUSPIDATA *Ck.*

Dead stems of thimble berry, *Rubus odoratus*. Catskill Mountains. July.

This is the variety with spores .0012′ long. The colorless cusps at the tips of the spores are well shown.

SPHÆRIA SQUAMULATA *Schw.*

Decaying wood. Catskill Mountains. Sept.

It is with some hestitation that our specimens are referred to this species, for the "black crust" required by the description is not clearly present; indeed, it is in some instances clearly absent; and the ostiola, which are described as "rather thick," in our specimens are compressed as in the genus Lophiostoma. In other respects the agreement with the description is good so far as the description goes. But no diagnosis is given of the fruit, and I am informed that no specimens of the species are to be found in Schweinitz's Herbarium, so that it is scarcely possible to remove all uncertainty. In our specimens the asci are clavate; the spores are crowded, oblong-fusiform, uniseptate, constricted in the middle, colorless, .0015′–.0018′ long, containing from four to six nuclei.

SPHÆRIA SUBICULATA *Schw.*

Decaying wood. Catskill Mountains. July.

Sphæria mutans scarcely differs from this species except in the color of the tomentum, and sometimes in the larger size of the perithecia. It is doubtful if the two ought to be kept separate.

SPHÆRIA (VILLOSÆ) INTRICATA *n. sp.*

Perithecia scattered or crowded, more or less elongated, obtuse, subventricose, generally narrowed at the base, blackish-brown, tomentose-hairy; asci slender, elongated; spores crowded, elongated, linear, more or less curved or flexuous, greenish-yellow, .0016′–.002′ long.

Decaying wood and leaves in damp places. Sandlake.

This species partakes of the characters of several others, but is perhaps most likely to be confounded with *S. hirsuta* or *S. strigosa*. The perithecia, though smaller, resemble in shape those of *S. bombarda*. The spores are very similar to those of *S. hirsuta* and *S. ovina*. From *S. strigosa* it is separated by its peculiar soft matted hairs or tomentum.

SPHÆRIA (VILLOSÆ) SCOPULA *C. & P., n. sp.*

Perithecia scattered or crowded, small, .006 –.008′ broad, very black, subglobose, bristly with short, rigid black hairs; asci lanceolate or subclavate; spores crowded or biseriate, linear or slightly narrowed toward each end, multinucleate, obscurely multiseptate, greenish-yellow, .0025′–.003′ long, .00016 broad.

Decaying hemlock wood. Adirondack Mountains. Aug.

The spores are often slightly curved

SPHÆRIA (BYSSISEDÆ) ALBIDOSTOMA *n. sp.*

Perithecia numerous, subcrowded, small, .014′–.018′ in diameter, subglobose, seated upon or involved in a black or blackish-brown tomentum, the ostiola naked, not prominent, whitish when moist, darker when dry; asci cylindrical; spores biseriate, oblong-fusiform, at first uniseptate, constricted at the septum and containing two or three nuclei in each cell, then 3–5-septate, colorless, .0015′–.0018 long, .0003′–.00035′ broad.

Dead branches of mountain maple, *Acer spicatum*. Catskill Mountains. September.

The whitish ostiola constitute a marked feature in this species. Its affinity is apparently with *S. nidulans*.

SPHÆRIA (BYSSISEDÆ) CLAVARIÏNA *n. sp.*

Perithecia small, subovate, clothed with rigid blackish-brown hairs and seated on a blackish-brown subiculum; asci cylindrical; spores uniseriate, oblong-elliptical or subfusiform, containing one or two nuclei, at first colorless, then brown, .0004′–.0005′ long, about half as broad.

Stems and branches of *Clavaria cristata*. Sandlake. Aug.

The Clavaria, when attacked by this fungus, becomes distorted and discolored.

SPHÆRIA (CERATOSTOMÆ) SUBDENUDATA *n. sp.*

Perithecia immersed or superficial, subglobose, .02'–.025' broad, black, sometimes bearing a few scattered straight black hairs; ostiola cylindrical, straight or slightly curved, blunt, sometimes oblique, in length equal to or a little shorter than the diameter of the perithecia; asci cylindrical; spores uniseriate, simple, oblong-elliptical, uninucleate, colorless, .0005'–.00055' long, .0002' broad.

Much decayed wood. Catskill Mountains. Sept.

This species, by reason of its somewhat hairy perithecia, might be sought among the Villosæ. The perithecia are sometimes deeply sunk in the soft matrix, and have only the ostiola exposed, again they are nearly or quite superficial.

SPHÆRIA LIVIDA *Fr.*

Dry hard hemlock knots. Catskill Mountains. July.

SEHÆRIA (CAULICOLÆ) HUMULINA *n. sp.*

Perithecia small, slightly prominent, covered by the blackened epidermis; ostiola minute, piercing the epidermis; asci cylindrical; spores uniseriate, elliptical, triseptate, colorless, .0006' long, .0003' broad.

Dead hop stems. Carlisle. June.

SPHÆRIA INFECTORIA *Fckl.*

Culms and sheaths of *Calamagrostis arenaria.* Buffalo. Oct. *Clinton.*

SPHÆRELLA PECKII *Spegaz.*

Fallen leaves of *Amelanchier Canadensis.* Center. May.

SPHÆRELLA SEPTORIOIDES *n. sp.*

Spots few, orbicular, angular or irregular, white; perithecia numerous minute, hypophyllous, black; asci oblong; spores crowded, uniseptate, colorless, .0005' long, the two cells nearly equal.

Living leaves of *Thalictrum dioicum.* Central Bridge. June.

The spots are very white, and so thin that the perithecia show through the tissues of the leaf. The external resemblance to species of Septoria suggests the specific name.

(5.)

REMARKS AND OBSERVATIONS.

VIOLA BLANDA *Willd.*

A noticeable form of this violet occurs about Albany. It has the calyx peduncles and petioles tinged with dull red, the flowers rather large, the petals scarcely greenish at the base, and the fragrance wanting. The leaves are sometimes rather coarsely hairy.

VIOLA MUHLENBERGII *Torr.*

A dwarf form of this species was found in South Corinth, flowering freely the latter part of August.

SEDUM TELEPHIOIDES *Mx.*

This plant which is rare in our State, is reported by *Hon. D. F. Day*, to be growing at Chittenango Falls, high up on the face of the cliffs.

ASTER MACROPHYLLUS *L.*

A form occurs near Albany with purplish stems, broadly ovate cauline leaves and flowers with six to ten rays only.

ASTER NOVÆ-ANGLIÆ *L.* var. ROSEUS *T. & G.*

Buffalo. *Clinton.*

ASTER ERICOIDES *L.* var. VILLOSUS *T. & G.*

Buffalo. *Clinton.*

HIERACIUM AURANTIACUM *L.*

This plant is already fully established in several localities in our State, and is rapidly spreading. I have seen it in abundance in Rensselaer, Schoharie and Montgomery Counties, and it is reported by *Mr. S. W. Cowles* as fully established in Cortland County. It spreads both by seed and by runners. It thrives in hard gravelly soils, by roadsides, in pastures and in meadows, and bids fair to rival the daisy as a noxious weed. It forms a dense carpet of hairy leaves closely pressed to the surface of the ground, and sends up its flowering stems a foot or more high. These bear at their summit a cluster of beautiful orange-colored flowers, which give a very showy appearance to the fields they occupy. The growth of the plant is very rapid. One field that had been plowed in the spring was red with the blossoms of this weed the middle of June Meadows containing it, after having been mowed, quickly send up a second crop of flowering stems. It is pronounced by farmers to be worthless as fodder, and it is doubtful if it can be kept down except by thorough cultivation of the soil.

SHEPHERDIA CANADENSIS *Nutt.*

Rocky places near Central Bridge and Sprakers.

CHENOPODIUM ALBUM *L.*

This species at present is made to include a variety of forms, some of which do not well harmonize either in general aspect or in details of character. A common form about Albany has wide-spreading branches, broad leaves with numerous teeth, usually five to ten on each side, large dense clusters of fruit, usually intermingled with leaves but sometimes becoming leafless, and seeds very large, fully equal in diameter to the seeds of *C. hybridum.* This form differs so widely, in its whole aspect and in all the characters mentioned, from the ordinary narrow-leaved form, *C. viride*, that unless they are clearly connected by intermediate forms it would seem better that they should be kept distinct.

Pinus mitis *Mx.*

Specimens of this pine and of the scrub-pine, *Pinus inops*, have been received from *Mr. N. L. Britton*, who found them growing on Staten Island. This makes six species of pine known to belong to the State. Unfortunately neither of the specimens was accompanied by flowers or cones, from which I infer that they do not fruit, and that the existence of these two species within our limits will not be long continued. *P. inops* is also said to occur on Long Island, but I have seen no specimens from that locality.

Juncus Canadensis *Gay*, var. subcaudatus *Engelm.*

Ditches along the railroad. South Corinth. Aug.

The weak stems and spreading panicles give this variety an appearance quite unlike that of the more common one, var. *coarctatus*.

Trisetum molle *Kunth.*

Cliffs near Central Bridge. June.

Aspidium spinulosum *Swartz.*

Fertile specimens of the dwarf form known as var. *dumetorum* were found on the Catskill Mountains. They are glandular-hairy and therefore should be referred to the recently-proposed species, *A. Americanum* Dav. The typical *A. spinulosum*, as limited by *Mr. Davenport*, occurs on the Adirondack Mountains.

Botrychium ternatum *Swartz*, var. obliquum *Eaton.*

The dwarf form of this variety with the sterile frond about one inch broad and long and the whole plant three or four inches high was found at South Corinth.

Botrychium simplex *Hitch*, var. subcompositum *Lasch.*

Lewis's Bluff near Oswego. *Rev. H. Wibbe.*

Bryum elongatum *Dicks.*

This rare moss occurs on Slide Mountain, one of the highest peaks of the Catskills.

Agaricus cæsareus *Scop.*

This species was found at Gansevoort growing in a circle about forty feet in diameter. About one-fourth of the circumference of the circle was unoccupied by the fungus in consequence of the encroachment of a cleared field. In the American form of the species the stem is rather slender and equal or slightly tapering upward. I have not seen it "subventricose" as required by the description.

Agaricus Americanus *Pk.*

This Agaric usually grows in grassy places or on lawns, but fine specimens were found the past season growing in a large tuft on an old stump. The lamellæ are much narrowed behind and somewhat reticulately connected. In the fresh state the whole plant is white with the exception of the scales of the pileus.

AGARICUS HORDUS *Fr.*

Although the specimens formerly referred to this species agree in most respects with the description there are certain discrepancies, which upon further investigation induce me to believe it to be a distinct species. I would, therefore, give it the following name and description :

AGARICUS (TRICHOLOMA) PRÆFOLIATUS *n. sp.*

Pileus thin, slightly convex or expanded, a little moist in wet weather, virgate with innate brownish fibrils, dark-cinereous or grayish-brown, usually a little darker on the disk, the margin sometimes revolute ; lamellæ very broad, subdistant, rounded behind, sometimes united at the point of attachment, venose-connected and somewhat transversely striate, often split transversely, the edge uneven or eroded, white ; stem equal, firm, fibrous, fibrillose-striate or rimose, stuffed or hollow, white or whitish ; spores broadly elliptical, generally uninucleate, .00025′–.00035′ long ; flesh white, odor pleasant, anise-like.

Plant 4′–6 high, pileus 3 –5′ broad, stem 5′ –10″ thick.

Ground and decaying hemlock wood in woods and groves. June and Aug.

The pileus is often irregular and sometimes eccentric. The lamellæ are very broad, sometimes a half an inch or more, and usually much torn. The plant is scattered in its mode of growth, but few individuals occurring in a place. The obscure striations of the lamellæ are retained in the dried specimens.

AGARICUS CORTICOLA *Schum.*

This plant revives on the application of moisture, thus indicating an affinity with species of Marasmius.

AGARICUS CALLISTUS *Pk.*

This beautiful Agaric grows on decaying wood in damp places as well as in exsiccated water-holes.

CORTINARIUS CORRUGATUS *Pk.*

In woods. Gansevoort and Sandlake. Aug.

The color of the pileus varies from yellow to reddish-yellow or ochraceous, the lamellæ are sometimes minutely transversely venose, and the stem is slightly fibrillose, and sometimes sprinkled above with yellowish grains or squamules.

PAXILLUS POROSUS *Berk.*

Fine specimens were found at Brewerton, growing on the ground in woods and on mounds of earth. The plant emits an unpleasant earthy odor. I have not found the pileus viscid, and conclude that the part of the description "viscid when moist" is a mistake. This species is easily known by its porous hymenium, which connects it with the genus Boletus. *Paxillus flavidus* Berk. is probably not distinct from *Gomphidius rhodoxanthus* Schw., which occurs within our limits. The species is ambiguous between Paxillus and Gomphidius, but from the character of its spores it seems nearer the latter genus to which I have referred it. Our New York species of Paxillus may be tabulated thus:

Stem central:	
Pileus glabrous or only the margin tomentose..........	P. involutus *Batsch.*
Pileus hairy, less than two inches broad..............	P. strigosus *Pk.*
Stem eccentric or lateral:	
Velvety-tomentose, hymenium lamellated............	P. atrotomentosus *Batsch.*
Glabrous, reticulated, hymenium porous.............	P. porosus *Berk.*
Stem none	P. panuoides *Fr.*

LACTARIUS INDIGO *Schw.*

This Lactarius appeared in considerable abundance in August, both in Sandlake and in Gansevoort. The younger and fresh plants are generally highly colored and distinctly zonate, especially on the margin, but they fade with age, and generally lose their zonate character. The pileus when moist, is smooth, and subviscid to the touch, the stem is hollow and often spotted, and the spores are yellowish. Wounded places become greenish. It belongs to the section Dapetes, so named doubtless because of the edible qualities of its species. The four New York species of this section are very similar in character, and differ but little except in color and place of growth. They may be tabulated as follows:

Lamellæ when young blue, milk blue........................	L. Indigo *Schw.*
Lamellæ when young orange, milk orange..................	L. deliciosus *L.*
Lamellæ when young purplish-red, milk dark red...........	L. subpurpureus *Pk.*
Lamellæ when young grayish-yellow, milk pale saffron......	L. Chelidonium *Pk.*

The first and last species usually occur on dry soil under or near pine trees; the second and third prefer damp soil in and about swamps and among mosses.

LACTARIUS SORDIDUS *Pk.*

A notable variety occurs in Sandlake. It has a hairy pileus and a greenish stem. The hairs of the pileus are of a brownish-green color, and toward the margin they separate in tufts or squamules. The pileus, as well as the stem, is more highly colored than in the typical form. It may take the name var. *hirsutus.*

LACTARIUS AQUIFLUUS *Pk.*

The agreeable aromatic odor, which is present both in the fresh and in the dried plant, is similar to that of *L. glyciosmus.*

RUSSULA FŒTENS *Pers.*

The odor of this plant as it occurs with us is not usually fetid or unpleasant. It resembles the odor of cherry bark and might aptly be termed amygdaline. The lamellæ are rarely forked and frequently they are quite as equal as in species of the section Fragiles. In this respect it violates the characters of the section Heterophyllæ in which the species is placed. It is doubtless this form to which Dr. Curtis gave the name *Russula amygdalina.* But our plant is scarcely a distinct species, for it does occur with numerous short lamellæ intermingled with the longer ones, and the same peculiar odor has been attributed by one writer at least to the European *R. fœtens.*

BOLETUS SPECTABILIS *Pk.*

This rare species occurs near Indian Lake in Hamilton County. It was discovered in North Elba in 1869, since which time I had not met with it. It constitutes with *B. pictus* and *B. paluster* a natural group of allied species. When young the tomentum in all of them covers the whole pileus.

BOLETUS ALBUS *Pk.*

This is another Boletus of rare occurrence. When young the tubes are white, but they at length become yellow or ochraceous-yellow. The flesh is white and the plant when fresh emits a fetid odor.

BOLETUS SUBTOMENTOSUS *L.*

A form of this species occurs in which the costæ of the stem anastomose in such a way as to form large but rather obscure reticulations. Is it *B. lanatus* Rost.? Another form having the pileus and stem darker-colored than usual occurs on much decayed prostrate trunks of trees and about old stumps. The chinks of the pileus are sometimes whitish.

BOLETUS AFFINIS *Pk.*

A fine variety of this species was found at Gansevoort, in which the pileus was beautifully mottled by small yellowish spots. It merits the name var. *maculosus.*

BOLETUS MODESTUS *Pk.*

This rare species sometimes has the flesh of the pileus yellowish. The stem is minutely scurfy or furfuraceous.

POLYPORUS CÆRULEOPORUS *Pk.*

A form of this species was found at South Corinth, in which the whole plant was grayish-blue except the flesh which was white.

POLYPORUS RHIPIDIUM *Berk.*

There is a slight viscidity to the pores of this species. The pileus fades with age.

POLYPORUS SPUMEUS *Fr.*

A large form of this plant, with pilei sometimes six or eight inches across, occurred at Brewerton.

POLYPORUS BOREALIS *Fr.*

This sometimes occurs on hemlock stumps. It then differs from the form on spruce in having the pileus broader, wholly white and strigose-hairy or fibrous-hispid.

POLYPORUS VOLVATUS *Pk.*

The form recently published under the name *Polyporus obvolutus* Berk. & Cke. is not specifically distinct from this species, according to specimens received from Mr. Ellis.

CLAVARIA BOTRYTES *Pers.*

When old the branches both of this species and of *C. flava* become elongated, obtuse, very fragile and of a uniform color. The yellow tips of the latter and the red ones of the former species wholly disappear.

MYROTHECIUM FUNGICOLA *Pk.*

This species has recently been referred to *M. inundatum* Tode. The spores in that species are represented in *Sturm's Dutchland Flora* as globose. In our plant they are oblong or cylindrical, a difference which seems to me to be of specific value.

PERONOSPORA VITICOLA *B. & C.*

Leaves of wild grape-vines. Catskill Mountains. A Peronospora which is scarcely distinguishable from this species occurs about Albany on leaves of the great ragweed, *Ambrosia trifida.*

MORCHELLA SEMILIBERA *DC.*

Mr Warne finds two forms of this species at Oneida, one with the pileus conical, the other with it hemispherical and obtuse. In both the stem may be either short or long. The pileus is often free nearly or quite to the apex.

GYROMITRA ESCULENTA *Fr.* (*Helvella esculenta.*)

This plant sometimes grows so large that a single one will weigh a pound.

HELVELLA ELASTICA *Bull.*

This species is described as having the pileus free. It is not uncommon to find it with the pileus attached in one or two points to the stem.

VERPA DIGITALIFORMIS *Pers.*

Buffalo. *Clinton.*

HELOTIUM PILEATUM *Pk.*

Decaying stems lying in water. Sandlake. May.

This is a large form about an inch high, with a conical or subcampanulate pileus 2′-3″ broad.

VALSA OXYSPORA *Pk.*

The habitat of this species was, by an error, stated to be dead oak branches. It is dead branches of mountain holly, *Nemopanthes Canadensis.* I have not found it on oak. It is very distinct from *V. taleola*, if the published characters of that species are at all reliable.

(6.)

NEW YORK SPECIES OF LYCOPERDON.

LYCOPERDON *Tourn.*

Peridium membranaceous, vanishing above or becoming flaccid; bark adnate, subpersistent, breaking up into scales or warts; capillitium soft, dense, adnate to the peridium and sterile base. *Syst. Myc.*, *Berk. Outl.*, *Cooke's Handbook.*

The species of Lycoperdon are commonly known as "Puff-balls." They belong to a family of fungi called Gasteromycetes, because of their habit of producing their spores in the inner cavity of the plant. The particular order to which they belong is called Trichogasters, a name having reference to the hair-like filaments with which the interior of the mature plant is filled. These filaments form a somewhat elastic mass, and are interspersed with vast numbers of minute dust-like spores. When, therefore, the mature plant is suddenly compressed, it emits a little cloud of spores which bears some resemblance to a puff of smoke. This probably suggested the name "Puff-balls."

There are two other closely related genera in this order, whose species emit the characteristic puff of spores. One is called Bovista, the other Scleroderma. In the former, the outer rind or epidermis disappears as the plant matures, and there is no distinct spongy or cellular mass of sterile tissue at the base of the plant. In the latter, the walls of the plant are thick and firm when young, and they remain in nearly the same condition when mature. In these respects both genera differ from the genus Lycoperdon. In it the fertile part of the plant is more or less globose in shape, but there is always a mass of coarse empty cells at the base, which constitute a sterile part of the plant—that is, they produce no spores. In those species which have this part highly developed, it constitutes a sort of stem to the fertile part, and raises it above the earth or the matrix on which the plant grows. When the sterile base is but slightly developed, the plant appears to sit directly on the ground or matrix, and is then said to be *sessile.* The exterior of the plant consists of two parts. The outer part is sometimes called the *bark*, sometimes the *exterior peridium.* In some species it takes the form of minute flocculent or pulverulent masses of scurf-like scales, in others it consists of weak spines or spine-like bristles, while in others still the spines are much longer and stouter, being thickened at the base. Plants with these coarse long spines are said to be *echinate*, because of their stiff bristly aspect. Sometimes several contiguous spines have their tips curved toward each other and united together, thus forming little stellate or star-like clusters. These external processes or adornments are often called *warts.* In some species they are deciduous at maturity, in others they form a permanent adornment of the inner rind or true *peridium*, but in such cases they usually shrivel with age and become less conspicuous. In a few species, the exterior peridium, at maturity, is separable from the inner, and may be peeled off like a thin membrane. The inner or true peridium is at first rather thick and firm, but when fully mature it is generally thin, membranaceous and flaccid. In one series of species, the upper part, when mature, breaks up into irregular fragments and soon falls away; in another series it bursts by a small apical aperture, and then remains in this condition a long time. This difference in the peridia of the various species affords a character by which the genus is divided into two sections. The first section was designated by Fries as *Bovistoides*, the other as *Proteoides.* The former was raised by Rostkovius to the rank of a genus with the name Langermannia, but modern mycologists have generally followed Fries in regarding these species as a section or subgenus of Lycoperdon.

The peridium incloses at first a soft fleshy mass of white cellular matter. If a minute portion of this be examined microscopically, a great number of short jointed filaments and enlarged cells or basidia are seen, the latter of which bear slender spicules, usually four apiece, on the tips of which the spores are borne. When the plant is fully developed, this central fleshy substance becomes filled with moisture and quickly changes its color. So abundant is the moisture that it may be pressed out like water from a wet cloth or sponge. The inexperienced collector is sometimes surprised at finding the moisture in the specimens which he has laid up to dry increasing instead of diminishing, and his surprise is soon changed to disappointment and perhaps annoyance, when he sees his beautiful specimens water-soaked and discolored by this superabundance of moisture. In most species the white color of the flesh at first changes to a yellow or greenish-yellow, but this hue soon becomes darker until at last it is either a purple-brown or a dingy-olive; that is, brown more or less tinged with dark-red, or brown tinged with yellow or greenish-yellow. In a few species the final color is less decided, approaching a dark-umber or snuff-brown. Sometimes the outer stratum, lying next to and in contact with the inner surface of the peridium, is paler than the rest of the mass. With this change in the color of the interior mass there is also a change no less wonderful in its character. It is now no longer moist and fleshy, but dry and dusty. The whole interior is filled with a soft but elastic mass of intricate, slender, cottony filaments interspersed with countless multitudes of minute dust-like spores. This mass of threads is called the *capillitium.* In some species it is of nearly uniform density throughout, but in others those filaments that spring from the base do not so freely unite and intermingle with those that spring from the walls of the peridium. They, therefore, form a central mass more or less distinct from the rest, and are called the *columella.* The columella is usually of a somewhat conical shape, but sometimes it is nearly globose. It may be detected in the mature plant by carefully making two opposite slits in the peridium, extending them from the apex nearly or quite to the base, and then opening the two hemispheres thus formed, the uncut base acting as a hinge on which the halves may turn. The columella, if present, will be seen projecting from the base in the center of the cleft. The slits are best made with a pair of small, sharp scissors, as care should be taken not to disturb the natural position of the filaments more than is necessary. In the mass the capillitium and spores appear to be uniformly and similarly colored, but often if the filaments are cleared of the spores they are seen to be paler in color. Rarely they are darker. The color of the capillitium and spores might be used as a character for grouping our species in subsections. The spores in all our species are nearly or quite globose. They vary in size in the different species from .00016 to .00025 of an inch in diameter. The olive-tinted spores in nearly all the species are smooth and about .00016 of an inch in diameter, but the purple-tinted ones are always rough or echinulate and generally larger, varying from .0002 to .00025 of an inch broad. It is perhaps needless to say that the size of the spores does not at all depend on the size of the plant that produces them. The spores of the Giant puff-ball, the largest one of the genus, are but .00016 of an inch in diameter, while those of the little Smooth puff-ball, which is scarcely more than an inch in diameter, are about .00025 of an inch broad. The color of the spores may be ascertained by ejecting a small quantity of them on white paper or by opening the peridium and exposing them to view.

Puff-balls rarely make their appearance in the early part of the season. Old effete specimens of the preceding autumn may be found in early spring, flattened and closely pressed to the ground by the snows of winter. Fresh specimens rarely appear before the middle of June. Their greatest abundance is in late summer and early autumn. During the months of August, September and October most of our species occur. One species I have found in July and August only, another in July only. Some species are invariably found in cleared lands, others in woods or bushy places, while a few are denizens of both field and forest. Some grow on the ground only, others on old logs and decaying wood, and a few on both the ground and decaying wood. One southern species is said to inhabit the bark of living oak trees. Some species have distinct, whitish, root-like fibres at the base. These penetrate the earth, and sometimes creep through it for a considerable distance. In the Pear-shaped puff-ball they are generally well developed, and sometimes several individuals are found to be attached together by these creeping subterranean fibres.

In the determination of the species, it is desirable to have specimens in both the mature and the immature condition. The former will afford the means of ascertaining the color and character of the capillitium and spores, the latter will exhibit the color of the immature plant, and the character of its warts or adornments. The character of these, and the characters of the capillitium and spores are of the first importance, but the color of the immature plant and its size and shape are less constant and reliable, and are therefore generally considered of secondary importance. Specimens preserved entire and in their natural shape are much more satisfactory for study than those that are sliced in sections or pressed flat and mounted on herbarium paper. Such specimens can easily be kept in trays or small paper boxes. The immature ones should be gathered just before maturity. If taken too early they shrivel too much, and do not keep their shape as well.

Puff-balls are useful because they are edible. None of the species are considered dangerous or even hurtful, yet some are so small and so scarce, that they are not of much value for food. The larger ones are generally better flavored than the smaller and more common ones. They should be used as food in the immature condition only, while the flesh is yet of a pure white color. When it begins to discolor its goodness is gone.

The method of preparing them for the table is as follows: Take off the rind and cut the fleshy part into thin slices. Beat up two or three or more eggs, according to the quantity to be prepared, and dip the slices in it. Then fry in butter, seasoning with salt, pepper and savory herbs if desired. Another method is to put the slices in water and heat to the boiling point. Then take them out and fry in butter as before. Puff-balls, as an article of food, have this advantage over mushrooms. They are not often infested by insects or their larvæ, and there is scarcely any possibility of mistaking any deleterious species for them. In the following descriptions, those species whose esculent qualities have been tested by the writer are marked edible.

The Synoptical table is intended to be an aid to the student in tracing the species. Nearly all the characters employed in it are ascertainable without the aid of the microscope.

SYNOPTICAL TABLE OF SPECIES.

SECTION 1. *Peridium Rupturing Irregularly.*

Plant very large, spores dingy-olive....................	L. giganteum.
Plant large, spores purple-brown....................	L. cyathiforme.
Plant medium size, stem long, spores dingy-brown	L. saccatum.

SECTION II. *Peridium Opening by a Small Apical Aperture.*

Mature capillitium and spores purplish-tinted.............	a.
Mature capillitium and spores olive-tinted.................	b.
a Denuded peridium reticulate with brown lines.........	L. constellatum.
a Denuded peridium smooth........................	L. atropurpureum.
a Peridium not denuded, warts minute, persistent......	L. glabellum.
b Plant shaggy or echinate with spinose or pyramidal warts,	c
b Plant not shaggy, warts minute or papilla-like.........	e.
c Plant sessile, growing in cleared land..............	L. Wrightii.
c Plant subsessile, growing in wood or bushy places....	d.
d Denuded peridium pitted, spores pedicellate...........	L. pedicellatum.
d Denuded peridium smooth, spores not pedicellate.......	L echinatum.
e Plant generally with a stem-like base..............	f.
e Plant without a stem-like base, sessile...............	g.
f Denuded peridium pitted and reticulate with dotted lines,	L. gemmatum.
f Denuded peridium not pitted......................	L. molle.
f Peridium scarcely denuded, warts minute, equal	L. pyriforme.
g Plant pinkish-brown, growing in woods...............	L. subincarnatum.
g Plant whitish, growing in cleared land...............	L. pusillum.
g Plant yellowish, growing in woods..................	L. coloratum.
g Plant whitish, ovate or conical.....................	L. calyptriforme.

Section I. *Bovistoides. Peridium rupturing irregularly, the upper part falling away in fragments. Columella none.*

In the species of this section the peridium is apt to crack in areas, and at maturity it breaks up in irregular fragments and falls away. The capillitium and spores are also soon dispersed, so that there remains only the sterile base which is sometimes margined by the lacerated, but more permanent basal part of the peridium. In this case the remains are somewhat cup-shaped. The bark or warts are usually of a soft floccose character, but sometimes not conspicuously developed.

Lycoperdon giganteum *Batsch.* Giant Puff-ball.

Very large, 10′–20′ in diameter, obconic or depressed-globose, nearly or quite sessile, white or whitish, becoming discolored by age, smooth or slightly roughened by weak spinose or minute floccose warts, sometimes cracking in areas; capillitium and spores yellowish green to dingy-olive; spores smooth, .00016 in diameter. Edible.

Ground in fields, pastures and grassy places. Buffalo, *Clinton.* Oneida, *Warne.* North Galway, *Teft.* Rensselaerville, *Doolittle.* Catskill Mountains, *Paine.* Late summer and autumn.

This is the largest puff-ball known in this country, and is therefore very appropriately named the Giant puff-ball. The species, according to Fries, has also received other names, such as *L. maximum* Schæff, the largest puff-ball; *L. Bovista* L., the Bovista-like puff-ball; *L. vulgare* Vaill, the Common puff-ball, and *L. proteus* Sow., the Protean puff-ball. Its dimensions are usually within the limits given in the description, but sometimes it grows much larger. Its great size frequently brings it into notice, and makes it the subject of short newspaper articles. The following have recently fallen under the observation of the writer, and are introduced here because they indicate the size sometimes attained by this puff-ball: "In a low moist portion of the Gordon Park there grew this fall one of the largest puff-balls (*Lycoperdon giganteum*) ever seen. It measured a little over eight feet in circumference, and weighed forty-seven pounds. It looked at a distance like some large boulder. * * A specimen of the above dimensions would be a meal for a good large family. In fact, I think it sufficient to appease the appetites of some of the largest European fungus clubs."—*Country Gentleman.* "There was an enormous puff-ball in a bank near the house of the writer this summer. It was eighteen and a half inches in its greatest diameter, and four feet four inches in circumference. These puff-balls have come up in the same place for many years past, and always of a large size, but never before so large as the above."—*Grevillea.* "Among noteworthy specimens seen at the recent Edinburgh Fungus Show, was * * a puff-ball (*Lycoperdon giganteum*) fifty-four inches in circumference and weighing twenty pounds." —*Botanical Gazette.* Schweinitz affirms that he found in a certain meadow specimens of this puff-ball three feet in diameter. The largest New York specimen that I have seen is the one contributed by Mr. Warne. It measures fifteen inches in diameter in its dried state. It was considerably larger in its fresh state. The specimen from Rensselaerville is fourteen inches in diameter in the dried state. One writer advises that when one of these large puff-balls occurs at a convenient distance from the house, it should not be removed from its place of growth, but that a sufficient quantity be cut from it for a meal. The next day it may be visited again and enough more be taken for another meal. In this way it may supply a small family for a week; but if all were taken up and carried to the house at once, some of it would spoil before it could be used. It is said that when the growing plant is cut or wounded, the wounds heal or fill up with new tissue. Cordier states that the old flesh of this puff-ball is sometimes used for amadou, and that the spores are mixed with milk by the Finns, to make a medicine for calves afflicted with diarrhœa. They are also used, he says, in making various shades of brown paint. The capillitium and spores of this and other species are also said to have been used in staunching blood, and their fumes as an anæsthetic. Fries says that there are two forms of this species, one obconic, and the other larger and globose. All the specimens that I have seen were depressed-globose, their vertical diameter being less than the horizontal. As one correspondent expresses it, they were very much like a large round loaf of bread in shape and in color. In all our specimens the sterile base is very small in proportion to the size of the plant, so that, in the growing state the plant must have appeared quite sessile. Probably the smaller obconic form has a more distinct base. According to Fries, the species is so variable in size, shape, color and the character of the surface, that from these alone it is difficult to distinguish it There is, however, no New York species at present known to me with which it is likely to be confused, if the characters of the mature peridium, and the color of the capillitium and spores are observed.

LYCOPERDON CYATHIFORME *Bosc.* CUP-SHAPED PUFF-BALL.

Large, 3′–10′ in diameter, nearly globose, generally furnished with a short more or less thick stem-like base, whitish cinereous or pinkish-brown, smooth or minutely floccose, sometimes with minute scattered spinules or floccose scales, generally cracking in areas, the upper part at length falling away in fragments and leaving a cup-shaped base with a lacerated margin; capillitium and spores purple-brown; spores rough .0002′-.00025′ in diameter. Edible.

Ground in fields and pastures. Buffalo, *Clinton.* Oneida, *Warne.* Utica, *Johnson.* Fort Edward, *Howe.* Albany, Sandlake, Maryland and South Corinth. Autumn.

Bosc's figure and description of this species, for a transcript of which I am indebted to the kindness of Prof. Farlow, are not very satisfactory. They were evidently derived from the basal remains of the effete plant, a mode of describing fungi which is scarcely to be recommended. But in this case it happens that there is no other known American puff-ball than the one here described to which, in the effete condition, his description is applicable, so that there is very little doubt as to the species he intended to describe. A translation of his description is here given.

"Sessile, conical, concave at the top, the margin thin and lacerated.

"This species, which occurs in very dry and open places in South Carolina, appears to have some resemblance to *L. infundibulum* Willd. Its color is a grayish-violet, more distinct in the cavity. I have never seen it open naturally to disseminate its seeds. Insects which perforate it, the feet of quadrupeds which crush it, winds which blow it against trees supply this want."

The use of the word sessile in this description is very natural, if we should suppose as Bosc evidently did, that the sterile base was the only and normal condition of the plant. "Conical" would probably have been more accurate, if it had been written "obconical" or "inversely conical." This species, according to Dr. Berkeley, is apparently the same as *L. fragile* Vitt. It is also the *L. albopurpureum* of Frost's List of Fungi in the Catalogue of

Plants growing near Amherst College. It is the *Bovista cyathiformis* of the Twenty-second State Cabinet Report, and an immature condition of it was reported and figured in the Twenty-third State Cabinet Report under the name *L. giganteum.*

As an edible species, it is not inferior to the giant puff-ball. It is equal to it in flavor and occurs more frequently and in greater numbers. The smaller plants are about the size of a man's fist, the larger ones are as big as a man's head. The short thick stem often penetrates the earth so that the plant appears to be truly sessile. The color is generally brown more or less tinged with pink or lilac, but sometimes it is nearly white. Usually the upper part cracks into rather large distinct areas. Just at maturity there is a thin membrane or epidermis which may be separated from the peridium, which is then seen to have a beautiful but minutely velvety surface. It is at this time quite thick but very fragile. The cup-like base, which remains after the dispersion of the capillitium and spores, is suggestive of the specific name. It is more or less tinged with the purplish-brown hue of the capillitium and frequently persists till the following spring. Sometimes the persistent basal part of the peridium is expanded so that the cup is lost in a nearly plane surface. The color of the capillitium and spores readily separate it from the other species of this section.

LYCOPERDON SACCATUM *Fr.* LONG-STEMMED PUFF-BALL.

Medium size, 2′–4′ high, 1′–2′ broad; peridium depressed-globose or somewhat lentiform, supported by a long stem-like base, furfuraceous with minute persistent mealy or granular warts or spinules, often plicate beneath, white or creamy white, at maturity becoming brown or olive-brown, subshining and very thin or membranous, breaking up into irregular fragments which sometimes adhere to the capillitium for a considerable time, the stem-like base cylindrical or narrowed downward, sometimes thick; capillitium rather dense, subpersistent, and with the spores dingy-olive or dingy-brown, sometimes verging toward purplish-brown; spores rough, .00016′–0002′ in diameter. Edible.

Low mossy grounds and bushy swamps, especially under alders. Sandlake, Center and Adirondack Mountains. August—October.

The Long-stemmed puff-ball is one of our finest species. Its symmetrical shape, pure color, soft and delicate appearance, all conspire to render it attractive. The peridium is sometimes nearly globose, but usually it is more or less depressed and hemispherical or lens-shaped. It warts are soft and delicate, and so minute, that to the naked eye the plant appears to be mealy or almost pruinose. They are persistent, but in the mature plant they shrivel or dry up so that they are scarcely noticeable. In the mature plant the peridium shrinks to a thin delicate membrane, in which respect it differs from the peridium in the two preceding species. The under surface is sometimes marked by radiating alternate elevations and depressions, and in some instances the stem is also rendered uneven by shallow, undulate depressions. The stem sometimes persists long after the disappearance of the peridium and its contents.

Before maturity this species bears a strong resemblance to *L. molle* Pers., the Soft puff-ball, but when mature the two are easily separated by the different manner in which the peridium ruptures.

Section II. *Proteoides. Peridium opening by a small apical aperture, persistent. Columella generally present.*

In this section the species are more numerous than in the preceding, and the plants are generally more abundant, but they do not attain such large dimensions. The peridium persists for a long time, and as its aperture is very small, its capillitium and spores are not so soon dispersed. In some of the species there are larger deciduous warts or spines interspersed among smaller and more persistent ones; in others, all are nearly equal and persistent; in a few, all are deciduous.

* *Spores purple-tinted, intermingled with short fragmentary slender filaments.*

Lycoperdon constellatum *Fr.* Reticulate Puff-ball.

Peridium subglobose or obovate, sometimes depressed, 10″–18″ broad, echinate with rather long stout crowded brown spines which are either straight curved or stellately united and which at length fall off and leave the surface reticulate with brown lines; capillitium and spores brown or purplish-brown, columella present; spores rough, .0002′–.00025′ in diameter.

Ground in dense shades and groves. Oneida. *Warne.* Rare. Autumn.

I am not aware that this species has been found in any other locality in the State. I have seen the dried specimens only, but Mr. Warne informs me that the fresh plants do not differ essentially in color from the dried ones. These are of a cervine or dull-brown color, closely resembling the hue of the dead and fallen leaves among which they appear to have grown. They are about an inch across, and very rough or shaggy, with crowded stout spines. When these have fallen, the surface is reticulated by a network of minutely warted brown lines, a character by which the species is readily distinguished.

Lycoperdon atropurpureum *Vitt.* Purple-spored Puff-ball.

Peridium globose depressed-globose or obovate, 6″–30″ broad, generally narrowed below into a short stem-like base, white cinerous or brownish, mealy-spinulose hairy-spinulose echinate or stellately echinate, when denuded smooth and subshining; capillitium and spores finally purplish-brown, columella present; spores rough, .0002′–.00025′ in diameter.

Sandy pastures, woods and bushy places. Common. August—October. Albany, Sandlake, Gansevoort, Brewerton, Catskill Mountains and Helderberg Mountains.

This appears to be one of the most polymorphous species we have. It is so variable that I have been obliged to modify the usual description very much, in order to include forms which are quite diverse, yet which appear to me to run together in such a way that I am unable to draw any satisfactory line of distinction between them. The following is the usual description of the Manuals:

"Peridium flaccid, dingy-rufous, opening by a minute obtuse mouth; bark at first rough, with minute spines; sterile base cellular, continuous with the capillitium; spores largish, pedicellate, brown-purple, echinulate."

I do not find the spores in our plant truly pedicellate; but in all the forms which I have referred to this species, as well as in all the species of this sub-

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section and in European specimens of this species, I find them intermingled with short, fragmentary, slender filaments, which look very much as if they were pedicels broken from the spores. I have not been able to find the spores attached terminally to them; but, in several instances, they appeared to be attached laterally. There also appears to be a minute point or apiculus on the spores, probably the point of attachment; but this is scarcely worthy of being called a pedicel.

There are three principal varieties which I have referred to this species. The first is usually one to two inches broad, sessile, or with a very short stem, nearly smooth, being mealy or pruinose, and having a few minute, weak, scattered spinules or scales. Its color is generally whitish, or white slightly clouded with brown. It grows in sandy pastures and cleared lands, and is probably the nearest of the three in its resemblance to the type.

The second is turbinate or subglobose, and narrowed below into a distinct, though short, stem-like base. It varies in diameter from half an inch to an inch and a half, and is thickly beset with slender bristle-like spinules which are often blackish, and give the plant a decidedly hairy aspect. The largest specimens have the spinules a little stouter, and sometimes stellately united. Such specimens connect this with the next variety.

The third variety varies from one to two and a half inches in diameter, and is generally furnished with a short stem-like base. Its spines are quite coarse, and often crowded and stellately united. They give it a decidedly rough or echinate appearance, so that at first sight it would be thought a distinct species; but the spines are easily deciduous, and individuals occur in which they are more scattered, and which have a mealy or pruinose surface, by which characters this variety appears plainly to run into the first I regard the second and third as worthy of a name, and designate and define them as follows:

Var. *hirtellum*. Peridium hairy-spinulose with erect or curved sometimes stellately united spinules, which are often of a blackish color.

Ground and decaying vegetable matter in woods.

Var. *stellare*. Peridium echinate or stellately echinate with rather stout easily deciduous spines.

Ground in woods and bushy places.

In this species the capillitium and spores are at first greenish-yellow, olive-tinted or brownish; but when fully mature they are purple-tinted. Some care will, therefore, be necessary, lest the last variety be confused with the Echinate puff-ball, *L. echinatum*. This variety was mentioned in the Twenty-second State Cabinet Report, under the name *L. calvescens* B. & C. The specimens were thus referred by one of the authors of that species; but when the description of the species was published, the reference was found to be erroneous. The larger, purple-tinted, rough spores forbid such a reference.

Lycoperdon glabellum *Pk.* Smooth Puff-ball.

Plant subglobose or subturbinate, 8″–18″ broad, sometimes narrowed below into a stem-like base, yellow or brownish-yellow, furfuraceous with minute nearly uniform persistent warts; capillitium and spores purplish-brown columella present; spores rough, .0002′–.00025′ in diameter.

Ground in pine woods and bushy places. North Greenbush, Albany and Center. Autumn.

The Smooth puff-ball is not inferior in beauty to any of our species. Its pretty yellow color and soft, smooth appearance readily attract attention. It is generally about one inch in diameter, and obovate, pyriform or subturbinate in shape. To the naked eye it appears to be smooth, or only mealy, or minutely papillose; but under a lense it is seen to be covered with minute, granular, or branny warts. These, in all the specimens that I have seen, are persistent. The character of the warts and the different color of the peridium enable this species to be easily distinguished from the preceding one, to the smaller and smoother forms of which it otherwise approaches.

* * *Spores olive-tinted or brown.*

a. Plant shaggy or echinate.

Lycoperdon Wrightii *B. & C.* Wright's Puff-ball.

Peridium globose depressed-globose or lentiform, 6′′–24′′ in diameter, generally sessile, white or whitish, echinate with deciduous sometimes crowded stellate spines or pyramidal warts, when denuded smooth or minutely velvety; capillitium and spores dingy-olive, columella present; spores smooth, .00016′ in deameter. Edible.

Ground in pastures and grassy places. Very common. July—October.

This is another very variable species. The typical form was a small one, minutely echinate and having the denuded peridium smooth. The plant often occurs much larger and more coarsely echinate with stout angular spines or pyramidal warts which fall off and generally leave the surface of the peridium velvety. This larger form was published in the Twenty-sixth Report of the N. Y. State Museum under the name *Lycoperdon separans*, but it is impossible to keep the two forms distinct. The larger ones sometimes have the denuded peridium smooth and there are other forms intermediate in the size and roughness of the peridium. I have therefore modified the specific description so as to include both forms.

Another puff-ball occurs which is probably a variety of this species but of which I have seen only immature specimens. It is of a purer white color and has the warts or spines tipped with black. For the present I have placed it with this species as a variety. It is probable that *L. calvescens* B. & C., is merely another form of this species differing simply in having a stem-like base. The following are the characters of the varieties noticed:

Var. *typicum*. Small, 6′′–9′′ broad, globose, minutely echinate, the warts quickly falling off and leaving the peridium smooth. (*L. Wrightii* B. & C.)

Var. *separans*. Larger, 10′′–24′′ broad, subglobose or lentiform, echinate with coarse substellate spines or pyramidal warts which at length fall off and leave the peridium smooth or velvety. (*L. separans* Pk.)

Var. *atropunctum*. Larger, 10′–15′ broad, subglobose, pure white, warts or coarse spines brown or blackish at the tips.

This species is generally gregarious, but sometimes it forms tufts of several individuals closely crowded together. It sometimes occurs in cultivated grounds and stubble fields. The under surface is occasionally plicate as in the Long-stemmed puff-ball. In the variety *separans* the warts or spines are crowded at their thickened bases and slightly attached to each other so that they come off at maturity in flakes or patches. When the denuded surface of the peridium is velvety it is usually of a darker color than when smooth, being subcinnamon, reddish-brown or dark-brown.

LYCOPERDON PEDICELLATUM *Pk.* PEDICEL-SPORED PUFF-BALL.

Peridium 10′′–18′′ in diameter, globose or depressed-globose, sessile or narrowed below into a stem-like base, whitish or cinereous, becoming dingy or smoky-brown with age, echinate with rather dense spines which are either straight curved or stellately united and which at length fall off and leave impressions or obscure reticulations on the surface; capillitium and spores greenish-yellow, then dingy-olive, columella present; spores smooth, pedicellate, .00016′–.00018′ in diameter, the pedicel three to five times as long.

Ground and decaying wood in woods and bushy places. Croghan, Center, Brewerton and Catskill Mountains. Autumn. Oneida, *Warne.*

The pedicellate spores constitute the peculiar feature of this species. It is one which suggests the name and which enables the species to be easily distinguished from all its allies. The spore is terminally and persistently attached to the pedicel, as in some species of Bovista. The plant is sometimes sessile, but usually it is narrowed below into a stem-like base. In the immature state it has a rough, shaggy appearance, but the spines shrivel with age so that it appears less rough when old. The pitted surface of the denuded peridium affords a mark of distinction from the next species. *L. pulcherrimum* B. & C. is evidently the same species, but the name here adopted has priority of publication.

LYCOPERDON ECHINATUM *Pers.* ECHINATE PUFF-BALL.

Peridium 10′′–18′′ broad, subglobose, generally narrowed below into a short stem-like base, whitish brownish or pinkish-brown, echinate above with rather stout spines, which at length fall off and leave the surface smooth; towards the base spinulose or furfuraceous; capillitium and spores dingy-olive; spores minutely rough, .00016′ in diameter.

Ground and decaying wood in woods. Albany, Forestburgh and Adirondack Mountains. August—October.

Fries, in the Systema Mycologicum, refers this species to *L. gemmatum* as a variety; but it seems to me to be worthy of specific distinction, both on account of the different character of its warts, its much more echinate appearance, and its smooth, denuded peridium. He also gives as synonyms *L. candidum* Pers., and *L. muricatum* Willd.

The whole plant is generally obovate, pyriform or turbinate, and the spines are larger and more or less curved at and near the apex, diminishing in size toward the base where they are more persistent. In the immature condition it is difficult to distinguish it from the preceding species; but when mature its smooth peridium and spores destitute of pedicels separate it. It grows chiefly in woods among fallen leaves, and on decaying vegetable matter.

b. Plant not shaggy.

LYCOPERDON GEMMATUM *Batsch.* STUDDED PUFF-BALL.

Peridium 10′′–18′′ in diameter, globose or depressed-globose, generally narrowed below into a stem-like base, scattered or cæspitose, subumbonate, whitish or cinereous, often tinged with yellow pinkish or brown, warts generally unequal, the larger mostly gemmate or papilla-like, pointed at the apex, scattered among smaller granular and more persistent ones, at length falling off and leaving the surface areolate-dotted or reticulate with a network of fine dotted lines; capillitium and spores greenish-yellow, then dingy-olive or brown, columella present; spores smooth or very minutely rough, .00016′ in diameter. Edible, but not pleasant flavored.

Ground and decaying wood in woods and fields. Very common. July—October.

This is one of the most common and, at the same time, one of the most variable species. It is, therefore, more difficult to describe than to recognize after its peculiar appearance is familiar. The most available marks of distinction are the larger, erect, pointed warts or spinules, scattered among the minute ones, and giving the surface an appearance somewhat as if studded with gems, and, when these have fallen, the little smooth dots or impressions which they leave on the peridium. These are surrounded by the smaller and more persistent warts, which usually form fine reticulating dotted lines, and render the denuded peridium scabrous. In some instances, the warts on the upper part of the peridium are more crowded than usual, and nearly uniform in size; but when they fall they leave the usual smooth dots or impressions where they had stood. The denuded peridium is generally cinerous or grayish and opake. The stem varies very much in thickness and length. In some instances, it is almost or entirely wanting; in others, it is elongated nearly as much as in the Long-stemmed puff-ball. It is cylindrical or narrowed downwards, and it may be nearly equal to the peridium in diameter, or very much thinner. As in the preceding species, the larger warts generally occur on the upper part of the peridium and near the apex. When these are close and nearly uniform in size, they give the plant a coarsely papillose appearance, and if, at the same time, the stem is wanting, the plant becomes the variety called *papillatum*, or *L. papillatum* Schœff. Such forms occur both with and without the stem, and cannot easily be kept distinct from the ordinary forms. In the variety *hirtum*, or *L. hirtum* Mart., the larger warts are reduced to slender bristle-like spinules, which are often blackish in color; but they have an expanded base, and when they fall off they leave the usual dot-like impressions and reticulations. This form is rare with us. *L. excipuliforme* Pers., which is regarded by Fries as a variety of this species, either does not occur with us or else I have confused it with the ordinary forms of the species. It is characterized by its elongated stem with a subplicate base, and its scattered subspinulose warts. Sometimes the larger warts are blackish, or tipped with black, and occasionally they manifest a tendency to group themselves in a stellate manner. When the plant is cæspitose, it sometimes forms tufts of considerable extent. Such tufts, fully two feet in diameter, and containing scores of plants crowded together so compactly that their usual rounded form was lost, have fallen under my observation.

The following are the characters of the two varieties mentioned as they are given in Systema Mycologicum:

Var. hirtum. Turbinate, subsessile, hairy with soft slender warts which generally become blackish.

Var. papillatum. Subrotund, sessile, papillose, furfuraceous-pulverulent.

LYCOPERDON MOLLE *Pers.* SOFT PUFF-BALL.

Peridium 6″–16″ broad, globose or depressed-globose, narrowed below into a stem-like base, furfuraceous with nearly uniform persistent minute weak spinules or granular warts, sometimes with a few larger papilliform ones toward the apex, whitish, sometimes tinged with yellow, when mature brownish or olive-brown, nearly smooth, subshining; capillitium and spores dingy-olive, columella present; spores minutely rough, .00016′–.00018 in diameter.

Among mosses, especially Polytrichum, in old meadows and pastures. Albany, Summit and South Corinth. Autumn.

This puff-ball closely resembles the ordinary forms of the preceding species in the size, shape and color of the immature plant, and by Fries was referred to it as a variety. There may be connecting forms, but if so, I have not observed them, and for the present prefer to keep the two distinct. In this plant, the warts or spinules are very small and weak, so that it has a smoothish, soft and delicate appearance, much like that of *L. saccatum*. They are mostly persistent, but wither or shrivel with age, so that the mature peridium appears to the naked eye to be nearly smooth and somewhat glossy or shining. In this respect it differs essentially from the Studded puff-ball. I have never seen it with the dotted and reticulate surface of that species. From the Long-stemmed puff-ball it is with difficulty separated in its immature state, but when mature, the different manner in which the peridium of the two species ruptures will at once distinguish them. From its habit of growing among mosses, the stem is often elongated, and is sometimes very slender in proportion to the size of the peridium. In wet weather the peridium of this and the preceding species manifests a tendency to crack in areas.

LYCOPERDON PYRIFORME *Schæff.* PEAR-SHAPED PUFF-BALL.

Plant 6″–15″ broad, 10″–20″ high, generally cæspitose, obovate, pyriform or turbinate, sessile or with a short stem-like base, radicating with white branching and creeping root-like fibres, subumbonate, covered with very minute subpersistent nearly uniform warts or scales, often with a few slender scattered deciduous spinules intermingled, pallid dingy-whitish or brownish; capillitium and spores greenish-yellow, then dingy-olivaceous, columella present; spores smooth, .00016′ in diameter. Edible, but not well-flavored.

Decaying wood and ground both in woods and cleared lands Very common. July—October.

The Pear-shaped puff-ball sometimes approaches *L. gemmatum* in size and shape, but it is not easily mistaken for that species because of the different character of its warts. They are very numerous, small, nearly uniform in size, and appear to the naked eye like branny scales. They are often quite as distinct on the stem as on the peridium. They are quite persistent, but sometimes fall from the upper part of the peridium, leaving it smooth and whitish or cinerous. The peridium frequently cracks in areas, especially in wet weather. One form occurs with the peridium abruptly narrowed into a small, but distinctly scaly stem; another is of a very pale color and almost smooth, the warts being scarcely visible to the naked eye. In mountainous forests, patches of this puff-ball which are several feet in length frequently occur on old prostrate mossy trunks. Whole clusters of young plants may sometimes be obtained attached together by their creeping radicular fibres.

LYCOPERDON SUBINCARNATUM *Pk.* PINKISH PUFF-BALL.

Peridium 6″–12″ broad, globose, rarely either depressed or obovate, gregarious or cæspitose, sessile, with but little cellular tissue at the base, covered with minute nearly uniform pyramidal or subspinulose at length deciduous warts, pinkish-brown, the denuded peridium whitish or cinereous, minutely reticulate-pitted; capillitium and spores greenish-yellow, then dingy-olivaceous, columella present; spores minutely roughened, .00016–.00018′ in diameter.

Prostrate trunks, old stumps, etc., in woods. Common. August—October.

This is a very distinct species not likely to be confused with any other. Its peculiar color is quite constant, and this, with its minute, uniform warts, cæspitose habit, sessile character, and pitted, denuded peridium, easily distinguishes it from all allied species. It rarely exceeds an inch in diameter, and I have never found it growing on the ground, nor in cleared lands. It often has white, creeping, radicular fibres, similar to those of *L. pyriforme*, and it sometimes forms patches equal in extent to those of that species. The little pits or depressions in the denuded peridium are left by the deciduous warts. They are smaller and deeper than the similar impressions of *L. gemmatum*, and are not surrounded by dotted lines.

Lycoperdon pusillum *Fr.* Little Puff-ball.

Peridium 3″–12″ broad, globose, scattered or cæspitose, sessile, radicating, with but little cellular tissue at the base, white or whitish, brownish when old, rimose-squamulose or slightly roughened with minute floccose or furfuraceous persistent warts; capillitium and spores greenish-yellow, then dingy-olivaceous; spores smooth, .00016′ in diameter.

Ground in grassy places and pastures. Common. June—October.

This puff-ball is generally about a half an inch in diameter; but specimens sometimes occur that are scarcely larger than a pea, and others that are fully an inch across. It grows in open ground, either on naked soil or among short grass, and is sometimes crowded together in tufts. Its surface is often cracked in areas which are sometimes quite minute, giving the surface a scaly appearance. Rarely the warts are in the form of minute, branny spinules or stellate hairs. They are generally persistent, but in the mature plant they are so shriveled that they are scarcely noticeable. It occurs throughout the season, sometimes appearing as early as June. Its smoother surface will readily distinguish it from small forms of *L. Wrightii* and *L. gemmatum*, var. *papillatum*.

Lycoperdon coloratum *Pk.* Colored Puff-ball.

Peridium 5″–10″ broad, globose or obovate, subsessile, radicating, yellow or reddish-yellow, brownish when old, slightly roughened with minute granular or furfuraceous persistent warts; capillitium and spores at first pale, inclining to sulphur-color, then dingy-olive; spores subglobose, smooth, about .00016′ in diameter.

Ground in thin woods and bushy places. Sandlake and Catskill Mountains. July and August.

This delicate little puff-ball is quite rare. It is generally about a half an inch broad and nearly globose, though sometimes it is narrowed toward the base, where it is usually furnished with a few delicate, white, radicular fibres. The color of the immature plant is yellowish and quite conspicuous; but when old it so closely resembles the dead, brown color of the fallen leaves among which the plant grows, that it is difficult to detect it. But few individuals are found in one place. The warts are very minute, and easily overlooked. They have a granular or almost mealy appearance, and, when old, usually become blackish. At first the capillitium and spores appear to have a sulphur-yellow color ; but when fully mature, if the capillitium is cleared of the spores, it is seen to be much darker. There appears to be a slight depression in one side of the spore, so that, when viewed in a particular direction, it appears flattened or depressed on one side, although viewed in a different direction it may appear globose.

LYCOPERDON CALYPTRIFORME *Berk.* CONICAL PUFF-BALL.

Peridium about 6″ high, 3′–4″ broad, ovate or subconical, sessile, whitish, furfuraceous with minute warts or sipinules; capillitium and spores olivaceous or yellowish-olivaceous; spores smooth, .00016′ in diameter.

Moss-covered rocks. Very rare. Adirondack Mountains. August.

I have met with this very small and rare species but once, and then but two specimens were found. In these the apex was compressed or laterally flattened, instead of papilliform, as required by the original description of the species; but in all other respects they agree well with the specific characters. The plant is very distinct from all our other species by its small size and ovate or conical shape.

In closing this report, grateful acknowledgments are rendered to those botanists whose names already appear in the preceding pages, for their kind coöperation in the investigation of our flora, and for their generous contributions of specimens.

When no name is added to the station or stations herein given, the plant has been found therein by the writer. Dates signify the time when the specimens were collected or the plants observed.

Respectfully submitted,

CHAS. H. PECK.

ALBANY, *January* 4, 1879.

[From the Tenth Report of the New York Commissioners of Fisheries.]

THE MOSSES OF CALEDONIA CREEK.

By CHARLES H. PECK.

The plants received from Caledonia creek (the fish-hatching station), are a water-cress, a chara, and four mosses. The latter grow in tufts or patches more or less dense, either in wet places or submerged in water. When growing in or under water, they afford a place of refuge or a habitation, and probably food, also, to various water insects and their larvæ, small mollusks and crustaceans. The mosses received had an abundance of these small animals among their branches. I have before observed inhabitants of similar character in tufts of moss in swamps and mountain rivulets, but never before have I seen them so various and so numerous. Whether this abundance is due chiefly to the character of the stream whence the specimens were taken, or to the character and plenteousness of the food it affords them, or to both combined, may be a question. But one thing is evident. There cannot long be an abundance of consumers without an abundance of food to be consumed. The abundance of animal life in Caledonia creek implies an abundance of food on which these organisms exist, and, if we wish to perpetuate or increase this abundance, we must preserve or increase the necessary supply of food.

There is, among the mosses of that locality, one of special interest, both because of its rare occurrence, and because of the noticeable coincidence between its abundant growth there, and the abundance of animal life that accompanies it. It is possible that this coincidence is purely accidental, and yet, on the other hand, it is not wholly improbable that there is some important connection between the two facts, which would render a brief account of the moss desirable.

It is known to botanists by the name *Hypnum noterophilum*; or Moisture-loving moss, under which name it was described by Messrs. Sullivant and Lesquereux.

Franklin and Lancaster counties, Pennsylvania, are its previously reported localities, given on the authority of Prof. T. C. Porter. In those localities it is said to grow in limestone springs. It was discovered in the Caledonia locality, several years ago, by Hon. G. W. Clinton, but up to the present time this remains its only known locality in our State. It is quite evident, therefore, that it is a moss of very rare occurrence in our State, although it occurs in abundance in this single locality. At Caledonia it grows (according to my information) in shallow, mostly quiet or slowly flowing water, attached to pebbles and rocks, and forms quite extensive patches of a dark-green or blackish-green color. The stems are generally two to four inches long, though smaller forms sometimes occur. They are irregularly branched, the branches being rather long, and ascending or nearly erect, so that the moss has a somewhat stiff or rigid aspect. The narrow, nearly erect leaves, also add to this peculiar appearance. They are furnished with a stout, thick midrib, which extends through the leaf and projects a little beyond its apex. In some of the specimens nothing remained of many of the lower leaves except this thick midrib. Whether the blade of these leaves had been eaten away by the crustaceans and insect larvæ that hide everywhere among the branches, or whether it had gradually fallen away by decay, is uncertain. The principal features of the moss are represented in the accompanying illustration (Plate 3).

I have never seen the moss in fruit, and am of the opinion that it rarely, if ever, fruits in submerged situations. It is a noticeable fact, that it has occurred in limestone regions only, and in water in which more or less lime is held in solution. Any experiments in transplanting it in other waters would be more likely to be successful, if this fact be kept in view; still it is possible that it might thrive in other waters. One of the mosses associated with it, at Caledonia, frequently occurs in water free from lime. The pebbles and small stones could be easily removed by taking them up bodily with the attached moss and its occupants, and transporting them to the desired localities. If planted in large streams, care should be taken to place them in still, shallow water, for in streams of strong current and large volume, the smaller stones are rolled about by the force of the current, so that mosses seldom acquire or retain a foot-hold in such situations.

The three other mosses associated with the preceding one, are *Hypnum rusciforme*, the Ruscus-like moss, *Hypnum filicinum*, the fern-branched moss, and *Hypnum riparium*, the river-bank moss. The first one has occurred in our State, in rivulets in the Catskill and Shawangunk Mountains. The second has been found in many localities, but it prefers springy places and dripping rocks in limestone districts. The third occurs everywhere, in swamps, water-holes, and sluggish streams. The specimens of these were less in quantity than of the other, from which I infer that they are not in unusual abundance there, and probably their occurrence is of no special significance.

[From the Tenth Report of the New York Commissioners of Fisheries.]

THE INSECTS AND OTHER ANIMAL FORMS OF CALEDONIA CREEK, N.Y.

BY J. A. LINTNER.

To the Commissioners of Fisheries of the State of New York:

GENTLEMEN—In March, 1877, I received a communication from the Chairman of your Honorable Board, calling my attention to the remarkable abundance of trout in Caledonia creek, upon which the State Hatching-house is located, abounding there, it was believed, as in no other natural locality in the United States. It had also been noticed by the Commissioners, that the mosses and other aquatic plants of the stream contained an unusual number of insects, and it was thought that their abundant presence might be the principal cause of the great abundance of trout. If this surmise should prove to be well-founded, then, the question was raised, would it not be desirable, and was it not practicable, to transport these insects and accompanying plants to other streams within the State, and thereby add, in all probability, to their waters, forms of animal life, and appropriate shelter not at present occurring in them.

By the direction of your chairman, a large can, containing, in water, mosses and other plants from Caledonia creek, and their living occupants, was sent to the State Museum or Natural History, in the month of March, for the examination of the State Botanist and myself. The result of the examination of the mosses by the botanist has been presented to your board.

I found the mosses and plants swarming with insect forms, crustaceans, etc., to such an extent as I had never seen before, and which I could not believe to be a fair representation of the fauna of Caledonia creek. I accordingly addressed a letter to Mr. Seth Green, under whose supervision the can and its contents had been forwarded, making the inquiry whether the animal life contained in the can was only that which belonged to the accompanying plants, or if it embraced collections from other sources. The answer was returned that no other living forms had been placed in the can, except those contained in the plants when gathered.

The most abundant form was that of a small crustacean—*Gammarus fasciatus* Say. It was so numerous that no one could have carelessly raised a handful of the moss without noticing the very large number of these creatures present. A representation of it, of twice the natural size, is given in plate 4, fig. 12.

The *Gammaridæ*, commonly known as shrimps, belong to the order of Amphipoda, one of the higher groups of the Crustacea, found in both fresh water and salt. Three species of *Gammarus* are known to occur in our ponds, brooks, rivers or lakes, viz.: *G. limnæus* Smith, *G. fasciatus* Say, and ? *G. minus* Say. Of the salt-water forms, five species are recorded in Verrill's *Report on the Invertebrate Animals of Vineyard Sound*,* viz.: *G. ornatus* Edw., *G. annulatus* Smith, *G. natator* Smith, *G. marinus* Leach, and *G. mucronatus* Say. They are all comparatively small forms—the largest measuring considerably less than an inch in length.

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* U. S. Commission of Fish and Fisheries. Report 1871-72, pp. 557-559.

Gammarus fasciatus has quite a wide distribution, probably occurring throughout most of the Northern States, as it is reported from Maine, Connecticut, several localities in New York, from Pennsylvania, Michigan, Illinois and Wisconsin. Its habits of life admit of its existence in the standing water of ponds, as well as in the running water of streams. Of its life-history very little is known; or, indeed, of any of the species of the *Gammaridæ*. Our knowledge of them scarcely extends beyond descriptions of the several species, except that the embryology of some of the European forms has been studied and published. All the *Gammaridæ* are eagerly devoured by fishes.

The mosses contained a large number of the cases of caddis-worms—Neuropterous insects of the family of *Phryganidæ*. A reference to these cases and their occupants will be made hereafter.

So few of these insects have been reared from their larvæ, that it is scarcely possible to identify a species from the examination of its case or its larva—not that they do not afford reliable specific features, but simply because these features have not been connected with the perfect forms. Had this been done, the caddis-case would, in all probability, indicate its imago as readily as does the cocoon its moth, or the gall its gall-fly.

The cases contained in the moss were apparently of only two forms. These, together with the larvæ taken from them, were submitted to Dr. Hagen, of the Museum of Comparative Zoölogy, at Cambridge, Mass.—our highest authority in the Neuroptera.

One of these forms, composed of bits of wood and bark cemented together, and represented in fig. 7 of plate 5, was found by Dr. Hagen to belong to the *Limnophilidæ*—a family comprising the two great genera of *Limnophilus* and *Hallesus*. The larva had not been seen by him before, and could, therefore, from its general characters, only be referred with doubt to *Hallesus*.

The other form, consisting of small pieces of stone united in a somewhat flattened cylindrical case, was referred to the *Sericostomidæ*, and might possibly be that of *Dasystoma numerosum;* but the larvæ of these groups are so imperfectly known, that nothing definite could be affirmed of this case.

The pupæ of a species of *Cloë*—one of the *Ephemeridæ*, were quite abundant in the moss, and actively darting about in the water. Of this genus five species are described in Hagen's *Synopsis of the Neuroptera of North America.* They are of small size, measuring, in expanse of wings, from one-fourth (*C. pygmæa*) to three-fourths of an inch.

The *Ephemeridæ* are commonly known as May-flies, and from their brief life in their winged state—usually represented as of but a few hours' duration—are sometimes spoken of as Ephemera. Mr. B. D. Walsh, however, has retained living examples of *Palingenia bilineata* (Say) in his breeding cages, for nearly a week.*

De Geer has kept *Ephemera vespertina* alive for eight days, and Stephens mentions having kept specimens of *Cloeon dipterum* alive for more than three weeks.† These insects often occur in such immense numbers, that they have been observed "stranded in winrows along the borders of our lakes." The swarms of a European species with white wings (*E. albipennis*) has been compared to a snow storm; whilst in some parts of Europe where they abound, it is the custom to collect their dead bodies into heaps and use them for manure. The fishes at such times eagerly wait for them; and so great are the numbers which fall into the water that the fishermen call them *manna.* (Westwood, loc. cit., p. 29.)

* Practical Entomologist. Vol. ii, p. 95. 1867.
† Westwood's Introduction to the Classification of Insects. Vol. ii, p. 27.

The distinguished naturalist Reaumur gives so interesting and wonderful an account of the appearance of these insects on one occasion, near the river Marne, in France, that we transcribe it here: The myriads of Ephemeræ which filled the air over the current of the river, and over the bank on which I stood, are neither to be expressed nor conceived. When the snow falls with the largest flakes and with the least interval between them, the air is not so full of them as that which surrounded us was with Ephemeræ. Scarcely had I remained in one place a few minutes, when the step on which I stood was quite concealed with a layer of them from two to four inches in depth. Near the lowest step, a surface of water, of five or six feet dimensions every way, was entirely and thickly covered by them, and what the current carried off was continually replaced. Many times I was obliged to abandon my station, not being able to bear the shower of Ephemeræ, which, falling with an obliquity less constant than that of an ordinary shower, struck continually, and in a manner extremely uncomfortable, every part of my face,—eyes, mouth and nostrils were filled with them."*

From their number, habit of flight over the surface of the water, and liability to be blown therein, the Ephemeridæ constitute an important part of the food of many of our fishes; consequently their frail forms are often imitated by the fly-fishermen, by which to lure the trout from his retreat. Of the forty-four species of insects given by Ronald in his *Fly-fishers' Entomology*, eighteen belong to this family.

Some of the *Ephemeridæ*, in their preparatory stages, live in burrows in the mud of the banks, "divided internally into two canals, each having a separate opening externally, and uniting internally at the extremity, so that the insect can crawl in at one hole and out of the other, without being obliged to make the awkward turn it would have to do in a straight hole" (Westwood, loc cit., p. 29). Others of the family, which are of a stronger build, live at large in the water, and are quite active in their movements.

To illustrate this interesting family, in fig. 6 of plate 5, *Hexagenia bilineata* (Say) is given. This is the *Palingenia bilineata* of Hagen's *Synopsis of the Neuroptera of North America*, p. 41, where its habitat is given as British North America, Penn., Md., Dist. Colum. and Mo. The example figured was captured at Schenectady, N. Y., in the month of June.

I was unable to comply with the request of your board, that I would visit Caledonia and make an examination of the fauna of the creek, during the summer, when the insect life would be at its height, and the mature forms easy to be collected for their identification.

On the first of December, I visited the State Hatching-house, and examined the ponds and the portion of the creek in the immediate vicinity. The season was too far advanced for an abundant insect fauna, and the weather, unfortunately, proved very unfavorable for the collection of such forms as were present. In the afternoon of my arrival, I noticed three species of Neuroptera on the wing, much to my surprise. One of these, a Phryganid, *Chilostigma coagulata*, kindly determined by Dr. Hagen, was quite abundant, flitting about in the occasional sunshine, although the temperature was but a few degrees above the freezing point. A pair of these was taken in copula; the other two species will be noticed hereafter. A species of Diptera, somewhat smaller than the common housefly, was also captured on the wing (see page 81).

The following day, December second, proved exceedingly unfavorable for my examinations; a severe snow storm, continuing throughout the day, with the

* Introduction to Entomology: Kirby and Spence. Phila., 1846, p. 197.

high wind accompanying it, frequently compelled me, although incased in india-rubber, to seek the shelter of the Hatching-house. My explorations were confined to the mosses and other plants upon and near the borders of the principal pond (formed by a dam thrown across the creek), to pieces of timber floating in it, and to the bed of the stream.

The following forms were collected during my brief stay:

FISHES.

Among the water-plants, drawn with the aid of a rake to the bank of the pond, for the examination of their contents, were a number of specimens of the little fish, commonly known as Millers' Thumbs. Often unobserved at first, after the plants had lain upon the ground for several minutes, upon raising them up, the fishes would be discovered lying quietly on the surface of the ground beneath. Both the locality and quiet habit are strikingly at variance with what is related of the Cottoids. Girard, in his *Monograph of the Fresh-water Cottoids of North America*,* says of them: "Clear and limpid waters are the places most preferred by these fishes. The small rivulets of cold water descending along the slopes of mountains, are often their favorite residence. * * * * * They keep sheltered under stones, which must be removed when in search of them. When uncovered, they sometimes dart away with great rapidity, in search of another hiding-place; and sometimes they wait motionless until started."

For nearly a century, all the fresh-water Cottoids, both in this country and in Europe, were supposed to constitute but a single species—the *Cottus gobio* Linn. Subsequently, more critical observation has largely added to the number of the species, Girard citing seven in Europe, and fifteen in North America; of these latter, he refers thirteen to *Cottus*, and one each to *Cottopsis* and *Triglopsis*. Jordan and Copeland, in their "*Check List of the Fresh-water Fishes of North America*,"† arrange the Cottoids under the four genera of *Pegedichthys* Raf., *Uranidea* Dekay, *Cottopsis* Girard, and *Triglopsis* Girard, having respectively 13, 9, 3 and 1 species—Nos. 106–127 of Check List. Of these, but a single species, the *Cottus gracilis* of Heckel (*Uranidea quiescens* of Dekay) is credited to New York.

From the difficulty attendant upon the determination of these closely allied species, I have not attempted to name the Caledonia examples, but have submitted them to Prof. Putnam, of Cambridge, Mass., who has made special study of this interesting group.

In the last sending from Caledonia, a large number of "stickle-backs" were received—beautiful little creatures—varying in length from one inch to one inch and seven-eighths, with silvery sides, their upper portion marbled in shades of green, and with five or six dorsal spines from which they derive their name. They belong to the family of *Gasterosteidæ*, which, in the Check List above quoted, are arranged in the genera *Gasterosteus* Linn., *Pygosteus* Brevoort, *Apeltes* Dekay, and *Eucalia* Jordan. Two only of the contained species, viz.: *Apeltes quadracus* and *Eucalia Cayuga*, are ascribed to New York.

The Caledonia examples do not, apparently, belong to either of these species. They have, therefore, been submitted to Prof. Putnam's study, in company with the forms above mentioned.‡

The stickle-backs are noted for the singular habit which pertains to all the species; of constructing nests for the reception of their eggs.

* Smithsonian Contributions to Knowledge, 1852. Vol. iii, No. 30.

† Bulletin of the Buffalo Society of Natural Science. Vol. iii, pp. 133–164.

‡ Prof. Putnam, having examined the specimens, refers the "millers' thumbs" to *Cottus gracilis* Heckel, and the stickle-backs to *Gasterosteus inconstans* Kirtland (*Eucalia inconstans* of Jordan).

Their nests are not very elaborate structures, as they are composed of such material as is accessible to the pair within the narrow limits near the bank of the stream, which they have selected as their special domain, and from which every venturesome intruder is at once driven away. Pieces of straw or of dried grasses blown into the water are appropriated for the purpose and interwoven among the vegetation of the stream in such a manner as to harmonize with the surrounding objects, and with difficulty to be detected by one walking upon the bank. When removed from the water, their delicate structure causes them to fall together into a shapeless mass. When the female has deposited her eggs in the nest, they are guarded with ceaseless vigilance. The boldness of the male, in their defense, is remarkable: "He will dash at a fish of ten times his size, and by dint of his fierce onset and his bristling spears, drive the enemy away. Even if a stick be placed within the sacred circle, he will dart at it, repeating the assault as often as the stick may trespass upon his domains."

REPTILES.

At the time of my December visit, lizards were quite abundant in the mosses at the water's edge. A number of examples were brought with me on my return, but unfortunately they died, and decomposition ensued to the extent of destroying their characteristic features, before they were determined. They were, apparently, of three species.

In the month of February following, diligent search, at my request, was made for additional examples, but only one individual could be found. This proved to be the gray-spotted Triton—*Triton porphyriticus* (Green) of Dekay,—the *Gyrinophila porphyriticus* of Cope's *Check List of North America Batrachia and Reptilia.** Its range is from New York to Alabama (Cope).

CRUSTACEANS.

Two examples of the craw-fish, *Cambarus Bartonii* (Fabr.), were among the collections.† This species is probably the most common of our Northern forms, in ponds, creeks and rivers, beneath stones, or burrowing into banks It extends southward into Maryland and Kentucky.

The shrimp, *Gammarus fasciatus* Say, previously noticed, was very abundant among the mosses and the water plants.

In the aquarium to which the water of the can containing the collections, was transferred, numerous examples of the minute crustacean, *Cyclops* —— ? were observed, resting against the glass sides, or darting swiftly through the water, very many of the females bearing on each side of them, the ovoid sac of eggs, which forms so conspicuous a feature in their appearance during this period of their existence.‡

These small crustaceans are often spoken of as water-fleas. They occur in both fresh water and salt—in the latter so abundantly that, notwithstanding their insignificant size, they constitute, it is said, a material portion of the food of whales.

INSECTS.

COLEOPTERA.

The following species of water beetles were obtained from the plants at the time of their collection, or subsequently from the aquarium in which they were placed on my return to Albany:

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* Bulletin of the United States National Museum. No. 1. 1875.

† Prof. Uhler finds these examples representative of the Northern type, but to differ, in details of mouth-organs and proportions of body, from the Montana forms.

‡ For an outline figure of *Cyclops quadricornis*, see American Naturalist, vol. ix, p. 586.

Laccophilus maculosus Germ.	Trans. Am. Ent. Soc., IV,	p. 399.
Acilius semisulcatus Aubé	Ib.	p. 401.
Hydryporus? oppositus Say	Ib.	p. 393.
Hydroporus affinis Say	Ib.	p. 391.
Dytiscus Harrisii Kirby	Ib.	p. 407.
Laccobius agilis Randell	Bost. Journ. Nat. Sci., II,	p. 19.
Philhydrus nebulosus Say	Trans. Am. Ent. Soc., II,	p. 250.
Philhydrus reflexipennis Zimm	Trans. Am. Ent. Soc., II,	p. 250.
Hydrobius subcupreus (Say)	Journ. Acad. N. S. Ph., V,	p. 189.
Hydrobius despectus Lec	New Sp. N. A. Coleop.,	p. 25.
Hydrobius globosus Say	Long's Expedition, II,	p. 276.

They are all strictly aquatic species, belonging to the families of *Dytiscidæ* (the first five mentioned) and *Hydrophilidæ* (the last six). For their determination, I am indebted to the kind services of Dr. Le Conte, of Philadelphia.

The *Dytiscidæ* have an extensive distribution, being found in all quarters of the globe. The peculiar structure of their posterior and middle pair of legs, which are flattened and edged with a row of dense cilia, permit of their swimming with great agility, readily ascending to the surface of the water for air, and again diving to the bottom (whence the derivation of their name, meaning a diver), with the greatest ease. In swimming, their hind legs move together, like those of a frog, and by observing this motion, they may be distinguished from the *Hydrophilidæ*, in which they act alternately. They are carnivorous in their habits in both their larval and perfect states, like the mature forms of the predaceous land-beetles—the *Carabidæ*, which they closely resemble in structure, except in their legs. Occasionally they leave the water, climbing up the stem of a water-plant in the evening, whence they take wing, rising almost perpendicularly in the air, and dropping after their flight upon the surface of water, and at times upon sashes of glass, as glazed garden frames, etc., which they mistake for water. Their locomotion on land is quite limited, from their hind legs being capable only of a horizontal movement. The species of *Laccophilus*, however, are able to spring a considerable distance. The hybernation of many of the species is beneath moss and lichens, from which they occasionally venture forth, being sometimes seen swimming under the ice; others maintain a torpid state, buried in the mud.

In illustration of this family, two of the species mentioned above as occurring in Caledonia creek, are figured, viz., *Dytiscus Harrisii* Kirby (fig. 2, plate 4), one of the largest of our species, and of common occurrence, and *Acilius semisulcatus* (fig. 7, plate 4), a more unusual form. Figure 1, plate 4, represents a larva belonging to this family, believed by Dr. Le Conte, from an inspection of the original drawing, to belong to the genus *Gaurodytes*. Several examples of it occurred in the Caledonia collections.

The larvæ of these beetles have been called water-tigers, from their predaceous habits. They are long, cylindrical, usually with contracted necks, and a flat head, armed with powerful jaws, which they use expertly in seizing and devouring other insects. Comparatively few of the larvæ of our species are known. The larva of *Acilius semisulcatus* may be presumed to resemble that of the European *A. sulcatus*, shown in fig. 4, plate 4, from an outline figure by Westwood. Of this larva, it is said: "It is extremely insidious in its attacks; the downward bending of its neck, and the upward turning of its head, inducing it to seize objects above rather than in front of it; so that when an object is perceived floating on the surface of the water, the larva rises very cautiously until it has nearly reached it, when, by a sudden jerk of the neck, it seizes the object with its jaws, and immediately drags it under water; if it still struggles, the larva endeavors to despatch it by repeated jerkings of the head. When in the water they may constantly be seen jerking themselves in every direction, probably for the purpose of seizing upon other minute insects." (Westwood, loc. cit., I, p. 102.)

Another species of this genus — *Acilius mediatus* of Say — will probably be found at Caledonia, as it is quite a common species.

Of the genus *Hydroporus*, of which two species were taken at Caledonia, seventy-seven species are described from the United States.* The individuals of the several species are also usually quite abundant.

The family of *Hydrophilidæ* is named from the principal genus, *Hydrophilus* —the name from the Greek, meaning a lover of water. The larvæ are predaceous, eagerly catching and devouring other insects. In their perfect form, as beetles, they live almost wholly on vegetable food, and are, therefore, valuable agents in the purification of our waters, from their feeding on refuse and decaying vegetable matter. Their legs are similar to those of the preceding family, but they do not swim with the same facility.

An interesting feature of some of the species of *Hydrophilidæ* is the cocoon-like envelop which the female spins for her eggs—fifty or sixty in number. It is composed of silk, proceeding from two large silk glands, like those of many of the Lepidoptera, through a pair of external spinnarets. The cocoon has been compared in shape with a turnip, having a horny projection which serves as a respiratory channel for the young larvæ after they are hatched. In some species, the cocoon is attached to aquatic plants, and in others it is borne about by the beetle, upon the under surface of the abdomen. In fig. 5, plate 4, the form of the cocoon or egg-envelop of *Hydrophilus piceus* Linn., a European species, is shown: figure 6 is the same cut open to show the arrangement of the eggs contained within. The figures are copied from drawings by Riley, given in *Le Baron's Fourth Annual Report on the Insects of Illinois.*

Hydrophilus triangularis Say — one of our common species and of frequent occurrence in ponds, is represented in figure 9, of plate 4, in illustration of this family. The figure is from the same source as above cited.

While all the species of these two families, in both their larval and perfect stages, furnish desirable food for fishes, it is proper to state that many of their larvæ also prey upon very young fishes. It is not probable, however, that in pisciculture serious evil need be apprehended from the presence, unless in very unusual number, of predaceous larvæ. From the rule of general antagonism prevailing throughout nature—of devouring and being devoured in turn—final good undoubtedly results, in the succumbing of the weaker forms, and the survival of those best fitted to accomplish the objects of their creation.

DIPTERA.

The larvæ of two species of small flies, allied to the musquitos and gnats, were abundant in the plants collected at Caledonia in March, 1877, and very abundant in a package containing additional material, from the same source, received in February, 1878. They are, to all appearance, congeneric with the larvæ figured by Packard, Smith, Glover and others, as those of *Chironomus*.

The perfect insects of this genus are musquito-like in appearance, having beautifully feathered, usually triangular, antennæ, a large thorax, small abdomen and wings, and long, delicate legs. A large number of North American species are embraced in the genus, so that it would not be proper, with our

* Crotch: Revision of the Dytiscidæ of the United States. Trans. Amer. Ent. Soc., iv, p. 383.

present knowledge, and without observing the transformations, to make a specific reference to any of the larvæ. A species is described by Dr. Fitch, in his *Winter Insects of Eastern New York* as *Chironomus nivoriundus*—the snow-born midge.* It is said of it: "It is a very common species, appearing upon the snow in the winter season, and upon fences, windows, etc., in the forepart of spring, the males and the females being about equally numerous. The beautiful plumose antennæ of the former distinguish them at a glance from all other insects abroad at this season. At times they may be met with in immense swarms. April 27, 1846, in a forest, for the distance of a quarter of a mile, they appeared in such countless myriads as to prove no small annoyance to the passer, getting into his mouth, nostrils and ears at every step, and literally covering his clothing. These had probably hatched from the marshy border of an adjoining lake." On one occasion, a species of *Chironomus*, believed by Walsh to have been the *stigmaterus* of Say, appeared in such a swarm, on Long Island, as to have been mistaken by the observer for smoke coming from a hay-stack half a mile distant.†

One of the two forms of the larvæ above mentioned, represented in fig. 13 of plate 4, was so numerous in the package of *Chara vulgaris*—a very common plant in a large pond near the hatching-house—that, on taking up little patches of it from the bottom of the box in which it was packed, they would be found almost covered with the larvæ. They evidently had a fondness for the fishes which had died in the Chara while in transit, for from the body of a small *Cottus* twenty individuals were removed, and nearly as many from a quite small *Gasterosteus*. The abundance of this form, associated with a plant simply taken from the water for the purpose of packing, would indicate an exceedingly prolific species, and also the possibility that it might be the form which originates the "immense swarms" of *Chironomus nivoriundus*, like that observed by Dr. Fitch.

The other species of larva, much less abundant, was more elongate, with longer joints proportionately, and of a blood-red color. It is also, by writers, referred to the genus *Chironomus*.

The fly captured upon the wing (before mentioned) has been referred by Mr. Burgess, of the Bost. Soc. Nat. Hist., who is paying special study to our Diptera, to the family of *Ephydrinidæ*, and probably to the genus of *Scattella;* but, in the absence of its antennæ, it cannot be positively placed. Most of the larvæ of this family are aquatic, and many of them possess particular interest, from their occurrence in the graduating houses of salt-works, and very numerously in some of the western salt lakes.

The tribe of Ephydrina, to which *Scatella* belongs, have, as a prominent characteristic feature, naked eyes. On submitting the above example to a high magnifying power, traces of hairs are discoverable, from which it is almost evident that the hairy clothing of the eyes has been removed through the extremely rough handling which I had unfortunately given the insect. If this should prove correct, then it is not improbable that the species should be referred to the closely allied *Hydrellina*, and perhaps to the genus *Hydrillia*, near to *H. hypoleuca* Loew.‡ In that species, the first joint of the hind tarsi is red; in the Caledonia example, black.

HEMIPTERA.

Examples of *Gerris remiges* Say — shown in fig. 10, plate 4, were found abundantly, skipping over the surface of some quiet water. These insects,

* American Journal of Agriculture and Science. Vol. v, p. 282. 1846.

† The Practical Entomologist. Vol. ii, p. 10. 1866–67.

‡ Monographs of the Diptera of North America, by H. Loew. Part I, p. 151. 1862.

from their six long legs branching out from their small bodies, and their peculiar motion, in jerking over the surface of the water of ponds and the more quiet portions of our streams, are familiar to all. The popular name of water-boatmen is sometimes applied to them. They are extremely active creatures, skimming about with great velocity, and quickly turning in any direction. Westwood states that their hind feet act conjointly as a rudder, while the longer middle feet, placed at the middle of the sides of the body, are used somewhat as oars; they are not, however, dipped into, but merely brush along, the surface of the water. With their shorter fore-legs they seize and hold the small insects upon which they prey, while devouring them. The under-side of the body is covered with a plush-like coating to repel the water.

They belong to the family of *Hydrometridæ*, and are placed by Latreille in the section of *Ploteres*—not very appropriately named, as Westwood remarks, for their motion is not that of swimming. For a long time the generic name of *Gerris* has been applied to them, but they have been recently referred to new genera by Stal. Professor Glover* cites six species, viz.; *G. caniculatus* Say (Georgia), *G. conformis* Uhler (Md.), *G. lacustris* Fabr. (Md.), *G. marginata* Say (U. S.), *G. remiges* Say (U. S. generally), and *G. rufoscutellata* Latr. (U. S.). The last three species have a broad distribution, they having been collected by Prof. Uhler and Dr. Packard, in Colorado.† Of *G. remiges*, Prof. Uhler writes, loc. cit.: "Collected by Dr. Packard, on July 10, in Denver; at Boulder, June 20; and at Manitou, July 15. It was found, also, by myself on the still water along the margins of Sloan's lake, and it was very abundant also on the surface of the irrigating canal proceeding from the cañon of the Arkansas, in August." Prof. Uhler, to whom I owe the authoritative determination of this species, refers it to the genus *Hygrotrechus* of Stal.

Numerous examples of another form of "water boatman," of the family of *Notonectidæ*, and of the genus *Corixa*, were contained in the box of Chara received from Caledonia in February. They are apparently of two species—the larger measuring three-eighths of an inch in length of abdomen, and the smaller about one-half so long. They were submitted to Prof. Uhler, who informs me that "the species does conform to any published description, and is, therefore, probably undescribed." From an accompanying pen-and-ink sketch, the larger form shown in fig. 11 of plate 4, is undoubtedly the one referred to, the smaller one having probably escaped from the box in which they were sent alive.

Large companies of these insects are often seen floating on the surface of the water, frequently with their back downward. When disturbed, they dive to the bottom with a quick, paddling motion. Their hind legs have the two tarsal joints very long, broad, and fringed with cilia, admirably adapting them for swimming purposes. The fore-legs are partly prehensile, armed with a single claw—these legs not seen when at rest. The middle legs are comparatively slight, terminating in a long and slender claw; when floating on the surface, these are bent backward, while the hinder legs are thrown forward as balancers, as shown in the figure, apparently reversing their true position.

A species of this genus, *C. mercenaria* Say, is said, by Say, to be largely used in Mexico as food.

In figure 8 of plate 4, the family of *Belostomidæ* is represented, in *Belostoma Americanum* Leidy; the specimen figured is not of the maximum size. The largest of the Caledonia examples measured two and a quarter inches in length of

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* Manuscript Notes from my Journal. Order Hemiptera. By Townend Glover, p. 39. 1876.

† Bulletin of the U. S. Geolog. and Geograph. Survey of the Terr. Vol. iii, No. 2, p. 453. 1877.

abdomen, while in the *Practical Entomologist*, vol. i, p. 249, a figure of the species is given (erroneously referred to the South American *B. grandis*,) which measures two and one-half inches in length. Another species, the *B. grisea*, occurring in several of the seaboard States, is said to attain the length of three and a half inches.

The principal features of this insect—its strong prehensile fore-legs, its flattened body, and its broad hind legs, are well shown in the figure. It is an aquatic species, but occasionally takes flight for short distances. Its popular name is the "gigantic water-bug."

The Belostomæ are predaceous, feeding on many of the smaller aquatic insects, and on fishes and their eggs. Their presence, therefore, is to be dreaded, in waters devoted to pisciculture. Prof. Glover states (loc. cit., p. 26), that a small goldfish in the aquarium of the Department of Agriculture, at Washington, which had been left over night with a specimen of the *B. Americanum*, was found the following morning to have been killed by it.

This species occurs in Texas and throughout the Atlantic region, from Maine to Florida (Uhler).

NEUROPTERA.

Perlidæ.—One of the two species of Neuroptera, previously referred to, (page 77) as having been captured on the wing at Caledonia, on the first of December. is a species of *Leuctra*, and, as I am informed by Dr. Hagen, to whom it was submitted, probably undescribed. Of the two known North American species, viz., *L. ferruginea* and *L. tenuis*, it is nearer to the latter, and possibly more abundant material (only two examples were taken) and in better condition, might show it to be identical. Dr. Fitch, in his *Winter Insects*, (loc. cit.) describes two other species, as *Perla nivicola* and *Nemoura nivalis*, which are different from this species. In remarking upon the abundance of the two forms, Dr. Fitch says: "One of the purposes served by these prolific insects in the economy of nature, doubtless is, to supply with food the fish of our streams at this early period of the year" (in the latter half of winter, upon the snow).

Ephemeridæ.—The third species captured on the wing (see page 77) was in so broken a condition when received by Dr. Hagen, having lost its legs and other appendages, that it could only be referred with doubt to the genus *Baëtis*, not far from *B. alternata* Say. It might possibly belong to the genus *Potamanthus*. From its being in the subimago state, determination was rendered more difficult.

Odonata.—The pupal skin of a large species of dragon-fly was picked up among the dried grasses on the bank of the stream, which Dr. Hagen, from his extensive acquaintance with these forms in their several stages, is able to refer to *Anax Junius* of Drury. The imago measures four and a half inches in expanse of wings, is of a green color, spotted with blue and fuscous, and with a yellow head. Its larva is correspondingly large and powerful, and from the known habit of most of the Odonata, must be particularly injurious to the culture of fishes. This species has a remarkable distribution, extending across the entire continent from New York to San Francisco, and southwardly into Texas, Mexico and Cuba. It occurs also in the Sandwich Islands, Kamtschatka and China (Hagen).

In the later February collections, there were contained several living pupæ of *Æschna verticalis* Hagen, shown in figure 10 of plate 5. This is a smaller species than the above, having an expanse of wings of but three and three-fourth inches. Its only assigned habitats are New York State and Washington, D. C.

The above family will undoubtedly be found very largely represented at Caledonia — usually abounding in and about waters which have an abundant insect fauna. It is quite desirable that full collections of them should be made during the season when they occur most numerously—in the months of July and August. In their larval and pupal forms, they are the terror of the inhabitants of the water, and in their perfect form, they are the hawks and eagles of the insect world, persistently chasing and devouring other smaller insects. Their habits, in all their stages, are exceedingly interesting, but it would occupy too much space to present them here.

Phryganidæ.—The second species, before referred to, of which many individuals were observed at Caledonia, alighting after short flights on the whitened, dead Chara, strewing the shore of a pond, is *Chilostigma coagulata* Say MS.—the name in Say's handwriting being attached to a specimen in the Harris Collection at Boston. It is mentioned in Hitchcock's Report, 2d edition, p. 582, and by Dr. Hagen in *Proc. Bost. Soc. Nat. Hist.*, vol. xv, p. 296, as *Platyphylas coagulata.* Dr. Hagen writes me farther in relation to it: "The genus *Chilostigma* was established by McLachlan, in 1876, for a European species, *C. Sieboldii*, which is nearly related to *C. coagulata*, differing by characters which are probably only of specific value, viz.: the apical joint of the labial palpi in the North American species, is egg-shaped; the length of the joints of the maxillary palpi of the female is slightly different in their proportions, and the areolus in the interior wings is straight and unbroken. I would not deem it advisable, for the present, to establish a new genus for the N. A. species, of which three are described by Walker, as *Limnephilus*, and in the *Synopsis of North American Neuroptera* as *Enoicyla*, because all have 1, 2, 2, spurs. The species are:

"1. *C. coagulata* Say. Dublin and Mt. Monadnox, N. H.

"2. *C. difficilis* Walk. Mt. Monadnox, N. H. This species are much like the first, but a little larger, and the male and female have different genital parts.

"3. *C. præterita* Walk. Arctic America, Slave River.

"4. *C. interscisa* Walk.=Phr. irrorata *Fabr.* (teste McLach.). Hudson's Bay Territory. This species differs from the others by much more elongate wings.

"*Chilostigma* is a northern, probably an Arctic genus. The species are nearly the latest Neuroptera in their appearance in their imago state. Their nymphæ swim in the water in undergoing their last metamorphosis, when they fall an easy prey to fishes."

As *C. coagulata* has not, to the present, been described, a figure enlarged to two diameters, is given of it. (Fig. 2, plate 5.)

The *Phryganidæ*, in many of their species, bear so strong a resemblance to some of the moths of the Order of Lepidoptera, in the shape of their wings and in the hairs with which they are overspread, that they are sometimes designated by the name of water-moths. In their larval stage, passed in the water, they are known as case-worms, or caddis-worms. They live in cases, which, by the aid of a silk which they spin, they build about themselves, composed of various substances, such as portions of leaves or stems of plants, pieces of wood or bark, the shells of the smaller species of *Helix*, *Planorbis*, *Limnæa*, etc., gravel, fragments of stone, seeds of plants, and of almost any small body which may occur in their locality.*

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*In two examples contained in the material recently received by me from Caledonia, the larvæ, which were of large size, with the object no doubt of avoiding the labor attending the construction of a new case, necessitated by their growth, had availed themselves of the hollow stem of some sileceous-coated aquatic plant of a suitable diameter (one-fourth inch), a section of which two inches in length, afforded them a strong, agreeable, and easily transported habitation.

These cases are of various forms and proportions, sometimes being of an oval shape, and attached by the rim to the under surface of a stone, but more generally of an elongated, cylindrical form. These latter are closed at one end, with the other remaining open to admit of the extrusion of the head and thoracic segments of the larva, for the purpose of locomotion or taking its food. It retains its position within the case by means of some hooks at its posterior extremity, and three mammiform protuberances on its first abdominal segment (shown in fig. 9, plate 5), adhering so strongly that considerable force is required for its dislodgment.

Sub-fam. *Rhyacophilidæ.*—In fig. 1, plate 5, one of the oviform, attached cases, above referred to, and quite common at Caledonia, is represented. They are usually considerably longer than broad, as I recall them in place — the examples at hand having evidently been distorted in their careless removal from the stone. They belong, as Dr. Hagen informs me, "to the sub-family of *Rhyacophilidæ.* There are only eight North American species described, but a number of others are known. From the small size of the examples sent, they probably do not belong to *Rhyacophila* proper, but to some other genus yet to be established. The cases of these larvæ are composed of pieces of stone, or other rough material, and are attached to the surface of stones. The larva is not confined to its case, but passes in and out of it through an aperture. Most of the species of *Rhyacophila* build for the nympha, a brown, membranaceous cocoon, which is wanting in these examples."

Westwood, loc. cit., vol. ii, p. 62, fig. 68.6, represents a case somewhat similar to this, but more elongate, and composed of finer material, which he refers to *Hydropsyche senex* Pictet. He says of the larvæ: "They are compelled to quit their retreat whilst searching for food, in a naked state, and they are accordingly better fitted for such a kind of life, by having the abdomen of a firmer consistence. Their pupæ are inclosed in a single silky envelop, to which various materials are attached."

Hydroptilæ.—In fig. 4, plate 5, a case of one of the Hydroptilæ (natural size), is shown. Dr. Hagen writes of it: "It is probably of the genus *Phrixocoma* Eaton. Of the Hydroptilæ cases very little is known. I have worked much at them, but have not yet published. The shape and manner of living are similar for all, but some cases consist only of silk and fibres of Chara, very neatly arranged. A full account of one is given in the *London Quarterly Journal of the Microscopical Society*, 1857, New Series, Vol. VII, No. xxv, p. 83; and we have found a similar one here."

Westwood (loc. cit.), fig. 68.5, figures the case of the European *Hydroptila pulchricornis* Pictet — "a small, flattened, kidney-shaped case, opened by a slit at each end." These cases resemble somewhat the interior cases of *Rhyacophila*, but differ from them in their not being inclosed in an additional outer case, and in their swimming freely in the water.

Sub-fam. *Sericostomidæ.*—The cases constructed by the larvæ of this group are represented in fig. 5, plate 5, given in twice the natural size. They are subcylindrical, being somewhat flattened, and usually larger at their open end. They are composed of grains of sand, bits of stone, or other hard material, and occasionally a small shell is worked in. Often a larger stone is attached to each side, as shown in the figure, to give them, it is supposed, additional weight. But few of the species have been described. Dr. Hagen refers the species herewith figured to *Silo*, or some nearly related genus. Quite a number of these cases, when collected, were slightly fastened at one extremity to stones, indicating the readiness of the occupants for their pupal change, or in the examples where the cases were closed, their having already entered upon that stage. In their early state, they are numbered among the unattached forms, moving freely in the water.

Sub-fam. *Limnophilidæ.*—An interesting case of this group is shown in fig. 8, plate 5. It consists mainly of pieces of charcoal interspersed with sand, fragments of stone, seeds of a raspberry, a number of the shells of *Planorbis* (*Gyraulus*) *parvus* Say, and a few valves of a species of *Sphærium.* It obviously belongs to a genus near to *Hallesus*, and may possibly pertain to the *Chilostigma coagulata*, shown in fig. 2, plate 5.

Another of the same group is given in fig. 3, plate 5. From the entirely different material of which it is constructed, as well as the manner of its construction, it is probably of a different species, and perhaps of a different genus, but not far removed from *Hallesus.* It is composed principally of small pieces of stone and marl, with here and there a minute shell and a hard seed. Before its open end was closed with its silken grating. the larva, as an additional protection, had attached to it a stone, nearly covering and projecting over it at an angle of 60°; the angle is not represented in the figure.

Fig. 9, plate 5, represents a Phryganid larval form, of which hundreds of examples were found in the box of Chara, much the larger number being without cases, although similar in appearance to other encased ones. The vacant cases observed seemed by far too few to have accommodated the large number of naked forms present. Many of these latter were placed in the aquarium, but nearly all were found to be dead the following day, either from injuries sustained from the Mollusca, or from an unsuitable condition of the water.

It will readily be seen that, in an aquatic form, in which the size of the abdomen is so disproportionate to the locomotive organs, some protection, like that afforded by a case, is indispensable to prevent its extermination by its natural enemies. Even when wholly withdrawn within its retreat, as is its condition under the slightest alarm, it is not exempt from attack and destruction. Some of the species of water snails as *Limnæa* and others, have been seen to attach themselves to the Phryganid cases, penetrate the walls, and devour the insects within, wholly powerless to defend themselves against this artful approach. This procedure has been observed by Dr. Hagen, who, on one occasion, in this manner, lost nearly the entire brood of a rare species which he was rearing in an aquarium in which *Limnæa* and allied forms were present.

When ready for their pupal change, these tubular-cased *Phryganidæ* partially close the opening to their dwelling by spinning across it a silken network, excluding enemies, but permitting the entrance of water. The meshes are severed as the final transformation approaches, when the insect comes to the surface of the water, and from its case, or the stem of a water-plant on which it has climbed, it withdraws itself, expands its wings, and betakes itself to its new element.

VERMES.

Quite a number of earth worms were observed in jars to which some of the mosses had been transferred. As they were not noticed at first, it is believed that they were developed from ova. Their rapid increase in size was a matter of no little surprise.

A leech, brought from the stream, is at present lurking among the mosses of the aquarium, having, since its first discovery, been successful in eluding recapture. From the glimpses had of it, it is probably the common blood-sucking species of the Northern States, the *Macrobdella decora* (Say).*

The leeches, as a class, are not of service to the fish-culturist. Some of the species have been found in the stomach of the lake white-fish (*Corregonus albus*

* In a can received from Caledonia, while these pages are passing through the press (August), in answer to a request for shrimps only, at least forty specimens of leeches, of two species, were contained in the accompanying water plants.

Lesu.), but the larger number are injurious to fishes, in attaching themselves to them and sucking their blood; in being, by nature, parasitic upon them, and by destroying insect larvæ and mollusks which constitute so large a proportion of fish food. They at times occur in almost incredible numbers, as related by J. W. Milner,* when, on one occasion, in the month of April, as some fishermen were lifting their nets from about fifty fathoms, some fifteen miles out from Kenosha, Wis., a species of *Ichthyobdella* [? *Milneri* of Verrill] so thickly covered the fishes (trout, white-fish and cisco) and the nets, that they fell to the deck in such numbers that it became slippery, and an old coat was thrown down for the man to stand upon who was lifting the gang.

MOLLUSCA.

No special effort was made to collect the Mollusca of the waters. Two species, *Physa heterostropha* and *Limnæa desidiosa* were observed abundantly on sticks and pieces of timber in the water. In the bed of a small stream near the hatching-house, where the current was interrupted by scattered blocks of stone, a marl-like deposit occurred, consisting almost entirely of small shells and comminuted larger ones, into which the hand could be thrust to the depth of several inches. Specimens of this deposit were brought with me, and its examination disclosed the following species—authoritatively determined by Dr. James Lewis, of Mohawk, N. Y.:

Helodiscus lineatus Say,	*Limnæa catoscopium* Say,
Helix albolabris Say,	*Limnæa desidiosa* Say,
Helix alternata Say,	*Limnæa humilis* Say,
Pupa corticaria Say,	*Physa heterostropha* Say,
Succinea ovalis Gould,	*Gyraulus parvus* Say,
Zonites nitidus Müller,	*Bythinella obtusa* Lea,
Zonites arborea Say,	*Sphærium* —— sp. ?,
Carychium exiguum Say,	*Pisidium abditum* Hald.

None of the above species are of special rarity, but are such as occur in various limestone regions throughout the State.

The *Physa heterostropha* and *Limnæa desidiosa*, which were taken from the waters in their living state, were brought to Albany and placed in a small aquarium. From that time (early in December) to the present, clusters of eggs have been deposited on the surface of some thin pieces of wood floating on the water, and occasionally on the glass sides of the aquarium just at the surface of the water. From these eggs, many hundreds of young have been produced, during the past three months. The clusters, which are believed to be of both species, are transparent, gelatinous masses of about one-half of an inch long, with a breadth of from one-third to one-half their length, enveloping the transparent eggs, which show distinctly, at first, the milk-white interior nucleus.

Having, in the preceding pages, referred to the various forms of animal life populating the waters of Caledonia creek, and, in addition, presented brief statements of their appearance, habits, transformations and classification, to aid in their recognition, and with a view of lending additional interest to their study, it may be proper to devote a few pages to a consideration of the economic value of the several classes in their connection with fish-culture.

CRUSTACEANS AS FOOD FOR FISHES.

It is almost unnecessary to state the fact that the appearance, condition and quality of fish are greatly influenced by the nature of their food. One of your

* Report U. S. Commission of Fish and Fisheries, 1872–73, p. 64.

board writes: "It is a well-known fact among fish-culturists, that the growth, flavor and color of trout are largely affected by the food which they obtain. To merely state the two extremes, trout fattened for market on liver are almost worthless for the table, while those that visit the salt water, and obtain shrimp and other similar food, are nearly equal to salmon."

Visitors to the State Hatching-house, at Caledonia, who happen to be ignorant or forgetful of this close connection between food and quality, as they make the tour of the grounds, and feast their eyes upon the rare sight presented in the thirty spacious preserves, each swarming with its hundreds or thousands of brook trout, California salmon and salmon trout (some of the last, two feet in length and ten pounds in weight), would naturally picture the table of those engaged in the culture and care of those creatures as constantly supplied from so desirable and convenient a source. They are surprised to learn that none of these fish are ever placed upon the table, the flavor of their flesh being but a few degrees removed from that of the liver on which they are fed.

In reference to the influence of the food of fishes upon their color, Mr. Charles Lanman states: "One principal cause for the great variety in the color of the brook trout, is the difference of food; such as live upon fresh-water shrimps and other crustacea are the brightest; those which feed upon May-flies and other common aquatic insects are the next; and those which feed upon worms are the dullest of all. * * * * Trout that frequent clear and cold waters, and feed much on larvæ [Phryganid] and their cases, are not only red in flesh, but they become golden in hue, and the red spots increase and outnumber the black ones. * * * * The peculiarity of feeding on shell-fish produced the gillaroo trout, a remarkable variety, found only in the Irish lakes."

According to a statement of Professor Agassiz, "the most beautiful salmon trout are found in waters which abound in Crustacea, direct experiments having shown that the intensity of the red colors of their flesh depends upon the quantity of *Gammaridæ* which they have devoured.

The improvement capable of being made to the natural flavor of fish seems to have been known to the Romans, for it is said of them: "The art of breeding and fattening fish was well known to the luxurious Romans, and many stories are related about the fanciful flavors which were imparted to such pet fishes as were chosen for the sumptuous banquets of Lucullus, Sergius Orata, and others."

The fondness and even preference, shown by many of our fishes for crustacean food, is well established. Prof. Verrill, in his *Report upon the Invertebrate Animals of Vineyard Sound*,* says: "These small crustacea [Amphipods] are of great importance in connection with our fisheries, for we have found that they, together with the shrimps, constitute *a very large part of the food of our more valuable, edible fishes, both of fresh and salt waters*. * * * * Even the smallest of them are by no means despised or overlooked, even by large and powerful fishes, that could easily capture larger game. Even the voracious blue-fish will feed upon these small crustaceans, where they can be easily obtained, even when menhaden and other fishes are plenty in the same locality. They are also the favorite food of trout, lake white-fish, shad, etc."

Crustaceans constitute almost the entire food of the herring (*Clupea* species), a fish which, from its number and large consumption, is of so much value in the fisheries of both hemispheres. According to a theory recently advanced by Sars, the migrations of the herring, for a long time unexplained, are controlled by the presence of their crustacean food. He affirms that a rich summer herring fishery depends exclusively on the accidental occurrence of small crusta-

* U. S. Commission of Fish and Fisheries. Report for 1871-72, pp. 295-778, plates 38.

ceans, and their accidental accumulation in certain places favorable to the fisheries. During some years, the sea, near the western coast of Norway, throughout the whole summer, has been filled with great masses of different crustaceans. At such time the fishermen expect to be favored with the presence on their coast of the "herring-mountain"—a high, deep, and closely-packed mass of herrings.

The shad (*Alausa sapidissima*) eagerly devours crustaceans when they can be obtained. During their presence in our rivers for the purpose of spawning, they partake of no food. A microscopic examination of the stomachs of twenty shad (*Alausa vulgaris* of Europe), made at their advent into fresh water, revealed the tarsi, antennæ, etc., of microscopic Entomostraceans and other small crustaceans. Nothing else could be recognized.

The white-fish (*Corregonus albus*) was for a long time believed to feed on algæ and aquatic plants; but it was ascertained by Dr. Hoy, of Racine, Wis., through a careful examination of the partially digested contents of their stomachs, that they fed mainly on a small crustacean, whose presence in the lake had not been suspected.*

Similar examinations, instituted by Mr. J. W. Milner, of the stomachs of white-fish from various localities in Lake Michigan, confirmed the statement of Dr. Hoy, that the Crustacea constituted by far the larger proportion of their food, namely, species of the *Gammaridæ* and *Mysidæ*. Associated with these were Molluscan species of *Pisidium* and other genera, together with Phryganid insects. At Sault Sainte Marie the white-fish has been taken with a hook baited with a May-fly.

The favorite food of the black bass (*Micropterus nigricans*) is the craw-fish—species of *Cambarus* and *Astacus*, when they can be procured.

The lake-herring (*Argyrosomus clupeiformis*) feeds upon the *Gammaridæ* and insects.

Mr. Seth Green informs me, that it is believed that the peculiar richness of the Otsego lake bass (*Corregonus ?Otsego*)—its superiority over that of the white-fish of the lakes, of which it is thought, by many, to be but a local variety, is the result of its feeding largely on a small crustacean, which is remarkably abundant in Otsego lake.

The food of the salmon (*Salmo salar*), previous to its entering fresh water for spawning, during which period, like the shad, it partakes of no food, consists principally of Crustacea, "this rich aliment giving the color and flavor for which its flesh is so highly prized."

The American smelt (*Osmerus mordax*)—one of the salmon family—feeds largely on the shrimp. They are readily taken with a hook, baited with any of the smaller crustaceans, or pieces of the larger species.

Nearly all our salt-water fishes feed upon crustaceans, from the minute *Entomostraca* to the large crabs and lobster. Prof. Verrill, loc. cit., pp. 514–521, gives a list of thirty-two species, in the stomachs of which crustaceans, as the principal portion of their food, were found.

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* ***Mysis relicta*** Loven. The detection of this species in the waters of lakes Michigan and Superior was a very interesting discovery, not only from its first having been brought to notice in this country, in the stomach of a white-fish, but also from its identity with the species previously known as existing, under similar conditions, in the fresh-water lakes of Sweden and Norway. Dr. Sars had found it in Wener and Wetter, and eight other lakes in Sweden, and in one lake in Norway. Dr. S. regards it as specifically identical with the salt-water form occurring off the coasts of Labrador and Greenland—***Mysis oculata;*** the varietal differences which he finds, he regards as resulting from the interruption of its former salt-water communication. He accordingly designates it as ***M. oculata***, var. ***relicta***.—(Smith's ***Fresh-water Crustacea of the United States; U. S. Comm. of Fish and Fisheries***, pt. ii, for 1872–73.)

It can scarcely fail of being observed, from the above statements, that nearly all the fishes which are most highly prized for richness and delicacy of flavor—the shad, the salmon, the trout, the white-fish, and the Otsego lake bass—are those whose diet is, to a great extent, crustacean. Hence, the inference is a natural one, that the Crustacea are the best food upon which fishes can feed.

INSECTS AS FOOD FOR FISHES.

Insects, in either their larval or perfect stages, form a portion of the food of nearly all our fresh-water fishes, and a very large proportion of the food of most of the species.

Sir Humphry Davy remarks: "As a great proportion of the insects that fly, walk, or crawl, are the food of fishes, a dissertation or discourse on this subject would be almost a general view of natural history."*

The art of fly-fishing, which has given to our libraries the delightful volumes of Walton, Davy, and others, and contributed so many hours of unalloyed happiness to the angler and the naturalist, is an enduring attestation to the love of fishes for insect food.

The trout is preëminently an insect-loving fish. The facility with which it is enticed by the artificial fly is known to all, and its leaps from the water to capture the insect floating on the surface or winging its way above it,† are familiar to those who have had the privilege of making its acquaintance in the more secluded lakes and streams of the Adirondack wilderness. The range and extent of its insect diet may be best shown by some extracts from a paper on "*The food of the Salmon, the Trout, and the Shad*," prepared by D. Barfuth, of the University of Bonn.‡

An examination of the digestive organs (from the œsophagus to the anus) of twenty-one specimens of the common trout of Europe (*Salmo fario*) obtained, November 25, 1873, gave as follows:

1. Twenty-one wings of insects—mostly Neuroptera.
2. Twenty-six parts of integuments, heads and wings of Coleoptera and Orthoptera, as well as Crustaceans and Myriopods.
3. Thirty-five tarsi and other portions of the legs of the same insects.
4. Thirty-six larvæ of *Phryganidæ* and their cases composed of particles of quartz and plants.

No remains of fish were discovered. In some stomachs, the tolerably well-preserved larvæ of *Sialis lutaria* were found. On one occasion I found six cases of *Phryganidæ* in a fish, and several times three or four were packed closely together, so that they extended the stomach, and could be seen from the outside. In some instances the larvæ of these cases were well preserved."

A later examination (20th June, 1874), of the stomachs and entrails of six trout, caught in the Kyll, near Gerolstein, gave the following results:

"In the first, I found four cases of *Phryganidæ;* in the second, I found one hundred and thirty-six cases, one insect, one dragon-fly's wing, and the remains of a fish; in the third, five hundred and eighty-five (?) cases, one insect, and the scale of a fish; in the fourth, one hundred and sixteen cases, one insect and the

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* Salmonia and Consolation in Travel. London, 1840. Vol. ix, p. 152.

† The capture of insects upon the wing by trout has been questioned; but, in confirmation of the assertion, Mr. W. W. Hill, of Albany—a gentleman who has had much experience in fly-fishing, and with the eye of a thorough naturalist, has carefully studied the habits of the trout, makes the following statement: "From personal observation, I am able to state, that it is *a very common occurrence* for the speckled trout (*Salmo fontinalis*), during the months of June, July and August, in the Adirondack region, to spring from the water and catch moths, dragon-flies, ephemera, caddis-flies, and other insects flying near the surface."

‡ U. S. Commission of Fish and Fisheries. Part iii. Report for 1873–74 and 1874–75, p. 735.

remains of a fish; in the fifth, one hundred and eighty-six cases, and the flower of a graminaceous plant; in the sixth, one hundred and fifteen cases, a small caterpillar, a number of fish-eggs, and one-half of a small fish. The cases of *Phryganidæ* were found in all the stomachs, and also in the entrails; in one, the intestinal canal, as far as the anus, was completely stuffed with the cases."

Similar examinations of the stomachs of the brook-trout (*S. fontinalis*) made in this country have shown the presence of numerous Phryganid larvæ, with the cases of various species of both slight and strong construction.

The contents of the stomachs of some white-fish, examined by Prof. S. I. Smith, gave the following insect remains: *Chironomus* larvæ and pupæ; the imagos of two species of *Diptera;* larvæ and pupæ of *Ephemeridæ;* larvæ, pupæ and subimagos of *Hyprophsyche* and of another Phryganid; the legs and scales of a Lepidopterous insect.

In an excellent paper "*On the Benefit and Damage of the Trichoptera*" (a division of the Neuroptera including the *Phryganidæ*), contributed to the *Stettiner Entomologische Zeitung*, 1848, Vol. ix, pp. 50–52, by Dr. Kolenat, the writer asserts that Phryganids are a first-class food for fishes. Not only are they very desirable for food, but they are valuable also as indicating the character of the water—the nature of their cases indicating clearly the chemical composition of the water, and its adaptation to fish-culture. No pond or stream should ever be selected for pisciculture, unless the *Phryganidæ* are abundant in them.

With the above attestations to the high character of insect food for the use of fishes, and in consideration of a very prevalent belief that many insects were specially created to serve as fish-food, it will be unnecessary to multiply details, at the present, of the peculiar fondness of fishes for this diet, or of certain species for particular classes of insects. It may suffice to say, that the entomologist can corroborate the statement of Sir Humphry Davy (loc. cit., p. 159),—"there is hardly any insect that flies, including the wasp, the hornet, the bee and the butterfly, that does not become, at some time, the prey of fishes."

MOLLUSCA AS FOOD FOR FISHES.

The food of the Lake sturgeon, *Acipenser rubicundus* Lesu., consists almost entirely of the shell-fish of the lakes, principally Gasteropods—the thinner shelled kinds of the genera *Physa*, *Planorbis* and *Valvata*, being found broken in the stomachs, while *Limnœa* and *Melantho* remain whole (J. W. Milner). At Sand Island, Lake Superior, a specimen contained a few bones of some fish and numerous shells, among which were the following: *Valvata tricarinata*, *V. sincera*, *Limnœa catascopium*, *Physa sp. ?*, *Planorbis bicarinatus and Sphærium striatinum* (S. I. Smith).

The stomachs of some white-fish from Sault Sainte Marie contained scarcely anything but small shells. Among these, *Valvata tricarinata*, *V. sincera*, *Amnicola generosa*, *A. pallida* (?), *Gyraulus parvus*, and a species of *Lymnœa* were in abundance; there were fewer specimens of *Goniabasis livescens*, *Physa vinosa* (?), *Sphærium striatinum* and *Pisidium compressum* (S. I. Smith).

I have no accessible data showing the extent to which the trout, salmon trout and other of our fresh-water fishes, feed upon the Mollusca, but there is every reason to believe that they form a portion of the food of many of the species, and that the molluscan ova are readily eaten by their young.

A large number of our salt-water fishes are recorded by Prof. Verrill as feeding on Mollusca—as, for example, the porgee, black-fish, cod (twenty-six species of shells are mentioned as having been found in its stomach), haddock, flounder, minnow, blue-shark, tiger-shark, skate, sting-ray, and the long-tailed sting-ray.

PLANTS AS FOOD FOR FISHES.

In Europe, the common carp (*Cyprinus carpio*) has long been cultivated, from the ease and economy with which it is reared on aquatic vegetation, and "on all vegetable and animal kitchen-refuse, agricultural products of little value, etc., which supply a wholesome food for them, if it is given to them in small pieces, so that they can easily grasp it with their toothless mouth and swallow it." Others of the carp family—the tench (*Tinca vulgaris*), the barbel (*Barbus fluviatilis*), the bream (*Abramis brama*), and the bleak (*Alburnus lucidus*), are represented as vegetable feeders.

The gourami (*Osphromenus olfax*), of Eastern Asia, famed for its excellence as food, is also largely a vegetable eater. Prof. Gill, in his "*Natural and Economical History of the Gourami*,"* furnishes the following interesting account of its food:

"The gourami is omniverous in its appetite, taking at times fish, frogs, insects, worms, and many kinds of vegetables; it is, however, essentially a vegetarian, and its adaptation for this diet is indicated by the extremely elongate intestinal canal, which is many times folded on itself. It is said to be especially fond of the leaves of several Araceous plants belonging to the genera *Caladium*, *Arum and Pistia;* but it also devours, with not much inferior relish, cabbage, radish, carrot, turnips and beet-leaves, lettuce, and most of the wild plants which grow in the water, and it can secure for its use the leaves of plants that grow on the banks and a slight distance out of the water. It also takes wild rice, maize, potatoes, arrow-root, manioc, bread and analogous articles."

The attempt is being made to introduce both the carp and the gourami into this country for cultivation.

An interesting statement is given by J. Stanton Gould, in a valuable paper by him on "*The Grasses and their Culture*,"† of the fondness of the trout for the seeds of a plant—the *Glyceria fluitans*. This is a rather common plant, ranging throughout the United States, from Canada to Louisiana, and also occurring in Europe. "It is found growing in shallow water, overflowed meadows and wet woods, but will bear cultivation on moderately dry grounds. Schreber says that it is cultivated in several parts of Germany for the sake of the seeds, which form the manna-crop of the shops, and are considered a very great delicacy in soups and gruels. When ground into meal, they make bread very little inferior to that made from wheat. All gramniverous birds are exceedingly fond of these seeds. * * * * * * Trout, and, indeed, most fish, are very fond of them; and wherever *G. fluitans* grows over the banks of streams, the trout are always found in great numbers waiting to catch every seed that falls."

In plate 33 (op. cit.), figs. 104–107, this interesting grass is illustrated.

In proceeding, after the above consideration of the various classes of fish-food (which I trust will not be regarded by your board as wholly digressive), to the subject to which my attention was particularly invited, we may consider, first:

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* U. S. Fish Commission—Report 1872–73, pp. 710–728.

† Trans. N. Y. State Agricul. Soc. Vol. xxix, 1869, pp. 191–402, plate 74.

THE DESIRABILITY OF TRANSPLANTING FISH-FOOD.

If, as there is every reason to believe, the great abundance of trout in Caledonia creek is owing to two principal causes, viz.: the character of the water, and the nature of its fauna and flora, then we may draw the following conclusions:

First. In any stream having the same character of water, the addition of a similar fauna and flora should fit it for an equal abundance of trout.

Second. Streams, ponds, and lakes having a different character of water (as to current, temperature, substances in solution, etc.), by the addition of a similar fauna and flora, may be fitted for an equal abundance—perhaps greater—of some species of fish desirable for food.

It is evident that, however well adapted a body of water my be, in the conditions above referred to, and others of the kind, for a fish population, there may still be wanting the essential requisites of an appropriate and efficient food-supply.

The absence of proper food is not necessarily the consequence of unsuitable conditions of the water. There are, undoubtedly, in certain waters, conditions which are unfavorable to, perhaps inconsistent with, the presence of certain forms of animal life, or of their abundance. For example, Dr. Kolenat, ut cit., asserts, that in water containing an excess of lime or oxide of iron, only certain subfamilies of the *Phryganidæ*, as the Sericostomides and the Rhyachophilides which inhabit sessile cases attached to stones, are to be found, to the exclusion of those subfamilies which occupy cases swimming freely in the water. In such waters, the writer claims that the propagation of fish cannot be advantageously conducted.

It should be borne in mind, that throughout nature, conditions are ever changing. It would be difficult to cite a locality where the conditions of to-day are those of a century ago; often a decade of years suffices to produce material modification, especially when human agency lends its powerful aid—always in the direction of disturbing the harmony in nature which had previously existed. Forests are felled: the fauna which they harbored—the mammals, birds, reptiles, insects—perish with it, or are driven elsewhere. The streams which they sheltered are dried up, or change their character with the season, and the larger bodies to which they are tributary, are modified in temperature, in their soluble constitutents, in area, in the flora and geological nature of their bed. Mills are erected, dams are constructed, and factories discharge their poisonous chemicals into the once pure waters. A too ardent pursuit of the pleasures of angling, or an excessive love of gain, may have thoroughly depleted waters which before had teemed with the animal life natural to it.

With the evidences of such changes wrought, through the operation of known causes, it would be inexcusable to accept a present unfavorable condition as unalterable. We find a stream barren of animal life; it has neither fish nor, apparently, food for fishes. Tradition does not tell us whether it has always lain thus, or whether it once swarmed with occupants. It may have rested so long fallow, that it only needs the dropping of the seed to insure a bountiful return; or, in addition to the seed, its food-elements may also have to be added.

In view of the valuable results which have attended the labors of your Commission thus far, it would seem to be proper that the attempt should be made to cultivate every now barren piece of water within our State, particularly as it may be undertaken with the prospects of success.* I purposely employ the word *cultivate*, for its use, I believe, is authorized by the examinations which I have made in accordance with the request of your board, and heretofore referred to.

*It is asserted that, in China, every body of water of the extent even of a small pond, has been utilized for fish-culture, and that an acre of water yields a larger return than an equal area of land.

It is not to be expected that many of our waters will require *cultivation*, in order that they shall yield an ample return for the comparatively trifling labor and expense attendant upon the present system of pisciculture. It is not improbable that careful observation, or a series of experiments. may admit of so judicious a planting in each locality of the species of fish fitted for, and adapted to, the particular locality, that nothing farther shall be necessary. The food required may be there already, although not detected by us. The shallow rivulet may contain its myriads of crustacean and insect forms, so small as to have escaped the eye. The bottom of the lake may be alive with crustacea, whose presence is first disclosed to us by the dredge, or in the examination of the stomach of a bottom-feeding fish.*

But it may be desirable that localities already producing largely should double their product; then, of necessity, cultivation must be resorted to. As very few of our fields or gardens are so bountifully supplied by nature with all the elements requisite for an abundant annual harvest, that they do not need a return to be made of some of the substances entering into the production of the crops which are taken from them, so we may not expect that our waters are to be brought up to the standard of their greatest productiveness, without some provision for the larger draft made upon them. The food-supply must be increased by successive plantings, as provision for the greater size or increased numbers of the consumers.

Again, as there are soils which are wanting in nearly every element, except moisture, of proper plant-growth, so there are waters, which, from some cause, may be destitute of fish-food. If desirable to render these productive, the food must be supplied. Were it necessary that this should be done annually, as with a barren field, the attempt at reclamation would seem a hopeless one; but the entomologist, with a knowledge of the prolific nature of many species, their rapid development, the successive broods throughout the year, offers the encouragement of the probability that a single planting of insect life, under favoring conditions, would perpetuate itself.

The considerations above advanced, together with others which have presented themselves to me, lead me to regard the suggestion made by your board, of super-adding to the planting of fishes that of the planting of fish-food, as one, which, if it be successfully carried into effect, will mark a new era in pisciculture. By its means, every body of water, suited by nature for the purpose, could be made productive, and the productiveness of those already remunerative largely augmented.

THE PRACTICABILITY OF TRANSPLANTING FISH-FOOD.

The transplanting of food as proposed would be attended with little difficulty. The insects, crustaceans and other animal forms could be collected from ponds or streams in which they abound, and, with mosses and aquatic plants placed in large cans filled with water, such as are employed for the transportation of young fish. In this manner, they could be sent to any locality within the State, which could be reached within a reasonable time, accompanied with such instructions for placing them in the water, as are now sent with the shipments of young fish.

A still more convenient method would be to substitute for the cans, as requiring less care in handling, boxes, kegs or barrels, to be lightly filled with the plants containing the several forms as collected. Or, when it is desirable to send larger numbers of the insect and crustaceans, the packages could be filled with successive layers of aquatic plants or mossess, and animal forms—so lightly packed

* See page 90, for the discovery of *Mysis relicta* in Lake Michigan.

as to avoid crushing, and not to interfere with a certain degree of freedom of motion. During the writing of these pages, a box has been received at the State Museum, from Caledonia creek, containing in *Chara vulgaris*, a common water-plant in that locality, the following forms of animal life: fishes, lizards, craw-fish, shrimps, beetles, water-bugs, water-boatmen (*Gerris* and *Coraxis*), gnats, shells, leeches, and the larvæ of beetles, caddis-flies, dragon-flies and May-flies. Although the capacity of the box did not exceed a cubic foot, it contained hundreds of living shrimps, caddis-worms and larvæ of gnats, and numerous examples of other forms. So much of the Chara had been placed in the box, that it had unfortunately crushed out the life from most of the usually hardy "miller's thumbs" (*Cottus*) and the delicate "stickle-backs" (*Gasterosteus*); still a number were found, which, being transferred to water, swam as lively as if they had not been banished from their natural element for twenty hours.

To illustrate the facility with which the above collection could be made at Caledonia creek, it may be mentioned that in the month of December last I took from the water's edge a single bunch of moss resting on a stone in the water, which gave me a representation of the six following groups:—fishes, reptiles, crustaceans, insects, worms and mollusks.

In the transplanting of fish-food, if the greatest benefit is to be derived from it, it would be proper that it be regulated by a knowledge of the particular localities best adapted for the permanency and increase of the transferred species. While we are often surprised at the ability of accommodation to changed circumstances displayed in the animal kingdom,* still the probability of success is greater when we work in accordance with established laws, than when we wander in the field of experiment.

Thus, among tho Neuroptera, the larvæ of the *Ephemeridæ* and the *Perlidæ*, require for their abundant propagation, certain conditions of the bottom and banks of the streams which they occupy; for the former, a sloping, muddy bank, in which the larvæ reside (see page 77), and for the latter, a bed of stones, beneath which the larvæ conceal themselves. Dr. Hagen suggests that the needed conditions may be artificially provided; as, for example, for the Ephemeræ the bank may be prepared of loam, sloping at an angle of about forty-five degrees.

The transplanting of insects need not be confined to the aquatic forms. There are numerous other species, which, in their larval state, if favorably placed for the purpose, would contribute largely to the food of fishes. The larvæ of the saw-flies, belonging to the *Hymenoptera*, often live together in large companies. Many of these, and other classes of insects, have the habit of eluding their enemies by dropping from the leaves to the ground, where they hide until the danger is past. When they have attained maturity they frequently drop to the ground, perhaps by the aid of a thread spun for the purpose, as the most convenient means of reaching the place of their transformation. The willows are a favorite food-plant for several species of saw-flies and other gregarious larvæ. When these overhang the streams they furnish a large supply of insect food to the fishes, who are quick to discover the favorable feeding ground. The planting of willows, therefore, together with such other shrubs and trees as are known to be favorite food-plants of insects, in position

* I once entirely stripped a caddis-worm of its case of bits of leaves and stems of aquatic plants, and placed it in a vessel containing only some small shells of *Helix*, *Pupa*, etc. The following morning it was found to have made for itself a new case composed of these shells, which, to all appearance, was as well suited to its purpose as its original, consisting of such very different material.

to project over the water, would be a simple method of contributing largely to the fish-food of our ponds and streams.

The disscussion of the above topics—the practicability and the desirability of transplanting fish-food, has also suggested another to my mind, equally and perhaps more important, which I beg leave to present for the consideration of your board, viz.:

THE PROPAGATION OF FISH-FOOD.

The proposition to propagate crustaceans and insects for fish-culture must be regarded as intimately connected with that of transplantation—perhaps as a corollary of it. If transplantation be attempted to any great extent, then it follows that the supply of food must be somewhat commensurate with its need. Few localities in our State (perhaps none other than Caledonia) are so bountifully provided by nature, that they could contribute, to any great extent, of their surplus of animal life for the improvement of less favored waters. A single planting from Caledonia creek to a Long Island trout stream would, in all probability, add to the latter some forms not previously existing there, which might be expected to perpetuate themselves; while in a stream not abounding in fish, and therefore presumably characterized by a scarcity of animal food, a single planting would naturally be appropriated by the hungry occupants before the several species could be established A stream destitute of fish, and equally devoid of other life, would need the nursing of a term of years, or of several bountiful plantings, in order to render it profitable for pisciculture.

All these, and other like difficulties, would find their remedy, in a propagation of fish-food, on such a scale, as seems to the writer within the easy limits of practicability. The artificial propagation of fish, in its application to the increase of the food-supply of our lakes and rivers, is of recent date, and already your board are prepared to meet all demands made upon them for stocking the waters of our State with fish appropriate to them—even our rivulets, with the speckled trout. In view of what has already been accomplished, it is not unreasonable to predict, that, in the event of these recommendations meeting the approbation of your board, within a few years, cans of crustaceans and insects will be the usual accompaniment of the cans of fishes dispatched from the State Hatching-house, in response to such requests as, "send me five thousand brook-trout and a hundred thousand shrimps" Should you raise the question—"In our artificial fertilization of ova, are not our results the consequence of aiding and improving upon nature?"—my reply would be, true; but the ordinary laws of nature give us a prodigality of insect life, almost infinitely in excess of fish fecundity, even as displayed in the enormous herring-shoals of the North Atlantic. A fish deposits her spawn but once during the year; but in the aphis, or plant-louse, in one year there may be twenty generations. Latreille says that a female aphis produces usually about twenty-five young each day; and Reaumur proved by experiment, that a single aphis might be the progenitor of 5,904,900,000 (nearly six billions) descendants during its life. The crustacea are, also, remarkably prolific: a naturalist has found above twenty-one thousand eggs in a lobster, and Leeuwenhœck seems to compute four millions in a crab.

In view of such facts, an attempt to stimulate the fecundity of nature in the production of her insect hosts, must seem a superfluous undertaking. Protection is all that would be needed.

The propagation of food for fishes is already in practice, in the simple form of placing over a fish pond the flesh of some animal, so arranged that its decomposition shall attract flies for the deposition of their eggs, the grubs proceeding from which will drop into the water to feed the fish.

A method somewhat allied to this, would be that of obtaining the eggs of certain species of insects, having the habit before referred to, of dropping to the ground when alarmed or in readiness for pupation, and placing them upon their appropriate food-plants projecting over the water—the larvæ to serve as fish-food during their growth. It is believed that there would be no insuperable difficulty in procuring the eggs of some of the species in sufficient quantity for this purpose, in consideration of the fact, that under the stimulus of the profit resulting from sericulture, the eggs of the silk-worms are produced in such quantities, that a *freight-car laden entirely with them*, recently passed through Albany, en route from California to Europe.

From the habit inherent to many of the insects and to most of the aquatic forms of the animal kingdom, of preying upon one another, it would be necessary to propagate most of the species separately. The predaceous water-tigers could not be reared with the defenceless, herbivorous Phryganids; the larger forms of the dragon-flies with the smaller coleopterous larvæ; the Dysticus larvæ with the shrimps.

It would also be necessary, in order to insure complete protection to such species as are particularly liable to be preyed upon by other insects, that they should be reared under cover. If, for example, the *Phryganidæ* are to be propagated, the aquatic plants upon which the larvæ feed, would require not only considerable space, but an exposure to light. If an open pond were devoted to them, freed, if possible, at the outset, from every enemy, their presence, or even the water-surface and its vegetation, would soon attract hither the dragon-flies (*Odonata*) and water-beetles (*Dytiscidæ*, etc.), for the deposition of their eggs upon the plants, and the consequent speedy population of the water with hosts of insect foes.

The cover, either of suitable netting or glass, in addition to the protection it would afford, would also prevent the escape of the insects when they have attained their winged form; and, furthermore, insure the return of their progeny to the water devoted to their propagation.

For many forms, properly constructed and arranged aquaria, of a capacity to admit of the introduction of the requisite vegetation, would be all that would be needed. They would afford ready means for isolation, and for the confinement of the perfect insects for securing the eggs.

If the suggestion last advanced—that of the propagation of fish-food, be regarded as valuable by your board, and as giving promise of aiding materially in the important work of your Commission, I would, in addition, propose, with your approval and coöperation, personally to test the value of some of the suggestions offered. The aquarium of the State Museum (of a capacity of sixty-five gallons), could be used for the purpose. The State Botanist, Prof. Peck, would cordially lend his aid in stocking it with such forms of vegetation as would seem desirable (with the rare *Hypnum noterophilum* of Caledonia creek, and other Caledonia mosses), and in other matters connected with his department.

In view of the superiority of crustacean food, it would be a great achievement, if the propagation of some of the more desirable species could be successfully prosecuted. All the efforts thus far made to rear the lobster in confinement have proved failures. It undergoes during its growth several transformations, in one of which its abode in deep waters seems essential to its development, and has also served to conceal from us that portion of its life-history.

The craw-fish, *Astacus fluviatilis*, under liberal appropriations made by the government, is, at the present time, extensively cultivated in the rivers and brooks of France for table use.

The small crustaceans of the family of *Gammaridæ*, noticed in preceding pages, undergo no metamorphoses after their escape from the egg, and, therefore, give promise of less difficulty in their propagation. They have not, however, been reared from the egg, and we are still without their complete history. Even their food is somewhat in doubt; but they are believed to be principally vegetable feeders, although eating animal matter in a decaying state, when convenient to them.

Although, under these circumstances, it would be but an experiment, I propose to undertake the propagation of *Gammarus fasciatus*—the species so abundant at Caledonia, and which, therefore, should not prove very difficult to rear. Prof. S. I. Smith, of Yale College, New Haven, whose successful study of the Crustacea has necessitated his frequent citation in these pages, informs me that this species probably breeds througout the spring and summer, as females taken at various times, from March to August, are found carrying eggs or young in various stages of development. From the fact that females with undeveloped eggs and others with fully developed young, occur together during so long a period, while very few are observed without eggs or young; and further, that the development of allied species is very rapid, Prof. Smith infers that the same female breeds several times during the season.

The above is about all that is known of the habits of this species; but it leads us to hope that there will be found no insuperable difficulties in its propagation in confinement, or in its rapid multiplication.

My acknowledgments are due to Mr. Seth Green, and to his brother, Mr. Monroe A. Green, for the facilities afforded me for my examinations, and for courtesies extended to me during my visit to Caledonia.

I desire, also, to bear my testimony to the admirable manner in which the operations at the State Hatching-house are conducted. It is difficult to see in what direction further improvements can be made. The extreme care displayed in all the minute details connected with the operations, on the part of each one of the trained assistants engaged, certainly deserves the remarkable success whieh has signalized the labors of your Commission.

N. Y. State Museum of N. H.,
March 12, 1878.

ANNELIDA CHÆTOPODA OF NEW JERSEY.

By H. E. WEBSTER.

The Annelida catalogued and described in the following pages, were collected in June and the first half of July, 1878, by the writer and a number of students from Union College, forming the usual summer zoölogical party, or "Natural History School," sent out by the college. The locality was Great Egg Harbor, N. J., our residence and point of departure being Beesley's Point. The harbor is quite shallow, with a narrow channel carrying from ten to fifteen feet of water. Outside of the channel at low water, there is from one to three feet of water, and the bottom is covered for the most part with a dense growth of grass and sea-weed. As usual, by far the greater number of species were obtained with the spade, between tides. In collecting and taking care of the annelids, I was very much aided by Mr. James E. Benedict. Mr. Benedict had general charge of the shore work, giving especial attention to the birds, but managed to find time for much good work on the annelids. Mr. C. M Culver, relieved me of much care and responsibility by taking general supervision of the marine invertebrate collecting and collections; while Mr. H. H. Dey Ermand, although acting as Mr. Benedict's assistant in shore work, did good service in marine collecting, from time to time. We were very fortunate in our boatman, Mr. Aaron Clark, of Beesley's Point, and I can heartily recommend him to hunting, fishing and collecting parties. During this winter (1878–79), we have received from him a fine lot of birds in good condition for mounting. I mention this fact, because, in common with others, I have found it very difficult to find men competent to collect and care for birds or other natural history objects, except under direct supervision.

The results of the work on the chætopod annelids may be summarized as follows:

Number of Families represented	23
Genera	50
Species	57

It was found necessary to establish two new genera Streblospio and Paraxiothea; of the species fourteen are believed to be new; one genus, Grubea, has not previously been reported from our coast, although the species is probably not new. The specimens upon which the work is based are in the Museum of Union College, and a nearly complete series has also been deposited in the New York State Museum of Natural History.

Fam. POLYNOIDÆ.

LEPIDONOTUS (*Leach*) *Kinberg*.

Fregatten Eugenies Resa; Zoloögi, ii, Annulata, p. 13.

Lepidonotus squamatus *Knbg.*

Aphrodita squamata Linn. Syst. Nat., ed. x, p. 655. 1758.
Polynoë squamata Savigny. Syst. des Ann., p. 22. 1820.

Polynoë squamata Aud. & M. Ed. Littoral de la France, vol. ii, p. 80, pl. i, figs. 10–16. 1834.
" " Grube. Familien der Anneliden, p. 36. 1851.
" " Quatr. Hist. Nat. des Ann., vol. i, p. 218. 1865.
" *dasypus* Quatr. Hist. Nat. des Ann., vol. i, p. 226. 1865.
Aphrodita punctata Abldg. Zoöl. Danica, vol. iii, p. 25 (non figs. pl. 96). 1789.
" " O. Fabricius. Fauna Grœnlandica, p. 311. 1780.
Lepidonote punctata Œrsted. Ann. Dan. Consp., p. 12, figs. 2, 5, 39, 41, 47, 48. 1843. Grön. Ann Dors., p. 16. 1843.
" *armadillo* Leidy. Marine Invert. Fauna, N. J. & R. I., Ex. Jour. Phila. Acad., series ii, vol. iii, p. 16, pl. xi, fig. 54. 1855.
Lepidonotus squamatus Knbg. Fregatten Eugenies Resa omkring Jorden. Vetenskapliga Jakttagelser. Zoölogi, Annulata, p. 13, pl. iv, fig. 15. 1857.
" " Johnston. A Catalogue of the British Non-parasitical Worms, p. 109, pl. viii, fig. 1. 1865.
" " Malmgren. Nordiska Hafs-Annulater; Öfvers. af K. Vet. Akad. Förh., p. 56. 1865. Annulata Polychæta, p. 130. 1867.
" " Baird. Linn. Proc. Zoölogy, vol. viii, p. 182. 1865.
" " Möbius. Untersuchung der Ostsee, p. 112. 1873.
" " Verrill. Invert. Animals of Vineyard Sound, etc., in Report of U. S. Commissioner of Fish and Fisheries, Part I, p. 581. 1874.
" " Webster. Annelida Chætopoda of the Virginian Coast, in Trans. Albany Institute, vol. ix, p. 204, pl. i, figs. 1–5. (Advance copies, Jan. 1879.)

LAGISCA *Malmgren.*

Nordiska Hafs-Annulater, p. 65. 1865.
Annulata Polychæta, p. 133. 1867.

Lagisca impatiens *n. sp.*

PLATE I, FIGS. 1–7.

Head (fig. 1) broader than long, sides convex, posterior margin concave, slightly depressed along the median line.

Eyes large, lateral, remote from each other, black.

Antennæ covered with minute, cylindrical papillæ, which are a little swollen and lobed at the end; median, cylindrical for inner two-thirds, outer third conical, delicate; basal article large, swollen; in length falling a little short of the palpi; lateral, about one-half as long as the median, fusiform; basal articles cylindrical, a little longer than that of the median antenna.

Palpi smooth, very changeable in form, at rest a little longer than the median antenna, tapering uniformly to near the end, where the diameter suddenly diminishes.

Tentacular cirri with cylindrical basal articles; superior about the length of median antenna; inferior but little shorter than superior; these cirri, together with the dorsal and anal cirri, have the same structure, in all respects, as the median antenna, but the dorsal cirri are a trifle longer than the superior tentacular cirri, and the anal are a little longer than the dorsal.

Elytra, first pair (fig. 5) nearly circular; the rest (fig. 6) reniform; covering the body completely in front, but further back not quite touching along the middle line, leaving a narrow, naked, median space; when magnified, seen to be covered with minute granules, around each of which is a circular depression;

outer margin fringed; from two to seven rather stout, cylindrical papillæ arising from the surface, near the posterior margin; last seven segments without elytra.

Feet (fig. 2) of the usual form, margins of both dorsal and ventral rami with flattened somewhat triangular prolongations; ventral cirri arising at about the outer third and projecting a little beyond the foot, sparsely covered with papillæ similar to those found on the superior cirri.

Setæ of dorsal ramus quite stout (fig. 4), numerous, about half as long as the ventral setæ, although the longest dorsal are as long as the shortest ventral; those of the ventral ramus (fig. 3) long, numerous, ending in a single curved point. The dorsal setæ are usually more numerous than in fig. 2, very nearly concealing the prolongation of the ramus.

Color. Head, flesh-color; palpi, brown with white tips; antennæ and all superior cirri with one or two black rings at about the outer third; elytra extremely variable; they may be white, yellow or flesh-color, with markings varying much both in form and extent, and in color from light brown to very dark brown; on one specimen the elytra were light orange, with transverse linear markings of dark brown, on the anterior segments; body usually white above, without markings, or with transverse lines or spots of black or purple; the last segments have usually black markings; the ventral surface may be white, or white tinged with red or purple.

This species is very fragile, readily breaking up and losing their elytra when disturbed. Middle third widest; last third tapering rapidly; first third slightly tapering.

Length of adult specimens, 25^{mm}; width, $4–6^{mm}$.

Common, associated with *Lepidonotus squamatus*, and like that species abundant on beds of *Mytilus edulis*.

LEPIDAMETRIA *Webster.*

Annel. Chæt. of the Virginian Coast, p. 209. 1879.

Lepidametria commensalis *Webster.*

Op. cit., p. 210, plate iii, figs. 23–31.

Not common; only three specimens were collected.
Lives in the tube of *Amphitrite ornata* Verrill.

Fam. SIGALIONIDÆ.

STHENELAIS *Kinberg.*

Annulata Nova., etc., Öfvers af Kongl. Vet-Akad-Förh. 1855.

Sthenelais picta *Verrill.*

Verrill. Invert. Animals of Vineyard Sound, etc., p. 582. 1874.
Webster. Annel. Chæt. of the Virginian Coast, p. 213. 1879.

Not common. Dredged.

Fam. NEPHTHYDIDÆ.

NEPHTHYS *Cuvier.*

Nephthys incisa *Malmgren.*

Nephthys incisa Mgrn. Nordiska Hafs-Annulater, p. 105, pl. xii, fig. 21. 1865.
Annulata Polych., p. 141. 1867.
Nephthys ingens Verrill. Invert. An. Vin Sound, etc., pl. xii, figs. 59, 60. 1874.
" " Webster. Annel. Chæt. of the Virginian Coast, p. 213. 1879.
Nephthys incisa Verrill. Check List. 1879.

Not common. Found in sand and mud; low water to fifteen feet.

Nephthys picta *Ehlers.*

Ehlers. Die Borstenwürmer, p. 632, pl. xxiii, figs. 9, 35. 1868.
Verrill. Invert. An. Vin. Sound, etc., p. 583, pl. xii, fig. 57. 1874.
Webster. Annel. Chæt. of the Virginian Coast, p. 214. 1879.

Fam. PHYLLODOCIDÆ.

ANAÏTIS *Malmgren.*

Nordiska Hafs-Annulater, p. 94.

Anaïtis speciosa *n. sp.*

PLATE I, FIGS. 8, 9.

The outline of the head conforms perfectly to Malmgren's generic description; the middle third of the posterior margin curves suddenly backward, encroaching upon the anterior margin of the first segment, the sides and front are regularly rounded, forming a semicircle.

Antennæ delicate, conical, length about one-half the width of the head; only the upper pair can be seen from above; both pairs arise from the lower surface of the head, upper also external and pointing outward, lower directed downward.

Eyes large, circular, lateral, posterior: first segment prolonged forward as far as the front of the eyes, embracing the sides of the head.

Tentacular cirri arise from short, stout basal articles, are stout at base, regularly and acutely conical; first and second equal, a little shorter than the third, which reaches back to the front margin of the fourth setigerous segment; the fourth cirrus, or cirrus of the second segment, as long as the third.

Dorsal cirri (branchiæ) broad heart-shaped (fig. 8), with long basal attachment, retaining the same form throughout; feet (fig. 8) cylindrical, bilabiate; ventral cirri with slightly convex lower margin, nearly straight or slightly concave upper margin; apex bluntly rounded, a little shorter than the feet: anal cirri circular, a little thicker than the dorsal.

Setæ (fig. 9) long, slender, with very long and delicate appendix; the stem ends in two sharp curved points, one much longer than the other.

Color: head and first two segments white with brown specks; dorsum generally dark green; between the segments a narrow spindle-shaped band of umber-brown; eighth and ninth segments umber-brown, giving a well-defined band of the width of these two segments; dorsal cirri green, not quite so dark as the dorsum, with a central brown spot, extending to their attachment on the segments 3–9; after the ninth segment this marking becomes obsolete. Ventral surface light green, growing darker externally, and with reddish-brown lateral markings along the posterior third; feet and ventral cirri dark green at base, growing lighter further out. Anal segment brown. The general color of the body in one instance was reddish-yellow; in another all the markings were very dark-brown, nearly black, in place of the umber-brown. The transverse band on the eighth and ninth segments is still visible, after six months' preservation in very strong alcohol. Body slightly convex above, flattened below; the first segment is much wider than the second, but shorter; the second is narrower than the head; the middle third of the body has a uniform width, about double that at either extremity.

Length of adult specimens, 10–12^{mm}; width, 1.5–2^{mm}.

Found occasionally at low water; quite common on beds of *Mytilus edulis.*

PHYLLODOCE (*Sav.*) *Malmgren.*

Malmgren. Nord. Hafs-Ann., p. 94.

Phyllodoce arenæ *n. sp.*

PLATE II, FIGS. 10–12.

Head bluntly rounded in front, diameter increasing backward to the middle line, just back of the middle slightly constricted; margins behind the constriction straight; posterior margin with a deep triangular emargination; lateral lobes broadly rounded.

Antennæ short, conical, rather stout, their length about equal to the anterior diameter of the head.

Eyes situated at posterior third of the head, latero-dorsal, large, circular, dark brown to black.

Tentacular cirri; first and second equal, reaching some distance beyond the head; second and third equal, about double the length of the first, reaching back to the ninth or tenth segment, subulate. On the first segment, in the triangular space between the posterior lobes of the head, there is a small, blunt papilla, its length about equal to the base of the triangle; this papilla is obvious in fresh specimens, but is seen with difficulty in alcoholic specimens.

Dorsal cirri of the anterior segments (fig. 10), broad heart-shaped, from the twenty-fifth segment somewhat quadrangular (fig. 11), and with the inner margin abruptly turned up, presenting a narrow surface nearly at right angles to the larger outer part of the cirrus; the line of union of the two surfaces is thickened and densely covered with long cilia.

Ventral cirri, lower margin convex, upper margin nearly straight in front; they are rounded externally, pointed behind.

Setæ numerous, of one kind only (fig. 12), very long with a flexible capillary termination; the stem is roughened near the articulation by numerous projecting points; the appendix is joined to the stem by a delicate membrane, and is minutely denticulated along its thin margin.

Anal cirri short, conical.

Color: on the dorsum each segment has a dark brown crescent on both its anterior and posterior margin, while the intervening part is green; thus there are transverse, hour-glass shaped green markings, alternating with spindle-shaped brown markings; on the first ten or twelve segments the brown falls a little short of the outer margins of the segments The dorsal cirri are greenish-white with a large patch of brown at base, not quite so dark as the brown of the dorsum. Back of the middle of the body a second brown spot appears on the outer central part of each cirrus. The ventral surface is light green with a central brown spot on each segment, and a similar spot between the bases of the feet. The head, antennæ and tentacular cirri are white.

Proboscis not seen in full extension, basal portion closely covered with longitudinal series of conical papillæ, except a narrow, naked space above.

Body tapers slightly along the posterior third, but is of nearly uniform diamter throughout.

From the twenty-fifth segment the middle (green) part of each segment is ciliated. Three specimens were found, two of which were colored as described above, while the third had white everywhere replacing the green.

Length, 10^{mm}; diameter, 1^{mm}; diameter including feet, 2.5^{mm}.

Found near low-water mark, in sand.

EUMIDA *Malmgren.*

Nord. Hafs-Annulater, p. 97. 1865.

EUMIDA MACULOSA *Webster.*

Annel. Chæt. of the Virginian Coast, p. 215, pl. iv, figs. 38–41. 1879.

Very common on shells, etc., from low-water to fifteen feet.

EULALIA (*Sav.*) *Malmgren.*

MALMGREN. Nord. Hafs-Annulater, p. 98. 1865.

EULALIA ? ANNULATA *Verrill.*

Invert. Animals of Vineyard Sound, etc., p. 291. 1874.

A single specimen, having the anterior portion only, was found, which probably belongs to Verrill's species.

ETEONE (*Sav.*) *Œrsted.*

ŒRSTED. Annulatorum Dan. Consp., p. 29. 1843.

ETEONE ALBA *n. sp.*

PLATE II, FIGS. 13–16.

Head longer than broad, wide at base, apex bluntly rounded (fig. 13); a slight depression just above the bases of the lower antennæ, and another similar depression just back of the upper antennæ.

Antennæ small, conical; the upper, about equal in length to the width of the apex; the lower, a trifle longer. On the middle line of the head, just back of the eyes there is a small papilla, which can be seen only with difficulty in living forms, and can hardly be demonstrated in alcoholic specimens.

Eyes small, circular, widely separated, situated at about the posterior fourth of the head; on young specimens, red; on adults, black.

Buccal segment nearly as long as the three following segments taken together.

Tentacular cirri; upper nearly as long as superior antennæ, but more delicate; lower, three times as long as upper, and stouter, but still very delicate.

Dorsal cirri pretty evenly rounded, quite small on the anterior segments (fig. 14), growing larger behind (fig. 15).

Ventral cirri, in front larger than the dorsal, lower margin strongly convex, upper margin straight, apex acute; further back they are larger than in front but smaller than the dorsal cirri, their margins slightly convex, apex bluntly rounded.

Anal cirri short, subulate.

Setæ (fig. 16) numerous, short, stem reaching but little beyond the feet; appendix also short, rather wide at base, termination capillary, one edge minutely denticulated.

Body elongated, in front flattened, further back rounded above, flat below; tapering rapidly along the anterior third, gradually along the posterior third.

Color white, or white with flake-white specks, sometimes with an intestinal brown line showing through.

Length of largest specimens, 45^{mm}; width with feet, 1.5^{mm}.

Rare; low water to fifteen feet.

Eteone limicola *Verrill.*

Verrill. Invert. Animals of Vineyard Sound, etc., p. 294. 1874.

This species, reported by Verrill from Great Egg Harbor, we failed to find.

Fam. HESIONIDÆ.

Podarke *Ehlers.*

Die Borstenwürmer, p. 190. 1864.

Podarke obscura *Verrill.*

PLATE II, FIGS. 17, 18.

Verrill. Invert. An. of Vin. Sound, etc., p. 589, pl., xii, fig. 61. 1874.
Webster. Annel. Chæt. of the Virginian Coast, p. 216. 1879.

Rare; low water to fifteen feet.

Podarke luteola *n. sp.*

PLATE II, FIGS. 19, 20.

Head very slightly convex in front, posterior margin slightly concave, and a little shorter than the front margin, the sides being directed a little inward; length to width as 1 to 3; angles all bluntly rounded.

Antennæ: median lost; those in pairs delicate, subulate, without basal articles. Upper pair situated just above the lower, their length about equal to the width of the head; lower pair a little shorter than upper.

Eyes dark red; anterior pair large, circular, latero-posterior; posterior pair a little within the front pair, almost in contact with them; crescentic, concavity directed outward and backward.

Tentacular cirri six pairs, arising from short, cylindrical basal articles, borne on the first three segments, two pairs to each segment; upper cirri as long as the dorsal cirri, or even a little longer; lower about one-half as long as the upper. The first four pairs on each side seem to arise from the sides of the head; this is due to the fact that the first and second segments are not visible from above, except as narrow lateral bands extending forward on the head as far as the anterior eyes; these segments are well defined below; in alcoholic specimens they cannot be seen from above, and even in living forms the line of division between the sides of the head and the lateral prolongations of these segments is not easy to demonstrate.

Dorsal cirri very long, delicate, tapering uniformly, basal articles short, cylindrical (fig. 19).

Feet biramous; upper ramus a stout papilla arising just below the base of the dorsal cirrus; lower ramus stout, elongated, terminating above in a conical process, below which the end of the ramus is bluntly rounded, almost truncate.

Ventral cirri arise from lower outer margin of the ventral ramus, delicate, conical, about one-sixth as long as the dorsal cirri.

Setæ: dorsal very long, slender, capillary, forming a close-set bundle, arising from the summit of the dorsal ramus; ventral (fig. 20) of the form usual in this genus, hardly to be distinguished from the ventral setæ of *Podarke obscura* Verrill, except that they are longer, and that the stem has transverse markings, which I have never been able to see in the setæ of that species. The difference in length between the setæ of the two species is due almost entirely to the elongation of the stem in the setæ of *P. luteola*.

Body slightly convex above and below, widest in front, tapering very gradually. The feet increase in length from the first pair to the middle a little faster than the body narrows, so that the widest part, including the feet, is in the middle.

Anal cirri in all respects similar to the dorsal.

Color: reddish-yellow dorsally; feet green or yellow above, green laterally; ventral surface a shade lighter than the dorsal; antennæ and all cirri white.

Length, 11^{mm}; width, including feet, 2^{mm}; number of segments, 45.

A single specimen was found on an oyster shell at low water.

This species is easily distinguished from *Podarke obscura* Verrill (the only species of this genus previously described from our coast), by the form of the head—lack of basal articles for the antennæ, apparent origin of the tentacular cirri of the first two segments, great length, and short basal articles of the dorsal cirri, etc.

Fam. SYLLIDÆ.

SYLLIS (*Sav.*) *Ehlers.*

EHLERS. Die Borstenwürmer, p. 222. 1864.

SYLLIS GRACILIS *Grube.*

Syllis gracilis GRUBE. Actinien, Echinodermen und Würmer, p. 77. 1840.
" " CAPAREDE. Glanures Zoötomiques parmi les Annélides de Port-Vendres, p. 75, pl. v, fig. 3. 1864. Annélides Chétopodes du Golfe de Naples, p. 503, pl. xv, fig. 3. 1868.
" " MARION AND BOBRETZKY. Annélides du Golfe de Marseille ; in Annales des Sciences Naturelles, 6th series, vol. ii, p. 23, pl. ii, fig. 6. 1875.
" " PANCERI Catalogo degli Annelide, etc. Atti. Soc. Ital., vol. xviii, p. 520. 1875.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 217. 1879.

Only a few examples of this species were taken, it being far less common than in Virginia.

ODONTOSYLLIS *Claparède.*

Glanures Zoötomiques, etc., p. 94. 1864.
Beobachtungen über Anatomie, etc. 1863.

ODONTOSYLLIS ? FULGURANS *Clpd.*

Odontosyllis fulgurans CLAPAREDE. Glanures Zoötom., etc., p. 95, pl. viii, fig. 1. 1864.
" " QUATREFAGES. Hist. Nat. des Annel., vol. ii, p. 648. 1865.
" " MARION AND BOBRETZKY, in Ann. des Sci. Nat., 6th series, vol. ii, p. 40, pl. iv, fig. 2. 1875.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 220. 1879.

This species was not common. One very large adult male was taken swimming on the surface. Its length was 22^{mm}; sexual setæ began on the 21st segment; existed on forty-two segments, followed by thirty-three with the ordinary setæ only. Other specimens were taken on sandy and shelly bottom, 10–15 ft. For further notes on this form, see Webster, l. c., p. 220.

GRUBEA (*Quatr.*) *Claparède.*

QUATREFAGES. Histoire Naturelle der Annèles, etc., vol. ii, p. 35. 1865.
CLAPAREDE. Annél. Chét. du Golfe de Naples, p. 516. 1868.

GRUBEA TENUICIRRATA *Clpd.*

Sphærosyllis tenuicirrata CLPD. Glanures Zoötom., etc., p. 87, pl. vi, fig. 2. 1864.
Grubea tenuicirrata CLPD. Annél. Chét. du Golfe de Naples, p. 517. 1868.
" " MARENZELLER. Zur Kentniss der Adriatischen Anneliden. Ausdem, lxix. Bande der Sitzb. der K. Akad. der Wissench, p. 29. 1874.

In some respects my specimens agree better with *Grubea dolichopoda* MARENZELLER (l. c., p. 26) than with *G. tenuicirrata* CLPD. This is especially the case in the form of the setæ and of the pharyngeal tooth. According to Claparède's figure, the setæ end in a single point, and with the magnifying power used by him this does seem to be the case ; in reality they are bidentate, the teeth being very small, and requiring a high power to bring them out distinctly. On only two specimens was the first dorsal cirrus much longer than the second.

The anal cirri, in the only case where they were seen, were as long as the dorsal cirri, and somewhat swollen at base.

Body colorless; stomach white; intestine colorless; eyes very dark reddish-brown.

The sexual setæ begin on the ninth setigerous segment. All the males had lost the posterior part of the body, but on one specimen the capillary (sexual) setæ existed on nineteen segments. The eggs and young in different stages of development agree very closely with those described by Claparède as belonging to *Syllis pulligera* Krohn (*Syllides pulligera* Clpd.), *Glanures, etc.*, p. 81, pl. vi, fig. 6.

Not common; ten to fifteen feet, on shelly bottom.*

PÆDOPHYLAX *Claparède.*

Annél. Chét. du Golfe de Naples, p. 520. 1868.

Pædophylax dispar *Webster.*

Annel. Chæt. of the Virginian Coast, p. 230, pl. iv, fig. 49; pl. v, figs. 50–55. 1879.

Male.

Capillary setæ begin on the eleventh setigerous segment, and are found on all following segments except the last 2–4. They are delicate, longer than the width of the body, including the feet.

The body from the eleventh, or sometimes from the sixth, segment, is pure white and much swollen.

Female.

Capillary setæ as in the males, only a little shorter.

Eggs attached to the ventral surface by a peduncle, two to each segment; at first spherical, then becoming elongated; purple with many black specks.

The constriction dividing the head from the body appears first; at this time the eyes are apparent, the antennæ are mere buds, equal in length, the palpi are not united along their outer two-thirds.

The young, when detached from the body of the mother, have a well-formed head with appendages, buccal segment with tentacular cirri, five setigerous segments with feet and cirri, and anal segment with anal cirri which are relatively longer than in the adult; otherwise they do not differ from the adult except, of course, in size and number of segments.

Common on shelly bottom, 10–15 feet.

AUTOLYTUS. (*Grube*) *Marenzeller.*

Marenzeller. Zur Kentniss der Adriatischen Anneliden, etc., Zweiter Beitrag, p. 37. 1875.

Autolytus hesperidum *Claparède.*

Claparede. Annél. Chét. du Golfe de Naples, p. 520, pl. xiv, fig. 1. 1868.
Webster. Annel. Chæt. of the Virginian Coast, p. 225. 1879.

Male.

No adult males were found, but in one specimen, though not detached, the following modifications of structure had occurred:

Head slightly convex in front; eyes very large, but not quite in contact; lateral antennæ arising from the front margin of the head, just before the

* Since writing the above I have had further opportunity of studying this species. I am now satisfied that our specimens belong to *Grubea dolichopoda* Marenzeller. Langerhaus, however, identifies this with *Grubea clavata* Clpd. (*Zeitschrift für Wissenschaftliche Zoologie*, p. 564. 1879.)

anterior eyes, bifurcate at their outer third, swollen at base, three times as long as the head; median antenna arising back of the eyes, near the posterior margin of the head, one-third longer than the head; buccal segment hardly distinct from head, bearing two pairs of tentacular cirri, of which the upper had about the length of the lateral antennæ, the lower, of the median; second segment with ordinary dorsal cirrus; no sexual setæ.

This species was very common from just below water mark to fifteen feet, living on certain forms of sea-weed. In number of individuals it probably surpassed any other species of Annelid found in the harbor.*

Fam. NEREIDÆ.

NEREIS (*L.*) *Cuvier.*

Nereis limbata *Ehlers.*

PLATE III, FIGS. 21, 22.

Ehlers. Die Borstenwürmer, p. 567. 1868.
Verrill. Invert. Animals of Vineyard Sound, etc., pp. 318, 590, pl. xi, fig. 51. 1874.
Webster. Annel. Chæt. of the Virginian Coast, p. 235, pl. vi, figs. 70–75. 1879.

Male.

The dorsal cirri of the first seven segments have a peculiar form, which seems to have escaped notice. Near the end they are slightly enlarged (fig. 21), then suddenly become smaller, ending in a delicate, almost filiform appendix. The dorsal cirri of the middle region have one margin crenulated for nearly their entire length (fig. 22); the ventral cirri have a few crenulations near their outer end.

Found living very near high-water mark, and common everywhere in the harbor, except in pure sand.

Nereis Culveri *n. sp.*

PLATE III, FIGS. 23–30. PLATE IV, FIGS. 31, 32.

Head (fig. 23) emarginate in front; anterior half of lateral margins concave, posterior half slightly convex; posterior margin straight; from the anterior emargination, a deep, triangular depression runs backward to the middle line, so that the front half of the head seems to be divided into two lobes, broadly rounded in front; length to width as two to three.

Eyes: anterior pair elliptical or elongate-oval, on the middle line, lateral; posterior pair circular, a little within the front pair, close to the posterior margin.

Antennæ remote from each other at base, conical, length to length of head as three to four.

Palpi very stout with long terminal articles, in extension reaching beyond the antennæ, in contraction falling much short of them.

Proboscis (fig. 24): it is in the structure of this organ that the chief peculiarities of this species are to be found. There are no paragnathi. At the

* Regarded by Prof. Langerhaus as identical with *Autolytus prolifer* Grube. (See *Zeitschrift für Wissenshaftliche Zoologie*, p. 574. 1879.)

summit of the maxillary ring are bunches of short, conical, pointed papillæ, arising from low, marginal elevations, with the arrangement as follows: on the middle line above, a small bunch of four or five papillæ; on the latero-dorsal margin a bunch of ten or twelve arranged in a double series; on the latero-ventral margin a bunch composed of the same number of papillæ, but not arranged in series; a median ventral bunch, six papillæ in double series; half way between the last and the latero-ventral, a small bunch, three to five papillæ. The lateral papillæ, above and below, are about one-third as long as the antennæ, the others a little shorter. Aside from these papillæ, the surface of the maxillary ring is quite smooth. On the ventral surface of the basal ring, near the posterior margin, are five small elliptical elevations or calluses, a median and two lateral, equally distant from each other. The notes made on the living forms make mention of a small, median, triangular papillæ, just in front of the antennæ. It cannot be demonstrated in alcoholic specimens.

Jaws (fig. 25): in color varying from light to dark horn-color; about fourteen strong, sharp teeth.

Buccal segment double the length of the second segment, equal to the fourth.

Tentacular cirri (fig. 23) arise from stout and long basal articles; upper posterior cirrus longest, reaching back to the middle of the third segment, or sometimes to its posterior margin; the lower posterior cirrus and the upper anterior equal, from one-fourth to one-third shorter than the longest; lower anterior cirrus shortest; viewed from below, this cirrus is seen to arise much below the others.

The first two setigerous segments have no dorsal rami (fig. 26), but the cirri, lingulæ, and ventral ramus have nearly the same form as on the segments following. From the fourth to the twentieth–twenty-fifth segment (fig. 27), the dorsal ramus is small, conical, distinct from its lingula; the lingula is longer than the dorsal ramus, broad at base, tapering gradually, apex bluntly rounded, somewhat compressed; the dorsal ramus has two lips, anterior and posterior; anterior small, of uniform diameter, directed upward; posterior larger than anterior, shaped much like upper lingula, but smaller, directed outward; the lower ramus has also two lips, placed one behind the other, stout, bluntly conical, anterior turned outward, posterior a little downward; the inferior lingula is a little stouter at base than the lips of the ventral ramus, otherwise about the same form and size; the ventral cirrus is longer than the dorsal, fusiform, reaches to the middle of its lingula, arising some distance below it.

Further back the basal part of the feet gains in length (fig. 28); the dorsal cirrus becomes shorter; the upper lingula longer, conical, with less diameter; the anterior lip of each ramus becomes gradually smaller, and finally disappears; the lower lingula is greatly reduced in size; the ventral cirrus recedes from its lingula, becoming minute, conical.

On the posterior feet (fig. 29), the dorsal cirrus arises from the base of the upper lingula; the remaining (posterior) lip of the upper ramus becomes delicate, conical, reaching beyond the lingula.

The anal segment (fig. 30) has a slightly crenulated margin; its cirri are delicate, their length more than double that of the longest tentacular cirrus.

Setæ of two kinds; one, with long narrow appendix (fig. 31), one edge minutely denticulated; the other (fig. 32) with short appendix, one margin thickened and rounded, the opposite margin very thin, somewhat coarsely denticulated; those of the second form are found only in the lower bundle of the ventral rami, after the first twenty to thirty segments, from four to six in each bundle, always accompanied by some of the first form.

Color, light flesh-color to reddish-brown; dorsal cirri and superior lingulæ pure gleaming white, other parts of the feet also white; head, especially its posterior half, usually darker than the body.

Body elongate, widest at the eighth segment, diminishing rapidly forward, uniformly but very gradually backward.

This species forms a tough membraneous tube, in color dark reddish-brown, fitting the body very closely.

Length of one specimen (140 segments) 60^{mm}; width with feet 4^{mm}; without feet, 2^{mm}; length of a larger specimen, 75^{mm}; width with feet, 5^{mm}.

Two specimens kept in well-water, not at all brackish, for forty-eight hours, seemed to be in good condition; while specimens of *Nereis limbata* Ehlers treated in the same way stopped all movements in thirty minutes, and in an hour the blood ceased to circulate; the latter were taken at a higher station than that in which the former lived, and where they must often have been exposed to the action of brackish water.

The only place in which this species was found was a few rods above the old wharf, in front of the hotel at Beesley's Point, in coarse sand and gravel, at about half-tide. We looked for them carefully in many other places, where the conditions seemed to be the same, but without success.

Sexual Forms.

Many males and females, apparently adult, were taken, in which no structural changes had occurred except that the eyes had become a little larger; the anterior pair crescentic; the posterior oval; the body and feet being swollen by the contained sexual products.

The color of the female was unchanged; immature males were bright green; adult males greenish white.

This species was first found by Mr. C. L. Culver, at Beaufort, N. C., in the summer of 1877. Mr. Culver was at that time a student in Union College, and attached to the usual summer zoölogical expedition of the college. He brought in two specimens with a lot of *Nereis limbata* Ehlers, taken at low water. The exact station was not known, and though we searched diligently and frequently for additional specimens, none were found.

Nereis tridentata *n. sp.*

PLATE IV, FIGS. 33-40.

Head (fig. 33) deeply emarginate in front, and with a well defined depression carried back to the middle line; behind the middle line the sides are convex;

in front of it, strongly concave; posterior margin slightly convex; anterior margin interrupted by the emargination which divides the apex into two bluntly rounded lobes; length to width as two to three.

Antennæ widely separated at origin, conical, length to length of head as two to three.

Palpi very stout, with long terminal articles. Eyes circular, lateral; anterior pair quite large, situated just back of the middle line; posterior about one-half as large as the anterior, and a little within them, very near the posterior margin.

Buccal segment equal in length to the three following segments taken together; much wider than the head.

Tentacular cirri short, tapering but little, arising from stout cylindrical basal articles; upper posterior cirrus reaches to the middle of the third segment, or to the front margin of the fourth; the lower posterior and upper anterior cirri equal, about two-thirds as long as the longest; lower anterior shortest, one-half as long as the longest.

Proboscis (fig. 33) without denticles (paragnathi) on the dorsal surface; my notes make mention of two minute fleshy papillæ situated one on either side of the middle line of the basal ring, but I cannot find them on the alcoholic specimens; ventral surface of maxillary ring also without denticles (fig. 34), while on the basal ring are three small paragnathi, circular or elliptical, flat, corneous, brown.

The jaws are light horn-color with numerous long sharp teeth.

Feet of the first two setigerous segments without dorsal rami, and with the ventral cirrus much swollen at base (fig. 35), in other respects similar to the feet immediately following them.

Anterior feet (fig. 36), dorsal cirrus finger-shaped, longer than its lingula; lingulæ and lips of the two rami tapering but little, nearly cylindrical, very bluntly rounded externally; upper lingula longer than dorsal ramus; dorsal ramus with anterior and posterior lips, anterior shorter than posterior and above it; lower ramus with a long posterior, short anterior lip; lower lingula long, reaching nearly to the outer end of the lower ramus; ventral cirrus delicate, conical, about one-half as long as its lingula.

After the first third the structure of the feet changes gradually (fig. 37); the upper lingula becomes conical, and further removed from the upper ramus; the anterior lips of both rami become much smaller; the lower lingula and the ventral cirrus do not change much; on the extreme posterior feet the dorsal cirrus is longer than elsewhere.

Anal segment simple; anal cirri as long as the last eight segments, filiform.

Setæ of three forms: those of the first form (fig. 38) have the terminal points of the stem in the same plane, appendix very narrow; this is the only kind found in the dorsal rami; they also form the greater part of the upper bundle of the ventral rami, but are not found in the lower bundles; those of the second form have the terminal points of the stem not in the same plane (fig. 39), appendix short, in other respects like the first form; found in both bundles of the ventral rami, but not numerous; those of the third kind (falcate setæ) are short (fig. 40), with a very short appendix, one margin of which is thickened and rounded, the opposite edge thin, and deficient near the apex; a few of this form are found in the upper bundle of the ventral rami, and they form the greater part of the lower bundle.

Body of uniform width along the anterior half, then tapering very slowly.

Color: body light flesh-color; sides of head and bases of antennæ and tentacular cirri dark reddish-brown; one specimen was light orange.

Length of largest specimen, 29^{mm}; greatest width with feet, 3.5^{mm}; number of segments, 105. Length of a specimen with 70 segments, 12^{mm}.

Very rare: 10 to 15 feet, shelly bottom.

Fam. EUNICIDÆ.

DIOPATRA *Aud. and M. Edw.*

AUDOUINE AND M. EDWARDS. Littoral de la France, vol. ii, Annélides, p. 155. 1834.

DIOPATRA CUPREA *Claparède.*

Nereis cuprea BOSC. Hist. Nat. des Vers., vol. i, p. 143. 1802 (teste Claparède).
Eunice cuprea QUATREFAGES. Hist. Nat. des Annelés, vol. i, p. 331. 1865.
Diopatra cuprea CLAPAREDE. Annél. Chét. du Golfe de Naples, p. 432. 1868.
" " VERRILL. Invert. Animals of Vin. Sound, etc., p. 593, pl. xiii, figs. 67, 68. 1874.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 236. 1879.

Quite common on the sand flats at low water, and occasionally dredged at from ten to fifteen feet.

MARPHYSA *Quatrefages.*

Histoire Nat. des Annelés, vol. i, p. 331. 1865.

MARPHYSA SANGUINEA *Quatr.*

Nereis sanguinea MONTAGU. Linn. Trans., vol. xi, p. 20, pl. iii, fig. 1. 1815.
Leodice opalina SAVIGNY. Système des Annélides, p. 51.
Nereidonta sanguinea BLAINVILLE. Dict. Sci. Nat., vol. lvii, p. 447. 1828.
Eunice sanguinea AUD. AND M. EDW. Littoral de la France, vol. ii, Annélides, p. 147. 1834.
" " GRUBE. Familien der Anneliden, pp. 44, 123. 1851.
" " " Die Insel Lussin, p. 79. 1864.
" " " St. Malo and Roscoff, pp. 87, 91, 106, 114, 140. 1870.
" " LEIDY. Marine Invert. Fauna, R. I. and N. J., p. 15. 1855.
" " JOHNSTON. Catalogue of British Worms, p. 134. 1865.
Marphysa sanguinea QUATR. Hist. Nat. des Annel., vol. i, p. 332, pl. x, fig. 1. 1865.
" " EHLERS. Die Borstenwürmer, p. 360, pl. xvi, figs. 8–11. 1868.
" " BAIRD. Linn. Proc. Zoölogy, vol. x, p. 352.
" " MAR. AND BOBR. Ann. des Sci. Nat., vol. ii, p. 12. 1875.
" *Leidii* QUATR. Histoire Nat. des Annel., vol. i, p. 337. 1865.
" *Leidyi* VERRILL. Invert. An. Vin. Sound, etc., pp. 319, 593, pl. xii, fig. 64. 1874.
" *sanguinea* WEBSTER. Annel. Chæt. of the Virginian Coast, p. 236, pl. vi, figs. 76–80; pl. vii, figs. 81–83. 1879.

This species is by no means common. Some young specimens taken had one antenna, others three antennæ; eyes, four; branchiæ, from tenth segment; palpi hardly apparent.

DRILONEREIS (*Clpd.*) *Webster.*

CLAPAREDE. Annél. Chét. du Golfe de Naples. Supplément, p. 25. 1870.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 240. 1879.

DRILONEREIS LONGA *Webster.*

Annel. Chæt. of the Virginian Coast, p. 240, pl. vii, figs. 84–88. 1879.

Common in sand at low water.

LUMBRICONEREIS (*Blv.*) *Ehlers.*

EHLERS. Die Borstenwürmer, p. 377. 1868.

LUMBRICONEREIS TENUIS *Verrill.*

VERRILL. Invert. Animals of Vineyard Sound, etc., pp. 342, 594. 1874.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 241. 1879.

Not common; sand, low water.

ARABELLA (*Grube*) *Ehlers.*

GRUBE. Die Familien der Anneliden, p. 45. 1851.
EHLERS. Die Borstenwürmer, p. 398. 1868.

ARABELLA OPALINA *Verrill.*

Lumbriconereis splendida LEIDY. Marine Invert. Fauna R. I. and N. J., p. 10. 1855.
" *opalina* VERRILL. Invert. Animals of Vineyard Sound, etc., pp. 342, 594, pl. xiii, figs. 69, 70. 1874.
Arabella opalina VERRILL. Proc. Acad. Nat. Sci. Phila. for 1878, p. 299.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 242. 1879.

Common at low water in sand and mud, and occasionally dredged, ten to fifteen feet.

STAUROCEPHALUS (*Grube*) *Ehlers.*

GRUBE. Archiv für Naturgesh., p. 97. 1855.
EHLERS. Die Borstenwürmer, p. 422. 1868.

STAUROCEPHALUS PALLIDUS *Verrill.*

VERRILL. Invert. Animals of Vineyard Sound, etc., pp. 348, 595. 1874.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 242. 1879.

Only one specimen was found—fifteen feet, sand and shells.

Fam. GLYCERIDÆ.

RHYNCHOBOLUS *Claparède.*

Annélides Chétopodes du Golfe de Naples, p. 492. 1868.

RHYNCHOBOLUS AMERICANUS *Verrill.*

Glycera Americana LEIDY. Marine Invert. Fauna R. I. and N. J., p. 15, pl. xi, figs. 49, 50. 1855.
" " EHLERS. Die Borstenwürmer, p. 668, pl. xxiii, figs. 43–46. 1868.
" " GRUBE. Jahres-Bericht der Schles. Gesell. für Vaterlän. Cultur, p. 64. 1869.
Rhynchobolus Americanus VERRILL. Invert. An. Vin. Sound, etc., p. 596, pl. x, figs. 45, 46. 1874.
" " " Proc. Acad. Nat. Sci. Phila. for 1878, p. 300.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 245. 1879.

Common; low water to fifteen feet.

Rhynchobolus dibranchiatus *Verrill.*

Glycera dibranchiata Ehlers. Op. cit., p. 670, pl. xxiv, figs. 1, 10–28. 1868.
" " Grube. Op. cit., p. 64. 1869.
Rhynchobolus dibranchiatus Verrill. Op. cit., p. 596, pl. x, figs. 43, 44. 1874.
" " Webster. Op. cit., p. 245. 1879.

Common; low water to fifteen feet.

GONIADA *Aud. and M. Edw.*

Annales des Sciences Naturelles, vol. xxix, p. 266. 1833.

Goniada solitaria *n. sp.*

PLATE IV, FIGS. 41, 42. PLATE V, FIGS. 43, 44.

Head as long as the first seven segments taken together, acutely conical, with minute antennæ.

Eyes small, black, circular, lateral, posterior.

Proboscis not seen in complete extension, covered with numerous longitudinal series of stout hooks; on the dorsal surface three rows of hooks on either side of a naked median space; on the ventral surface four rows, two on either side of the median line; one lateral series; ventral and lateral hooks smaller than the dorsal; at the base, on the ventral surface, numerous, quite small hooks scattered about irregularly.

The first twenty-five segments are uniramous; the ramus has two lips (fig. 41), anterior long and narrow; posterior short and broad; dorsal and ventral cirri widely divergent, bluntly conical, dorsal a little shorter than ventral. After the twenty-fifth foot a dorsal ramus appears (fig. 42), composed at first of a broad, thick, squarish plate, with a slight emargination near its upper margin, indicating its future division into lips; it contains from three to six straight aciculæ or setæ, usually concealed, sometimes projecting slightly; the dorsal cirrus becomes smaller; the other parts of the foot do not change much; further back the dorsal ramus is divided into two bluntly rounded lobes (fig. 43).

Anal cirri long, filiform.

Setæ of one kind only; in two bundles, upper and lower; upper most numerous; very long and slender; appendix nearly as long as the stem (fig. 44).

Body slightly convex above, flat below, anterior two-thirds of uniform width, tapering a little along the posterior third.

Color gray, slightly tinged with green.

Length, 25^{mm}; width, 1.3^{mm}.

The only specimen taken was a female filled with eggs; low water, mud.

Fam. THELETHUSIDÆ.

ARENICOLA *Lamarck.*

Arenicola? cristata *Stimpson.*

Stimpson. Proc. Boston Soc. Nat. Hist., vol. v, p. 114.
Quatrefages. Histoire Naturelle des Anneiés, vol. iii, p. 673. 1865.

Only the anterior part of a single specimen was found. Probably belongs to Stimpson's species.

Fam. CHLORÆMIDÆ.

TROPHONIA (*Aud. and M. Edw.*) *Claparède.*

CLAPAREDE. Annél. Chét. du Golfe de Naples, p. 105. 1868.

TROPHONIA AFFINIS *Verrill.*

Siphonostomum affine LEIDY. Marine Invert. Fauna R. I. and N. J., p. 16. 1855.
Trophonia affinis VERRILL. Invert. An. Vin. Sound, etc , p. 605, pl. xiv, fig. 75. 1874.

This species is reported from Great Egg Harbor by Leidy, from Block Island and Buzzard's Bay by Verrill. We failed to find it.

Fam. CHÆTOPTERIDÆ.

SPIOCHÆTOPTERUS (*Sars*) *Webster.*

SARS. Fauna Littoralis Norvegiæ. Seconde Livraison, p. 7. 1856.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 246. 1879.

SPIOCHÆTOPTERUS OCULATUS *Webster.*

Annel. Chæt. of the Virginian Coast, p. 247, pl. viii, figs. 98–102. 1879.

Low water, sand; only a few specimens were taken.

Fam. SPIONIDÆ.

NERINE (*Johnston*) *Sars.*

NERINE AGILIS *Verrill.*

Invert. Animals of Vineyard Sound, etc., p. 600. 1874.

Prof. Verrill reports this species from the outer beach, burrowing in sand at low-water mark. We failed to find it.

SCOLECOLEPIS *Blv.* 1828 (*teste Malmgren*).

SCOLECOLEPIS VIRIDIS *Verrill.*

Invert. Animals of Vineyard Sound, etc., p. 600. 1874.

Our specimens do not agree in all respects with Verrill's description, and at first it seemed necessary to refer them to a new species; comparison with specimens received from him has established their identity. Verrill ascribes four eyes to *S. viridis;* our specimens have no eyes, as they were examined in this respect in the fresh state; the alcoholic specimens received from Prof. Verrill have no trace of eyes remaining, whatever their condition may have been while living. We found but one green specimen; the others were dark brown, or dark brown with a reddish or greenish tinge. There are from eight to ten anal papillæ (cirri), subulate, three to four times as long as the anal segment.

On one specimen the head and a few of the anterior segments had been lost and renewed, but the branchiæ were still wanting.

Common in sand at low water.

SCOLECOLEPIS TENUIS *Verrill.*

Invert. Animals of Vineyard Sound, etc., p. 601. 1874.

Reported by Verrill from Great Egg Harbor, in sand at low water. We failed to find it.

SPIO (*O. Fabr.*) *Œrsted.*

ŒRSTED. Annulatorum Danicorum Conspectus, p. 39. 1843.

SPIO SETOSA *Verrill.*

Nerine coniocephala? A. AGASSIZ. Annals Lyceum Nat. Hist. of N. Y., vol. viii, p. 333, pl. x, figs. 39–45. 1866. (See Verrill, op. cit.)
Spio setosa VERRILL. Invert. Animals of Vineyard Sound, etc., p. 602, pl xiv, fig. 77 (copied from Agassiz.)

Verrill says of this species that the lateral lobes of the head are shorter than the median; this is true in alcoholic specimens; the reverse is the case in living forms. Common in sand at low water.

POLYDORA *Bosc.*

Histoire Naturelle des Vers, vol. i. 1802.

POLYDORA HAMATA *Webster.*

Annel. Chæt. of the Virginian Coast, p. 251, pl. viii, figs. 111–116, pl. ix, figs. 117, 118. 1879.

Common, living in galleries in shells. From low water to fifteen feet.

POLYDORA LIGNI *n. sp.*

PLATE V, FIGS. 45–47.

Head deeply emarginate in front, lateral lobes bluntly rounded (fig. 45), pointing forward and outward; lateral margins, in front and back of the eyes, concave; opposite the eyes (middle third) convex; a rounded carina runs back to the middle of the fourth segment; at the front margin of the third segment this carina bears a small conical papilla, always distinct, even on the smallest specimens.

Eyes four, black, circular, placed at the angles of a trapezoid; anterior pair larger than posterior.

Tentacles short, with the usual structure, colorless, without markings.

Dorsal cirri, long and stout on the anterior segments, smaller on those having branchiæ.

Branchiæ begin on seventh segment, long, finger-shaped, colorless, with red centre; they are found on all segments after the sixth, except a small but variable number of posterior segments.

Setæ of the fifth segment (fig. 46) eight to twelve in number, stout, apex bluntly rounded and slightly curved; a little below the apex is a small tooth on the side of the seta, forming a very small angle with the seta; dorsal setæ long, capillary, longer behind than in front; ventral setæ (fig. 47) short, bidentate; inner tooth very long, sharp, given off at right angles to the body of the seta; outer half covered by a membrane.

Terminal sucker broad, shallow, white; anal opening surrounded by low papillæ.

Body colorless, except as colored red or brownish-red by the blood and contents of the intestine; on either side of the carina a brown line, diverging in front, and passing to the outer base of the tentacles.

Length, 1–4^{mm}; segments numerous.

Found on water-soaked wood, living in crevices, etc.

Tubes made of dirt, fragile, constructed with great rapidity.

STREBLOSPIO *n. gen.*

Head conical; proboscis incomplete above, divided below into two lobes along its anterior part. First segment prolonged laterally and below nearly to the front of the head; above carrying one pair of tentacles and one pair of branchiæ. Second segment with raised dorsal membrane, forming a pouch. Dorsal setæ capillary. Ventral setæ of first six segments like the dorsal, afterwards both uncinate and capillary. Anal segment simple, without appendages.

Streblospio Benedicti *n. sp.*

PLATE V, FIGS. 48-50.

Head, in extension, pointed, conical; posterior half somewhat compressed, sharply convex; anterior half slightly depressed.

Proboscis deficient above, below divided into two lobes for about one-half its length; these lobes are triangular at base, but (in extension) terminate, each in a short, finger-shaped process, covered with numerous long cilia. The first segment is about the length of the following segments, dorsally; at the sides and below it is prolonged, forming a kind of hood for the head. This hood or sheath originates as a thin, almost membraneous elevation of the sides of the segment, just within the dorsal setæ, passes forward external to the bases of the tentacular cirri and branchiæ, is prolonged to near the apex of the head, then curves suddenly downward, presenting a thin, free, anterior margin; laterally it is closely applied to the head, but rises above it, presenting a free, upper margin on each side; the head projects but very little beyond its hood. Dorsally the anterior margin of the first segment is concave, and carries a minute, conical, median papilla or cirrus.

Tentacular cirri (tentacles) have the same structure as in Polydora; turned backward they reach to the eighth or ninth segment.

Branchiæ behind and a little within the tentacles; reach back to the seventh or eighth segment; widest in the middle, tapering uniformly in both directions, except that near the top they are suddenly constricted, ending in a short cylindrical process; they are flattened below, carinate above, giving a triangular cross section for most of their length; edges thin, and thrown into deep, rounded folds or scollops. Both tentacles and branchiæ are densely covered with long cilia; turned forward they completely cover the head; the setæ of the first segment, both dorsal and ventral, are similar to those of the next five, but are a little shorter.

Second segment, covered dorsally by a raised membrane, forming a pouch; the free anterior margin of this pouch is deeply concave; its elevation above the dorsum equal to the thickness of the body; at the sides it passes into the dorsal cirri (lobes).

Dorsal cirri: back of each fascicle of dorsal setæ, on the first ten segments, is a broad, rounded plate or lobe; back of the tenth segment this plate gradually becomes narrower, until it is changed into a short, conical cirrus, which remains to the end.

Ventral cirri: on the first six segments behind each bunch of ventral setæ is a lobe similar to the dorsal lobe, but smaller; at the seventh segment it disappears.

Dorsal setæ, capillary; those on the anterior segments (fig. 48) wider and shorter than those further back (fig. 49); ten to fifteen in each fascicle in front, gradually decreasing in number till only four or five are found on the posterior segments; they are arranged along the lateral line of the dorsum, and point upward; the ventral setæ of the first six segments are similar to the dorsal, but less numerous, and a little shorter; back of the sixth segment the capillary setæ are nearly replaced by uncinate setæ—a few, however, remaining in the lower part of each series, even to the end; the uncini (fig. 50) are arranged in a single, transverse series, three to five in number, quite short, hardly projecting beyond the surface; they become gradually more numerous, each series having from eight to twelve on the posterior segments, at the same time growing a little longer; they have four terminal teeth, the outer one being shortest (fig. 50), and are covered by a delicate membrane.

Anal segment with slightly thickened, rounded margin; no appendages.

Body slightly convex above, flattened below.

Color: tentacles colorless; branchiæ dark green, with transverse bands of light green or yellowish-green; body colorless or light flesh-color; a few specimens with the first eight segments dark green.

Length of adult, 6^{mm}; with, 0.6^{mm}; number of segments, 70.

Found in great numbers on beds of *Mytilis edulis;* also in ditches to which the tide-water had access, very near high-water mark; the only other annelid found under the same circumstances being *Nereis limbata* EHLERS; the first specimen taken was on a shell, dredged. This species lives in dirt tubes, which they leave very readily when disturbed, and move about rapidly with quick, jerking motions of the body; they soon settle to the bottom, and immediately construct a new tube of any loose dirt that may be at hand.

The first part of the generic name is intended to recall their peculiar method of locomotion. The specific name is given in recognition of Mr. James E. Benedict, a sound and enthusiastic naturalist—my associate for the past two years in zoölogical work, who not only discovered the species in New Jersey, but has since found it at South Norwalk, Conn.

Female.

On one specimen the middle third of the dorsum was covered by a very thin, transparent, raised membrane. Unfortunately no figures of the young were made, and the notes are not full. They were broadly rounded in front and behind; sides convex; two small red eyes on the anterior margin of the head; lateral depressions indicating three segments; two circles of cilia, one just back of the head, the other near the posterior end.

Fam. ARICIIDÆ.

ANTHOSTOMA *Schmarda.*

Neue Wirbellose Thiere, vol. i, part ii, p. 61. 1861.

ANTHOSTOMA FRAGILE *Verrill.*

VERRILL. Invert. Animals of Vineyard Sound, etc., p. 598. 1874.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 258. 1879.

The branchiæ may begin on any segment from the thirteenth to the twenty-first, according to the size of the specimen.

Common in sand at low water.

Fam. CIRRATULIDÆ.

CIRRATULUS *Lamarck.*

Hist. Nat. des Animaux sans Vertebres, vol. v, p. 300. 1838.

Cirratulus grandis *Verrill.*

Verrill. Invert, An. Vin. Sound, etc., p. 606, pl. xv, figs. 80, 81. 1874.
Webster. Annel. Chæt. of the Virginian Coast, p. 258. 1879.

Rare; only one specimen was taken.

CIRRHINEREIS *Quatrefages.*

Histoire Naturelle des Annelés, vol. i, p. 462. 1865.

Cirrhinereis fragilis *Qtrfg.*

Cirrhatulus fragilis Leidy. Marine Invert. Fauna R. I. and N. J., p. 15, pl. xi, figs. 39–43. 1855.
Cirrhinereis fragilis Quatrefages. Op. cit., vol. i, p. 464. 1865.
" " Verrill. Op. cit., p. 607. 1874.

Rare; a single injured specimen was found which probably belongs to this species.

Fam. CAPITELLIDÆ.

NOTOMASTUS *Sars.*

Reise i Lofoten og Finmarken, p. 199. 1850.
Fauna Littoralis Norwegiæ, p. 12. 1856.

I have referred the following species to Notomastus *Sars*, although somewhat in doubt as to what constitutes a Notomastus. The following species of this genus and of the allied or identical genus Ancistria have been reported from our coast: *Notomastus luridus* Verrill, *Notomastus filiformis* Verrill, *Ancistria acuta* Verrill, *Ancistria capillaris* Verrill and *Ancistria minima* Quatrefages (reported by Webster). It is quite certain that these five species belong to the same genus, but to what genus? Certainly to Ancistria *Quatr.*, if it is a good genus. But Claparède says that Ancistria is a synonym of Capitella. But so far no one has seen the peculiar male sexual organs and setæ upon which so much stress is laid as characteristic of Capitella. Prof. Verrill writes that he has never found them; I have never let a specimen pass without looking for these organs, but to no purpose. Accordingly, while our specimens belong to Ancistria, they do not belong to Capitella. It will be noticed that two of our species have been referred to Notomastus; and in fact they cannot be said to differ from Notomastus except in the length, and number of setæ, of the ventral rami. But Claparède, speaking of the "tores hamifères ventraux," says (Glanures, p. 58): "Le développement extraordinaire des tores ventraux du côté dorsal est même le caractère essentiel des Notomastus," according to which dictum not one of our species is a Notomastus, as they have not the elongated ventral rami and numerous setæ of the type species, *Notomastus latericeus* Sars. In regard to Arenia *Quatr.*, Claparède (Annel. Chét. du Golfe de N., p. 18) claims that is a Notomastus, and that the type species, *A. cruenta* Quatr., is *Capitella* (*Notomastus*) *rubicunda* Keferstein. In this case one must believe that Quatrefages entirely mistook the character of the posterior dorsal setæ, since he describes and figures them as capillary.

NOTOMASTUS FILIFORMIS *Verrill.**

PLATE V, FIGS. 51–54.

Invert. An. Vin. Sound, etc., p. 611. 1874.

Head very small, pointed, conical.

Proboscis apparently smooth; when magnified seen to be covered with minute papillæ.

First five setigerous segments with capillary setæ in both rami, not differing from each other, arranged in each ramus in a single transverse series, containing from eight to twelve setæ. After the fifth segment uncini only are found. At first the uncini are quite long (fig. 51), but few in the dorsal rami, from eight to twelve in the ventral; they grow progressively shorter backward (figs. 52, 53), and along the posterior third their number is much reduced, there being one to three in the dorsal rami, three to five in the ventral; a few of the posterior segments may be without setæ. The form of the uncini changes, as shown in the figures.

The anterior segments are biannulate, afterwards crossed by from three to five deeply impressed lines.

The anal segment is obliquely truncated; margin thickened and rounded (fig. 54); from its lower border projects a finger-shaped cirrus, which is distinctly annulated. (A similar cirrus exists on *N. luridus* VERR., *Ancistria minima* QUATR., and on several as yet unpublished species from Beaufort, N. C. I do not know that this cirrus has been previously described as belonging to this genus, or to any in the Family.)

Color: red to purplish-red in front; flesh-color to bright red behind.

Length very variable; greatest diameter of largest specimen 1.2^{mm}.

Common; low water to fifteen feet.

NOTOMASTUS LURIDUS *Verrill.*

Invert. Animals of Vineyard Sound, etc., p. 610. 1874.

Rare; only one specimen was taken.

Young forms of Notomastus?

(a). One specimen, evidently immature, had capillary setæ only on the first four segments, then uncini only; but about the middle of the body the dorsal uncini were replaced by capillary setæ. Posterior segments lost.

(b). Another form, of which several specimens were found, had capillary setæ in all the dorsal rami, uncini in all the ventral. Length of (a) and (b) 10–20^{mm}.

Found in shells bored by sponge; low water to fifteen feet.

Fam. MALDANIDÆ.

CLYMENELLA *Verrill.*

Invert. Animals of Vineyard Sound, p. 607. 1874.

CLYMENELLA TORQUATA *Verrill.*

Clymene torquata LEIDY. Marine Invert. Fauna R. I. and N. J., p. 14. 1855.
Clymenella torquata VERRILL. Op. Cit. p. 608, pl. xiv, figs. 71–73. 1874.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 258. 1879.

Very common in sand at low water.

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* I regarded this as a new species, and gave it the specific name of *lævis*; but on submitting specimens of the same form, taken at Provincetown, Mass., to Prof. Verrill, he referred them to his *N. filiformis*.

MALDANE (*Grube*) *Malmgren.*

GRUBE. Archiv für Naturgeschichte. 1860.
MALMGREN. Nordiska Hafs-Annulater, p. 186. 1865.

MALDANE ELONGATA *Verrill.*

VERRILL. Invert. Animals of Vineyard Sound, etc., p. 609. 1874.
WEBSTER. Annel. Chæt. of the Virginian Coast, p. 259. 1879.

Rare; only one specimen was taken.

PRAXILLA *Malmgren.*

Nordiska Hafs-Annulater, p. 191. 1865.

In characterizing the genus PRAXILLA Malmgren assigns to it twenty-six segments, of which nineteen are setigerous, and five ante-anal without setæ. The following species belongs to Praxilla in all other respects, but has more than twenty-six segments, and less than five nude anti-anal segments.

PRAXILLA ELONGATA *n. sp.*

PLATE VI, FIGS. 55–59.

Buccal segment (fig. 55) with a projecting margin, slightly emarginate in the middle line above, and with a very narrow, hardly perceptible incision on each side, a little back of the middle. The cephalic plate has a well defined, median carina, widest in front, and with a flattened, slightly projecting portion, broadly rounded at the apex.

After the fifth segment the diameter increases gradually to the tenth; remains unchanged to the thirteenth; decreases gradually to the sixteenth; then falls off suddenly to about one-half the previous diameter, after which it remains unchanged.

Segments one, two, four, five and six have about the same length; three, seven, eight and nine are a little longer than the preceding; ten to fifteen about double the ninth; sixteen to thirty-six a little shorter than the fifteenth; last three equal to each other—together equal to the thirty-sixth (fig. 56).

The anterior margin of the fifth segment is raised and rounded, embracing the posterior end of the fourth. The first fifteen segments are nearly cylindrical, segmentation distinct, and crossed by numerous impressed lines; after the fifteenth the form suddenly changes, the anterior end being narrow, diameter increasing regularly to near the posterior end, then somewhat suddenly decreasing; the posterior margin of the ante-anal segment is raised, rounded, forming a sheath for the anterior end of the anal segment.

The anal segment is funnel-shaped; margin surrounded by a circle of conical or finger-shaped papillæ; very similar to the anal segment of *Clymenella torquata* VERRILL.

Setæ; dorsal (capillary) numerous, long, delicate, bilimbate (fig. 57); after the fifth segment there is a distinct, rounded papilla, or dorsal ramus, from which the setæ arise; ventral (uncini), on the first three setigerous segments only one, or occasionally two, to each ramus; these end in three sharp teeth (fig. 58), of which two are very small; along the inner two-thirds are numerous longitudinal striæ, interrupted by transverse striæ, unequally distant from each other; at the fourth setigerous segment the number of uncini increases suddenly to ten or fifteen in each series, and the form also changes (fig 59); they have now five terminal teeth, a short, external part is quite narrow, and divided from the stouter, internal part by a deep constriction, simulating a compound seta; the thirty-seventh segment has only the dorsal setæ; to the tenth segment the setæ are found in the middle of each segment; after the tenth they suddenly recede to near the posterior end.

Three specimens were collected—one perfect, the others with anterior part only; and of these only one, having the ten anterior segments, was observed while living; its general color was yellowish-white, with narrow, red bands on the posterior part of each segment after the fourth, increasing gradually in width so as to occupy one-half the length of the tenth segment; indications of similar bands can be traced on the entire specimen, in alcohol, but not after the tenth segment.

Length of entire specimen, 95^{mm}; greatest diameter, 3^{mm}; diameter of buccal segment, 2^{mm}.

Number of segments, 39; buccal (coalesced with the cephalic), 1; setigerous, 36; ante-anal, nude, 1; anal, 1.

Rare; found in sand at low water, associated with *Clymenella torquata* VERRILL.

PRAXILLA ELONGATA *var.* BENEDICTI *Webs.*

PLATE VI, FIGS. 60, 61.

Mr. J. E. Benedict found at south Norwalk, Conn., a variety of this species, differing from the form just described in the following particulars:

First two segments short (fig. 60), together about equal to the third; after the fifteenth segment the diameter suddenly becomes less, segments short, and, except the last four, equal. (Compare the first segment of fig. 61 with the first of fig. 56.) The ante-anal segments (fig. 61), quite short, together equal to the anal; anal cirri longer than in the New Jersey form.

Length of an entire specimen, 20^{mm}; number of segments, 37.

A young specimen had twenty-six segments, with a length of 3^{mm}.

PARAXIOTHEA *n. gen.*

No cephalic plate.

Anterior margin of first segment prolonged as a thin membrane, emarginate above, and with a slightly projecting conical process in the middle line below.

Mouth situated on the lower surface of a conical process, arising from the bottom of the cylindrical cavity enclosed by the frontal membrane, not reaching to the front margin of the membrane. First segment with capillary and uncinate setæ, similar to those on the remaining segments.

Anal segment funnel-shaped; margin digitate.

PARAXIOTHEA LATENS *n. sp.*

PLATE VII, FIGS. 62–66.

Frontal membrane (figs. 62, 63) forming one-half the length of the first segment; anterior margin slightly reflexed, lobed or scolloped by shallow incisions, which are continued as impressed lines for some distance, on both the outer and inner surface of the membrane; superior emargination broad but shallow.

First segment a little longer than the second, about equal to the sixth; second, third and fourth equal; fifth a little shorter; segments six to ten grow progressively longer, but so gradually that the change is hardly perceptible; eleven to thirteen also gain in length progressively, but rapidly, the thirteenth having double the length of the tenth; fourteenth, fifteenth and sixteenth about equal to the tenth; seventeenth and eighteenth short, equal, together about equal to the sixteenth, a trifle longer than the anal.

Diameter of first segment a little less than that of the second; uniform from second to tenth inclusive; falling off about one-third et the eleventh, after which the decrease is very slight.

One ante-anal nude segment (fig. 64) with thickened, rounded, posterior margin, forming a collar around the front end of the anal segment.

Anal segment with numerous, short, unequal cirri or digitations, quite similar to *Clymenella torquata* VERRILL, or *Praxilla elongata* WEBSTER.

The dorsal (capillary) setæ (fig. 65) are long, delicate, numerous, with a single thin margin. The uncini have the same form on all the segments (fig. 66); they have five sharp terminal teeth, of which three are small and equal; the fourth longer and larger than the third; the fifth, double the size of the fourth. On the first three segments there are from fifteen to twenty uncini in each series; after the third, from twenty to twenty-five, except on a few of the posterior segments, where there is a smaller number. The first five segments have the setæ on the middle line, and a deeply impressed ventral line connects the series of uncini on each segment. After the fifth segment the setæ are near the posterior end, and after the tenth the dorsal rami (*tori uncinigeri*) are quite large, making the segments somewhat club-shaped.

Number of segments, 19; of these 17 are setigerous; one ante-anal, nude; one anal.

Color (in alcohol) yellowish-white; on one specimen broad bands of umber-brown cross the ventral surface, dividing at the uncini, giving a narrow band on each side of each series of uncini after the fifth.

At Great Egg Harbor we obtained two specimens, both of which had lost their posterior segments. The longest has fifteen segments, with a length of 65^{mm}; greatest diameter 3^{mm}. The description was completed from a single perfect specimen, collected by Mr. James E. Benedict at South Norwalk, Conn., during the same summer.

Length of entire specimen, 46^{mm}; greatest diameter, 3^{mm}.

Found at low water in sand, associated with *Clymenella torquata* VERRILL.

Fam. HERMELLIDÆ.

SABELLARIA *Lamarck*.

SABELLARIA VARIANS *Webster*.

Annel. Chæt. of the Virginian Coast, p. 259, pl. ix, figs. 133–136; pl. x, figs. 137–139. 1879.

Prof. Verrill has described a species of SABELLARIA (*S. vulgaris*) from Great Egg Harbor, and in the proceedings of the Academy of Natural Sciences of Phila. for 1878, p. 300, mentions that he has also received the same form from Beaufort, N. C. After careful comparison of numerous specimens from New Jersey, Virginia, and North Carolina, I have found it impossible to refer any of them to his species. It will be necessary to compare type specimens of the two forms.

Fam. AMPHICTENIDÆ.

CISTENIDES *Malmgren.*

Nordiska Hafs-Annulater, p. 358. 1865.

CISTENIDES GOULDII *Verrill.*

Pectinaria Belgica GOULD. Invertebrata of Mass., 1st ed., p. 7, pl. i, fig. 1. 1841.
Pectinaria auricoma LEIDY. Marine Invert. Fauna R. I. and N. J., p. 14. 1855.
Cistenides Gouldii VERRILL. Invert. An. of Vineyard Sound, etc., p. 612, pl. xvii, figs. 87, 87a. 1874.

Common at low water. One very large specimen was taken; length, 50^{mm}; diameter, 9^{mm}; length of tube, 80^{mm}. The color of all our specimens was yellowish-white, save as colored red by the blood showing through.

Fam. AMPHARETIDÆ.

SABELLIDES (*M. Edw.*) *Malmgren.*

The following species agree with SABELLIDES *Mgrn.*, except that the uncini begin on the third setigerous segment instead of the fourth, and that the first ramus, though smaller than the second, is not very small:

SABELLIDES OCULATA *n. sp.*

PLATE VII, FIGS. 67–69.

On the middle line of the head two minute eye specks, black, lateral.

Cirri numerous, light flesh-color.

Anal cirri short, obtuse.

Branchiæ delicate, reaching back to the ninth or tenth segment.

Capillary setæ, some (fig. 67), with a single, narrow margin; others (fig. 68) bilimbate. Uncini begin on the third setigerous segment; fourteen posterior segments with uncini only; they have five sharp teeth (fig. 69).

Branchiæ green with dark green center; head white; body flesh-color.

Length, 18–20^{mm}.

Dredged, fifteen feet, shelly bottom.

Fam. TEREBELLIDÆ.

AMPHITRITE (*Müller*) *Malmgren.*

MALMGREN. Nordiska Hafs-Annulater, p. 374. 1865.

AMPHITRITE ORNATA *Verrill.*

Terebella ornata LEIDY. Marine Invert. Fauna, R. I. and N. J., p, 14, pl. xi, figs. 44, 45. 1855.
Amphitrite ornata VERRILL. Invert. An. Vin. Sound, p. 613, pl. xvi, fig. 82. 1874.
" " WEBSTER. Annel. Chæt. of the Virginian Coast, p. 262. 1879.

Very abundant at low water; sand and mud.

SCIONOPSIS *Verrill.*

Invert. Animals of Vineyard Sound, p. 614. 1874.

Scionopsis palmata *Verrill.*

Verrill. Op. cit., p. 614. 1874.
Webster. Op. cit., p. 262. 1879.

Common; dredged ten to fifteen feet.

POLYCIRRUS (*Grube*) *Malmgren.*

Malmgren. Nordiska Hafs-Annulater, p. 393. 1865.

Polycirrus eximius *Verrill.*

Torquea eximea Leidy. Marine Invert. Fauua of R. I. and N. J., p. 14, pl. xi, figs. 51, 52. 1855.
Polycirrus eximius Verrill. Invert. An. Vin. Sound, p. 616, pl. xvi, fig. 85, 1874.
" " Webster. Annel. Chæt. of the Virginian Coast, p. 263. 1879.

Common on shells, etc.; dredged.

Fam. SABELLIDÆ.

SABELLA (*L.*) *Malmgren.*

Malmgren. Nordiska Hafs-Annulater, p. 398. 1865.

Sabella microphthalma *Verrill.*

Verrill. Op. cit., p. 618. 1874.
Webster. Op. cit., p. 265. 1879.

Quite common.

Fam. SERPULIDÆ.

HYDROIDES *Gunnerus.* (1768.)

Hydroides dianthus *Verrill.*

Serpula dianthus Verrill. Op. cit., p. 620. 1874.
Hydroides dianthus Verrill. Proc. Acad. Nat. Sci., Phila. for 1878, p. 300.
" " Webster. Annel. Chæt. of the Virginian Coast, p. 266. 1879.

Common on rocks and shells, from low water to fifteen feet.

Union College, Schenectady, N. Y.,
December, 1878.

DESCRIPTION OF NEW SPECIES OF FOSSILS FROM THE CALCIFEROUS FORMATION.*

By C. D. WALCOTT.

PLATYCERAS *Conrad*, 1840.

PLATYCERAS MINUTISSIMUM *Walcott.*

Shell small, subspiral, regularly arcuate from near the aperture to the apex, making nearly three-fourths of one volution; section subelliptical, somewhat carinate upon the dorsum. Two transverse depressions upon the sides, give a slight undulation to the body of the shell.

Surface marked by faint longitudinal striæ.

Formation and locality. Calciferous formation, Saratoga Co., N. Y.

METOPTOMA *Phillips*, 1836.

METOPTOMA CORNUTAFORME *Walcott.*

Oval, subconical; apex incurved, depressed, extending beyond the anterior margin; distance from the posterior margin to the apex twice the width. The most elevated point is about two-thirds the distance from the posterior margin to the apex; from this point the outline curves regularly to the posterior margin and anteriorly to the apex. Outline from the apex to the anterior margin convex. Length, nine lines; width, four and one-half lines.

Surface, with narrow concentric ribs, one-half a line apart; finely striate vertically.

Formation and locality. Calciferous formation, Saratoga Co., N. Y.

CONOCEPHALITES *Zenker*, 1833.

CONOCEPHALITES CALCIFEROUS *Walcott.*

Head semicircular, convex. Glabella truncato-conical, moderately convex; width at the base nearly equal to the length; anterior margin straight, abruptly rounded at the angles; sides straight and regularly converging; the posterior and middle glabellar furrows oblique and well marked, the anterior furrow indicated by a smooth line upon the granulose outer shell, and a slight depression when the outer shell is removed. Occipital furrow broad and well impressed. Occipital ring narrow at the sides, widening at the centre to form the base of a strong slightly curved spine, which extends obliquely backward;

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* Advance copies of this paper were printed January 3, 1879.

the length of the spine in large individuals equals the length of the head. The glabella in very young individuals is more convex, the glabellar furrows more strongly impressed, and the spine projecting from the occipital ring shorter and less obliquely inclined backward. Dorsal furrows equally impressed at the sides and front of the glabella. Facial suture, curving slightly outward from the frontal margin, passes directly to the anterior angles of the palpebral lobe opposite the anterior glabellar furrow, thence curving to the posterior angle of the palpebral lobe, it extends obliquely outward to the lateral margin of the posterior limb.

Fixed cheeks narrow; frontal limb extending equal to one-half the length of the glabella, sloping somewhat abruptly to a comparatively broad, thickened margin; posterior limb narrow, elongate, with a strongly defined furrow along the center. Palpebral lobe separated from the fixed cheeks by a sigmoid groove, which unites anteriorly with the dorsal furrow. Surface of glabella and fixed cheeks granulose; on the frontal limb the granules are so arranged as to give the appearance of lines running from the dorsal furrow to the broad margin, which has lamellose striæ subparallel to the margin. The largest head obtained of this species is ten lines in length, with a spine of equal length projecting from the occipital ring.

Formation and locality. Calciferous formation, Saratoga Co., N. Y.

Conocephalites Hartti *Walcott.*

Glabella truncato-conical, moderately convex; width at base, excluding occipital segment, equal to the length; slightly rounded in front, with anterior lateral angles abruptly rounded; posterior glabellar furrow extends obliquely in about one-third the distance across the glabella from each side, where it is united by a transverse furrow; middle furrow extends obliquely in from each side, but is not united at the center; anterior furrow obscurely defined opposite the anterior angle of the palpebral lobe. Occipital furrow broad and not deeply impressed. Occipital ring broad and slightly convex. Dorsal furrow well defined at the sides and front.

Facial suture curves slightly outward from the frontal margin, thence curving in to the anterior angle of the palpebral lobe, passes to the posterior angle of the palpebral lobe, and thence obliquely outward to the margin of the posterior limb.

Fixed cheeks comparatively broad; frontal limb about one-fifth the length of the head, curving gently from the dorsal furrow to the anterior margin; posterior limb elongate, with a strong furrow from the dorsal furrow to its extremity. Palpebral lobe elongate, separated from the fixed cheeks by a groove within the margin; surface covered with fine lamellose striæ.

This species is much larger than *C. calciferus;* the head described measures seventeen lines in length by twenty-eight lines in breadth at the extremities of the posterior limb.

Formation and locality. Calciferous formation, Saratoga Co., N. Y.

PTYCHASPIS *Hall*, 1863.

Ptychaspis speciosus *Walcott.*

Glabella large, very convex, almost subcylindrical, width a little less than the length, nearly straight in front; the lateral angles rounded, sides straight and nearly parallel; posterior glabellar furrow extending deeply and obliquely about one-third across the glabella and connected by a straight transverse furrow; the middle glabellar furrow is less deeply impressed and extends across the glabella subparallel to the posterior furrow; the anterior furrow is indicated by a very obscure line opposite the anterior angle of the palpebral lobe. The occipital furrow is deeply impressed throughout its length. The occipital ring is strong and prominent, but not elevated above the general surface of the glabella. Dorsal furrow deeply excavated at the sides and well defined in front.

Facial suture, cutting the frontal margin on a line with the outer edge of the palpebral lobe, curves slightly outward, and passes directly to the anterior angle of the palpebral lobe, curving around this it passes obliquely outward to the margin of the posterior limb.

Fixed cheeks of medium width; the frontal limb is impressed with a groove midway between the dorsal furrow and its anterior margin; the posterior limb is subtriangular, with a furrow extending from the dorsal furrow to its lateral margin; the palpebral lobe is large and separated from the fixed cheeks by a deep sigmoid furrow. Surface granulose with waving striæ on the central portion of the fixed cheeks opposite the palpebral lobes.

This species is referred to the genus Ptychaspis from its strongly furrowed subcylindrical glabella and the direction of the facial suture. The largest specimen obtained of the head has a length of six lines, with a breadth of seven lines at the palpebral lobes.

Formation and locality. Calciferous formation, Saratoga Co., N. Y.

Bathyuras armatus *Billings.*

Mr. Billings described* the type of this species from the Levis formation of the Quebec group. A form closely related occurs in the Calciferous formation of Saratoga county, and may prove to be the same. A comparison with the type will be necessary to separate them, as the specimen figured was in poor condition and not well illustrated, if the description was taken from it.

The above described species are associated with *Stromatopora* sp.?, *Lingula acuminata*, *Metoptoma simplex*, *Murchisonia* sp.?, a lamellibranchiate shell, and two forms too imperfect for determination.

The occurrence of a species of the genus Ptychaspis associated with *Conocephalites calciferous* and *C. Hartti*—species related to *C. Wisconsenensis* and *C. Iowensis* of the Potsdam fauna of Iowa and Wisconsin, relates the fauna of the Calciferous formation of New York with that of the Potsdam sandstone of Iowa and Wisconsin.

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* Palæozoic Fossils, vol. i, p. 411.

LAURENTIAN MAGNETIC IRON ORE DEPOSITS

IN NORTHERN NEW YORK.

To Prof. JAMES HALL, *Director of the New York State Museum of Natural History, Albany, N. Y.:*

SIR—For several years past the subject of the Laurentian Magnetic Iron Ore Deposits in Northern New York has occupied my attention. My intention in the following pages is merely to state a few facts which have come to my notice, and for the present reserve a longer and more detailed report.

I have not been able, from any of the reports on the geology of New York, to draw any general conclusions with reference to the geological structure of the district under consideration; indeed, this seems still to be an exceedingly complicated question. I shall endeavor to explain what I have seen, and possibly aid others in their researches.

The Laurentian of Canada has been divided by Sir W. E. Logan into the Lower Laurentian, and the Upper Laurentian or Labrador Series. In the Canadian reports we find that the Upper Laurentian is acknowledged to rest uncomformably upon the Lower Laurentian. We have in Northern New York these two groups of rocks characterized by their mineralogical peculiarities, and we have proof of their unconformity. There are, however, several series of rocks in the eastern portion of the Adirondack region, or that portion bordering Lake Champlain, in the townships of Moriah, Crown Point, and Ticonderoga, which undoubtedly deserve separate consideration.

The Lower Laurentian, or that series containing the workable beds of magnetic ore, is without doubt the lowest of the series exposed in this region. Its area and distribution I have, from the first of my work, endeavored to trace, as it is of the utmost economic value. My data for the present are based on limited observations at various times during the last four years, and not extending over any very great area, being confined to Essex county, and particularly to a few of the townships of that county. Some facts which I have been able to establish may, in time, lead to the completion of a geological map and a solution of the geological structure.

The mountains throughout the eastern portion of Essex county lie in ranges extending in a northeast and southwest direction, and indicate lines of upheaval.

The following streams indicate in a general manner the direction of the uplifts: the east and west branches of the Ausable river and Boquet, the Black river, draining to the northeast, and the Upper Hudson river, Boreas river, Schroon river, flowing to the south.

These streams may be divided in the following manner: the west branch of the Ausable river, from Wilmington southwestward through North Elba and its head waters into the Indian Pass, forms a general northeast and southwest line with the course of the Upper Hudson, originating in the Indian Pass and flowing southward through Lake Henderson, Lake Sanford, and continuing in an almost due-southward direction as far as Tahawus. Along this line are the abrupt mountains, "White Face" and "Wall Face."

The eastern branch of the Ausable extends from Ausable Forks southward and a little west through Upper Jay, Keene, Keene Flats, and southward by way of Gill brook to the neighborhood of Nipple Top mountain, where the head-waters of the west branch of the Schroon river have their origin, north of Elk lake or "Mud pond." This west branch of the Schroon river flows southward to the neighborhood of the old cord-du-roi road leading from Root's or Schroon River post-office, to Tahawus, where it takes an easterly course.

From the neighborhood of Clintonville, on the Ausable river, the road leads southward through Lewis to Elizabethtown, along the line of a northeast and southwest valley, which is continuous with the valley of the Boquet river, extending nearly on a line with the above road, from Elizabethtown southward to Euba Mills.

The course of the valley of the Black river from its confluence with the Boquet to its head-waters at Lincoln pond, is in general that of the Boquet from Elizabethtown to Euba Mills, and is in direct line with the valley of the Schroon river and Schroon lake.

There is also the valley now occupied by Lake George, entering only in part into this country, which has the same general course as the above valleys.

There are many other smaller and less important valleys which are similarly arranged. I find that these valleys are along the lines of general upheaval. The valleys are anticlinal and monoclinal escarpments, undoubtedly in some cases accompanied by faults. The structure of the western portion of Essex county, I have not been able to study; the rocks there, however, belong principally to the Labrador Series.

The river courses do not necessarily cut down to the Lower Laurentian rocks along the deep valleys, but they do expose them along portions of their courses in many places. In the eastern portion of the county, the Lower Laurentian or Magnetic ore-bearing series forms high ground, though I have not yet proved that it forms the highest mountain ranges east of the Schroon and Boquet rivers. I am at present inclined to think that other measures cap them. The main mass of higher mountains west of these two rivers is formed by the Upper Laurentian or Labradorite series in which the Titanic Iron Ore abounds. These measures extend eastward through the northern half of Elizabethtown, flanking the lower rocks on the east in the township of Westport, forming the lake range the entire length of the township, as well as the lower range of Split Rock mountain.

The Lower Laurentian occupies a portion of the southwestern edge of the township of Westport. The southeast portion of Elizabethtown, lying south and east of a line drawn from the Kingdom Forges to New Russia and thence to Euba Mills, is occupied by the Lower Laurentian, extending into and occupying the northern half of the township of Moriah. There is a belt of rocks in the southern and southeastern portion of Moriah and northern part of Crown Point, the geological relations of which are not determined, but belong in the group of Lower Laurentian.

The northwestern portion of Crown Point is occupied by the Lower Laurentian, in the midst of which are located the Hammond mines at Hammondville.

In the northern portion of the township of Moriah are the enormous mines of the Port Henry Iron Ore Co., and Witherbee, Sherman & Co., at Mineville and vicinity. The belt of rocks occupying the southern part of the township of Moriah and eastern portion of Crown Point, extends southward into Ticonderoga, occupying the greater part of this township, and belongs to a subdivision in which the sulphur ores abound. This subdivision is one of the Lower Laurentian, but its relation to the Magnetite series is still doubtful. It is characterized by light weathering garnetiferous gneisses with their beds of magnetite, containing often a large percentage of sulphur, and thinly bedded quartzites. Some of the crystalline limestones undoubtedly belong in this group, and it may be that they will all be proven to be a portion of this series.

There is undoubtedly a non-conformity of the limestones with the magnetic ore series or lower members of the Laurentian, but the relation of the Labrador series to this limestone is by no means clear.

We have, therefore, the following groups in ascending order:

The Lower Laurentian Magnetic Iron Ore series.

The Laurentian Sulphur Ore series.

The limestones (verd antique marbles, plumbago, etc.), and the Labrador series, or Upper Laurentian with its Titanic Iron Ores.

The Laurentian Magnetite group is the lowest and the Labrador series the highest, but the precise relations of the Sulphur Ore and Limestone series are still undetermined.

The Lower Group of the Lower Laurentian.

This series of quartzites, Hornblendic gneisses and micaceous, garnetiferous gneisses, with its beds of rich magnetite, occupies a comparatively limited area as compared to that occupied by the other groups of the series.

The mines at Mineville, in the township of Moriah, are located about 1,200 feet above the lake level, which is about 100 feet above the level of the sea. These mines are located on two distinct horizons. The beds located on the upper horizon are the "New Bed," "Barton Hill" and "Fisher Hill" mines. Those of the lower horizon are the "21," the "Old Bed" and "Cook's Shaft" mines.

The general pitch of the ore beds is to the west and northwest, where the structure has not been complicated by folds, contortions or faults.

It is, in many cases, scarcely possible to determine the direction in which the beds pitch, but from all I can learn from careful observation, the deposits at the lower horizon, or those of "21" and the "Old Bed" mine, are on a line of an anticlinal fold, which has been complicated by faults.

At the Cook Shaft we have clearly a monoclinal, pitching to the westward, as we have in the upper workings of the New Bed, Barton Hill and Fisher Hill mines.

The only mines of note near the lake shore are the "Cheever" mine and the continuation of the same bed in the Champlain and Essex Company's works, located a little to the south of east from Mineville and north of Port Henry. The geological connection between these deposits is not established, as there are no large developments between these points. I am inclined to think, however, that, from the saucer-shaped structure at the Cheever mine, there is a fault which cuts off its connection with the geology to the west. The rocks between the Cheever mine, which is at the lake shore, and Mineville, have in general a westward pitch. This is demonstrated in the intermediate workings, as at Pilfershire (Lot 25, Small's patent), and in some few other places where openings have been made. Undoubtedly there are more iron ore horizons than these of Mineville and the Cheever, as it may be found in any position within the limits of the Lower Laurentian series; but whether there is more than this horizon known within this northeastern quarter of the township of Moriah, is still an open question.

I am at present of the opinion that the horizons of the Mineville deposit are repeated again by a fold or step fault, or by both, and reappear at and in the vicinity of Pilfershire, and along the line of the outlet of Barton pond, which flows into Mill brook.

The region east and south of Mineville is so completely covered by glacial drift, that it is impossible to trace the succession of rocks with precision.

We have the Lower Laurentian rocks in some workings with a pitch to the eastward and southward, overlaid with glacial debris, and, therefore, beyond these workings we have no data.

South of the mines along the line of Mill brook, extending from Port Henry to the neighborhood of Ensign pond, we find the Laurentian limestone group with its rusty, decomposing, syenitic rocks and some sulphury ores. This limestone is undoubtedly a newer series than that of the Mineville rocks, being clearly proven to rest unconformably upon the Lower Laurentian rocks of the Cheever Ore Bed, from which neighborhood it extends along the lake to Port Henry, thence westward to vicinity of Ensign pond. It encircles the end of the lake range, of which Bald Peak is the highest mountain, north of Port Henry.

The dips of the limestone group are more gentle, as a rule, than in the lower division, and, as a whole, it has the appearance of having been deposited secondary to the Lower Laurentian, and unconformably upon it.

The southern and southwestern portions of the township of Moriah are occupied by a series which bears a doubtful relation to the magnetic ore ranges, but is apparently intimately in connection with the limestone group. In some portions it resembles the quartzites of the Lower Laurentian, and in others it resembles more closely the light-colored garnetiferous rocks, which form a portion of the lake range in the southern and eastern quarters of the township of Westport, and belong to the Labrador series. The succession is, however, very different, and it is therefore impossible to identify them as the same. This group is undoubtedly a continuation of the thinly bedded quartzites and syenitic rocks which extend southward through Crown Point into Ticonderoga, where there are numerous deposits of sulphury iron ores and plumbago.

This group is characterized by its numerous Trap Dykes, apparently more frequent in the vicinity of the limestone, though this frequency may be due to the contrast in the rate of disintegration—the limestone leaving the trap rock more boldly exposed.

The line of junction between the two groups—the Lower Laurentian containing the large deposits of magnetic iron ore, and the crystalline limestones with the succession of quartzose rocks and garnetiferous gneisses—is not clearly seen at any point. The reason of this is that along such lines of junction the action of the weather has had fuller force, and the decomposition and disintegration has been more rapid, thus forming deep depressions and valleys which have recently been filled by the glacial debris swept into them by the moving ice.

The limestone group, with its various associated rocks, may be said to occupy the entire southern half of the township of Moriah, extending northward to the general line of Mill brook from Ensign pond to Moriah Center, and from thence in an easterly direction to the lake, and bordering the lake as far north as the Cheever Ore Bed.

The limestone is overlaid in many places along the lake by the Potsdam sandstone, which is well exposed at and above Port Henry; there are also fine exposures of it in the northeastern corner of the township.

The actual junction or overlapping of the Potsdam sandstone or quartzite on the gneiss and limestone is nowhere to be seen. The reason is that the limestones disintegrates so rapidly that the sandstone becomes undermined, and breaking off, covers up the junction.

The limestone along the lake extends westward to the base of the high range which rises about 3,000 feet, in Bald Peak mountain, above the lake. The rocks of this range, as far as my observations carry me, pitch to the westward within this township, and probably belong to the Lower Laurentian, though they have not been proven to contain any large deposits of magnetic ore.

I would remark here that this range has never been carefully studied; but I hope to complete the township map now in progress, and prove the relations of this range to the Labradorite series which forms the lake range in the township of Westport (north of Moriah), and probably extends to the line of Mullen brook, which cuts through a marked depression just north of Bald Peak mountain. This depression extends around the northern boundary of this mountain to the neighborhood of Barton pond.

There is a large area extending from the vicinity of Barton pond southward to Moriah Corners and south of this point, which is covered principally with glacial debris, varying from fifty to three hundred feet in depth.

Bald Peak mountain, together with the range of iron-ore-bearing rocks at and about Mineville, seem to have been brought up by faults.

The northern portion of the township of Moriah is occupied by the Lower Laurentian rocks, containing large deposits at various places of magnetite iron ore. The central portion of the township along the line of Mill brook is occupied by the limestones of the Laurentian, deposited unconformably on the Lower Laurentian, and the entire southern portion is occupied by the garnetiferous micaceous gneisses and quartzites, with numerous beds of sulphury and lean iron ores.

ELIZABETHTOWN.

Lower Laurentian.

The Lower Laurentian rocks of this township probably extend across the entire southern end, at least as far as the Boquet river, and thence to the neighborhood of New Russia and across in an easterly direction to the township of Westport. How far to the westward of the Boquet river this formation extends, I am as yet unable to say.

The region east and southeast of the Black river is undoubtedly a monoclinal pitching to the westward. As yet I have no evidence of a synclinal structure. There are no developments of iron ore beds through this region, though there are beds of Magnetite in the neighborhood of Long pond, which may be in close geological proximity to those of the Fisher Hill mines.

The region between the Black and Bouquet rivers has been proven to be synclinal; along the Black river the rocks and ore beds pitch to the westward and northwest, and along the right bank of the Boquet the rocks pitch to the eastward. It is highly probable that the same lower rocks pitch to the westward west of the Boquet river overlaid by the Labradorites, reappearing again in an anticlinal fold along which the Ausable river flows through Keene.

It is, therefore, probable that nearly all of the territory west of the Boquet river in this township belongs to the Labradorite series. That the portion of the township lying north of an east and west line from the neighborhood of the Kingdom Forges to the Boquet river belongs to this upper series, is beyond a doubt.

In lot 209 of the "Iron Ore Tract," situated southeast of the town of Elizabethtown, there has been developed a bed of Titaniferous iron ore, which is characteristic of the Upper Laurentian or Labradorite series. The true line of junction of the Labradorite series with the Lower Laurentian rocks is probably not far south of this point, and the outlet of Little pond flowing westward to the Boquet river may be the true line of junction. The general structure here is an eroded synclinal with northeast and southwest axis overlapped by the Labradorite series pitching westward.

WESTPORT.

Lower Laurentian.

The Magnetite range of the township of Moriah and Elizabethtown continues across the township lines and extends into the township of Westport, occupying probably the entire southwestern corner of the township—that is to say, an area commencing at the southwest corner near or at Fletcherville east to the line of Mullen brook, thence northward to the north of Nichols' pond and west to the township line. The old workings of Campbell Hill are located in the vicinity of this pond on lots 168 and 166. With the exception of this area and probably a small area south of Mullen brook, Westport is occupied by the Labradorite series, except that portion covered by the Cambrian limestones along the lake.

The entire eastern two-thirds of the "Iron Ore Tract" has been carefully studied, and nowhere are other rocks to be found than those belonging to the Labradorite series. The general pitch of these rocks, here forming the lake range, is to the northward as far as the northern boundary of the tract or a line east and west through the village of Westport.

The general structure of the northern half of the township is not settled, but we know that along the northern shore of the Westport bay we have the same Upper Laurentian series pitching to the southward. A great deal of the northern portion of this township is concealed by glacial debris and Champlain clays. Split Rock mountain occupies the northwestern portion of this township, and extends northwestward into the township of Essex. Titaniferous iron ore has been mined on this mountain. Along the lake shore, from the village of Westport to the Moriah township line, the Cambrian limestones occur everwhere. They are also exposed in place not far from the eastern boundary of the Iron Ore Tract, near and at the base of the lake range.

The region between the Iron Ore Tract and the lake is covered by the blue Champlain clay, which has been deposited principally on the limestones, but occasionally extending into bays and resting on the gneisses. At the village of Westport, the Potsdam sandstone makes its appearance in the bed of the brook. There are beautiful exhibitions of glacial action and glacial moraines in many parts of this township.

ESSEX, WILLSBOROUGH, LEWIS AND CHESTERFIELD.

These townships I have not been able to study, except in a very superficial manner. They are, however, occupied principally by the Upper Laurentian series as far as my observations carry me.

In the southwest corner of Chesterfield township, there is an outcrop of Titaniferous iron ore, and also large deposits of crystalline limestone containing much plumbago. Along the lake shore the Cambrian limestones occur in many places, capped by the Champlain clays and sands. At Keeseville, the Ausable river cuts through the Potsdam sandstone in a deep gorge or chasm, celebrated for its picturesque scenery.

CROWN POINT.

LOWER LAURENTIAN.

The area occupied by this group is comparatively small. It is situated in the western part of the township, bounded on the north and west by a stream flowing into Paradox lake; its southern and eastern boundary I have not as yet determined. Hammondville is probably located about the center of the area. There are large deposits of magnetic iron ore developed at this point.

The geological structure is exceedingly complicated. The probability is that it is an uplift cut off on the north and west by a fault, with an eastward pitch complicated by minor folds, faults and contortions. Crystalline limestone flanks it on the north and west. To the east it is followed by a series very similar, and probably identical, with that associated with the limestones of Moriah township.

This formation, with its sulphury ore, occupies the major part of the township Crystalline limestone occurs northwest of Irondale, and the enormous escarpment extending through the central portion of the township to the lake may be due to the rapid erosion of limestone beds. This may never be proven, as the Champlain clays and sands extend a long distance back from the lake, concealing everything from view. One of the most interesting quartz and feldspar veins I have ever seen occurs in the northern-central portion of this township. Crown Point itself is formed by the Cambrian limestones capped by Champlain clays.

TICONDEROGA.

There is very little information on this township in my possession. All I can say at present is, that all the rocks I have seen convince me that the series belong to that of eastern Crown Point and southern Moriah. It abounds in beds of sulphury iron ore and large deposits of crystalline limestone with plumbago. The rocks are, many of them, thinly bedded quartzites and hornblendic syenites.

I am indebted to Mr. William H. Case, C. E., of Port Henry, for information concerning a deposit of crystalline limestone capped by Potsdam sandstone, in the west-central part of the township, near Putnam's pond, lot 179 of Stoughton and McClellan's tract; also of a glacial moraine in the same vicinity.

The presence of Potsdam sandstone at this elevated point, and so far from the lakes, would rather indicate that there have been great disturbances since the deposition of this formation. The Cambrian limestones are to be seen at Fort Ticonderoga, and also extend along the lake front.

Lake George owes its origin to a dam of glacial debris capped by Champlain clays, across the northern end of a valley extending into Warren county. It is possible that the lake is really formed by two valleys—the summit being at the Thousand Islands—the one having its pre-glacial outlet to the north, the other to the south. I am informed the Potsdam sandstone occurs in many places along the lake.

SCHROON AND MINERVA.

I am satisfied that the township of Schroon is occupied by the Labradorites and the crystalline limestones with the associated gneisses.

The limestone occurs along Paradox lake and extends into the township of Crown Point, along the line of the brook which forms the north and the west boundary of the Lower Laurentian rocks of Hammondville. Undoubtedly this crystalline limestone extends southward further than it has yet been traced. It occurs just west of the village of Schroon Lake. In the western portion of the township the rocks have a similar aspect to those in Ticonderoga, and I have reason for classing them with those of that region. At Schroon Lake village the Chazy limestone occurs with fossils. The outcrops are not extensive, being covered by a sand and clay deposits. The southern portion of Minerva township is occupied principally by the crystalline limestones with the associated gneisses.

The lower Laurentian makes its appearance in a bold mountain, in the east-central portion of the township. The Rosenkranz mine is located here. The " Thorn's survey " probably includes nearly all of this uplift. It is flanked on the southeast, south and west by crystalline limestones. As for the western and northern portion of the township, I have no data, but the rocks belong undoubtedly to the Labradorite and the Limestone series.

NORTH HUDSON AND NEWCOMB.

I have not studied this region, but from the few observations I have made and facts I have gathered, there is no doubt that the entire region may be considered as belonging to the Labradorite series, with limestones probably of the same group as those in Minerva township. The iron ores which have been developed in Newcomb are all titaniferous.

As for the remaining townships, I would merely state that there are not facts enough as yet collected to make it worth while to theorize. Magnetite has been reported found at many places. Magnetic iron occurs at Long or Edmond's pond, in Keene township. It has also been found in the neighborhood or along the east branch of the Ausable river. Whether this river flows along an eroded anticlinal fold or not remains to be proved.

North Elba, St. Armand and Wilmington townships are undoubtedly occupied by the Labrador series.

Since the above was written, I have learned sufficiently of the relations of the crystalline limestone to state that it rests unconformably upon the Upper Laurentian rocks; and the entire group of crystalline limestones, with its associated decomposing gneisses, will probably be proven to be a newer series of rocks resting unconformably upon the Lower and Upper Laurentian.

I had hoped to have some maps of the iron-ore mines, but they are not ready for publication.

The accompanying map is subject to many alterations, and is only preliminary. Without doubt, further investigation will change the present assumed areas.

I am yours very respectfully,

CHARLES E. HALL,

Assistant to the Second Geological Survey of Penn.

PHILADELPHIA, *October* —, 1879.

CORALS AND BRYOZOANS OF THE LOWER HELDERBERG GROUP.

By JAMES HALL.

An Enumeration and Description of the Corals and Bryozoans of the Lower Helderberg group; with references to the plates and figures of species in vol. vi, Palæontology of New York—unpublished.

In the *Twenty-sixth Report on the New York State Museum of Natural History*, the writer communicated a paper on the "*Bryozoa and Corals of the Lower Helderberg Group.*" This paper was published in pamphlet form, in May, 1874, and in the full Report in July of the same year. In 1877 it became necessary to prepare the drawings of these subjects for the Palæontology of the State. In commencing this work, it soon became apparent that the previous publication was very incomplete, and that a careful revision would be required for many of those species already described. After a study of the entire group of species, with special instruction given to Mr. Simpson, the draughtsman of the work, I committed them to his care. The species have been critically studied by him, and the drawings have been made with a knowledge of the structure and characters of the fossils. The plates have been lithographed in a very satisfactory manner preparatory to the final publication.

The results of more recent studies made upon the former collections, and upon others subsequently obtained, have rendered it necessary to modify the expressions regarding some of the species previously described, and to designate a considerable number of new species. The revision of the previous paper, together with the descriptions of the new species here included, give an expression of our knowledge of these groups of fossils, up to 1878.

In the enumeration of the species, I have considered it advisable to make reference to the numbers of the plates and figures, as already arranged and lithographed for the volume of the Palæontology which will contain the final descriptions.

*** The fossils included in this enumeration are designated as Corals and Bryozoans—the line of demarcation between the two classes, in the genera Chætetes, Trematopora and Callopora being at the present time not satisfactorily determined.

STREPTELASMA, *Hall.*

Streptelasma stricta.

(plate i, figs. 1–10.)

Streptelasma (*Petraia*) *stricta*, Hall. Twenty-sixth Rep. N. Y. State Museum of Nat. Hist., p. 114. 1874.

ZAPHRENTIS, *Raf.*

Zaphrentis Rœmeri.

(plate i, figs. 11–21.)

Zaphrentis Rœmeri, Edwards & Haime. Monog. des Polypiers Fossiles. Paris. 1851.

AULOPORA, *Goldf.*

Aulopora Schohariæ.

(plate ii, figs. 1–6.)

Aulopora Schohariæ, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 110. 1874.

Corallum consisting of elongate, tubular cells, gradually enlarging to the aperture, transversely corrugated, longitudinally striated; increasing sometimes by one tube budding in a direct line from the basal part of another; at others two buds rising at an angle of about 45° from the parent tube. All the tubes, after budding, assume an erect position and cease growth. Diameter of cell-tubes, at apertures, a little more than one mm.; length from five to seven mm.

This species is much smaller than that in the Hamilton group referred to *A. tubæformis* Goldf.; it corresponds more nearly in size to *A. serpens* var. *minor* Goldf., in *Petref. Germ.*, p. 82, pl. 29, fig. 16, but is larger than that figure; the extremities of the tubes are more unequal, and the mode of growth and bifurcations differ.

Formation and localities. In the shaly limestone of the Lower Helderberg group, at Schoharie and near Clarksville, N. Y.

Aulopora tubula, *n. sp.*

(plate ii, figs. 7, 8.)

Corallum consisting of comparatively short, tubular cylindrical cells, gradually increasing in size to the aperture; generally two buds from each cell, sometimes three, two laterally and one from the basal portion nearer to the aperture; showing spinules in the interior; transversely corrugated and strongly striated longitudinally; growing in close aggregation from the rapid and repeated budding. Length of cell-tubes about two mm.; diameter at the apertures a little more than one mm.; diameter at the base nearly one mm.

This species differs from *A. Schohariæ* in its shorter tubes and proportionally greater diameter, its more frequent gemmation and closer aggregation of growth.

Formation and locality. In the shaly limestones of the Lower Helderberg group, Schoharie, N. Y.

Aulopora subtenuis, *n. sp.*

(PLATE II, FIGS. 9-18)

Corallum consisting of elongate, slender, tubular cells, very gradually enlarging to the aperture, generally only a single budding, but sometimes two, and very rarely three. Cell-tubes straight to the point of budding, when they abruptly turn to one side. Length about eight mm.; diameter at aperture one mm., at smaller end, .75 mm. Sometimes quite strongly corrugated and longitudinally striated; surface in some specimens apparently papillose.

This species may be distinguished from *A. Schohariæ* by its more slender form, greater length, and by its mode of budding. In *A. Schohariæ*, where two buds proceed from one tube, they are at about the same distance from the aperture, and one on each side of a central line, and the cell ceases to grow after budding, while in this species the buds are in the centre of the posterior part of the tube in a direct line, and sometimes two mm. apart. In all the specimens, so far seen, the apertures do not turn upward after budding, but to one side.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Aulopora elongata, *n. sp.*

(PLATE II, FIGS. 19, 20.)

Corallum consisting of comparatively large, cylindrical, tubular cells, increasing by one or two buds from each cell; when two, they are bilateral. Length of tubes about eight mm.; diameter at apertures two mm.; corrugated and striated longitudinally.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

Aulopora ? cornulites, *n. sp.*

(PLATE II, FIGS. 21, 22.)

Length of tube six mm.; diameter at the apertures a little less than two mm.; surface marked by numerous, comparatively strong transverse annulations, and by longitudinal striæ.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

VERMIPORA, *Hall.*

Vermipora serpuloides.

(PLATE II, FIGS. 24-31.)

Vermipora serpuloides. Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 110. 1874.

Corallum ramose, solid, consisting of contiguous, cylindrical tubes, increasing by interstitial additions. Branches from two to eight mm. in diameter. Tubes nearly parallel, sinuous, and marked by transverse lines of growth. Length reaching fourteen mm.; diameter at aperture from one-half to nearly one mm.

Dr. Rominger, in his description, speaks of diaphragms and lateral pores, in a form described by him, but with a careful examination of numerous specimens and transparent sections, I have been unable to find either of these characters in the typical species.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

VERMIPORA ROBUSTA, *n. sp.*

(PLATE II, FIGS. 32, 33.)

Corallum ramose, tubes from six to eight mm. in length, and two mm. in diameter at the aperture; diameter of branch seven mm.; surface marked by obscure transverse striæ and undulations.

This species differs from *V. serpuloides* in its much larger size and comparatively shorter cell-tubes.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

VERMIPORA? TORTUOSA, *n. sp.*

(PLATE II, FIG. 23.)

Corallum consisting of elongate cylindrical tubes, increasing by interstitial additions. Length of single tube four mm.; diameter at mouth .50 mm.; surface marked by numerous oblique transverse annulations which give to the tube a twisted appearance.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

STRIATOPORA, *Hall.*

STRIATOPORA ISSA.

PLATE III, FIGS. 14, 15.)

Striatopora Issa, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 114. 1874.

Corallum ramose, solid; bifurcations distant; diameter of the branches about ten mm.; cells polygonal, arising from the centre of the branch, rapidly increasing in size, and quite abruptly curving to the surface; diameter of the larger cells at the aperture about two mm.; cell-walls thick, strongly striated; mural pores large, round.

This is the most robust species of this genus yet noticed, and the cells are large in proportion; it is not a common form and is generally found in detached pieces on the weathered surfaces of blocks of limestone.

Formation and locality. In limestones of the Lower Helderberg group, Clarksville, N. Y.

MICHELINA, *De Koninck.*

Michelina lenticularis.

(Plate III, figs. 1, 2, 3, 5.)

Michelina lenticularis, Hall. Twenty-sixth Rep N. Y. State Mus. Nat. Hist., p. 113. 1874.

Corallum forming small lenticular bodies, the lower surface the less convex, and covered with a strongly wrinkled epitheca; cells large and few, broadly campanulate; partition walls thin, strongly striate longitudinally, with the margins denticulate—the number of striæ and denticulations varying with the size of the cell.

In a specimen of twenty mm. in diameter, there are about twelve cells, the larger ones somewhat more than six mm. in diameter. The entire height of the specimen is about the same as the width.

This is a very small species, seldom attaining a diameter of more than twenty-five mm. This form with the large cells and their strongly granulose-striate character, are distinctive features.

Formation and localities. In the shaly limestones of the Lower Helderberg group, near Clarksville and Schoharie, N. Y.

FAVOSITES, *Lamarck.*

Favosites Helderbergiæ.

(Plates IV, V, VI.)

Favosites Helderbergiæ, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 111. 1874.

Corallum growing in large, lenticular, depressed-convex or hemispherical masses, base covered by a strongly wrinkled epitheca. Cell-tubes polygonal, averaging about one and one-half mm. in diameter, their inner surface showing evidence of a few strong longitudinal striæ, and more frequently above the mural pores; mural pores in one or two ranges, comparatively large, circular, with margins distinctly elevated; cell-walls thin, but greatly increasing by silicification; transverse partitions strong, numerous, about three in a space equal to the diameter of the cell-tube.

In many specimens some of the cell-tubes are larger and less angular than those surrounding them, being a little more than two mm. in diameter, with thicker walls. A single specimen from Coeymans Landing has slightly larger tubes on one portion, while in all the others the cells have the ordinary characters.

This species differs from the *Favosites Niagarensis*, which it resembles in the the size of the cells, in having more numerous diaphragms, and in the mural pores being on the lateral faces instead of at the angles of the cells.

Formation and localities. In the shaly limestones of the Lower Helderberg group, near Clarksville, Albany county. It is here found weathered out from the rock and silicified, frequently in masses of a foot or more in diameter. It is also found in several localities in Schoharie county. Smaller specimens of what appears to be the same or a closely allied form occur at Cole's quarry, Herkimer county, N. Y. The species likewise occurs near Cumberland, Md., having the cells somewhat smaller than those of New York specimens.

Favosites conica, *Hall.*

(Plate III, figs. 4, 6, 13.)

Favosites conica, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 112. 1874.

Corallum forming conical masses; flattened at the base, which is covered with a strongly wrinkled epitheca. Cells arising from the centre of the base, quite abruptly curving to the surface, increasing by interstitial additions; polygonal; from four to eight-sided, variable in size, the larger ones being three mm. in diameter; dividing walls thin; mural-pores comparatively large, circular, with distinctly raised margins, in one, two and sometimes three ranges; where two ranges occur, the pores alternate with each other; where more than two ranges occur, the arrangement of the pores is more irregular; transverse partitions closely arranged, two or three in a distance equal to the diameter of a tube.

The conical form of this species, and the inequality of the cells, distinguish it from every other known Favosites of the New York formations. The specimens are usually from one inch to three inches in diameter.

Formation and locality. In the shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

Favosites inexpectans.

(Plate IX, figs. 16, 17.)

Chætetes Helderbergiæ, Hall. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist., p. 110. 1874.
Not *Favosites Helderbergiæ,* Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 111. 1874.

Corallum ramose; diameter of branches, ten mm.; cell-tubes polygonal, very long and slender, rising from the centre of the branch and gradually curving to the surface; diameter of the cell-apertures from .50–.65 mm.; transverse partitions very thin; mural-pores large, one or two series on each face of the tube walls, which have numerous oblique corrugations.

Formation and localities. In the shaly limestone of the Lower Helderberg group, at Catskill creek, near Clarksville, and at Schoharie, N. Y.

Favosites sphæricus.

Chætetes sphærica, Hall. Twenty-sixth Rep. N. Y. State Museum Nat. Hist., p. 113. 1874.

Corallum forming globose or depressed-globose bodies, composed of minute, radiating cells, about .35 mm. in diameter, having comparatively thick walls, which are perforated at regular distances by large pores, distant from each other less than the diameter of the tube, generally a single series on each face of the wall; transverse plates rather closely arranged.

From the globular form of this small species, and where the external characters are obscured by shale, it may be mistaken for the species of ASTYLOSPONGIA, found in the same rocks. The largest specimens observed are about four centimetres in diameter.

Formation and localities. In the shaly limestone of the Lower Helderberg group, near Clarksville, and Catskill creek, N. Y.

FAVOSITES MINIMUS.

(PLATE VII, FIGS. 1-12.)

Favosites? minima, HALL. Twenty-sixth Rep. State Mus. Nat. Hist., p. 113. 1874.

Corallum massive, variable in form. Cell-tubes small, polygonal, generally hexagonal, from two to thirteen mm. or more in length; diameter .25–.35 mm.; there are numerous maculæ where the cells are larger than the others, being about .50 mm. in diameter. Cell-walls thin, more or less corrugated and striated transversely; septa strong, distant from each other a space equal to two or three times the diameter of the tube; mural pores minute, comparatively distant, a single series on each face of the tube.

This species is very variable in its mode of growth, sometimes occurring in branching forms, with the cell-tubes commencing at the centre, and gradually curving upward and outward to the surface; others are in hemispherical masses, with a flat base, the tubes radiating from the centre of the base to the surface; increasing by interstitial or lateral additions; sometimes in masses formed of successive layers as if by interruptions in growth; it is also found incrusting crinoid stems and other objects, especially the basal portion of LEPADOCRINUS, occurring in layers of sometimes not more than two mm. in thickness.

It differs from *F. proximus* in its smaller cell-tubes, the thinner walls, and the frequent maculæ of larger cells.

Formation and localities. Lower Helderberg group, Schoharie, and near Clarksville, N. Y.

FAVOSITES PROXIMUS, *n. sp.*

(PLATE VII, FIGS. 13-15.)

Corallum forming irregular masses; cell-tubes polygonal, of nearly uniform size; diameter slightly more than .50 mm.; transverse partitions strong, generally distant from each other a space equal to twice the diameter of the cell-tubes, though frequently occurring much closer; mural-pores minute, occurring in one or two series on each face of the tube.

This species in general appearance is very similar to *F. minimus*, but may be distinguished from that species by its larger cells, thicker and smoother cell-walls and the absence of maculæ of larger cells.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CHÆTETES, *Fischer*.

CHÆTETES MONTICULATUS, *n. sp.*

(PLATE VIII, FIGS. 5–7.)

Corallum forming spheroidal masses. Cell-tubes small, polygonal, .35 mm. in diameter at aperture; cell-walls thin, strongly corrugated; transverse partitions slightly thinner than the cell-walls, occurring at irregular intervals, varying from .35 mm. to eight mm. or even more; surface having frequent strongly elevated nodes, with cells of the same size as on other parts of the surface, arranged in intersecting rows.

This species in general appearance is similar to *C. colliculatus*, but may be distinguished from that species by its smaller cell-tubes, more numerous nodes, spheroidal form and difference in septa.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CHÆTETES COLLICULATUS, *n. sp.*

(PLATE VIII, FIGS. 1–4.)

Corallum hemispheric, base flat or concave, covered by a wrinkled epitheca. Cell-tubes polygonal, nearly .5 mm. in diameter at the aperture; surface having frequent strongly elevated nodes, with cells about the same size as the others; septa thin and infrequent.

This species differs from *C. monticulatus* in form and in the size of cells.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CHÆTETES FRUTICOSUS, *n. sp.*

(PLATE IX, FIGS. 1–8.)

Corallum ramose, solid; branches slender, frequent; diameter generally from two to two and one-half mm.; cell-tubes polygonal, arising from the centre of the branch, and very gradually diverging to the surface; opening very slightly oblique to the surface; five mm. or more in length; diameter less than .25 mm.; cell-tubes thin, apparently slightly corrugated transversely; septa thin, and very infrequent.

This species can be distinguished from *C. abruptus*, plate ix, figs. 9–11, by its more slender branches, which character seems to be constant, but especially by the manner in which the tubes approach the surface, the thinner and more infrequent septa.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CHÆTETES ABRUPTUS, *n. sp.*

(PLATE IX, FIGS. 9–11.)

Corallum ramose, solid; branches frequent; cell-tubes polygonal, small, arising from the centre of the branch, and gradually diverging till within about two mm.

from the surface, when they abruptly turn outward, and at this point are generally constricted, and the cell-walls, previously very thin, become much thicker; transverse partitions rare or entirely wanting until after the abrupt turn of the tubes, when they are numerous; length of longest cell-tubes six mm.; diameter at aperture .25 mm.; cells of nearly uniform size, frequently spinulose at the angles.

This species may be easily recognized, when a longitudinal section can be seen, by the abrupt turn of the cell-tubes to the surface, in which respect it differs from any other known species of this formation.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

Chætetes tabulatus.

(PLATE IX, FIGS. 12–15.)

Chætetes tabulatus, Hall. Illustrations of Devonian Fossils: Corals, plate 37, figs. 16, 19. 1876.

Corallum forming spheroidal or hemispheric masses; diameter of the largest specimen seen a little more than four mm.; tubes arising from the centre of the base, and increasing by interstitial additions; diameter at the apertnre about .50 mm.; cell-walls thin, transverse; diaphragms, so far as observed, wanting; the cell-walls are strongly and quite regularly corrugated; the corrugations are nodose at the angles of the cell-walls; about fifteen in the space of five mm.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

Chætetes corticosa.

(PLATE X, FIGS. 1–10, AND PLATE XIII, FIG. 4.)

Trematopora corticosa, Hall. Twenty-sixth Report N. Y. State Mus. Nat. Hist., p. 105. 1874.

Bryozoum ramose, solid; branches frequent, diverging at an angle of about ninety degrees; diameter of larger branches five mm.; cells contiguous, generally pentagonal, hexagonal or apparently oval from thickening of the margins, arising from the centre of the branch and gradually curving to the surface, increasing by interstitial additions; septa strong, distant from each other by a space equal to two or three times the diameter of a cell-tube; cell-walls thickened toward the apertures, frequently forming irregular ridges like the miniature roughened bark of a tree.

This species is easily recognized by its peculiarly roughened surface, and widely diverging branches.

Formation and locality. In the shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

TREMATOPORA, *Hall.*

TREMATOPORA] (CHÆTETES) DENSA.

(PLATE X, FIGS. 11-13.)

Trematopora densa, HALL. Twenty-sixth Report N. Y. State Mus. Nat. Hist., p. 105. 1874.

Bryozoum ramose, solid; diameter of larger branches three mm.; cell-tubes polygonal, arising from the centre of the branch, and gradually curving to the surface; diameter of apertures variable, but averaging about .35 mm. surface, with occasional maculæ where the cells are larger, being about .50 mm. On well-preserved specimens the angles are frequently spinose; septa few and only occurring near the surface.

Formation and localities. In the shaly limestone of the Lower Helderberg group, at Catskill creek and near Clarksville, N. Y.

TREMATOPORA [?] CONSTRICTA.

(PLATE X, FIGS. 14-19.)

Trematopora constricta, HALL. Twenty-sixth Report N. Y. State Mus. Nat. Hist., p. 104. 1874.

Bryozoum ramose, hollow, frequently branching; branches from two to four mm. in diameter; thickness of bryozoum about .35 mm.; cell-tubes oval; apertures closely arranged in more or less regular, quincunx order, opening obliquely upward; margin of upper part of aperture not elevated, of posterior part strongly elevated, extending over the lower portion and forming a projecting lip. There are frequent maculæ where the cells are larger than in other places, one of them being equal in size to two ordinary cells, and frequently radiating; inner surface of the branch (epitheca) strongly wrinkled transversely, and longitudinally striated by the recumbent position of the cell-tubes.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

TREMATOPORA DISPERSA, *n. sp.*

(PLATE X, FIGS. 20, 21.)

Bryozoum ramose; branches hollow; diameter about three mm.; cell-apertures circular, or slightly oval; about .30 mm. in diameter; very irregularly arranged; in some parts contiguous, and in other parts there are large spaces destitute of cells; margins of apertures very distinctly elevated.

This species differs from *T. constricta* in the cells being much less oblique, and much more irregularly arranged.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Trematopora regularis.

(Plate XI, figs. 1–8, and Plate XIII, figs. 1–3.)

Trematopora regularis, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 106. 1874.

Bryozoum ramose, solid, slender; branches frequent, widely diverging; diameter of larger branches about one mm.; cell-apertures elongate oval, arranged in longitudinal, parallel lines, alternating, forming a quincunx arrangement; about eighteen in the space of five mm. longitudinally; generally five rows in the width of a branch, sometimes a short spine at the lower end of the cell-aperture; space between the rows of apertures frequently elevated into a ridge, which in well-preserved specimens has a serrated crest.

This species is easily distinguished by its slender branches and the arrangement of cell-apertures in parallel longitudinal rows, separated by an elevated ridge.

Formation and locality. In the shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

Trematopora ovatipora, *n. sp.*

(Plate XI, figs. 9, 10.)

Bryozoum ramose, solid, slender; diameter of the branch about one mm.; cell-apertures ovate, about twice as long as wide, arranged in parallel, longitudinal rows; eight cells in the space of five mm. longitudinally; three rows in the width of a branch; a short spine at the base of each cell; margins slightly elevated, granulose.

This species can be distinguished from *T. regularis* by its much larger ovate cells and coarser appearance generally.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Trematopora canaliculata, *n. sp.*

(Plate XI, fig. 12.)

Bryozoum ramose, solid; diameter one mm.; cell-apertures comparatively large, oval, distant; length about .20, and width .10 mm.; arranged in quincunx order; space between cell-apertures channeled, leaving their margins elevated. Always on the margin at the ends of the aperture, and frequently on other parts of the margin, there is a short, obtuse spine.

This species, in its arrangement of cell-apertures, is very similar to *T. rhombifera*, but differs from that species by having the cell-apertures much more distinctly oval, and more widely separated, the space between the cell-apertures being channeled.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Trematopora parallela, *n. sp.*

(Plate XI, figs. 13, 14.)

Bryozoum ramose, solid; diameter of branches about one mm.; cell-apertures oval, .30 mm. in length, closely arranged in parallel, longitudinal and oblique transverse rows; margins elevated, ornamented with four or five minute spinules.

This species differs from *T. regularis* in its larger cell-apertures, which are more closely arranged, and is without the longitudinal ridge dividing the rows of apertures.

Formation and locality. Lower Helderberg Group, near Clarksville, N. Y.

Trematopora rhombifera.

(Plate XI, figs. 15–20.)

Trematopora rhombifera, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 103. 1874.

Bryozoum ramose, solid; diameter of branches from one-half of one mm. to two mm.; cell-tubes arising from the centre of the branch and quite abruptly curving to the surface; cell-apertures oval or rhomboidal, numerous, contiguous; eighteen in the space of five mm. longitudinally, and twenty-four in the same space transversely; arranged spirally around the branch in quincunx order; cell-walls thin, but frequently thickened by silicification; in well-preserved specimens serrated on their edges.

Formation and localities. Lower Helderberg group, near Clarksville, and at Schoharie, N. Y.

Trematopora crassa, *n. sp.*

(Plate XI, figs. 21, 22.)

Bryozoum forming irregular expansions or hollow branches; cells .25 mm. in diameter, circular, irregularly and closely arranged; margins of apertures thin, but slightly elevated; surface marked by frequent maculæ, which are destitute of cells.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CALLOPORA, *Hall.*

Callopora macropora.

(Plate XI, figs. 23–29.)

Callopora macropora. Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 100. 1874.

Bryozoum ramose, solid, slender, from one to two mm. in diameter; branches comparatively infrequent, widely diverging; cell-apertures elongate, oval, or polygonal, variable in size, margins elevated, intercellular spaces narrow; frequently the cells are contiguous, intercellular pits small, angular; generally only a single range; cell-margins frequently spinulose at the angle.

This is a very distinct and well-marked species, characterized by its large cells and slender branches. A single branch, apparently belonging to the species, has been found in the Niagara shale at Lockport.

Formation and localities. In the shaly limestone of the Lower Helderberg group, at Catskill, Greene county; near Clarksville, and at Schoharie, N. Y.

CALLOPORA MACROPORA, *var.* SIGNATA, *n. var.*

(PLATE XI, FIGS. 30, 31.)

Trematopora signata, HALL. Twenty-sixth Rep. of the N. Y. State Mus. Nat. Hist., p. 104. 1874.

This variety differs from the usual form of *C. macropora* in the more distinctly polygonal cell-apertures, and in having but very few intercellular pits.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA HETEROPORA.

(PLATE XI, FIGS. 32, 34, AND PLATE XIII, FIGS. 5–8.)

Callopora heteropora, HALL. Twenty-sixth Rep. of the N. Y. State Mus. Nat. Hist., p. 102. 1874.

Bryozoum ramose, solid; branches one mm. in diameter; cell-apertures oval, about .25 mm. in length, irregularly arranged, distance from each other varying from contiguity to the length of an aperture; cell-margins elevated, and in well-preserved specimens spinulose; intercellular spaces occupied by minute, angular pits, of about .15 mm. in length.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA UNISPINA.

(PLATE XI, FIGS. 35–39 and ? 40, 41.)

Callopora unispina, HALL. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist., p. 101. 1874.

Bryozoum ramose, solid; diameter of the larger specimens two mm.; branches infrequent, widely diverging; cell-apertures oval; length about .25 mm; width a little more than half the length; distance from each other varying from contiguity to a little more than twice their width; cell margins elevated, and generally having, at the base of each aperture a comparatively large, obtuse spine, though this feature is by no means invariable—in some specimens but few of the cells having spines; intercellular spaces occupied by small polygonal pits, in from one to three ranges, with sharply elevated margins.

Formation and localities. In the shaly limestone of the Lower Helderberg group, at Catskill creek, and near Clarksville, N. Y.

Callopora cellulosa, *n. sp.*

(Plate XII, figs. 7-9, and Plate XIII, fig. 9.)

Bryozoum ramose, solid, branching infrequently; diameter of larger branches about four mm.; cell-tubes arising from the centre of the branch, gradually diverging, curving outward to near the surface, when they turn quite abruptly to the surface; diameter at aperture about .15 mm.; apertures irregularly arranged, the distance from each other varying from contiguity to two or more times their diameter; margins elevated; intercellular spaces occupied by small polygonal pits, generally in two, occasionally three ranges; margins elevated; in well-preserved specimens the margins of both the cells and intercellular pits have small, short spines.

Formation and locality. In the shaly limestone of the Lower Helderberg group, near Clarksville, N. Y.

Callopora fistulosa, *n. sp.*

(Plate XII, figs. 1-6.)

The surface of this species very much resembles *Callopora cellulosa*, but differs in having frequent large openings which continue to the centre of the branch; the space surrounding the opening being much elevated and strongly striated. It may be a different mode of growth of the preceding species.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Callopora perelegans.

(Plate XII, figs. 10-17.)

Callopora perelegans, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 102. 1874.

Bryozoum ramose, solid; branches very frequent, not widely diverging; diameter from three to seven mm.; cell-tubes commencing in the centre of the branch, gradually enlarging and curving to the surface; length of tubes three mm.; diameter at aperture nearly .50 mm.; circular, or sometimes slightly subangular at their junction with the intercellular pits; distance from each other varying from contiguity to more than their diameter; cell-margins elevated, and occasionally, in well-preserved specimens, spinulose; intercellular spaces occupied by comparatively large, polygonal pits, in from one to three ranges, variable in size and shape; frequently, where only one range occurs, the length is more than twice the width; the transverse septa across the intercellular spaces are very regular and distinct.

This species is very similar to *Callopora elegantula* of the Niagara group, differing from it only in its more marked intercellular pits.

Formation and locality. In the shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA HYALE.

(PLATE XII, FIGS. 18, 19.)

Callopora Hyale, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 100. 1874.

Bryozoum ramose, branches hollow; surface marked by comparatively large, circular, or slightly oval cell-apertures which are irregularly arranged, with frequent maculæ destitute of cells. Intercellular spaces with small shallow angular pits, sometimes three or four between the apertures.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA VENUSTA.

(PLATE XII, FIGS. 20-24.)

Callopora venusta, HALL Twenty-sixth Rep. N.Y. State Mus. Nat. Hist., p. 101. 1874.

Bryozoum ramose, hollow; branches infrequent, widely diverging, from three to seven mm. in diameter; thickness of bryozoum about .50 mm.; cell-apertures oval, about .20 mm. in length, width one-half the length; distance from each other generally equal to the width; arranged in a more or less regular quincunx order; cell-margins elevated; intercellular space channeled, having generally a single series of angular pits, the margins of which are but slightly elevated; frequently they are so indistinct that the intercellular space presents only a smooth, channeled appearance. There are occasional maculæ destitute of cells; inner surface of the branches marked by strong, concentric wrinkles, and by fine, longitudinal lines made by the recumbent portions of the cell-tubes.

This species presents somewhat the appearance of *C. cellulosa*, but is easily distinguished from that species by its oval cells, their closer and more regular arrangement, the single series of intercellular pits and the hollow branches — that species being solid.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA OCULIFERA, *n. sp.*

(PLATE XIII, FIG. 10.)

Bryozoum ramose, solid; diameter of branches one mm.; cell-apertures broadly oval; length about .30 mm., quite regularly arranged in longitudinal rows, distant from each other less than the length of an aperture; margins thin; the slightly elevated space between the apertures occupied by minute angular pits, in one or two series, between adjacent apertures.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CALLOPORA MACULOSA.

(PLATE XIV, FIGS. 1-8.)

Trematopora ponderosa, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 106. 1874.

Trematopora maculosa, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 106. 1874.

Bryozoum lamelliform, free or incrusting, generally occurring in masses composed of numerous successive layers of growth; thickness of separate layers from less than one mm. to three mm. or more; celluliferous on one side; lower surface covered by an epitheca, with strong concentric wrinkles and radiating striæ; cell-tubes round or oval, generally opening at right angles to the surface; diameter of apertures about .25 mm.; distance from each other a little less than the diameter of the aperture, with frequent maculæ destitute of cell-apertures, the cells around these being larger than the ordinary cells, frequently radiating, and opening obliquely; cell-margins elevated; on the thinner fronds and near the margins of others, the cells open quite obliquely, the posterior margin frequently extending over and constricting the aperture, forming an elevated, projecting lip, and sometimes presenting very much the appearance of a CERAMOPORA. Intercellular spaces channeled, smooth or rugulose from the intercellular pits; sometimes the pits themselves are visible. In a vertical section the intercellular spaces are shown to be strongly vesiculose, the transverse septa being arched.

A critical study of numerous specimens has shown that the species originally described as *Trematopora ponderosa* and *T. maculosa* are not distinct, and the internal structure of both are like typical forms of CALLOPORA.

Formation and localities. In the shaly limestones of the Lower Helderberg group, at Catskill creek, and near Clarksville, N. Y.

CALLOPORA PONDEROSA.

(PLATE XIV, FIGS. 9-12.)

Callopora ponderosa, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 103. 1874.

Bryozoum explanate, either free or incrusting, generally growing in large masses composed of numerous successive layers; thickness of separate layers two mm. or more; lower surface covered by an epitheca, marked by strong, concentric wrinkles and radiating striæ; cell-apertures round, .25 mm. in diameter, distance from each other variable, frequently less than their diameter; cell-margins thin, elevated, having one or more comparatively large spines, causing the surface of well-preserved specimens to present an echinate appearance; intercellular spaces occupied by minute polygonal pits, in from one to three ranges.

Formation and locality. In the shaly limestones of the Lower Helderberg group, at Schoharie, N. Y.

CALLOPORA PARASITICA, *n. sp.*

(PLATE XIV, FIGS. 13-18.)

Bryozoum foliate, incrusting or free; width of largest specimen seen, twenty mm.; thickness .50 mm.; cell-tubes at first oblique, but opening directly upward; apertures comparatively large, nearly oval, very slightly angular, about .20 mm. in length, .15 mm. in width; cell-margins elevated, frequently spinose at the angles; distance from each other varying from two to three times their width; intercellular spaces occupied by polygonal pits, with distinctly elevated margins, in from one to three series; lower surface covered with an epitheca marked by strong, concentric rugæ, and by radiating striæ formed by the recumbent portions of the cell-tubes.

Formation and locality. In the shaly limestone of the Lower Helderberg group, near Clarksville, N. Y.

LICHENALIA, *Hall.*

LICHENALIA TORTA, *n. sp.*

(PLATE XV, FIGS. 1-7, AND PLATE XIII, FIGS. 17, 18.)

Bryozoum a thin lamellose expansion, celluliferous on one side; lower surface covered with an epitheca marked by concentric wrinkles and by fine concentric striæ; cell-tubes comparatively large, radiating from the centre to the margin; cylindrical, gradually enlarging to the aperture; recumbent, and nearly parallel with the surface for the greater part of their length; near the apertures bending quite abruptly upward, and opening slightly oblique to the surface; length of cell-tubes from one to four mm.; diameter at aperture nearly .5 mm., arranged in intersecting rows; intercellular space channeled; sometimes a slight ridge runs from the anterior portion of one cell to the posterior portion of another. Where the cell-tubes are worn away, the surface is covered by fine, sharp, regular striæ, which become slightly nodose in crossing the concentric lines. There are frequent nodes on the surface of well-preserved specimens.

A specimen showing the cells well preserved is very rarely found, the usual condition being with the cells entirely removed, and showing the concentric and radiating striæ.

This species can be distinguished from *L. distans*, plate xv, figs. 8, 9, by its larger, circular cell-apertures, and their more regular arrangement.

Formation and localities. Lower Helderberg group, near Clarksville, and Schoharie, N. Y.

LICHENALIA DISTANS, *n. sp.*

(PLATE XV, FIGS. 8, 9.)

Bryozoum foliate, incrusting or free; about .65 mm. in thickness; celluliferous on one side; lower surface covered by a wrinkled epitheca; cell-apertures small, oval, or suboval; margins elevated; length about .30 mm., irregularly arranged.

This species is very similar, in general appearance, to *L. torta* (plate xv, figs. 1–7), but may be distinguished from that one by its smaller and irregularly arranged oval pores.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

Lichenalia dissimilis, *n. sp.*

(PLATE XV, FIGS. 10–13.)

Bryozoum consisting of large, irregularly undulating, foliate expansions, of one mm. or more in thickness; width of largest specimen observed 120 mm.; celluliferous on one side; lower surface covered by a wrinkled epitheca; cells arising from the epitheca, and opening very obliquely to the surface, frequently alternating, arched and imbricating; slightly longer than wide; length about .65 mm.

This species, in its cell-apertures, is very similar to Alveolites, and may possibly belong to that genus.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

CERAMOPORA, *Hall.*

Ceramopora labeculoidea, *n. sp.*

(PLATE XVI, FIGS. 1, 2.)

Bryozoum small, circular, very thin; cells commencing in the centre and radiating nearly to the margin, comparatively large, cylindrical or nearly so, very oblique to the surface, .25 mm. in diameter at the aperture; apertures arched, arranged in alternating and imbricating series. The bryozoum for a short distance from the margin is free from cells and undulating; lower surface covered by an epitheca, and concentrically wrinkled.

This species differs from *C. maculata* (plate xvi, figs. 5–11), in being much thinner, the cells proportionately larger, more oblique and radiating from the centre to the margin without maculæ of larger cells. It bears a very close resemblance to *C. labecula* of the Niagara group, and may belong to that species.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Ceramopora parvicella, *n. sp.*

(PLATE XVI, FIGS. 3, 4.)

Bryozoum thin, foliate, incrusting, celluliferous on one side. Cells consisting of very oblique, subcylindrical tubes, opening rectangularly to the plane of the surface, having frequent maculæ where the cells are larger than in other portions; diameter of ordinary cell-tubes at aperture .25 mm., of the larger ones .3 mm.; apertures arched or triangular, arranged in alternating and imbricating series; lower surface covered by an epitheca which is strongly wrinkled concentrically, and having fine, radiating lines formed by the recumbent portion of the cell-tubes.

This species differs from *C. maculata*, plate xvi, figs. 5-11, in being incrusting, the frond much thinner, the cells smaller, more oblique and not radiating from a centre.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

CERAMOPORA MACULATA.

(PLATE XVI, FIGS. 5-11.)

Ceramopora maculata, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 108. 1874.

Bryozoum discoidal, flattened or concave on the lower side, covered by an epitheca having strong concentric wrinkles. Cells polygonal, radiating from the centre; diameter at aperture one-half of one millimetre; there are frequent maculæ where the cells are larger—about once and one-half as large as those on other portions; cell-walls sometimes slightly elevated at the angles, forming low spine-like projections at the centre of the disc; the cell-tubes in the central portions are at right angles to the surface, becoming more oblique as they approach the margin, where they are nearly rectangular to the central ones; the diameters of the discs vary from six to forty mm.; thickness of the larger specimens from two to three mm.

This species resembles *C. imbricata* of the Niagara limestone, but differs in the less distinctly hooded apertures; the maculæ are more obscure and less strongly divided and radiate, and it also grows to a much larger size.

Formation and localities. Lower Helderberg group, Clarksville and Schoharie, N. Y.

CERAMOPORA (BERENICEA) MAXIMA.

(PLATE XVI, FIG. 12.)

Ceramopora (Berenicea) maxima, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 109. 1874.

Bryozoum of a depressed-convex form, composed of cells which radiate from the centre of the disc, and open laterally, being nearly at right angles to the plane of the disc at the centre, and becoming more prone as they approach the margin; apertures irregularly hexagonal, somewhat elongated from the projection of the lower margin; diameter of aperture about one mm.; cell-walls thick, obscurely striate inside; their margins, at the angles of the cells, prolonged in a spine-like process; lower surface unknown.

The single specimen found measures eighteen mm. in diameter; it has the general features of those Palæozoic species usually referred to BERENICEA, but is much larger than their usual size. It resembles a MICHELINA with very small cells; but on examination its characters are more like those of a Bryozoan, especially the projections at the angles of the cell-walls.

Formation and locality. In the shaly limestone of the Lower Helderberg group, at Schoharie, N. H.

PALESCHARA, *Hall.*

Paleschara? radiata, *n. sp.*

(Plate XVI, figs. 13, 14.)

Bryozoum consisting of a thin expansion incrusting other bodies. Cells polygonal, contiguous, oblique; apertures about .25 mm. in diameter; irregularly arranged, radiating from a central point.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

Paleschara incrustans.

(Plate XVI, figs. 15–22, ? 24.)

Paleschara incrustans, Hall. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 106. 1874.

Bryozoum growing in Flustra-like expansions; incrusting. Cell-apertures polygonal, about .65 mm. in diameter; occasionally there are maculæ where the cells are slightly larger; cell-walls thick, their margins sometimes elevated at the angles of the apertures into obtuse projections, which are not sufficiently long to be characterized as spines.

The mode of growth is not dissimilar from that of a recent Flustra in its earlier stages, but the cells are less regularly arranged, and the whole has a stronger and firmer aspect.

Formation and locality. In the shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

Paleschara? bilateralis, *n. sp.*

(Plate XVI, figs, 22. 23.)

Bryozoum membraniform; fronds large, very thin, celluliferous on both sides; mesial plate or epitheca wrinkled, and with fine transversely concentric lines. Cells very slightly elevated, and a little oblique; variable in size, form and arrangement, from quadrangular to polygonal, generally longer than wide, with maculæ where the cells are larger than in other portions of the frond; length of the ordinary cell-apertures about .30 mm.; of the larger ones about .75 mm.; sometimes the length is equal to twice the width.

This is a distinct and very easily recognized species; the cells have sometimes a very regular arrangement, proceeding from a certain point in straight rows, slightly diverging, other similar rows coming in between; when having this regularity, the sides of the cells are parallel, and the angles nearly rectangular;

at other times the arrangement is very irregular, as also the form and size of the cells. Only two specimens have thus far been found, and both are fragments, so that the entire form is unknown; these fragments are each about twelve centimetres long and three centimetres wide.

Formation and locality. Lower Helderberg group, Clarksville, N. Y.

STICTOPORA, *Hall.*

STICTOPORA PAPILLOSA, *n. sp.*

(PLATE XIII, FIGS. 12, 13.)

Bryozoum ramose. Branches moderately flattened, transverse section elongate-oval or lenticular in outline; width of branch two mm.; thickness at the middle one mm. Cell-apertures circular, about .20 mm. in diameter, generally arranged in longitudinal rows; distant from each other less than the diameter of an aperture; margins distinctly elevated and sloping.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

ESCHAROPORA, *Hall.*

ESCHAROPORA LIRATA.

(PLATE XVII, FIGS. 1-6.)

Escharopora lirata, HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 100. 1874.

Bryozoum small, ensiform, gradually enlarging from an obtusely pointed striated base, for a short distance, the sides then becoming nearly parallel; width from one and a half to two mm.; transverse section lenticular in form; celluliferous on both sides; a thin epitheca dividing the cells of the two sides. Cell-apertures large, arranged in longitudinal rows—five or six rows on each side; apertures elongate-oval; three in the space of one mm. longitudinally, and five in the same space transversely; the cells of the two outer rows larger than the others; longitudinal partitions thick, elevated, granulose; transverse partitions thin, deeply depressed, widening at the junction with the longitudinal partitions, and having a pore on the expanded portion.

This species differs from *E. tenuis* (plate xvii, figs. 7–13), in its smaller size, proportionally larger cells, and the peculiar lirate appearance given to it by the thick elevated walls separating the longitudinal rows of cell-apertures.

Formation and locality. In the upper shaly portions of the limestones of the Lower Helderberg group, Clarksville, N. Y.

ESCHAROPORA TENUIS.

(PLATE XVII, FIGS. 7-13.)

Escharopora tenuis, HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 99. 1874.

Bryozoum consisting of thin, elongate, narrow stipes. with a striated base; gradually enlarging from an obtuse point to a short distance above the commencement of the celluliferous portion, when the sides become parallel; celluliferous on both sides. Cells arising obliquely from a thin, mesial lamina; apertures oval, rhomboidal, and occasionally hexagonal; on the central portion of the stipe the cells are of nearly uniform size, and arranged in longitudinal rows; there being fifteen cell-apertures in the space of five mm. longitudinally, and twenty in the same space transversely; longitudinal partitions thicker than the transverse. On the marginal portion the cells are larger, proportionally longer, more irregularly arranged and oblique to the others.

The transverse partitions widen at their junction with the longitudinal partitions, and frequently have a pore on the expanded portion. A single specimen has nodes similar to *E. nebulosa.*

Formation and localities. In the shaly limestones of the Lower Helderberg groups, Albany and Schoharie counties, N. Y.

Escharopora nebulosa.

(plate xvii, figs. 14–16.)

Escharopora nebulosa, Hall. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist., p. 99. 1874.

Bryozoum a thin foliate expansion, having a striated base; becoming abruptly wider and thinner at the commencement of the celluliferous portion; celluliferous on both sides. Cells arising obliquely from a thin, mesial lamina, arranged in parallel, longitudinal rows, rarely interrupted by intercalation of new rows, and then diverging slightly; apertures oval or quadrangular, occasionally hexagonal, a little longer than wide; twelve in the space of five mm. longitudinally, and eighteen in the same space transversely; longitudinal partition walls thin, rounded on the edges; transverse partitions thinner and depressed; the surface is marked by numerous nodes where the cells are larger than on other portions of the frond; thickness of the frond one and one-half mm.; width of the largest specimen observed more than fifty mm.

This species differs from *E. tenuis*, pl. xvii, figs. 7–13, in its greater breadth, nodulose surface, and the proportionally shorter cell-apertures.

Formation and localities. Lower Helderberg group, Catskill creek and Clarksville, N. Y.

Escharopora (? Paleschara) bifoliata.

(plate xvii, figs. 17, 18.)

Paleschara bifoliata, Hall. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist, p. 107. 1874.

Bryozoum growing in broad, foliate expansions, celluliferous on both sides. Cells arising obliquely from a mesial lamina; thickness of frond slightly more than one mm.; greatest width of an imperfect frond eighty mm.; cell-apertures rhomboidal or hexagonal, appearing oval on worn surfaces; diameter of aperture .25 mm.; there are frequent nodes having slightly larger cells than the other portions; cell-walls thin; cells more or less regularly arranged in undulating intersecting lines.

This species can be distinguished from *E. nebulosa* (plate xvi, figs. 14–16), to which it bears some resemblance, by its rhomboidal or hexagonal cells, with equally thick walls; equal length and width, and the absence of the regular longitudinal arrangement of cells, which is characteristic of that species.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

FENESTELLA, *Lonsdale.*

Fenestella compacta, *n. sp.*

(PLATE XVIII, FIGS. 1–3.)

Bryozoum cup-shaped. Branches strong; eight and nine in the space of five mm.; on non-poriferous side flattened, obscurely striated and much enlarged below the bifurcations, which are infrequent.

Dissepiments strong, from one-half to equal thickness of the branches; seven in the space of five mm., expanding at their junction with the branches; rounded and depressed on both poriferous and non-poriferous sides.

Fenestrules oval or subquadrangular, width less than that of the branches.

Cell-pores small, round, in two or three ranges; sometimes the third range extends but a short distance below the bifurcations, occasionally extending nearly to the next bifurcation below; distance of pores from each other equal to or greater than the diameter, opening directly upward; margins elevated, and indenting the boarder of the fenestrule.

Formation and locality. Lower Helderberg group, Clarksville, N. Y.

Fenestella arta, *n. sp.*

(PLATE XVIII, FIGS. 4–9.)

Bryozoum cup-shaped, undulating. Branches strong, varying in width; from five to nine in the space of five mm.; on non-poriferous side round, frequently slightly angular, apparently smooth, enlarging very much below the bifurcations, being frequently double the width of the branches just above.

Dissepiments from one-half to two-thirds the thickness of the branches immediately above the bifurcations; six in the space of five mm., expanding at their junction with the branches, angular on non-poriferous side, rounded and slightly depressed on poriferous side.

Fenestrules small, varying in form from subquadrangular to oval; width from one-fourth to two-thirds that of the branches, appearing much smaller and frequently scarcely perceptible on poriferous side.

Cell-pores in two and three ranges; always three ranges immediately below the bifurcation, the third range sometimes extending but a short distance, at others nearly to the bifurcation below; pores small, round, or slightly oval; three in the space of a fenestrule; distance from each other equal to or greater than their diameter, opening directly upward; where there are three ranges of pores, the openings of the two outer ranges are oblique to the axis of the branch;

cell-margins elevated, and indenting the borders of the fenestrule; space between ranges of pores strongly striated on well-preserved specimens.

Formation and locality. Lower Helderberg group, Clarksville, N. Y.

FENESTELLA PAXILLATA, *n. sp.*

(PLATE XVIII, FIGS. 10–12.)

Bryozoum flabellate or funnel-shaped. Branches, compared with the size of frond, slender; five or six in the space of five mm.; bifurcations distant; branches on non-poriferous side flattened, striated; striæ fine, from four to seven on a branch; for a short distance below the bifurcation is a broad, shallow, groove, extending less distinctly and narrower nearly the whole length of the branch.

Dissepiments four in the space of six mm.; width about two-thirds that of the branches, rapidly expanding at their junction with the branches; on non-poriferous side they are on the same plane as the branches; on poriferous side depressed.

Fenestrules oval to subquadrangular; a little more than twice as long as wide; width slightly more than that of the branches.

Cell-pores in three ranges, except for the distance of about two fenestrules below the bifurcations, where there are four in this space; the two central ranges are very close together and alternating, and open directly upward; the ranges on the sides are distant from the central range or ranges, and open so directly outward that, in looking perpendicularly upon the specimen, they are scarcely visible; margin of cells but very little elevated; six in the space of a fenestrule.

On account of the distant bifurcations, the branches run directly parallel for some distance, without increasing in size, which gives to the frond a peculiarly rigid appearance, distinguishing it from any other species.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA COMPRESSA, *n. sp.*

(PLATE XVIII, FIGS. 14–18.)

Bryozoum funnel-shaped. Branches, five in the space of five mm., much enlarged near the frequent and irregular bifurcations; on the non-poriferous side branches round, with fine but distinct striæ, which are frequently finely granulose; five or six on a branch.

Dissepiments about one-half as wide as the branches, granulose-striate, slightly expanding at their junction with the branches, occurring at irregular intervals, averaging about four in the space of five mm.

Fenestrules very variable in shape, from elongate-ovate to broadly oval or subquadrangular; width about one and one-half greater than that of the branches; length from two to three times the width.

Cell-pores in from two to four ranges; immediately below the bifurcations there are occasionally four ranges, for the distance of one and one-half or two fenestrules there are three ranges, and for the remainder of the distance to the next bifurcation there are two; where three and four ranges occur, the branch is flattened on the top, and much wider than in the other portion; the central range or ranges open directly upward, the others directly outward, so that where three ranges occur, in looking directly upon the specimen, the two outer ranges are scarcely perceptible. Pores large, round, closely arranged, five in the space of a fenestrule; cell-margins thin, but very slightly elevated; space between ranges of pores and dissepiments obscurely, tortuously striated.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA (POLYPORA) LILÆA.

(PLATE XVIII, FIGS. 19, 20.)

Polypora Lilia, HALL. Twenty-sixth Rep. N. Y. State Mus. Nat. Hist., p. 96. 1874.

Bryozoum fan-shaped. Branches moderately strong, seven or eight in the space of five mm.; on non-poriferous side rounded, striated; striæ obscure.

Dissepiments one-half the width of the branches, five or six in the space of six mm., enlarging at their junction with the branches.

Fenestrules subquadrangular to oval; width varying from equal to the branches to one-half greater; length from two to two and one-half times the width.

Cell-pores in from two to four ranges, large, oval, contiguous, alternating, and forming on the broader part of the branch, oblique intersecting rows; margins very slightly elevated; generally, on the dissepiment near the junction with the branch, there is a single cell-pore, and occasionally the entire dissepiment is poriferous.

Formation and localities. Lower Helderberg group, Schoharie, and near Clarksville, N. Y.

FENESTELLA EUDORA, *n. sp.*

(PLATE XIX, FIGS. 3-10 and ? 1, 2.)

Bryozoum fan-shaped; stipe at base nearly one mm. in diameter. Branches moderately strong near base, becoming more slender above; bifurcations frequent and irregular below, becoming more distant above; on non-poriferous side, branches rounded, striated; striæ obscure, from five to seven on a branch; from eight to ten branches in the space of five mm.

Dissepiments, five in the space of five mm.; width not quite one-half that of the larger branches, expanding at their junction with the branches; on poriferous side of frond slightly depressed, striated.

Fenestrules quadrangular, variable in width, but generally about as wide as the branch; the more slender the branch, the narrower the fenestrules; length from one and one-half to three times the width.

Cell-pores in two ranges, broad-oval or round, very closely arranged, opening slightly obliquely outward, and but very slightly upward; from four to six in the space of a fenestrule; cell-margins thin, elevated, slightly indenting the border of the fenestrule; pores in the opposite ranges alternating; space between ranges of pores not carinated in some cases, in others very slightly carinated, or obtusely angular; obscurely striated, and occasionally a line of obscure nodes.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA ÆSYLE, *n. sp.*

(PLATE XIX, FIGS. 11–13.)

Bryozoum fan-shaped. Branches slender, rapidly diverging; from eight to ten in the space of five mm., but very slightly enlarging below bifurcations, which are frequent and irregular.

Dissepiments slender, from one-half to two-thirds the width of the branches; six in the space of five mm., but slightly expanding at their junction with the branches.

Fenestrules variable in size and shape, generally subquadrangular; width varying from once to three times that of the branches; poriferous side unknown.

Formation and locality. Lower Helderberg group, near Clarksville. N. Y.

FENESTELLA IDOTHEA, *n. sp.*

(PLATE XIX, FIGS. 14, 15.)

Polypora elegans ? HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 97. 1874.

Bryozoum palmate. Branches moderately strong, rounded, frequently and irregularly bifurcating; non-poriferous side unknown.

Dissepiments slender; width from less than one-half that of the branches to nearly equal; six in the space of five mm., scarcely expanding at their junction with the branches.

Fenestrules variable in shape, mostly subquadrangular; width slightly more than that of the branches; length from once and one-half to twice the width.

Cell-pores in two alternating ranges, opening nearly directly outward; openings circular or slightly oval; distance from each other equal to their diameter; three in space of a fenestrule; margins slightly elevated, scarcely indenting the borders of the fenestrules; space between ranges of pores not carinated; rounded; tortuously striated; dissepiments also striated.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA ALTHÆA, *n. sp.*

(PLATE XIX, FIGS. 17–19.)

Bryozoum—only fragments have been so far observed, so that the form of the whole frond is not certainly known. Branches slender; bifurcations comparatively distant, irregular; from seven to nine branches in the space of five mm.; on non-poriferous side rounded, striated; striæ fine, distinct; from three to seven on a branch.

Dissepiments slender, frequently oblique to the branch; four in the space of six mm., expanding at their junction with the branches, the expansion extending but a very slight distance from the branches.

Fenestrules subquadrangular; width varying from equal to two or three times that of the branches.

Cell-pores in two and three ranges; the central range opens directly upward, the two outer ranges nearly directly outward; cell-openings oval, five in the space of a fenestrule; distance from each other less than the diameter of an opening; margins scarcely elevated; at the junction of a dissepiment and branch there is frequently a cell-opening on the expanded portion of the dissepiment.

This species has, in some respects, very much the appearance of *F. crebripora*, but is of a much coarser growth, differing also in the number of ranges of pores.

Formation and locality. Lower Helderberg group, Albany county, N. Y.

FENESTELLA CREBRIPORA.

(PLATE XX, FIGS. 1-3.)

Fenestella crebripora, HALL. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist., p. 95. 1874.

Bryozoum, form unknown—this species having been seen only in fragments. Branches slender, distant; eight in the space of five mm.; on non-poriferous side rounded, striated, striæ fine, indistinct; bifurcations moderately distant.

Dissepiments very slender, oblique to the branches, six in the space of five mm.

Fenestrules subquadrangular; width from once and one-half to twice that of the branches, length frequently double the width.

Cell-pores in two ranges, large, oval, distance from each other less than their diameter, four in the space of a fenestrule, opening outward obliquely to the axis of the branch; margins not elevated; at the junction of the dissepiment with the branch, there is frequently a triangular cell-pore in the expanded portion of the dissepiment, opening directly upward; space between cell-apertures not carinated, though sometimes angular; finely striated; dissepiments also striated.

Formation and locality. Lower Helderberg group, Albany county, N. Y.

FENESTELLA SYLVIA.

(PLATE XX, FIGS. 4-7.)

Fenestella Sylvia, HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 96. 1874.

Bryozoum large, funnel-shaped, rapidly spreading and radiatingly undulating. Branches very slender, closely arranged, twelve in the space of five mm.; non-poriferous side rounded, striated, striæ distinct, from three to five on a branch; sometimes the central striation is so large as to give a carinated appearance to the branch; bifurcations distant.

Dissepiments slender, from one-half to two-thirds the width of the branch; nine to ten in the space of five mm., expanding at their junction with the branches; on non-poriferous side rounded, on poriferous side angular.

Fenestrules small, subquadrangular to oval; width from equal to the branch to one-half greater; length from equal to the branch to twice its width.

Cell-pores in two ranges, small, round; opening outward, at an angle of about 45°; three in the space of a fenestrule; margins elevated, slightly indenting the borders of the fenestrule; space between ranges of cell-pores angular, but not carinated; striated, and having in the centre a line of nodes.

Formation and locality. In upper layers of shaly limestones of the Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA PHILIA, *n. sp.*

(PLATE XX, FIGS. 9–11.)

Bryozoum fan-shaped, undulating. Branches slender, closely arranged near base, becoming more distant above; from twelve to sixteen in the space of five mm.; on non-poriferous side rounded or slightly angular, apparently smooth.

Dissepiments from two-thirds to nearly equal the width of branches; nine in the space of five mm., not enlarging at their junction with the branches; on non-poriferous side rounded, and on the same plane as the branches; on poriferous side angular and depressed.

Fenestrules subquadrangular, variable in width, length from two to two and one-half times the width.

Cell-pores in two ranges, small, round or slightly oval; distance from each other greater than their diameter, three in the space of a fenestrule, opening nearly directly outward, except when occurring opposite the dissepiment, where they open nearly directly upward; space between ranges of pores carinated, carina but little elevated, and having a line of nodes on the top; nodes distinct, sharp, and about equal in number to the cell-pores.

Formation and locality. Lower Helderberg group, Albany county, N. Y.

FENESTELLA HESTIA, *n. sp.*

(PLATE XX, FIGS 12, 13.)

A species with moderately strong branches and subquadrangular fenestrules. The non-celluliferous side is distinctly pustulose. The celluliferous side is unknown.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

FENESTELLA JUNCEUS, *n. sp.*

(PLATE XX, FIGS. 16–18.)

Bryozoum probably cyathiform. Branches slender; from eight to eleven in the space of five mm., frequently presenting a crowded appearance; on non-poriferous side rounded, except just below the bifurcations, where they are flattened; striated, striæ fine, but very distinct, from five to seven on a branch; bifurcations distant, irregular.

Dissepiments, three in the space of five mm., slender; width one-half that of the branches, expanding very slightly at their junction with the branches; on non-poriferous side striated, and on plane of the branches; on poriferous side depressed.

Fenestrules subquadrangular, about four times as long as wide; width varying from one-half to a little more than the width of the branches.

Cell-pores in two ranges, round, distant from each other equal to or greater than their diameter, six in the space of a fenestrule, opening obliquely outward; margins distinctly elevated, and indenting the border of the fenestrule; space between ranges of pores subcarinate, carina narrow, elevated but slightly above the branch.

This species is easily recognized by the long, narrow fenestrules, and the slender and frequently crowded appearance of the branches.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA ADRASTE, *n. sp.*

(PLATE XX, FIGS. 20–22.)

Bryozoum fan-shaped. Branches moderately strong, eight in the space of five mm.; on non-poriferous side flattened, striated, from one to three striæ on a branch; where more than one striation occurs, the one nearest the centre of the branch is much the stronger; very frequently only one striation occurs, in which case it is very strong, giving to the branch a carinate appearance.

Dissepiments about one-third the width of the branches, six in the space of five mm., much expanded at their junction with the branches.

Fenestrules oval, width a little less than that of the branches, length from two to three times the width.

Cell-pores in two ranges, opening nearly directly upward, three in the space of a fenestrule; distance from each other less than the diameter of an opening, sometimes contiguous; cell-apertures circular; margins distinctly elevated, and indenting the borders of the fenestrules; space between ranges of cells carinated, carina sharp, height above the branch equal to the diameter of the branch.

This species is easily recognized by the flattened branches on the non-poriferous side, with the strong central striation giving a carinate aspect.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA CLEIA, *n. sp.*

(PLATE XX, FIGS. 14, 15.)

Bryozoum broadly cup-shaped. Branches somewhat rigid in appearance, from nine to eleven in the space of five mm.; on non-poriferous side subangular near the base, flattened above; bifurcations frequent.

Dissepiments very slender, eight in the space of five mm., width from one third to one-half that of the branches, not expanding at their junction with the branches.

Fenestrules subquadrangular, about twice as long as wide, width variable, but averaging a little less than that of the branches.

Cell-pores in two ranges, opening nearly directly upward; apertures large, circular, three in the space of a fenestrule, distance from each other equal to or less than the diameter of an aperture; margins distinctly elevated, but very slightly indenting the border of the fenestrules, apparently granulose; space between the ranges of pores occupied by a low, rounded ridge, but slightly elevated above the branch, and frequently a slight groove on each side of the ridge.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA THYENE, *n. sp.*

(PLATE XXI, FIGS. 1-5.)

Bryozoum broadly cup-shaped, undulating. Branches strong, nine in the space of five mm.; non-poriferous side angular or subangular, obscurely striated; bifurcations moderately distant, irregular.

Dissepiments eight in the space of five mm., width slightly more than one-half that of the branches, expanding at their junction with the branches; on non-poriferous side of frond angular, on poriferous side rounded.

Fenestrules broadly oval or nearly round; the angularity of the branches and dissepiments on non-poriferous side give them an appearance more nearly circular than is really the case; width nearly the same as that of the branches, slightly longer than wide.

Cell-pores in two ranges, opening obliquely outward; cell-openings small, round, three in the space of a fenestrule, counting those opposite the dissepiment; margins elevated; space between the ranges of pores carinated, carina comparatively thick, elevated, about two-thirds the thickness of the branch, expanded above.

A single specimen of this species shows, at a distance from the base, the long, oval fenestrules, and flattened, striated branches.

This species, on the non-poriferous side, bears a close resemblance to *F. Coronis* (plate xxi, figs. 10–13), but is distinguished from that species by its more compact mode of growth, more slender branches, and smaller fenestrules.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA IDALIA.

(PLATE XXI, FIGS. 6-9.)

Fenestella Idalia, HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 95. 1874.

Bryozoum cup-shaped. Branches moderately strong, closely arranged, eleven in the space of five mm.; on non-poriferous side rounded, striated, striæ very distinct; from four to seven on a branch, frequently granulose; branches much wider below bifurcations; frequently four or five contiguous branches bifurcate at equal distances from the base.

Dissepiments from one-half to one-third the width of the branches, eight in the space of five mm., slightly expanding at their junction with the branches; on non-poriferous side rounded, on poriferous side angular, and deeply depressed.

Fenestrules small, subquadrangular, from three-fourths to once and one-half the width of the branches, length twice the width.

Cell-pores in two ranges, opening nearly directly upward; cell-openings small, round, three in the space of a fenestrule, distant from each other more than the diameter of an opening; margins distinctly elevated, and indenting the border of the fenestrules; space between ranges of pores carinated, height of carina nearly equal to the diameter of a branch; top of carina much expanded, especially below bifurcations, with a fine, sharp keel along the middle, and on each edge a row of nodes, which, when worn, present the appearance of minute pores or pits.

This species is distinguished by the compact and closely arranged branches.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

FENESTELLA CORONIS, *n. sp.*

(PLATE XXI, FIGS. 10–13.)

Bryozoum funnel-shaped, undulating, without fenestrules near the base. Branches strong, seven in the space of five mm.; on non-poriferous side generally angular, sometimes rounded, occasionally granulose, not perceptibly striated.

Dissepiments about two-thirds the thickness of the branches, five in the space of five mm., slightly expanding at their junction with the branches, angular on both sides.

Fenestrules variable in shape and size, from quadrangular to oval, and from equal to double the width of the branches.

Cell-pores in two ranges, openings circular, distant from each other less than the diameter of an aperture, three in the space of a fenestrule, opening nearly directly upward, partially concealed by the carina; margins distinctly elevated, indenting the borders of a fenestrule; space between the ranges of pores carinated, carina elevated more than the thickness of a branch, hollow, much expanded above, and having a thin, sharp crest.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA PRÆCURSOR.

(PLATE XXI, FIGS. 14–18.)

Fenestella præcursor, HALL. Twenty-sixth Rep. N.Y. St. Mus. Nat. Hist. p. 94. 1874.

Bryozoum deep, narrow, funnel-form. Branches strong, seven or eight in the space of five mm.; non-poriferous side generally flattened, gradually enlarging to bifurcations, striated, striæ coarse, rounded, from two to three on a branch, frequently entirely concealed by granules, the branch presenting only a granulose surface; bifurcations few near the base, becoming more frequent and regular above.

Dissepiments about one-half the thickness of the branches, six or seven in the space of five mm., expanding at their junction with the branches, sometimes oblique to the branches; on non-poriferous side granulose, on plane with the branches; on poriferous side depressed, not extending above the ranges of pores.

Fenestrules from subquadrangular to oval, width varying from one-half to equal the width of branches in different fronds, or different parts of the same frond; length varying from double to little more than double the width.

Cell-pores in two ranges, opening directly upward or obliquely outward; openings circular, three in the space of a fenestrule, distant from each other more than the diameter of an aperture; margins elevated, very slightly indenting the border of the fenestrules; space between the ranges of pores carinated, carina elevated more than the diameter of a branch, expanded above, and having, in the middle of the wider portion, a thin, sharp crest, giving to the upper portion of the carina very much the appearance of a branch; the expanded portion has, on each side, a row of pustules, which when worn, present the appearance of ranges of minute cell-pores; occasionally, either on account of the more perfect condition of the frond or more advanced stage of growth, the pustules of contiguous carinæ are extended until they unite, forming slender bars connecting the carinæ; there are five pustules in the space of a fenestrule.

This species, when the pustules are extended into bars, has all the characters of the genus Hemitrypa.

Formation and localities. On the surfaces of decomposing shaly limestone of the Lower Helderberg group, near Catskill and Clarksville, N. Y.

Fenestella quadrula, *n. sp.*

(Plate XXI, figs. 19–22.)

Bryozoum funnel-shaped, rapidly expanding. Branches comparatively broad, nine in the space of five mm.; non-poriferous side flattened, striated, striæ sharp, distinct, generally three on a branch.

Dissepiments ten in the space of five mm., extremely slender, not expanding at their junction with the branches.

Fenestrules quadrangular, width about the same as that of the branches, length but slightly more than the width.

Cell-pores in two ranges, opening nearly directly upward; cell-openings circular, two in the space of a fenestrule, counting those opposite the dissepiment; margin elevated, slightly indenting the border of the fenestrule; space between the ranges of pores carinated, carina sharp, strongly elevated, abruptly expanding above, having in the centre of the wider portion a thin, sharp crest, and on each edge a line of sharp pustules, which frequently have the appearance of minute cell-pores, of which there are five in the space of a fenestrule.

This is a very distinctly marked species, and is easily recognized by its extremely slender dissepiments and square fenestrules.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA (HEMITRYPA) NERVIA.

(PLATE XXII, FIGS. 1-6, AND ? 9, 10.)

Fenestella Nervia, HALL. Twenty-sixth Rep. N. Y. St. Mus. Nat. Hist., p. 93. 1874.
Hemitrypa prima, HALL. " " " " p. 98. 1874.

Bryozoum broadly spreading, funnel-shaped, undulating on a line with the branches. Branches closely arranged, nine in the space of five mm.; on non-poriferous side rounded, apparently smooth, though better presevea specimens may show striæ; bifurcations frequent, irregular.

Dissepiments from one half to equal the thickness of branches, six in the space of five mm., widening at their junction with the branches; on non-poriferous side on the same plane as the branches, on poriferous side deeply depressed.

Fenestrules oval, generally from one-half to two-thirds the width of the branches, length twice the width.

Cell-pores in two ranges, opening obliquely to the axis of the branch; openings small, oval or circular, three to four in the space of a fenestrule, counting those opposite the dissepiment, generally one, sometimes two so situated; margins of upper portion of cell-pores distinctly elevated, of lower portion slightly elevated; space between ranges of pores carinated, carina sharp, elevated equal to the thickness of the branch, expanded above; expanded portion finely striated and having in the center a small sharp keel; crests of carinæ connected by a series of narrow, angular and striated bars, about fourteen in the space of five mm.

This species, in the study of more extensive collections, was found to include the forms previously described as *Hemitrypa prima*.

Formation and localities. Lower Helderberg group, two miles north of Clarksville, N. Y., and at Schoharie.

FENESTELLA CLEIS, *n. sp.*

(PLATE XXI, FIGS. 7, 8.)

Bryozoum broadly cup-shaped. Branches closely arranged, moderately strong, nine in the space of five mm.; on non-poriferous side somewhat flattened; striated, striæ granulose, strong, from three to five on a branch; bifurcations comparatively regular.

Dissepiments six in the space of five mm., expanding at their junction with the branches, on non-poriferous side on plane of the branches; on poriferous side depressed.

Fenestrules small, oval, width from one-half to two-thirds the width of the branches, length from once and one-half to a little more than twice the width.

Cell-pores in two ranges, opening obliquely outward; openings small, round, three or four in the space of a fenestrule, distance from each other equal to or greater than their diameter; margins elevated; space between ranges of pores carinate, carina sharp, elevated, slightly thickened above in well-preserved specimens.

This species resembles *F. Nervia* (pl. xxii, figs. 1–6), but the branches are straighter, giving a more rigid appearance to the frond, and so far as observed the carinæ are never connected by bars as in that species.

Formation and locality. In the Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA (HEMITRYPA) NERVIA *var.* CONSTRICTA, *n. var.*

(PLATE XXII, FIGS. 11, 12.)

This form differs from *F. Nervia* in the closer arrangement of branches and much smaller fenestrules, but it is probably only a variety of that species.

FENESTELLA (HEMITRYPA) BISERIALIS, *n. sp.*

(PLATE XXII, FIGS. 13–18.)

Bryozoum funnel-shaped, not rapidly expanding.

Branches ten in the space of five mm.: on non-poriferous side rounded, granulose, not perceptibly striated; opposite each dissepiment a node, which is frequently strongly elevated forming a blunt spine.

Dissepiments from one-third to two-thirds the width of the branches, seven or eight in the space of five mm.; on non-poriferous side slightly angular, on poriferous side rounded, on both sides depressed, expanding at their junction with the branches; oval or subquadrangular, nearly as wide as the branches; length once and one-half to twice the width.

Cell-pores in two ranges opening nearly directly upward; openings small, circular, three in the space of a fenestrule, counting those opposite the dissepiment; distance from each other equal to or greater than their diameter; margins elevated indenting the border of the fenestrule; space between the ranges of pores carinated, carina sharp, elevated about the diameter of a branch, expanding above; crests connected with each other by an extension of their substance in the form of slender bars; the bars of adjacent crests alternate with each other, forming midway between them a longitudinal ridge of a thickness equal to that of the bars, and leaving a double range of small fenestrules; twenty-three bars in the space of five mm.; top of carina rounded, obscurely striated.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

ICHTHYORACHIS, *McCoy.*

ICHTHYORACHIS NEREIS.

(PLATE XXII, FIGS. 19–21.)

Ichthyorachis Nereis, HALL. Twenty-sixth Rep. N Y. St. Mus. Nat. Hist., p. 98. 1874.

Bryozoum plumose, midrib flattened on non-poriferous side, longitudinally striate with a groove along the center; lateral branches slender, distance from each other equal to the width of the midrib; pores on all specimens seen, indistinct; two rows on the lateral branches with three or more on the midrib; length of largest specimen seen, seventeen mm.; width of midrib .5 mm.; branches about one-half as wide as the midrib.

This species is very rare and all specimens observed are imperfect and indistinct; as the specimens seen appear, they have the character of both ICTHYCRACHIS and GLAUCONOME.

Formation and locality. Lower Helderberg group, Schoharie, N. Y.

THAMNISCUS, *King*.

THAMNISCUS VARIOLATA, *n. sp.*

(PLATE XXII, FIGS. 34–46.)

Bryozoum fruticose; several stems arising from a common base; stems frequently bifurcating and spreading laterally, becoming very much widened before bifurcation, clavate, celluliferous on one side, smooth on the other or faintly marked longitudinally from the cell-tubes within.

Cell-tubes cylindrical, diameter at their aperture about .15 mm.; length three mm.; for most of the distance nearly parallel with the branches, then abruptly turning and opening directly outward; a row on each side of a branch opens laterally; in some places, especially just above the bifurcations, they are arranged in oblique rows—the distance between the rows about equal to the diameter of an aperture; the apertures forming the rows are contiguous, but generally they do not seem to be arranged in any regular order, and are frequently crowded; inosculating; margins much elevated; length of longest specimen seen, eighteen mm., greatest diameter two mm.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

THAMNISCUS NYSA, *n. sp.*

(PLATE XXII, FIGS. 47, 48.)

Several stems arising from a common base, frequently bifurcating, celluliferous on one side, smooth or obscurely striated on the other, expanding but very slightly below bifurcations; diameter of largest stem seen, a little more than one mm.

Cell-tubes cylindrical, opening directly outward, diameter of aperture about .12 mm., margins distinctly elevated; regularly arranged in oblique rows across the branches; distance between rows equal to the diameter of an aperture; the cell-apertures forming the rows are nearly contiguous.

This species can be distinguished from *T. variolata* (pl. xxii, figs. 34–46), by the more nearly equal size of branches, not much enlarging below the bifurcations, by the smaller cell-apertures and their more regular arrangement.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

THAMNISCUS NYSA, *var.*

(PLATE XXII, FIGS. 31, 32.)

The specimen has a mode of growth similar to the preceding species. The cell-apertures are somewhat smaller and not so closely arranged.

Formation and locality. Lower Helderberg group, near Clarkesville, N. Y.

THAMNISCUS FRUTICELLA, *n. sp.*

(PLATE XXII, FIG. 33.)

The only specimen observed is a small branching fragment of a frond, which has a very different mode of growth from the other species. The celluliferous side has not yet been observed.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

THAMNISCUS? CISSEIS, *n. sp.*

(PLATE XXII, FIGS. 23-30.)

Bryozoum ramose, solid, celluliferous on one side, striate on the other; diameter of stem one mm.; branches numerous, equal in size to the main stem, and branching frequently, expanding very slightly below bifurcations: non-celluliferous side striated, striæ fine, numerous; cell apertures small, round or slightly polygonal from mutual proximity, their diameter about .25 mm.; generally four in the width of a branch, alternating, inosculating, forming very oblique rows; sometimes at the angles having minute spines.

Length of largest specimen seen, twenty-five mm.

Formation and locality. Lower Helderberg group, near Clarksville, N. Y.

FENESTELLA ———, *n. sp.*

(PLATE XVIII, FIGS. 21, 22.)

FENESTELLA ———, *n. sp.*

(PLATE XIX, FIG. 16.)

STATE OF NEW YORK.

No. 120.

IN ASSEMBLY,

February 7, 1880.

THIRTY-THIRD ANNUAL REPORT

OF THE STATE MUSEUM OF NATURAL HISTORY BY THE REGENTS OF THE UNIVERSITY OF THE STATE OF NEW YORK.

University of the State of New York,
Office of the Regents,
Albany, *April* 30, 1880.

To the Hon. George H. Sharpe,

Speaker of the Assembly:

Sir — I have the honor to transmit to the Legislature the Thirty-third Annual Report on the State Museum of Natural History by the Regents of the University.

Very respectfully,

Your obedient servant,

ERASTUS C. BENEDICT,

Chancellor of the University.

REPORT.

To the Honorable the Legislature of the State of New York:

The Regents of the University of the State of New York, as Trustees of the State Museum of Natural History, respectfully submit their Thirty-third Annual Report.

The condition of the State collections, as detailed in the accompanying reports of the director and botanist, is highly satisfactory. Very material additions have been made during the past year in all departments, partly by the efforts of the scientific staff of the museum, and partly by contributions by way of exchange.

The preparation and labeling of specimens have been carried forward as rapidly as the number of assistants would permit. The preparing sections of palæontological specimens showing internal structure has been continued with great success. The same machinery also has been applied to trimming and shaping large specimens which could not without injury be trimmed by the hammer alone.

The botanist has, since the date of his last report, placed in the herbarium of the museum a large number of specimens collected by himself and contributed by others. Lists of these will be found in his report.

The assistant in zoölogy has made large additions to the collections in entomology. The zoölogical department of the museum, although very valuable and instructive, still requires material additions to render it a satisfactory representation of the zoölogy of the State.

The want of additional space in which to arrange the collections of the museum is every year more and more felt. Large numbers of specimens in geology and palæontology are kept in buildings outside of the museum for want of room. They are, therefore, in a great measure, valueless for the purposes intended, and the separation of the collections renders the care and study of them much more difficult and unsatisfactory. The trustees, therefore, beg to urge the necessity of providing, at an early day, sufficient space for the rapidly increasing and invaluable material of the museum.

The trustees have noted with satisfaction the increase in the number of visitors to the rooms of the museum. Realizing the propriety of making the State museum, as far as possible, a place of instruction and interest to the public, they have appointed a special assistant, whose duty it is to provide information and guidance to those who wish to visit and study the collections.

The trustees, in conclusion, desire to express their satisfaction with the ability as well as the industry and fidelity with which the scientific staff have fulfilled their duties.

All of which is respectfully submitted.

By order of the Regents,
ERASTUS C. BENEDICT,
Chancellor of the University.

David Murray,
Secretary.

REPORT.

ALBANY, *January* 5, 1880.

To the Honorable the Board of Regents of the University of the State of New York:

GENTLEMEN — I communicate herewith the Annual Report on the State Museum of Natural History, giving some account of the condition of the collections in the several departments, the additions which have been made, and the work done in the institution during the past year.

I am able to report that the collections of the museum are in good order, and are arranged for exhibition and study as satisfactorily as our facilities will admit. The want of room for the increasing collections is more seriously felt every succeeding year, and it has become quite impossible to place on exhibition the results of the labor in the several departments. The want of proper working rooms in connection with the museum building has long been a serious cause of embarrassment, and most of the work of arrangement and preparation is, from necessity, done outside of the walls of the museum. This being already known to the Regents, it is unnecessary for me to offer any comment, farther than to remark that there are several thousand specimens of fossils already prepared for arrangement in the museum, and for which we have no available space in the building.

I beg leave to repeat on this occasion what I have said in my report of last year regarding some parts of the zoölogical collections. I regard it as very important that the ornithological collection should be re-arranged and relabeled, in accordance with the more recent nomenclature, and that the wanting species should be supplied. Beyond this we need information regarding the migration and local distribution, habits, breeding, etc., of many of the species. While so much attention is being given to this subject in various parts of the country, the State Museum of New York should not remain behind similar institutions elsewhere. The subject of ornithology has enlisted so many votaries who have become experts in the science, that it will not be difficult to secure the services of a competent person, who, for a moderate compensation, would undertake and complete the work in a manner creditable to himself and to the State.

In January last I made a special communication to your honorable body upon this subject; and I beg leave now to call your serious attention to the matter, with a hope that we may be able to accomplish so desirable an object, both for the advancement and diffusion of scientific knowledge among the people of the State, and for the credit and respectability of the State museum.

With my last report, I made a special communication, accompanied by a letter from Mr. Andrew Sherwood relative to the completion of the geological map of the Catskill mountain region ; a map commenced in 1873, and nearly completed when Mr. Sherwood entered the service of the Geological Survey of Pennsylvania, where he has been occupied until last year. Having been employed in the adjacent regions of Pennsylvania, which are of similar geological structure, his experience has given him great advantages, and he will be prepared to give a more satisfactory result, and to connect the work of New York with the completed work of the adjoining State. Mr. Sherwood offers to finish the map for a very moderate cost, and a single season of field work will render it available for publication. I consider this as very important in every respect, and a work that should be no longer neglected.

In order that the reports on the State museum might present evidence of attention to matters of special economic interest, closely connected with the immediate wants of an intelligent people, I communicated, with my report of last year, a paper by Mr. C. E. Hall, of the Pennsylvania Geological Survey, upon the geographical and geological distribution of the iron ores in portions of Northern New York. This report is still in the hands of the printer.

With a view to a farther exposition of this important subject, I have made an arrangement with Mr. J. H. Case, civil and mining engineer at Port Henry, to prepare a correct map of the mining region of that part of the country, which will be accompanied by some account of the history and progress of mining the magnetic ores, and the statistics regarding the present production. I communicate with this report an outline map upon which the positions of certain ore beds are laid down. I believe that this work is of great importance, and would be of general interest to the public, as giving reliable information concerning this most important mineral resource of the State. At the present time we have no publication which gives any complete account of these mines, in their character or production. The report of Dr. Emmons in 1843 was necessarily very incomplete ; the mines had not been developed ; the knowledge then possessed was only from the initiation of enterprises which have subsequently proved of great magnitude and importance.

The details of the additions to the museum in each of its departments will be found appended to this report. The donations have not been as extensive as in some former years.

To the Botanical department there have been thirty contributors of an aggregate of one hundred and thirty-two species. The details in regard to this department will be found in the report of the botanist.

To the Zoölogical department, twenty-six contributors of an aggregate of two hundred and thirty-six species.

To the Mineralogical, Geological and Palæontological department there have been seven contributors.

To the Archæological department one contributor is recorded.

To the Library contributions have been received from thirty individuals and societies of forty-two miscellaneous pamphlets, eighty-seven serials, and eighteen bound volumes.

Museum Publications.

Museum edition of the Twenty-eighth Report on the State Museum of Natural History.

The Thirtieth Report, containing 256 pages and four plates. [Copies received at the museum April 27th, 1879.]

The Thirty-first Report, containing 78 pages. [Copies received at the museum September 27th, 1879.]

The following papers by those engaged in the museum have appeared in other publications:

United States species of Lycoperdon. By C. H. Peck.

Transactions of the Albany Institute, Vol. IX, pp. .

Descriptions of new species of fossils from the Calciferous formation. By C. D. Walcott. Advance of the 32d *Report on the State Museum of Natural History*. Jan. 3d, 1879. 4 pp.

Utica slate, etc. Fossils of the Utica slate and metamorphoses of Triarthrus Becki. By C. D. Walcott. *Transactions of the Albany Institute*, Vol. X, 1879. Also, as a pamphlet, 38 pp. and two plates.

Description of a new species of Anisota. By J. A. Lintner. *Canadian Entomologist*, Vol. XI, pp. 10–12.

The clover-seed Fly, a new insect pest. By J. A. Lintner. *Ibid.*, Vol. XI, pp. 44, 45.

On Cecidomyia leguminicola, n. sp. By J. A. Lintner. *Ibid.*, Vol. XI, pp. 121–124.

Annual address of the President of the Entomological Club of the American Association for the Advancement of Science. [J. A. Lintner.]

Ibid., Vol. XI, pp. 163–175.

Descriptions of new species of fossils from the Niagara formation, at Waldron, Indiana. By James Hall.

Transactions of the Albany Institute, Vol. X, pp. 57.

Also, as a pamphlet, 20 pp.

The Work of the Museum.

Botany. — The accompanying report of the botanist, Mr. C. H. Peck, will indicate the work done by himself, the additions to the herbarium, and the general condition of the department.

Zoölogy. — Owing to the discontinuance for the past few years of special appropriations for increase in the Zoölogical department, no large additions have recently been made. A few specimens of birds have been mounted and placed in the cases. As a source of interest to visitors, and of instruction to students, and to the agriculturists and horticulturists of the State, two collections of insects have been commenced during the past year. A Synoptical Collection designed to illustrate the classification of the insect world, and to readily show to the student its systematic divisions into orders, families, genera and species. Five cases have been arranged and are ready.* The completed

* For list of species, see art. 3 of this report.

series will probably require about twenty cases for its illustration. For the Biological Collection, quite an amount of material has been obtained, which is not yet exhibited. This collection is intended to represent the entire life-history of our most injurious insects, throughout, as far as possible, their several stages and transformations, their architecture, conditions of disease, the parasites attacking them, and their depredations upon their food-plants or other objects which they infest or frequent. Such a collection will admit of indefinite extension ; and its value for instruction and economic uses will be commensurate with its use in showing the several phases of the insect depredator whose nature and habits it is important to learn.

Geology. — The principal work in the arranged collections of this department has been to exhibit in some temporary table-cases the series of rock specimens, two hundred and fifteen in number, collected the previous summer by J. W. Hall from fifty-one typical localities on the Hudson river, between Rhinebeck and New York. This excellent series will illustrate, to some extent, the physical characters and the geographical distribution of the rocks of that part of the Hudson river valley. The specimens at present bear only the locality number, the list of localities corresponding being in the director's office.

The collections of fossil corals from Western New York have furnished large numbers of fine slabs covered with various species and genera of corals, which have been weathered into fine relief ; or of masses of a single species, which being silicified have been beautifully preserved in the weathering and solution of the limestone. These make most interesting and important additions to the collection, both for study and exhibition. For the want of a suitable place for their display, a few of these slabs only have been placed in the entrance hall of the museum.

During the past year, studies of the Gasteropoda, Pteropeda, and Cephalopoda have been essentially finished, and the volume containing the descriptions and figures of the species, embracing 492 pages of letter-press with 120 plates, has been completed and published.

All the specimens of Gasteropoda, which had been in use, from the original collections of the museum, together with others obtained from later collections, and used for special study, have been placed in the cases upon the first floor of the museum and properly labeled. The specimens of Pteropoda and Cephalopoda, which have been used in the descriptions and illustrations of the volume, will soon be labeled and arranged in the cases as far as these afford room for the same. In the last-mentioned class of fossils large accessions have been made to the collections and to the number of species, and the cases available for their exhibition are quite inadequate to contain them.

The cleaning, preparation and ticketing of the extensive collections of 1878, chiefly the Corals and Bryozoa of the Upper Helderberg and Hamilton groups, have occupied the greater part of the time of Mr. Geo. B. Simpson, who has made a careful study of the Bryozoans of this and the previous collections; and has selected and arranged the materials, critically determining the species. This work has been done for the museum collections preparatory to making the drawings for illustrating this portion of the Natural History of the State. The material has afforded figures for about twenty-five plates, for which the original drawings are nearly completed.

Mr. C. E. Beecher has been occupied for a considerable time upon the study and arrangement of the Waldron Collections, of which the museum now possesses a very extensive and well-arranged series. The latter part of the year has been entirely devoted to the Cephalopoda, which will soon be arranged in the rooms of the museum.

In the preparation of the corals, for study and illustration, large numbers of translucent sections have been made, and also simple cuttings with polished surfaces.

The machinery used for cutting sections has also been applied to trimming and shaping large specimens, which cannot be trimmed with a hammer without danger of fracturing. A large number of specimens have thus been made available for the museum, which were too unwieldly or otherwise unfit for arrangement in the cases.

The addition of five hundred drawers during the past year will afford great relief in the disposition of the accumulated collections. These will all be occupied by a selected series of corals, arranged for the special study of this class of fossils, and from which specimens will be taken for illustrating the Natural History. A very large number of specimens of corals will ultimately be available for distribution to the colleges and normal schools; but this work cannot properly be done until the final determination of the species, in order that the collections may be authentically labeled.

During the present year we shall require five hundred additional drawers for receiving the collections which are now in process of being unpacked and prepared for labeling and arrangement. Even with such accommodation, we shall be obliged to repack in boxes a large amount of material, after it shall have been cleaned and ticketed. This course is very unsatisfactory in every way, since it renders so much of the collection almost inaccessible.

Field Collections.

The field collections during the past year have been chiefly limited to the Trenton Limestone. Dr. J. W. Hall was engaged for two or three weeks in making collections from that formation along the shores of Lake Champlain. This collection has furnished specimens of Bryozoa and other fossils, which are very much needed in the museum.

Reports of the Museum.

During the past year, the 28th, 29th, 30th and 31st reports on the State museum have been published for the use of the Regents and the museum. The three first named, together with the 27th report, were especially ordered near the close of the legislative session of 1878, having been previously ordered printed as legislative documents at the time of their presentation. This delay in ordering these reports printed has operated to the disadvantage of the museum, since it has not been possible to place before the public evidence of the work done in the successive years. The printing of so many reports during one year has required much time and special attention to proof-reading by persons connected with the museum. Notwithstanding this unusual interference, the ordinary work of investigation has been very successfully carried on, as you will learn from the communications accompanying this report.

The organization of the museum, as existing during the past year, has been very satisfactory, and the work accomplished, both in the direction of scientific investigation and in the preparation of the collections for the museum, and for illustration, has been greater than in any previous year.

I would therefore recommend that the same organization be continued during the ensuing year.

I am very respectfully,

Your obedient servant,

JAMES HALL,

Director.

REPORT OF THE BOTANIST.

S. B. Woolworth, LL. D., *Secretary of the Board of Regents of the University:*

Sir — Since the date of my last report, specimens of one hundred and eighty-three species of plants have been mounted and placed in the herbarium of the State Museum of Natural History, none of which were before represented therein. A list of the specimens mounted is marked (1).

Specimens of plants have been collected in the counties of Albany, Dutchess, Oneida, Onondaga, Orange, Saratoga, Schenectady, Suffolk and Rensselaer. These represent one hundred and eighty-eight species, of which one hundred and fifty-one are new to the herbarium. Sixty-eight of these are believed to be new or hitherto undescribed species. A list of the specimens collected is marked (2).

Specimens of nineteen New York species, new to the herbarium and not represented by specimens collected by myself, have been contributed by correspondents. These, added to those collected, make the whole number of added species one hundred and seventy. There are, besides, a considerable number of extra-limital contributions. A list of the contributors and their contributions is marked (3).

Previously unreported species, including new species and their descriptions, are marked (4).

New stations of rare plants, remarks and observations are marked (5).

Among the Agarics, classified by botanists under the sub-generic name Amanita, are several species known to be deleterious when used as food. These are sometimes mistaken, by persons not possessing sufficient knowledge or ability to distinguish the species, for those that are harmless and truly edible, and serious accidents are the result. The published descriptions of the species are generally purely technical, and scarcely intelligible to any except botanists. It has, therefore, seemed desirable that a revision of the New York species of this group should be made, and the descriptions written in such a manner as to give special prominence to the principal distinctive characters, so that the species may be easily and readily recognized. The descriptions of all the species hitherto observed in our State have, therefore, been rewritten and supplemented by remarks upon their variations, their peculiar characteristics, and their distinguishing specific features. For the benefit of students of fungi, the synonyms have to some extent been given, and the spore characters of each species have been added. The qualities generally ascribed to the more common species are also noted. Of the others, they are not yet ascertained. The account of these Agarics is marked (6).

(1.)

PLANTS MOUNTED.

New to the Herbarium.

Glaucium luteum	*Scop.*
Alliaria officinale	*D. C.*
Hypericum adpressum	*Bart.*
Aster memoralis	*Ait.*
Plantago Rugelii	*Decaisne.*
Gentiana puberula	*Mx.*
Potamogeton crispus	*L.*
Listera australis	*Lindl.*
Chantransia violacea	*Ktz.*
Zygnema insigne	*Hass.*
Glœtrichia Pisum	*Thuret*
Micromitrium Austinii	*Sull.*
Agaricus spretus	*Pk.*
A. impolitoides	*Pk.*
A. subhirtus	*Pk.*
A. alboides	*Pk.*
A. patuloides	*Pk.*
A. dealbatus	*Sow.*
A. odorus	*Bull*
A. anisarius	*Pk.*
A. leptolomus	*Pk.*
A. cremoraceus	*Pk.*
A. hygrophoroides	*Pk.*
A. lentinoides	*Pk.*
A. atratoides	*Pk.*
A. luteopallens	*Pk.*
A. epichysium	*Pers.*
A. tomentosolus	*Pk.*
A. umbrosus	*Pers.*
A. dystheles	*Pk.*
A. muricatus	*Fr.*
A. trechisporus	*Berk.*
A. nodulosporus	*Pk.*
A. eutheloides	*Pk.*
A. infelix	*Pk.*
A. sapineus	*Fr.*
A. carbonarius	*Fr.*
A. aquatilis	*Fr.*
A. flavidus	*Schæff.*
A. Artemisæ	*Pass.*
A. modestus	*Pk.*
Cortinarius cærulescens	*Fr.*
C. crystallinus	*Fr.*
C. amarus	*Pk.*
C. opimus	*Fr.*
C. bivelus	*Fr.*
C. furfurellus	*Pk.*
C. armeniacus	*Fr.*
C. iodes	*B. & C.*
Hygrophorus lividoalbus	*Fr.*
Lactarius corrugis	*Pk.*
Russula nigricans	*Bull.*
R. delica	*Fr.*
R. compacta	*Frost.*
Russula olivascens	*Fr.*
R. flavida	*Frost.*
Marasmius archyropus	*Fr.*
Boletus punctipes	*Pk.*
B. rubinellus	*Pk.*
B. sensibilis	*Pk.*
B. Roxanæ	*Frost.*
Polyporus parvulus	*Kl.*
P. simillimus	*Pk.*
P. circinatus	*Fr.*
P. cuticularis	*Bull.*
P. chrysoloma	*Fr.*
P. molluscus	*Fr.*
Trametes Trogii	*Berk.*
Hydnum fuscoätrum	*Fr.*
H. cinnabarinum	*Schw.*
H. alutaceum	*Fr.*
Grandinia membranacea	*Pk.*
Craterellus Cantharellus	*Schw.*
C. clavatus	*Pers.*
Corticium polyporoideum	*B. & C.*
C. subrepandum	*B. & Cke.*
Clavaria fastigiata	*L.*
C. formosa	*Pers.*
C. corrugata	*Karst.*
C. flaccida	*Fr.*
Pterula divaricata	*Pk.*
Tremella subcarnosa	*Pk.*
Dacrymyces conglobatus	*Pk.*
Melanogaster variegatus	*Tul.*
Rhizopogon rubescens	*Tul.*
Cynophallus caninus	*Fr.*
Phallus Ravenelii	*B. & C.*
Clathrus cancellatus	*L.*
Geaster Capensis	*Thum.*
Enerthenema papillata	*Pers.*
Cribraria vulgaris	*Schrad.*
Acrospermum album	*Pk.*
Sphæropsis Peckiana	*Thum.*
S. pulchrispora	*P. & C.*
S. typhina	*Pk.*
S. cornina	*Pk.*
Depazea Juglandina	*Fr.*
Septoria Albaniensis	*Thum.*
S. Canadensis	*Pk.*
Vermicularia compacta	*C. & E.*
Torula ramosa	*Pk.*
Septosporium velutinum	*C. & E.*
Puccinia Scirpi	*Lk.*
Synchytrium Anemones	*D. C.*
Protomyces conglomeratus	*Pk.*
Isaria fulvipes	*Pk.*
Tubercularia hirtissima	*Pk.*
T. subdiaphana	*Schw.*

Periconia albiceps	*Pk.*
Helminthosporium obovatum,	*Berk.*
Cladosporium compactum	*B. & C.*
Heterosporium Ornithogali	*Kl.*
Fusicladium dendriticum	*Wallr.*
Cercospora Rosæcola	*Pass.*
C. Apii	*Fres.*
Peronospora Ficariæ	*Tul.*
P. Corydalis	*De By.*
P. gangliformis	*Berk.*
Verticillium lateritium	*Ehr.*
Polyactis cinerea	*Berk.*
Penicillium bicolor	*Fr.*
Spondylocladium tenellum	*Pk.*
Oidium destruens	*Pk.*
Ramularia effusa	*Pk.*
R. variabilis	*Feckl.*
R. albomaculata	*Pk.*
R. angustata	*Pk.*
R. Norvegicæ	*Pk.*
R. Fragariæ	*Pk.*
R. lineola	*Pk.*
R. Plantaginis	*Pk.*
Glomerularia Corni	*Pk.*
Sporotrichum sulfureum	*Grev.*
S. virescens	*Lk.*
S. alutaceum	*Schw.*
S. larvatum	*Pk.*
Acremonium flexuosum	*Pk.*
Sepedonium cervinum	*Dittm.*
S. brunneum	*Pk.*
Morchella angusticeps	*Pk.*
Gyromitra curtipes	*Fr.*
Geoglossum irregulare	*Pk.*
Peziza euplecta	*Cke.*
P. melastoma	*Sow.*
P. apiculata	*Cke.*
P. tetraonalis	*Pk.*
Peziza humosoides	*Pk.*
P. longipila	*Pk.*
P. urticina	*Pk.*
P. aurata	*Fckl.*
P. melaleuca	*Fr.*
P. Typhæ	*Pk.*
P. Sphærella	*P. & C.*
P. enterochroma	*Pk.*
Helotium lutescens	*Fr.*
H. fraternum	*Pk.*
H. palustre	*Pk.*
H. vibrisseoides	*Pk.*
Patellaria pusilla	*Pk.*
Dermatea minuta	*Pk.*
Bulgaria bicolor	*Pk.*
B. deligata	*Pk.*
Exoascus Pruni	*Fckl.*
Taphrina aurea	*Tul.*
Hypomyces luteovirens	*Fr.*
Dothidea reticulata	*Fr.*
Hypoxylon udum	*Fr.*
Diatrype verrucoides	*Pk.*
Valsa pulviniceps	*Pk.*
V. Sorbi	*Fr.*
Lophiostoma bicuspidata	*Cke.*
Sphæria squamulata	*Schw.*
S. subiculata	*Schw.*
S. intricata	*Pk.*
S. scopula	*C. & P.*
S. albidostoma	*Pk.*
S. clavariina	*Pk.*
S. subdenudata	*Pk.*
S. livida	*Fr.*
S. humilina	*Pk.*
S. infectoria	*Fckl.*
Sphærella Peckii	*Spegaz.*
S. septorioides	*Pk.*

(2.)

PLANTS COLLECTED.

Not new to the Herbarium.

Thalictrum dioicum	*L.*
Actæa alba	*Bigel.*
Viola Selkirkii	*Pursh.*
Hypericum mutilum	*L.*
Linum striatum	*Walt.*
Lespedeza reticulata	*Pers.*
Ribes hirtellum	*Mx.*
Proserpinaca palustris	*L.*
Dipsacus sylvestris	*Mill.*
Aster ericoides	*L.*
A. dumosus	*L.*
A. Tradescanti	*L.*
Solidago altissima	*L.*
S. gigantea	*Ait.*
Polymnia Canadensis	*L.*
Hieracium venosum	*L.*
Gerardia tenuifolia	*Vahl.*
Lycopus Europæus	*L.*
Monarda fistulosa	*L.*
Lophanthus nepetoides	*Benth.*
Polygonum Hartwrightii	*Gr.*
Potamogeton natans	*L.*
P. hybridus	*Mx.*
P. gramineus	*L.*
Triglochin palustre	*L.*
Cyperus dentatus	*Torr.*
Eleocharis olivacea	*Torr.*
Carex tentaculata	*Muhl.*
C. intumescens	*Rudge.*
C. polytrichoides	*Muhl.*
C. tenera	*Dew.*
Spartina alterniflora	*Loisel.*
Eragrostis capillaris	*Nees.*
Panicum proliferum	*Lam.*

Hordeum vulgare. . . . . *L.*
Equisetum arvense. . . . . *L.*
Woodsia obtusa. . . . . *Torr.*

New to the Herbarium.

Lechea racemulosa. . . . . *Mx.*
L. tenuifolia. . . . . *Mx.*
Rudbeckia triloba. . . . . *L.*
Mentha rotundifolia. . . . . . . *L.*
Salvia Sclarea. . . . . *L.*
Potamogeton Robbinsii . . . . *Oakes.*
Spiranthes simplex. . . . . *Gr.*
Glyceria obtusa. . . . . *Trin.*
Muhlenbergia sobolifera. . . . *Trin.*
Cladonia Boryi. . . . . *Tuckm.*
Vaucheria velutina . . . . *Ag.*
Agaricus solitarius. . . . . *Bull.*
A. strobiliformis. . . . . . . *Vitt.*
A. rhagadiosus. . . . . *Fr.*
A. Frostianus. . . . . *Pk.*
A. candicans. . . . . *Pers.*
A. compressipes. . . . . *Pk.*
A. vilescens. . . . . *Pk.*
A. trullisatus. . . . . *Ellis.*
A. confluens. . . . . *Pers.*
A. Iris . . . . *Berk.*
A. bombycinus. . . . . *Schæff.*
A. scabrinellus. . . . . *Pk.*
A. curvipes . . . . *Fr.*
Cortinarius multiformis. . . . *Fr.*
C. tophaceus. . . . . *Fr.*
C. pulchrifolius. . . . . . *Pk.*
C. rubrocinereus. . . . . . . *Pk.*
C. uliginosus. . . . . *Berk.*
C. sericipes. . . . . *Pk.*
C. croceoconus. . . . . *Fr.*
C. basalis. . . . . *Pk.*
Russula fragilis. . . . . *Fr.*
Cantharellus brevipes. . . . . *Pk.*
Panus lævis. . . . . *B. & C.*
P. dealbatus. . . . . *Berk.*
Boletus Frostii. . . . . *Russell.*
Polyporus hispidioides. . . . . *Pk.*
P. benzoinus. . . . . *Wallr.*
P. chioneus . . . . *Fr.*
P. floccosus. . . . . *Fr.*
Stereum neglectum. . . . . . . *Pk.*
Cyphella caricina. . . . . *Pk.*
Hymenula hysterioides. . . . . *Pk.*
Clavaria pyxidata. . . . . *Pers.*
C. miniata. . . . . *Berk.*
Physarum mirabile. . . . . *Pk.*
Cribraria argillacea. . . . . *Pers.*
Phoma Herbarum. . . . . *West.*
P. Phytolaccæ. . . . . *B. & C.*
P. lineolatum. . . . . *Desm.*
P. longipes. . . . . *B. & C.*
Leptothrium punctiforme . . *B. & C.*
L. dryinum. . . . . *Sacc.*
Hendersonia abnormalis. . . . *Pk.*
Sphæropsis celastrina. . . . . . *Pk.*
S. seriatus. . . . . *Pk.*
S. cerasina. . . . . *Pk.*
S. phomatella. . . . . *Pk.*

Sphæropsis abundans. . . . . . *Pk.*
S. smilacina. . . . . *Pk.*
Septoria pastinacina. . . . . . . *Pk.*
S. hedeomina . . . . *Pk.*
S. Gei. . . . . *Desm.*
S. Ostryæ. . . . . *Pk.*
S. lythrina. . . . . *Pk.*
S. increscens. . . . . *Pk.*
S. Ludwigiæ. . . . . *Cke.*
S. Mori. . . . . *Lev.*
S. Urticæ. . . . . *Desm.*
S. Cornicola. . . . . *Desm.*
S. atropurpurea. . . . . *Pk.*
S. Aceris . . . . *B. & Br.*
Cytispora minuta. . . . . *Thum.*
Glœosporium Trifolii . . . . . *Pk.*
G. Laporteæ. . . . . *Pk.*
G. Hepaticæ . . . . *Pk.*
G. salicinum. . . . . *Pk.*
Coryneum pustulatum. . . . . *Pk.*
Asterosporium betulinum . . *Pk.*
Melanconium cerasinum. . . . *Pk.*
Torula uniformis. . . . . *Pk.*
Synphragmidium effusum . . *Pk.*
Gymnosporium variabile. . . *Pk.*
Puccinia Ellisiana. . . . . *Thum.*
Protomyces fuscus. . . . . *Pk.*
Melampsora Hartigii. . . . . . . *Thum.*
Rœstelia Ellisii. . . . . *Pk.*
Cronartium asclepiadeum . . *Fr.*
Stilbum pruinosipes. . . . . . . *Pk.*
Periconia parasitica. . . . . *Pk.*
Tubercularia Celastri. . . . . . *Schw.*
Helminthosporium Pruni. . . *B. & C.*
Macrosporium Meliloti. . . . *Pk.*
Alternaria Chartarum . . . . *Preuss.*
Helicosporium cinereum . . . *Pk.*
Polyactis Streptothrix. . . . . . *C. & E.*
Pyricularia grisea. . . . . *Sacc.*
Peronospora obducens . . . . . *Schrœt.*
Oidium irregulare . . . . *Pk.*
Cercospora Nymphæacea. . . *C. & E.*
C. Smilacis. . . . . *Thum.*
C. elongata. . . . . *Pk.*
C. squalidula. . . . . *Pk.*
C. Caulophylli. . . . . *Pk.*
C. griseëlla. . . . . *Pk.*
C. zebrina . . . . *Pass.*
C. althæina. . . . . *Sacc.*
C. Sanguinariæ. . . . . *Pk.*
Ramularia Armoraciæ. . . . . *Fckl.*
R. Dulcamaræ. . . . . *Pk.*
R. Mitellæ . . . . *Pk.*
R. Celastri. . . . . *Pk.*
Microstroma leucosporum. . *Niessl.*
Fusisporium Solani. . . . . . . *Mart.*
Helvella palustris . . . . *Pk.*
Peziza subvernalis. . . . . *Pk.*
P. luteodisca. . . . . *Pk.*
P. multipuncta. . . . . *Pk.*
P. floriformis . . . . *Pk.*
P. mycogena. . . . . *Ellis.*
P. regalis. . . . . *C. & E.*
P. sanguinea. . . . . *Pers.*

Helotium vitigenum	*De Not.*	Diatrype nigrospora	*Pk.*
H. pallescens	*Fr.*	Valsa Carpini	*Pers.*
H. affinissimum	*Pk.*	Valsa aurea	*Fckl.*
Patellaria Hamamelidis	*Pk.*	V. paucispora	*Pk.*
Cenangium Viburni	*Schw.*	V. compta	*Tul.*
Caliciopsis pinea	*Pk.*	V. Prunicola	*Pk.*
Hysterium gramineum	*M. & N.*	V. tessera	*Fr.*
Taphrina alnitorqua	*Tul.*	V. Abietis	*Fr.*
Nectria dematiosa	*Schw.*	V. acrocystis	*Pk.*
Xylaria bulboso	*B. & Br.*	Cucurbitaria longitudinalis	*Pk.*
Hypoxylon Blakei	*B. & C.*	Sphærella recutita	*Fr.*
Eutypa subtecta	*Fr.*	S. depressa	*Pk.*
Diatrype quadrata	*Schw.*	S. conigena	*Pk.*
D. strumella	*Fr.*		

(3.)

CONTRIBUTORS AND THEIR CONTRIBUTIONS.

Mrs. S. M. Rust, Syracuse, N. Y.

Epipactis helleborine v. viridans, *Irm.*

Mrs. M. J. Myers, Syracuse, N. Y.

Scolopendrium vulgare, *Sm.*

Mrs. H. S. Gifford, Syracuse, N. Y.

Botrychium Lunaria, *Sw.*

Miss L. G. Barnett, Cannonsburg, Pa.

Secotium Warnei .... *Pk.* | Geaster limbatus .... *Fr.*

Mrs. L. A. Millington, South Haven, Mich.

Ascomyces deformans, *Berk.*

Prof. D. C. Eaton, New Haven, Ct.

Asplenium Bradleyi, *Eaton.*

Prof. S. A. Forbes, Normal, Ill.

Septoria podophyllina...... *Pk.* | Septoria Lactucæ. .... *Pass.*
S. Trillii .... *Pk.* | Cellulosporium sphærosporum, *Pk.*

C. Atwood, Moravia, N. Y.

Danthonia compressa, *Aust.*

S. H. Wright, M. D., Penn Yan, N. Y.

Enonymus Americanus v. obovatus, *T. & G.*

E. H. Crocker, Troy, N. Y.

Trifolium repens, *L.*

F. B. Hine, Silver Cliff, Col.

Bovista subterranea, *Pk.*

C. W. Irish, Iowa City, Iowa.

Mycenastrum spinulosum.... *Pk.* | Bovista subterranea........ *Pk.*

E. Michener, M. D, Toughkenamon, Pa.

Polyporus elongatus........ *Berk.* | Tuber excavatum.......... *Vitt.*

Hon. T. M. Peters, Moulton, Ala.

Phallus rubicundus...... *Bosc.* | Hypoxylon Petersii... .... *B. & C.*
Cenangium platascum..... *Pk.* | Collema callibotrys........ *Tuckm.*

E. W. Holway, Decorah, Iowa.

Æcidium Polemonii....... *Pk.*
Æcidium albescens........ *Grev.*

W. Barbeck, Philadelphia, Pa.

Enerthenema papillata..... *Pers.*
Chondrioderma floriforme.. *Bull.*

Prof. W. G. Farlow, Cambridge, Mass.

Uromyces Peckiana........ *Far.*
U. Junci v. Spartinæ, *Far.*
Puccinia Epil. v. Proserpinaceæ.................... *Far.*
Ascomyces flavus.......... *Far.*
A. deformans v. Potentillæ................. *Far.*

E. S. Miller, Wading River, N. Y.

Ranunculus Ficaria........ *L.*
Rumex maritimus......... *L.*
Alnus glutinosa........... *Gært.*
Pogonia verticillata........ *Nutt.*
Marsilia quadrifolia........ *L.*
Cystoclonium purpurascens, *Ktz.*

W. R. Gerard, New York, N. Y.

Stereum scriblitum........ *B. & Cke.*
Simblum rubescens........ *Ger.*
Tuber dryophilum......... *Tul.*
Sphærella spleniata........ *C. & P.*

E. A. Rau, Bethlehem, Pa.

Gymnosporangium speciosum.................... *Pk.*
Puccinia atropuncta....... *P. & C.*
Lecythea macrosora......... *Pk.*
Trichobasis Oxytropi....... *Pk.*
Æcidium monoicum......... *Pk.*
Æ. Jamesianum..... *Pk.*

Prof. J. Macoun, Belleville, Ont.

Paxillus hirsutus.......... *Pk.*
Polyporus Macouni........ *Pk.*

C. C. Frost, Brattleborough, Vt.

Lycoperdon Frostii, *Pk.*

A. P. Morgan, Dayton, Ohio.

Polyporus frondosus....... *Fr.*
P. Morgani........ *Frost.*
Polyporus graveolens..... *Schw.*
Stemonitis Morgani........ *Pk.*

J. J. Brown, M. D., Sheboygan, Wis.

Agaricus amabilipes....... *Pk.*
Mycenastrum spinulosum.. *Pk.*
Lycoperdon cælatum....... *Bull.*
L. cyathiforme... *Bosc.*

M. E. Jones, Grinnell, Iowa.

Sorosporium atrum........ *Pk.*
S. Astragali..... *Pk.*
Puccinia aberrans.......... *Pk.*
P. intermixta....... *Pk.*
P. Physalidis........ *Pk.*
Uromyces hyalinus....... *Pk.*
Tricholasis gaurina........ *Pk.*
Æcidium gaurinum........ *Pk.*
Æ. Giliæ............. *Pk.*
Æ. intermixtum...... *Pk.*
Sphærella megastoma...... *Pk.*

Prof. D. S. Martin, New York, N. Y.

Rœstelia lacerata, *Tul.*

N. L. Britton, New Dorp, N. Y.

Desmodium viridiflorum.... *Beck.*
Ribes Grossularia.......... *L.*
Disdia teres............. *Walt.*
Artemisa cadauta........... *Mx.*
Veronica Buxbaumii........ *Ten.*
Mentha rotundifolia....... *L.*
Heliotropium Europæum... *L.*
Quercus Phellos........... *L.*
Spiranthes simplex........ *Gr.*
Juncus maritimus.......... *Lam.*
Cyperus cylindricus....... *Britton.*
Scirpus sylvaticus........ *L.*
Carex extensa............. *Good.*
Muhlenbergia capillacis.... *Kunth.*

Hon. G. W. Clinton, Buffalo, N. Y.

Agaricus bombycinus	*Schæff.*	Melogramma gyrosum	*Schw.*
Clavaria pyxidata	*Pers.*	Cystopus cubicus	*Lev.*
Pestalozzia Guepini	*Desm.*	Peziza sanguinea	*Pers.*
Puccinia Ellisiana	*Thum.*	Cenangium Viburni	*Schw.*
P. atropuncta	*P. & C.*	Rhytisma sparsum	*P. & C.*
Stilbum erythrocephalum	*Dittm.*	Diatrype quadrata	*Schw.*

Arthur Hollick, Port Richmond, N. Y.

Ranunculus Ficaria	*L.*	Eclipta procumbens	*Mx.*
Portulaca grandiflora	*Hook.*	Tecoma radicans	*Juss.*
Fragaria Indica	*Ait.*	Morus alba	*L.*
Ribes Grossularia	*L.*	Tripsacus dactyloides	*L.*
Diodia teres	*Walt.*		

J. B. Ellis, Newfield, N. J.

Stereum zonatum	*Ell.*	Ombrophila aurea	*Ell.*
Pestalozzia monochæta	*Desm.*	O. subaurea	*Cke.*
Cladosporium fasciculatum	*C. & E.*	O. violacea	*Fr.*
Macrosporium atrichum	*C. & E.*	Stictis pinophila	*Ell.*
M inquinans	*C. & E.*	S. linearis	*C. & E.*
Trichothecium griseum	*Cke.*	Dothidea petiginosa	*Ell.*
Colletotrichum caudatum	*Pk.*	Diatrype rhuina	*C. & E.*
Fusisporium cyathicolum	*Ell.*	Eutypa subtecta	*Fr.*
Peziza acerina	*C. & E.*	Valsa delicatula	*C. & E.*
P. mauribarba	*Ell.*	V. myinda	*C. & E.*
P. tenella	*C. & E.*	V. chlorodisca	*C. & E.*
P. lethalis	*Ell.*	Sphaeria anguillida	*C. & E.*
Patellaria clavata	*Ell.*	S. subexserta	*C. & E.*
Phacidium sphæroideum	*C. & E.*	Venturia ciliata	*Ell.*

(4.)

PLANTS NOT BEFORE REPORTED.

Ranunculus ficaria, *L.* Flushing, Long Island, *J. Schrenk.* Contributed by *E. S. Miller.* Staten Island, *Arthur Hollick.* Introduced.

Lechea racemulosa, *Mx.* Highland Mills, Orange County. July.

Lechea tenuifolia, *Mx.* Wading River, Long Island. Sept.

Portulaca grandiflora, *Hook.* New Brighton, Staten Island. *Hollick.* July. Escaped from cultivation.

Lespedeza reticulata, *Pers.* Long Island. This and its variety, *angustifolia*, were formerly regarded as varieties of *L. violacea*, and were reported as such, but they are now regarded as a distinct species.

Fragaria Indica, *Ait.* West Brighton, Staten Island. *Hollick.* June–Sept.

Ribes Grossularia, *L.* Princes Bay and New Dorp, Staten Island. *N. L. Britton* and *A. Hollick.* May. Escaped from cultivation.

Diodia teres, *Walt.* Rossville and Tottenville, Staten Island. *Britton* and *Hollick.* Aug.

Eclipta procumbens, *Mx.* Streets of New Brighton. *Hollick.* July.

Rudbeckia triloba, *L.* Fishkill, Dutchess county. Sept.

Tecoma radicans, *Juss.* Princes Bay. *Hollick.* June.

Veronica Buxbaumii, *Ten.* New Dorp. *Britton.* June. Introduced.

Mentha rotundifolia, *L.* Richmond, Staten Island. *Britton.* Jamesville, Onondaga county. Aug. and Sept. Introduced.

Salvia sclarea, *L.* Jamesville. Aug. Introduced.

Heliotropium Europæum, *L.* New York city, along Eighth avenue and Harlem railroad. *Britton.* Oct. Introduced.

Rumex maritimus, *L.* Montauk Point. *Miller.*

Alnus glutinosa, *Gœrt.* College Point, Long Island. *Schrenk.* Contributed by *E. S. Miller.* Introduced.

Epipactis helleborine var. viridans, *Irm.* Woods, near Syracuse. *Mrs. S. M. Rust.* July. This is a very interesting and important addition to our flora. It is at present the only known representative of the genus in the eastern part of the country as *E. gigantea* is in the western part. It is remarkable that it should be limited to a single locality, but that locality had already been rendered famous by its possession of two ferns, *Botrychium Lunaria* and *Scolopendrium vulgare,* that, so far as our State is concerned, scarcely pass beyond its limits. *Mrs. M. P. Church,* a member of the Syracuse Botanical Club, has the credit of making this discovery, which has been favorably noticed by Prof. Gray and Prof. Hooker, and has already been published in the botanical journals.

Spiranthes simplex, *Gray.* Wading river, where it had previously been detected by *Mr. Miller.* Also Tottenville. *Britton.* Aug. and Sept. It is not probable that this species occurs much to the north of New York city.

Glyceria obtusa, *Trin.* Riverhead, Long Island. Sept.

Tripsacum dactyloides, *L.* Long Bridge, Staten Island. *Hollick.* Aug.

Asplenium Bradleyi, *Eaton.* Near Newburgh. *D. C. Eaton.* Sept. This fern was discovered and the specimens collected, in the locality mentioned, by *Prof. Eaton,* in the year 1864. In September last I visited the locality and searched carefully for the plant, but without success. The top of the rocky hill on which the fern had occurred had recently been cleared and it is possible that its station has already been destroyed.

Cladonia Boreri, *Tuckm.* (*Cladonia lacunoso* Delise.) Wading River. Sept.

Vaucheria velutina, *Ag.* Wet springy places. Albany. June. The specimens are not fertile and are, therefore, to some extent, doubtful.

Agaricus solitarius, *Bull.* Thin woods and open places, Wading River. Sept. A form with the bulb and lower part of the stem merely floccose-squamulose, or clothed with white mealy particles.

Agaricus strobiliformis, *Vitt.* Open bushy places, Catskill mountains. Oct.

Agaricus Frostianus, *Pk.* Woods and bushy places, Sandlake and Adirondack mountains.

Agaricus rhagadiosus, *Fr.* Woods. Wading River. Sept.

Agaricus candicans, *Pers.* Among fallen leaves in woods. Center. Oct.

Agaricus (Clitocybe) compressipes, *n. sp.* Pileus thin, convex or expanded, umbilicate, glabrous, hygrophanous, brownish when moist, whitish or pale-alutaceous when dry, margin thin; lamellæ close, subarcuate or horizontal, adnate or subdecurrent, whitish; stem firm, hollow, generally compressed, slightly pruinose; spores elliptical, .0002 in. to .00025 in. long, .00016 in. to .00018 in. broad; flesh white when dry, odor slight, farinaceous. Plant gregarious, 1 in. to 1.5 in. high, pileus 6 lines to 16 lines broad, stem 1 line to 2 lines thick. Grassy places. Albany. July. The moist pileus is sometimes obscurely zonate. The odor is not always perceptible unless the pileus is moist or broken. The stem is sometimes compressed at the top only, sometimes at the base only, and rarely it is wholly terete. The species belongs to the section Orbiformes.

Agaricus (Clitocybe) vilescens, *n. sp.* Pileus convex, then plane or depressed, often irregular, glabrous, slightly pruinose on the involute margin, brown or grayish-brown, becoming paler with age, often concentrically rivulose; lamellæ close, adnate or decurrent, cinereous, sometimes tinged with dingy yellow; stem short, solid, sometimes compressed, grayish-brown, with a whitish tomentum at the base; spores subglobose or broadly elliptical, .0002 in. to .00025 in. long; flesh whitish-gray, odor slight. Plant gregarious, 1 in. to 2 in. high, pileus 1 in. to 1.5 in. broad, stem 1 line to 2 lines thick. Grassy pastures. Jamesville. Aug.

Agaricus trullisatus, *Ellis*. Sandy soil. Long Island. Sept. This resembles the larger forms of *A. laccatus*, but it has a stouter habit, the pileus is more squamulose, the stem is bulbous or thickened at the base, the mycelium is violet-colored and the spores are oblong.

Agaricus confluens, *Pers*. Woods. Verona and Jamesville. Aug.

Agaricus iris, *Berk*. Decaying trunks of trees. Jamesville. Aug. Our specimens have the edge of the lamellæ minutely floccose and the base of the stem covered with a blue mycelium. The species seems too near *A. marginellus*.

Agaricus bombycinus, *Schæff*. Trunks of maple trees. Buffalo. *Clinton*. Kasoag and Catskill mountains. July and Aug.

Agaricus (Entoloma) scabrinellus, *n. sp.* Pileus thin, convex or nearly plane, papillate, minutely scabrous, dark-brown, the thin margin extending slightly beyond the lamellæ; lamellæ broad, ventricose, rounded behind and slightly attached, floccose on the edge, dingy-white, then flesh-colored; stem equal, fibrillose, slightly pruinose at the apex, paler than the pileus; spores irregular, uninucleate, .0003 in. to .0004 in. long, .0002 in. to .0003 in. broad. Plant about 1 in. high, pileus 6 lines to 10 lines broad, stem 1 line thick. Shaded, gravelly soil by roadsides. Wading River. Sept. The plants are very regular in shape, the pileus usually has a small, papilla-like umbo and is somewhat shining. Its roughness is scarcely visible to the naked eye.

Agaricus curvipes, *Fr*. Dead trunks of young trees. Verona. Aug. Our specimens have the lamellæ flocose-crenate on the edge.

Cortinarius multiformis, *Fr*. Woods. Jamesville. Aug. The specimens were collected in dry weather and the pileus was not perceptibly viscid except in very young plants. The bulbous base of the stem is not always distinctly marginate.

Cortinarius tophaceus, *Fr*. Woods. Jamesville. Aug. The spores in this species are subglobose, rough, uninucleate, .00025 in. to. 0003 in. long, 00025 in. broad.

Cortinarius (Inoloma) pulchrifolius, *n. sp.* Pileus convex or expanded, obtuse, silky-fibrillose, whitish or reddish-gray, the margin often whitened by the veil; lamellæ broad, subdistant, emarginate, bright purple or violet-purple; stem cylindrical, solid, bulbous, silky-fibrillose, white, often tinged with violet, violaceous within; spores subelliptical, rough, .0004 in. to .0005 in. long, about .0003 in. broad. Plant 2 in. to 4 in. high, pileus 2 in. to 4 in. broad, stem 3 lines to 5 lines thick. Oak woods. Wading River. Sept. This species is easily known by its pale pileus and bright-colored lamellæ. From the hue of these the plant might, at first sight, be taken for *Agaricus ochropurpureus*, but when mature the lamellæ assume the characteristic cinnamon color of species of Cortinarius, though it is somewhat darker than usual.

Cortinarius (Inoloma) rubrocinereus, *n. sp.* Pileus convex, then expanded, silky-fibrillose, reddish-cinereus; lamellæ subdistant, rounded behind, emarginate, dingy-violaceous, soon becoming pale-cinnamon; stem short, solid, bulbous, silky-fibrillose, whitish tinged with violet; spores subelliptical, .0004 in. to .0005 in. long, about .0003 n. broad; veil whitish-cinereus, flesh when young violaceous. Plant gregarious, about 2 in. high, pileus 2 in. to 3 in. broad, stem 4 lines to 6 lines thick. Sandy soil in open places. Riverhead. Sept. This species is closely related to the preceding, from which it is separated by its darker colered pileus and differently colored lamellæ.

Cortinarius uliginosus, *Berk.* In sphagnous bogs. Center. Sept. The fingers become stained in handling fresh specimens of this plant. Paper in which they are wrapped is also stained by them. The spores are elliptical-cymbiform, .0004 in. long, .00025 in. broad. The pileus is sometimes obtusely, sometimes acutely, umbonate, and sometimes without any umbo.

Cortinarius croceoconus, *Fr.* Woods. Gansevoort. Aug.

Cortinarius (Dermocybe) sericipes, *n. sp.* Pileus thin, conical or subcampanulate, sometimes expanded and umbonate, glabrous, chestnut-color, the umbo often darker; lamellæ broad, close, ascending or ventricose, narrowed behind, whitish, then tawny or tawny-cinnamon, white on the edge; stem equal, hollow, silky-fibrillose, shining, white, slightly mealy at the top; spores large, unequally elliptical, pointed at each end, granular within, .00065 in. long, .00045 in. broad. Plant gregarious or subcæspitose, 1 in. to 3 in. high, pileus 6 lines to 12 lines broad, stem 1 line to 2 lines thick. Damp ground in thin woods. Center. Oct.

Cortinarius (Dermocybe) basalis, *n. sp.* Pileus thin, convex or expanded, hairy, tawny; lamellæ loose, subventricose, pale tawny when young, cinnamon color when old; stem short, equal, hollow, fibrillose, pallid or pale-tawny, usually with a webby annulus near the base; spores subelliptical, .0003 in. long, .00018 in. broad; flesh pallid, odor none. Plant subcæspitose, about 1 in. high, pileus 5 lines to 10 lines broad, stem 1 line thick. Naked soil in wood. Wading River. Sept. The noticeable feature in this species is the slight annulus which is placed below the middle of the stem. The hairy pileus and the lamellæ are nearly alike in color.

Russula fragilis, *Fr.* Woods. Center. Oct.

Cantharellus brevipes, *n. sp.* (Plate 1, figs. 18–20.) Pileus fleshy, obconic, glabrous, alutaceous or dingy cream-color, the thin margin erect, often irregular and lobed, tinged with lilac in the young plant; folds numerous, nearly straight on the margin, abundantly anastomosing below, pale umber tinged with lilac; stem short, tomentose-pubescent, cinereus, solid, often tapering downward; spores yellowish, oblong-elliptical, uninucleate, .0004 in. to .0005 in. long, .0002 in. broad. Plant 3 in. to 4 in. high, pileus 2 in. to 3 in. broad, stem 4 lines to 6 lines thick. Woods. Ballston, Saratoga county. July. This interesting species is related to the *C. floccosus*, both by its short stem and its abundantly anastomosing folds. The two species should be separated from the others and constitute a distinct section. The flesh in *C. brevipes* is soft and whitish and the folds are generally thinner than in *C. floccosus.*

Panus lævis, *B. & C.* Oak stumps. Wading River. Sept. The margin of the pileus is sometimes marked by small, oblique elevations or ridges which unite inwardly and thus form, with the edge of the pileus, small triangular spaces. Sometimes the two elevated lines which form the sides of a triangle divide near the margin and thus form two very small additional triangles. The pure white color and regular, even pileus make this a very pretty species The color, how. ever, becomes slightly tinged with yellow in drying.

Panus dealbatus, *Berk.* Decaying wood of deciduous trees. Verona Aug.

Boletus Frostii, *Russell.* Thin woods. Wading River and Riverhead. Sept. The spores in our specimens are longer than required by the description, but in other respects the specimens agree with the published characters of the species.

Polyporus (Anodermei) hispidoides, *n. sp.* Pileus 4 in. to 8 in. broad, about half an inch thick, sessile, rarely narrowed behind or below into a short, stem-like base, soft, spongy, fleshy-fibrous, tomentose, not at all or very obscurely zonate, ferruginous-brown, becoming darker with age, yellow on the margin when young; pores small, irregular, subrotund, angular or fleuxous, greenish-yellow, becoming brown when bruised or old, the thin dissepiments externally villous; spores subglobose or broadly elliptical, about .0002 in. long. Base of spruce or pine trees. Albany, Burnt hills and Adirondack mountains. July and Aug. This fungus is closely related to *P. hispidus*, and may yet prove to be a mere variety of it. That species is described as compact, and having minute rotund pores. It is also said to grow on the trunks of frondose trees, and to have a thick pileus, none of which characters are applicable to our plant. It occurs only, so far as I have seen, on trunks of spruce and pine, its pileus is rarely more than half an inch thick, its substance is soft, even when dry, and the pores are angular. The thin dissepiments become more or less lacerated when old, and often retain a yellowish color when dried. The pileus is very similar in color to *Lensites sepiaria.*

Polyporus benzoinus, *Wallr.* Decaying stumps and trunks of hemlock trees. Brewerton and Helderberg mountains. Sept. This closely resembles *P. resinosus* which occurs on trunks of frondose trees.

Polyporus chioneus, *Fr.* Decaying wood of frondose trees. Verona. Aug.

Polyporus floccosus, *Fr.* Decaying wood. Verona. Aug.

Stereum neglectum, *n. sp.* Pileus effuso-reflexed, thin, coriaceous, often laterally confluent, strigose-hairy, concentrically sulcate, grayish or yellowish-gray; hymenium pallid, becoming purplish, minutely setulose, the setæ short, colorless, rough, stout, .002 in. to .003 in. long; spores subelliptical, .0005 in. long, .0003 in. broad. Dead trunks and branches of elm trees. Verona. Aug. This fungus has the general appearance of such species as *S. purpureum*, *S. vorticosum* and *S. hirsutum*, from all of which it may be distinguished by its peculiar hymenium which, to the naked eye, has a pruinose appearance by reason of the presence of the minute colorless setæ. A genus *Peniophora* has been proposed for such species, and if accepted our plant will belong to it. The hymenium is sometimes rendered uneven by the confluence of several individuals.

Cyphella caricina, *n. sp.* Cups .5 line to .1 line broad, membranaceous, sessile, white, externally minutely webby-hairy; hymenium smooth, in large specimens uneven; spores lanceolate or subclavate, colorless, .0004 in. to .0005 in. long, about .00016 in. broad. Culms and leaves of carices. Verona. Aug.

Clavaria miniata, *Berk.* Damp ground. Burnt hills, Saratoga county. July.

Clavaria pyxidata, *Pers.* Oneida. *H. A. Warne.* Buffalo. *Clinton.* Savannah. Aug.

Hymenula hysterioides, *n. sp.* Minute, oblong or elliptical, plane or slightly convex, amber color, when dry contracted, hysteriiform, blackish; spores numerous, oblong, hyaline, .0003 in. to .00035 in. long. Wood of red osier, *Cornus stolonifera.* Center. May. When dry it looks like some minute Hysterium, but when moist it expands and reveals the pallid or amber-colored hymenium.

Simblum rubescens. *Ger. in litt.* Astoria, Long Island. Sept. *W. R. Gerard.* This is the only representative of the genus yet found in this country. It differs from all the other species in its pinkish-red color. One specimen was found in which the pileus was supported by two distinct stems arising from one volva.

Physarum mirabile, *n. sp.* Sporangium hemispherical or depressed, nearly plane above, pervious, minutely rough or squamulose, yellow or tawny, rupturing irregularly, the basal part adherent to the top of the stem; capillitium composed of slender pale or yellowish filaments and yellow, knot-like thickenings of two kinds, one minute and subglobose, the other elongated, pointed or spine-like, conspicuous and persistently attached to the inner wall of the sporangium; stem equal or slightly tapering upward, reddish-brown, penetrating quite through the sporangium and forming a hollow, persistent, yellow columella open at the top; spores globose, smooth, blackish-brown, .0003 in. in diameter.

Decaying wood and bark. Verona. Aug. This species is remarkable for the peculiar spine-like thickenings of the capillitium and for the singular elongated hollow columella. In a vertical section of the unruptured sporangium the former may be seen extending from the walls of the sporangium to the columella. The latter is yellow or subochraceous, about as thick as the stem and often a little widened at the top. Being hollow it causes the unruptured sporangium to appear deeply umbilicate or pervious. The filaments of the capillitium often adhere for a time to the base of the columella as a pale-yellowish flocculent mass. The exterior surface of the sporangium is scaly, but the number and size of the scales vary considerably in different specimens. This singular species may hereafter be deemed worthy of generic distinction, but for the present it is thought best to refer it to the genus Physarum.

Cribraria argillacea, *Pers.* Much decayed wood. Helderberg mountains. July.

Phoma herbarum, *West.* Dead stems of white daisy, *Leucanthemum vulgare.* Jamesville.

Phoma Phytolaccæ, *B. & C.* Dead stems of poke weed, *Phytolacca decandra.* Verona. Aug. The perithecia are sometimes covered by the whitened epidermis, sometimes exposed. They occur on both the exterior and the interior surface of the hollow stems. They are depressed, orbicular, elliptical or oblong, and are furnished with an ostiolum which pierces the covering epidermis. Sometimes two or more are confluent in a linear manner. The spores are about .0005 in. long and contain from four to six nuclei.

Phoma lineolatum, *Desm.* Cones of Norway spruce. Albany. May.

Phoma longipes, *B. & C.* ? Dead grape vines. North Greenbush. May.

Phoma hysteriellum, *P. & C., n. sp.* Perithecia immersed, slightly prominent, mostly hysteriiform, covered by the epidermis, black, with a minute papilliform ostiolum ; spores elliptical or subfusiform, colorless, binucleate, .0003 in. long. Dead stems of herbs. Buffalo. Nov. *G. W. Clinton.*

Leptothyrium punctiforme, *B. & C.* Perithecia minute, .0025 in. to .0042 in. broad, subhemispherical, black, shining, opening by a subcircular or irregular aperture, pale within ; spores subfusiform, curved, colorless, .0005 in. to .0008 in. long.

Living leaves of daisy fleabane *Erigeron annuum.* Quaker Street. June. The perithecia are so minute that they are but just visible to the naked eye. The fungus attacks the lower or basal leaves, which soon become yellowish in color and wither.

Leptothyrium dryinum, *Sacc.* Living leaves of white oak. Wading River. Sept.

Hendersonia abnormalis, *n. sp.* Perithecia numerous, small, subconical, surrounding the stem on all sides, seated on smoky-brown spots, raising small pustules in the bark, at length rupturing the epidermis and opening by a small round aperture ; spores elliptical or oblong, colored, .0006 in. to .0011 in. long, about .0004 in. broad, three to six-septate, the cells divided by longitudinal septa.

Dead stems of bitter-sweet, *Celastrus scandens.* Charlton. July. This fungus occurred in company with *Sphæropsis Celastri*, from which it is easily distinguished by the brown discolored spots it occupies. Colored filaments sometimes surround the perithecia. The ostiola are usually whitened.

Hendersonia Coluteæ, *P. & C., n. sp.* Perithecia prominent, erumpent, hemispherical or subconical, firm, cellular, ostiola black, papilliform; spores oblong, obtuse, colored, three to five-septate, sometimes with one or two longitudinal septa, .0008 in. to .001 in. long.

Dead twigs of *Colutea arborescens*. Buffalo. *Clinton.*

Sphæropsis brunneola, *P. & C.* Dead stems of *Smilax hispida.* Buffalo. *Clinton.* The specimens do not fully accord with the description of the species, but probably belong to it.

Sphæropsis phomatella, *n. sp.* Perithecia numerous, minute, seated on indefinite whitish or pallid spots, covered by the epidermis which is at length ruptured, black; spores oblong, at first hyaline, then colored, .0008 in. to .0012 in. long; sporophores short.

Dead shoots of ash, *Fraxinus Americana.* West Troy. May. The perithecia are very small and at first sight suggest the idea of a Phoma.

Sphæropsis abundans. *n. sp.* Perithecia numerous, erumpent, closely surrounded by the ruptured epidermis, black; spores very unequal, elliptical or oblong, at first hyaline and pedicellate, then colored, obtuse, .00065 in. to .0009 in. long, about .0005 in. broad. Dead twigs and branches of rock chestnut oak. Albany and North Greenbush. May. The twigs are roughened by the numerous perithecia and they sometimes have a darker appearance where they are affected by the Sphæropsis. The epidermis is ruptured very irregularly. *Sphæropsis dryina* differs in its smaller colorless spores, and *S. linearis,* in its linear arrangement. This last species occurs also on young dead shoots of hickory, *Carya alba.*

Sphæropsis cerasina, *n. sp.* Perithecia numerous, small, seated on the inner bark, covered by the slightly elevated epidermis which is at length pierced or slightly ruptured, black, often cinereous above; spores at first hyaline, then colored, ellipticalobovate or oblong, .0008 in. to .001 in. long; sporophores short. Dead branches of choke cherry, *Prunus Virginiana.* West Albany. May.

Sphæropsis seriatus, *n. sp.* Perithecia hard, crowded or subcæspitose, arranged in long lines in the chinks of the rough bark, black; spores at first pale, then colored, ellipticalo bovate or oblong, .0008 in. to .001 in. long. Dead bark of sassafras, *Sassafras officinale.* Center. May. The hard sclerotoid perithecia and the linear arrangement of the clusters make this a very distinct species.

Sphæropsis celastrina, *n. sp.* Perithecia numerous, small, seated on the inner bark, covered by the epidermis which is slightly elevated and at length pierced or slightly ruptured; spores oblong or oblong-ovate, colored, .0008 in. to .001 in. long. Dead stems of bitter-sweet, *Celastrus scandens.* Charlton. July. This is quite unlike *S. propullans* in which the perithecia are much larger and cæspitose. The epidermis is usually whitish or cinereous over each perithecium and it ruptures slightly, forming a small aperture.

Sphæropsis smilacina, *n. sp.* Spots orbicular, 2 lines to 3 lines broad, arid, whitish with a dark border; perithecia epiphyllous, subhemispherical or depressed, black, often disposed in a circle near the margin of the spot; spores oblong or subfusiform, colorless, .0008 in. to .0012 in. long, about .0003 in. broad. Living leaves of greenbrier. *Smilax rotundifolia.* Wading River. Sept.

Septoria pastinacina, *n. sp.* Spots extended, indefinite, brown; perithecia minute, .005 in. to .006 in. broad, numerous, surrounding the stem on all sides, covered by the epidermis which is pierced by the ostiolum, black; spores filiform, curved or flexuous, .0008 in. to .0012 in. long. Dead stems of parsnip, *Pastinaca sativa*. Albany. May It is related to such species as *S. Brunandiana*, *S. nebula*, etc.

Septoria hedeomina, *n. sp.* Spots none; perithecia scattered, minute, .003 in. to .004 in. broad, inconspicuous, black; spores filiform, strongly curved, hyaline, .0012 in. to .0015 in. long. Dead stems and calyces of pennyroyal, *Hedeoma pulegioides*. Sandlake. May.

Septoria Gei, *R. & D.* Living leaves of *Geum Virginianum*. Guilderland. July.

Septoria Ostryæ, *n. sp.* Spots small, suborbicular, reddish-brown; perithecia few, generally clustered in the center of the spot, brown or blackish-brown; spores linear, strongly curved, obscurely three or four-septate, colorless, .0016 in. to .0024 in. long. Living leaves of hop hornbeam, *Ostrya Virginica*. Helderberg mountains. July.

Septoria lythrina, *n. sp.* Spots suborbicular or irregular, grayish-brown, often surrounded by a narrow blackish border; perithecia minute, epiphyllous, rarely amphigenous, blackish; spores filiform, slightly curved, .0008 in. to .0016 in. long. Living leaves of spiked loosestrife, *Lythrum Salicaria*. Newburgh. July.

Septoria increscens, *n. sp.* Spots at first small, then larger, brown with an arid center; perithecia minute, black; spores filiform, curved or flexuous, .0012 in. to .0016 in. long. Living leaves of star flower. *Trientalis Americana*. Charlton. July. After the leaves are attacked by this fungus they turn yellow in patches and then brown. These discolored places increase in size till the whole leaf is dead.

Septoria atropurpurea, *n. sp.* Spots suborbicular, sometimes confluent, purplish-brown above, often centrally mottled by small whitish arid spots, paler below, purplish, with a brown or an ochraceous-brown center; perithecia few, tendrils white; spores filiform, straight or flexuous, .002 in. to .003 in. long. Living leaves of the large-leaved aster, *Aster macrophyllus*. Jamesville. Aug. The perithecia occur both on the arid central dots and on the colored parts of the spots. The peculiar character of the spots and the very long spores make this a very distinct species.

Septoria Aceris, *B. & Br.* Living leaves of sugar maple, *Acer saccharinum*. Sandlake. Aug. In our specimens the spots are very small, almost dot-like, arid, with a reddish-brown border and one to four perithecia. The spores are three-septate and strongly curved, but this difference is probably only varietal.

Septoria Ludwigiæ, *Cke.* Living leaves of water purslane, *Ludwigia palustris*. Charlton. July. In our specimens the spots have a purplish border and the spores are without nucleoli. Dr. Curtis long ago distributed specimens of this species under the name *Septoria Ludwigiæ* B. & C., but so far as I know the characters of the species were never published.

Septoria Mori, *Lev.* Living leaves of white mulberry, *Morus alba*. Charlton. July.

Septoria Urticæ, *Desm.* Living leaves of wood nettle, *Laportea Canadensis*. Charlton. July.

Septoria Cornicola, *Desm.* Living leaves of red osier and alternate-leaved dogwood, *Cornus stolonifera* and *C. alternifolia*. Jamesville and Center. Aug. and Oct.

Cytispora minuta, *Thum.* Dead branches of ash, *Fraxinus Americana.* West Troy. May.

Glœosporium Trifolii, *n. sp.* Spots suborbicular often concentrically zoned, brown; spores oblong or cylindrical, obtuse, simple, colorless, .0006 in. to .0009 in. long, .00016 in. to .00025 in. broad Living leaves of red clover, *Trifolium pratense.* Albany. July.

Glœosporium salicinum, *n. sp.* Spots large, irregular, indefinite, arid, pale; spores elongated, subfusiform, curved or flexuous, obscurely triseptate, each cell usually containing two nuclei, colorless, .0016 in. to .002 in. long. Living leaves of willow, *Salix sericea.* Sandlake. Aug. Usually one end of the spore is more acute than the other.

Glœosporium Hepaticæ, *n. sp.* Spots large, irregular, often discoloring the whole leaf, blackish-brown; pustules minute, scattered, epiphyllous, the thick tendrils pinkish when dry; spores oblong or cylindrical, colorless, obtuse at each end, straight or slightly curved, .0006 in. to .001 in. long, .00025 in. to .0003 in. broad, usually with two to four nuclei. Living leaves of liverwort, *Hepatica acutiloba.* Helderberg mountains. July. This species appears to be very destructive to the leaves it attacks. The discoloration apparently spreads rapidly and finally involves the whole leaf.

Glœosporium Laportæ, *n. sp.* Spots orbicular, yellowish-green with a dark-margined arid center; spores simple, globose or elliptical, colorless, .00016 in. to .00025 in. long, uninucleate or binucleate, forming a pallid globule on the upper surface of the spot. Living leaves of wood nettle, *Laportea Canadensis.* Charlton. July.

Coryneum pustulatum, *n. sp.* (Plate 1, figs. 1–3.) Pustuliform, seated on the inner bark, covered by the elevated epidermis which is at length pierced or slightly ruptured; spores long, subclavate or subfusiform, colored, five to seven septate, often strongly curved, .0025 in. to .003 in. long, about .0005 in. broad; sporophores short. Dead branches of oak or chestnut. Sandlake. May. The spores sometimes ooze out and stain the matrix black. This and its pustulate form give the fungus the appearance of a *Stilbospora,* though the structure indicates that it is a *Coryneum.*

Pestalozzia Guepini *Desm.* Living leaves of Camellia in conservatories. Buffalo. *Clinton.*

Asterosporium betulinum, *n. sp.* (Plate 1, figs. 4–5.) Pustulate, erumpent, with a black orbicular disk, the stroma filamentous; spores three or four-radiate, slightly colored, the rays oblong-ovate or elonlgate-conical, subacuminate, three to five-septate, .0008 in. to .0015 in. ong, .00035 in. to .00048 in. broad in the widest parts, slightly narrowed at the base, the cells often uninucleate, the terminal one paler. Dead branches of birch, *Betula lutea.* Quaker Street. June. Externally this closely resembles *A. Hoffmanni,* but in European specimens of that species the rays are triangular-ovate and widest at the base where they are .00065 in. broad. In our plant they are paler, narrower, more elongated and abruptly narrowed at the base. I have been unable to detect a perithecium else I should refer our plant to *Prosthemium betulinum* Kze.

Melanconium cerasinum, *n. sp.* Stroma distinct, thin, white; spores very unequal, globose, ovate, elliptical or oblong, .00065 in. to .001

in. long, generally containing a single large nucleus. Dead bark of choke cherry, *Prunus Virginiana.* Center. June. This species is closely related to *M. intermedium,* from which it is distinguished by its paler, smaller spores and especially by its distinct white stroma. In. *M. intermedium* the stroma is obsolete or merely cortical. It also approaches *M. effusum* Cd.

Torula uniformis, *n. sp.* (Plate 1, figs. 11–13.) Flocci cæspitose, erect, parallel or slightly diverging, nearly straight and uniform in diameter, .0012 in. to .003 in. long, black or blackish-brown, the articulations subquadrate, uninucleate, not easily separating, about .00016 in. broad and long. Dead bark of maple. Quaker Street. June. The flocci are slightly united at their bases, and when pressed under the cover of the microscope slide they separate into groups of two to six or more, and look then very much like a species of Speira or Synphragmidium. The species differs from *T. splendens* in its more slender flocci, which also are not narrowed above.

Synphragmidium effusum, *n. sp.* (Plate 1, figs. 6–10.) Effused, forming a dense velvety black stratum ; strings of spores moniliform, colored, sometimes paler at the tips, united at their bases into groups of three or more, either with or without a short common pedicel, at first laterally adherent throughout their length, .0016 in. to .003 in. long, .0002 in. to .0003 in. broad, the groups .0005 in. to .0011 in. broad, the cells about as long as broad. Decaying maple wood. Verona. Aug.

I have not been able to detect any membrane investing the groups of spore threads, but its absence may be due to the age of the specimens. In every other respect the characters of the genus are present. The species is readily distinguished from *S. Kummeri* by its effused character. The preceding species, *Torula uniformis,* strongly resembles this in its spore threads, which are united at the base, but I find no common pedicel to the groups. It forms a beautiful connecting link between *Torula* and *Synphragmidium.*

Gymnosporium variabile, *n. sp.* Flocci sparse, branched, paler than the spores; spores abundant, variable, globose, elliptical, oblong or fusiform, purplish-brown, .0005 in. to .0012 in. long, .0005 in. to .00055 in. broad, forming effused pulverulent patches. Under surface of decaying wood lying on the ground. Albany. May. The species is related to *G. fulvum* from which it differs in its darker, purplish-brown color and in its smoother and more variable spores.

Puccinia Ellisiana *Thum.* Living and languishing leaves of *Andropogon scoparius* and *A. furcatus.* Buffalo. *Clinton.* Center. Sept. and Oct. This is apparently *Puccinia Andropogi* Schw., but that name is badly formed, nor can it be corrected without interfering with *Puccinia Andropogonis* Fckl. I have therefore adopted the later name.

Protomyces fuscus, *n. sp.* Spots irregular, determinate, blackish-brown or grayish-brown, often marginal ; spores immersed in the tissues of the leaf, globose, colored, .0016 in. to .0024 in. in diameter, with a thick epispore. Living leaves of liverwort, *Hepatica acutiloba* Helderberg mountains. July. This species differs from *P. macrosporus* in the darker color of the spores and in its darker definite spots.

A species of *Vermicularia* often occurs on the spots formed by the *Protomyces.*

Melampsora Hartigii, *Thum.* Living leaves of willows, *Salix cordata* and *S. nigra.* Albany and Helderberg mountains. July to Oct.

Æcidium cimicifugatum *Schw.* Living leaves of black snakeroot, *Cimicifuga racemosa.* Buffalo. *Clinton.* July.

Rœstelia Ellisii *Pk.* Living leaves of shad bush, *Amelanchier Canadensis.* Riverhead. Sept.

Cronartium asclepiadeum *Fr.* Living leaves of sweet fern, *Comptonia asplenifolia.* Long Island. Sept.

Stilbum pruinosipes, *n. sp.* Stem slender, equal or slightly tapering upward, scarcely one line high, blackish, pruinose; head small, subglobose, chestnut colored or blackish; spores very minute, elliptical. Dead stems of raspberry, *Rubus strigosus.* Center. Oct.

Stilbum erythrocephalum *Dittm.* Cow-dung. Buffalo. *Clinton.*

Periconia parasitica, *n. sp.* Stem slender, smooth, equal, subpellucid, white; head subglobose or lenticular, white; spores obovate elliptical or oblong, .0003 in. to .0005 in. long, about .0002 in. broad. Dead branches of water beech, *Carpinus Americana,* and parasitic on *Cheirospora botryospora.* Charlton. July.

This resembles *Stilbum candidum,* but the spores are not diffluent and the heads are more depressed and whiter.

Tubercularia Celastri *Schw.* Dead stems of bitter sweet, *Celastrus scandens.* Charlton. July.

Helminthosporium Pruni *B. & C.* Dead branches of choke cherry, *Prunus Virginiana.* Center. June. The spores in this species are very variable both in length and in the number of septa.

Macrosporium Meliloti, *n. sp.* Spots irregular, terminal or marginal, blackish-brown; flocci short, colored, septate, generally flexuous; spores subelliptical, or clavate, generally tapering below into a short pedicel, three to five-septate with a few longitudinal septa, colored, .001 in. to .002 in. long. Living leaves of melilot. Newburgh. July.

Alternaria Chartarum *Preuss.* Damp paper. Albany. Nov.

Helicosporium cinereum, *n. sp.* (Plate 2, figs. 4–6.) Patches effused, thin, cinereous; flocci slender, sparingly branched, septate, blackish-brown, the articulations longer than broad; spores nearly colorless, grayish or cinereous in the mass, coiled in three or four volutions, diameter of the coil .0008 in. to .001 in. Decaying wood. North Greenbush. June. The species is easily distinguished from *H. olivaceum* by its cinereous color and from *H. obscurum* by the more numerous volutions of the spores.

Polyactis Streptothrix, *C. & E.* Living or languishing leaves of cohosh, *Caulophyllum thalictroides.* Jamesville. Aug. The spores in our specimens, as well as in authentic specimens received from Mr. Ellis, are .011 to .012 mm. in diameter, not .018 mm. as required by the description.

Pyricularia grisea, *Sacc* (*Trichothecium griseum, Cke*). Living leaves of crab grass, *Panicum sanguinale.* Sandlake. Aug. I do not find any published description of this fungus, but specimens have been distributed under the latter name by Mr. Ellis.

Peronospora obducens, *Schrœt.* Cotyledonous leaves of touch-me-not. Sandlake. May.

Oidium irregulare, *Pk.* Living leaves of bladder nut, *Staphylea trifolia.* Monroe, Orange county. July.

Cercospora Nymphæacea, *C. & E.* Living leaves of water lily, *Nymphæa odorata.* Riverhead. Sept.

Cercospora zebrina, *Pass.* Living leaves of yellow clover, *Trifolium agrarium.* Sandlake. Aug.

Cercospora althæina, *Sacc.* Living leaves of hollyhock, *Althæa rosea.* Sandlake. Aug.

Cercospora Smilacis, *Thum.* (Plate 2, figs. 1–3.) Spots numerous, small, orbicular, reddish-brown, surrounded by a darker margin on the upper surface of the leaf; flocci hypophyllous, tufted, slender, septate, nodulose above, colored; spores narrowly clavate, .0012 in. to .0024 in. long, colorless, with two to four septa. Living leaves of *Smilax glauca.* Wading River. Sept. This fungus was very abundant in the locality mentioned. The number of flocci in a tuft is usually small, generally four to eight, and the spores are so strongly narrowed toward one end that they are obclavate in form.

Cercospora elongata, *n. sp.* (Plate 1, figs. 21–23.) Spots irregular, angular, limited by the veinlets, often confluent, sometimes arid, brown grayish-brown or cinereous; flocci amphigenous, tufted, colored, subflexuous, sometimes nodulose; spores elongated, obscurely three to many-septate, gradually narrowed toward one end, colorless, .002 in to .006 in. long, .00015 in. to .0002 in. broad, generally longer than the flocci. Living leaves of wild teasel, *Dipsacus sylvestris.* Jamesville. Aug.

Cercospora squalidula, *n. sp.* Spots angular or subrotund, unequal, brown or grayish-brown with a dark border; flocci amphigenous, tufted, slightly nodulose above, colored; spores cylindrical or subclavate, unequal in length, .0012 in. to .0045 in. long, nearly colorless, simple or with one to three obscure septa. Living leaves of virgin's bower, *Clematis Virginiana.* Jamesville. Aug. The spots are sometimes of a uniform dark-brown color, sometimes grayish with a darker border. The species is distinct from *C. olivascens* which is said to grow on leaves of clematis.

Cercospora Sanguinariæ, *n. sp.* Spots large, indeterminate, smoky-brown, sometimes obscurely mottled or subreticulate with darker lines on the upper surface; flocci hypophyllous, few, scattered or subcæspitose, rather long, colored, often nodulose above; spores subcylindrical, obtuse, four to eight-septate, colorless, .0015 in. to .0025 in. long. Living or languishing leaves of blood root, *Sanguinaria Canadensis.* Jamesville. Aug. Mycelioid filaments appear to permeate the tissues of the leaf and send up, here and there, spore-bearing flocci which are generally nodulose at or near the tips. Owing to the scattered mode of growth of the flocci the fungus is scarcely visible, but the large smoky-brown spots are very conspicuous.

Cercospora Eupatorii, *n. sp.* Spots at first small and pale-green, then larger, suborbicular, determinate, reddish-gray or reddish-brown, with an elevated margin and darker border; flocci tufted, short, simple, colored; spores elongated, slender, generally slightly thickened toward one end, obtuse, colorless, triseptate, .002 in. to .003 in. long. Living leaves of *Eupatorium album.* Long Island. *Miller.*

Cercospora griseëlla, *n. sp.* Spots suborbicular, indeterminate, yellowish; flocci short, minutely tufted, septate; spores slightly thickened toward one end or subfusiform, colorless, triseptate, .0016 in. to .002 in. long. Living leaves of fleabane, *Erigeron annuum.* Charlton. July. The tufts are so numerous and so minute as to give the spots on the under surface of the leaf the appearance of being suffused by a minute pruinosity.

Cercospora Caulophylli, *n. sp.* Spots irregular or suborbicular, dark-brown or grayish with a dark-brown margin; flocci hypophyllous, tufted, flexuous, nodulose above, colored, rarely branched; spores oblong or cylindrical, with one to three septa, colorless, .0008 in. to .0012 in. long, .00025 in. to .0003 in. broad. Living or languishing leaves of cohosh, *Caulophyllum thalictroides.* Helderberg mountains. July.

Ramularia Armoraciæ *Fckl.* Living leaves of horse radish, *Nasturtium Armoracia.* Charlton. July.

Ramularia Celastri, *n. sp.* Spots small, suborbicular, scattered, brown or blackish-brown, generally with a pure-white center on the upper surface; flocci hypophyllous, slender, septate, tufted; spores cylindrical, nearly straight, colorless, .0006 in. to .001 in. long, about .00015 in. broad. Living leaves of bitter sweet, *Celastrus scandens.* Highland Mills, July.

Ramularia Mitellæ, *n. sp.* Spots suborbicular, brown; flocci hypophyllous, minutely tufted, short, nearly straight, slightly colored; spores straight, oblong or cylindrical, colorless, unequal in length, .0003 in. to .0008 in. long, .00012 in. broad. Living leaves of mitrewort, *Mitella diphylla.* Newburgh and Jamesville. Aug. and Sept.

Ramularia Dulcamaræ, *n. sp.* Spots indeterminate, yellowish-green; flocci hypophyllous, branched, forming with the spores a soft felty stratum of a violet-gray color; spores oblong or subcylindrical, simple or containing several nucleoli, colorless, .0008 in. to .0018 in. long, .0002 in. to .00025 in. broad. Living leaves of nightshade, *Solanum Dulcamara.* Verona. Aug. The spots are very unequal in size and often confluent. When the leaf fades the spots retain for a longer time their greenish hue. The species in some respects approaches the genus *Peronospora.*

Microstroma leucosporum *Niessl.* (Plate 1, figs. 14–17.) Living leaves of butternut, *Juglans cinerea.* Charlton. July. It is with some hesitation that I refer our plant to this species. According to the figure of the European fungus, which occurs on leaves of *Juglans regia*, the spores are more than twice as long as broad and binucleate, while in our fungus they are scarcely twice as long as broad and uninucleate. Perhaps farther investigation will require its separation as a distinct species. It occurs on leaves of young trees.

Fusisporium Solani, *Mart.* Potatoes. Albany. March. In England, this fungus is regarded as a great pest. Mr. W. G. Smith writes of it and the potato-rot fungus as follows: "For more than thirty years our potato crops have been systematically destroyed by two virulent fungi, viz., Peronospora infestans and Fusisporium Solani, these two parasites almost invariably work in company with each other, they suddenly appear for a few weeks, destroy our crops, and vanish for ten or twelve months, then reappear and repeat the work of destruction. * * * As I have kept the resting-spores of both parasites alive artificially in decayed potato leaves in water, in moist air and in expressed diluted juice of horse-dung, it conclusively proves to me that the resting-spores hibernate naturally in the same manner."

Helvella palustris, *n. sp.* (Plate 2, figs. 16–18.) Pileus irregular, at first blackish and slightly adnate, then grayish-brown or mouse-colored and free, rugose beneath; stem equal, slender, sulcate-costate, colored like the pileus, the costæ thin, subacute; asci cylindrical; spores broadly elliptical, .00065 in. to .0008 in. long, .0005 in. broad containing a single large nucleus; paraphyses thickened above, brown. Plant 1 in. to 2 in. high, pileus 6 lines to 12 lines broad, stem about 2 lines thick. Among mosses and liverworts in swamps. Manlius. Aug. This species is related to *H. sulcata*, from which it differs in its more slender and darker-colored stem, its less firm and more free pileus and its darker-colored paraphyses. In the dried specimens the upper surface of the pileus has assumed a blackish color, but the lower surface has retained very nearly its normal hue. The dark-colored slender stem readily separates this species from all others with costate or lacunose-costate stems.

Peziza (Cupulares) subvernalis, *n. sp.* Cups fleshy, 3 lines to 6 lines broad, sessile or with a short thick stem-like base which is sometimes whitened with mycelium, chestnut-colored when moist, darker when dry, externally slightly furfuraceous, the hymenium plane or slightly concave, subpruinose; asci cylindrical; spores smooth, elliptical, .0008 in. to .0009 in. long, .0005 in. broad; paraphyses numerous, slightly thickened above, colored. Decaying wood and bark of ash trees, *Fraxinus sambucifolia*. Sandlake. May. The color is a little paler than in *P. badia*. The thick fleshy base gradually expands into the broad, shallow or nearly plane cup, which is narrowly margined. The plants shrivel much in drying.

Peziza (Dasyscyphæ) luteodisca, *n. sp.* Cups minute, .014 in. to .028 in. broad, expanded, plane or slightly concave, margined, externally mealy-pubescent, white, the hymenium yellow, inclining to orange when dry; stem short or obsolete; asci subcylindrical; spores crowded or biseriate, fusiform, .0004 in. to .0005 in. long. Dead stems of rushes, *Scirpus validus*. Manlius. Aug. The stems are so short that at first sight the cups appear to be sessile.

Peziza (Mollisia) floriformis, *n. sp.* Cups small, one-half to one line broad, thin, smooth, at first subcyathiform and regular, then floriform with the margin wavy inflexed, dull cream-colored; asci short, cylindrical, .00065 in. to .0008 in long; spores spermatoid. Decaying wood of maple. Verona. Aug. The margin of the larger cups is strongly inflexed in three or four places, giving the plants a resemblance to a small three or four-petalous flower.

Peziza multipuncta, *Pk.* Dead culms of carices. Albany. May.

Peziza regalis, *C. & E.* Dead branches. North Greenbush. Nov.

Peziza mycogena, *Ellis.* On some effete fungus. Griffins. Sept.

Peziza sanguinea, *Pers.* Decaying wood. Buffalo. *Clinton.* Sandlake. This species is referred by some mycologists to the genus *Patellaria.*

Helotium vitigenum, *De Not.* Dead grape vines. Albany and North Greenbush. July and Oct.

Helotium pallescens, *Fr.* Chips and decaying wood. North Greenbush. Oct.

Helotium (Pelastea) affinissimum, *n. sp.* Cups subcæspitose, stipitate, plane or convex, 1 line to 2 lines broad, yellow, the external surface and margin slightly pruinose; stem subcylindrical, yellowish, 2 lines to 4 lines long; asci cylindrical; spores oblong, obtuse, .0008 in. to .0004 in. long. Decaying sticks buried in the ground. Albany. June. This species resembles *H. lutescens* very closely, but it is more cæspitose in its mode of growth, becomes more discolored in drying and has smaller spores.

Patellaria Hamamelidis, *n. sp.* (Plate 2, figs. 7–10.) Small, .014 in to .02 in. broad, sessile, black or externally slightly tinged with reddish-brown, the disk nearly plane, margin at length obliterated; asci oblong-clavate, spores crowded or biseriate, oblong-fusiform, sometimes slightly curved, at first colorless, then slightly colored, triseptate, .00065 in. to .0008 in. long, .00025 in. to .0003 in broad. Dead bark of witch hazel, *Hamamelis Virginica.* North Greenbush. May.

Cenangium Viburni, *Schw.* Dead stems and branches of hobble bush. *Viburnum Lantanoides.* Buffalo. *Clinton.* Catskill mountains. July.

Caliciopsis, *Pk.* Receptacle oblong urceolate or subcylindrical, at first closed, then open and pulverulent at the apex, stipitate. This genus is instituted to receive a small Calicium-like fungus that does not well accord with the characters of any genus known to me. It partakes to some extent of the characters of some of the small stipitate species of *Cenangium,* but its more slender habit and urceolate or subcylindrical receptacle which soon becomes pulverulent above separate it from that genus. These same characters and its less tough substance forbid its reference to the genus *Tympanis.* The name is formed from *Calicium* and *opsis.*

Caliciopsis pinea, *Pk,* (Plate 2, figs. 11–15.) Scattered or subcæspitose, about 1 line high, glabrous, shining, black; stem slender, straight or curved, slightly thickened at the base, often growing from a cluster of black spheriform perithecia which contain spermatoid spores; receptacle narrowly urceolate, generally a little curved or inclined to one side, slightly exceeding the stem in diameter, the apex soon brownish pulverulent; asci ovate-lanceolate; long pedicellate, spores simple, elliptical, colored, .0002 in. to .00025 in. long. Bark of pine trees, *Pinus Strobus.* Guilderland and Charlton. The peculiar form of the receptacle is suggestive of the dry capsules of many mosses, particularly of species of *Hypnum.* The spheriform bodies and their spermatoid contents are probably only another condition of this fungus. The young stems are at first pointed, but as they increase in length they become more obtuse and finally the receptacle is developed at the top. Although this plant strongly resembles species of Calicium externally, it is wholly destitute of any thalline crust and gonidial cells and must be deemed a fungus.

Tuber dryophilum, *Tul.* Staten Island. *Gerard.*

Hysterium gramineum, *M. & N.* Dead leaves of sand reed, *Calamagrostis arenaria.* Wading River. Sept. This is the *Hysterium Robergii* Desm. of Dr. Curtis' specimens. *H. culmigenum var. gramineum* Fr. and *Lophodermium arundinaceum var. gramineum,* Duby.

Taphrina alnitorqua, *Tul.* Fertile aments of alders. Newburgh. July.

Nectria dematiosa, *Schw.* Dead branches of mulberry. *Morus aba.* Charlton. July.

Xylaria bulbosa, *B. & Br.* Ground under tamarack and arbor-vitæ trees. Manlius. Aug.

Hypoxylon Blakei, *B. & C.* Dead trunks of willows. Buffalo. *Clinton.* Center. June. This scarcely differs from *H. Morsei* except in its spores which are a little smaller than in that species.

Eutypa subtecta, *Fr.* Dead trunks and branches of poplar, *Populus tremuloides.* Center. Sept.

Diatrype quadrata, *Schw.* Bark of oak, beech, etc. Buffalo. *Clinton.* Sandlake and North Greenbush. This is *Diatrype obesa* B. & C. in Ravenel's Exsicc. Fung. Fasc. IV, No. 47. It bursts forth from the bark of various deciduous trees and assumes a great variety of aspects, being crowded, scattered or seriately arranged and forming either large or small pustules. Schweinitz's description of it is so defective that it is not surprising that several synonyms have been made.

Diatrype strumella, *Fr.* Dead stems of flowering currant, *Ribes florida.* Albany. May.

Diatrype nigrospora, *n. sp.* Stroma small, thin, orbicular, pustulate, blackish or black, elevating the epidermis and stellately or transversely rupturing it; perithecia few, generally 6–12, sunk to the wood and covered above by the stroma; ostiola slightly prominent, piercing the subcinereous or blackish disk; asci subcylindrical, 8-spored; spores crowded or biseriate, oblong elliptical, obtuse; generally slightly curved, at first pale, then colored, uniseptate, .00065 in. long, .00032 in. broad, each cell containing a large nucleus. Dead branches of birch, *Betula lutea.* Quaker Street. June. This is related to such species as *D. moroides*, *D. cincta* and *D. æthiops.*

Melogramma gyrosum *Schw* Dead bark. Silver Creek, Chautauqua county. *Clinton.*

Valsa Carpini, *Pers.* Dead bark of water beech, *Carpinus Americana.* North Greenbush. May.

Valsa aurea *Fckl.* Dead branches of water beech. North Greenbush. May. This species is well marked by the small reddish or yellowish disk and the simple ovate-elliptical spores which are about .0008 in. long and .00035 in. broad.

Valsa paucispora, *n. sp.* Pustules covered by the slightly elevated epidermis which is at length ruptured; perithecia, 2–5, seated on the inner bark; ostiola short, black, piercing the minute pallid disk, even or rarely slightly radiate-sulcate; asci short, .0025 in. to .0028 in. long, subcylindrical, tetrasporous; spores simple, uniseriate, nearly colorless, ovate-elliptical, .0006 in. long to .0008 in. long, .0004 in. to .00045 in. broad. Dead alder twigs. North Greenbush. May. This is closely related to the preceding species from which it may be separated by its paler disk, shorter four-spored asci and uniseriate spores.

Valsa compta, *Tul.* Dead branches of beech, *Fagus ferruginea* Quaker Street. June. In our specimens the spores are ovate or oblong-elliptical, colorless, .0007 in. to .0009 in. in length.

Valsa prunicola, *n. sp.* Pustules scattered, slightly prominent, piercing the epidermis or rupturing it transversely; perithecia 10–12, sunk to the wood or nestling in the inner bark; ostiola entire, crowded, slightly exserted; asci fusiform or subcylindrical; spores crowded, cylindrical, straight or slightly curved, quadrinucleate, colorless, .0005 in. to .0006 in. long, .00016 in. broad. Dead branches of wild bird cherry, *Prunus Pennsylvanica.* Sandlake. May.

Valsa tessera, *Fr.* Dead stems of hazel nut, *Corylus Americana.* Center. May.

Valsa Abietis, *Fr.* Bark of hemlock and spruce trees. West Troy, Sandlake and North Greenbush. May and Oct. In some instances the asci are wanting, the perithecia being filled with a multitude of the minute spores.

Valsa acrocystis, *n. sp.* (Plate 2, figs. 19–22.) Pustules small, covered by the epidermis, which is slightly elevated and ruptured in a narrow transverse chink; perithecia generally 4 to 12, circinating, seated on the inner bark, covered by a grayish-brown tomentum, ostiola short, blunt, black, seriately placed; asci oblong; spores large, crowded or biseriate, oblong, colored, uniseptate, .0016 in. to .0025 in. long, .0005 in. to .0008 in. broad, with a small hyaline hemispherical or subglobose appendage at each end. Dead branches of birch, *Betula lenta.* North Greenbush. May. The linear arrangement of the ostiola and the peculiar character of the appendages of the spores are marked features in this species. The tomentum of the pustules and the large colored appendiculate spores indicate a relationship between this species and *Valsa hapalocystis,* and yet our plant belongs to the Section Euvalsa. The specific name has reference to the appendages of the spores.

Sphæria capillifera, *Curr.* Decaying wood. Portage. July. *Clinton.*

Cucurbitaria longitudinalis, *n. sp.* (Plate 2, figs. 23–26.) Perithecia .02 in. to .03 in. broad, subglobose, arranged in short lines in longitudinal chinks in the bark, black, pierced at the apex; asci cylindrical; spores uniseriate, four or five-septate, often with one or two longitudinal septa, colored, .0011 in. to .0013 in. long, .0004 in. to .0005 in. broad. Dead stems of the privet Andromeda, *Andromeda ligustrina.* Center. May.

Sphærella recutita, *Fr.* Dead leaves of carices, *Carex varia.* West Troy. May.

Sphærella depressa, *n. sp.* Perithecia numerous, minute, depressed or even concave when dry, black; asci oblong-clavate; spores simple, oblong-elliptical or subfusiform, colorless, .0005 in. to .0006 in. long. Dead stems of Mulgedium. Center. May. The perithecia are so much depressed that they resemble a minute Peziza in form. They are slightly papillate.

Sphærella conigena, *n. sp.* Perithecia minute, erumpent, black; asci broad, obovate or subclavate, somewhat pointed at the apex; spores oblong or subcylindrical, when mature uniseptate, .001 in. to .0016 in. long. Old cones of arbor-vitæ. Helderberg mountains July.

(5.)

REMARKS AND OBSERVATIONS.

Viola Selkirkii, *Pursh.* Plentiful in a pine grove near West Albany. The large pale blunt spur is a conspicuous feature in the flowers of this species.

Hypericum mutilum, *L.* A tall form, 12 to 15 in. high, with straight branches, occurs near Riverhead. Its cyme is leafy, and thus connects the variety *gymnanthum* with the typical form.

Linum striatum, *Walt.* Wet banks near Newburgh. July.

Hieracium venosum var. subcaulescens, *Gr.* A form of this plant with the veins of the leaves uncolored was found near Wading River. It was in full flower in September.

Lycopus Europæus var. sessilifolius, *Gr.* Near Riverhead.

Convolvulus arvensis, *L.* Fields near Newburgh.

Polygonum Hartwrightii, *Gr.* Flowering specimens were found on the shore of the "Green Lake" west of Jamesville. In all the specimens seen the peduncle was axillary, not terminal as in *P. amphibium.*

Quercus Phellos, *L.* Tottenville. *Britton.*

Potamogeton amplifolius, *Tuckm.* Thompson's Lake, Helderberg mountains, and near Warwick, Orange county.

Potamogeton gramineus var. heterophyllus, *Fr.* Thompson's Lake, also "Green Lake" near Jamesville. In low muddy places east of the latter lake it forms a dense carpet over the surface of the ground.

Potamogeton, Robbinsii, *Oakes.* Ballston Lake. July. Though the plants were abundant and the flowering spikes numerous, the stems being sometimes excessively branched above, no good fruit could be found. The plants grow at the head of the lake in company with *Potamogeton lonchites, P. perfoliatus, P. compressus, P. hybridus, P. Claytonii, P. pectinatus* and *Bidens Beckii.*

Triglochin palustre, *L.* Abundant in marshy ground near Manlius Center.

Hemerocallis fulva, *L.* Banks of streams in fields. Guilderland. Escaped from gardens, but thriving without cultivation.

Juncus maritimus *Lam.* This rush was found some years ago on Coney Island. Specimens were collected there again the past season by *Mr. N. L. Britton,* thus showing that it is still maintaining its foothold amid the march of improvement on that island.

Carex tentaculata var. altior, *Boott.* (*C. Purshii* Olney.) Charlton and North Greenbush.

Carex intumescens, *Rudge.* Helderberg mountains. A starved form with but one or two perigynia in a spike.

Scolopendrium vulgare, *Sm.* A rediscovery of this interesting fern was recently made by *Mrs. Barnes* and other members of the Syracuse Botanical Club, probably in the identical station where it was found by Pursh in 1807. Specimens collected in this locality by *Mrs. Leavenworth* were kindly contributed by *Mrs. M. J. Myers.* If we regard the stations near Jamesville as one locality there are now three localities in the State where this fern is known to grow.

Botrychium Lunaria, *Sw.* A new station for this rare fern has been discovered near Syracuse, and specimens have been contributed by *Mrs. H. S. Gifford.*

Chara fœtida var. longibracteata, *A. Br.* This interesting variety of our common chara occurs in pools by the side of the railroad at Verona.

Chara fragilis, *Desv.* This and the preceding species abound in the "Green Lakes" of Onondaga county. On account of the clearness of the water, the plants are seen at a great depth and they give the green appearance that suggests the popular name of the lakes.

Fissidens grandifrons, *Brid.* Rivulets near Jamesville, but as usual the moss is sterile.

Cladonia papillaria, *Hoffm.* Sterile soil. Ballston. July.

Agaricus melleus, *Vahl.* This extremely variable species sometimes has a white pileus.

Agaricus virescens, *Pk.* I find that this name is preoccupied and substitute for it *Agaricus viriditinctus.*

Gomphidius rhodoxanthus, *Schw.* This plant has been thought by some to be the same as *Paxillus flavidus,* Berk., but it does not agree well with the description of that species. Neither does it agree fully with the characters of the genus *Gomphidius.* I do not find the pileus viscid, nor the lamellæ forked, though they are venose-connected. They do not readily separate from the pileus as in *Paxillus.*

Russula virescens, *Fr.* According to the description of this species the margin of the pileus should be even, but specimens sometimes occur in which the margin is wholly or partly striate. The number of forked and intermediate lamellæ is also variable and the warts are sometimes pale-brown instead of green. The color of the pileus is generally grayish-green but it is frequently tinged with yellow.

Panus stipticus, *Bull.* This usually occurs on trunks of deciduous trees, but occasionally it is found on hemlock trunks.

Lenzites betulina, *Fr.* Specimens of this species have been found on hemlock trunks. *Lenzites vialis* also occurs both on frondose and acerose trees, so that the division of the genus into two sections depending on the character of the habitat is scarcely reliable.

Polyporus igniarius, *Fr.* One specimen was found about one foot broad and having seventeen strata of pores, thus indicating an age of seventeen years.

Polyporus pergamenus, *Fr.* The typical form of this species, according to the description, has the pileus coriaceo-membranaceus, rigid, tomentose, concentrically sulcate, white; the pores seriately placed, pallescent and produced into very thin dentate plates. Its habitat is said to be pine, and its locality Arctic America. The species, as now understood, proves to be a very common and very variable one and includes several synonyms. In Ravenel's Fungi Car. Exsicc., Fasc. 1, No. 13, *Polyporus laceratus,* Berk., is represented to be a synonym of this species. Dr. Berkeley himself does not give it as a distinct species in his Notices of North America Fungi, though it was founded on specimens from New Orleans, from which we infer that he does not regard it as a good species. According to the description it scarcely differs from *Polyporus elongatus*, Berk., except in its shape and its larger pores. The former difference is of little value for *P. elongatus* is known to vary very much in shape and size. But *P. elongatus*, according to authentic specimens received from *Dr. Michener*, can scarcely be regarded as any thing more than a mere form, or perhaps variety, of *P. pergamenus*. For of this species we have in this State two prevailing forms. One form has the pileus tomentose, concentrically sulcate and white, and its pores become paler with age and are at length produced or lacerated into thin dentate plates precisely as required by the description. But it differs from the type in generally, though not always, having the pileus too thick to be called membranaceous, and in the pores not being seriately placed. These slight differences, however, are of but little account in such a variable plant as ours is known to be, and there can be no doubt that it should be referred to *P. pergamenus*. The other form, which is more abundant even than the first, is generally thinner and less distinctly tomentose. Indeed, it is sometimes nearly or quite smooth, and it often appears to become smoother with age. Instead of being concentrically sulcate it is generally more or less marked with narrow delicate zones. There are also fine radiating lines or striations which are more perceptible in the smoother specimens. The color is generally grayish pallid or subochraceous. The pores are usually seriately placed, especially toward the margin, and though variable in color they are commonly tinged with purple when fresh and young, as in the preceding form. As in that form also they become paler with age. This is the form recently published under the name *Polyporus pseudopargamenus*, Thum. When the pileus is narrowed toward its base so that its length is greater than its breadth it is *Polyphorus elongatus*, Berk. It occurs on a great variety of deciduous trees, but is most frequent on birch, maple, oak and chestnut. The first form is most common on poplar though not limited to it. I have not found either growing on pine. These two forms run into each other by such insensible gradations that it is not possible to draw any satisfactory line of distinction between them, and therefore the conclusion must be that both are forms of one species, *Polyporus pergamenus*.

According to Berkeley and Curtis *Polyporus Menandianus*, Mont. also belongs to this species, thus making the synonymy include *P. laceratus*, Berk., *P. elongatus*, Berk., *P. Menandianus*, Mont., and *P. pseudopargamenus*, Thum. It may also be added that according to Berkeley and Curtis the specimens in the Schweinitzian Herbarium under the names *Polyporus abietinus* and *Polyporus stereoides* should be referred to *P. pergamenus*. This species sometimes revives to a certain extent the second season. It puts on a new hymenium and a new growth on the margin of the pileus. The same is true also of *Polyporus cinnabarinus*.

Polyporus vulgaris, *Fr.* The variety with pale yellow pores occurs on decaying maple wood at Verona. The yellow hue is generally lost in drying.

Polyporus splendens, *Pk.* This name proves to be preoccupied and I would therefore substitute for it *Polyporus subsericeus* Pk. For the same reason I would substitute *Polyporus guttulatus*, Pk., for *Polyporus maculatus*, Pk., *Polyporus flavidus*, Pk., is *P. Peckianus*, Cke.

Cheirospora botryospora, *Fr.* This species occurs with us on the beech, *Fagus ferruginea,* and the water beech, *Carpinus Americana.* In Europe it occurs also on the ivy.

Puccinia linearis, *Pk.*, On *Calamagrostis Canadensis*. Copake. The name being preoccupied it is changed to *Puccinia striatula,* Pk.

Uromyces solida, *B. & C.* Living leaves of *Desmodium rotundifolium.* Newburg. The name of this species proves to be inappropriate and the description very imperfect if we may rely on authentic specimens received from Dr. Curtis. It is scarcely possible to identify the species satisfactorily from the published description. The spores are not always "compact," but often quite lax. Neither are they always "obovate," but generally ovate or elliptical. The rough or verruculose epispore is a noticeable feature, yet it is not mentioned in the description. It is not surprising, therefore, that the species has recently been republished under a new name, *Uromyces Desmodii* Thum.

Rœstelia lacerata, *Tul.* This fungus was recently detected by *Prof. D. S. Martin* growing in abundance on the living leaves of apple trees at Rogers Rock near Ticonderoga. An allied fungus, *Rœstelia cancellata,* has also been found to attack the fruit of the quince.

Peridermium decolorans, *Pk.* This is considered by Baron Thumen in his "Blasenrost Pilze der Coniferen" to be a variety of *Peridermium abietinum.*

Peronospora alta, *Fckl.* Living leaves of English plantain, *Plantago lanceolata.* Verona.

Sphærella nigrita, *Cke.* This is not specifically distinct from *Sphærella spleniata,* C. & P., according to specimens received from *Mr. Gerard.*

NEW YORK SPECIES OF AMANITA.

"Spores white. Veil or *volva* universal, at first continuous distinct from the cuticle of the pileus. Hymenophorum distinct from the stem. *All terrestrial.*" *Hymen. Europ.* p. 17.

The Agarics which are grouped under the subgeneric name Amanita are distinguished from all others by their white spores and their universal veil distinct from the pileus. In the subgenus Volvaria there is a similar veil or volva, but the spores are rosy or pinkish-colored. By some authors the species of these two subgenera have been united under the common name Amanita, but even in this case it was found convenient to separate them into two sections, depending on the color of the spores. Some mycologists have regarded the species of Amanita as worthy of generic distinction, and have separated them from the Agarics as a distinct genus. But by those species whose volva is evanescent they approach so closely to other subgenera that it is difficult to maintain this position unless we also raise the other subgenera to the same rank. The differences between the subgenera are so slight that this has not seemed advisable to the most eminent mycologists; and yet the species of Agarics are already so numerous that it is very difficult to find appropriate unoccupied specific names for the new ones frequently discovered, and some mode of relief in this respect is exceedingly desirable.

The species of Amanita grow on the ground in the woods, groves and copses. They rarely occur in open fields, unless in the vicinity of trees or near the margin of woods. Thin, open woods and copses afford the most favorable localities. In the early condition the plant is wholly enveloped in its volva, but as it increases in size the volva is necessarily ruptured. In some species, *A. cæsareus*, for example, the volva is distinctly membranous, and includes the young plant as if in an oval sack. At length the upper part of the volva is ruptured, and the pileus and stem are exserted. Sometimes one or more irregular and unequal fragments of the ruptured volva adhere to the surface of the pileus for a time, and are carried up by it in its growth. But usually in these species the surface of the pileus is smooth, and the remains of the ruptured volva wholly adhere to the base of the stem or its bulb like a membranous margin, a sheath or a lacerated cup. In other species the volva is not distinctly membranous, but is more floccose or scaly and friable in its character. It envelops the young plant, but the distinction between the pileus and bulbous base of the stem is soon manifest, and as the stem elongates the upper part of the volva is separated from the lower part, and persistently adheres to the surface of the pileus. As this expands its covering or calyptra breaks up into superficial scales or warts. These are often angular or pyramidal in form, and sometimes unlike the pileus in color, and afford a beautiful ornamentation. The part that remains at the base of the stem often breaks up into mealy or floccose scales, and sometimes wholly disappears when the plant matures. Generally a smooth pileus indicates a perfect membranous volva, and a warty one an imperfect, floccose or evanescent one. Sometimes, especially after heavy rains, specimens, which normally have the pileus warty, are found with a smooth pileus; but these are only occasional, and probably mostly accidental cases, the warts having been washed off by the rain. Most of the species are solitary or gregarious and of moderate or large size. The pileus, when fully expanded, is nearly plane and quite regular, so that these Agarics are among the most noble and attractive in their appearance. Many of them have a thin pellicle or cuticle, which, in the young and moist plant, is slightly viscid.

The lamellæ in nearly all the species are white or whitish, and free from the stem. Usually they are narrowed toward the stem, and cease just before reaching it, thus leaving a small free space around its apex. In many species the short ones that intervene between the long ones are abruptly terminated at their inner extremity, as if truncated or cut square off. The stem is usually rather long and well formed, and in most species is more or less thickened or bulbous at the base. In some species it is hollow or stuffed with cottony fibrils; in others it is solid. In the greater number of species it is furnished with a membranous ring or annulus, that surrounds it near the top like a flabby collar. In the young plant this is stretched from the stem to the margin of the pileus, and wholly conceals the lamellæ. As the pileus expands the annulus breaks loose from its attachment to the margin, and remains adhering to the stem. In some species this rupture is not always clean and even, small portions remaining attached to the margin. The annulus then has a lacerated or torn appearance. The species are readily divided into two primary sections, depending on the presence or absence of the annulus. The species having an annulus have been again divided by Fries into subsections, depending on the character of the volva. These are thus characterized:

1. Volva rupturing at the apex or circumscissile, the free margin persistent. Of our species *A. cæsareus, A. spretus* and *A. phalloides* belong to this subsection.

2. Volva definitely circumscissile, persistent on the margined base, the covering of the pileus broken up into thick warts. Here belong *A. russuloides, A. muscarius, A. Frostianus, A solitarius* and *A. strobiliformis.*

3. Volva wholly friable, reduced to scales and warts. Our only representative of this subsection is *A. rubescens.*

4. Volva wholly obsolete, flocculose, entirely evanescent. Of this subsection we have thus far no representative.

The second and third sub-sections appear to run into each other in such a way that it is difficult to keep them distinct.

In collecting specimens for examination, the earth should be carefully removed from the base of the stem before the plant is taken up, in order to obtain it entire and to secure the volva in as perfect condition as possible. Young plants taken just as the pileus is emerging from the volva, if kept in a warm, moist atmosphere, will continue to elongate the stem and expand the pileus.

The characters especially to be noted in the determination of the species are found in the volva, whether membranous and persistent or floccose-scaly, and more or less evanescent; in the pileus, whether smooth and naked or warty, and whether even or striated on the margin; in the stem, whether with or without an annulus, whether solid or hollow and whether with or without a bulb at the base, and if bulbous what is the character of the bulb. The color, though a conspicuous character, is so variable in some species that it is deemed of secondary importance. The spores, beyond their color, can only be available in affording distinctive characters by the aid of a compound microscope and a micrometer.

Some of the species have a very bad reputation for their deleterious and poisonous qualities, but a few are generally admitted by authors to be esculent. I have not personally tested the edible qualities of any of the species, and those indicated as edible are thus given on the authority of others. I do not consider it safe for any one who is not fully able to distinguish the edible from the poisonous species to indulge in the use of the Amanitas for food.

SYNOPSIS OF THE SPECIES.

1. Stem furnished with an annulus.. 2
2. Volva membranous, persistent; pileus not warty.............................. 3
    3. Pileus widely striate on the margin, lamellæ yellow.... *A. cæsareus.*
    3. Pileus narrowly striate, lamellæ white.................. *A. spretus.*
    3. Pileus even on the margin, lamellæ white............... *A. phalloides.*
2. Volva squamose, friable, sometimes evanescent............................ 4
    4. Pileus striate on the margin.. 5
        5. Pileus widely striate, warts soon disappearing...... *A. russuloides.*

5. Pileus narrowly striate 6
    6. More than two inches broad, spores elliptical... *A. muscarius.*
    6. Less than two inches broad, spores globose..... *A. Frostianus.*
4. Pileus even on the margin 7
    7. Flesh with reddish stains when wounded.......... *A. rubescens.*
    7. Flesh without reddish stains when wounded 8
        8. Bulb of the stem acutely margined, often split.. *A. strobiliformis.*
        8. Bulb not acutely margined .... *A. solitarius.*
1. Stem destitute of an annulus 9
9. Volva membranous 10
    10. Pileus hairy-squamulose, volva large, firm. .... *A. volvatus.*
    10. Pileus soon glabrous, volva sheathing, flabby. .... *A. vaginatus.*
9. Volva not membranous 11
    11. Pileus soon glabrous .... *A. nivalis.*
    11. Pileus warty.. .... *A. strangulatus.*
    11. Pileus pulverulent .... *A. farinosus.*

STEM FURNISHED WITH AN ANNULUS.

Agaricus cæsareus, *Scop.* Orange Agaric. Pileus hemispherical, then expanded, smooth, bright red or orange, fading to yellow, widely and *distinctly striate on the margin;* lamellæ free, *yellow;* stem equal or slightly tapering upward, flocculose, stuffed with cottony fibrils or hollow, yellowish, bearing a yellowish annulus near the top and inserted at the base in a *large loose membranous white volva;* spores elliptical, .00035 in. to .0004 in. long.

Plant 5 in. to 8 in. high, pileus 4 in. to 8 in. broad, stem 4 lines to 6 lines thick. August.

This is a large, beautiful and very showy Agaric and has been called "*Fungorum princeps,*" chief of fungi. It occurs in wet seasons in thin open woods, but is not very common. It sometimes grows in large circles or "fairy rings." The American plant differs in some slight respects from the European as represented in figures and descriptions, and I have modified the description to meet the peculiarities of our plant. In Europe the pileus is said to vary in color, being sometimes white, pale-yellow, red and copper-colored, though usually orange-yellow. In our plant I have found the pileus very uniform in coloration, it being at first bright-orange or even a brilliant red, fading with age to yellow, either wholly or on the margin only. In dried specimens the red color entirely disappears. The striations of the margin are quite deep and long, and almost as distinct as in *A. vaginatus,* where they are said to be "pectinate-sulcate." The flesh is represented as yellowish. In our plant it may be white, yellow or red under the cuticle, but next the lamellæ it is pretty constantly yellow. The stem is described as subventricose. In our plant I have always found it equal or slightly tapering upwards and generally rather long in proportion to the size of the pileus, so that the American plant must have a more graceful aspect than the European. The stem is yellowish, but adorned with delicate floccose fibrils of a yellowish-rhubarb color. The annulus is also sometimes tinged with this hue. The volva is soft and almost tomentose in texture, yet distinctly membranous, persistent and white. The lamellæ are yellow, a character by which it is at once distinguished from all our other species. All authors agree in attributing esculent qualities to this fungus. It has been termed "*Cibus Deorum,*" the food of the gods. Cordier says it is delicious and everywhere sought after, but utters a caution against confounding it with the "False Orange" or Fly Agaric, *Agaricus muscarius. Agaricus aurantius* Bull. and *Amanita aurantia,* Pers., are given as synonyms.

Agaricus spretus, *Pk.* Despised Agaric. Pileus subovate, then convex or expanded, smooth or at first adorned with a few fragments of the volva, *slightly striate on the margin,* whitish or pale-brown; lamellæ close, *reaching the stem, white ;* stem equal, smooth, slightly pruinose above the white annulus, stuffed or hollow, whitish, finely striate at the top, inserted at the base in the rather large *persistent membranous somewhat sheathing volva ;* spores elliptical, .0004 in. to .0005 in. long, .00025 in. to .0003 in. broad, generally containing a single large nucleus.

Plant 4 in. to 6 in. high, pileus 3 in. to 5 in. broad, stem 4 lines to 6 lines thick. August.

This species occurs in bushy or open places and seems to prefer a dry gravelly or sandy soil. It is not common. It sometimes grows in clusters and then has the pileus more or less irregular. The striations of the margin of the pileus are rather short and not always deep and distinct. The lamellæ reach the stem and form little decurrent lines at its apex. The stem is without any bulb at its base, which is more or less sheathed by the persistent volva much as in *A. vaginatus.* In light sandy soil the stem penetrates the earth quite deeply. The whole plant is sometimes white, but often the pileus and stem are tinged with brown. It appears to be related in some respects to *A. porphyrius* and *A. recutitus,* but it differs from both in its coloration and in other characters.

Agaricus phalloides, *Fr.* Phallus-like Agaric. Pileus at first ovate or subcampanulate, then expanded, slightly viscid when young and moist, smooth or rarely adorned by a few fragments of the volva, *even on the margin,* white, yellowish-brown or blackish-brown ; lamellæ rather broad, rounded behind, free, white ; stem equal or slightly tapering upward, stuffed or hollow, smooth or slightly floccose, annulate, *bulbous,* the ruptured volva either appressed loose or merely forming a narrow margin to the bulb ; spores *globose,* .0003 in. to .00033 in. broad.

Plant 4 in. to 8 in. high, pileus 2 in. to 5 in broad, stem 3 to 6 lines thick. Summer and Autumn.

This species is common and variable. It occurs everywhere in woods and assumes such different colors that the inexperienced mycologist is apt to mistake its different forms for distinct species. With us the prevailing colors of the pileus are white, yellowish-white, grayish-brown and blackish-brown. It is remarkable that the form with a greenish pileus, which seems to be common enough in Europe, does not occur here. Fries also mentions a form having a white pileus with a black disk. A somewhat similar form occurs here, in which the pileus is grayish-brown with a black disk. Some of the variously-colored forms were formerly taken to be distinct species, in consequence of which several synonyms have arisen, of which *A. virescens,* Fl. Dan., *Amanita viridis,* Pers., and *Amanita citrina,* Pers., are examples. *A. vernus,* Bull., is a variety having a white pileus, a rather thick annulus and an appressed volva. It sometimes occurs early in the season ; hence the specific name. It also occurs late in the season and runs into the typical form so that it is not easy to keep it distinct. The flesh and the lamellæ are white, the stem is white, pallid or brownish, and the annulus is either white or brownish. The bulb is generally very broad and abrupt or depressed, though it sometimes is small and approaches an ovate form. The large bulbs are sometimes split externally in two or three places and are, therefore, two or three-lobed. In such cases the volva is less persistent than usual and its free portion then furnishes merely an acute edge or narrow margin to the bulb. Specimens sometimes occur in which the margin of the pileus is narrowly adorned with a slight tomentose villosity, but usually it is perfectly smooth and even. By this character taken in connection with the membranous volva and bulbous base of the stem, the species is readily distinguished. Sometimes a strong odor is emitted by it, but usually the odor is slight. Authors generally pronounce this a poisonous and very dangerous species. Its appearance is attractive, but its use as food is to be avoided.

Agaricus russuloides, *Pk.* Russula-like Agaric. Pileus at first ovate, then convex or expanded, at first rough with a few superficial warts, *soon smooth*, viscid when moist, *widely striate-tuberculate on the margin*, pale-yellow or straw color; lamellæ close, free, narrowed toward the stem, white; stem firm, smooth, stuffed, equal or slightly tapering upward, bulbous, furnished with a thin subevanescent annulus; *volva fragile*, subappressed; spores broadly elliptical, .0004 in. long, .0003 in. in. broad.

Plant 2 in. to 3 in. high, pileus 1.5 in. to 2 in. broad, stem 3 lines to 5 lines thick. June.

This rare species was found in grassy places in open woods, several years ago, and has not been met with by me since. It is remarkable for and easily known by the widely striate margin of the pileus. The tuberculate appearance is due to short transverse veins or wrinkles which intervene beween and connect the lamellæ and give to the surface of the pileus an appearance similar to that seen in many species of Russula. The dried specimens look very much like small dried forms of *A. cæsareus,* but they have not the perfect volva of that species. The bulb is ovate and the volva fragile and easily broken into fragments. Its nearest relationship is with *A. muscarius,* from which its smoother pileus and peculiar margin at once distinguish it.

Agaricus muscarius, *L.* Fly Agaric. Pileus at first ovate or hemispherical, then broadly convex or nearly plane, slightly viscid when young and moist, *rough with numerous whitish or yellowish warts*, rarely smooth, narrowly and *slightly striate on the margin*, white, yellow or orange-red; lamellæ white; stem equal or slightly tapering upward, stuffed with webby fibrils or hollow, bearing a white annulus above, *ovate-bulbous* at the base, white or yellowish; the volva usually breaking up into scales and adhering to the upper part of the bulb and the base of the stem; spores *elliptical*, .0003 in. to .0004 in. long, .00025 in. to .0003 in. broad.

Plant 5 in. to 8 in. high, pileus 3 in. to 6 in. broad. June to October.

The Fly Agaric, or "False Orange" as it is called in France, is a common and variable species. It occurs in thin open woods and in bushy pastures. The fine ornamentation of its warts and its beautiful colors make it a very showy and attractive species. I have not seen it with the bright blood-red or scarlet colors attributed to the European plant, but it is usually more or less orange-colored when young, fading to yellow with advancing age, either wholly or on the margin only. Sometimes the fading process goes on until the pileus is nearly white. In one variety the pileus is of a uniform citrine or lemon-yellow color, in another it is wholly white. This form I suspect is the same as *A. subremotus*, B. & C. The margin is narrowly and usually but slightly striate. Sometimes, especially after heavy rains, it is not uncommon to find specimens almost or entirely destitute of warts and even of the fragments of the volva at the base of the stem. The flesh under the cuticle is not always yellow. It may be either white or orange according to the color exhibited by the pileus. The lamellæ are sometimes faintly tinged with a yellowish or creamy hue. The stem also, which is usually white, may be occasionally tinged with yellow. The remains of the volva often encircle it at the base in a somewhat concentric manner. The varieties already mentioned may be characterized thus:

Var. *formosus* (Amanita formosa, G. & R.) Pileus soft, fragile, citrine-yellow, warts loose, white or yellowish. Var. *albus*. Pileus white, warts rather firm, subacute. Var. *regalis*, a large form with a liver-colored pileus, and Var. *umbrinus* with a thin, brown or livid pileus and dark-brown disk I have not seen.

The species is renowned for its intoxicating and poisonous properties. Cordier states that it is one of the most active poisons and has caused numerous accidents by being mistaken for the Orange Agaric. A kind of fly poison is sometimes manufactured from it. If a moist plant be placed where flies have access to it they will sip the viscid substance from the surface of the pileus and pay the penalty with their lives. I have seen it surrounded by a circle of dead flies thus destroyed.

Agaricus Frostianus, *Pk.* Frost's Agaric. Pileus convex or expanded, bright-orange or yellow, warty, sometimes nearly or quite smooth, striate on the margin; lamellæ free, white or slightly tinged with yellow; stem white or yellow, stuffed, bearing a slight, sometimes evanescent, annulus, bulbous at the base, the bulb *slightly margined* by the volva; spores *globose* .0003 in. to .0004 in. in diameter.

Plant 2 in. to 3 in. high, pileus 1 in. to 2 in. broad, stem about 2 lines thick. June to October.

This appears like a very small form of the Fly Agaric, to which, as var. *minor*, it was formerly referred. The only decided characters for distinguishing it are its small size and globose spores. Relying mainly on the latter I have hesitatingly admitted it as a species. It should yet be compared with *Amanita puella*, G. & R., which Fries regards as a mere form of *A. muscarius*, characterizing it with the words "smaller, without warts." It is also near, *A. gemmatus* Fr., but that is described as having a solid exannulate stem. Mr. Frost's manuscript description says "not often warty," but I have nearly always found it more or less warty. The specific name "affinis" which was given to this species by Mr. Frost, has been more than once used, in connection with other species, and it seems best to substitute another for it. Our plant sometimes grows in company with *A. muscarius*, but it seems to prefer more dense woods, especially mixed or hemlock woods. It is generally very regular and beautiful and has the stem quite often of a yellow color, and the bulb margined above with a collar-like ring.

Agaricus rubescens, *Pers.* Reddish Agaric. Pileus at first ovate, then broadly convex or nearly plane, *warty*, slightly viscid when young and moist, even or substriate on the margin, whitish, reddish-brown or brown; lamellæ reaching to the stem toward which they are narrowed, white; stem equal or slightly tapering upward, squamulose, stuffed or hollow, thickened or bulbous at the base, slightly striate at the top, annulate, whitish or pallid; *flesh becoming reddish where wounded;* spores elliptical, .0003 in. to .00035 in. long, .0002 in. to .00025 in. broad.

Plant 4 in. to 6 in. high, pileus 3 in. to 5 in. broad, stem 4 lines to 6 lines thick. July to September.

This Agaric occurs both in thin and in dense woods. It is solitary or scattered in its mode of growth. The pileus is generally adorned with soft, easily removable, whitish or reddish-stained warts, but as in other species, it is not unusual after heavy rains to find specimens with the pileus entirely naked. The margin of the pileus is generally even, but sometimes specimens are found in which it is slightly striated. It is also in this, as in all the other species, sometimes split in one or more places. The color is quite variable and is generally somewhat sordid and undecided in character. It is whitish, alutaceous, pinkish-brown, yellowish-brown or reddish-brown. The flesh is white and generally becomes reddish where bruised or wounded, especially in warm wet weather. Reddish stains are usually found on the stem or lamellæ, being the result probably of the bites of insects. They are not always readily produced at will in the American plant. Sometimes the little branny scales that clothe the stem are colored red. The base of the stem is thickened or bulbous, but the bulb is ovate or gradually tapering into the stem, and not abrupt and distinct as in *A. phalloides.* The volva is wholly friable and often entirely disappears from the base of the stem or bulb.

A. circinatus, Schum., is regarded by Fries as a variety of this species, distinguished by its plane brownish-red pileus and numerous adnate circinating warts. *A. verrucosus*, Bull., is a mere form with minute warts and flesh slowly changing to red.

One author places this Agaric among the suspected species. Berkeley says of it, "Quality doubtful," while most authors, including Badham, Rogues, Currey, Cooke and Curtis, pronounce it esculent. Cordier says it is a most delicate food, of which large quantities are consumed in Lorraine.

Agaricus solitarius, *Bull.* Solitary Agaric. Pileus convex or plane, *warty*, white or whitish, *even on the margin;* lamellæ reaching the stem, white or slightly tinged with cream-color; stem at first mealy or scaly, equal, *solid*, white, bulbous, the bulb scaly or mealy, *narrowed below into a root-like prolongation; annulus lacerated,* often adhering in fragments to the margin of the pileus and lamellæ; spores elliptical-oblong, .0003 in. to .0005 in. long, .00025 in. broad.

Plant 4 in. to 8 in. high, pileus, 3 in. to 6 in. broad, stem 4 lines to 6 lines thick. August and September.

The Solitary Agaric grows singly or very much scattered in thin woods and open places. It is generally white throughout, though sometimes the pileus is tinged with brown and the warts are a little ochreous or brownish. In some specimens they are few and scattered, but generally they are numerous, crowded, angular and often erect and acute, especially on the disk. There are two forms of the species. In one, the volva breaks up into brownish scales which adorn the bulb and lower part of the stem. In the European plant these scales are said to be imbricating. I have not found this form in our State, but it occurs farther south. In the other, the bulb and lower part of the stem are covered with white mealy or granular particles. This form occurs on Long Island. The annulus also and the upper part of the stem, when young, are covered with floccose or mealy particles. The former is soon lacerated and a part of it frequently adheres to the margin of the pileus and the edge of the lamellæ. Sometimes there is very little of it left to form a ring on the stem. This lacerated annulus and the peculiar deeply-rooting bulb are marked and distinguishing features in this species. *A. echinocephalus*, Vitt., is apparently a closely-related species, but is characterized as having a shining pileus with pyramidal acute seceding warts and a distant persistent annulus. The lamellæ are also said to become green. *A. albellus*, Scop., and *Aminata pellita*, Secr., are regarded by Fries as synonyms.

Authors are divided in their estimate of the qualities of this fungus, one saying that it is very poisonous, another, that it is scarcely edible, and another, that its flesh is white and of an excellent flavor. In any case it is too scarce with us to be of much value.

Agaricus strobiliformis, *Vitt.* Fir-cone Agaric. Pileus convex or nearly plane, *rough with angular supersistent warts*, white or cinereous, sometimes yellow on the disk, the margin even and extending a little beyond the lamellæ ; lamellæ free, rounded behind, not reaching the stem, equal or slightly tapering upward, *solid*, floccose-scaly, white, bulbous, *the bulb very large, margined above and furnished with one or two concentric furrows*, somewhat pointed below, floccose mealy when young ; spores elliptical, .0005 in. to .0006 in. long, .0003 in. to .0004 in. broad.

Plant 6 in. to 10 in. high, pileus 6 in. to 10 in. broad, stem 8 lines to 15 lines thick. Autumn.

This Agaric, which usually attains a very large size, is quite rare with us. It is generally of a white or whitish color, but sometimes yellowish on the disk, and it has the pileus rather thickly studded with firm angular mostly persistent warts which are often flattened at the top in such a way as to resemble somewhat the scales of a pine cone, whence the specific name. They are generally whitish though sometimes tinged with brown. In some instances they fall away and leave the pileus nearly smooth. The annulus is large, and as in the preceding species is often torn or lacerated. The bulb at the base of the stem is one of the peculiar and distinguishing features of the species. It is very large, sometimes attaining a diameter of two and a half inches, and at the upper part a slight furrow intervenes between its narrow margin and the stem, as if produced by the impressed margin of the young pileus. Sometimes a second furrow surrounds the bulb a little below this, and below the second furrow the thick exterior coat of the bulb is split longitudinally in several places, thus giving it a lobed appearance. The larger part of the bulb often appears above the surface of the ground, but it is somewhat pointed or conical below and thus slightly penetrates the earth, but it has not the long distinct tap root that so strongly characterizes the preceding species. All traces of the volva soon disappear from the bulb. The plant formerly referred to *A. muscarius* as variety *major* is to be referred to this species. The solid stem and even margin of the pileus separate this species from white forms of *A. muscarius.* Authors generally agree in calling it an edible species.

STEM DESTITUTE OF AN ANNULUS.

Agaricus volvatus, Pk. Volvate Agaric. Pileus convex, then nearly plane, *slightly striate on the margin, hairy or floccose-scaly,* white or whitish, the disk sometimes brownish, lamellæ close, free, white; stem equal or slightly tapering upward, stuffed, minutely floccose-scaly, whitish, inserted at the base in *a large, firm, cup-shaped, persistent volva;* spores *elliptical,* .0004 in. long, .0003 in. broad.

Plant 2 in. to 3 in. high, pileus 2 in. to 3 in. broad, stem 3 to 4 lines thick. July and August.

This species is quite rare. It grows in woods and open places and is easily distinguished from all others by the absence of the annulus and the presence of the large somewhat cup-shaped persistent volva. The pileus is not smooth as is usually the case in the species with a persistent membranous volva, but is more or less scaly with minute tufts of fibrils or tomentose hairs. Sometimes the margin is not very distinctly striate. The color varies from white to brownish. The lamellæ, which are white in the fresh plant, in the dried specimens assume a dull cinnamon-brown hue, except on the edge which remains white and is more or less floccose. *A volvaceus,* Bull., has a similar volva, but its spores and lamellæ are pinkish or flesh-colored and it belongs, therefore, to the subgenus Volvaria.

Agaricus vaginatus, *Bull.* Sheathed Agaric. Pileus at first ovate or subcampanulate, then convex or nearly plane, *smooth,* rarely adorned with a few fragments of the volva, slightly viscid when young or moist, *deeply and distinctly striate on the thin margin,* very variable in color; lamellæ free, white or whitish ; stem rather slender, equal or slightly tapering upward, stuffed or hollow, fragile, nearly smooth or minutely mealy-squamulose, *not bulbous;* surrounded at the base by the more or less elongated *sheathing flabby volva;* spores *globose,* shining, .0003 in. to .0004 in. in diameter.

Plant 4 in. to 7 in. high, pileus 2 in. to 4 in. broad, stem 2 lines to 4 lines thick. Woods and copses, sometimes on much decayed wood. June to October.

This, like our other common species *A. muscarius* and *A. phalloides* is very variable. The pileus is generally smooth, but sometimes, especially in young plants, it is adorned with one or more irregular fragments of the volva. The thin margin is rather widely striate and the striæ are so deep and distinct that the margin has sometimes been described as "sulcate" and "pectinate-sulcate." The prevailing colors are grayish-brown, livid-brown and tawny or ochery-brown with their intermediate shades. The flesh and lamellæ are white or whitish, and the stem is generally paler than the pileus. Both it and the pileus are somewhat fragile and the plant is easily broken unless handled with care. The pileus is sometimes slightly prominent or umbonate in the center, but it is nearly plane and quite regular. In very wet weather this and many other species sometimes have the margin a little raised or reflexed so that the pileus appears concave or depressed in the center. The volva is so fragile that unless care is taken in gathering the specimens it does not adhere to the base of the stem but is left in the ground. In appearance this species is rather slender and regular, in mode of growth it is solitary or very much scattered. It grows in woods either dense or thin and sometimes in open places, and it seems to be able to accommodate itself to a great variety of circumstances. As it often happens, the variability of this species has given rise to numerous synonyms, which are mostly indicative of its various colors. Among these may be mentioned *A. plumbeus*, Shæff., *A. hyalinus*, Schæff., *A. badius*, Schæff., *A. fulvus*, Schæff., *A. trilobus*, Bolt., *A. pulvinatus*, Bolt., *Amanita livida*, Pers., and *Am. spadicea*, Pers. Some authors class this among the edible species, others, among the suspected or doubtful ones. Cordier pronounces it a delicate food.

Agaricus nivalis, *Grev.* Snowy Agaric. Alpine Agaric. Pileus at first ovate, then convex or plane, smooth, *striate on the thin margin, white,* sometimes tinged with yellow or ochraceous on the disk, flesh white; lamellæ subdistant, white, free; stem equal, rather tall, nearly smooth, *bulbous,* stuffed, white, the volva very fragile, *soon breaking up into fragments or sometimes persisting in the form of a collar-like ring at the upper part of the bulb;* spores globose, .0003 in. to .0004 in. in diameter.

Plant 4 in. to 6 in. high, pileus 2 in. to 3 in. broad, stem 2 to 4 lines thick. July to October.

This fungus has generally been considered a mere variety of the preceding, from which, according to the "English Flora," it differs merely in the "greater distance of the lamellæ and the greater compactness of the stem." But in the American plant, which seems to me to be the same specifically, I find two other notable points of distinction, namely, the more frail fragmentary volva and the distinctly bulbous base of the stem. This last character is also noticed in Greville's description, and it has especially influenced me to keep the species distinct. In its original locality its habitat is said to be "highland pastures and summits of mountains." With us it occurs in open, grassy places and in thin woods, but it is not common. I have seen it in the counties of Essex, Rensselaer and Otsego. It approaches in some respects, *A. Frostianus*, but its larger size, smooth pileus, lighter color and the absence of an annulus will easily distinguish it from that species. *A. fungites*, Batsch, is given as a synonym of this species.

Agaricus strangulatus, *Fr.* Strangulated Agaric. Pileus at first ovate or subelliptical, then campanulate, convex or plane, *warty,* slightly viscid when moist, *deeply and distinctly striate on the margin,* grayish-brown; lamellæ free, close, white; stem equal or tapering upwards, stuffed or hollow, nearly smooth, white or whitish, *the vlova soon breaking up into scales or subannular fragments;* spores globose, .0004 in. to .0005 in. in diameter.

Plant 4 in. to 6 in. high, pileus 2 in. to 4 in. broad, stem 3 lines to 6 lines thick. July.

This plant was found in 1869 growing in the grassy borders of a grove near Greenport, Long Island. I have not since found it, and conclude that it is a very rare species with us. In color and general appearance it resembles *A. vaginatus*, from which it may be distinguished by the warty pileus and the slight volva which does not sheath the base of the stem, but soon breaks up into small fragments, or scales, which sometimes form a sort of ring around the base of the stem, but which oftener remain as scales or disappear entirely. The warts of the pileus are often very numerous, persistent and close, especially on the disk, but sometimes they nearly all disappear, leaving the resemblance to *A. vaginatus* very close. They are dingy-gray or mouse-colored. The stem usually tapers upward and is adorned with minute branny scales or with a sort of mealiness, especially on the upper part. This species was described by Berkeley and Broome under the name *A. Ceciliæ*, but Fries considers it the same as his *A. strangulatus*. Our plant has globose spores, while the spores of *A. Ceciliae* are described in the Handbook of British Fungi as "oval, .00034 by .0006 in.," a discrepancy which I am unable to explain. Neither is the application of the specific name *strangulatus* clear.

Agaricus farinosus, *Schw.* Mealy Agaric. Pileus nearly plane, thin, *flocculent-pulverulent, widely and deeply striate on the margin*, gayish-brown or livid-brown; lamellæ free, whitish; stem whitish or pallid, equal, stuffed or hollow, mealy, *subbulbous*, the volva *flocculent-pulverulent*, evanescent; spores variable, *elliptical ovate* or *subglobose*, .00025 in. to .0003 in. long.

Plant about 2 in. high, pileus 1 in. to 15 lines broad, stem 1 line to 3 lines thick. July to September.

This is our smallest Amanita. It is neither very common nor very abundant when it does occur. The pileus is generally grayish-brown or mouse-colored, though specimens sometimes occur that are almost white. The striations of the margin are long and generally distinct. The dusty flocculent covering is grayish-brown and usully most dense on or near the center of the pileus. It is this that suggests the specific name and affords a good distinguishing character for the species, which might otherwise be easily mistaken for a diminutive form of *A. vaginatus*. The lamellæ are sometimes uneven or floccose on the edge, which gives them a serrated appearance. Toward the outer extremity they are somewhat venosely connected in the interspaces as in *A. russuloides*. The stem is whitish and more or less mealy, with a slight bulb at the base which is at first clothed like the pileus. It is described by Schweinitz as "solid," but I have always found it stuffed or hollow.

Two other species of Amanita have been published by *E. C. Howe*, M. D., of Yonkers, under the names *A. onustus* and *A. soleatus*. No locality is added to the descriptions, but they are presumably of this State. I have seen no specimens of these species, but the description of the latter indicates that it is the same as *A. volvatus*. I have therefore deemed it best to omit them, until we have more definite information concerning them.

In the preceding pages, when no name is added to the station or stations mentioned, the plant has been found therein by the writer. Dates signify the time when the specimens were collected, and therefore indicate, to some extent, the time of the occurrence of the plant. Grateful acknowledgments are rendered to those Botanists whose names appear in the preceding pages, and who have kindly aided me by contribution of notes and specimens.

Very respectfully submitted,

CHARLES H. PECK.

ALBANY, *January* 7, 1880.

EXPLANATION OF PLATE I.

Coryneum pustulatum *Peck.*

Page 26.

Fig. 1. Piece of a branch bearing the fungus in pustules.

Fig. 2. One immature and three mature spores in position x 400.

Fig. 3. Two free spores x 400.

Asterosporium betulinum *Peck.*

Page 26.

Fig. 4. Piece of a branch bearing the fungus in pustules.

Fig. 5. One immature and two mature spores x 400.

Synphragmidium effusum *Peck.*

Page 27.

Fig. 6. A piece of wood bearing a patch of the fungus.

Fig. 7. Mycelium with two rudimentary spores x 400.

Fig. 8. A spore with the series of cells adhering to each other x 400.

Fig. 9. A spore with the series of cells separating from each other x 400.

Fig. 10. A single separated series of cells separating from each other x 400.

Torula uniformis *Peck.*

Page 27.

Fig. 11. A piece of bark bearing tufts of the fungus.

Fig. 12. Two clusters of flocci x 400.

Fig. 13. Two flocci united at the base x 400.

Microstroma leucosporum *Niessl.*

Page 30.

Fig. 14. Part of a leaflet bearing small patches of the fungus.

Fig. 15. Vertical view of a spore mass x 400.

Fig. 17. Lateral view of a spore mass x 400.

Fig. 17. Five spores x 400.

Cantharellus brevipes *Peck.*

Page

Fig. 18. A small plant.

Fig. 19. Vertical section of a pileus.

Fig. 20. Four spores x 400.

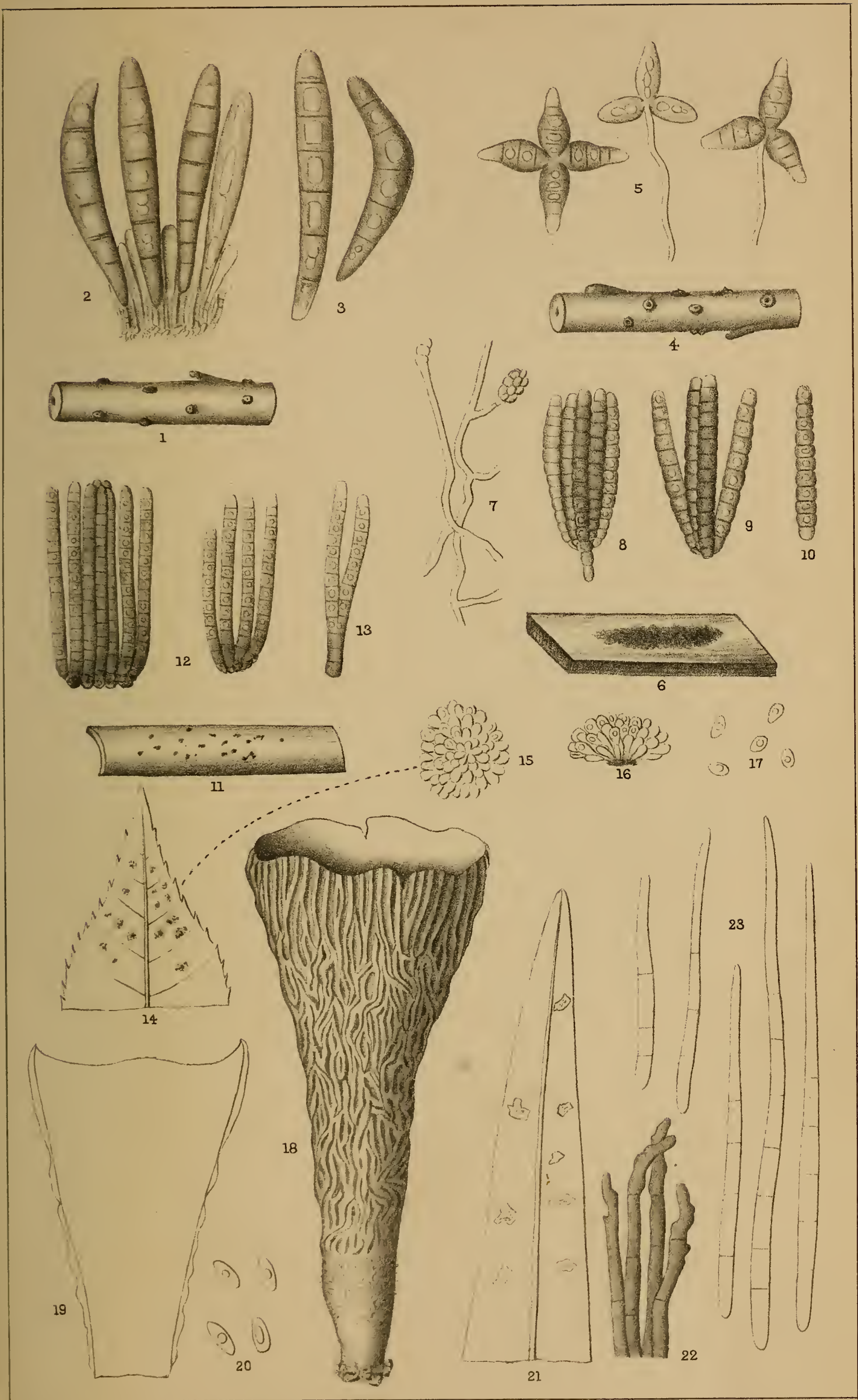
Cercospora elongata *Peck.*

Page 29.

Fig. 21. Part of a leaf bearing the fungus in augular spots.

Fig. 22. A tuft of flocci x 400.

Fig. 23. Five spores x 400.



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EXPLANATION OF PLATE II.

*CERCOSPORA SMILACIS *Thum.*
Page 29.

FIG. 1. A leaf bearing the fungus in orbicular spots.
FIG. 2. A tuft of flocci x 400.
FIG. 3. Three spores x 400.

HELICOSPORIUM CINEREUM *Peck.*
Page 28.

FIG. 4. A piece of wood bearing a patch of the fungus.
FIG. 5. Mycelium and part of three flocci x 400.
FIG. 6. One spore partly uncoiled and two spores coiled x 400.

PATELLARIA HAMAMELIDIS *Peck.*
Page 32.

FIG. 7. A piece of bark bearing the fungus.
FIG. 8. Two receptacles magnified.
FIG. 9. A paraphysis and an ascus containing spores x 400.
FIG. 10. Four spores x 400.

CALICIOPSIS PINEA *Peck.*
Page 32.

FIG. 11. A piece of bark bearing the fungus.
FIG. 12. One mature and two immature plants with a cluster of sphæriform bodies at the base, all magnified.
FIG. 13. Two asci containing spores x 400.
FIG. 14. Five spores x 400.
FIG. 15. Five spermatia x 400.

HELVELLA PALUSTRIS *Peck.*
Page 31.

FIG. 16. A young plant.
FIG. 17. A mature plant.
FIG. 18. A paraphysis and an ascus containing spores x 400.

VALSA ACROCYSTIS *Peck.*
Page 34.

FIG. 19. Piece of a branch bearing the fungus.
FIG. 20. A magnified cluster of perithecia with the epidermis removed.
FIG. 21. An ascus containing spores x 400.
FIG. 22. One immature and two mature spores x 400.

CUCURBITARIA LONGITUDINALIS *Peck.*
Page 34,

FIG. 23. Piece of a branch bearing the fungus.
FIG. 24. A row of perithecia magnified.
FIG. 25. An ascus containing spores x 400.
FIG. 26. Three spores x 400.

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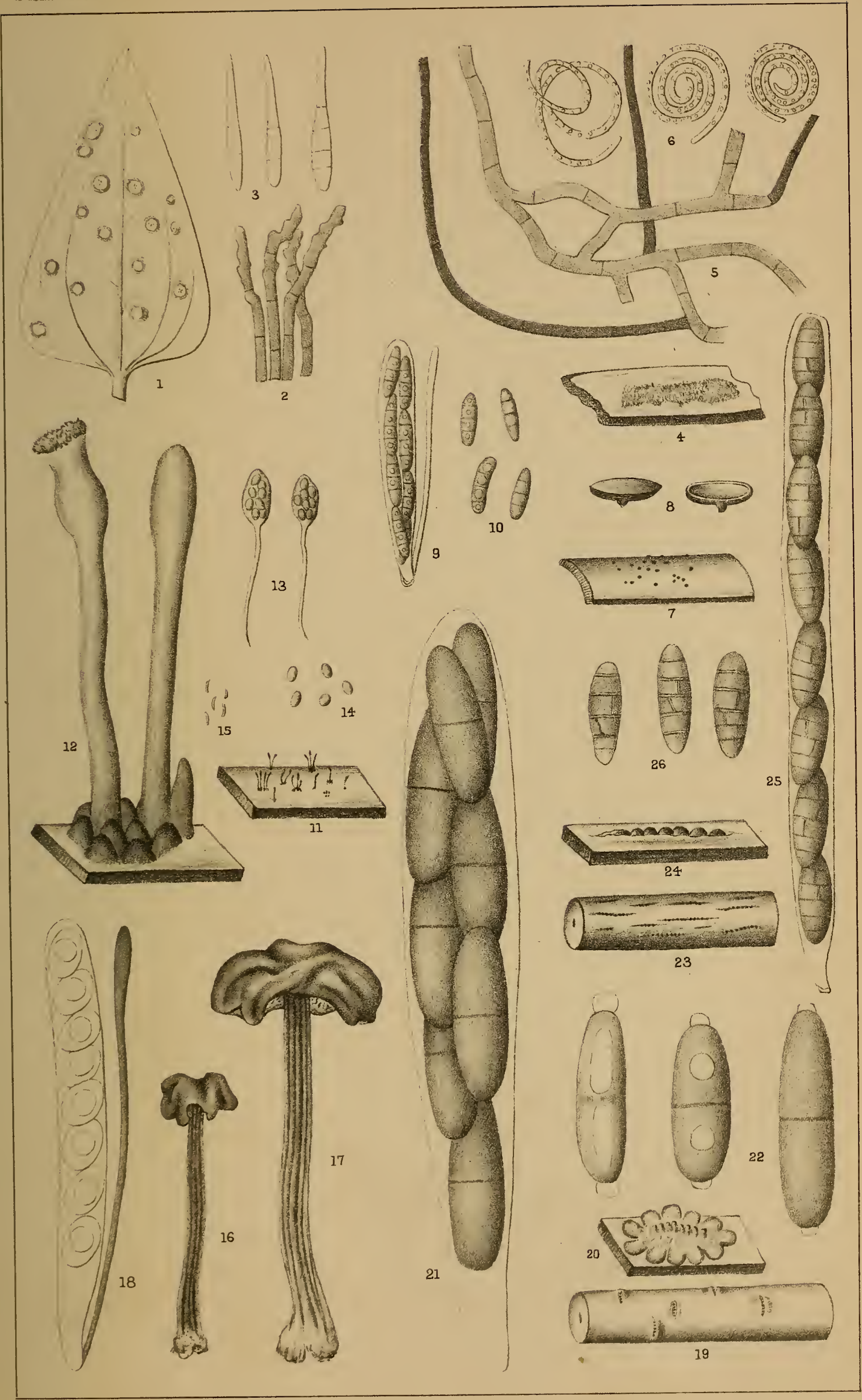
*This species was unpublished when the report was written, but was afterward published by Baron Thumen. Owing to the delay in printing I am enabled to insert the name given by him and thus avoid a synonym.

FUNGI.



Weed, Parsons & Co Albany, NY

No. 127.

IN ASSEMBLY,

MARCH 7, 1881.

THIRTY-FOURTH ANNUAL REPORT

ON THE NEW YORK STATE MUSEUM OF NATURAL HISTORY BY THE REGENTS OF THE UNIVERSITY, EX-OFFICIO TRUSTEES OF THE MUSEUM.

UNIVERSITY OF THE STATE OF NEW YORK,
OFFICE OF THE REGENTS,
ALBANY, *December* 29, 1880.

To the Hon. GEORGE H. SHARPE,
Speaker of the Assembly:

SIR — I have the honor to transmit to the Legislature the Thirty-Fourth Annual Report on the State Museum of Natural History by the Regents of the University.

Very respectfully,
Your obedient servant,
HENRY R. PIERSON,
Chancellor of the University.

REPORT.

To the Honorable, the Legislature of the State of New York:

The Regents of the University, as Trustees of the State Museum of Natural History, respectfully submit their thirty-fourth annual report:

For a description of the work carried on during the past year, and of the condition of the collections, the Trustees refer to the report of the Director and the accompanying documents, which are herewith transmitted. These statements indicate plainly the inadequacy of the present accommodations of the Museum. A large part of the collections are, for want of room in the Museum building, temporarily stored in other quarters. This separation of the collections causes not only great loss of time in the work of classifying them, but great inconvenience in pursuing any systematic study in connection with them. In addition to this it must be stated that neither the principal Museum building nor the temporary store-houses are fire-proof structures; so that this valuable property of the State is exposed to the hazard of destruction by fire. When it is remembered what a calamity the destruction of this large and valuable accumulation of scientific and industrial material, and especially of the specimens in the Museum which have served as the types from which the descriptions in the publications of the State have been derived, would be, the Trustees feel that they cannot urge too strongly the necessity of providing new and worthy accommodations for the Museum.

The Trustees also call attention to the want of a working collection of scientific books and serials for the use of those in charge of the Museum and of those who resort to it for purposes of scientific study. Such a collection of books is the proper accompaniment of every scientific Museum, and is indispensable for rendering such a Museum capable of realizing the purposes of its establishment. Books appropriate for such a purpose are not usually found in general libraries, and as a matter of fact are not found, to any considerable extent, in the State Library. It is therefore respectfully suggested, that along with increased accommodations for the collections of the Museum, this important adjunct should not be forgotten.

Important additions have been made during the past year in all the departments of the Museum; in part obtained by exchanges and donation, and in part collected by members of the permanent staff. These additions will be found described in the documents annexed to this report.

The scientific staff of the Museum during the past year has consisted of the following persons:

Professor James Hall, LLD., Director, who, besides the general work of supervision and direction, has given special attention to the study and arrangement of the collections in Geology and Palæontology.

Mr. Charles H. Peck, Botanist, who has continued his study and preparation of specimens, especially of the lower forms of vegetable life. Large additions to the Herbarium have been made.

Mr. J. A. Lintner continued his connection with the Museum until his appointment as State Entomologist under chapter 549 of the Laws of 1880. The Trustees have appointed in his place as assistant in charge of the Zoölogical collection, Dr. D. N. DeTarr, who enters at once upon his duties.

Dr. J. W. Hall, assistant, in charge of the collections in Osteology and in sections of rocks and fossils. He has continued his work of cutting these sections with improved machinery of his own invention, and preparing them for exhibition. For a part of the summer he was in the field collecting fossils from the Trenton limestone, as exposed along West Canada creek.

Mr. Charles E. Beecher, assistant, engaged upon the collections in Geology and Palæontology.

Mr. George B. Simpson, assistant, engaged upon the preparation of Palæontological specimens.

Mr. John Gebhard, special assistant, to act as guide and demonstrator to those who visit the Museum.

Respectfully submitted,

H. R. PIERSON, *Chancellor.*

DAVID MURRAY, *Secretary.*

REPORT OF THE DIRECTOR.

ALBANY, *December* 29, 1880.

To the Hon. the Board of Regents of the University of the State of New York:

GENTLEMEN—I beg leave to communicate herewith the annual report upon the State Museum of Natural History, with some general account of the collections in the several departments the work done in the Museum, and in the field; and also a list of papers which accompanied the thirty-second and thirty-third reports in 1879 and 1880 and not yet published for the use of the Regents or for the Museum; the thirty-second report only, having been printed among the State documents. I present also a statement concerning the distribution of duplicate collections of fossils and minerals since 1866, which may be of use in future reference. The usual lists of donations and other additions to the collections and library are appended, together with special communications.

In regard to the collections generally, it may be said that these are all in comparatively good condition, and as well arranged as our facilities will permit. The need of room is more severely felt year by year, and we are working under great disadvantages, both for want of proper exhibition rooms and for want of suitable working rooms to carry on the preparatory work of the Museum. At the present time almost all the preparatory work upon the collections, especially those of Geology and Palæontology, is done in buildings outside of the State Museum. This necessity of carrying on the work in two places, distant from each other, imposes much more labor upon the Director, while the results are far less complete and satisfactory than if all the preparatory work could be done in the same building under constant supervision, and the collections at once properly placed.

In the two preceding reports, and in a special communication upon the subject, your attention was called to the neglected Zoölogical collections and especially that of the Ornithological department. Nothing has yet been done in this direction; but I hope to secure the appointment of an assistant who will devote his time to the advantage of the Zoölogical collections of the Museum.

The additions to the Museum collections, during the year 1880, will be found recorded in detail in the lists appended.

To the Botanical department there have been seventeen contributors of an aggregate of sixty-five species.

To the Zoölogical collection there have been added ten species, some of them in numerous individuals, from ten contributors; and two specimens have been purchased. The additions to the Insect collections by Mr. Lintner will be found in a special list.

To the collections in Mineralogy, Geology and Palæontology, there have been added by the donation of nine contributors, twenty-six specimens; and by purchase, thirty-five specimens.

A special collection of Eocene Tertiary fossils from Clairborne, Alabama, amounting to sixty species represented by 806 specimens, and a collection of Cretaceous fossils from Prairie Bluff, Alabama, of eleven species, represented by forty-five examples, has been presented by the Director.

The additions to the arranged collection of Palæontology in the Museum building by the Director are given in an appendix under the head of Current Work of the Museum. This list, with references to plate and figure of those specimens used in description, shows a total addition of 820 specimens among the Cephalopoda, of which 697 are new to the Museum collections. The specimens of *Camarocrinus stellatus*, described in the twenty-eighth Museum report and not before arranged in the Museum collections, are also given in this appendix, with reference to plate and figures.

To the library, contributions have been made by societies and individuals of eighty-six books and pamphlets.

THE CURRENT WORK OF THE MUSEUM.

In the Botanical department, the accompanying report of the Botanist, Mr. Charles H. Peck, will give an account of his work, with the additions of one hundred and ninety-seven species of plants, of which eighty-five are new to the Herbarium.

The collection of insects, begun in 1879, has been continued with considerable additions, but its progress was interrupted by the appointment of Mr. Lintner as State Entomologist on the 1st of July, 1880.

Dr. D. W. Hartman, of West Chester, Pennsylvania, who has been engaged in the special study of the shells of the genus Partula, kindly offered to examine and revise the nomenclature of the species belonging to the State Museum. The specimens were placed in his hands and this work has been accomplished. Dr. Hartman has also contributed other species, which are noted in the lists of additions to the Museum collections.

Mr. Geo. B. Simpson has prepared a collection of fresh-water shells, to be placed in the Museum whenever cases can be provided. In addition to the usual exhibition of the species, a large number of transverse and longitudinal sections of the specimens have been cut and so arranged as to show the convexity of the valves, the comparative thickness of the shell, and the capacity of the interior at different points in the width and in different stages of growth. These sections have been cut from specimens supposed to represent the opposite sexes of the species, and furnish some very interesting material for study. This collection will be accompanied by original drawings representing the anatomical structure of the animal.

The work of preparing sections of fossil corals and other families of fossils, the cutting of larger specimens for the study of the interior, as among the Cephalopoda, the shaping and polishing of specimens, and the cutting of numerous sections of fresh-water and other shells, has been carried on as usual and with success and satisfaction. This department of work has become a necessity for the Museum, and we have found it constantly applicable and constantly required, both in the study and illustration of fossils and in that of recent objects of natural history. The Museum now possesses a very extensive series of translucent sections of fossil corals, bryozoans and sponges, numbering about 1,700; while of the larger specimens which have been cut and polished for study, where no translucent sections were required, and of those which have been cut and shaped for the Museum collections, we have more than one thousand examples. The entire number of cuttings including fossils and shells are more than three thousand specimens.

DUPLICATE COLLECTIONS OF FOSSILS AND MINERALS.

During the year collections of duplicate fossils and minerals have been sent to the following institutions, viz.: Westfield Academy, Chautauqua county; Albion Academy and Union School, Orleans county; Schoharie Academy, at Schoharie C. H.; Norwich Academy, Chenango county. Three other collections still remain subject to the order of the Board of Regents.

A detailed statement of the collections sent to colleges and academies as ordered by special acts of the Legislature, or directed by the Board of Regents, and of those distributed from the collections of the Museum, or contributed by the Director from his private collections from 1866 to 1880, will be found in appendix A.

COLLECTIONS IN THE FIELD AND ADDITIONS TO THE MUSEUM COLLECTIONS.

The only collections of importance made in the field during the current year are from the Trenton limestone. Dr. J. W. Hall, assisted by Martin Sheehy, made a collection of thirty-six boxes of specimens of fossils from the exposures of the limestone in the ravines along the valley of West Canada creek.

Mr. Sherwood has sent in several boxes of specimens of Catskill sandstone and Chemung fossils collected in the Catskill region during the summer. Mr. C. E. Beecher has made a collection of more than thirty species of fossils, from the shales of the Hudson river group, at an exposure within the limits of the city of Albany.

The largest addition to the Museum collections has come from the arrangement of the Cephalopoda which have been used by the Director for study and illustration in the Palæontology of the State. A considerable number of these were in the former collections of the Museum, but by far the larger number are from more recent collection or additions from other sources. A classified catalogue of these is given in Appendix B.

The total number of specimens thus added to the arranged collections is 821; of these 124 belong to the old arrangement, having been borrowed for study and are now returned—being thus indicated in the catalogue. The number of specimens new to the collections, as shown in the same catalogue, are 697. Of the whole number (821) 268 are arranged under glass and the remainder (553) are consigned to the drawers.

There are at the present time in the Museum several hundred specimens of fossil Gasteropoda and Pteropoda, for which there is no proper space in the cases.

In my last report on the Museum, I called attention to a special communication of the preceding year, regarding the completion of a Geological map of the Catskill mountain region, which was begun many years ago. This work I considered as very necessary, and though it may have been regarded as not strictly the legitimate work of the Museum, it was nevertheless extremely important to the institution in several aspects, and especially in the authenticity of some of its collections. It is certainly of importance that the Geological collections of the Museum should represent the true order and sequence of the rock formations; and especially since we have undertaken to teach this order of succession among the palæzoic rocks, and to give a nomenclature of the same. Such work is qnite as germane to the object and purposes of the Museum as the determination of the Geographical limits distribution and habits of any living object within the State, and is strictly within the requirements of the study of the fossil flóra and fauna.

With its usual liberality the Legislature of the State made an appropriation ($1,200) for the completion of the field work—necessary for the construction of the Geological map of the Catskill mountain region and the southern counties of the State. This appropriation was vetoed by the Governor, and no provision was left for the continuance of the work. This action of the Executive was not known until sometime in June; and while not suspecting the possibility of such action, I had authorized the prosecution of the work early in May, and I could get no communication with Mr. Sherwood, who was carrying on examinations in the mountain region, until July. At this time the work had made considerable progress, and Mr. Sherwood's other engagements having been given up for this work, I could not, in good faith, do otherwise than continue his services for the season. The result is that the map will be essentially completed, but in order to verify former observations regarding the relations of the sandstones of Oneonta and of the Catskill mountains proper, it will be necessary to revisit some of the localities formerly mapped to compare with our more recent determinations.

This work will be a valuable contribution to Geological science, both as regards the structure and real topography of the Catskill mountain region, and also as concerns the true order of superposition in the higher Geological formations of the State, and the relations of the fossil faunas of the later groups of strata below the coal formation. The want of means for completing the work causes a serious embarassment, and defers the publication of knowledge which would be extremely welcome and of great service to all Geologists as well also to all the people of intelligent communities within the State.

It was during the collection of fossils for the Palæontology of the State in the early stages of that work that the writer became aware of the misinterpretation of the order of succession among the strata, and the erroneous reference of certain fossils. Feeling the necessity and importance of presenting the true stratigraphical relations of these fossils, which also involved the supposed determination of an entire group of strata with its fauna and flora, he undertook the investigation as a necessary part of the Palæontological work. This investigation has been carried on at intervals and continued after many interruptions during the past year, and now that the field labor is nearly completed it is a misfortune not to be able to present the results to the public.

During the years 1879 and 1880, special communications were made to the Regents regarding an important collection of fossils, chiefly of the Trenton limestone, belonging to Mr. C. D. Walcott, of Trenton Falls. In 1879, the committee on the State Museum recommended the purchase of the collection, and the Legislature made the necessary appropriation ($4,000) for that purpose. This appropriation was vetoed by the Governor, and the collection remained in the hands of the owner. In 1880 the subject was again brought before the Board of Regents, who appointed a special committee to examine the collection and report. The committee made their examination and recommended the purchase, and the Legislature again appropriated the required sum. The appropriation was a second time vetoed, by the Governor; and the collection was sold elsewhere and lost to the State Museum for ever. It is not my business to discuss the subject in this place; but it is necessary to record the facts, in order that the Museum and its Trustees may be vindicated in the future, as having discharged their duties to the institution and to the sciences which it represents.

With the limited means at our disposal, it is not possible to obtain, by collecting in the field all that is necessary for such a Museum. Moreover, persons, either scientists or collectors, living upon certain prolific localities will be able to give a greater amount of time, and to accumulate much larger and more complete series of specimens than any person not thus situated; and no institution of limited means can ever keep its collections up to the standard required by the progress of science without purchasing local collections. It is moreover almost always true that such can be purchased at a less cost than they could be made by a special collector. It should be remembered that the only mode by which we can ever hope to work out the details of our Geology, and to obtain even a moderately complete exhibition of the fossil contents of the strata, will be through the local observers and collectors; and the least recognition which the state can give for such services, is the purchase of these collections where their value is attested by proper authority. The evidences of the value of the collection here referred to are on record in communications made by the director as well as in published memoirs to the Board of Regents, and to the committee on the State Museum of Natural History. Were any farther evidence required we have it in the fact that the collection, on its refusal by New York, was immediately purchased by the first scientific Museum in the country.

With my last report I presented an outline map, giving the position of certain ore-beds in Essex county, and their relation to the rock formations. This was preliminary to a systematic development and exhibition of the relations of the mineral products of the State to the Geological formations. I regret that this object could not have received some encouragement from the Board, since it is only a part of the plan of the Museum, recommended by a committee of the Regents in 1866.

In this connection I would beg leave to call the attention of the

Board of Regents to the plan and mode of working for the State Museum recommended by the Board to the Legislature in February, 1866. After the lapse of nearly fifteen years, we are far from having carried out this plan in actual practice; and the constant tendency seems to be toward a passive condition which must ultimately lead to desuetude and to the disintegration of the Museum.

I am led to these reflections at this time, more especially in regard to the printing and publication of the reports, and their appended scientific papers, which are the medium of our communication with the scientific and practical world. Without systematic and continuous investigation and timely publication of the results, any Museum will degenerate in reputation, and cease to maintain equal relations with those which, while accumulating collections, give evidence of their vitality by the vigor and originality of the researches and the character of the publications. The activity now pervading the entire civilized world in scientific investigations and publications, and in the organization of Museums of Natural History should stimulate the authorities of the State of New York to a liberal support of its own Museum, whose collections, originating in the Geological Survey, have been the basis of such valuable contributions to Geology and general Natural History.

In my last report, I wrote that during the year, the twenty-eighth, twenty-ninth, thirtieth and thirty-first reports on the State Museum, had been published for the use of the Regents and the Museum. The three first named, together with the twenty-seventh report, were specially ordered near the close of the legislative session of 1878; having been previously ordered printed as legislative documents at the time of their presentation. This delay in publishing these reports has operated to the serious disadvantage of the Museum, since it has not been possible to place before the public evidence of the work done in these successive years.

It is moreover discouraging to those who are working for the Museum, when several years may elapse before the result of their work can reach the public ; and in the mean time, some one having greater facilities may anticipate the publication so tardily conducted, and the labor of months or years thus be lost to the individuals deserving the credit. It is useless to ignore the fact of the deleterious influence coming from our inability to give to the public promptly the results of our scientific investigations.

At the present time the thirty-second report, communicated in January, 1879, is printed simply as a public document, without the illustrations accompanying the scientific papers; no copies having been printed for the Regents or for the Museum; and it is essentially inaccessible to the scientific public.

The thirty-third report, presented to the Board in January, 1880, is not yet published, and several valuable papers with illustrations remain in the hands of the State printer. Neither the authors of these papers nor the scientific public have any benefit from the researches made in these several departments of science preceding and during the year 1879. The time in the future when these two reports may come before the public is very uncertain.

I do not blame any person or party for this delay; it is the fault of a *system* which is pernicious to all scientific progress under the patronage of the State. It is of no avail to say that the employees of the Museum are paid for their services whether their productions are published or not. The fact of the publication is important to them as well as to the museum; and we also have volunteer contributors who communicate important papers with the expectation of seeing them appear in the Museum reports.

I am well convinced that the founders of the Museum could never have anticipated such a state of things; and certainly the Board of Regents, when making a special report to the Legislature in 1866, regarding the reorganizing of the State Cabinet of Natural History, in order to meet the advancing requirements of science, could never have supposed that the reports of its workings would remain unpublished for two, three, or four years after their completion and presentation. I beg most earnestly that your Board will give serious consideration to this matter, which I assure you is of vital importance to the existence of the Museum as a scientific institution.

The tables of contents of the thirty-second and thirty-third reports are as given in the note below.*

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*THIRTY-SECOND REPORT.

Report of the Director.
Additions to the State Museum during the year 1878.
Report of the Botanist, C. H. Peck.
The Mosses of Spring Brook, Caledonia, by Charles H. Peck.
The Insects and other Animal Forms of Spring Brook, Caledonia, by J. A. Lintner
Annelida Chætopoda of New Jersey, by H. E. Webster.
Descriptions of New Species of Fossils from the Calciferous Formation, by C. D Walcott.
Laurentian Magnetic Iron Ore deposits, of Northern New York, by Charles E. Hall.
Descriptions of Lower Helderberg Corals and Bryozoans, by James Hall.

THIRTY-THIRD REPORT.

Report of the Director.
Additions to the State Museum during the year 1879.
List of additions to the Synoptical collection of insects.
List of the Unionidæ of the Gould collection.
List of the Unionidæ of the State collection.
List of the Unionidæ of the general collection.
List of the Land Shells of the New York State collection.
List of the Corbiculidæ of the New York State collection.
List of the Land Shells of the United States in the Museum collections.
List of Land Shells presented to the State Museum in 1875, by Dr. James Lewis
Descriptions of New Species of Fossils from the Trenton Group of New York by C. D. Walcott, with illustrations.
Report of the Botanist, Charles H. Peck, with illustrations.
Bryozoans of the Upper Helderberg and Hamilton Groups, by James Hall.

In the same connection I beg leave to call your attention to another condition attached to the publications of the Museum. The reports are published for the Regents of the University, and have formerly all been delivered at the State Library. Within a few years the Museum has been allowed a small proportion of the copies for distribution. In the publication of the Natural History of the State, the Palæontology when published is delivered to the Secretary of State for sale and distribution, but these volumes often remain a long time in the office, many copies of volumes three and four being still on hand. The Museum is suffering for the want of a library, and the few important works which have from time to time been purchased have taxed our means to the utmost. In the past years the forming of a library for the Museum has been discouraged on the ground that the State Library should serve all purposes of reference for those working in the Museum. It appears to me, however, that the time has arrived when such a position should be abandoned. The Museum needs a working library, in which should be found the current literature of the sciences from all parts of the world, as well as standard scientific works.

The catalogue of our library, which I shall communicate to your Board, will show how meagre are our resources in this respect.

Were we allowed a thousand copies of our own reports, and a like number of the volumes of the Palæontology (which, in fact, should be regarded as emanating from the Museum), we should be in a position to open a correspondence and exchange with the more important scientific societies of America and Europe, and thus accumulate a library of great value and importance without costing the State any more money than is at present expended in publication ; and it would simply be diverting from the present course of sale and distribution this number of copies, which would inure to much greater final advantage to the State than as at present disposed of. Upon the subject of a Museum Library I have made a special communication to the committee on the State Museum.

Respectfully submitted,
JAMES HALL,
Curator.

Appendix A.—Distribution of duplicate fossils and minerals.
" B.—List of species and specimens of Cephalopoda, etc., added to the arranged Museum collections.
" C.—Additions to the State Museum collections.
" D.—Additions to the library.

APPENDIX C.*

Additions to the State Museum During the Year 1880.

I. BOTANICAL.

BY DONATION AND COLLECTION.

Specimens of three species of marine algæ. From Miss Julia S. Hoag, Albany, N. Y.

Specimens of *Polyporus squamosus,* Fr. From Prof. James Hall, Albany, N. Y.

Specimens of *Thalictrum anemonoides,* Mx. and a leaf of *Nelumbium luteum,* Willd. From Prof. J. S. St. John, Albany, N. Y.

Specimens of eight species of Fungi. From Prof. A. N. Prentiss, Ithaca, N. Y.

Specimens of *Triosteum angustifolium,* L., *Galium verum* L. and *Trillium erectum* v. *declinatum,* Gr. From Isaac Coles, Glen Cove, N. Y.

Specimens of *Carex Sullivantii* Boott. and *Polypogon Monspeliensis,* Desf. From E. C. Howe, M. D., Yonkers, N. Y.

A specimen of *Æcidium pedatatum,* Schw. From W. R. Gerard, New York City, N. Y.

A specimen of *Quercus heterophylla,* Mx. From J. C. Martindale, Camden, N. J.

Specimens of three species of Fungi. From William Barbeck, Philadelphia, Pa.

Specimens of *Hirneola auricula-Judæ,* Berk. From C. J. Sprague, Boston, Mass.

Specimens of three species of Fungi. From E. W. Holway, Decorah, Iowa.

Specimens of *Agaricus spectabilis,* Fr. From I. D. Trask, M. D., Astoria, N. Y.

Specimens of eleven species of Fungi. From J. B. Ellis, Newfield, N. J.

Specimens of twelve species of Fungi from Florida. From George Martin, Westchester, Pa.

Specimens of five species of Fungi. From Prof. W. G. Farlow, Cambridge, Mass.

Specimens of ten species of Fungi; also a piece of wood of *Librocedrus decurrens,* injured by the mycelium of a fungus. From H. W. Harkness, M. D., Sacramento, Cal.

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*Appendices A. and B. are transferred to the Thirty-fifth Report.

A specimen of the root of a carrot with numerous branches. From C. Feltis, Cranesville, N. Y.

By collection of the Botanist [Charles H. Peck], specimens of one hundred and ninety-seven species of plants have been added to the Herbarium, of which eighty-five are new to it.

II. ZOÖLOGY.

BY DONATION.

Spoon-bill Sturgeon (*Etheostoma caprodes*, Raf.), from the Alleghany river, at Warren, Penna. By Charles E. Beecher.

Alcoholic specimens of *Chrysochus ornatus* (Fabr.). From Miss Anna Hall, Delaware Co., New York.

Examples of *Asellus communis*, Say, from Trout-ponds, Albany Co., N. Y. From J. M. Batterman, Albany, N. Y.

Cocoons of *Samia cecropia* (Linn.) and *Callosamia Prometheus*, Knox, Albany Co., N. Y. From H. C. Williams, Knox, N. Y.

Pupa of *Deilephila lineata*. From James Hall.

Cermatia forceps, Raf. From D. A. Nichols, Albany, N. Y.

Julus canadensis, new sp. From G. C. Hall, Taunton, Mass.

An owl-beetle, *Alaus oculatus* (Linn.) From Howard Cole, Albany.

A fresh-water shrimp, *Gammarus? fasciatus*, Say. Abundant in a well. From James Trego, New Baltimore, N. Y.

Corydalis carnutus, Linn. From T. L. Harison, Albany, N. Y.

BY PURCHASE.

A Blue Heron. A young individual in full plumage. Killed near Albany.

List of species of the Genus *Partula* donated by W. D. HARTMAN M. D. West Chester, Pennsylvania.

P. Ganymedes, Pfr. Dominique, Marquesas.
P. bilineata, Pfr. Tahaa.
P. affinis, Pse. Tahiti.
P. lignaria, Pse. Tahiti.
P. nucleola, Pse. Moorea.
P. sinistrorsa, Pse. = *Otaheitana* var. Tahiti.
P. brevicula, Pse. = *Otaheitana* var. Tahiti.
P. attenuata, Pse. = *gracilis*, Pse. (one specimen.) Raiatea.
P. crassilabris, Pse. = *rustica*, Pse. Raiatea.
P. amabilis, Rve. = *Otaheitana*, var. Tahiti.
P. rubescens, Rve. = *Otaheitana*, var. Tahiti.
P. variabilis, Pse. = *navigatoria*, Pfr. Raiatea.
P. bella, Pse. = *Hebe*, var. (according to Garrett.) Raiatea.
P. robusta, Pse. = *auriculata*. Tahiti.
P. umbilicata, Pse. Tahaa.
P. reparida, Pse. = *recta*, Pse. Nukahiva, Marquesas Is.

P. *Thalia*, Garr. n. sp. = *abbreviata*, Pse. M. SS. (non Mousson), good species. Raiatea.
P. *lutea*, Lesson = *lilacina*, Pfr. = *solidula*, Rve. non Pse. Borabora Island.
P. *imperforata*, Pse. = *solidula*, Pse. non Rve. Raiatea.
P. *lugubris*, Pse. = *fusca*, Pse. Raiatea.
P. *Reevana*, Pfr. = dextral form of *Otaheitana*. Tahiti.
P. *Garretti*, Pse. Raiatea.
P. *terrestris*, Pse. Raiatea.
P. *purpurascens*, Pfr. = *rosea*, var. Huaheine.
P. *planilabrum*, Pse. = *lateralis*, Pse. non Pfr. Tahaa.
P. *compacta*, Pse. Raiatea.
P. *radiata*, Pse. n. sp. (good species, not described.) Raiatea.
P. *Proteus*, Pse. Raiatea.
Twenty-nine species, all of which are new to the Museum collections.

Catalogue of species of the Genus *Partula* in the collections of the State Museum, as determined by W. D. Hartman, M. D., Dec. 1880. (The corresponding numbers are inclosed with the shells.)

1. P. *bicolour*, Pse. Guam, (found in the parcel with P. *gibba*.)
2. P. *gibba*, Fer. Guam, Ladrone Islands.
3. P. *Mastersii*, Pfr. = *gibba*, the chocolate colored var., found with *gibba*.
4. P. *fasciata*, Pse. (Type) *Moorea* = *Ganymedes* var.
5. P. *varia*, Brod. Huaheine.
6. P. *spadicea*, Rve. Marquesas, (found with *varia*.)
7. P. *dentifera*, Pfr. Raiatea, not Tahiti.
8. This is the true P. *auriculata*, Fer. also = P. *Dumartroyi*, Soult. It is however *not a Partula* but = *Achatinella auriculata*, Fer.
9. *Partula affinis*, Pse. Tahiti.
10. P. *Ganymedes*, Pfr. Dominique, Marquesas.
11. P. *filosa*, Pfr. = *lineolata*, Pse. Tahiti.
12. P. *rosea*, Brod. = *cognata*, Pse. var. Huaheine.
13. P. *Otaheitana*, Brug. original var. Tahiti.
14. P. *faba*, Martyn. Type.
15. P. *radiolata*, Pfr. Guam, Ladrone Islands.
16. P. *hyalina*, Brod. Tahiti.

    P. *Hebe*, Pfr. Type, no number. P. *inflata* Rve = *Thersites*, Pfr. Dominique, Marquesas.
17. P. *bilineata*, Pse. Tahaa.
18. P. *Zebrina*, Gould = *Reclusiana*, Petit = *actor albers*. The latter name is the correct one. This is a *fresh shell*, Upolu, Tutuila.
19. P. *Zebrina*, Gould. Same as No. 18, except that it is a weather-beaten and dead shell.
20. P. *affinis*, Pse. Tahiti.
21. P. *lignaria*, Pse. Tahiti.

P. *Otaheitana*, Brug. Tahiti; Number seems to have been omitted as there are two Nos. 21, this one like No. 13.

22. *P. bulimoides,* Lesson, Upolu (Type).
23. *P. nucleola,* Pse. Moorea.
24. *P. sinistrorsa,* Pse. M. SS. = *Otaheitana* var. Tahiti.
25. *P. brevicula,* Pse. M. SS. = *Otaheitana* var. Tahiti.
26. *P. attenuata,* Pse. = *gracilis,* Pse. M. SS. Raiatea.
27. *P. crassilabris,* Pse = *rustica,* Pse. Raiatea.
28. *P. semilineata,* Mousson, this is = to No. 22 yellow var.; the dextral shell = *conica* Gould. Upolu.
29. *P. amabilis,* Pfr. = *Otaheitana* var. Tahiti.
30. *P. formosa,* Pse n. sp. Raiatea, (good species.)
31. *P. rubescens,* Reeve = *Otaheitana* var. Tahiti.
32. *P. variabilis,* Pse. = *navigatoria* Pfr. Raiatea.
34. *P. bella,* Pse. = *Hebe* var. (according to Garrett), Raiatea.
35. *P. auriculata,* Brod. (Type.) Tahiti.
36. *P. robusta,* Pse. M. SS. = *auriculata,* Tahiti.
37. *P. umbilicata,* Pse. Tahaa.
38. *P. amabilis,* Pfr. (Same as 29), Tahiti.
39. *P. Guamensis,* Pfr. Guam.
40. *P. repanda,* Pse = *P. recta,* Pse. Nukuhiva, Marquesas Is.
41. *P. Thalia,* Garr. = *abbreviata,* Pse. M. SS. non Mousson (good species), Raiatea.
42. *P. lutea,* Lesson. = *lilacina,* Pfr. = *solidula,* Rve. non Pse. Borabora Island.
43. *P. imperforata,* Pse. M. SS. = *solidula,* Pse. M. SS. non Rve, Raiatea.
44. *P. lugubris,* Pse. = *fusca,* Pse. Raiatea.
45. *P. Reevana,* Pfr. = dextral *Otaheitana.* Tahiti.
46. *P. Garretti,* Pse. Raiatea.
47. *P. terrestris,* Pse. Raiatea.
48. *P. purpurascens,* Pfr. = *rosea* var., Huaheine.
49. *P. planilabrum,* Pse. = *suturalis,* Pse. M. SS. non Pfr. Tahaa.
50. *P. compacta,* Pse. Raiatea.
51 *P. radiata,* Pse. n. sp. Raiatea, (good species).
52. *P. proteus,* Pse. Raiatea.
53. *P. spadicea,* Rve. Yellow var., Moorea.
54. Hybrid between *P. crassilabris* and *P. Thalia* (rare).
55. *P. fusca,* Pse. = *ovalis,* Pse. Raiatea Island.

III. ARCHÆOLOGY.

Two arrow-heads from a lot of over one hundred specimens found at a single locality in the town of Amsterdam, N. Y. From P. M. Van Epps.

IV. MINERALOGY, GEOLOGY AND PALÆONTOLOGY.

ADDITIONS BY DONATION AND EXCHANGE.

Baculites oavtus, from the Cretaceous formation. From B. A. Mills, Sioux City, Iowa.

A block of trap-rock with a circular red ring on the two opposite sides. From Andrew C. Randall, Springfield, N. J.

A specimen of *Dictyophytau clavatum.* Wellsville, N. Y. From Ira Sayles.

A large specimen of arenaceous shale, from the Hamilton Group, with numerous casts and impressions of *spirifera mucronata.* From John Reed.

A specimen of red pipestone. Pipestone, Minnesota. From O. A. Moore.

Specimens of flattened discoid concretions occurring in the Slates of the Hudson River Group. From P. M. Van Epps, Glenville, N. Y.. in exchange for Museum reports.

Mammillary Quartz, loose specimen near Culpepper Court House, Va.

Tentaculites gyracanthus. Knox, Albany Co., N. Y. From H. C. Williams, Knox, N. Y.

From Prof. James Hall.

Green and purple *Jasper.* Marshall Pass Creek, Saguache Co., Col. (Two specimens.)

Opal (*Cacholong*). Marshall Pass Creek, Saguache Co., Col. (Two specimens.)

Silver Ore. Horn Silver Mine, Frisco, Utah. (Five specimens.)

Silver Lead Ore, Carbonate Mine, Frisco, Utah. (Three specimens.)

BY PURCHASE.

From Joel Harvey.

One	specimen,	Gray Copper, Silver and Gold Ore. Silverton, Col.
"	"	Silver Ore. Yellow Mountain, Howard's Fork of San Miguel.
"	"	" " Nettie Mine, San Miguel.
Three	"	Ruby Silver and Gray Copper. Cock-tail lode, Col
One	"	Dendrites. Colorado.
Two	"	Pyrite and Quartz Crystals.
One	"	Malachite.
Six	"	Worn pebbles, agate, etc.
"	"	Ferruginous-tufa with inclosed pine-needles.
One	"	" " " " pine-cones.
Two	"	" " " " moss.
One	"	Dumb-bell concretion. Cannon-ball Creek, Mo.
"	"	Crystal of Salt.
"	"	Bituminous coal.
Seven	"	Calcareous-tufa from deposits around hot-springs.
One	"	Quartz and impure opal.
Eight	"	Fragments of Pottery.

List of Tertiary Fossils and geological specimens from Claiborne, Alabama, presented to the State Museum by James Hall, April, 1880. To remain the property of the Institution so long as the same shall be located at the Capital of the State.

Gasteropoda.	No. specimens.
1. Crepidula lirata Conrad...........................	15
2. Voluticella Sayana Lea............................	22
3. Pyrula Smithi Lea.................................	7

4.	Rostellaria Lamarzcki Lea	18	
5.	Anolax gigantea Lea	10	
6.	Voluta Defrancii Lea	15	
7.	Fusus ——	7	
8.	Oliva Greenoughi Lea	25	
9.	Dentalium alternatum Lea	30	
10.	Turitella carinata Lea	18	
11.	" lineata Lea	22	
12.	Cyprea ——	20	
13.	Natica mamma Lea	22	
14.	Bulla St. Hilairii Lea	30	
15.	Oliva ——	5	
16.	Natica ——	7	
17.	Nassa ——	10	
18.	Turritella — casts	4	
19.	Natica — casts	2	
20.	Solarium — casts	3	
21.	Turritella — casts	2	
22.	Miscellaneous casts	5	

LAMELLIBRANCHIATA.

23.	Venericardia transversa Lea	20	
24.	Crassatella ——	30	valves.
25.	Gratilupia Moulinsii Lea	16	valves.
26.	Pectunculus Broderipii Lea	18	valves.
27.	Cytherea globosa Lea	4	valves.
28.	" comis Lea	13	valves.
29.	" Hydii Lea	18	
30.	Venericardia Sillimani Lea	5	
31.	Lucina compressa Lea	8	
32.	Corbula Murchisoni Lea	20	
33.	Plicatula Mantelli Lea	25	valves.
34.	Crassatella Marylandica Conrad	11	valves.
35.	Ostrea sellæformis Conrad	9	valves.
36.	Ostrea Georgiana Conrad	5	
37.	" Alabamiensis Lea	9	valves.
38.	Corbula Alabamiensis Lea	30	valves.
39.	Lucina lunata Lea	20	
40.	" ——	30	valves.
41.	Myoparo costatus Lea	30	valves.
42.	Ostrea divaricata Lea	10	valves.
43.	Ostrea — casts	5	
44.	Cardium — casts	5	
45.	Cardium — casts	3	
46.	Crassatella — casts	2	
47.	Venus — casts	2	
48.	Cardium — casts	3	
49.	Spondylus — casts	1	
50.	Cytherea — casts	10	
51.	Siliquaria Clairbornensis Lea	17	
52.	Calcareous tubes	30	
53.	Lunulites Bouei, etc., Lea	30	

RADIATA.

54.	Turbinolia Maclurii Lea	12
55.	" Stokesi Lea	30
56.	Scutella Lyelli Conrad	16
57.	Authophyllum	3
58.	Coral	5
59.	Fossil wood, from the Tertiary of Virginia	5
60.	Geological specimens	3

Sixty species represented in 806 examples.

Cretaceous Fossils from Prairie Bluff, Alabama.

1.	Nautilus De Kayi	3
2.	Nautilus De Kayi	2
3.	Ammonites Conradi	2
4.	Ammonites Conradi, var	3
5.	Turritella vertebroides	4
6.	Natica petrosa	2
7.	Fusus (cast)	3
8.	Fusus (cast)	4
9.	Gasteropod sp. (cast)	6
10.	Exogyra costata	6
11.	Gryphea mutabilis	10

Eleven species represented by 45 examples.

APPENDIX D.

Additions to the Library of the State Museum of Natural History for the Year 1880.

ADDITIONS TO THE LIBRARY.

BY DONATION AND EXCHANGE.

Report of condition of crops, Nos. 20, 24, 25, 26, 27. and 29. From the Department of Agriculture. Washington, 1880.

Official Gazette of the U. S. Patent Office, Vol. 17. Washington, 1880.

Official Gazette of the U. S. Patent Office, Vol. 18, Nos. 1–23 (except 10 and 12), 1880.

Alphabetical lists of Patentees and inventions from January to June inclusive, 1880.

Culture of Sumac in Sicily, by W. McMurtrie. Pamph. 8vo. pp. 18, 8 plates, from Department of Agriculture, 1880.

U. S. Commission of fish and fisheries. Report of Commissioner for 1877. From the Commissioner. Washington, 1879.

Commissioner for 1878. From the Commissioner. Washington, 1880.

Investigation of diseases of swine, etc. Pamph. 8vo. pp. 288. From Department of Agriculture. Washington, 1879.

Contagious diseases of domestic animals. Pamph. 8vo. From Department of Agriculture. Washington, 1880.

U. S. Entomological Commission:

Bul. 3, Cotton Worm, C. V. Riley. Pam. 8vo. pp. 144. 1880.
" 4, Hessian fly, A. S. Packard. " " " 43. "
" 5, Chinch bug, Cyrus Thomas. " " " 44. "

Reports of the Commissioners of Agriculture for 1873, '74, and '75. From the Commissioner, 3 vols. 8vo. pp. 496, 463, 536. Washington, 1874, '75 and '76.

Department of the Interior. U. S. Geographical and Geological Survey of the Rocky Mountain region. J. W. Powell.

Geology of the Henry Mountains. G. K. Gilbert, 4to, cloth, pp. 160, plates 5. 1877.

Lands of the Arid Regions of the U. S. and of Utah. J. W. Powell, 4to, cloth, pp. 195.

Geological and Geographical survey of the Territories. F. V. Hayden. Bulletin of the U. S. Geological and Geographical survey of the Territories. Vol. V, 8vo. Washington, 1879.

United States National Museum. Bul. 13. The Flora of St. Croix and the Virgin Islands. Baron H. F. A. Rogers. Washington, 1879.

Bul. 14. Catalogue of the collection, illustrating the animal resources and the fisheries of the U. S. G. Brown Goode, 8vo. pp. 351.

Department of the Interior. U. S. Geographical and Geological survey. F. V. Hayden, U. S. Geologist in charge.
Bulletin of the U. S. Geological and Geographical survey of the Ter. Vol. V, Nos. 2 and 3. Washington, September 6th and 30th, 1879, 8vo. pp. 153–520. From the Department.
Verzeichnise in der Formarei der Konigl. Museum, pamphlet. Berlin, 1879.
Journal of the American Geographical Society of New York. Vol. 10, 8vo. From the Society. New York, 1878.
Bibliographical contributions. No. 11, The Entomological libraries of the United States. S. A. Scudder, Cambridge, 1880, pamph. 8vo. pp. 6. From Author.
Tenth Annual Report of the U. S. Geological and Geographical survey of the Territories. F. V. Hayden. Washington, 1878. Cloth, 8vo. pp. 546, plates 77, 3 maps.
The American Medical and Philosophical Register. Vol. 11, New York, 1812, 8vo. pp. 476. From the New York Academy of Medicine.
Bulletin de la Societe des Naturalistes de Moscow. No. 3 and 4 for 1878, No. 1 for 1879. From the Society.
Exposition Universelle de Paris, 1878. Section Belge. Cat. official des Oeuvres d'Art, etc.
Catalogue du Ministere de l'Instruction, Publique des Culte et des beaux artes, Paris, 1878. Tomes, I, II, III, pp. 408, 123, 84. From the Smithsonian Institution.
Journal of the American Chemical Society, Vol. 1, No. 12, New York, 1879. Pamph. 8vo. pp. 505, 621. From the Society.
Anales del Museo Nacional de Mexico, Tomo, II. Extr. 1a, Mexico, 1880. Quarto, pp. 82.
Geology of Wisconsin. Survey of 1873, 1879, Vol. III. Accompanied by an Atlas of Maps. Madison, 1880. Royal 8vo. pp. xxxii and 763. From the State Geologist through the custodian of public property.
Canadian Entomologist. Vol. 12, No. 7, London, Ont., 1880.
Anthracite Coal Fields of Pennsylvania, by P. Sheafer, 1879.
Catalogue of Pacific Coast Fungi, 1880.
Inaugural Address — Practical Uses of the Microscope — by R. H. Ward. Indianapolis, 1880.
Proceedings of the Literary and Philosophical Society of Liverpool. From the Society, 1878.
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REPORT OF THE BOTANIST.

Hon. David Murray, LL. D., *Secretary of the Board of Regents of the University:*

Sir — Since the date of my last report, specimens of two hundred and thirty-nine species of plants have been mounted and placed in the Herbarium in the State Museum of Natural History, of which one hundred and sixty-seven were not before represented therein. Seventy-two species have been represented by better specimens or by the addition of specimens of some form or variety not before shown. A list of the mounted specimens is marked (1). Specimens have been collected in the counties of Albany, Columbia, Dutchess, Essex, Greene, Hamilton, Franklin, Rensselaer, Schenectady, Saratoga, Ulster and Warren. These represent one hundred and ninety-seven species, of which eighty-five are new to the Herbarium and thirty-eight are believed to be unpublished. A list of collected specimens is marked (2). Specimens of thirteen New York species, new to the Herbarium and not among my own collections, have been contributed by correspondents, or have been obtained in naming specimens for them. These, added to the collected species, make the whole number of additions new to the Herbarium, ninety-eight species. A list of contributors and their contributions is marked (3). Previously unreported species will be noticed and descriptions of new species given in a part of the report marked (4). New stations of rare plants, remarks upon interesting species or varieties, and various observations are recorded in a part marked (5).

The plants designated by the term "fungi," are very numerous, whether we speak of them as individual plants or as species. In localities where they have been most thoroughly collected and investigated they outnumber in species the larger and far more conspicuous flowering plants. They are also extremely varied in their characters and habits. All, however, are comparatively small in size, but few species ever attaining the length or breadth of a single foot. If we except the fleshy and speedily perishable sorts which are not generally very abundant, we may say that most of the species are too small to be readily distinguished by the naked eye. And of no species is it possible for the unaided eye to distinguish clearly the shape and features of the spores (seeds). Even the entire plant in multitudes of species would probably wholly escape observation and detection if they had not the habit of growing in masses or patches of many individuals closely congregated together, for masses of minute objects become visible when the single elements that compose them are invisible. They sometimes produce changes also in or on the substances they inhabit, which attract attention and lead to their discovery. Such changes were known and noticed long before the fungi that produce them were detected. The leaves of many plants often became discolored in spots or would wither and die in an unaccountable manner; the branches of plum trees and cherry trees bore black and unsightly excrescences which at length caused them to die; potato vines were suddenly affected with blackish spots and premature death, and the tubers themselves rotted mysteriously, either in the ground or out of it; fields of waving grain were struck with "rust" that was not due to any oxidation; stems and leaves of grass and grain were "branded" in blackish lines, yet not by the use of fire; Indian corn often produced turgid, smutty excrescences on the ears that should have been well filled with golden grain; the products of the fruit trees and the orchards would speedily decay without any apparent or satisfactorily explainable cause; the sweetened juice of grapes and other fruits would quickly ferment, effervesce and indicate chemical activity without the introduction of any chemical reagents; preserved fruits would often turn sour or musty; even sweet milk would not retain its sweetness long; wood thoroughly dried and kept so, or if kept constantly submerged, was found to be almost imperishable, but in intermediate circumstances it would speedily decay. These and many other phenomena were noticed, and their causes were sometimes made the subject of speculative theories, but the real agencies that produced them were not and could not well be fully understood till investigated by the aid of the microscope. When by this means our powers of vision have been sufficiently increased, we find that the dead spots on leaves usually bear crops of minute fungi, that the "black knot" of plum and cherry trees is an enlargement of the branch covered by a fungus whose threads have caused the mischief, that the spots on the potato leaves and the consequent rotting of the tubers are the work of a minute parasitical fungus, that the "rusts" and "brands" of the grain fields, the smut of corn, the decay of fruits, the fermentation of juices, the souring of milk and other substances and the rotting of wood are all due to the presence of fungi of one kind or another. And now that the microscope has disclosed this previously almost invisible world of vegetation and we have entered upon its investigation, we can only wonder at its extent and importance. We find these minute organisms endowed with certain definite forms and certain fixed structural characters by means of which they can be systematically classified and specifically designated just as readily as the ordinary plants we see about us. We find in many instances that they have peculiar habits and habitats to which they are addicted, so that a knowledge of the habitat and behavior of the fungus is many times sufficient to indicate pretty accurately the systematic character of the parasite.

We have already learned that nearly all flowering plants, whether cultivated or wild, have one or more parasitic fungoid foes to whose attacks they are sometimes subject. Some plants have several of these enemies that attack them in one part or another, at one time or another, while some more fortunate are rarely affected and then only under circumstances peculiarly favorable to the parasite. Besides the fungi that attack only living plants, there are multitudes of species that are often less particular concerning their habitat and that revel promiscuously upon the tissues of dead plants. Nor can we stop here, for living animal organisms are by no means exempt from the pernicious and even fatal attacks of these minute parasites. Fishes and flies, silkworms and cicadas, the larvæ and pupæ of various moths, beetles and other insects are killed by certain fungi that grow in or upon them. So peculiarly liable are insects to death from this cause that eminent scientists have suggested that these parasitic plants may be made available as insecticides with which we may combat injurious species. But before this can be accomplished it is necessary to find a fungus that will inhabit the insects we wish to destroy, for it is evident that no single insect-killing fungus can be used against every noxious insect; and, unfortunately, those insects which are most hurtful to our crops do not thus far appear to be subject to the attack of any fungus. Parasites and predaceous foes of their own class yet appear to be a more promising means of diminishing the numbers and ravages of such insects.

Most of our knowledge of fungi has been acquired within the present century. Many thousands of species have been described and classified, and new ones are discovered and published almost monthly. But much yet remains to be done. The life histories and the true specific limits of many comparatively common species are yet to be ascertained. In some instances a kind of polymorphism or alternation of generations exists and makes investigation more difficult. The minuteness of some species and the peculiar conditions necessary for the development of others are also obstacles to be overcome before we can claim to fully understand these organisms. Indeed there is a lower grade of these very lowly plants the investigation of which is difficult even with our best microscopes. I refer to such organisms as Bacteria, Vibriones, Bacilli and Micrococci. To them the putrefaction of animal substances is attributed and also of some vegetable substances; they are also charged with the production of some of the most destructive maladies of our domestic animals; and the recent investigations of Prof. Burrill indicate that they are responsible too for the production of those dread diseases of our fruit trees, the "yellows" of the peach and the "blight" of the apple and the pear trees, diseases that have hitherto baffled all efforts to ascertain their causes. There are also those who believe that many of the contagious diseases of the human race are due to similar agencies. It is very probable that this belief will yet be supported by abundant evidence; but, if it should not be, enough is already known to make it evident that the relations of fungi to our material interests and well-being are much more intimate and far-reaching than is generally supposed. In view of their relations to us and to our food-plants, and of their importance in the economy of nature, and of the general lack of information concerning them, I have thought it would be well to give a plain and easy account of a few of our common species, avoiding, as far as possible, the use of technical terms and illustrating the minute parts by enlarged drawings. I have selected for this purpose such species as almost any one may find and observe if they will examine our corn fields, strawberry plants and orchards.

Ustilago Maydis, *Lev.* Indian corn Smut. (Plate 3, Figs. 1–3.) This fungus can be found in almost any corn field after the corn has developed its flowers. The visible part of the fungus consists of more or less irregular and unsightly swellings or excrescences on the tassel or the ears of the corn. Very rarely these swellings occur on the stem and leaves also, but as a rule they occur on the tassels and ears and more often on the latter than on the former. They are very variable in size and shape. Generally they range from the size of a hazel-nut to that of an ordinary apple. They are soft to the touch and externally whitish and membranous, but they soon rupture and are then more or less stained by their own contents. The interior is composed of a shreddy mass of tissue filled in and covered over with a copious blackish-brown dust or powder that crocks the fingers in handling it or the clothes that brush against it. By microscopic examination this is found to be a mass of globular grains each one of which has a diameter of about four ten-thousandths of an inch; that is, it would take two thousand five hundred of them when laid in a straight row in contact with each other to cover the space of one inch. The surface is covered with minute points or prominences which gives them a rough but pretty appearance under the microscope. These powdery grains are the spores, that is, the seeds of the fungus. There are thousands, perhaps millions of them in a single excrescence. Nature has thus made plentiful provision for the multiplication and spread of the fungus. This and other closely related fungi have been specially studied by Professor Fischer Von Waldheim who finds that the fungus enters the corn while yet young, tender and germinating. The spores of the fungus are scattered over the ground by the wind. They may then be carried beneath its surface by rain or water soaking into the ground or the farmer himself in preparing his ground and planting his seed may unwittingly plant beneath the surface the seeds of a crop of fungi. If any of these spores happen to be in such a position that they come in contact with the young corn sprout in its upward growth they immediately send forth their growing filaments which penetrate the tender tissues of the young plant. When they have established themselves within the supporting plant they continue to live at its expense and grow with its growth, extending themselves upward through the stem as it elongates, until the proper time comes for them to break forth in excrescences and perfect a new crop of spores. It is characteristic of the smuts that they perfect their spores in certain definite parts of the supporting plant, though their mycelial threads may pervade all parts of the plant. A few produce their spores in the leaves or on the stem, but most of them develop their fruit in the flowers or seeds of the host plant. A knowledge of this fact is important in case it is deemed desirable to attempt the destruction or extermination of the parasite. It may serve as a guide to us in our search for the pest, informing us both as to the time when and the place where. In the case of the Indian corn smut it would be useless to look for it before the tassels appear. I am not aware that any experiments, made with the purpose to discover a remedy for this malady, have been successful. It is not probable that any external application will be of much avail, for the threads of the fungus are well protected by the surrounding tissues of the supporting plant. In this, as in so many other cases, prevention is better than cure. Although it may not be possible wholly to prevent the attacks of this pest, yet it is reasonable to suppose that if every cultivator of corn would go through his fields at the proper time, that is, as soon as the excrescences have made their appearance, and cut off and burn up every excrescence, he would thereby prevent the dissemination of millions of these fungus spores and do much toward the prevention of the continuance and spread of the evil. Though the winds may carry the spores to great distances it is probable that most of them fall to the ground in the field in which they are produced. In this event it is easy to see that corn raised for several consecutive years on the same piece of ground would be more likely to be affected with smut than corn raised where there is a constant rotation of crops.

The specific name *Maydis*, applied to this fungus, is derived from the specific name *Mays*, which belongs to its supporting plants. *Ustilago Zeœ*, Schw., is a synonym, the specific part of which is derived from *Zea*, the generic name of Indian corn. The specific names of fungi are often derived from the name of the plant they inhabit.

Helminthosporium inconspicuum, *C. & E.* Obscure corn-leaf Fungus. (Plate 3, figs. 4–6.) If the lower leaves of corn stalks be examined toward the end of Summer, some of them will be found to be dead and discolored at and near the pointed end. This discoloration is sometimes continuous, involving the whole outer half of the leaf, and sometimes it is interrupted and forms spots of various sizes and shapes. The spots, by increasing in size, become confluent, and thus a leaf at first spotted may soon become uniformly discolored. The discoloration results from the death of the leaf tissues and the destruction of the green coloring matter of the leaf cells, the affected part appearing to the observer like so much dead leaf. The fungus that causes the discoloration is too minute to be easily seen by the unaided eye. But if a hand-glass of moderate magnifying power is brought into use, the surface of the dead spots will appear as if adorned with a slight pubescence or hairiness. With good eyes, well trained, this apparent hairiness can be seen in a favorable light by looking horizontally across the surface of the affected part. By microscopic examination it is found that this appearance is not due to the presence of hairs, but of a minute fungus. Numerous short, stiff, dark-colored articulated threads grow up from the surface, each one of which bears at its apex one or two nearly black spores. These are about as long as the threads and a little thicker. They are generally from thirty-five to forty-five ten-thousandths of an inch long, and about one-seventh or one-eighth as broad. They are divided into several cells by dark transverse partitions. In the original description of the species these partitions are said to vary in number from three to five, but I have generally found them more numerous, running up even to eight or nine. The life history of this fungus has not yet been traced and therefore it is not known where it passes the Winter. The genus to which it belongs takes its name from two Greek words, one of which signifies a worm, and the other, a spore. It was doubtless given because of some fancied or real resemblance between the spores of some species and a worm. The species of Helminthosporium usually inhabit vegetable matter already dead. From the habit the present species has of attacking the lower leaves only, which already have had their vigor impaired by age, and their vitality diminished by partial exclusion from the full rays of the sun, it is quite probable that it never attacks healthy and vigorous leaves, but only those already weak and languishing. In this case it would be but slightly different in its habitat from those species that live on dead vegetable matter, and it could only be said to hasten the death of the leaf by a few days or weeks and therefore should not be regarded as a very noxious fungus. It is not unusual to find another fungus, a species of Macrosporium, associated with it and growing on parts of the leaf that have been dead for some time. This fungus is easily distinguished from the other by its spores which are shorter and comparatively thicker and divided into cells by short, longitudinal as well as transverse partitions.

Puccinia Maydis, *Potsch.* Indian corn Brand. (Plate 3, figs. 7–11.) Frequently in the latter part of the season the corn leaves are affected by a fungus called the Indian corn Brand. Small pustules or tubercles, technically called *sori,* appear on one or both sides of the leaf. Sometimes they are accompanied by a discolored spot, but often there is scarcely any discoloration. The pustules may be few and scattered or numerous and more or less crowded, or even confluent, in which case they form lines or irregular patches. At first these pustules are covered by the thin epidermis of the leaf, but at length this is ruptured, and then the fungus beneath is revealed. Some of the pustules, especially at the time of the earliest appearance of the fungus, are filled with rusty-red globular spores about one one-thousandth of an inch in diameter. This is the Uredo-form or early state of the fungus, for some fungi have different states or forms of development, just as insects do. Other pustules, and a little later in the season all the pustules, contain the true Puccinia or brand-spores. These are nearly or quite black, and before the covering epidermis is ruptured the pustule containing them have a peculiar livid or lead color. The covering of the pustules usually ruptures in a longitudinal direction, that is, lengths wise of the leaf, either through the middle or near one side of the pustule. In the latter case the broad fragment of the epidermis forms a kind of flap that remains and partly covers the cluster of spores. Each pustule contains many spores closely packed together in an upright position. When highly magnified they are found to be two or three times as long as broad, and to have a single transverse partition which divides each spore into two cells nearly equal in size. A pale pedicel of variable length is also attached to the base of each spore. The spores themselves vary in length from sixteen to twenty ten-thousandths of an inch, exclusive of the pedicel. They are very persistent and may still be found in the pustules of old leaves in the Spring of the next year. Thus it appears to be the office of these brand-spores to carry the fungus through the Winter.

The species of Puccinia are very numerous and all inhabit living plants. Most of them, as in the present species, are known to have two or more forms of development. They do more or less injury to their supporting plants, according to the greater or less abundance of the parasite, though they do not usually kill the plant they attack. By interfering with the office of the leaves and abstracting therefrom nourishment that should go to the support of the plant, they must necessarily impair its strength and vigor. Experiments are greatly needed to indicate the best methods of preventing the attack of these fungi on cultivated plants.

Another name, *Puccinia Sorghi*, Schw., is sometimes applied to the fungus under consideration, but as Schweinitz employed it to designate also a fungus found on the leaves of Sorghum, and as I have not been able to ascertain positively whether the Sorghum fungus is really identical with the Indian corn Brand, I have thought it best to employ for this the name *Puccinia Maydis*.

The three fungi already noticed as inhabitants of Indian corn are by no means all the species that attack it in the living state, but they are the most common ones that infest it in this vicinity. One or all of them can be found in almost every corn field in the latter part of the season. Many other species occur on the dead stalks and leaves, especially when left lying in damp places.

Ramularia Fragariæ, *Pk.* Strawberry Ramularia. (Plate 3, figs. 12–15.) It is by no means an unusual thing to find the leaves of strawberry vines, both cultivated and wild, marked with nearly circular spots. These spots have a pale or whitish center in which the leaf tissues appear to be dry and dead. They are not ordinarily much more than an eighth of an inch in diameter, but they are surrounded by a broad border which is dark-red or brownish-red. When the spots are numerous these colored borders run into each other and form discolored patches on the leaf. Sometimes the discoloration runs out to the margin of the leaf in a broad stripe. On the lower surface of the leaf the central part of the spot is not usually as pale as on the upper surface. To an ordinary observer the spots alone are seen. The cause of them remains a mystery. Some have supposed them to be produced by the scalding heat of the sun, others by the stings of insects, and others have intuitively imagined that possibly they might be caused by a fungus, and have alluded to them as the "strawberry rust." A fungus indeed does produce them but it is not a true "rust-fungus." It is one so small and so well protected from observation by the similarity between its own color and the color of the spot that untrained eyes will scarcely detect it. If, however, the white or central part of the spot be examined with a magnifying glass it will generally be found to be frosted over with minute white flocculent tufts or mealy-looking particles. This is the fertile condition of the fungus. It may not always be found in fertile condition. If sterile, nothing but the spot will be seen. The fungus consists of three parts: first, the creeping filaments which permeate the cells of the leaf, destroying their vitality and natural color; second, the minute tufts of short, upright stems, usually simple, but sometimes branched; and third, the long, narrow spores which are borne at the top of the stems. The spores are cylindrical, and about eight or ten times as long as broad. They are generally straight and simple, but occasionally one occurs which is slightly curved or which may be divided near the middle by one or two obscure transverse partitions. The spores and stems make up the minute white flocculent masses seen upon the surface of the spot. The latter are usually a little thicker than the former, but there is not much difference in the length of the two. They are found on both surfaces of the leaf, but are more abundant on the upper surface. The fungus occurs throughout the season, and, so far as my observation goes, it attacks especially those plants that grow in exposed, sunny places, or on dry, light or sandy soils. To what extent the productiveness of the plants is diminished or the quality of the fruit is deteriorated by the attacks of this fungus, I have no data for determining.

The generic name Ramularia is derived from the Latin *ramulus*, a little branch, and has reference to the disposition of the stems to bear branches occasionally. The species inhabit the living leaves of plants and produce spots on them which at once indicate the presence of the fungus. In some species several spores occur on one stem, they being attached end to end like the links of a chain. A species of Ramularia occurs in Europe on the leaves of the Indian strawberry, *Fragaria Indica*, but I have seen no specimens of it. The figure of it in "Fungi Italici" indicates that it has thicker stems than our plant and that they are swollen in the middle and narrower toward each end.

Mucor inæqualis, *Pk.* Black Squash Mold. (Plate 3, figs. 16–18.) This mold attacks squashes and pumpkins in Autumn, or even in Winter, if kept in a warm place. It does not require a very high temperature for its development. The mycelioid threads of the fungus permeate the cells of the squash or pumpkin, producing soft pulpy rotten spots in the flesh. These threads are comparatively coarse and they send off numerous branches in every direction. If their progress is not interrupted they continue to extend themselves until the whole squash is rendered worthless. On the surface or exposed part of the affected places numerous thread-like stems grow up about one-twelfth of an inch high, each one of which bears a minute globose head. These stems and their swollen tips are at first of a milky-white color, the tips shining and appearing somewhat like a drop of dew; but they gradually assume a darker hue and finally become blackish or bluish-black. The growth is often so dense and extensive that to the naked eye it appears like a black felty patch. The stems are generally undivided, but occasionally one is found separating near the base into two branches. The heads contain the spores of the fungus. These are nearly black in color and very unequal in size, a character which suggests the specific name *inæqualis* which has been given to the fungus. The spores vary from two to six ten-thousandths of an inch in length. They are also very variable in shape, some being nearly globose, others broadly elliptical, and others, especially the larger ones, more or less angular or irregular as if they had been so closely crowded in the head as to be pressed out of proper shape. This variable character of the spores, together with the dark color of the plant, serves to distinguish this mold from all other species known to me. Another somewhat similar species attacks the pumpkin occasionally, but its stems are longer and permanently white and its spores are more uniform in size and shape. Several other species attack melons and gourds but all are readily distinguished from the present one. The growth of this mold is very rapid. A piece was cut from a pumpkin infected by the mycelium of its fungus and placed in a warm room. The next day the cut surface was covered with a black patch of the mature mold. It is probable, however, that in a lower temperature its development is less rapid. Obvious methods of checking the spread of the fungus are: first, remove all affected pumpkins or squashes at once from the vicinity of the unaffected ones; second, cut out and destroy all the affected spots as soon as detected; third, keep in as low a temperature as possible without freezing.

Mycologists have instituted two genera of molds that are very closely related. In one, which they call *Mucor*, the globose head that contains the spores bursts irregularly when mature. In the other, which they call *Ascophora*, it collapses or falls down over the top of the stem, and then presents an appearance similar to that of a miniature spread parasol, or of a saucer inverted and supported on a slender stick. In the black squash mold both these characters exist, for sometimes the head collapses and sometimes it bursts irregularly. If young specimens, while yet white, are placed in a warm dry place their further development is sometimes checked and then especially the heads collapse as in *Ascophora*. Thus it will be seen that satisfactory generic characters and generic limits have not yet in all cases been ascertained.

Fusicladium dendriticum, *Wallr*. Apple peel Fungus. (Plate 4, figs. 1–3.) Probably every one has observed the small, round, blackish spots common on apples, but perhaps not every one is aware of the cause of them. These spots are not always uniform in color, but are varied by lighter and darker patches or circles. They often have a cracked or scaly appearance. Sometimes they are bare and nearly smooth and then they have a dull reddish tint, but generally they have a blackish or blackish-brown color, more or less tinged with gray or dark-green. They are generally from one-eighth to one-fourth of an inch in diameter, but sometimes they are even larger. There may be but one or two on an apple, but usually they are more numerous, sometimes even so numerous and close that two or more run together. When examined microscopically it is found that they are produced by a fungus, whose dense stratum of threads and spores gives a somewhat velvety appearance to the surface. The fungus develops beneath the epidermis or thin outer skin of the apple, which at length ruptures, breaking up in small flakes or fragments which remain attached for some time, giving a grayish tint to the spot. The margin is generally well defined but minutely irregular. It may be either darker-colored or paler than the center. The threads and spores are colored and very variable, scarcely any two being exactly alike. Some of the threads are long and prostrate, others short and upright. The spores vary from subglobose to elliptical, fusiform, oblong or narrowly pyriform. They are generally simple, but sometimes when old they are divided by a single transverse septum or partition. Occasionally they contain one or more nuclei or shining oil globules. The fungus does not affect the apple deeply, its injury being limited to the surface. It is all taken off with the peel and does not detract materially from the weight or quality of the flesh. Still it injures the appearance of the fruit, and possibly in this way affects the sale of it. It is said that it sometimes opens the way for the attack of other fungi by cracking the epidermis of the apple, but this is not a common result. All varieties of apples are not equally subject to its attacks. Common fruit and especially that growing on trees in the borders of woods seems more liable to its attacks than fruit on thrifty, well-cultivated trees. This fungus with us occurs most frequently on apples, but its habitat is not limited to them. It sometimes appears also on apple leaves, and on pears and pear leaves and young twigs which it sometimes seriously injures. It has also been found in Europe, on thorns, particularly the evergreen thorn, *Cratægus pyracantha*. In consequence of this variety in its habitat it is not surprising that it has received a variety of names. *Spilocæa Pomi*, Fr., *Helminthosporium Pyrorum*, Desm., *Cladosporium Pyrorum*, Berk., *Cladosporium dendriticum*, Wallr., *Cladosporium orbiculatum*, Desm., *Actinonema Cratægi*, P. & A., *Actinonema Pomi*, Lev., and *Phlyctidium Cratægi*, Wallr., are some of the synonyms that have been at one time or another applied to the forms of this fungus.

Penicillium glaucum, *Grev.* Crustaceous Mold. (Plate 4, figs. 4–10.) Soft decaying spots, of a peculiar brown color, somewhat resembling that of dead leaves, often make their appearance on apples, especially if they are stored in a warm place. Frequently a species of mold develops on these spots. At first minute white tufts appear but they soon acquire a pale bluish-green color, which is indicated botanically by the word "glaucous." These tufts are usually about as large as the head of an ordinary pin. Generally they become so numerous and so closely crowded together that they form a continuous patch or crust, which would render the name "crustaceous mold" appropriate, although this name was probably suggested originally by the patches, sometimes formed by the sterile threads of the fungus. If the decayed portion of the apple be examined microscopically, numerous slender fungoid filaments will be found running through it in every direction. These are the mycelium of the fungus, the immediate cause of the rot. As the roots of a tree absorb nourishment from the soil that surrounds them, so the threads of this fungus absorb their nourishment from the apple cells that surround them. They spread more or less rapidly till the whole apple is rendered worthless. When they come to the surface or reach an air cavity, such as exists about the seeds, they send up fruiting stems if the conditions are favorable. These stems are delicate jointed threads which give out near the top one or more pairs of short opposite branches, which are themselves once or twice forked. Each ultimate branchlet bears at its tip a string of spores, looking much like a string of minute beads. The branches are so short that they are scarcely visible unless highly magnified They with their strings of spores resemble a minute inverted tassel. The strings of spores are so numerous that they give a dusty appearance to the fungus and often hide from view the threads that support them. Their attachment to the branchlets and to each other is very slight and easily broken. Even a drop of water spreading itself on the slide of the microscope will separate them if it comes in contact with them. A slight breath of wind is enough to scatter them far and wide. The separate spores are globular and range from twelve to twenty one-hundred thousandths of an inch in diameter. Five thousand of the largest ones could be placed in a line in the space of one inch.

As has already been intimated, the fertile threads often grow in clusters or tufts. Sometimes these tufts are so compact and the threads that compose them are so closely united that it is not possible to distinguish them easily. They appear to form a single white stem crowned with a mass of spores. This form of the fungus is represented in fig. 7. It was at one time thought to be, not merely a distinct species, but a distinct genus, and was named *Coremium lencopus* (the white stemmed *Coremium*) by Persoon. It was also called *Floccaria glauca* by the celebrated Greville. It is now regarded simply as a variety of the crustaceous mold and takes the name variety *Coremium.* Sometimes the fertile threads go to the other extreme and become excessively loose and elongated in their mode of growth and send off a few fertile branches as represented in fig. 8.

Although so commonly found on decaying apples, this fungus is not limited to that habitat. It occurs also on pears and other fruits and various decaying vegetable substances.

Besides the synonyms already given, *Byssus scoparia,* Fl. Dan., and *Penicillium crustaceum,* Fr., may be mentioned.

Oidium fructigenum, *Knz. and Schm.* Fruit Oidium. (Plate 4, figs. 11–15.) Small, mealy-looking cushions or pustules sometimes occur on the surface of apples. Single ones are scarcely larger than the head of an ordinary pin, but sometimes two or more occur so near each other that they appear to run together and form larger and irregular masses. Their color is not very decided, but it is generally a dingy-white or grayish-yellow or a brownish-yellow, with a slight tinge of red. When very old they sometimes assume a blackish tint. They break out over a part or even over the whole surface of the apple, and are said to be more abundant in dry than in wet seasons. The external visible part of the fungus consists of short more or less densely tufted threads, each one surmounted by a string of spores. These are somewhat elliptical or egg-shaped, from which feature the generic name appears to have been derived. As in most species whose spores are produced in necklace-shaped strings the spores readily separate from each other. In this fungus they are much larger than in the crustaceous mold already noticed. The fungus attacks also pears, peaches, plums, etc., and is therefore appropriately called the "fruit Oidium." With us it is especially common on plums. It does not always wait for the fruit to fall from the tree, but often attacks it while yet attached to the branches. Dried and withered plums yet dotted with the fungus cushions may sometimes be found still hanging on the trees in the spring of the year. It is even claimed by one writer that fruit is preserved by this fungus rather than destroyed. But my observations indicate that it does not preserve in an uninjured and pure condition. It first produces a kind of rot in the fruit, a "dry rot" perhaps it may be called. It is perhaps less pulpy and soft than the rot produced by some fungi, but the flesh becomes discolored and changed under the influence of the mycelium. Some experiments illustrative of this were made by the writer with peaches.

On September 25th spores of the fungus were planted on a sound peach in three places; on the rind, on the scar that marks its place of attachment to the branch, and on the flesh which had been exposed by cutting away a minute portion of the rind. Those planted on the scar were at the same time moistened by a drop of water.

On the next day there was a slight discoloration about the scar. A small portion of the exposed flesh being examined it was found that the spores had germinated and had commenced sending out their threads or mycelium. No change was observed where spores had been sown on the rind.

On the 27th the discoloration about the scar had increased in extent, and the spot where the spores had been planted on the flesh was surrounded on all sides by a rot-discoloration one-fourth of an inch broad. Nothing has yet come of the spores planted on the rind, nor did they appear afterward to produce any effect. On the 28th both rot spots had increased in size, and the flesh wound where the spores were planted was covered with a fine crop of the Oidium. On the 30th the two rot spots had run together and the scar was also covered with the oidium. Oct. 1st, nearly the whole peach was discolored. Oct. 2d, the whole peach was discolored and the Oidium had broken out in one new spot.

Sept. 27. A hard, sound peach was inoculated in two places by making slight incisions under the rind, inserting in them the spores of the Oidium and then pressing down the rind closely in its original place, to shut off as much as possible exposure to the external air. Spores were also planted on the uninjured rind and moistened with water. On the next day the places of inoculation were surrounded by discolored rot spots. No change appeared where the spores were planted on the rind, nor did these spores afterward produce any effect. Sept. 30th. The two rot spots about the places of inoculation have run together and now occupy about one-half the peach. Oct. 1st. The rot has extended and reached the stem-scar of the peach, and there a nice crop of the Oidium has made its appearance. No Oidium has appeared in the two places of inoculation. Oct. 2d. The rot has extended and the Oidium has broken out in a new place on the part of the peach opposite the stem-scar.

Sept. 27. A hard, sound peach was cut into halves and the Oidium spores were planted in a small spot in the cut flesh of one of the halves. On the 28th there was a discolored spot about the place where the spores were planted, but not elsewhere. The 29th, being Sunday, no observation was taken. On the 30th about one-third of the cut surface was discolored, the discoloration being only on the side where the spores were planted. Also the Oidium has appeared. Oct. 1st. The discoloration has extended and more Oidium has developed. Oct. 2d. The discoloration has extended but little, probably from lack of moisture, as the peach is becoming dry. The unplanted side is still unharmed, though considerably dried.

From these three simple experiments the following deductions are made: First, the Oidium does produce a kind of rot in the peach; Second, the spores do not affect the peach when planted on the uninjured skin or rind; Third, when planted on the freshly-exposed flesh they germinate most readily and reproduce themselves in about three days. These results might possibly be somewhat modified if the experiments were made on other fruits, but essentially I believe they would only be confirmed.

The names that have been applied to this fungus by mycologists at different times are numerous. Among them are *Torula fructigena*, Pers., *Oospora candida,* Wallr., *Oidium Wallrothii,* Thum., *Monilia fructigena,* Sacc., *Acrosporium fructigenum,* Pers., and *Oidium laxum,* Ehr.

Sphæropsis malorum, *Berk.* Apple Sphæropsis. (Plate 4, figs. 16–21.) It is not an uncommon thing to find apples in Autumn lying under the trees of the orchard and discolored by an incipient decay. Sometimes this discoloration is seen in them while yet hanging on the trees. It is the work and earliest manifestation of the presence of a fungus, distinct from those already noticed. It has the usual brown hue of decay produced by the mycelium of some other apple-infesting fungi, and it is not easy to say just what fungus is causing the decay until the fertile condition of the parasite makes its appearance. In this case the discoloration is soon followed by the appearance of numerous minute black pimples or pustules. These are at first covered by the thin epidermis, but soon this is ruptured and the black, somewhat conical protuberance beneath is revealed. This is the spore-case of the fungus. In due time it contains a cluster of spores which are generally about twice as long as broad, and which range from eight to twelve ten-thousandths of an inch in length. They are at first pale in color and supported on a short stem or pedicel, but when mature they become black or blackish-brown, separate from their pedicels and escape through a minute aperture at the apex of the spore-case. The spores are not always developed as soon as the spore-cases appear. Sometimes fertile spore-cases are found in Winter or even in the following Spring. The specific part of the name of this fungus, *Sphæropsis malorum,* is derived from the Latin *mala,* a word meaning apples.

The generic name is suggested by the resemblance these fungi have to species of Sphæria. There is another genus called Diplodia which scarcely differs from Sphæropsis in any respect except that its spores are divided in the middle by a transverse septum. In some instances this mark of distinction between the two genera fails, for both divided and undivided spores may be found in the same spore-case. And even both so-called genera are now regarded by excellent mycologists as mere forms or states of more highly developed fungi. For other remarks concerning this fungus see Thirty-first Report, page 20.

(1.)

PLANTS MOUNTED.

Not new to the Herbarium.

Thalictrum diocium	*L.*	Proserpinaca palustris	*L.*
Actæa alba	*Bigel.*	Cornus circinata	*L'Her.*
Viola Selkirkii	*Goldie.*	Dipsacus sylvestris	*Mill.*
Hypericum mutilum	*L.*	Aster dumosus	*L.*
Linum striatum	*Walt.*	A. ericoides	*L.*
Vitis riparia	*Mx.*	A. Tradescanti	*L.*
Euonymus Americana	*L.*	Solidago altissima	*L.*
Trifolium repens	*L.*	S. gigantea	*Ait.*
Lespedeza reticulata	*Pers.*	Polymnia Canadensis	*L.*
Desmondium rotundifolium	*D. C.*	Hieracium venosum	*L.*
Ribes hirtellum	*Mx.*	Vaccinium Pennsylvanicum	*Lam.*
R. rotundifolium	*Mx.*	Gerardia tenuifolia	*Vahl.*

Monarda fistulosa	L.
Lophanthus nepetoides	Benth.
Lycopus Europæus	L.
Polygonum Hartwrightii	Gr.
Quercus prinoides	Willd.
Potamogeton natans	L.
P. amplifolius	Tuckm.
P. hybridus	Mx.
P. gramineus	L.
Pogonia verticillata	Nutt.
Triglochin palustre	L.
Juncus Canadensis	J. Gay
Cyperus dentatus	Torr.
Eleocharis olivacea	Torr.
Carex polytrichoides	Muhl.
C. straminea	Schk.
C. tentaculata	Muhl.
C. lagopodioides	Schk.
C. intumescens	Rudge.
Hordeum vulgare	L.
Spartina alterniflora	Loisel.
Danthonia compressa	Aust.
Panicum proliferum	Lam.
P. sanguinale	L.
Tricuspis seslerioides	Torr.
Equisetum arvense	L.
Woodsia obtusa	Torr.
Pellæa atropurpurea	Lk.
Cladonia papillaria	Hoffm.
Polyporus hirsutus	Fr.
P. zonatus	Fr.
P. vulgaris	Fr.
Irpex lacteus	Fr.
Clavaria aurea	Schæff.
Thelephora terrestris	Fr.
T. laciniata	Pers.
Stereum ochraceoflavum	Schw.
Puccinia Menthæ	Pers.
Uromyces solida	B. & C.
Peronospora alta	Fckl.
Microsphæria Vaccinii	C. & P.
Helotium citrinum	Batsch.
Triblidium hiascens	B. & C.
Hypoxylon concentricum	Grev.
Diatrype quadrata	Schw.
Valsa leucostoma	Fr.
V. rugiella	C. & E.
Sphærella spleniata	C. & P.

New to the Herbarium.

Ranunculus Ficaria	L.
Lechea racemulosa	Mx.
L. tenuifolia	Mx.
Portulaca grandiflora	Hook.
Fragaria Indica	L.
Ribes Grossularia	L.
Diodia teres	Walt.
Eclipta procumbens	Mx.
Rudbeckia triloba	L.
Tecoma radicans	Juss.
Veronica Buxbaumii	Tenore.
Mentha rotundifolia	L.
Salvia Sclarea	L.
Heliotropium Europæum	L.
Rumex maritimus	L.
Alnus glutinosa	Gærtn.
Potamogeton Robbinsii	Oakes.
Spiranthes simplex	Gr.
Epipactes helleborine v. viridans	Irm.
Hemerocallis fulva	L.
Tripsacum dactyloides	L.
Glyceria obtusa	Trin.
Muhlenbergia sobolifera	Trin.
Asplenium Bradleyi	Eaton.
Cladonia Boryi	Tuckm.
Vaucheria velutina	Ag.
Agaricus solitarius	Bull.
A. strobiliformis	Vitt.
A. rhagadiosus	Fr.
A. candicans	Pers.
A. vilescens	Pk.
A. compressipes	Pk.
A. trullisatus	Ellis.
A. confluens	Pers.
A. Iris	Berk.
A. scabrinellus	Pk.
A. curvipes	Fr.
Cortinarius subsiccus	Pk.
C. tophaceus	Fr.
C. pulchrifolius	Pk.
C. rubrocinereus	Pk.
C. uliginosus	Berk.
C. croceoconus	Fr.
C. sericipes	Pk.
C. basalis	Pk.
Russula fragilis	Fr.
Cantharellus brevipes	Pk.
Panus lævis	B. & C.
P. dealbatus	Berk.
Boletus Frostii	Russ.
Polyporus chioneus	Fr.
P. floccosus	Fr.
Stereum neglectum	Pk.
Clavaria miniata	Berk.
Cyphella caricina	Pk.
Hymenula hysteroides	Pk.
Simblum rubescens	Ger.
Physarum mirabile	Pk.
Cribraria argillacea	Pers.
Leptothyrium punctiforme	B. & C.
L. dryinum	Sacc.
Phoma lineolatum	Desm.
P. hysteriellum	P. & C.
P. longipes	B. & C.
P. Phytolaccæ	B. & C.
Sphæropsis phomatella	Pk.
S. cerasina	Pk.
S. abundans	Pk.
S. celastrina	Pk.
S. seriatus	Pk.
S. smilacina	Pk.
S. brunneola	B. & C.
Hendersonia abnormalis	Pk.
H. Coluteæ	P. & C.
Cytispora minuta	Thum.
Asterosporium betulinum	Pk.

Coryneum pustulatum	*Pk.*
Melanconium cerasinum	*Pk.*
Synphragmidium effusum	*Pk.*
Gymnosporium variabile	*Pk.*
Torula uniformis	*Pk.*
Glæosporium Hepaticæ	*Pk.*
G. salicinum	*Pk.*
G. Laporteæ	*Pk.*
Septoria pastinacina	*Pk.*
S. increscens	*Pk.*
S. Gei	*R. & D.*
S. Ostryæ	*Pk.*
S. Aceris	*B. & Br.*
S. Mori	*Lev.*
S. Ludwigiæ	*Cke.*
S. lythrina	*Pk.*
S. Urticæ	*Desm.*
S. atropurpurea	*Pk.*
S. hedeomina	*Pk.*
S. cornicola	*Desm.*
Protomyces fuscus	*Pk.*
Puccinia Ellisiana	*Thum.*
Melampsora Hartigii	*Thum.*
Cronartium asclepiadeum	*Fr.*
Rœstelia Ellisii	*Pk.*
Æcidium cimicifugatum	*Schw.*
Stilbum pruinosipes	*Pk.*
Periconia parasitica	*Pk.*
Tubercularia Celastri	*Schw.*
Hèlicosporium cinereum	*Pk.*
Helminthosporium pruni	*B. & C.*
Alternaria chartarum	*Preuss.*
Macrosporium Meliloti	*Pk.*
Polyactis Streptothrix	*C. & E.*
Pyricularia grisea	*Sacc.*
Oidium irregulare	*Pk.*
Ramularia Armoraciæ	*Fckl.*
R. Dulcamaræ	*Pk.*
R. Celastri	*Pk.*
R. Mitellæ	*Pk.*
Cercospora Nymphæacea	*C. & E.*
C. elongata	*Pk.*
C. Caulophylli	*Pk.*
C. Eupatorii	*Pk.*
C. griseëlla	*Pk.*
Cercospora zebrina	*Sacc.*
C. Smilacis	*Thum.*
C. squalidula	*Pk.*
C. Sanguinariæ	*Pk.*
C. althæina	*Sacc.*
Peronospora obducens	*Schr.*
Microstroma leucosporum	*Niessl.*
Fusisporium Solani	*Mart.*
Helvella palustris	*Pk.*
Peziza multipuncta	*Pk.*
P. mycogena	*Ellis.*
P. floriformis	*Pk.*
P. regalis	*C. & E.*
P. luteodisca	*Pk.*
P. subvernalis	*Pk.*
Patellaria Hamamelidis	*Pk.*
Helotium pallescens	*Fr.*
H. vitigenum	*De Not.*
H. affinissimum	*Pk.*
Cenangium Viburni	*Schw.*
Caliciopsis pinea	*Pk.*
Taphrina alnitorqua	*Tul.*
Hysterium gramineum	*M. & N.*
Nectria dematiosa	*Schw.*
Xylaria bulbosa	*Pers.*
Hypoxylon Blakei	*B. & C.*
Eutypa subtecta	*Fr.*
Diatrype nigrospora	*Pk.*
D. strumella	*Fr.*
Valsa compta	*Tul.*
V. aurea	*Fckl.*
V. paucispora	*Pk.*
V. Prunicola	*Pk.*
V. tessera	*Fr.*
V. Carpini	*Pers.*
V. Abietis	*Fr.*
V. acrocystis	*Pk.*
Cucurbitaria longitudinalis	*Pk.*
Sphæria pulveracea	*Ehrh.*
S. pulviscula	*Curr.*
S. capillifera	*Curr.*
Sphærella recutita	*Fr.*
S. conigena	*Pk.*
S. depressa	*Pk.*

(2.)

PLANTS COLLECTED.

Not new to the Herbarium.

Clematis verticillaris	*D. C.*
Ranunculus Pennsylvanicus	*L.*
Nuphar advena	*Ait.*
N. lutea	*Sm.*
Nymphæa odorata	*Ait.*
Cardamine hirsuta	*L.*
Sisymbrium officinale	*Scop.*
Lepidium ruderale	*L.*
Raphanus sativus	*L.*
Malva rotundifolia	*L.*
Vitis æstivalis	*Mx.*
Acer Pennsylvanicum	*L.*
Rubus odoratus	*L.*
R. villosus	*Ait.*
Rosa Carolina	*L.*
R. lucida	*Ehrh.*
Ribes rotundifolium	*Mx.*
R. prostratum	*L'Her.*

Epilobium angustifolium..... *L.*
E. coloratum......... *Muhl.*
Aralia hispida .... *Mx.*
Sambucus pubens............ *Mx.*
Viburnum nudum............ *L.*
Aster corymbosus............ *Ait.*
A. cordifolius............ *L.*
A. multiflorus............ *Ait.*
A. Tradescanti............ *L.*
A. longifolius............ *Lam.*
A. puniceus............... *L.*
A. acuminatus.......... *Mx.*
Solidago latifolia............. *L.*
S. serotina............. *Ait.*
Bidens connata............... *Muhl.*
B. cernua................ *L.*
Artemisia Canadensis .... *Mx.*
Lactuca sanguinea........... *Bigel.*
Campanula rotundifolia...... *L.*
Plantago major.............. *L.*
Verbascum Blattaria. .... *L.*
Mimulus ringens............ *L.*
Mentha piperita.............. *L.*
M. Canadensis........... *L.*
Lycopus Virginicus .... *L.*
Scutellaria lateriflora........ *L.*
Echium vulgare............ *L.*
Origanum vulgare............ *L.*
Polygonum amphibium....... *L.*
Euphorbia maculata.......... *L.*
E. hypericifolia ...... *L.*
Humulus Lupulus............ *L.*
Juglans nigra................ *L.*
Taxus Canadensis.... .... *Willd.*
Sparganium simplex .... *Huds.*
Potamogeton Claytonii........ *Tuckm.*
P. amplifolius...... *Tuckm.*
P. gramineus...... *L.*
P. lucens.......... *L.*
P. pusillus ... . *L.*
Sagittaria variabilis .... *Engelm.*
Lilium Philadelphicum....... *L.*
Juncus tenuis... .... *Willd.*
Carex stipata............... *Muhl.*
C. stellulata............... *L.*
C. scoparia............... *Schk.*
C. cristata............... *Schw.*
C. straminea............... *Schk.*
C. gynandra............... *Schw.*
C. formosa............... *Dew.*
C. virescens............... *Muhl.*
C. triceps .. .. *Mx.*
C. laxiflora............... *Lam.*
C. debilis............... *Mx.*
C. flava .... *L.*
C. tentaculata............ *Muhl.*
C. oligosperma............ *Mx.*
Leersia Virginica..... .... *Willd.*
L. oryzoides.............. *Swartz.*
Agrostis perennans........... *Tuckm.*
A. scabra................ *Willd.*
A. vulgaris.............. *With.*
A. alba.................. *L.*

Muhlenbergia Mexicana...... *Trin.*
M. sylvatica............... *T. & G.*
Dactylis glomerata........... *L.*
Eatonia obtusata............. *Gr.*
E. Pennsylvanica......... *Gr.*
Glyceria Canadensis.......... *Trin.*
G. nervata............... *Trin.*
G. pallida................ *Trin.*
G. fluitans............ .. *R. Br.*
G. acutiflora.............. *Torr.*
Poa serotina................. *Ehrh.*
P. pratensis............... *L.*
P. alsodes .... *Gr.*
Festuca elatior......... ..... *L.*
F. nutans............... *Willd.*
Triticum repens.......... ... *L.*
Elymus Canadensis..... ..... *L.*
Anthoxanthum odoratum..... *L.*
Phalaris arundinacea......... *L.*
Panicum agrostoides .... *Spreng.*
P. dichotomum............ *L.*
P. depauperatum...... ... *Muhl.*
Setaria viridis ... . *Beauv.*
Equisetum limosum .... *L.*
E. sylvaticum............ *L.*
Pteris aquilina............... *L.*
Asplenium Filixfœmina ...... *Bernh.*
Phegopteris polypodioides... *Fee*
P. hexagonoptera......... *Fee.*
Aspidium Noveboracense..... *Sw.*
A. aculeatum... .... *Sw.*

New to the Herbarium.

Carum Carui................. *L.*
Potamogeton rufescens....... *Schrad.*
Carex adusta .... *Boott.*
C. glaucodea............ .... *Tuckm.*
Triticum violaceum.......... *Hornem.*
Nitella opaca .... *Ag.*
N. intermedia .... *Nordst.*
Agaricus ornellus............ *Pk.*
Hygrophorus limacinus....... *Fr.*
Polyporus croceus............ *Fr.*
P. undosus............... *Pk.*
P. semipileatus........... *Pk.*
Irpex viticola............... *C. & P.*
Pterula densissima........... *B. & C.*
Tremella subochracea......... *Pk.*
T. epigæa................ *B. & Br.*
Grandinia crustosa........... *Fr.*
Hymenula vulgaris..... ..... *Fr.*
Arcyria macrospora........... *Pk.*
Cribraria dictydioides..... *Cke. & Balf*
Hendersonia Cydoniæ......... *C. & E.*
Phyllosticta Sambuci......... *Desm.*
P. Grossulariæ............ *Sacc.*
P. Nesææ............... *Pk.*
Septoria Galeopsidis... ...... *West.*
S. Hydrocotyles........... *Desm.*
S. Violæ........ .... *West.*
S. Cucurbitacearum........ *Sacc.*
S. corylina............... *Pk.*
S. betulicola.............. *Pk.*

Septoria microsperma	*Pk.*	Ramularia rufomaculans	*Pk.*
S. Pileæ	*Thum.*	R. sambucina	*Pk.*
Septoglœum Apocyni	*Pk.*	R. Impatientis	*Pk.*
Vermicularia circinans	*Berk.*	R. Rudbeckii	*Pk.*
Morthiera Thumenii	*Cke.*	Monilia Harknessii	*Pk.*
Pestalozzia Stevensonii	*Pk.*	Colletotrichum lineola	*Cd.*
Puccinia Thalictri	*Chev.*	Sporocybe nigriceps	*Pk.*
P. Cirsii	*Lasch.*	Macrosporium concinnum	*Berk.*
P. simplex	*Pk.*	Helminthosporium Tiliæ	*Fr.*
Protomyces polysporus	*Pk.*	H. inconspicuum	*C. & E.*
Rœstelia penicillata	*Rabh.*	H. arbusculoides	*Pk.*
Aspergillus phæocephalus	*D. & M.*	H. septemseptatum	*Pk.*
A. clavellus	*Pk.*	Zygodesmus bicolor	*C. & E.*
Fusisporium tenuissimum	*Pk.*	Rhinotrichum subalutaceum	*Pk.*
Diplocladium minus	*Bon.*	Periconia sphærophila	*Pk.*
Verticillium candidum	*Pk.*	Graphium gracile	*Pk.*
Septocylindrium Ranunculi	*Pk.*	Peziza hydrophila	*Pk.*
Cercosporella reticulata	*Pk.*	P. fusarioides	*Berk.*
Cercospora clavata	*Ger.*	P. atrata	*Fr.*
C. venturioides	*Pk.*	P. balsamicola	*Pk.*
C. Bœhmeriæ	*Pk.*	Hypoxylon marginatum	*Schw.*
C. Acalyphæ	*Pk.*	Diatrypella angulata	*Fr.*
C. circumscissa	*Sacc.*	Dothidea melanoplaca	*Desm.*
C. beticola	*Sacc.*	Valsa myinda	*C. & E.*
C. Violæ	*Sacc.*	Lophiostoma angustilabrum	*B. & Br.*
C. depazeoides	*Sacc.*	Meliola balsamicola	*Pk.*
Ramularia Spirææ	*Pk.*	Sphærella Leersiæ	*Pass.*

(3.)

CONTRIBUTORS AND THEIR CONTRIRUTIONS.

Julia S. Hoag, Albany, New York.

Euthora cristata	*Ag.*	Delesseria alata	*Lamour.*
Ptilota serrata	*Harv.*		

Professor J. Hall, Albany, New York.

Polyporus squamosus	*Fr.*

Professor J. S. St. John, Albany, New York.

Thalictrum anemonoides	*Mx.*	Nelumbium luteum	*Willd.*

Professor A. N. Prentiss, Ithaca, New York.

Geaster mammosus	*Chev.*	Helicomyces mirabilis	*Pk.*
Stemonitis Morgani	*Pk.*	Peziza aurelia	*Pers.*
Arcyria macrospora	*Pk.*	Diatrype punctulata	*B. & R.*
Lamproderma iridea	*Cke.*	Zasmidium cellare	*Pers.*

Isaac Coles, Glen Cove, New York.

Triosteum angustifolium	*L.*	Trillium er. var. declinatum	*Gr.*
Galium verum	*L.*		

E. C. Howe, M. D., Yonkers, New York.

Carex Sullivantii	*Boott.*	Polypogon Monspeliensis	*Desf.*

W. R. Gerard, New York City, New York.

Æcidium pedatatum	*Schw.*

I. C. Martindale, Camden, New Jersey.

Quercus heterophylla	*Mx.*

W. Barbeck, Philadelphia, Pa.

Chondrioderma floriforme	*Bull.*	Cribraria dictydioides	*Cke. & Balf*
Physarum leucophæum	*Fr.*		

C. J. Sprague, Boston, Mass.

Hirneola Auricula-Judæ	*Berk.*

E. W. Holway, Decorah, Iowa.

Æcidium Periclymeni	*D. C.*	Æcidium Xanthoxyli	*Pk.*
Æ. albescens	*Grev.*		

J. B. Ellis, Newfield, N. J.

Sporidesmium Rauii	*Ellis.*	Helicosporium auratum	*Ellis.*
Cercospora graphioides	*Ellis.*	H. thysanophorum	*E. & H.*
Menispora glauconigra	*C. & E.*	Gonytrichum subroseum	*Ellis.*
Dendryphium Harknessii	*Ellis.*	Arthrosporium compositum	*Ellis.*
Penicillium repens	*C. & E.*	Ascomyces anomalus	*E. & H.*
Zygodesmus bicolor	*C. & E.*		

Rev. H. Wibbe, Oswego, N. Y.

Coreopsis discoidea	*T. & G.*	Eleocharis quadrangulata	*B. Br.*
Lamium maculatum	*L.*		

Geo. Martin, M. D., Westchester, Pa.

Agaricus laccatus	*Scop.*	Stereum complicatum	*Fr.*
A. subochraceus	*Pk.*	Peridermium Pini	*Chev.*
A. sapineus	*Fr.*	Uromyces Martinii	*Far.*
Lenzites sepiaria	*Fr.*	Cryptosporium acicolum	*Thum.*
Trametes hydnoides	*Fr.*	Meliola amphitricha	*Fr.*
Polyporus sanguineus	*Fr.*	Capnodium elongatum	*B. & D.*

J. D. Trask, M. D., Astoria, N. Y.

Agaricus spectabilis	*Fr.*

H. W. Harkness, M. D., Sacramento, Cal

Daedalea vorax	*Hark.*	Coniothecium irregulare	*Pk.*
Monilia Ellisii	*Hark.*	Zygodesmus granulosus	*Pk.*
Helicosporium Mulleri	*Cd.*	Z. atroruber	*Pk.*
Rhinotrichum repens	*Preuss.*	Patellaria indigotica	*C. & P.*
Trichægum atrum	*Preuss.*	Hypoxylon discretum	*Schw.*

Prof. W. G. Farlow, Cambridge, Mass.

Podisoma macropus	*Schw.*	Gymnosporangium biseptatum	*Ellis.*
P. clavariæforme	*D. C.*	Basidiospora entospora	*Cornu.*
P. fuscum	*Duby.*		

(4)

PLANTS NOT BEFORE REPORTED.

Triosteum angustifolium, *L.* Manhasset and Glen Cove, Long Island. *I. Coles.*

Coreopsis discoidea, *T. & G.* Borders of Lily pond near Oswego. *Rev. J. H. Wibbe.*

Lamium maculatum, *L.* Roadsides west of Oswego. *Wibbe.*

Potamogeton rufescens, *Schrad.* Edmonds ponds, Adirondack mountains. July. A few plants were found growing in water one to two feet deep, but most of them grow where it was three or four feet deep. In the latter the leaves are more distant than in the former. A few of the lower ones are obtuse, the others are acute. They are brownish-green in color and have two or three faint veins each side of the midrib. These are connected by transverse veinlets. The stems were not at all branched but in some instances they had sent out runners from the base and had thus given rise to new plants. Neither petiolate nor floating leaves were seen. The dry fruit has a deep impression or pit on each side. This is *Potamogeton obrutus,* Wood.

Eleocharis quadrangulata, *R. Br.* "Paddy lake," South Scriba, Oswego county. *Wibbe.* This is a rare plant. In the Manual the outlet of Oneida lake is given as a station for it and in the Beck Herbarium a specimen is labeled N. Salem pond, Westchester county.

Carex adusta, *Boott.* Rocky woods, Stissing mountain, Dutchess county. June. In some of the specimens all the spikes were sterile.

Carex glaucodea, *Tuckm.* Stissing mountain. June.

Carex Sullivantii, *Boott.* Yonkers. *E. C. Howe.* Dr. Howe informs me that he regards this plant as a hybrid between *C. pubescens* and *C. arctata.*

Polypogon Monspeliensis, *Desf.* Yonkers. *Howe.*

Triticum violaceum, *Hornem.* Rocky places and mountain precipices. Stissing mountain and Adirondack mountains. June and July I have seen no specimens with purplish or violet-tinged spikes. The lower sheaths are sometimes slightly hairy or downy. The awns vary in length and when long they sometimes curve outward.

Nitella opaca, *Ag.* Edmonds ponds. July. The specimens are referred to this species because of their diœcious character. Their general appearance is remarkably like that of *N. flexilis.* But few fertile plants were seen.

Nitella intermedia, *Nordst.* Sandy shore of Lake Sanford, Adirondack mountains. Aug. The specimens are small but apparently belong to this species.

Agaricus spectabilis, *Fr.* Long Island. *J. D. Trask.*

Agaricus (Hypholoma) ornellus, *n. sp.* Pileus convex or nearly plane, slightly squamose, reddish-brown tinged with purple, the margin paler, floccose-appendiculate; lamellæ moderately close, yellowish or pallid, becoming brown; stem equal or slightly thickened upward, solid, squamulose, pale-yellow, sometimes expanded at the base into a brownish disk margined with yellowish filaments; spores brown, elliptical, .00025 in. to .0003 in. long, .00016 in. to .0002 in. broad. Plant 1 in. to 2 in. high, pileus about 1 in. broad, stem 1 line to 1.5 lines thick. Decaying wood. South Ballston, Saratoga county. Oct. The scales of the pileus are sometimes arranged in concentric circles. The purplish tint is not always uniform but in some instances forms spots or patches.

Hygrophorus limacinus, *Fr.* Thin woods and open places. North Greenbush. Oct.

Polyporus croceus, *Fr.* Decaying oak wood. Catskill mountains. Aug.

Polyporus undosus, *n. sp.* Effuso-reflexed, carnose-fibrous, soft but rather tough; pileus thin, undulate, narrow, rugose-tomentose, obscurely sulcate-zonate, whitish or alutaceous; pores long, medium size, unequal, angular, white, the dissepiments thin, dentate, in oblique situations elongate, lacerate; mycelium white. Decaying trunks of hemlock, *Abies Canadensis.* Catskill mountains. Aug. This Polyporus is apparently related to *P. destructor.* It is often entirely resupinate. The pileus is narrow, scarcely exceeding half an inch in breadth, but it is frequently two or three inches long. It is generally distinctly wavy or almost complicate after the manner of *Stereum complicatum.* The substance is soft when fresh but becomes hard in drying. The pores are much longer than the thickness of the pileus which is at first slightly fibrillose-tomentose.

Polyporus semipileatus, *n. sp.* Suborbicular, narrowly reflexed above, subvillose, whitish or alutaceous; pores short, minute, rotund, white, with thin acute dissepiments. Bark of dead maple, *Acer spicatum.* Catskill mountains. Aug. Related to *P. semisupinus,* B. & C. The effused or resupinate part of the fungus is usually about one inch in diameter. The pileus or reflexed part is scarcely half an inch broad. The pores are so minute that they are scarcely visible to the naked eye. Both this and the preceding species belong to the section Anodermei.

Irpex viticola, *C. & P. n. sp.* Resupinate, suborbicular or confluent in long patches, the margin usually definite and slightly reflexed, subcinereous; teeth compressed, subincised, acute or obtuse, whitish or pallid. Dead grape vines. North Greenbush. July.

Grandinia crustosa, *Fr.* Decaying wood and bark. Helderberg mountains. Nov.

Pterula densissima, *B. & C.* Decaying wood. Helderberg mountains. Nov.

Tremella epigæa, *B. & Br.* Catskill mountains. The habitat of this species is the ground, but our specimens were growing on the hymenium of and old Polyporus near the ground.

Tremella subochracea, *n. sp.* Small, two to four lines in diameter, forming interrupted or anastomosing lines or patches, gyrose-plicate, pale-ochraceous, becoming darker in drying; spores oblong or oblong-pyriform, slightly curved at the small end, colorless, .0004 in. to .0005 in. long, .00016 in. to .0002 in. broad. Decorticated wood of poplar, *Populus monilifera.* Albany. Sept. A peculiar feature of this species is its tendency to grow in lines which run together in a reticulate manner. The color is a dingy-yellow or subochraceous.

Hymenula vulgaris, *Fr.* Dead stems of herbs. Albany. Sept.

Geaster mammosus, *Chev.* Ithaca. *Prof. A. N. Prentiss.*

Stemonitis Morgani, *Pk.* Decaying wood. Ithaca. *Prentiss.*

Lamproderma arcyrioides var. iridea, *Cke.* Decaying wood. Ithaca. *Prentiss.*

Arcyria macrospora, *n. sp.* Sporangia short, oval or ovate-oblong, crowded, stipitate, the persistent basal part smooth or finely striate; stem short, reddish-brown or chestnut color; capillitium and mass of spores red, the filaments .0002 in. to .0003 in. thick, rough with numerous spines and spiny bands; spores large, globose, nearly smooth, .0004 in. to .0005 in. in diameter. Decaying wood. Ithaca. *Prentiss.* Copake. Oct. The large size of the spores in this fungus induces me to separate it from *A. puniceus* which it closely resembles. When viewed with a glass of high power the spores appear minutely rough.

Cribraria dictydioides, *Cke & Balf.* Decaying wood. Adirondack mountains. Aug. This fungus differs but slightly from *Cribraria tenella.* The persistent cup or basal part of the sporangium in that species is entirely wanting in this, hence its resemblance to species of Dictydium. This character appears to be constant, but should it fail this fungus could scarcly be regarded as any thing more than a variety of *C. tenella.* When this report was written this fungus was deemed an unpublished species. Prof. Wm. Barbeck, then of Philadelphia, had detected it, pointed out its distinctive character, and given it the name *Cribraria dictydioides*, but before its publication it was distributed in Cooke and Ravenel's Fungi Americani Exsiccati under the name, which, owing to the delay in the publication of the report and to avoid synonymy, I am permitted to here insert.

Hendersonia Cydoniæ, *C. & E.* Living leaves of pear, crab-apple and apple. Catskill mountains and Sandlake. Aug. and Sept.

Phyllosticta Sambuci, *Desm.* Living or languishing elder leaves. Catskill mountains. Aug.

Phyllosticta Grossulariæ, *Sacc.* Living leaves of red currant. Sand lake. Sept.

Phyllosticta Nesææ, *n. sp.* Spots suborbicular, scattered or somewhat confluent, pale-rufous; perithecia hypophyllous, numerous, very minute; spores oblong, straight or slightly curved, colorless, .0003 in. to .0004 in. long, about .0001 in. broad. Living leaves of swamp loosestripe, *Nesœa verticillata.* South Ballston. Sept.

Septoria Galeopsidis, *West.* Living leaves of hemp-nettle, *Galeopsis Tetrahit.* Catskill mountains. Aug.

Septoria Hydrocotyles, *Desm.* Living leaves of water pennywort, *Hydrocotyle Americana.* Catskill mountains. Aug.

Septoria Violæ, *West.* Living leaves of violets. Catskill mountains. Aug.

Septoria Cucurbitacearum, *Sacc.* Living pumpkin leaves. Catskill mountains. Aug.

Septoria corylina, *n. sp.* Spots suborbicular, scattered, brown or reddish-brown, with a darker margin; perithecia few, epiphyllous, minute, blackish-brown, opening widely when moist; spores filiform, curved, colorless, .0015 in. to .0018 in. long. Living leaves of hazelnut, *Corylus rostrata.* Millerton. June. The spots are usually one and a half to three lines broad. They are darker on the lower than on the upper surface.

Septoria betulicola, *n. sp.* Spots small, often large by confluence, angular, reddish-brown above, paler below; perithecia hypophyllous, very minute, blackish; spores filiform, curved, colorless, .0012 in. to .0018 in. long. Living leaves of birch, *Betula lutea.* Catskill mountains. Aug. This is distinct from *S. Betulœ,* both in the color, and character of the spots and in the length of the spores. The perithecia are so minute that they are scarcely distinguishable by the naked eye. In variety *marginalis* the spots are marginal and confluent.

Septoria microsperma, *n. sp.* (Plate 1, figs. 3–5.) Spots indefinite, brown, sometimes confluent, perithecia hypophyllous, numerous, small, irregular, brown, wrinkled when dry, rupturing irregularly; spores allantoid, colorless, .00035 in. to .0005 in. long. Fading leaves of birch, *Betula lenta.* Knowersville. Oct. The leaves bearing the fungus had assumed their autumnal tints, but in some instances the green color had been retained about the margin of the spots.

Septoria Pileæ, *Thum.* Spots small, scarcely one line in diameter, scattered, angular or suborbicular, definite, whitish, perithecia few, one to four, epiphyllous, minute, brown or blackish-brown ; spores filiform, colorless, .0009 in. to 0015 .in. long, about .00008 in. thick. Living leaves of the stingless nettle, *Pilea pumila.* Sandlake. Sept. The spots are numerous but very small and the perithecia are scarcely visible to the naked eye. On the lower surface the spots are sometimes tinged with red or reddish-brown.

Septoglœum Apocyni, *n. sp.* (Plate 1, figs. 1–2.) Spots few, large, irregular, brown or blackish-brown ; nuclei few ; spores large, subcylindrical, rounded at the ends, colorless, .0016 in. to .002 in. long, .0003 in. to .0004 in. broad, three to seven-septate, each cell nucleate. Living leaves of Indian hemp, *Apocynum cannabinum.* North Greenbush. Sept. The spots at length become thick, brittle and almost black. The surrounding tissue fades to a yellowish hue. The septa of the spores are not always distinct but the nuclei in all the specimens examined are plainly visible.

Vermicularia circinans, *Berk.* Surface of onions. Albany. Jan.

Morthiera Thumenii, *Cke.* Living leaves of thornbush, *Cratægus coccinea.* Sandlake. Sept. The specimens have the spores of this species but the perithecia are few and scattered as in *M. Mespili.*

Pestalozzia Stevensonii, *Pk.* (*P. strobilicola,* Speg.) Cone scales of Norway spruce. *Abies excelsa.* Albany. September.

Puccinia Thalictri, *Chev.* Living leaves of tall meadow rue, *Thalictrum Cornuti,* and early meadow rue, *Thalictrum dioicum.* Albany and Center. The spores of this species are scarcely distinguishable from those of *P. Anemones* to which species I formerly referred our specimens.

Puccinia Cirsii, *Lasch.* Living leaves of thistles, *Cirsium lanceolatum.* Knowersville. October.

Puccinia simplex, *n. sp.* Spots small, orbicular, scattered, brown or grayish-brown, with a purplish margin ; sori hypophyllous, hemispherical or depressed, compact, central, one on a spot, dark-brown ; spores fragile, oblong-clavate, slightly constricted at the septum, pale-brown, .0016 in. to .002 in. long, .0004 in. to .0005 in. broad; pedicel very short. Living leaves apparently of some species of Geum. Albany. Sept. Though the spots are numerous, it is seldom that more than one sorus occurs on a single spot.

Protomyces polysporus, *n. sp.* Spots orbicular, thickened, generally convex on the upper surface, concave on the lower, pale-green or yellowish-green, becoming brown when old, two to four lines broad ; spores numerous, crowded, globose or subglobose, subhyaline, or slightly tinged with green, .0005 in. to .0006 in. in diameter. Living leaves of the great ragweed, *Ambrosia trifida.* Albany. September. Leaves spotted by this fungus may be found from June till the close of the season. Usually the upper surface of the spot is convex and the lower concave, but sometimes this order is reversed. Late in the season many of the spots are found to have assumed a brown or blackish-brown color. The spores are generally globose, but from their crowded mode of growth some of them appear to be pressed into a somewhat angular ovate or broadly elliptical shape. The host plant does not suffer materially from the attacks of the fungus, the affected ones growing as large as the unaffected and their leaves retaining their ordinary green color except in the affected spots. Occasionally a Peronospora is found on the spots, an indication, perhaps, that the supposed Protomyces spores may be after all only the resting spores (oöspores) of a Peronospora.

Rœstelia penicillata, *Rabh.* Leaves and unripe fruit of the shad bush, *Amelanchier Canadensis.* Highlands. June.

Æcidium pedatatum, *Schw.* Living leaves of violet, *Viola pedata.* New Dorp, Staten Island. *W. R. Gerard.*

Helicomyces mirabilis, *n. sp.* (Plate 2, figs. 6–10.) Forming dense tufts or irregular whitish patches one line or more in diameter; flocci slender, branched, colorless, the fertile ones sometimes coiled and slightly thickened near the spore; spores abundant, large, spirally or irregularly coiled in two or more volutions, multiseptate, the cells about as broad as long, either filled with a granular endochrome or containing a single large nucleus; coils .0016 in. to .0025 in. in diameter; spores .0005 in. to .0006 in. broad. Old corn cobs lying in water. Ithaca. *Prentiss.* The tufts or masses occur mainly on the erect scales of the cob. In the dry state they are rather firm and compact. The septa of the spores are variable in number, ranging from six to sixteen or more. Unlike typical Helicomyces, this species has the threads long and well-developed.

Septocylindrium Ranunculi, *n. sp.* Spots oblong or irregular, brown; flocci hypophyllous, very short; spores oblong or subcylindrical, usually narrowed in the middle, obtuse, colorless, simple or one to three-septate, .0008 in. to .0016 in. long. Living leaves of buttercups, *Ranunculus acris.* Sandlake. Sept. This species is ambiguous between Cylindrium and Septocylindrium. Many of the spores are simple, others are obscurely uniseptate and others still show three septa. Possibly the simple spores are immature, and on this supposition I have referred the species to Septocylindrium; otherwise this fungus would obliterate the distinction between Cylindrium and Septocylindrium.

Ramularia Spirææ, *n. sp.* Spots indefinite, scattered or confluent, brown or blackish-brown; spores hypophyllous, concatenate, oblong or cylindrical, colorless, variable in length, .0003 in. to .001 in. long, .00012 in. to .00016 in. broad, generally with a minute nucleus near each end. Living leaves of nine-bark, *Spiræa opulifolia.* Albany. Sept. The strings of spores are well-developed, and in some instances branched.

Ramularia rufomaculans, *n. sp.* Spots numerous, often confluent and occupying nearly the whole leaf, dull-red; flocci very short, hypophyllous tufted; spores concatenate, variable, elliptical oblong or cylindrical, colorless, .0003 in. to .0006 in. long, .00012 in. to .00016 broad. Living leaves of *Polygonum amphibium* var. *terrestre.* Albany. Sept. The chains of spores are sometimes branched. The species is closely related to *R. Bistortæ,* from which it is separated because of the different character of the spots and the different and variable character of the spores. Sometimes the spots have a paler or greenish-yellow margin. When very confluent the leaf at a little distance presents the general dingy red hue of the spots.

Ramularia sambucina, *n. sp.* Spots small, orbicular, scattered, pallid or reddish-brown, surrounded by a blackish-brown border; flocci hypophyllous, tufted, short, irregular above, colorless; spores oblong or subcylindrical, slightly narrowed at the extremities, colorless, .0009 in. to .0013 in. long, .0002 in. to .00025 in. broad, sometimes concatenate, rarely uniseptate. Living leaves of elder, *Sambucus Canadensis.* Catskill mountains. Aug.

Ramularia Impatientis, *n. sp.* Spots few, suborbicular, reddish-brown, the margin subindeterminate; spores epiphyllous, oblong, subacute, colorless, .0006 in. to .0009 in. long. Living leaves of touch-me-not, *Impatiens fulva.* Catskill mountains. Aug. This is a very obscure fungus, scarcely visible to the naked eye. The flocci and spores are generally more abundant near the margin of the spot, but this is not always well defined.

Ramularia Rudbeckii, *n. sp.* Spots variable in size, frequently confluent, angular, included by the veinlets, brown; flocci hypophyllous, tufted, short; spores subcylindrical, rounded at the ends, colorless, .0012 in. to .002 in. long, sometimes concatenate and obscurely septate. Living leaves of the cut-leaved cone-flower, *Rudbeckia laciniata.* Catskill mountains. Aug. The flocci are even shorter than the spores.

Cercosporella reticulata, *n. sp.* (Plate 2, figs. 14–16.) Spots large, irregular, brown; flocci amphigenous, short, tufted, nearly colorless; spores numerous, very variable in length, bacillary or subcylindrical, colorless, .0016 in. to .0045 in. long, .00025 in. to .0003 in. broad, with three to seven septa. Living leaves of the tall goldenrod, *Solidago altissima.* Catskill mountains. Aug. The large spots sometimes occupy nearly half of the leaf. They are dry and brittle. The pure white color of the fungus contrasts beautifully with the dark brown color of the spots. The spores are usually more abundant along the veinlets than elsewhere, and they thus give a reticulate appearance to the spot. I have referred the species to the genus Cercosporella, between which and Cercospora there appears to be scarcely any difference, except that of color.

Cercospora depazeoides, *Sacc.* Living leaves of elder, *Sambucus Canadensis.* Sandlake. Sept

Cercospora circumscissa, *Sacc.* Living leaves of choke cherry, *Prunus Virginiana.* Catskill mountains. Aug.

Cercospora beticola, *Sacc.* Living leaves of beets, *Beta vulgaris.* Albany. Sept.

Cercospora Violæ, *Sacc.* Living leaves of violets. Catskill mountains. Aug.

Cercospora venturioides, *n. sp.* Spots generally large, irregular, sometimes confluent, dark-brown or cinereous with a broad blackish-brown margin; flocci epiphyllous, tufted, short, subflexuous, generally one or two-septate, united at the base, colored; spores cylindrical or bacillary, at length three to five-septate, colorless, .0015 in. to .005 in. long. Living leaves of silkweed, *Asclepias Cornuti.* Albany. Sept. The spots have a very dark or smoky-brown color which often becomes centrally cinereous on the upper surface. Sometimes there are but one or two on a leaf, in other instances they are so numerous that nearly all the leaf is discolored. The flocci usually occur on the cinereous part of the spot. They are so compactly united in a mass at the base that when viewed through a handglass they appear like some minute species of Venturia.

Cercospora clavata, *Ger.* Spots small, numerous, irregular, indefinite, often confluent; flocci hypophyllous, minutely tufted, abundant, short, thick, subflexuous, subnodulose, colored, .001 in. to .0015 in long; spores very unequal in length, cylindrical or bacillary, slightly colored, .0015 in. to .005 in. long, three to seven-septate. Living leaves of *Asclepias incarnata.* Albany. Sept. This species is very closely related to the preceding one. The flocci and spores are nearly alike in both, but the external appearance of the two is quite different. In this species the spots are small and numerous and have no cinereous center; the flocci are on the lower surface of the leaf and the tufts are so numerous and crowded that, with the spores, they form a continuous velvety stratum. It is *Helminthosporium clavatum*, Ger.

Cercospora Bœhmeriæ, *n. sp.* Spots small, numerous, often confluent, angular, limited by the veinlets, brownish, sometimes becoming arid and grayish; flocci hypophyllous, tufted, short, subflexuous, colored; spores subcylindrical or bacillary, generally curved, four or five-septate, colored, .0016 in. to .0035 in. long. Living leaves of the false nettle, *Bœhmeria cylindrica.* South Ballston. Sept. The tufts are very numerous but so minute that they are scarcely visible to the naked eye. They are compactly united at the base in a sort of sclerotoid mass as in *C. venturioides.* The spots, though numerous, are not very conspicuous because of their dull, pale color.

Cercospora Acalyphæ, *n. sp.* Spots very small, orbicular, arid, whitish with a narrow purplish-brown border; flocci epiphyllous, tufted, subflexuous, septate, colored; spores slender, bacillary, five to seven-septate, colorless, .002 in. to .003 in. long, .00016 in. broad in the widest part. Living leaves of three-seeded mercury, *Acalypha Virginica.* Albany. Sept.

Verticillium candidum, *n. sp.* (Plate 2, figs. 11–13.) White; fertile flocci erect, septate, branched, the branches opposite or verticillate, sometimes with verticillate ramuli; spores terminal, globose, colorless, .00016 in. to .0002 in. in diameter. Decaying wood and bark in damp secluded places. Helderberg mountains. Oct. and Nov. It forms more or less extensive thin, white patches. The sterile flocci are usually thicker than the fertile.

Diplocladium minus, *Bon.* Decaying Agarics and Polypori. Helderberg mountains. Nov. It forms dense felty patches of intricate white filaments on the soft decaying substance of the matrix. It is distinguished from *Verticillium epimyces* by its clear white color and uniseptate spores.

Fusisporium tenuissimum, *n. sp.* Tufts superficial, very minute, lax, forming thin subpulverulent whitish patches; flocci branched, colorless, subconglutinate at the base; spores fusiform, straight or curved, three to five-septate, colorless, .0008 in. to .0016 in. long, .00016 in. to .0002 in. broad. Dead stems of herbs. Schenectady. Sept. The tufts are so minute that they appear to the naked eye like patches of mere flocculent dust. The spores are at first short and simple, but they soon become uniseptate and then longer and mostly triseptate.

Aspergillus phæocephalus, *D. & M.* "Spanish onions." Albany. Oct.

Aspergillus clavellus, *n. sp.* (Plate 2, figs. 1–5.) Sterile flocci creeping, abundant, soft, white; fertile flocci erect, gradually enlarged above into an oblong-elliptical or clavate head; head at first white, then glaucous-green; spores globose or broadly elliptical, smooth, .00016 in. to .0002 in. long. Cooked squash. Albany. Oct. This species, by the clavate apices of the fertile flocci, is related to *A. mollis*, but that species is white and has the fertile flocci branched and the spores large. In color, our plant resembles *A. glaucus*, but that has the apices of the fertile flocci globose, and the spores, according to Corda, much larger and rough.

Monilia Harknessii, *n. sp.* Flocci tufted, slender, tawny, breaking up into elliptical or lemon-shaped spores, .00025 in. to .0004 in. long, about .0002 in. broad. Decaying wood. Helderberg mountains. Nov. This fungus is related to and congeneric with such species as *Oidium aureum*, *O. fulvum* and *O. pulvinatum*, but if the genus Oidium is to be limited to such fungi as grow on living vegetable tissues, as some mycologists hold, then the species just mentioned and the one just described must be referred to the genus Monilia.

Colletotrichum lineola, *Cd.* Old corn stalks. Chatham, Columbia county. June. Sometimes this fungus is so abundant that the patches surround the whole stem and appear to clothe it with a thin blackish pubescence, though the flocci have a tendency to arrange themselves in parallel lines. It is this tendency apparently which suggested the specific name. The gelatinous subiculum which is said to exist is not at all apparent in our specimens. The spores vary somewhat, being in some instances about equally pointed at both ends, in others they are much more pointed at one end than at the other. *Psilonia apalospora*, B. & R., and *Vermicularia velutina*, B. & R., according to my Curtisian and Ravenelian specimens are very closely related to each other and to this species if indeed they are really specifically distinct.

Sporocybe nigriceps, *n. sp.* (Periconia of some authors.) Plant black, .025 in. to .03 in. high; stem erect, shining, smooth, septate, sometimes with one or two short thick branches at the top; head globose or elliptical; spores globose, minutely rough, colored, .00025 in. to .00035 in. in diameter. Dead leaves of sedges and carices. Albany and Adirondack mountains. July and Aug. Two forms occur, sometimes growing on the same leaf. In one the head is larger, elliptical in outline and nearly as long as its stem, which has but one or two septa. In the other the head is smaller and nearly or quite globose and the proportionally longer stem has several septa. *Sporocybe nigrella* is said to inhabit dead leaves of grass, and *S. cholorocephala*, dead leaves of carices. I am not acquainted with either species, but as both are described as having smooth spores our plant cannot well be referred to either of them. An unfortunate disagreement exists among European mycologists in the application of the generic names Sporocybe and Periconia. The English mycologists employ the former term to designate those species that have simple septate stems, and the latter those that have the stems made up of several compacted or coalescing filaments. This application of these terms is exactly reversed by some of the continental mycologists. We have thought best to follow the English mycologists in our use of these generic names.

Periconia sphærophila, *n. sp.* (Sporocybe of some authors.) (Plate 2, figs. 17–20.) Stem slender, cylindrical, about .03 in. high, black, growing like a rostrate ostiolum from Sphæriaceous perithecia ; spores few, loose, scarcely forming a head, subglobose or broadly elliptical, colored, .0003 in. to .00035 in. long. On perithecia of *Sphæria morbosa.* Adirondack mountains. July. This fungus usually occupies patches of perithecia. In the places where it occurs nearly every perithecium supports a fungus, but other parts of the same excresence will be wholly free from it. It is not often that the fungus occupies all the excrescence. Growing, as it does, from the apex of the perithecium, it, with its matrix, simulates the appearance of a Ceratostomaceous Sphæria, the Periconia answering to the rostrate ostiolum. The stems are scarcely half a line high and are composed of densely compacted filaments. They are often coated by a pellucid membrane. It is not a rare fungus in elevated localities in the Adirondack mountains, where *Sphæria morbosa* is plentiful on the wild red cherry, *Prunus Pennsylvanica.* So intimate is its connection with the Sphæria that it is difficult to believe that it is a distinct fungus rather than a second form of development of the Sphæria. But the spores are clearly produced at the apex of the pseudo ostiolum just as in Periconia and it has therefore seemed to me a distinct fungus, but one of very singular character. I find no fruit of the Sphæria in any of the attacked perithecia. It may be that this Periconia is one of nature's antidotes to the too rapid multiplication of this noxious Sphæria, but before this can be positively affirmed the specimens should be examined in winter or spring when the Sphæria matures its spores.

Graphium gracile, *n. sp.* (Plate 1, figs. 11–13.) Spots large, irregular, reddish-brown ; stems hypophyllous, slender, attenuated upwards, black or blackish-brown, pale at the tips where the component filaments diverge and are colorless, subnodulose or rarely slightly branched ; spores oblong, colorless, .0005 in. to .001 in. long, .0002 in. to .00025 in. broad. Living leaves of red raspberry, *Rubus strigosus.* Catskill mountains. Aug. The slender subulate stems of the fungus are so scattered that they are easily overlooked. They are, however, more easily seen because of the whitish tomentum of the leaf through which they grow. The spores fall off easily. They sometimes contain a small nucleus near each end.

Macrosporium concinnum, *Berk.* Dead twigs of striped maple, *Acer Pennsylvanicum.* Catskill mountains. Aug.

Helminthosporium Tiliæ, *Fr.* Dead branches of bass wood, *Tilia Americana.* Helderberg mountains. Nov. This was associated with *Exosporium Tiliæ,* from which it is distinguished by its narrower spores with more numerous septa and by the absence of the hard stroma which belongs to the Exosporium. The tufts in our specimens are almost wholly made up of spores.

Helminthosporium septemseptatum, *Pk.* Cut surface of maple stump. Helderberg mountains. Nov. The young spores are colorless, adhere firmly to the tips of the flocci and are either simple or one to three-septate. When mature they are colored, easily separated from the flocci and six or seven-septate. The species is allied to *H. fusisporum*, but in that the spores are described as narrower than the flocci, in our plant they are broader than the flocci.

Helminthosporium inconspicuum, *C. & E.* Living or languishing leaves of Indian corn. Sandlake and Albany. July and Sept.

Helminthosporium arbusculoides, *n. sp.* Flocci rather slender, long, simple, subflexuous, often decumbent at the base, multiseptate, opaque, black, forming extensive blackish patches; spores terminal, oblong or narrowly elliptical, colored, triseptate, .00065 in. to .00085 in. long, about .0003 in. broad, the terminal cells sometimes paler. Bark of living white birch, *Betula populifolia.* West Albany. Oct. The species is apparently allied to *H. arbuscula*, from which it is distinquished especially by its septate flocci. The articulations are numerous, being once or twice as long as broad, but owing to the opaque character of the flocci the septa are not always distinctly seen. The decumbent flocci present a very straggling appearance. They form extensive patches which sometimes entirely surround the trunks of small trees, especially near the base.

Zygodesmus bicolor, *C. & E.* Decaying leaves and fungi. Helderberg mountains. Nov. The margin is sometimes nearly uniformly colored with the rest of the stratum.

Rhinotrichum subalutaceum, *n. sp.* Flocci elongated, branched, creeping, intricate, septate, forming brownish-alutaceous tomentose patches, fertile branches commonly short, narrowed and minutely roughened with spicules at the apex; spores globose, colored, minutely roughened or echinulate, .0003 in. to .0004 in. in diameter. Decaying wood. Helderberg mountains. Nov. The fertile branches are generally short and without septa. They are usually abruptly narrowed at the apex and there rough with minute spicules on which the globose spores are borne.

Zasmidium cellare, *Pers.* Decaying wood in damp shaded places. Ithaca. *Prentiss.* The specimens are without fruit but apparently belong here.

Peziza (Humaria) hydrophila, *n. sp.* Cups scattered, sessile, expanded, nearly plane or even convex, reddish-brown when moist, black when dry, two to four lines broad; asci cylindrical; spores uniseriate, elliptical, generally binucleate, .0009 in. to .001 in. long, .0006 in. to .0007 in. broad, paraphyses numerous, thickened above, brown, closely compacted and adhering to each other. Decaying wood lying in water. Adirondack mountains. July. Externally this fungus has the general appearance of some species of Bulgaria, but its softer fleshy substance requires its reference to the genus Peziza. The numerous colored coalescing paraphyses constitute a distinctive feature.

Peziza atrata, *Fr.* Dead stems of herbs. Albany. May.

Peziza fusarioides. *Berk.* Dead stems of nettles. Albany. June.

Peziza aurelia, *Pers.* Decaying wood. Ithaca. *Prentiss.*

Peziza (Tapezia) balsamicola, *n. sp.* (Plate 1, figs. 14–21.) Subiculum thin, appressed, gray, one to two lines broad, composed of filaments of two kinds, one kind, coarse, branching, septate, blackish-brown, bearing numerous short ramuli, each of which is terminated by a large colored three to four-lobed spore-like body, .0006 in. to .0009 in. long and broad, the other kind, delicate colorless, bearing narrowly fusiform colorless conidia; cups minute, .012 in. to .016 in. broad, sessile, glabrous, immarginate, waxy, whitish, subpellucid; asci enlarged upwards, broad and obtuse at the apex, .0015 in. to .0002 in. long; spores oblanceolate, crowded, .0006 in. to .0008 in. long, .0002 in. to .0003 in. broad, generally three or four-nucleate; paraphyses filiform.

Living or languishing leaves of balsam fir, *Abies balsamea.* Stony Clove, Catskill mountains. Aug. The presence of two kinds of filaments in the subiculum suggests the question whether both belong to the Peziza. In a few instances the perithecia of a sphæriaceous fungus were found on the subiculum, and in one case both this fungus and the Peziza were occupying the same patch of filaments. The delicate whitish filaments appear to overrun and adhere to the coarse brown ones as if parasitic on them. This commingling of the two gives the general gray hue to the subiculum. It is probable that the delicate filaments belong to the Peziza and are parasitic on the other which probably belongs to the following fungus.

Meliola balsamicola, *n. sp.* (Plate 1, figs. 22–27.) Perithecia few, gregarious, minute, ovate or subconical, free, black, seated on a small blackisn-brown spot-like subiculum; asci generally oblong, rarely subcylindrical and elongated; spores mostly crowded or biseriate, rarely uniseriate, uniseptate, colorless, .00035 in. to .00045 in. long, generally two to three-nucleate and one cell a little narrower than the other. Living or languishing leaves of balsam fir, associated with *Peziza balsamicola.* Catskill mountains. Aug. The subicula on which this fungus occurred were a little darker colored than those which bore the Paziza the whitish filaments being less abundant. From this it is inferred that the colored filaments are properly the subiculum of the Meliola. *M. ganglifera* and some South African species of Asterina are said to have similar bodies on the threads of the subiculum. Our fungus does not fully meet the requirements of the genus Meliola, neither is it a good Asterina nor Dimerosporium. It needs further investigation.

Hypoxylon marginatum, *Schw.* Oak fence posts. Albany. Sept.

Diatrype punctulata, *B. & R.* White oak wood. Ithaca. *Prentiss.* The specimens are sterile, but evidently belong to this species, which, though first published as a Hypoxylon, was afterward described as a Diatrype.

Diatrypella angulata, *Fr.* Dead branches of ash and poplar. North Greenbush. Oct.

Valsa myinda, *C. & E.* Dead branches of maple, *Acer spicatum.* Knowersville. Oct.

Dothidea melanoplaca, *Desm.* Languishing or dead leaves of white hellebore, *Veratrum viride.* Catskill and Adirondack mountains. July and Aug. The specimens are not in fruit; neither has it been found in fertile condition in Europe so far as I am informed. Possibly it perfects its fruit in Winter or early Spring.

Lophiostoma angustilabrum, *B. & Br.* Decorticated sticks. North Greenbush. June.

Sphærella Leersiæ, *Pass.* Dead leaves of grass, *Leersia oryzoides.* North Greenbush. Sept.

REMARKS AND OBSERVATIONS.

Thalictrum anemonoides, *Mx.* A double-flowered form with the stamens transformed into oval greenish petaloid leaflets was detected near Coeymans, Albany county. *Prof. J. S. St. John.*

Nuphar advena, *Ait.* A variety (near var. *variegata*) with large partly purplish flowers is not rare in the lakes and sluggish streams of the Adirondack wilderness. The flower when pressed open is nearly three inches in diameter. A very noticeable variety occurs in Forked lake, Adirondack mountains, where it was first detected by *Prof. P. A. Puissant.* It may be characterized thus: Var. *hybrida.* Sepals six, rarely five, subequal, the three exterior often tinged with red; petals twelve to fourteen, generally thirteen, about as long as the contiguous stamens; stigmatic disk red, umbilicate, ten to thirteen-rayed, the margin slightly crenate; leaves small, with a paler greenish dash beneath on each side of the midrib, the sinus usually open; petioles flattened on the upper side. This variety grows in water four to eight feet deep in close proximity to a patch of *Nuphar lutea* var. *pumila* (*N. Kalmiana*, Pursh.) In size and character it is intermediate between this and the ordinary form of *N. advena.* It is smaller in all its parts than the latter and larger than the former and appears very much as if it might be a hybrid between them. The number of the sepals connects it with *N. advena*, but the disk of the stigma allies it more closely with *N. Kalmiana.* The flowers when outspread are nearly two inches across. When fresh they have an agreeable spicy or aromatic odor. In this respect they differ from our common forms of both species.

Nymphæa odorata, *Ait.* In stony ponds, Adirondack mountains, a small form was found in which the outspread flowers are scarcely two inches in diameter. Also a form in which the outer petals are tinged with pink.

Cardamine hirsuta v. sylvatica, *Gr.* Thin dry soil covering rocks. Edmonds ponds.

Vitis æstivalis, *Mx.* A form with the leaves deeply and angularly five-lobed occurs in Sandlake. The foliage at first sight appears as if it had been eaten by insects.

Prunus pumila, *L.* Sandy shore near the outlet of Long lake, Adirondack mountains; the prostrate trailing form fruiting abundantly.

Rosa lucida, *Ehrh.* To this species I refer a very marked form occurring on the slopes of Mt. Defiance and near Westport, Essex county. The stems are armed, especially toward the base, with very numerous unequal, bristly prickles, the calyx lobes are scarcely gladular-bristly and the smooth fruit is ovate or elliptical.

Ribes rotundifolium, *Mx.* Mt. Defiance. A form with leavês mostly about half an inch broad, as if starved and unthrifty, yet fruiting abundantly.

Myriophyllum tenellum, *Bigel.* Not uncommon in the Adirondack region. On the miry shores of Mud-pond, a shallow sheet of water about one mile south-west of Edmonds ponds, it is so plentiful that its peculiar yellowish hue is visible at a long distance. It grows both in and out of water.

Epilobium angustifolium, *L.* A form with flowers nearly white, occurs occasionally in the Adirondack region. White flowered forms of the following species have been observed the past season; *Verbascum Thapsus, Echium vulgare, Mimulus ringens, Scutellaria lateriflora, Origanum vulgare.* The last-named plant is very plentiful about Phœnicia, Ulster county, where it monopolizes some of the pastures and hillsides.

Epilobium coloratum, *Muhl.* A small form with unbranched stems six to ten inches high was observed in the Catskill mountains. It resembles *E. alpinum,* from which it may be distinguished by its acute leaves.

Lythrum alatum, *Pursh.* Bank of Oswego river opposite Battle Island. *Wibbe.*

Conioselinum Canadense, *T. & G.* Moist cliffs, Catskill mountains.

Galium verum, *L.* Glen Cove. *Coles.*

Aster corymbosus, *Ait.* In the Catskill mountains three forms occur which are readily distinguished from each other by the flowers. A small form in open grassy places has a dense corymb of small heads with short broad close rays; a large form in shaded moist places along streams has a loose corymb of larger heads with long narrow distant rays; a third form, intermediate between these two, grows in thin woods and has rays about midway between the other two in length, breadth and relative position. In all the forms the rays sometimes exceed nine in number. The flowers of the large form resemble those of *A. macrophyllus,* but the involucre is shorter.

Aster Tradescanti v. fragilis, *T. & G.* (*A. fragilis, Willd.*) Long lake and Raquette falls, Adirondack mountains. It is one of the earliest flowering Asters of this region, being in flower the latter part of July.

Aster longifolius, *Lam.* A form with the stem leaves broadly lanceolate and strongly serrate in the middle was found at Phœnicia.

Aster acuminatus, *Mx.* Two well-marked forms occur. In one the leaves are crowded on the upper half of the stem, the lower half being nearly or quite destitute of foliage. In cold, elevated localities, as in the Stony Clove of the Catskills, this form has but few heads; generally from one to six. The other form has a stouter stem, leafy throughout its entire length, and numerous heads of flowers.

Artemisia Canadensis, *Mx.* Sandy banks along the railroad near Thurman station, Warren county.

Rudbeckia laciniata, *L.* Plentiful in the Catskill mountains, following the streams far up toward the Stony Clove.

Lactuca Canadensis v. sanguinea, *T. & G.* Fields and cleared places. North Elba. Plants with yellow flowers and those with reddish or orange-colored flowers were associated in the same station.

Campanula rotundifolia, *L.* A small form with solitary flowers grows at Edmonds ponds.

Mentha piperita, *L.* Along streams at Phœnicia a singular form was observed. Its flowers were in axillary whorls or clusters as in *M. sativa, M. Canadensis*, etc.; not in terminal spikes as in the ordinary form. This marked variation from the usual mode of inflorescence gives such a peculiar aspect to the plant that it seems worthy of a name and might be called var. *interrupta.*

Mentha Canadensis, *L.* Very variable. The stems are simple or branched; the leaves are ovate or elliptical, tapering at the base or abruptly narrowed, grayish-green or purplish; the flowers may have the stamens all exserted or all included, or some exserted and some included even on the same plant. Besides, the plant varies from nearly smooth to very hairy.

Lycopus Virginicus, *L.* The small few-flowered form (*L. pumilus, Vahl.*) with a thickened tuberous root occurs in the Adirondack region.

Polygonum amphibium v. aguaticum, *Willd.* Common in still or slow-flowing water of the Adirondack region. The elongated stems creep on the bottom and send up, at intervals, flowering branches which bear the thick, smooth, glossy, floating leaves and the brilliant red spikes of flowers which enliven and beautify the lonely waters of the wilderness. Each node of the submerged stem gives rise to a cluster of rootlets.

Sparganium simplex v. angustifolium, *Gr.* The terrestrial form, with shorter, erect leaves, occurs at Edmonds ponds.

Sparganium minimum, *Bauh.* Colby pond, Adirondack mountains.

Potamogeton Oakesianus, *Robbins.* In the slow-flowing streams of the Adirondack region there is a slender Potamogeton which I refer to this species. I have not seen it with mature fruit, its fruiting season being very late, if indeed it matures its fruit at all. Its stem is not at all or only sparingly branched, its floating leaves are very narrow or even lanceolate, and borne on slender petioles many times longer than the leaves, and the phyllodia or submerged leaves are exceedingly long and slender, even capillary.

Potamogeton Claytonii, *Tuckm.* A dwarf form resembling *P. lucens* v. *minor*, grows on mud in an exsiccated pond-hole in the Stony Clove. It fruits freely but seldom has any phyllodia. The stems are but a few inches long and yet they are sometimes much branched. Its appearance is very unlike the ordinary floating forms of the species.

Potamogeton gramineus v. graminifolius, *Fr.* Stony ponds, Adirondack mountains. It is sometimes destitute of floating leaves. The var. *heterophyllus* was collected in Raquette river. This also occurs without floating leaves, as at Westport, and yet fruiting freely.

Potamogeton amplifolius, *Tuckm.* One of the most common pondweeds in the Adirondack waters. It is a large, fine-appearing plant and fruits abundantly. Like other species it is more slender in waters with a strong current than in still waters. In such localities the leaves are more diseant and even the spikes elongated and more loosely flowered. In still water the spikes are very compact and the flowers are regularly arranged in six ranks.

Potamogeton lucens, *L.* Raquette river. The var *minor* in the Normanskill near Albany.

Potamogeton pusillus, *L.* Both var. *vulgaris* and var. *tenuissimus* occur in Lower Saranac lake. In this lake are also *P. amplifolius*, *P. Claytonii*, *P. gramineus*, *P. hybrideus*, *P. compressus*, *P. perfoliatus* and *P. natans*. In the inlet between this lake and Round lake, *P. amplifolius*, *P. Claytonii* and *P. gramineus* v. *heterophyllus* abound in a luxuriant growth. Pond-weeds, water-lilies and aquatic plants generally are more abundant in and near the inlets of the lakes of this region than in other parts of the waters. Probably the sediment brought down by the streams and accumulating in the parts of the lakes adjacent to their inlets affords a soil especially favorable to the production and support of water-plants.

Trillium erectum v. declinatum, *Gr.* Long Island. *Coles.* Some of the flowers are white, others are variously tinged with pink. In one specimen two flowering stems grew from the same rootstock.

Lilium Philadelphicum, *L.* This commonly has but one or two flowers on a stem, but in rare instances as many as five flowers occur.

Carex flava, *L.* A large form with three or four fertile spikes and the staminate spike, nearly all fertile, was collected at Millerton. The numerous large fertile spikes give the plant an unusual appearance. Sometimes the lowest spike is compound.

Carex triceps, *Mx.* A form with oblong spikes. Mt. Defiance.

Carex gynandra, *Schw.* Not rare in the Adirondack region, but passing into *C. crinita* by such insensible gradations that it is difficult to keep them separate.

Carex scoparia, *Schk.* Of this species we have three forms. In one, the spikes are arranged in a somewhat racemose manner. This is usually found in dry, sandy soil. In another the spikes are more or less aggregate in a cluster or head. This is the common form usually found in wet places. In the third form, the var. *minor*, the spikes are small and aggregate. This occurs in the Adirondack mountains. The whole plant is smaller than usual.

Carex debilis, *Mx.* A large, thrifty form is found in the Adirondack region. It has five fertile spikes, the lowest one usually bearing near its base a branch about an inch in length.

Carex tentaculata, *Muhl.* At Edmonds ponds starved specimens occur which have but a single short subglobose fertile spike. They were in company with var. *gracilis*.

Carex oligosperma, *Mx.* Stony ponds. A slender form with the fertile spikes but three or four-flowered.

Agrostis scabra, *Willd.* In thin woods in the Catskills there is a small leafy form of this grass with green panicles.

Muhlenbergia Mexicana, *Trin.* A very variable grass. A tall, slender, slightly branched variety was found on damp shaded cliffs in Stony Clove. A much branched form with short erect leaves and a rigid aspect occurs on the banks of the Hudson near Albany. Growing with it and scarcely to be distinguished from it, except by the awned flowers, is a very similar form of *Muhlenbergia sylvatica*.

Glyceria fluitans, *R. Br.* Edmonds ponds. In this locality the spikelets are short, three to four lines long, and usually about five-flowered.

Setaria viridis, *Beauv.* A singular form was found at West Albany on the banks of the railroad. The spikes are more slender than usual, and the bristles are shorter, stouter and purplish. These give a purplish tint to the appearance of the spike whereby this form can be readily distinguished from the ordinary one. The flowers make an approach to a verticillate arrangement toward the base of the spikes after the manner of *S. verticillate.*

Aspidium fragrans, *Sw.* This rare fern was found in limited quantity on the rocks at Edmonds ponds. This is the second locality in the Adirondacks in which it has been found. Here also, as at Lake Avalanche, it was associated with *Woodsia hyperborea,* a fern of no common occurrence in our State. *Aspidium aculeatum* v. *Braunii* also occurs sparingly in this locality.

Pellæa gracilis, *Hook.* At Edmonds ponds, about half way up the cascade opposite the Cascade House, is a limited mass of calcite surrounded by the ordinary rock of the mountains. The limestone affords a congenial habitat for this dainty little fern and here it grows in great luxuriance and profusion. This mass of calcite appears to render this limited locality inhabitable by the fern, for I did not find it extending beyond this isolated station which is the only one in the interior mountain district in which I have observed this fern.

Phegopteris polypodioides, *Fee.* A dwarf yet fertile form of this fern with the frond only two or three inches long was found growing in crevices of rocks in the Adirondack mountains.

Cheilanthes vestita, *Sw.* A second station for this fern in our State has been found near Poughkeepsie. The one on New York Island is said still to exist but the plants occupy a very limited area.

Agaricus virescens, *Pk.* (Report 25, p. 74.) The name of this species being preoccupied I would substitute for our plant the name *Agaricus viriditinctus.*

Polyporus radiatus, *Fr.* One form of this species has the margin yellow, in another form the pileus is uniform in color.

Polyporus lucidus, *Fr.* Specimens sometimes occur in which there are two distinct strata of pores.

Septoria Rubi, *B. & C.*, var. alba, *Pk.* In this variety the spots are small and white, and bear but few perithecia. It occurs on *Rubus villosus* and *R. Canadensis*.

Sporocybe Persicæ, *Fr.* This fungus should be placed in the genus Sphæronema. The spores are produced at the base, not at the apex of the fungus.

Haplographium apiculatum, *Pk.* This species was first found inhabiting an insect gall on leaves of witch hazel, *Hamamelis Virginica.* It has since been found on the lower surface of the leaves themselves, on dry suborbicular brown spots. The flocci often have two or three swollen nodules in the upper part, from which strings of spores grow. In such cases the strings of spores appear to be in verticils when viewed with a low magnifying power.

Sphæria Coryli, *Batsch.* var. spiralis, *Pk.* This variety differs from the ordinary form only in having the ostiola spirally coiled in about two volutions. All the ostiola on the perithecia of a host plant are affected in the same way, that is, I do not find on any given leaf or leaves of an affected plant some ostiola straight and some coiled, but all are straight or all are coiled.

EXPLANATION OF PLATE I.

SEPTOGLŒUM APOCYNI, *Pk.*

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FIG. 1. A leaf with two spots produced by the fungus.

FIG. 2. Three spores x 400.

SEPTORIA MICROSPERMA, *Pl*

Page 44.

FIG. 3. A leaf bearing three groups of the fungus.

FIG. 4. A fragment of a leaf with a perithecium magnified.

FIG. 5. Four spores x 400.

ASPERGILLUS GLAUCUS, *Lk.*

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FIG. 6. A fragment of Polyporus bearing a patch of the fungus.

FIG. 7. A young plant magnified.

FIG. 8. Two mature plants magnified.

FIG. 9. Upper part of a plant with most of the spores removed, more highly magnified.

FIG. 10. Four spores x 400.

GRAPHIUM GRACILE, *Pk.*

Page 50.

FIG. 11. Part of a leaf with spots produced by the fungus.

FIG. 12. A fragment of a leaf and four plants magnified.

FIG. 13. The upper part of a plant with spores x 400.

PEZIZA BALSAMICOLA, *Pk.*

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FIG. 14. A leaf with the subiculum and three cups of the fungus.

FIG. 15. The same slightly magnified.

FIG. 16. Part of one of the coarse colored threads of the subiculum with its spore-like bodies x 400.

FIG. 17. Delicate colorless threads of the subiculum with their fusiform conidia X 400.

FIG. 18. Three conidia x 400.

FIG. 19. A cup magnified.

FIG. 20. A paraphysis and two asci containing spores x 400.

FIG. 21. Three spores x 400.

MELIOLA BALSAMICOLA, *Pk.*

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FIG. 22. A leaf with the subiculum and five perithecia of the fungus.

FIG. 23. The same slightly magnified.

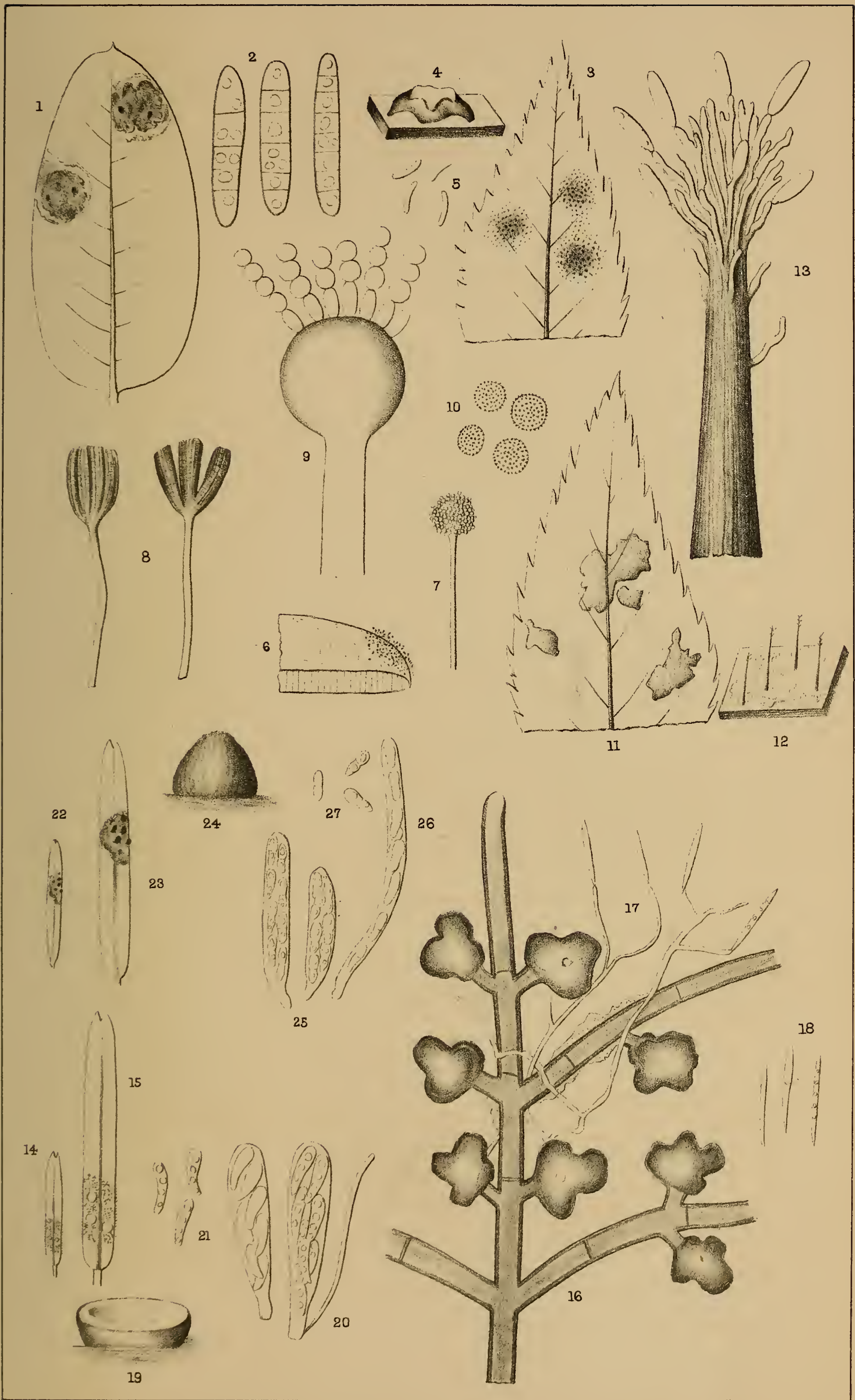
FIG. 24. A perithecium more highly magnified.

FIG. 25. Two asci of usual form, with their spores x 400.

FIG. 26. An ascus of unusual form, with its spores x 400.

FIG. 27. Three spores x 400.

FUNGI.



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EXPLANATION OF PLATE II.

ASPERGILLUS CLAVELLUS, *Pk.*

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FIG. 1. A tuft of the fungus with its matrix.
FIG. 2. Three plants magnified.
FIG. 3. Upper part of a plant with most of the spores removed, more highly magnified.
FIG. 4. A group of spores x 400.
FIG. 5. A string of spores with its basidium more highly magnified.

HELICOMYCES MIRABILIS, *Pk.*

Page 46.

FIG. 6. A piece of a corn cob bearing the fungus.
FIG. 7. Threads of the fungus x 400.
FIG. 8. A coiled spore x 400.
FIG. 9. A spore partly uncoiled x 400.
FIG. 10. A fragment of a spore x 400.

VERTICILLIUM CANDIDUM, *Pk.*

Page 48.

FIG. 11. A piece of wood bearing a patch of the fungus.
FIG. 12. A plant with spores x 400.
FIG. 13. Six spores x 400.

CERCOSPORELLA RETICULATA, *Pk.*

Page 47.

FIG. 14. A leaf discolored at the apex by the fungus.
FIG. 15. A group of flocci x 400.
FIG. 16. Three spores x 400.

PERICONIA SPHÆROPHILA, *Pk.*

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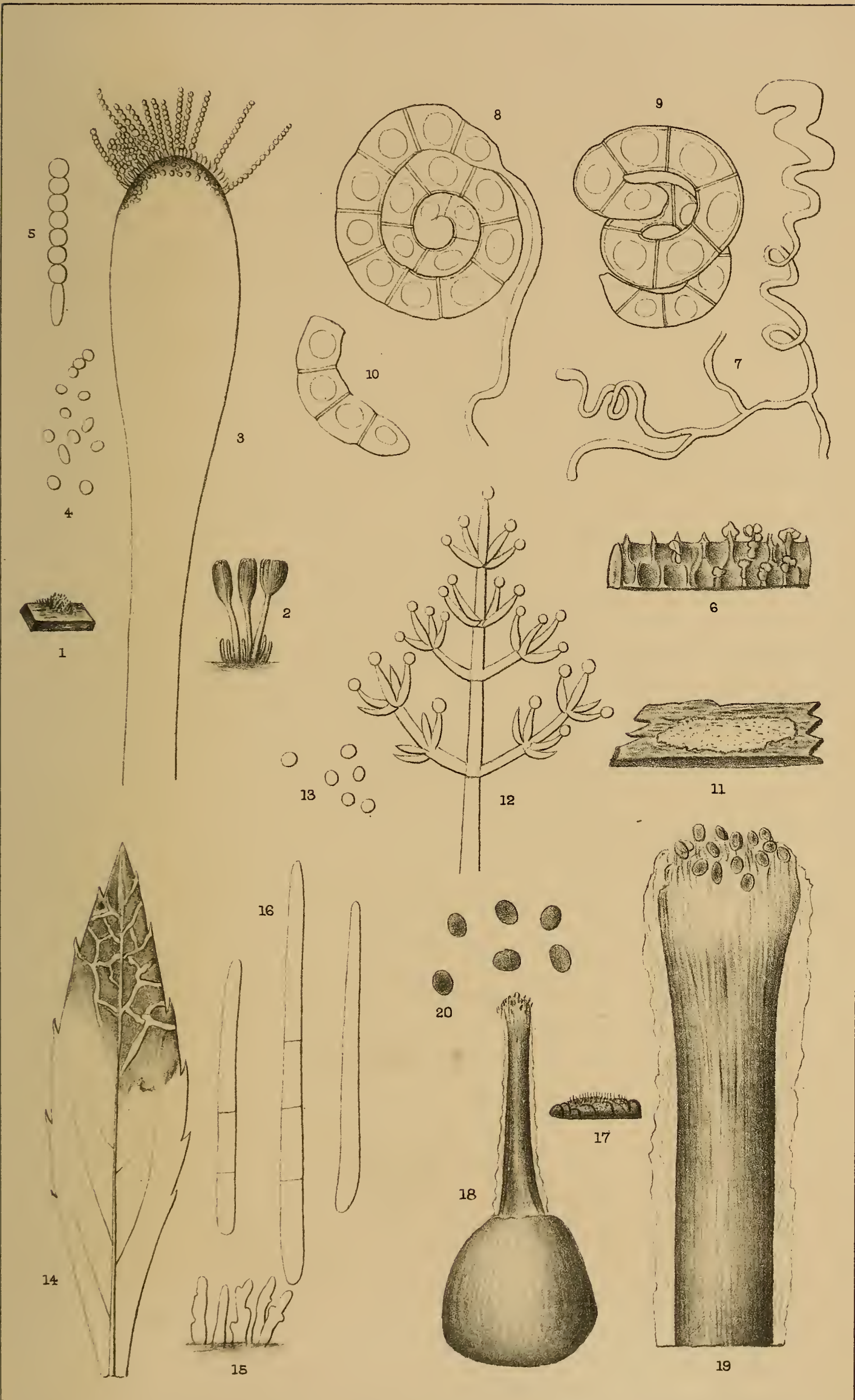
FIG. 17. A patch of the fungus with its matrix.
FIG. 18. A plant and the perithecium from which it grows magnified.
FIG. 19. Upper part of a plant with spores more highly magnified.
FIG. 20. Six spores x 400.

FUNGI.



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EXPLANATION OF PLATE III.

USTILAGO MAYDIS, *Lev.*

Page 26.

FIG. 1. Part of the "tassel" of Indian corn affected by the corn smut.

FIG. 2. Part of a cob of corn affected by the corn smut.

FIG. 3. Five of the spores x 400.

HELMINTHOSPORIUM INCONSPICUUM, *C. & E.*

Page 28.

FIG. 4. Part of a leaf of Indian corn with its terminal part discolored and spotted by the fungus.

FIG. 5. A small fragment bearing six plants moderately magnified.

FIG. 6. Three plants bearing spores x 400.

PUCCINIA MAYDIS, *Potsch.*

Page 29.

FIG. 7. Pustules of the fungus on the leaf of Indian corn.

FIG. 8. Four pustules of the early state of the fungus.

FIG. 9. Vertical sections through two pustules of the fungus, moderately magnified; the one at the left the early state.

FIG. 10. Four of the early spores x 400.

FIG. 11. Three spores x 400.

RAMULARIA FRAGARIA, *Pk.*

Page 30.

FIG. 12. Part of a leaf spotted by the fungus.

FIG. 13. A tuft of the fungus bearing four spores x 400.

FIG. 14. Two separate stems of the fungus, one of them branched, x 400.

FIG. 15. Four spores x 400.

MUCOR INÆQUALIS, *Pk.*

Page 31.

FIG. 16. A tuft of the fungus.

FIG. 17. A branched and an unbranched stem of the fungus with their spore-cases, moderately magnified; the one at the left ruptured irregularly and discharging its spores, the one at the right collapsed and the other yet unchanged.

FIG. 18. Several spores x 400.

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EXPLANATION OF PLATE IV.

FUSICLADIUM DENDRITICUM, *Wallr.*

Page 32.

FIG. 1. Fungus spots on an apple.
FIG. 2. Threads of the fungus x 400. The three lower much elongated.
FIG. 3. Twelve spores of various shapes x 400; two still attached to the threads.

PENICILLIUM GLAUCUM, *Lk.*

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FIG. 4. Decayed fungus spot on an apple, with tufts of the fungus in the center.
FIG. 5. A small fragment of the apple with seven tufts of the fungus.
FIG. 6. A few plants magnified.
FIG. 7. A tuft of the variety *coremium* magnified.
FIG. 8. An elongated branched plant magnified.
FIG. 9. A plant x 400.
FIG. 10. Six spores 400.

OIDIUM FRUCTIGENUM, *Pers.*

Page 34.

FIG. 11. Tufts of the fungus on an apple.
FIG. 12. A fragment of the apple, with six tufts of the fungus.
FIG. 13. A tuft of the fungus magnified.
FIG. 14. Three threads of the fungus bearing strings of spores x 400.
FIG. 15. Three spores x 400.

SPHÆROPSIS MALORUM, *Berk.*

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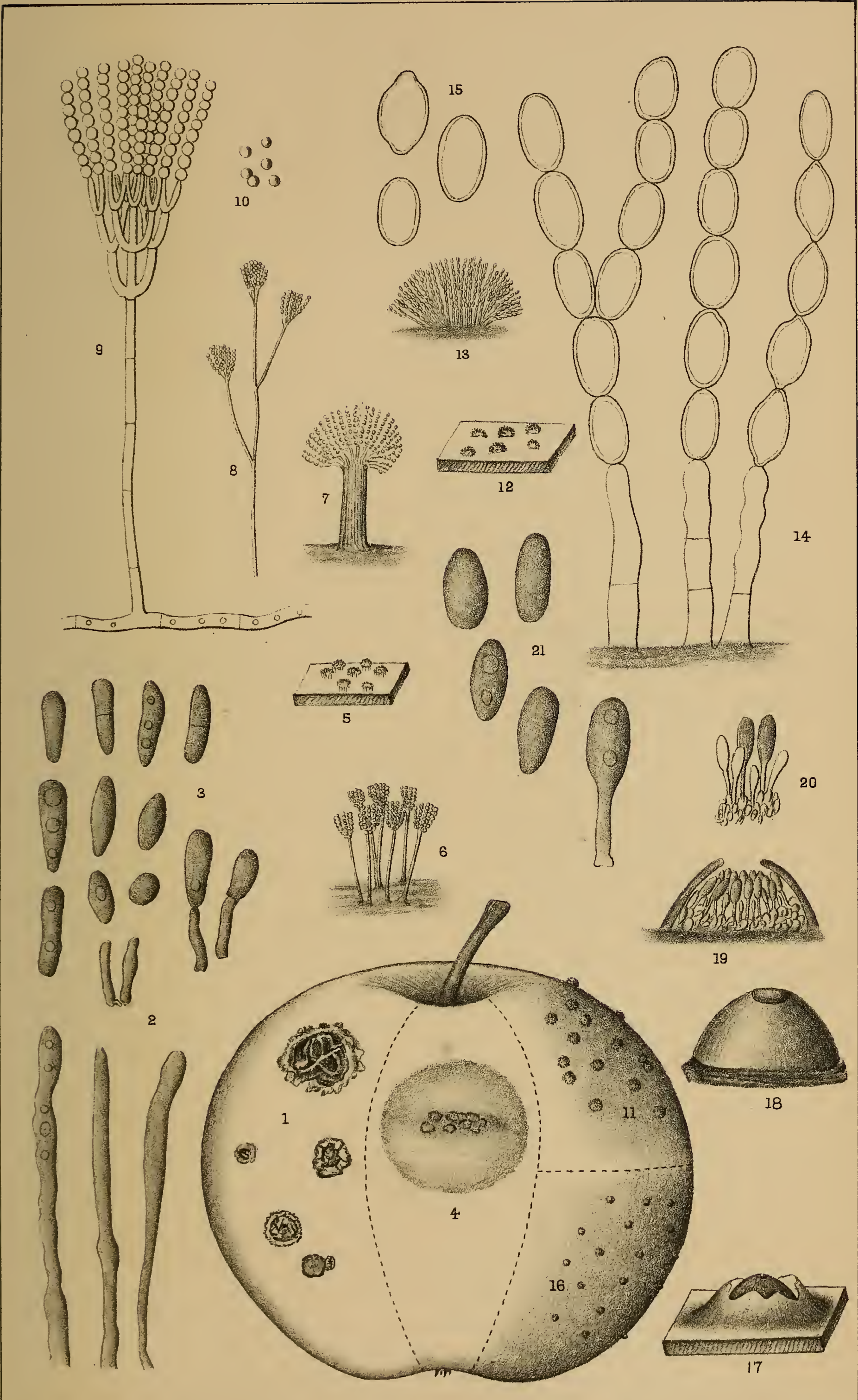
FIG. 16. Part of the surface of an apple dotted by the fungus.
FIG. 17. A fragment of the apple with a single perithecium bursting through the epidermis magnified.
FIG. 18. A perithecium magnified.
FIG. 19. A vertical section through the center of a perithecium magnified.
FIG. 20. A tuft of spores taken from the perithecium magnified; some of them immature.
FIG. 21. Five spores x 400; one of them with its pedicel still attached.



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