

**THE COMPOSITE GENUS BLUMEA,
A TAXONOMIC REVISION¹**

by

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PREFACE

This study is intended to be a revision of the composite genus *Blumea*, species of which characterize the "weed-flora" of S. E. Asia and particularly that of India. The study roughly falls into two parts — the first, including the introduction and general discussion, and the second embodying the systematic treatment proper. At the outset, I would like to express my gratitude to all those who have made the study possible.

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Finally I would like to express my thanks to the Curators and Directors of various herbaria through whose courtesy the specimens used for this work were obtained. The list of the herbaria from which these specimens were received on loan are listed in detail in the chapter on Materials and Methods.

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INTRODUCTION

My first acquaintance with the genus *Blumea* was made in December of 1949. On one of my taxonomy field trips then, and many more subsequently, I encountered these weedy, yellow-flowered composites. Perhaps what most helped to attract my attention was their relative abundance and their characteristic pungent odour that was hard to miss. My attempts to identify these plants brought me down quite consistently to the genus *Blumea*; in most cases, I could proceed no farther than that with any degree of certainty. The specimens would either be quite close to species "x" or belong in the same general group as species "y". On making inquiries then, I learned that the genus was extremely variable, not at all "well-behaved", and troublesome to key. My interest in these plants soon followed.

This interest did not transpose itself into any serious work on the group until December of 1955. Meanwhile, bibliographic research had more and more convinced me of the need for a taxonomic revision of the group. As early as 1882, Hooker had recognised the inadequacy of the characters theretofore used and even those used by him to separate the species. His remarks following the generic diagnosis in the Flora of British India (Vol. 3: 260) will only serve to emphasize this point:

"There is no more unsatisfactory genus than this; it is distinguished from *Laggera* only by the tailed anthercells, and this is not a very constant character, the anthers of some states of *B. virens* having no tails whilst forms of *Laggera* have them; Kurz, indeed, suggests (with much probability) that some *Laggeras* are sexual forms of *Blumeas*. The divisions of the genus here proposed are most unsatisfactory, and I fear that the specific diagnoses are not much better. The glabrous or pubescent receptacle is very difficult to see; the size of the heads is tolerably constant; the form and number of the involueral bracts are difficult to describe; the very minute achenes are tolerably uniform; the foliage is sportive to an extraordinary degree, as is the pubescence; gland hairs are common to most species, but the amount varies with the dryness of the locality. I have not been able to follow Clarke's disposition of the species at all closely, but they want a careful study *in situ* and under cultivation".

Even though Hooker does appear to take an overly pessimistic view of the situation, the same general tone of dissatisfaction can be noted in the systematic treatments of many other workers. Not only are the characters variable and overlapping but they are variously interpreted by different botanists. Koster (1941) presents this problem very adequately:

"Often the differences are too trifling to distinguish a separate species. Thus, polymorphous species are inevitable, of which moreover the conception of various authors is different. Their diagnoses of one and the same species are often considerably unlike, one describing the receptacle to be glabrous, the other describing it to be hirsute, etc. They create the dilemma: which

is to be considered as a separate species and which is a variety of the polymorphous species”.

In addition, the list of names and synonyms is very extensive. At the specific level alone there have been about 250 epithets published since 1833, when the genus *Blumea* was first segregated. However, a careful inspection of the specimens quickly suggests that these are by no means all “good” species.

The bibliography on the subject, though vast, is not very discerning. Apart from De Candolle's original treatment in the *Prodromus* (Vol. 5, 1836) no monograph of the genus *per se* exists. Subsequent to that time various authors have either described new species or, in floristic studies, have reworked the classification of the old ones. A few species of economic and medicinal value have also gained recognition in the literature. The papers in which they are described mainly deal with the chemical compounds contained in these plants and their effects, remedial or otherwise.

It was readily apparent to me that a problem did exist here and that a revision of the genus *Blumea* was in order. An attempt towards that end has been made in the present study. My investigation originally started out as a systematic treatment of the Indian species only. Soon, however, it was found that in order to get an adequate idea of the relationships between these Indian members and to derive any conclusions whatsoever, it would be necessary to examine the rest of the members of the genus. As a result, a total of 49 species of *Blumea* throughout its geographic range, are recognized and dealt with in this study. Materials for some other species described in the literature were not available for study and such taxa have been dealt with separately at the end of the systematic treatment.

The plants have been scrutinized mainly from a morphological and anatomical standpoint. I have continued to use the traditional characteristics of the habit, the inflorescence type, etc. where applicable, but these have been further supplemented by the data obtained from the following detailed anatomical features investigated during the course of this study.

1. Shape of leaf epidermal cells of both laminar surfaces.
2. Position of stomata.
3. Type and morphology of trichomes (rather than their relative abundance).
4. The length relationship of the anther tails to the thickened portions of the filaments.
5. Pollen grains.
6. Structure of wood.

Of all the characters studied the last two were the least rewarding as distinguishing features between categories. The rest have been extremely valuable, particularly in determining the species limits in cases where external morphology alone had proved confusing or inadequate.

In addition, data from phytogeography and any other pertinent sources have been used to complement the existing information. Owing to the variability of the genus, I have oftentimes felt it necessary to depart from

the traditional system and to utilize some of the anatomical features in the separation of very closely related entities. I realize the shortcomings of such an approach as far as routine identification is concerned, but am of the strong opinion that in such a polymorphic group as *Blumea*, any additional evidence, either positive or even negative, can only be an asset.

The problems of synonymy and critical species delimitation have been settled mainly by an analysis of the original descriptions and an examination of the type material on which the taxa were based. The earlier diagnoses are quite brief and often vague; in such circumstances, the conclusions chiefly rested on the type material, most of which is extant and has been available for study.

From my own investigations, I agree completely with the suggestions of Hooker (1882) and Koster (1941) that these plants need a careful study under cultivation. Further, I am sure that a cytological and possibly chemotaxonomical investigation of the species would aid considerably in the delimitation of the taxonomic units. Such an approach, however, was impossible here due to the lack of availability of any fresh material. Until such a project is undertaken it is hoped that this study based on nearly 8000 herbarium specimens representative of the entire geographic range will be an important step in the right direction.

MATERIALS AND METHODS

A. Materials

The materials used for this study have been restricted to herbarium sheets and the problem mainly approached from the standpoint of comparative morphology and anatomy. The possibility of any first-hand collection and study of living material during the tenure of the investigation was largely precluded by the distribution of the genus exclusively in the Old World tropics.

The specimens were obtained on loan through the courtesy of the herbaria listed below and include species of the three genera *Blumea*, *Laggera*, and *Nanothamnus*. The name of each herbarium is preceded by its abbreviated symbol according to Lanjouw and Stafleu (1952).

BLAT	Bombay, India: Blatter Herbarium, St. Xavier's College.
CAL	Calcutta, India: Indian Botanic Garden, Howrah.
DD	Dehra Dun, India: Forest Research Institute and Colleges.
E	Edinburgh, Great Britain: The Royal Botanic Garden.
GH	Cambridge, Massachusetts, U. S. A.: The Gray Herbarium of the Harvard University.
HK	Hong Kong, E. Asia: Herbarium, Gardens Department.
K	Kew, Surrey, Great Britain: Herbarium, Royal Botanic Gardens.
L	Leiden, Netherlands: Rijksherbarium.
MICH	Ann Arbor, Michigan, U. S. A.: University Herbarium, University of Michigan.
MO	St. Louis, Missouri, U. S. A.: Missouri Botanical Garden.
NY	New York, New York, U. S. A.: New York Botanical Garden.

- P Paris, France: Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie.
 RAW Rawalpindi, Pakistan: Gordon College Herbarium.
 U Utrecht, Netherlands: Botanical Museum and Herbarium.
 UC Berkeley, California, U. S. A.: Herbarium of the University of California.
 US Washington, D.C., U. S. A.: National Museum, Smithsonian Institution.
 ZT Zürich, Switzerland: Institut für spezielle Botanik der Eidg. Technischen Hochschule.

Only one or two specimens were studied anatomically in the case of species with restricted distributions or those which were represented by only a few herbarium sheets. On the other hand, for the more variable and widespread species up to as many as 15 specimens per species were used for study. The actual specimens examined and the herbaria in which they are located are listed below in alphabetical order of the species. In each case both the leaf and floral material were studied. An asterisk (*) following the citation indicates that the specimen has been used for the illustration of that particular species.

- Blumea adenophora** Franchet. China: *Delavay 842** (P, type).
Blumea angustifolia Thwaites. Ceylon: *Thwaites C. P. 691** (CAL, GH, P, type collection).
Blumea arfakiana Martelli. New Guinea: *Brass 7306* (GH, L); *Clemens 6024** (GH); *Versteeg 1057* (L, U).
Blumea arnakidophora Mattfeld. New Guinea: *Carr 14536* (L); *Clemens 5421 A** (GH, isotype).
Blumea aromatica (Wall.) DC. Nepal: *Wallich 3054/164** (E, GH, P, type collection). China: *Henry 10127* (MO, NY, US).
Blumea balsamifera (Linn.) DC. India: *Raizada 18540* (DD). China: *Lau 1258* (GH, NY). Philippines: *Williams 2305** (NY, US). Borneo: *Elmer 20086* (GH, MO, U, UC).
Blumea barbata DC. India: *Wight 528** (E).
Blumea belangeriana DC. India: *Randeria 585** (BLAT).
Blumea bicolor Merr. Philippines: *Bur. Sci. 30784 Ramons and Edaño** (L, NY).
Blumea bifoliata (Linn.) DC. India: *Meebold 10647* (E); *Mooney 2210* (DD); *Wallich 3092/202b* (GH); *Wight 1425** (E, NY, P, type collection).
Blumea bovei (DC). Vatke. Abyssinia: *Schimper 1842** (GH, L, NY, P).
Blumea bullata Koster. Java: *Blume s.n.** (L, P, type collection).
Blumea cafra (DC.) O. Hoffm. Madagascar: *Humbert and Swingle 5423* (GH, NY, P, US). S. W. Africa: *Rodin 2145** (UC, US).
Blumea clarkei Hook. f. China: *Ging 7075** (UC); *Lau 5289* (GH).
Blumea crinita Arn. Ceylon: *Walker s.n.** (E).
Blumea densiflora (Wall.) DC. India: *Jenkins s.n.** (CAL); *Wallich 2997/107* (E, GH, type collection). Indochina: *Harmand 1329* (P).
Blumea diffusa R. Br. ex Benth. Australia: *Specht 743** (L, US).

- Blumea eriantha* DC. India: *Randeria* 593* (BLAT).
- Blumea fistulosa* (Roxb.) Kurz. Burma: *Brandis* 760 (DD). China: *Cavalerie s.n.* (GH); *Sampson* 12815 (GH). India: *Wallich* 2076/186 (GH). Indochina: *Chevalier* 1263 (UC). Nepal: *Wallich* 3002/112* (E, GH); *Wallich* 3055/165 (GH); *Wallich* 3055/165c (E).
- Blumea hieraciifolia* (D. Don) DC.
 var. *hieraciifolia*. China: *Lau* 4082 (US); *Levine* 324 (GH, MO, US). India: *Wight* 1433* (E, NY, P). Philippines: *Elmer* 11139 (L, MO, US).
 var. *macrostachya* (DC.) Hook. f. India: *Clarke* 27018 F (CAL); *Griffith* 3160 (GH, L). Indochina: *Mouret* 178 bis (P).
 var. *flexuosa* comb. nov. Ceylon: *Thwaites C. P.* 19 (CAL, GH, P, type collection).
 var. *hamiltoni* (DC.) Clarke. Nepal: *Wallich* 2938/48 (E, GH, L, NY, P).
- Blumea integrifolia* DC. Australia: *Specht* 1052* (GH, L).
- Blumea junghuhniana* (Miq.) Boerl. Java: *Junghuhn* 366* (L, U, type collection); *Reinwardt s.n.* (L).
- Blumea korthalsiana* (Miq.) Boerl. Sumatra: *Korthals s.n.** (L, type collection).
- Blumea lacera* (Burm. f.) DC. China: *How* 70531 (GH, NY, US). India: *Watt* 5823 (CAL). Java: *Zollinger* 305* (P).
- Blumea laciniata* (Roxb.) DC. India: *Dudgeon & Kenoyer s.n.* (MO); *Hamilton* 1901 (E). Indonesia: *No coll. s.m.* (P). New Guinea: *Docters van Leeuwen* 10600* (L). Philippines: *Elmer* 5621 (P).
- Blumea lanceolaria* (Roxb.) Druce. Ceylon: *Thwaites C. P.* 1744 (CAL, E, GH, P). India: *Wallich* 3025/135* (DD, E, GH); *Wallich* 3026/136 (GH); *Wight* 439 (E, UC). Java: *Zollinger* 2341 (P, U). Philippines: *Elmer* 8231 (NY); *Bur. Sci.* 46679 *Ramos & Edaño* (NY, UC). Sikkim: *Native coll.* 656 (GH).
- Blumea malcolmii* (Clarke) Hook. f. India: *Wight s.n.** (E).
- Blumea manillensis* (Less.) DC. Philippines: *Foxworthy* 92* (GH, US); *Merrill* 10642 (HK, L, NY, US).
- Blumea martiniana* Vaniot. Siam: *Poilane* 17218* (P).
- Blumea membranacea* (Wall.) DC. India: *Wight* 526* (E).
- Blumea milnei* Seem. Solomon Islands: *Kajewski* 1640 (GH, L). Fiji: *Milne* 273 (GH, P, type collection); *Smith* 5491* (GH, US).
- Blumea mollis* (D. Don) Merrill. China: *Po* 12390 (UC). India: *Drummond* 26143 (E); *Stewart* 1677 (E). Indochina: *Chevalier* 2663* (P). Philippines: *Bur. Sci.* 2074 *Ramos* (MO, NY, US).
- Blumea napifolia* (Wall.) DC. Siam: *Zimmermann* 99* (L, MO, U, US).
- Blumea obliqua* (Linn.) Druce. India: *Cleghorn s.n.* (E); *Raizada s.n.* (DD); *Wight* 1423* (E, NY).
- Blumea oxyodonta* (Wall.) DC. Burma: *Kurz* 906 (CAL.). China: *Henry* 11915 (NY). India: *Clarke* 38724 B (US); *Hamilton* 1396 (E); *Stocks, Law, s.n.* (E, P); *Wight* 1436* (E, NY, P, type collection); *ex De Candolle herb.* (P). Indochina: *Pételot* 2092 (GH, MO, NY, UC, US).
- Blumea pachycephala* Koster. Java: *Radermacher s.n.** (L, type collection).
- Blumea papuana* S. Moore. New Guinea: *Versteeg* 1098* (GH, L).

Blumea procera (Wall.) DC. China: *Henry 10979 A* (HK, NY). India: *Wallich 3050/140** (GH, type collection).

Blumea ramosii Merrill. Philippines: *Clemens 17261** (NY, UC).

Blumea riparia (Bl.) DC.

var. *riparia*. India: *Meebold 6060* (E). Indochina: *Pételot 1233* (UC). Java: *Kuntze 5207* (NY); *Zollinger 230* (GH, L, P). Malaya: *Wallich 3043/153* (GH). Philippines: *Reillo 16289* (P, US). Sumatra: *Bartlett & La Rue 452** (GH, L, UC, US).

var. *megacephala* var. nov. China: *Forrest 26210* (NY, US); *Henry 10979* (GH, HK, MO, US, type collection); *Tsang 20690* (GH, L, MO, NY, UC, US).

Blumea sagittata Gagnep. China: *Cavalerie 3631** (P, type).

Blumea saxatilis Zoll. & Mor. Australia: *Mueller s.n.* (GH). Indochina: *Couderc s.n.* (P); *Thorel 3188* (P). Java: *Junghuhn 310* (L, U); *Junghuhn 332* (GH, L); *Zollinger 2233** (L, P, U, type collection). New Guinea: *Brass 5832* (GH, NY). Philippines: *Clemens 17514* (NY); *Clemens 19029* (NY, UC); *For. Bur. 5874 Curran* (US); *Loher 3631* (US); *Merrill 9397* (GH, L, MO, NY, P, US); *Bur. Sci. 42463 Ramos* (U); *Bur. Sci. 30648 Ramos & Edaño* (GH, UC, US).

Blumea sessiliflora Decaisne. China: *Brigham s.n.* (GH); *Lau 921* (NY). Timor: *Richard s.n.** (P, type collection).

Blumea stenophylla Merr. Philippines: *Bur. Sci. 43281 Ramos** (UC, type collection).

Blumea sylvatica (Bl.) DC.

var. *sylvatica*. Java: *No Coll. s.n.* (L).

var. *macrophylla* (Bl.) Randeria. Java: *Blume s.n.** (L, P, type collection).

Blumea tenella DC. Java: *Bakhuizen van den Brink Jr. 2679* (U), *5587** (L, UC). New Guinea: *Brass 7887* (L).

Blumea vanoverberghii Merr. Philippines: *Vanoverbergh 1065** (GH, L, MO).

Blumea virens (Wall.) DC. India: *Wallich 3038/148* (E, GH); *Wight 1430** (E, type collection), *1431* (CAL, E, UC).

Blumea veronicifolia Franchet. China: *Delavay 800** (P, type).

B. Methods

1. Laboratory Techniques

For the anatomical studies whole mounts of the leaves, phyllaries and florets were made according to the clearing technique described by Foster (1949). The materials were soaked overnight in a 5 % solution of NaOH at room temperature. When optimum clearing was obtained, they were washed with distilled water to remove the base, bleached in a 20 % aqueous solution of commercial Chlorox and rinsed again in water. Preparatory to staining, the bleached materials were soaked in a 5 % solution of lactic acid which seems to produce a more uniform staining. They were then immersed in 3 % ferric chloride and 1 % tannic acid (sodium salicylate, 1 g/100 cc, added to prevent fungal growth) until the tissues were dyed a dark bluish-black. The treatment with each reagent was followed by a thorough rinsing

in water. Dehydration was carried out in an ethyl alcohol series and the materials mounted in colourless diaphane.

Wood preparations were made utilizing the maceration technique: portions of dried stems were macerated for about 18 to 24 hours in a mixture of equal parts of 10 % nitric acid and 10 % chromic acid. The acids were removed by washing in water and the tissue then rinsed in 50 % alcohol. The material was next stained in safranin (1 % solution in 50 % alcohol) for three to four hours and the excess stain washed off in water. Differential staining and dehydration were carried out by running through an ethyl alcohol series (up to 95 %) and the material then counter-stained with fast green (1 % solution in 95 % alcohol) for 10 to 15 seconds. Washing and dehydration were completed with 95 % and absolute alcohol. After that the material was carefully teased out on a slide and mounted in diaphane. The tracheary elements with lignified walls are stained red or deep purple and the ray parenchyma and other thin-walled cells are dyed bright green.

Two staining techniques were used for pollen grain mounts depending on the type of data sought. The initial stages of preparation were, however, identical for both procedures. The dried florets were first soaked in hot water to soften them and the anthers then carefully dissected out on a slide. The pollen grains were liberated by crushing the anthers in a few drops of absolute alcohol and the slide warmed gently to evaporate the excess alcohol. At this stage, the pollen was ready for staining.

In order to study the comparative morphology and the sculpturing pattern of the grains, best results were obtained by staining and mounting them in glycerine jelly tinted with a small quantity of acid fuchsin. On the other hand, to study the relative abortion, the pollen grains were stained according to the technique described by Gerstel and Riner (1940). Best differentiation was obtained by warming the mounts slightly as soon as they were made and then allowing them to stand for 2 to 3 days.

2. Methods of Presentation

The systematic treatment of *Blumea* to be presented here consists of the original description of the genus by De Candolle (1833) and the detailed diagnosis prepared with the aid of the data subsequently secured. This is followed by an artificial key to all the species and the diagnoses of the 7 sections into which the genus is here subdivided.

The treatment of each section includes a key to the species contained in it. In the discussions of the individual species, the valid binomial with its author, place, and date of publication precedes the list of synonyms. The constructions of Article 46 and Appendix 5 of the International Code of Botanical Nomenclature, Utrecht 1956, have been adhered to in the bibliographic citations given after the name or synonym of every species.

As far as possible, consistency in sequence and terminology has been maintained for the actual descriptions themselves. All measurements have been made from herbarium sheets and are given in metric units. The terminology used to describe the degree of pubescence of the stems and the leaf surfaces has been based on that illustrated by Lawrence (1951, pp. 746, 747). The type locality, the flowering period, the geographic distribution

and habitat, the list of specimens examined and remarks on the affinities and relationships of the taxon under consideration conclude the treatment.

In addition, the distribution of each species within a section has been plotted on an outline map and line drawings showing the pertinent characteristics of the species are also provided. The drawings were made from permanent mounts described above with the aid of a microprojector. In the drawings of the bisexual florets, the anthers generally appear to be separated unlike the syngenesious condition typical of the composites. It must be pointed out here that this is an artifact due to the clearing technique and to the pressure of the cover glass in the process of making the slides permanent.

TAXONOMIC HISTORY OF BLUMEA

In tracing the history of the genus *Blumea* two main trends are apparent. As with other variable species with widespread ranges, numerous species of *Blumea* have been subjected to extensive "lumping". On the other hand, as more and more areas of the world are being botanized, new species are being constantly added to the list, but these species are often narrow endemics and known from a few or sometimes only one collection.

Curiously enough, even though the genus became known to the botanical world as late as 1790, some species of it had been recognized and even mentioned in literature as far back as the beginning of the 17th century. Fraser (1895) reports that *Blumea balsamifera*, then known under its Chinese name *ngai*, was described in detail in Li-Shi-Chen's Great Materia Medica dated about 1600 A. D. In addition to this, three or four other species were known to and economically used by the Indians, Malaysians and Chinese for the past four or five centuries (Burkill 1935).

As mentioned above, its status as a separate genus was first recognized in 1790, by Loureiro in his Flora Cochinchinensis. He gave it the generic name of *Placus* (which name was later displaced), basing it on two species, *P. tomentosus* and *P. laevis*. Previous to that time and even subsequently, its species had been described under *Conyza*, *Baccharis*, *Pluchea*, and other related genera by Linnaeus, Lamarek, Blume, Wallich, Wight *et al.*

It was not until 1833 that A. P. De Candolle gave the genus its present name *Blumea* in honour of C. L. Blume, the celebrated Dutch botanist and the author of many works on the East Indian flora. In erecting this genus and separating it from *Conyza* Less. (under which name Blume had previously recognized several species), he took into consideration such characters as the type of achene and the habit.

A. P. De Candolle was then working principally with the Indian species collected by various botanists in the service of the British East India Company. Nineteen species were initially described in Wight's Contributions to the Botany of India (1834) and two years later seventy-three more were added in the Prodrromus Systematis Naturalis Regni Vegetabilis (Vol. 5). *Blumea* was placed in the tribe Asteroideae and division Plucheeinae, its affinities being with *Phagnalon*, *Erigeron*, *Lannecia* and *Pluchea*. No type species was denoted with the original description of the genus. It must be pointed out here that while De Candolle described this

large number of species, as far as is known he never examined a single living plant of the genus. Also most of his descriptions were based on one, two, or sometimes several collections and this is perhaps the reason why he had so many separate species. Later on, as more and more material has been collected and studied, the distinctions between many of De Candolle's species have become obscure resulting in an extensive lumping of these entities.

De Candolle divided the genus into two series, the Apteræ with leaves not decurrent and the Caulopteræ with the leaves distinctly decurrent. The former series was the larger one of the two and further divided into 8 subseries while the latter had only 2 subseries. He used such characters as the degree of incision of the leaves, the pubescence, the inflorescence type, the habit, the colour of the pappus, the type of receptacle and others. Most of these are even used at present to subdivide this vast and variable genus.

Ten years later in 1843, Schultz-Bipontinus made the first change in the nomenclature and concept of the genus. He segregated the series Caulopteræ of De Candolle and raised it to generic rank. The new genus he named *Laggera*, which was separated from the rest of the assemblage in having decurrent leaves and in lacking anther tails. Continuing with his work on the classification of the composites, Schultz-Bipontinus made many further modifications and his treatment is the one essentially followed by Miquel in the *Florae Indiae Batavae* (1856).

Blumea DC. (in part) and *Pluchea* Cass. (in part) were united under *Conyza* Linn. *ex parte, non* Lessing. This taxon in its new sense together with *Laggera* was placed in the division Euconyzeae, subdivision Conyzeae legitimæ. In addition, Schultz-Bipontinus erected another genus, *Doellia*, included under its subdivision Doelliae. This was characterized by a biseriata pappus as contrasted with the uniseriate type of the Conyzeae legitimæ. However, in his diagnosis of *Doellia*, Schultz-Bipontinus appears to be in considerable doubt as to the validity of the genus, admitting the possibility that it was perhaps synonymous with *Blumea*. That this is so has been shown by later workers: the two species *abyssinica* Sch.-Bip. and *senecioides* Edgew. referred by Schultz-Bipontinus to *Doellia* are good members of *Blumea*.

The treatment of Achille Richard (1847) resembled that of De Candolle in that *Blumea* was still retained in the tribe Asteroideae occupying a position between *Conyza* and *Phagnalon*. He, however, expanded the generic concept of *Blumea* to include *Pluchea*, for, according to him, the two were very closely related and there was considerable overlap in the traditional characters theretofore used to separate them.

Bentham (1873) transferred the genus from the tribe Asteroideae to the tribe Inuleae, subtribe Plucheineae. In making this change he was influenced by the tailed anthers and the linear, obtuse, inappendiculate style arms. Subsequent workers including Hoffman (1897) have retained this placement unchanged. Bentham also reduced *Placus* Lour. and *Doellia* Sch.-Bip. to synonyms of *Blumea* and rejected the name *Conyza* Linn., that designation belonging more rightly to Lessing's genus. The generic status of *Laggera*, however, was maintained.

In his *Compositae Indicae* (1876), C. B. Clarke essentially complied with Bentham's treatment of the various genera involved. His disposition of the species, however, differed considerably from that of De Candolle. For the first time, the number of species was drastically reduced and also somewhat regrouped. He divided the Indian members of the genus into three sections: (1) *Minusculae*, including small herbs with the capitula either fasciculate or in narrow panicles; (2) *Scandentes*, including scandent herbs; and (3) *Majusculae*, including perennials with the heads in large corymbose panicles. Under these categories were included De Candolle's series based on most of the same characters used in the *Prodromus*.

Very little work involving the genus as a whole or a large number of its species has been done subsequent to Hoffmann's treatment (1897). Various authors working on regional floras, have from time to time, worked on the taxonomy of the species inhabiting their particular areas. Among these may be cited Bentham (1861, 1866), Thwaites (1864), Hooker (1882), Boerlage (1899), Koorders (1912), Merrill (1923), Gagnepain (1924), Mattfeld (1929), Kitamura (1935), Craib (1936) and Koster (1953). Most of them while recognizing the difficulty of establishing the species limits, have continued to use, with but few modifications, many of the characters employed by earlier workers. However, increasing attention has been progressively paid to the problem of possible hybridization between varieties and also between species.

The final major change in the taxonomy of the group was brought about by Gagnepain in 1920. Until that time, the species *Blumea flava* DC. had been shuttled back and forth between *Blumea* and *Laggera* by various workers, the reason for this being that it was more or less intermediate between the two genera. Whereas it has tailless anthers, a character in keeping with *Laggera*, its leaves are not decurrent, this being more typical of *Blumea*. Gagnepain erected a new genus, *Blumeopsis*, to accommodate this intermediate species.

Concurrently with all these changes, many new species have been described. A large number of these are from China, Malaysia and the Pacific Islands and a few others from parts of Africa and Australia.

The Sixth International Botanical Congress, Amsterdam 1935, accepted for conservation the generic name *Blumea* DC. over *Placus* Lour., its earlier homonym. *Blumea balsamifera* (Linn.) DC. was designated as the type species. This was, needless to say, a most opportune and necessary event in *Blumea* classification, for without it the nomenclature of the group, already overloaded with countless names and synonyms, would have been practically impossible.

RELATIONS WITH OTHER GENERA

Systematically *Blumea* belongs to the tribe Inuleae and subtribe Plucheinae of the family Compositae. The Inuleae form a natural group, distributed for the most part in the Old World and characterized by alternate leaves, heterogamous capitula, either rayed or disciform (rarely homogamous or dioecious), sagittate or caudate anthers always with an apical appendage to the connective, predominantly yellow corollas, and linear, obtuse and inappediculate style arms of the hermaphroditic florets.

The subtribe Plucheinae includes up to 18 genera (or less, according to the concepts of various workers) and it is in this assemblage that the closest affinities of the genus *Blumea* lie. The Plucheinae occur in both the Old and the New Worlds and are abundant in the tropical as well as in the temperate zones. Phytogeographically they are of some interest in that none of the genera are represented in Europe. The larger genera occur in both hemispheres; the smaller ones are more or less endemic and have restricted ranges. The characters that differentiate the Plucheinae from the rest of the subtribes of the Inuleae are as follows: heads heterogamous, usually with multiseriate marginal female florets, involucrel bracts generally dry and scarious, receptacle epaleaceous, corollas of the female florets usually tubular-filiform, rarely bilabiate or ligulate, hermaphroditic florets few, tubular, and anthers tailed, with the exception of *Laggera*.

Further division of the Plucheinae into genera has been achieved chiefly on the basis of differences in the pappus and other individual characters of the capitula, florets, and phyllaries. The same general trend for delimiting genera by single or very few characters seems to characterize the entire Compositae and other families like Gramineae, Cruciferae and Umbelliferae.

Most of the main distinguishing features of the 18 genera of the subtribe Plucheinae are tabulated in the following chart. The data used for the table have been drawn from various sources in the literature (Bentham 1873; Bentham and Hooker 1873; Clarke 1876; Hoffman 1897; Small 1917; Cronquist 1955) except for six genera (*Blumea*, *Blumeopsis*, *Laggera*, *Pluchea*, *Pterigeron* and *Nanothamnus*) which were studied first hand from dried material (Plate I).

Table 1 — Comparison of genera of the Plucheinae

	Stenachaenium *	Blumea	Blumeopsis	Laggera	Pluchea	Tessaria	Pechuel-Loeschea **	Sachtsia *	Rhodogeron **	Pterigeron *	Thespidium **	Coleocoma **	Denekia *	Nanothamnus **	Epaltes	Sphaeranthus	Pterocaulon	Monarrhenus *
Predominantly herbaceous .	x	x	x	x				x	x	x	x	x	x	x	x	x	x	
Predominantly shrubby					x	x	x											x
Leaves not decurrent		x	x		x	x	x	x	x	x	x	x	x	x				x
Leaves decurrent	x			x	[x]										x	x	x	
Heads solitary many-flowered	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Heads compound few-flowered																		x
Pappus present	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x
Pappus absent														x	x	x	x	
Pappus setaceous	x	x	x	x	x	x	x	x	x	x	x							x
Pappus otherwise												x	x					
♀ florets tubular	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x
♀ florets 2-lipped														x				
♀ florets filiform	x	x	x	x	x	x	x	x		x	x	x			x	x	x	x
♀ florets ligulate									x	x			x					
Anthers tailed	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x
Anthers tailless			x	x														

* = narrow endemic genera; ** = endemic and monotypic genera; x = positive for the character indicated; [x] = positive but less frequent condition.

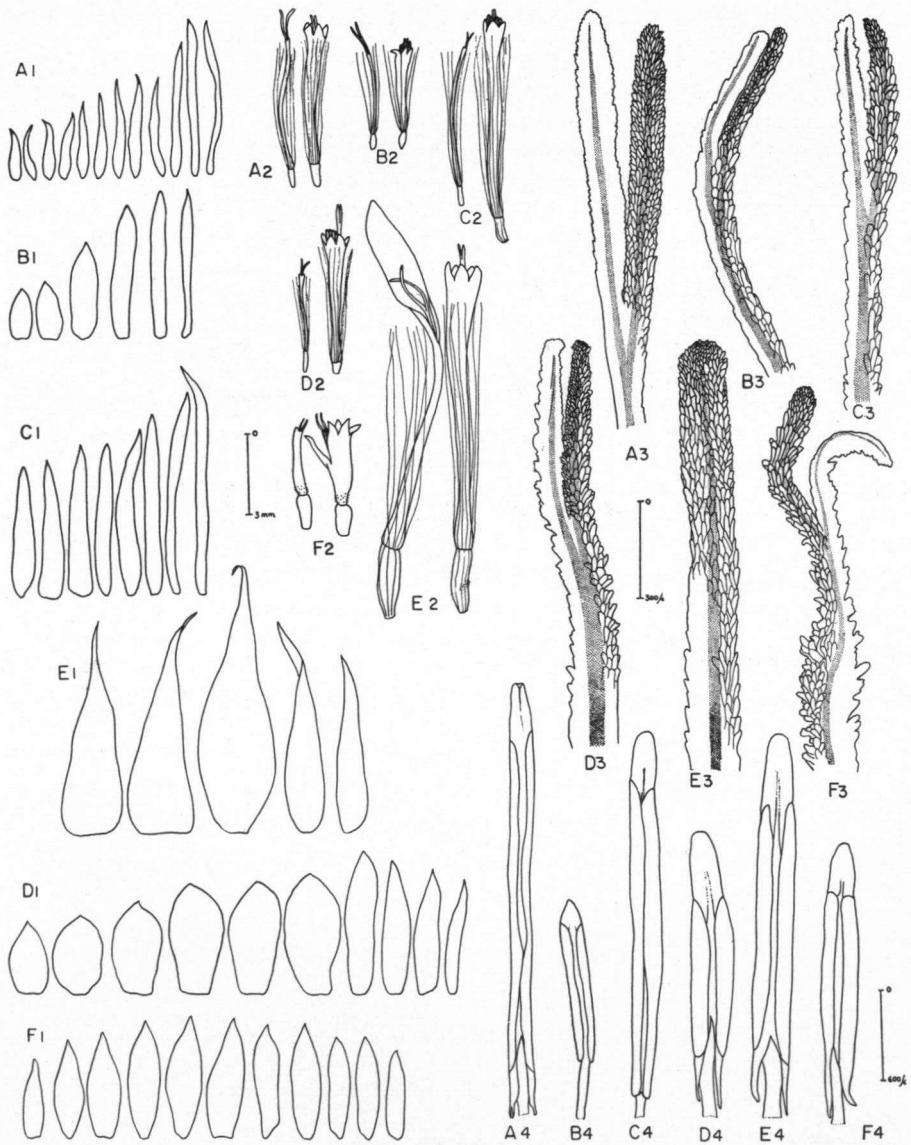


PLATE 1. — Floral structures of certain genera of the Pluceinae. A. *Blumea balsamifera* (Linn.) DC., Philippines, Mindanao, Williams 2305 (NY). B. *Blumeopsis falcata* (D. Don) Merr., China, Hainan, Liang 66495 (GH). C. *Laggera purpurascens* Sch.-Bip., Abyssinia, Schimper 153 (NY). D. *Pluchea odorata* Cass., U.S.A., Florida, O'Neill s.n. (MICH). E. *Pterigeron latroides* Benth., Australia, Maiden s.n. (MICH). F. *Nanothamnus sericeus* T. Thoms., India, Bombay, Santapau 10047 (BLAT). — For each genus, 1 represents phyllaries arranged from outermost series to innermost, 2 florets- female at left, bisexual at right, 3 style arms of bisexual florets, 4 anther.

The three genera that are farthest removed (i. e., most distinct) from *Blumea* are *Sphaeranthus*, *Pterocaulon* and *Monarrhenus*. These are separated from the rest of the subtribe by their capitula which are few-flowered and aggregated in globose secondary heads. Of the three, *Monarrhenus* is endemic to Madagascar and the Mascarene Islands, its species are shrubby and its leaves not decurrent, while *Sphaeranthus* and *Pterocaulon* are more widespread (pantropical), predominantly herbaceous and with winged stems.

Thespidium, *Coleocoma*, *Nanothamnus*, *Denekia* and *Epaltes* are all separable from the *Blumea-Laggera-Pluchea* group by their pappus characters plus corolla forms. With the exception of *Epaltes*, all the rest are narrow endemics, the first three being monotypic and *Denekia* having only two species. Conceivably, these genera are then specialized offshoots from the main line.

Four of the remaining genera are entirely New World in their distribution: *Stenachaenium*, which stands completely apart from the rest in its achenes and biseriate pappus; *Tessaria*, which is very close to *Pluchea* in its shrubby habit and coriaceous phyllaries; *Sachsia*, a perennial herb; and *Rhodogeron*, which is the only member of the subtribe with truly ligulate female florets. *Pterigeron*, an Australian endemic, shows an intermediate condition in that some of its species have ligulate female florets and others have tubular ones probably by a loss of the ray portion.

This leaves, with the exception of *Pechuel-Loeschea*, a South African member, the very closely related group of *Blumea*, *Blumeopsis*, *Laggera* and *Pluchea*. *Laggera* and *Blumeopsis* perhaps have the closest affinities with *Blumea*. As a matter of fact, species of the three were originally described by De Candolle altogether within the last genus and this occurs again and again in the nomenclatural literature of the group. Traditionally, *Laggera* is distinguished from *Blumea* by its obtuse anther bases and decurrent leaves as opposed to the tailed anther-bases and non-decurrent leaves of the latter. Whether or not these two entities are natural ones is open to considerable doubt; the presence of decurrent leaves is a feature that repeatedly appears throughout the subtribe and in one genus (*Pluchea*) there are species with one type or another. Moreover, *Blumeopsis* is exactly intermediate between the two genera; it has tailless anthers like *Laggera* and leaves which are not decurrent, a feature that is more characteristic of *Blumea*.

Pluchea is the second largest genus in the subtribe and one that is also very closely related to *Blumea*. Many of the *Pluchea* species, however, are distributed over North and South America, the rest occurring in Asia, Africa, and Australia. The genus, on the whole, differs from *Blumea* in possessing a more shrubby habit, corymbose inflorescences, broader, more coriaceous involucre bracts, and the central florets usually sterile with undivided styles. The individual characters of the two genera, however, overlap somewhat. In their ecological habitats the two are very well separated, the *Pluchea*s usually growing in salt marshes and the *Blumea*s usually in upland habitats. Species of *Pluchea* appear to be definitely less variable than those of *Blumea*, but the anatomical and morphological trends observable in the latter also occur, with but slight modifications, in the former.

It is quite evident that in order to derive any phylogenetic correlations from the above data, three distinct series of evolutionary trends have to be studied: the first, in the entire Compositae from the hypothetically most primitive to the advanced conditions; the second as exemplified by the subtribes of the Inuleae, and the third within the genera of subtribe Plucheinae.

As far as the family Compositae is concerned, there has been divided opinion in the literature as to the nature of its progenitor. Arguments have been put forward for a Senecionoid ancestry (Small 1917 *et seq.*) and suggestions have also been made for a Vernonioid (Augier & Du Merac 1951), a Cyanoroid (Leonhardt 1949) and perhaps even a Mutisoid (Carlquist 1957) ancestry. However, most of the authors in the field (Cassini 1834, Bentham 1873, Bessey 1915, Hutchinson 1916, Cronquist 1950, 1955) are strongly of the opinion that the present day Heliantheae come closest to the probable hypothetical progenitor of the group and this is further supported by the work of Wodehouse (1928) on pollen morphology.

Cronquist (1955, p. 480) explains and summarizes very well the traits of this primitive composite: "A study of either the ancestry or lines of development within the Compositae necessarily involves a consideration of what are the more primitive characters within the group. Whatever hypotheses are held as to the relationships of the Compositae, it seems obvious that they are derived from sympetalous, epigynous ancestors, that the head is a condensed inflorescence and that both the involucre and receptacular bracts are modified leaves. Bearing these and other facts in mind, the following features are here suggested as being primitive within the group:

1. Habit herbaceous; 2. Leaves opposite; 3. Heads few, each with many flowers; 4. Involucre leafy, several-seriate; 5. Receptacle chaffy; 6. Rays present, pistillate, fertile; 7. Disk flowers perfect, fertile; 8. Lobes of the disk corollas with well-developed midveins; 9. Corollas yellow, the pigments wholly or partly carotinoid; 10. Pappus chaffy, of 5 members; 11. Anthers connate, not tailed; 12. Stigmatic portion of the style branches not clearly differentiated or the branches largely stigmatic within".

From this primitive type of composite, then, the Inuleae have been evolved by a change to alternate leaves, reduction of the involucre bracts from leafy to scarious, gradual loss of paleae and rays, and the development of a setose pappus and anther tails.

A general survey of the characters of the subtribes within the Inuleae on the other hand, shows three entirely contrary phyletic trends on the basis, at least, of the principle that primitive characteristics tend to be repeated in different lines. The setose pappus appears to be more primitive than any other type as also does the absence of paleae on the receptacle and the tailed condition of the anthers which exists in all but three genera (*Laggera*, *Phagnalon*, and *Phacellothrix*).

Coming to the Plucheinae itself one more contrary trend is added to those listed above. The ligulate type of corolla for the female florets now appears to be an advanced feature for the group on the basis of the common ground plan.

These diametrically opposite phylogenetic trends then can and do create

a confusion in our thinking of the natural relationships within the group. They may probably be ascribed to two main causes: first, that no evolutionary change is necessarily irreversible and second, that parallel evolution may occur repeatedly and independently in widely separated species, genera and tribes of the family.

Cronquist (1955, p. 493) points out that "the tangled pattern of apparent relationships within the family is doubtless due to the difficulty of distinguishing between similarities of common descent and similarities due to parallelism" and it is on this ground that he refutes the relationship of the Inuleae to the Astereae through the genera *Blumea-Pluchea* and *Conyza*, a relationship which was believed to be valid by both Bentham and Hoffmann.

Be that as it may, bringing together the data and all the conflicting evidence, it appears that the Plucheiinae are a very closely knit group, the immediate, hypothetical prototype of which was very likely a perennial, herbaceous species with many-flowered, simple heads, non-decurrent leaves, filiform female florets, and anthers that were probably tailed at the base. From this type, the closest present affinities of which are with the three genera *Pluchea*, *Laggera*, and *Blumea*, the others arose by a change in habit, loss or modification of the pappus, aggregation of the heads, and various modifications in the form of the corollas.

GEOGRAPHIC DISTRIBUTION AND ECOLOGY OF BLUMEA

Blumea is exclusively a tropical and subtropical genus with its range lying between 35° north and 35° south of the equator. It is distributed from Africa through S. E. Asia and New Guinea to Australia and the Pacific Islands extending as far east as Hawaii. It is probably native to Africa, Asia, New Guinea and perhaps even Australia. In some of the Pacific Islands, it is possibly introduced. In Hawaii there seems to be, in fact, no question of its having been introduced. Only one species is known to occur there and even this has been reported fairly recently since the publication of the excellent flora of Hillebrand (1888). There are no representatives of *Blumea* in Europe or in the Americas.

The bulk of the species of *Blumea* occur in S. E. Asia which seems most likely to be the centre of origin. Certainly at least it is the centre of diversity of the genus. Also many of the species in this area are extremely variable. Some of their variability is definitely due to the environment, but a large share of it is probably attributable to inter-specific hybridization for both the ranges and the flowering periods of many of the species overlap.

No one species is distributed over the entire present range, but *Blumea lacera* (Burm. f.) DC. and *B. mollis* (D. Don) Merr. come very close to it, occurring all the way from Africa to Australia. The rest of the African species are endemic. The Australian and Micronesian species, on the other hand, are very closely inter-related with the Asiatic members. The data on geographic distribution of the species is summarized in the following table.

	Hawaii	1	0	0
	Pacific Islands	4	0	0
	Australia	6	2	33.3%
	New Guinea	13	2	15.4%
	Indonesia	18	2	11.1%
	Philippines	19	4	21.0%
	Ryukyus	4	0	0
	Formosa	6	0	0
	China	20	2	10.0%
	Indochina	19	0	0
	Malaya	6	0	0
	Burma	18	0	0
India	North-West	10	0	0
	North-East	19	0	0
	South	17	3	17.6%
	Ceylon	9	2	22.2%
	Africa	4	2	50.0%
Total spp. occurring in				
Species endemic to				
Percentage endemism				

Table 2. — Distribution of *Blumea* species.

The term endemism is used above in its most restricted sense as applying to species known from only one geographic area.

All species of *Blumea* are mesophytes growing at altitudes from sea level to 3000 m above. These species may occupy diverse types of habitats. The predominantly montane species generally grow as undergrowth plants in or on the edges of evergreen rain forests whereas the rest of the members are usually second-growth plants invading disturbed areas such as along roadsides, in clearings, along railway lines, in old fields, etc. Such species are often weedy and show the maximum degree of variability coupled with maximum adaptability to their environment.

CRITERIA FOR THE DETERMINATION OF RELATIONSHIPS WITHIN BLUMEA

As has been pointed out earlier, only the external morphological features have been used up to the present time for the delimitation of taxonomic categories in *Blumea*. Since these features may sometimes be somewhat subjective, quite variable, and often correlated with edaphic changes, they have been added to and supplemented in this study by the data obtained from anatomical observations. It must be pointed out at the outset that there is no one single criterion that can be applied throughout the genus. The groups of species are separable from other groups of species only by whole sets of characters and, moreover, the characters composing these sets differ from one instance to the next. The criteria investigated and used in this revision are discussed below.

1. Habit (*Plate II*).

Of the 49 species of *Blumea* recognized here, 35 are strictly herbaceous, either annuals or perennials or rarely biennials; the rest are perennial undershrubs to shrubs, in a few species reaching up to 3 to 4 m in height.

Several habit modifications are to be found among the herbaceous species. A majority of them are erect, generally branched or sometimes simple; a few others like *Blumea diffusa*, *B. saxatilis*, *B. bifoliata*, *B. bovei*, *B. adenophora*, *B. tenella*, and *B. veronicifolia* have ascending stems radiating out from a common rootstock; *B. oxyodonta* is completely prostrate except for the inflorescence axes, and still others, like *B. manillensis* and some forms of *B. hieraciifolia*, have a short, erect caudex with radical leaves and a more or less scapose aerial stem.

The group of the exclusively perennial species does not show as much variation in habit. With the exception of *B. riparia* and *B. procera* which are either straggling or climbing, all the rest are erect, generally branched and somewhat woody at the base.

2. Roots.

Unless the study is made in the field and first-hand, it is inevitable that the data on root morphology should be incomplete. Such has been the case here: only the root systems of some of the herbaceous species could be studied. Due to inadequate collection, no such data were available for the rest of the members of the genus. In spite of this, the existing information

is included here in the hope that when more knowledge is accumulated on the subject, it should prove to be of some significance.

The root systems of the herbaceous species studied show two conditions. Members with prostrate or ascending stems in general have a prominent tap root and the length of this seemingly varies with the habitat of the plant. Of the fifteen erect species studied, seven have a fibrous root system, while the other eight have tap roots. It is interesting to note that the species with fibrous roots generally grow in damp, shady localities; the tap-rooted ones, on the other hand, usually occupy drier habitats like grasslands, roadsides, clearings, etc.

3. Indumentum (*Plate III A*).

All species of *Blumea* are pubescent to a greater or lesser extent and this pubescence occurs on both the vegetative organs (stems and leaves) as well as on the floral parts (inflorescence axes, phyllaries, receptacles, corollas and ovaries). It is not surprising then that the relative degree of pubescence has long been used as a taxonomic character in the group. In spite of the fact that this feature is quite variable, often even within a single species, if used judiciously it still appears to be of considerable value.

The vestiture types on the vegetative organs show a complete range from the glabrate to the lanuginose conditions and the following terms or combinations thereof have been used to describe them in the species diagnoses: glabrate, puberulous, tomentose, velutinous, pilose, villous, sericeous, lanuginose (woolly), scabrous, strigose. The concepts of these terms as used in this work have been based on the illustrations given by Lawrence (1951, pp. 746, 747). The terms have often been supplemented by the two adverbs "densely" and "sparsely" to denote the relative abundance of the particular type of pubescence.

The structure and morphology of the individual trichomes is just as diverse as the overall pubescence pattern. A representative sample of the various types of trichomes is illustrated in *Plate III A*. With the exception of the simple unicellular types which occur mostly on the corolla lobes, the rest may be found on all the organs enumerated above.

On any part of the plant body, the indumentum may be composed of only one type of hair or a combination of two or even three types. However, apart from differences in size, the morphology of the trichomes on any particular organ remains constant from species to species and provides a valuable taxonomic character.

On the basis of their function and structure, these trichomes can be divided into two broad categories.

a. **Glandular** (*Plate III A, 1—4*): The glandular hairs are multicellular and the secretions from these are most probably responsible for the characteristic odour of some of the species. In their fresh state and even in the dried material, they appear as turgid, dark brown, glistening spots. These glands may be either clavate and stipitate with a biseriate stalk and a secretory head, or they may be essentially "sessile". The sessile glands were termed "colleters" by Hanstein (1868) and they are so called in this study.

b. Non-glandular (*Plate III A, 5—15*): These are seldom unicellular or usually multicellular with the terminal cell the longest. When multicellular, the base is either composed of a single cell generally flush with the epidermal surface or it is several celled, prominent and considerably raised above the surface.

4. Leaves. (*Plate III B*).

The leaves of *Blumea* are simple and alternate, generally cauline or, in a few species, forming a basal rosette. In size, form, degree of incision, texture, etc., they are usually extremely diverse. Indeed Hooker's description (1882) of the foliage as being "sportive to an extraordinary degree" is certainly not an overstatement. *Plate III B* depicts some of this diversity in leaf form.

Distinct petioles are present only in a few species where the leaf base is rounded or acute. In other species the leaves are definitely sessile, and the base is auriculate or semiamplexicaulous. *Blumea sagittata* (*Plate III B, 9*) with a sagittate leaf base can be distinguished from all the rest of the members by this single character. Most of the species of *Blumea*, however, have a cuneate to attenuate leaf base prolonged into a somewhat indistinct petiole.

The margins of the mature leaves are never smooth but vary from minutely denticulate to serrate to dentate to spiny-toothed. In some species the laminar margin is not lobed; in others it varies from entire to lyrate to runcinate. In a few perennial shrubby members like *Blumea aromatica*, *B. densiflora* and *B. balsamifera*, the generalized condition is one of entire leaves but there is a frequent tendency towards the pinnatifid form. This type of modification has led to the recognition of new species or new varieties based on this single difference. Such modifications, however, seem to warrant a more critical appraisal, for these plants with the deeply lobed leaves occupy the same range as the species of which they have been described as a new variety, and in no other way differ from them.

The texture of the leaves varies from membranous to thick and coriaceous, and this variation is somewhat correlated with the size of the plant and of the leaves. Both laminar surfaces are usually pubescent to varying degrees. The type of pubescence on the two surfaces may be similar or more often, is totally different. The morphology of the trichomes and the vesture types have been described in detail in the section on indumentum above.

The shape and size of the laminar epidermal cells and the position of the stomata have emerged as fairly reliable taxonomic characters as a result of this investigation. I must agree here that these are not features that are easily visible to the naked eye but inasmuch as they do show a very strong correlation with other criteria, their value must certainly be recognized.

At this point it seems necessary to define the terminology used in describing the outline of the epidermal cells before discussing their variations. The three types of epidermal cell walls present in *Blumea* are as follows:

a. **Straight:** The cell walls are generally straight or but slightly curved. The epidermal cells are consequently rectangular or polygonal rather than more or less "jigsaw puzzle" shaped as in the following.

b. **Undulate:** The cell walls are shallowly wavy.

c. **Sinuate:** The cell walls are deeply wavy.

These forms as well as the size of the epidermal cells are dependable characters once the initial range of variability is understood. Immature leaves in general tend to have smaller cells than the more differentiated leaves farther down the stem. In the present study an attempt has been made to study only the mature foliage.

The epidermal cells of the abaxial surfaces of all the species possess either undulate or sinuate cell walls with the exception of *Blumea angustifolia* where the walls are straight (Plate XXII H). The size of these cells generally varies in inverse proportion to the degree of pubescence (the greater the number of hairs the smaller the epidermal cells).

The epidermal cells of the adaxial surface show a greater range of modification. Of the 49 species examined, two have the straight walled condition, fifteen have the undulate condition and thirty-two have sinuate walls.

The stomata are usually of the anisocytic type, i. e., with the guard cells surrounded by three epidermal cells — two normal-sized and one considerably smaller. The stomata occur either on both the abaxial and adaxial surfaces of the lamina or only on the abaxial surface. The presence of the stomata on both surfaces is a feature that is correlated with the smaller-leaved species with membranous leaf texture, herbaceous habit and "weedy" habitat. On the other hand, in species with large leaves, leathery or tough texture, a perennial suffruticose habit and a montane or at least moist habitat, the stomata are usually present only on the lower surface. Certainly more work is needed on the subject to establish conclusively that these are not features which fluctuate with the environment, but it appears that they are reasonably dependable.

5. Capitula.

The capitula of *Blumea* are polygamo-heterogamous (i. e., bisexual and female florets in the same head) like the rest of the genera of the subtribe Plucheinae. Moreover they are disciform since all the florets are tubular. Each capitulum contains several to many series of florets.

The arrangement and disposition of these heads has been a primary and traditional character for the classification of the genus. It was chiefly on the basis of this feature that De Candolle (1836) split the group into subsections. Clarke's treatment (1876) shows a similar influence. Although later workers have continued to use this character, some recent authors have not accorded it its previous primary importance.

In certain species like *Blumea laciniata*, *B. lacera*, *B. mollis*, *B. hieracifolia*, *B. membranacea*, etc. the inflorescence¹ is essentially paniculate.

¹ The term inflorescence, here and in subsequent discussions refers to the grouping of the capitula and not to the individual head. Even though the latter is the basic inflorescence of the group, it will henceforward be treated as a single unit.

This panicle, in its shape and degree of laxity fluctuates in form often within a species and even within the same population, but with the exception of paniculate forms, the inflorescence type provides a dependable taxonomic criterion.

The range in other inflorescence types varies from the solitary head condition to the glomerate condition and the paniculate types. These inflorescences are often terminal on the stems or branches and are generally bracteate.

The individual capitula themselves show very little diversity. They may differ in size from species to species or even from one group of species to the next. This difference in size of capitulum is usually not correlated with the size of the plant. The number of florets in an individual head may also vary from several to many, resulting in a corresponding variation in the shape of the capitulum from cylindrical to broadly campanulate.

Peduncles may either be present or absent; when present, they are usually slender, erect (i. e., not recurved), and bracteolate.

6. Involucre (*Plate IV A*).

The involucre in *Blumea* is composed of numerous multiseriate phyllaries which are imbricate and discrete (i. e., only attached at their bases to the receptacle). In all cases the outermost or proximal series is the shortest and the bracts progressively increase in length inwardly. There is not much variation in the morphology of the phyllaries; as a matter of fact, *Blumea* is separated from the very closely related genus *Pluchea* primarily by the form of its involucre bracts.

The inner series of bracts are always linear to linear-oblong and usually have conspicuous scarious or hyaline margins. The outer ones show a little more variation in shape. These external phyllaries may be linear or lanceolate or even broadly ovate (*Plate IV A, 3*). The outer series particularly may be herbaceous and green in colour or, when the bracts are thick and somewhat leathery in texture, they may be pale yellow to brown. Some species like *Blumea fistulosa* and *B. hieraciifolia* are characterized by purple or at least purple-tipped phyllaries.

Pubescence occurs only on the dorsal surface of the involucre bracts and there is a progressive decrease in the amount of hairiness from the outside in. The type of trichomes present usually conform to those on the peduncles and the inflorescences axes. In addition to the pubescence, the margins and apices of the phyllaries may be ciliate.

The varying relationships of the length of the innermost series of phyllaries to the length of the mature disc florets *in situ* has been a feature observed by some investigators including De Candolle. However, it has not been used as a key character.

At maturity, after the dispersal of the fruits, the involucre is generally entirely reflexed.

7. Receptacle (*Plate IV B*).

In keeping with the general condition of the Plucheeinae, the receptacle of *Blumea* is naked or epaleaceous. It is usually flat or slightly convex

or, in rare cases, with a slight concavity in the centre in the region of attachment of the bisexual florets.

Although devoid of paleae, the surface of the receptacle shows interesting variations. It may be completely smooth (i. e., without pits), glabrous and areolate with the areoles almost circular and having a minute projection in the centre where the florets are attached; or, in other cases, it is alveolate or pitted, with the margins of the alveolae either fimbrillate or minutely pilose or long pubescent. The areolae and the alveolae are generally larger in size in the centre where the bisexual florets are attached and smaller around the periphery where the female florets are borne.

8. Florets.

Each capitulum bears two types of florets, the florets being arranged in a spiral from the centre to the periphery. The central florets are bisexual or sometimes functionally only male or female although structurally they are bisexual. They are usually fewer and more definite in number than the marginal ones. The latter are numerous, multiseriate and female. The colour of the florets in a predominant number of species is yellow but occasionally may be pale purple to lilac to white.

The corollas of the bisexual florets are tubular with the tube gradually expanding from the base upwards. At the summit they are often 5- or rarely 4-lobed. The tips, and sometimes the margins, of these lobes are commonly provided with papillae. In addition to the papillae, the corolla lobes are pubescent on the outside and the morphology of these trichomes has proved to be a valuable taxonomic character. All species, without exception, have colleters on the corolla lobes of the bisexual florets. The lobes may or may not be provided with other types of trichomes in addition to the colleters. In two species, *Blumea malcolmii* and *B. eriantha*, the tube is also hairy outside (*Plate XXI, B 2 & C 2*).

The female florets have extremely slender, filiform corollas. In all species except *Blumea sagittata* where they are 2-lipped (*Plate XIII, 8*), these corollas are equally 2- to 4-lobed at the apex. The lobes are minute, often papillate and usually glabrous. In exceptional circumstances, when they are provided with hairs, either on the lobes or on the entire surface, this has been used as an additional criterion.

Stamens, of course, are present only in the bisexual florets. They are equal in number to and alternate with the corolla lobes and are usually exerted at maturity. The filaments are inserted on the corolla tube at the base. Each filament is generally sharply divided into two regions: a lower, flaccid, strap-shaped portion of long, thin cells, and an upper, firm region composed of somewhat thick-walled cubical cells.

The anthers are syngenesious and form a tube. The connection between the adjacent anthers, however, does not seem to be firm and often in old, dried-up corollas, the anthers become separated from each other. Each anther is provided with two "tails" at the base; these are membranous appendages that are non-polliniferous and the tails from adjacent anthers are often entwined together. The length of the anther-tails in relation to the length of the thickened portion of the filament is quite constant from species to species.

As is the case in all Compositae with the exception of the Piquerinae, the anthers bear an appendage at the apex. This apical appendage is formed by an upward extension of the connective. The appendage in *Blumea* is either truncate or acute at the apex.

The anthers are introrse and 2-thecate, and the dehiscence takes place by a longitudinal slit. The pollen grains are provided with a spiny exine and have three, or sometimes four, colpae.

The styles of the bisexual florets pass through the anther tubes and are generally exerted beyond the corolla at maturity. They are bifid at the apex with the stigmatic hairs running down the inner surface of the style arms. Those of the female florets are also exerted and 2-lobed at the apex.

9. Achenes.

The achenes which provide many valuable taxonomic characters in other composite genera are remarkably uniform in *Blumea*. The only variation that occurs is one of ribbed vs. angular condition and even this difference is not clear-cut in some species. When the achenes are definitely ribbed, the number of ribs is usually 10 and these are paler in colour than the rest of the surface. When not ribbed, they are either terete or subquadrangular. The achenes are always oblong and brown in colour. They are generally hairy, the pubescence varying from sparse to quite dense. Glandular trichomes are never present on the ovaries or the achenes.

10. Pappus (*Plate IV C*).

The pappus is uniseriate and composed of numerous, soft, barbellulate hairs. The thickness of these hairs varies from 50 to 100 μ . In colour, the pappus is either pure white, yellowish or even red; this colour usually persists in the dried condition and can be used in identification.

INTRAGENERIC RELATIONSHIPS

It seems natural and logical that the revisionary study of a genus should attempt to culminate in a well-defined phylogenetic scheme showing the inter-relationships of the constituent species. However, exceptions to this deduction must and do occur, and such seems to be the case in *Blumea*.

That this is so has been a somewhat disappointing but not altogether surprising realization. The major problem of *Blumea* seems to lie in the fact that its species form a natural and extremely integrated whole. This is repeatedly evident throughout the assemblage, for, in spite of the broad diversity within *Blumea*, there is a continuum from one end of the variation range to the other. The result, then, is that species are usually separable from other species only by subtle differences. There is a complete lack of constant sets of changes and major breaks between groups. The presence of intermediate species have added to the problem.

Evidently, *Blumea* is rapidly and definitely evolving at the present



PLATE II. — Habit extremes in *Blumea*. 1. Prostrate herbaceous - *Blumea oxyodonta* (Wall.) DC. 2. Scapose rosulate - *Blumea manillensis* (Less.) DC. 3. Ascending herbaceous - *Blumea adenophora* Franchet. 4. Erect shrubby - *Blumea balsamifera* (Linn.) DC. 5. Climbing or sprawling - *Blumea riparia* (Bl.) DC.

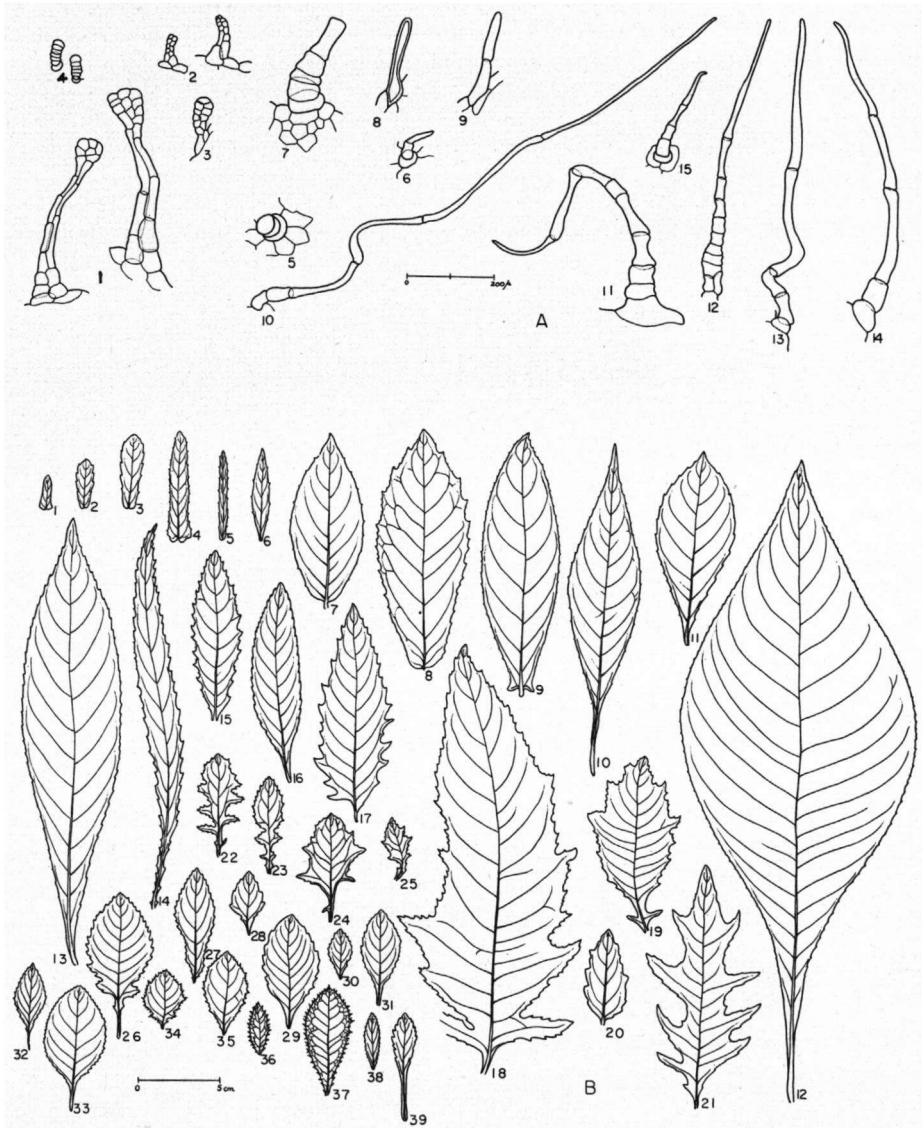


PLATE III. — A. Trichome types in *Blumea*. 1—4. Glandular trichomes: 1. Stipitate glands; 2—4. Colleters. 5—15. Non-glandular trichomes. — B. Leaf variations in *Blumea*.

time. Interspecific and even intersectional¹ hybridization has been reported in the genus and the occurrence of species (*B. oxyodonta* and *B. eriantha*) with abortive anthers points to some form of apomixis within the group. The genus is also extending its geographic range; this is proved by the records in recent years of *Blumea* from places from which it had been unreported previously.

A critical appraisal of the data shows, however, that certain evolutionary trends within the genus are recognizable. The perennial habit seems clearly to be more primitive and the annual condition more advanced. This has been definitely established in *Crepis* (Babcock 1947, p. 42) and as Hutchinson (1926) points out holds good for many natural assemblages of plants. The erect habit appears to be more primitive and from this

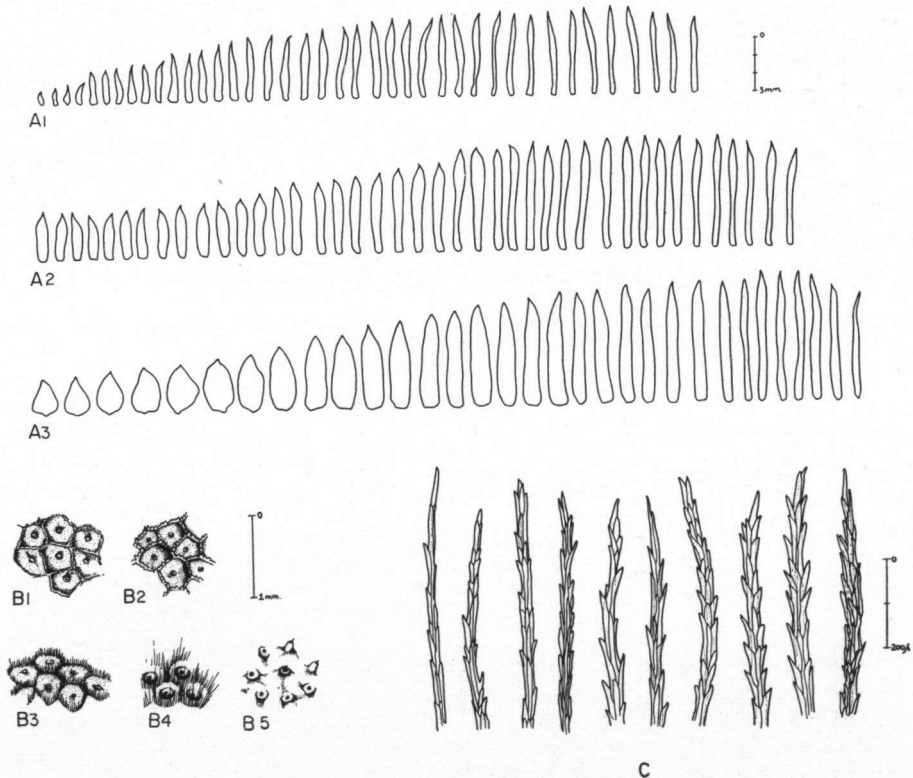


PLATE IV. A. Phyllary variations in *Blumea*. 1. Outer phyllaries linear - *Blumea mollis* (D. Don) Merr., Philippines, Luzon, *Bur. Sci.* 2074 Ramos (US). 2. Outer phyllaries linear-oblong - *Blumea hieracifolia* (D. Don) DC., China, Kwangtung, *Levine* 324 (US). 3. Outer phyllaries ovate-oblong - *Blumea riparia* (Bl.) DC., India, Assam, *Meebold* 6050 (E). — B. Receptacle types in *Blumea*: 1. Alveolate. 2. Fimbriate. 3. Pilose. 4. Pubescent. 5. Areolate. — C. Pappus hairs.

¹ *Blumea intermedia* Koster, reported by her to be the hybrid between *B. lacera* DC. and *B. riparia* DC., members of different sections.

the prostrate or climbing forms have been derived. As far as the floral structures are concerned, sterile or unisexual central florets (i. e., with abortive anthers) are more advanced than fertile central florets; and bilabiate female corollas are a specialization from the equally lobed female corollas. The other apparent changes that take place are not as clear-cut in direction and sometimes subtle.

Traditionally, *Blumea* has been split up into sections (De Candolle 1836; Hooker 1882). This convention has been adhered to in the present study even though it is realized that these sections are not always satisfactory or even convenient. It generally holds true, however, that most members of a section are more closely inter-related with each other than they are with members of other sections. But there are always intermediate species which could, with relative ease, be put under one section or another.

In the systematic treatment, the seven sections recognized here are treated in numerical order. It must be pointed out that this order in no way reflects an advancement series from the primitive to the specialized conditions, but it does denote a certain degree of relationship between adjacent sections. The actual evolutionary picture of the genus is most likely a three-dimensional, highly complex, reticulated system and not the straight linear relationship that is suggested by the sequence of these sections. The affinities of the species themselves are discussed individually after the diagnosis of each taxon.

SYSTEMATIC TREATMENT

Blumea DC. in Guill. Arch. Bot. 2: 514. 1833 (*non* Spreng. *nec* Nees); nom. cons. — *Doellia* Sch.-Bip. in Walp. Rep. 2: 953. 1843. — *Placus* Lour. Fl. Cochinch. 496. 1790.

Original diagnosis of the genus (De Candolle 1833)

“Capitulum multiflorum heterogamum; flor. radii multiseriilibus foemineis tenuissime tubulosis truncatis aut sub-2—3-dentatis, disco paucis (5—25) masculis tubulosis 5-dentatis. Recept. nudum planum. Invol. pluri-seriale imbricatum, squamis linearibus acuminatis. Antherae ecaudatae. Achaenium teretiusculum, erostre. Pappus 1-serialis, setis capillaribus sub-scabris.

“Ce genre est voisin des Conyzes telles que *M. Lessing* les a maintenant et avec pleine raison circonscrites, mais il en diffère par son fruit cylindracé et non comprimé par les côtés en forme de disque aplati. Son port est aussi assez différent pour le faire reconnaître dès le premier coup-d'oeil. Il comprend environ 80 espèces presque toutes inédites; elle sont originaires de l'Inde et quelques-unes d'Afrique, mais je n'en connais aucune d'Amérique, car le *Gnaphalium solidaginoïdes* de Poiret qui y rentre est de Sierra-Leone, et non des Antilles. Étant obligé de donner un nom nouveau à un genre éminemment indien, je l'ai dédié à *M. Blume*, auteur de la Flore de Java, qui en a lui-même trouvé plusieurs espèces et qui a rendu de si grands services à la botanique de l'Inde. Il aurait mérité un genre plus brillant, mais j'ai espéré que le grand nombre des espèces compenserait la modestie de leur aspect. Des deux genres auxquels le

nom de *Blumea* avait été affecté, l'un est *Reinwardtia*, et l'autre le *Talauma*."

Detailed description of the genus

Herbs, undershrubs or shrubs, annual to perennial. *Stems* simple or branched, usually erect, sometimes ascending, occasionally procumbent or climbing, terete, glabrate or variously pubescent. *Leaves* simple, alternate (except in *Blumea bifoliata* where the uppermost two are subopposite), sessile or shortly petiolate, linear-lanceolate, oblong, obovate or oblanceolate in shape, entire or pinnately or runcinately lobed to varying degrees, the margins never smooth, serrate, dentate or denticulate, the base rounded, semiamplexicaulous or tapering, the apex usually apiculate, sometimes acute or rarely shortly acuminate, the lower or more commonly both surfaces pubescent; upper epidermal cells usually sinuate-walled, rarely undulate- or straight-walled, the upper generally larger than the lower; stomata anisocytic, either on the abaxial or on both surfaces. *Capitula* heterogamous disciform, 3—18 mm in diam., sessile or pedunculate, either solitary-axillary and terminal, or arranged in lax to compact panicles or glomerulate; peduncles, when present, bracteolate. *Involucre* cylindrical to hemispherical, multiseriate; phyllaries numerous, the outer or proximal series the shortest, the inner the longest, the outer series usually linear, sometimes oblong to ovate, the inner series always linear or linear-oblong, all pubescent on the dorsal surface, with narrow or wide scarios margins. *Receptacle* naked or epaleaceous, flat, convex or rarely slightly concave, areolate or alveolate, mostly glabrous, sometimes pilose or densely pubescent, occasionally fimbriate. *Florets* numerous, multiseriate, the central ones usually bisexual or by abortion of the anthers, functionally only female, the marginal ones female. *Corollas* often yellow, very seldom white to pale purple, tubular for both types of florets; those of the bisexual florets broadly tubular, the tube gradually expanding from base upwards, the lobes 5 or occasionally 4, usually triangular-ovate, acute, papillate, pubescent with colleters and often also with unicellular or multicellular simple trichomes, the tube occasionally also pubescent; those of the female florets filiform and slender, tubular, equally 2 to 4 lobed at the apex or bilabiate, generally glabrous, sometimes pubescent with colleters or other types of trichomes, particularly on the lobes. *Stamens* 5 or 4 depending on the number of the corolla lobes and alternating with them; filaments inserted on the base of the corolla tube, flaccid and strap-shaped below, firm and thick above; anthers syngenesious, 2-thecate, introrse, always tailed at the base, the tails longer than, equal to or shorter than the thickened portion of the filament; the connective prolonged into an apical appendage beyond the anthers, truncate, rounded or pointed at the apex. *Ovaries* usually narrowly oblong or cylindrical, variously pubescent, 1-ovulate. *Styles* exerted beyond the corollas at maturity, 2-branched at the apex, the stigmatic hairs running down the inner surfaces. *Achenes* brown, oblong, ribbed (ribs 10 or 5), terete, or obscurely 4-angled. *Pappus* uniseriate, consisting of numerous, slender, barbellulate hairs, white to red.

Type species: *Blumea balsamifera* (Linn.) DC.

Distribution: Africa, Madagascar, S.E. Asia through New Guinea and Northern Australia to Micronesia.

Key to the Species

1. Leaves sagittate at the base; female florets bilabiate at the apex 19. **B. sagittata**
1. Leaves rounded or tapering at the base; female florets equally 2—4-lobed at the apex.
 2. Plants (stems, leaves, infl. axes) densely white-woolly.
 3. Leaves not spiny-toothed; corollas of bisexual florets only hairy on the lobes.
 4. Outer phyllaries linear and tapering.
 5. Capitula large, 15—18 mm in diameter.
 6. Corolla lobes of bisexual florets with colleters and multicellular hairs 15. **B. martiniana**
 6. Corolla lobes of bisexual florets with colleters but devoid of multicellular hairs 14. **B. arnakidophora**
 5. Capitula small, 5—12 mm in diameter.
 7. Capitula in large lax panicles; pappus red; corolla lobes of bisexual florets with multicellular hairs and colleters . 16. **B. densiflora**
 7. Capitula in compact, spiciform panicles; pappus white; corolla lobes of bisexual florets with unicellular hairs and colleters 30. **B. lacera**
 4. Outer phyllaries oblong-lanceolate, acute 21. **B. hieraciifolia**
 3. Leaves spiny-toothed; corollas of bisexual florets hairy on the tubes as well as the lobes 37. **B. malcolmii**
2. Plants glabrate or variously pubescent, never woolly all over.
 8. Phyllaries at least the outer, oblong-ovate to oblong-lanceolate.
 9. Leaves glabrate on the upper surface.
 10. Climber; receptacle densely pubescent; corolla lobes of female florets with multicellular hairs 2. **B. riparia**
 10. Erect; receptacle fimbriate or rarely pilose; corolla lobes of female florets glabrous or with occasional colleters.
 11. Leaf margins mucronate-serrate with indurated teeth.
 12. Corolla lobes of bisexual florets with numerous multicellular hairs in addition to colleters; *Java* . 7. **B. pachycephala**
 12. Corolla lobes of bisexual florets with occasional multicellular hairs in addition to colleters; *New Guinea*.
 13. Leaves a maximum of 10 cm long and 3.5 cm wide; capitula in clusters of 3—8 at the ends of branches 4. **B. papuana**
 13. Leaves a maximum of 28 cm long and 10 cm wide; capitula not clustered at the ends of branches 6. **B. arfakiana**
 11. Leaf margins serrate-dentate 5. **B. lanceolaria**
 9. Leaves variously pubescent on the upper surface.
 14. Leaf margins undulate 3. **B. vanoverberghii**
 14. Leaf margins not undulate.
 15. Receptacle pilose or densely pubescent.
 16. Capitula in large, spreading panicles.
 17. Receptacle densely pubescent 1. **B. procera**
 17. Receptacle pilose 8. **B. bullata**
 16. Capitula in narrow panicles 23. **B. clarkii**
 15. Receptacle glabrous.
 18. Undershubs; leaves auriculate and more or less stem clasping at the base; capitula 8—10 mm in diameter 20. **B. ramosii**
 18. Herbs; leaves tapering at the base, not stem clasping; capitula 3—5 mm in diameter 24. **B. veronicifolia**
 8. Phyllaries all linear or linear-lanceolate.
 19. Receptacle fimbriate.
 20. Leaves minutely mucronulate-serrate; *Micronesia* . 12. **B. milnei**
 20. Leaves coarsely serrate-dentate; *S. E. Asia* 11. **B. aromatica**
 19. Receptacle glabrous or pilose.
 21. Leaves purplish on under surface 13. **B. bicolor**
 21. Leaves not purplish on under surface.

22. Pappus reddish.
23. Laminar surfaces and phyllaries with colleters; leaf margins serrate or denticulate with minute, indurated teeth.
24. Corolla lobes of bisexual florets with multicellular hairs and colleters 9. *B. sylvatica*
24. Corolla lobes of bisexual florets only with colleters
10. *B. korthalsiana*
23. Laminar surfaces and phyllaries without colleters; leaf margins serrate with prominent teeth.
25. Corolla lobes of bisexual florets with colleters
18. *B. balsamifera*
25. Corolla lobes of bisexual florets with colleters and multicellular hairs 17. *B. junghuhniana*
22. Pappus white.
26. Corolla lobes of bisexual florets with multicellular hairs in addition to colleters.
27. Leaves elliptic-oblong to obovate-oblong, a maximum of 3.7 cm wide; indumentum of long, yellow hairs
22. *B. crinita*
27. Leaves linear-oblong to lanceolate-oblong, a maximum of 2 cm wide; indumentum varying, never of long, yellow hairs.
28. Leaves remotely denticulate; African species.
29. Capitula 5—9 mm in diameter; female corollas glabrous 40. *B. bovei*
29. Capitula 8—14 mm in diameter; female corollas pubescent 41. *B. cafra*
28. Leaves serrate-dentate; Indian species
41. *B. obliqua*
26. Corolla lobes of bisexual florets glabrous or with unicellular hairs in addition to colleters.
30. Cauline leaves narrowly linear-lanceolate to oblong-lanceolate.
31. Leaves cordate clasping at the base 45. *B. tenella*
31. Leaves tapering at the base.
32. Leaves, phyllaries and inflorescence axes with numerous colleters and glands, leaf margins subentire 46. *B. integrifolia*
32. Leaves, phyllaries and inflorescence axes devoid of colleters; leaf margins toothed.
33. Heads 4—7 mm in diameter.
34. Peduncles short, woolly
47. *B. angustifolia*
34. Peduncles long and slender, not woolly
49. *B. saxatilis*
33. Heads 12—15 mm in diameter
48. *B. stenophylla*
30. Cauline leaves never linear-lanceolate or narrow.
35. Capitula solitary, axillary and terminal.
36. Diffuse herbs; leaves mostly radical, the cauline ones all alternate 44. *B. diffusa*
36. Erect herbs; leaves mostly cauline, the uppermost pair subopposite 43. *B. bifoliata*
35. Capitula glomerulate or variously paniculate.
37. Capitula glomerulate, the clusters interruptedly spicate.
38. Receptacle pilose; leaves not lobed
25. *B. fistulosa*
38. Receptacle glabrous; leaves lyrate-lyobed
26. *B. sessiliflora*
37. Capitula paniculate.

- 39. Leaves spinous-toothed; corollas of both types of florets hairy.
- 40. Anthers well-developed; heads in sessile, axillary clusters
 - 36. **B. belangeriana**
- 40. Anthers abortive; heads in pedunculate clusters.
 - 41. Plants erect; corolla tubes as well as the lobes hairy 38. **B. erlantha**
 - 41. Plants prostrate; only the corolla lobes hairy . . . 39. **B. oxydonta**
- 39. Leaves not spinous-toothed; corollas of female florets, at least, glabrous.
 - 42. Receptacle minutely pilose.
 - 43. Leaves lyrate-lybed
 - 27. **B. laciniata**
 - 43. Leaves not lyrate-lybed
 - 28. **B. adenophora**
- 42. Receptacle glabrous.
 - 44. Achenes ribbed.
 - 45. Leaves white-pubescent on the under surface, not lobed
 - 31. **B. barbata**
 - 45. Leaves not white-pubescent on the under surface, at least the lower ones lobed.
 - 46. Scapose-rosulate herbs; heads few, in paniculate racemes 32. **B. manillensis**
 - 46. Leafy herbs; heads numerous, in lax, spreading panicles.
 - 47. Plants more or less glabrate 35. **B. virens**
 - 47. Plants pubescent or variously glandular.
 - 48. Terminal lobe of leaves sub-orbicular
 - 33. **B. napifolia**
 - 48. Terminal lobe of leaves elliptic-ovate
 - 34. **B. membranacea**
 - 44. Achenes subangulate to terete.
 - 49. Leaves usually not lobed; corollas purple to lilac
 - 29. **B. mollis**
 - 49. Leaves often lyrate-lybed; corollas yellow 30. **B. lacera**

Conspectus of the Sections

Section 1. *Semivestitae* DC.

Herbs to shrubs. Leaves rounded or tapering at the base, the margins never spiny-toothed, the upper surface scabrous to glabrate at maturity. Upper epidermal cells with straight to undulate, walls, stomata only on the lower surface. Capitula paniculate. Outer phyllaries oblong-ovate or

oblong-lanceolate, rigid. Receptacle alveolate, pubescent, pilose or fimbriate. Corolla lobes of bisexual florets with colleters and multicellular hairs. Female florets with filiform, tubular, equally 2- to 4-lobed corollas, the lobes pubescent (except in *B. vanoverberghii*). Anther tails shorter to longer than the thickened portion of the filament. Achenes ribbed.

Section 2. *Macrophyllae* DC.

Suffruticose to herbaceous. Leaves rounded or tapering at the base, the margins never spiny-toothed, the upper surface variously pubescent. Upper epidermal cells with straight to sinuate walls, the stomata only on the lower surface. Capitula paniculate. Outer phyllaries linear. Receptacle alveolate, glabrous, pilose or fimbriate. Corollas of bisexual florets with colleters and multicellular hairs (except *B. balsamifera*). Female florets with filiform, equally 2 to 4 lobed corollas, glabrous. Anther tails longer to shorter than the thickened portion of the filament. Achenes ribbed.

Section 3. *Sagittatae* Randeria, sect. nov.

Herbae. Folia basi sagittata, margine haud spinosa dentata, sursum pubescentia; cellulis epidermatis superioris circumscriptione undulatis; stomatibus solum in pagina inferiori. Capitula paniculata; phyllariis linearibus; receptaculo alveolato fimbriato; floribus bisexualibus solum in lobis colleteris praeditis; corolla florum foeminarum filiformibus tubulosis inaequaliter bilabiatis. Caudae antherarum quam pars filamenti incrassata longiores. Achaenae non costatae.

Species typica: *B. sagittata* Gagnep.

Herbs. Leaves sagittate at the base, the margins never spiny-toothed, the upper surface pubescent. Upper epidermal cells with undulate walls, the stomata only on the lower surface. Capitula paniculate. Phyllaries linear. Receptacle alveolate, fimbriate. Corolla lobes of bisexual florets only with colleters. Female florets filiform, tubular, with unequally 2-lipped corollas, the lobes pubescent with colleters. Anther tails longer than the thickened portion of the filament. Achenes not ribbed.

Type species: *B. sagittata* Gagnep.

Section 4. *Hieraciifoliae* Randeria, sect. nov.

Herbaceae vel suffrutescentes. Folia basi rotundata vel acuta, margine haud spinosa dentata, sursum varie pubescentia; cellulis epidermatis superioribus circumscriptione sinuatis vel undulatis; stomatibus aut in superficiebus ambabus aut solum inferioribus. Capitula glomerata vel paniculata; phyllariis exterioribus lineari-oblongis; receptaculo alveolato glabro vel piloso; lobis florum bisexualium colleteris et pilis multicellularibus praeditis; corollis florum foeminarum filiformibus tubulosis, aequaliter 2—4 lobatis, lobis glabris; antherarum caudis filamentum parte incrassata aequilongis. Achaenae costatae.

Species typica: *B. hieraciifolia* (D. Don) DC.

Herbs to subshrubs. Leaves rounded or tapering at the base, the margins never spiny-toothed, the upper surface variously pubescent. Upper epidermal cells with sinuate to undulate walls, the stomata on both or only the lower surface. Capitula in clusters or panicles. Outer phyllaries linear-

oblong (except *B. crinita*). Receptacle alveolate, glabrous to pilose. Corolla lobes of bisexual florets with colleters and multicellular hairs. Female florets with filiform, tubular, equally 2- to 4-lobed corollas. Anther tails equal to the thickened portion of the filament. Achenes ribbed.

Type species: *B. hieraciifolia* (D. Don) DC.

Section 5. **Paniculatae** DC. (including *Senecioniflorae* DC. and *Fasciculiflorae* DC. in part).

Herbs. Leaves rounded or tapering at the base, the margins never spiny toothed, the upper surface variously pubescent. Upper epidermal cells with sinuate walls, the stomata on both surfaces. Capitula paniculate to glomerulate. Outer phyllaries linear. Receptacle alveolate, glabrous to pubescent. Corolla lobes of bisexual florets with colleters and unicellular hairs. Female florets with filiform, tubular, equally 2- to 4-lobed corollas, glabrous (except *B. manillensis*). Anther tails longer to shorter than the thickened portion of the filament. Achenes ribbed or not ribbed.

Section 6. **Oxyodontae** DC.

Herbs. Leaves tapering at the base, the margins spiny-toothed, the upper surface variously pubescent. Upper epidermal cells with sinuate walls, the stomata on both surfaces. Capitula paniculate. Outer phyllaries linear. Receptacle alveolate, glabrous. Corolla lobes of bisexual florets with colleters and unicellular or multicellular hairs. Female florets with filiform, tubular, equally 2- to 4-lobed corollas, pubescent. Anther tails (when present) longer than the thickened portion of the filament. Achenes not ribbed.

Section 7. **Dissitiflorae** DC.

Slender herbs. Leaves rounded or tapering at the base, the margins never spiny-toothed. Upper epidermal cells with sinuate, undulate or straight walls, the stomata on both surfaces. Capitula solitary, axillary and terminal or in lax, few-headed panicles. Outer phyllaries linear. Receptacle areolate, glabrous. Corolla lobes of bisexual florets with colleters and with or without other hairs. Female florets with filiform, tubular, equally 2- to 4-lobed corollas, the lobes pubescent or glabrous. Anther tails shorter to longer than the thickened portion of the filament. Achenes ribbed or not ribbed.

Section 1. **Semivestitae** (*Plates V—VIII*).

1. Straggling or climbing plants; receptacle densely pubescent.
2. Capitula more or less sessile in densely aggregated or lax, large, terminal, divaricate panicles; leaves velutinous-villous on the lower surface, the margins coarsely dentate 1. *B. procera*
2. Capitula pedunculate in lax, few-headed panicles; leaves glabrate on the lower surface, the margins minutely denticulate 2. *B. riparia*
1. Erect plants; receptacle minutely pilose or fimbriate.
3. Leaf margins undulately lobed, the lobes serrated 3. *B. vanoverberghii*
3. Leaf margins not lobed, only toothed.
4. Corolla lobes of bisexual florets pubescent with colleters and occasional

- multicellular hairs; receptacle fimbriate (rarely pilose in *B. lanceolaria*); anther tails considerably shorter than the thickened portion of the filament.
5. Leaves a maximum of 10 cm long, distinctly petiolate, acute at the base; stems, leaves and phyllaries purplish-brown in dried specimens
4. *B. papuana*
5. Leaves 25—50 cm long, more or less sessile, tapering at the base; stems, leaves and phyllaries not purplish-brown in dried specimens.
6. Leaves glabrate on both surfaces when mature, without colleters, the margins usually revolute when dry 5. *B. lanceolaria*
6. Leaves pubescent at least on the lower surface and with colleters, the margins not revolute when dry 6. *B. arfakiana*
4. Corolla lobes of bisexual florets pubescent with colleters and numerous long multicellular hairs; receptacle pilose; anther tails at least equal to or longer than the thickened portion of the filament.
7. Leaves elliptic-lanceolate reaching a maximum of 5 cm in width
7. *B. pachycephala*
7. Leaves ovate, obovate or oblanceolate reaching a maximum of 10 cm in width 8. *B. bullata*

1. *Blumea procera* DC. Prodr. 5: 445. 1836. Specific epithet referring to the tall habit of the plant. — *Conyza procera* Wall. Cat. no. 3050. comp. no. 140. 1831, *n. n.*, non Desf. — *Blumea semivestita* DC. Prodr. 5: 445. 1836 *pro parte*. — *Conyza semivestita* Wall. Cat. no. 2996 A. comp. no. 106 A, 1831, *n. n.*

Tall herbs or undershrubs, 1.0—3.5 m in height. *Stems* erect or straggling, branched, terete, sparsely pubescent at the base, densely velutinous-villous in the younger parts especially the inflorescence axes. *Leaves* subsessile, 6.0—18.5 cm long, 2.5—8.0 cm wide, oblanceolate-oblong to elliptic-oblong, the upper surface scabrous to tomentose, the lower densely velutino-villous, the apex shortly acuminate, the margins coarsely double-serrate or dentate, the base tapering, sometimes more or less semi-amplexicaulous; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, divaricate panicles, ultimately densely aggregated at the ends of the branches, the clusters sometimes lax; more or less sessile, 5—7 mm in diameter. *Involucre* with the phyllaries slightly longer than the florets, 1—7 mm long, the outer oblong-ovate, the inner linear-oblong and with scarious margins, all acute, densely pubescent on the back. *Receptacle* 1.5—2.5 mm in diameter, flat, alveolate, pubescent. *Corollas* yellow, tubular; those of the bisexual florets 4.5—6.0 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and few to many multicellular hairs; those of the female florets filiform, 4—5 mm long, with 2—4 lobes, occasionally pubescent on the lobes. *Anther* tails shorter than the thickened portion of the filament. *Achenes* pale brown, pubescent, ribbed. *Pappus* copious, white, up to 5 mm long.

Type specimen: Wallich 3050/140 (K).

Type locality: India, Silhet Province.

Flowers: January—May.

Distribution and Habitat: N. E. India, East Pakistan, Andaman Islands, Burma, and Western China. Growing in evergreen forests at altitudes up to 1500 m above sea level.

Specimens examined:

NEPAL. Wallich 2996 A/106 A (GH, type collection of *B. semivestita*).

SIKKIM. *Anderson s.n.* (CAL); *Gamble 10264* (K); *Hooker s.n.* (K, L, P); *No data* (CAL).

INDIA. Assam: *Biswas 6966* (GH); *Bor 129* (DD), *16075* (DD), *16991* (DD); *Burkill 36406* (CAL), *38178* (CAL); *Calder 1006* (CAL); *Clarke 13872 A* (CAL), *13872 B* (CAL); *Collet s.n.* (CAL); *Wallich 3050/140* (GH, K, type collection of *B. procera*); *Watt 5119* (K). No locality: *Simons s.n.* (DD); *No data* (CAL). Andaman Islands: *Helper 3146* (CAL).

PAKISTAN. E. Bengal: *Griffith 3146* (CAL, GH, K, NY), *3163* (K).

BURMA. *Lambert s.n.* (K); *Shaik Mokim 93* (CAL), *s.n.* (CAL); *Su Koe 9122* (CAL); *Toppin 6329* (CAL).

INDOCHINA. Tonkin: *Poulane 18784* (P).

CHINA. Yunnan: *Anderson s.n.* (CAL); *Forrest 9752* (GH, K), *21071* (K); *Henry 10481* (MO, US), *10481 A* (K, NY), *10979 A* (HK, NY), *11587* (K, NY), *11587 A* (MO, US), *12951* (K).

Affinities: Closely related to *Blumea riparia* DC. particularly in its habit, receptacle and florets. *Blumea procera*, however, may be distinguished by its denser pubescence, its subsessile, aggregated heads and its leaves with coarsely double-serrate margins.

2. *Blumea riparia* (Bl.) DC. Prodr. 5: 444. 1836. Specific name describing the habitat of the plant along streams and rivers (*riparius*, from *ripa* = bank). — *Conyza riparia* Blume, *Bijdr.* 899. 1826, *non* H. B. K. — *Blumea chinensis* DC. *Prodr.* 5: 444. 1836 *pro parte*, *non* *Conyza chinensis* Linn. According to Koster (1948, p. 265), in the De Candolle herbarium, there are four specimens under this name, three of *B. riparia* DC. and one of *B. bullata* Koster. — *Blumea pubigera* Merr., *Philippine Jour. Sci. (Bot.)* 14: 250. 1919, *non* *Conyza pubigera* Linn. *vide* Craib *et* Koster. — *Sonchus volubilis* Rumph. *Herb. Amb.* 5: 299. t. 103. f. 2. 1747.

Scandent undershrub or shrub, 0.5—2.5 m in length. *Stems* woody at the base, about 2 cm in diameter, branched; branches sprawling, terete, glabrate or sparsely puberulous particularly on the inflorescence axes and in the younger parts. *Leaves* shortly petiolate (petioles up to 6 mm long), 2.5—13.0 cm long, 1.3—5.0 cm wide (narrower and longer in f. *angustifolia* Koster), obovate-oblong to elliptic-oblong, both surfaces glabrate or with a few hairs, the apex shortly acuminate, the margins mucronulate-denticulate with rigid teeth, the base rounded; upper epidermal cells with undulate walls, the lower with distinctly sinuate walls, the stomata only on the ab-axial face. *Capitula* in terminal and axillary, few (sometimes 1—5) headed laxly panicle racemes, pedunculate, 8—18 mm in diameter; peduncles up to 2.5 cm long. *Involucre* with the phyllaries almost equal in length to the florets, 1—10 mm long, the outer ones distinctly oblong-ovate, up to 1.5 mm broad, pubescent on the back with multicellular hairs, the inner ones linear-oblong, more or less scarious, sparsely hairy. *Receptacle* 2—5 mm in diameter, flat, densely pubescent with white, multicellular hairs. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 triangular, papillate lobes that are densely pubescent with white, multicellular hairs and colleters; those of the female florets filiform, 4.5—5.5 mm long, 2 to 4 lobed, occasionally pubescent on the lobes. *Achenes* oblong, pale brown, ribbed, pubescent. *Pappus* copious, white, 4—6 mm long.

Type specimen: *Blume s.n.* (L).

Type locality: Java.

Flowers: Throughout the year.

Distribution and Habitat: India, Burma, Malaya, Indochina, Southern China, Philippines, Indonesia, New Guinea and the Solomon Islands. Quite variable and growing in thickets, on open grassy plains, in clearings, along stream and river banks or rambling on the undergrowth in rain forests at altitudes from sea level to 1500 m above.

For the nomenclature of this species, I have followed the authority of Craib (1936) and of Koster (1950; personal communication, 1958). Both these authors and Merrill (1919) are of the opinion that De Candolle, Blume and Miquel misinterpreted Linnaeus' brief original description of *Conyza chinensis*, the name on which *B. chinensis* DC. was based.

The name *Blumea pubigera* Merr. cannot also be accepted as a valid name for the same reason. Linnaeus' *Conyza pubigera* was based on a specimen growing in his garden at Uppsala. A fragment of this specimen deposited in the Linnaean herbarium has been examined by Craib who claims that it is not the same as the species in question here; in Linnaeus' specimen the outer phyllaries are distinctly linear whereas in this species they are definitely oblong-ovate. The correct name for this species then must be *B. riparia* (Bl.) DC.

The species as interpreted here includes two varieties.

var. riparia.

Capitula small, 8—13 mm in diameter, the panicles many-headed.

f. riparia.

Leaves ovate-oblong to elliptic-oblong, 2.5—13.0 cm long, 1.3—5.0 cm wide, rounded at the base.

Distribution: India, Burma, Malaya, Indochina, China, Philippines, Indonesia, New Guinea, Solomon Islands.

Specimens examined:

INDIA. Assam: Clarke 27526 F (CAL), 43591 B (CAL); Kanjilal 6812 (DD); Meebold 6060 (E); Prain 67 (CAL, US); Simons s.n. (L); Watt 5359 (CAL, P). S. Andaman: Heinig 230 (CAL, DD); King's coll. s.n. (CAL, L, U). Nicobar Islands: Kurz s.n. (CAL); King's coll. s.n. (CAL, E). No data: ex DC. herb. (P); (CAL).

SIKKIM. Hooker s.n. (E, GH, K, L); Kurz s.n. (CAL); Lister s.n. (CAL); J. L. s.n. (DD).

BURMA. Hill 149 (K); Kermode 17108 (DD); MaoGregor 1176 (CAL, E); Pottinger s.n. (CAL); Rook 2340 (GH, US).

MALAYA. Gaudichaud 39 (P); Nur 34322 (GH); Scortechini s.n. (CAL); Sindair & Kiai bin Salleh 40746 (L); Wallkoh 3043/153 (GH).

INDOCHINA. Balansa 868 (P), 4819 (US); Clemens & Clemens 3782 (MICH, MO, NY, P, U, UC, US); Robinson 1309 (NY); Squires 411 (UC, US); Tsang 29139 (GH).

SIAM. Kerr 9499 (P), 11622 (P), 17138 (L).

CHINA. Kwangsi: Tsang 25795 (GH, MO, NY). Yunnan: Henry 11811 (K, MO, NY), 11811 A (US).

FORMOSA. Szeuki 9230 (MO); Tanaka 1738 (GH).

PHILIPPINES. Balabac: Bur. Sci. 49854 Ramos & Edaña (UC), 49870 (UC). Basilan: Ebaló 877 (GH, MICH); Reillo 16289 (K, P, US). Bohol: Bur. Sci. 42784 Ramos (P, UC, US). Catanduanes: Bur. Sci. 30371 Ramos (US). Leyte: Bur. Sci. 11846 Edaña (L); Bur. Sci. 85145 Ramos & Edaña (GH); Wenzel 1174 (L, MO, NY). Luzon: Bur. Sci. 1952 Ramos (US); Bur. Sci. 49296 Ramos & Edaña (UC), 49522 (NY, UC); Bur. Sci. 34401 Ramos & Pascasio (NY); Ebaló 1077 (L); Mendoza & Convozar 10223 (L); Merrill 8081 (US); Williams 2338 (US). Mindoro: Merrill 5565 (NY, US). Palawan: Merrill 9516 (US). Panay: Paniza 9403 (L). Paragua: Merrill 829 (GH). Samar: Bur. Sci. 17555 Ramos (K, P, US); Sulit 14350 (L). Siargao: Bur. Sci. 35020 Ramos &

Pascasio (K, US). Tawitawi: *Bur. Sci.* 43994 *Ramos & Edaño* (NY, UC). No locality: *Hallier* 454 (NY); *Langlasse* 44 (P).

INDONESIA. Anambas & Natoena: *van Steenis* 752 (L, U). Borneo: *Clemens* 20701 (NY), 27559 (NY); *Korthals s.n.* (L); *Native coll.* 2003 (US); *Purseglove* 4376 (K, L); *Ramos* 1336 (US); *Winkler* 2785 (L). Celebes: *Bloembergen* 4063 (L); *Elbert* 2792 (L), 3037 (L), 3199 (K); *Eyma* 1117 (L); *Kaudern* 83 (L), 222 (L); *Koorders* 16454 β (L), 16461 β (L), 16462 β (L), 16528 β (L); *Savinierre* 101 (P); *van Vuuren* 334 (L); *Warburg* 15097 (GH); *No coll.* 46 (L), 399 (L, teratological forms). Ceram: *Rutten* 251 (L, U). Flores: *de Voogd* 2841 (GH). Java: *Backer* 8451 (L), 8495 (L), 14105 (K, L), 14770 (K, L), 34428 (K, L); *Bakhuizen van den Brink* 1489 (U), 4299 (L); *Beumée s.n.* (P, U); *Blume s.n.* (L, type collection); *Boerlage s.n.* (L); *Forbes* 1244 (GH, L, P); *van Harreveld* 8939 (L); *Hallier s.n.* (K, L, NY); *Holstoogd* 519a (L); *Junghuhn* 382 (L); *Koorders* 20547 β (L), 20548 β (L, UC), 29132 β (L), 31129 β (L, UC), 40890 β (L); *Koorders & Koorders-Schumacher* 44161 β (L); *Kuntze* 3605 (NY), 5207 (NY); *Kurz* 2436 (CAL), *s.n.* (CAL); *Popta* 878/225 (L); *Priaman* 1044 HB (U), 2485 HB (U); *Pulle* 3216 (U); *Schiffner* 2787 (GH, K, L), 2804 (GH); *Splittgerber s.n.* (L); *van Steenis* 12473 (L); *Waitz s.n.* (L); *Winckel* 1357 (L), 1357 β (K, U, UC); *Zollinger* 230 (GH, K, L, P, type collection of *Conyza longissima*), 667 (K, L, P); *No data* (L, U). Kei: *Jensen* 337 (L). Mentawai: *Boden-Kloss* 14072 (K, UC); *Iboet* 89 (K, U), 353 (L). Krakatau: *van Borssum-Waalke* 872 (L). Moluccas: *Billardiére s.n.* (P); *Bloembergen* 4361 (L); *Buwalda* 4833 (K, L); *Iđjan* 96 (K, L); *Robinson* 421 (K, L, NY, US). Sangi & Talaud: *Lam* 2420 (L). Soemba: *Grevenstuk* 54 (GH, L). Sumatra: *Amand* 35 (U); *Bartlett* 6466 (MICH, US), 6799 (MICH, NY, US), 7241 (NY, US); *Bartlett & La Rue* 452 (GH, L, UC, US); *Boeea* 6916 (GH, MICH), 8750 (GH, MICH), 8838 (GH, MICH); *Iboet* 40 (L, U), 249 (L), 412 (L); *Korthals s.n.* (L); *Lörzing* 5929 (L), 6239 (L); *Ouwehand* 228 (L), 379 (L); *Posthumus* 699 (L); *Bahmat* 921 (GH, MICH), 1568 (MICH, NY, UC, US); *Schiffner* 2804 (L); *van Steenis* 8777 (L); *Stomps s.n.* (L); *Yates* 1002 bis (MICH, US); *No data* (L). Ternate: *de Vriese s.n.* (L). No locality: *Gaudichaud s.n.* (P).

NEW GUINEA. *Brass* 1363 (GH, K, P), 21731 (L), 23689 (L); *Carr* 11632 (L, NY), 11956 (L); *Clemens* 1037 (L), 10865 bis (GH, MICH), 40909 (GH, MICH), 41456 (GH, MICH); *van Dijk* 48 (L); *Docters van Leeuwen* 10539 (L); *Gjellerup* 313 (L, U); *Herre* 368 (NY); *Kostermans* 2603 (L); *Ledermann* 8554 (K); *Pleyte* 609 (K, L); *Schlechter* 16708 (P, UC); *Warburg* 21404 (GH). Ferguson Is.: *Brass* 25944 (L). Misima Is.: *Brass* 27469 (L). Normanby Is.: *Brass* 25539 (L). New Britain: *Floyd* 6604 (L).

NEW HEBRIDES. *La Rue s.n.* (GH).

SOLOMON ISLANDS. Bougainville Is.: *Kajewski* 1768 (GH, L). San Cristoval Is.: *Brass* 3029 (GH, L).

NO LOCALITY. *Warburg* 21407 (GH).

f. *angustifolia* Koster, *Blumea* 4 (3): 490. 1941.

Leaves narrowly oblong-lanceolate, 5.5–11.5 cm long, 1–4 cm wide, acute at the base.

Type specimen: *Bünnemeyer* 10329 (L).

Distribution: Indonesia, Philippines.

Specimens examined:

INDONESIA. Borneo: *Clemens* 27559 (K, NY, U), 31556 (GH, L, NY, UC), 51063 (GH, K, L, UC); *Elmer* 20500 (GH, K, L, MO, NY, UC). Celebes: *Docters van Leeuwen* 1707 (U); *Elbert* 2721 (L). Java: *Denker* 104 (K, L); *Junghuhn* 50 (L), *s.n.* (L, P); *Koorders* 24501 β (L); *Sapiin* 2103 (L), 2214 (L); *Went s.n.* (L). Sumatra: *Bünnemeyer* 4337 (L), 4918 (L), 10329 (L, holotype, U); *Lütjeharms* 4208 (K, L).

PHILIPPINES. Basilan: *Hallier* 4454 (L). Mindanao: *Elmer* 13863 (GH, K, L, MO, NY, U, UC, US). Negros: *Elmer* 9782 (GH, K, L, MO, NY, US).

var. *megacephala* Randeria, var. nov.¹

Capitula magna, 14–18 mm diametentia, solum 1–7 in paniculis paucicapitulatis.

¹ The extreme specimens of this taxon are distinct enough perhaps to merit specific status, but the presence of several not so clear-cut specimens tending more towards *Blumea riparia* has necessitated giving it only a varietal rank.

Specimen typicum: leg. A. Henry sub numero 10979 in U.S. Nat. Herb. ad Chi-Yuan in provincia Yunnan, China.

Capitula large, 14—18 mm in diameter, the panicles few (1—7) headed.

Holotype: A. Henry 10979 (US), collected in Chi-Yuan, Yunnan Province, China. (Plate XXVIII).

Distribution: China, Indochina (Tonkin).

Specimens examined:

CHINA. Fukien: *Chung* 960 (K, UC); *Fong* 17 (UC); *Tang* 5886 (MO). Kiangsi: *Lau* 4704 (GH, US). Kwangsi: *Chen* 91312 (GH); *Ching* 6627 (NY), 8412 (GH, NY); *Ko* 55863 (GH); *Steward & Cheo* 1112 (GH, NY); *Tsang* 23049 (GH), 23166 (GH, P), 24605 (GH, MO, NY), 28288 (GH, US); *No coll.* 249 (GH). Kwangtung: *Bodinier* 369 (P); *Chen* 5150 (UC); *Chun* 237 (UC), 40006 (NY); *Eng* 2731 (HK); *Esquirol s.n.* (NY); *Furet* 147 (P); *Henry s.n.* (MO, NY); *Lau* 626 (GH, NY), 2326 (GH); *Levine & Groff* 148 (GH, HK, MO, US); *McClure* 3537 (NY); *Boss* 11436 (HK); *Sm.* 125; *Taam* 108 (GH); *Tang* 238 (K), 1181 (HK), 1458 (HK); *Tang & Fung* 51.19171 (NY); *Tsang* 280.8939 (GH), 16620 (NY), 20690 (GH, K, L, MO, NY, UC, US); *Tsang & Wong* 14393 (UC); *Tsiang* 1264 (UC); *Tsui* 694 (K, MO, NY); *Wang* 314 (GH, K, NY), 324 (GH); *Welford s.n.* (GH); *Wright* 274 (GH, K, US). Kweichow: *Cavalerie* 1474 (GH), *s.n.* (UC); *Esquirol* 438 (P); *Tsiang* 9305 (NY). Szechuen: *Pratt* 815 (GH). Szechwan: *Wan-wen Ma* 2335 (US); *Wilson* 4963 (HK). Yunnan: *Feng* 335 (GH); *Forrest* 9602 (GH, K), 9681 (GH, K), 26210 (NY, US); *Henry* 10979 (GH, HK, K, MO, US, type collection), 10979 A (GH, K, MO, NY), 10979 C (US); *Rock* 7959 (NY, US); *Tsai* 51853 (GH), 52616 (GH), 55609 (GH), 56969 (GH). FORMOSA. *Henry* 18109 (NY); *Nakahara* 29 (US); *Price* 1090 (K); *Sasaki s.n.* (US); *Tanaka & Shimada* 13463 (L, NY, P, UC, US).

INDOCHINA. Tonkin: *Balansa* 3027 (K); *Colani* 4009 (NY, UC); *Pételot* 1215 (UC, US), 1222 (UC), 1233 (UC), 3385 (UC); *Poilane* 17258 (K), 18780 (P); *Tsang* 27115 (GH).

Affinities: *Blumea riparia* is related to the rest of the members of the section. Its main distinctive features are its habit, leaves, inflorescence and pubescent receptacles.

3. *Blumea vanoverberghii* Merr. Philipp. Jour. Sci. (Bot.) 7: 105. 1912. Named after Fr. Vanoverbergh who first collected in Luzon.

Herb, about 1 m in height (*vide* Merrill). *Stems* erect, branched, terete, almost glabrous in the older parts, the inflorescence axes velutinous. *Leaves* shortly petiolate, (petioles 2—5 mm long), 2.5—7.0 cm long, 1—3 cm wide, oblong-ovate to oblong-elliptic, tomentose on the upper surface when young, scabrous with bulbous based hairs at maturity, tomentose on the lower surface, the margins with multicellular hairs and colleters, the apex acute to apiculate, the margins irregularly sinuate-lobed, distantly and minutely serrate, the base rounded to slightly tapering; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in narrow, compact panicles terminating the branches, sessile or very shortly pedunculate, 6—9 mm in diameter. *Involucre* with the phyllaries about equal in length to the florets, 1—6 mm long, lanceolate, acute, the inner ones with scarious margins, all pubescent on the back with multicellular hairs, ciliate at the apex. *Receptacle* alveolate, distinctly pilose. *Corollas* yellow, tubular; those of the bisexual florets 4—5 mm long, with 5 ovate, papillate lobes that are pubescent with unicellular hairs and colleters; those of the female florets filiform, up to 4.5 mm long, 2 to 3 lobed, glabrous. *Achenes* oblong, ribbed, hispid. *Pappus* yellowish-white, 4—5 mm long.

Type specimen: *Vanoverbergh 1063*.

Type locality: Philippines, Luzon, Bontoc Subprovince.

Flowers: December—February.

Distribution and Habitat: Narrow endemic restricted to Luzon, Philippines. Growing at an altitude of up to 1300 m above sea level.

Specimens examined:

PHILIPPINES. LUZON: *Clemens 5861* (UC), *16437* (UC); *Vanoverbergh 1063* (K, type collection), *1065* (GH, L, MO), *2304* (P).

Affinities: Merrill believes that this species is somewhat anomalous in *Blumea* because of its pubescent receptacles and that this character allies it with the closely related genus *Merrittia*. However, pubescent receptacles do occur in other species of *Blumea*. Accordingly, *B. vanoverberghii* appears to me to be a perfectly normal member of its genus.

Its relationships lie with *B. riparia* DC. from which this species differs in its sinuately lobed leaves and its denser pubescence.

4. *Blumea papuana* S. Moore, Trans. Linn. Soc. Lond. (Bot.) 9 (2): 84. 1916. Specific epithet after the type locality, Papua.

Perennial herb, 1—2 m in height. Stems somewhat woody at the base, erect, branched, purplish-brown, puberulous particularly in the younger parts. Leaves petiolate, (petioles up to 1 cm long), 3—10 cm long, 1.3—3.5 cm wide, the upper smaller and passing into the inflorescence bracts, oblong to oblong-lanceolate, the upper surface dark and lustrous in dried specimens, glabrate or with scattered papillae, the lower surface paler, silky pilose with multicellular hairs, the apex apiculate, the margins mucronate-serrate to dentate, the base rounded; upper epidermal cells with shallowly undulate walls, the lower with sinuate to undulate walls, the stomata only on the abaxial surface. Capitula in axillary and terminal, pyramidal panicles, shortly pedunculate, 3—8 clustered at the ends of the ultimate branches, 10—14 mm in diameter; peduncles 5—10 mm long. Involucre with the phyllaries purplish-brown, slightly longer than the florets, 2—10 mm in length, linear-lanceolate, taper-pointed, the inner ones with broad, scarios margins, all pubescent on the back with multicellular hairs and scattered colleters, ciliate at the apex. Receptacle 3—4 mm in diameter, flat or slightly convex, minutely fimbriate. Corollas yellow, tubular; those of the bisexual florets 6.0—6.5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with sparse multicellular hairs and numerous colleters; those of the female florets filiform, 5—6 mm long, 3 to 4 lobed, glabrous. Anther tails shorter than the thickened portion of the filament. Achenes brown, densely pubescent, ribbed. Pappus white, 5—6 mm long.

Type specimen: *Boden-Kloss s.n.* (BM).

Type locality: Camps IX to XI and XIII, 5500 to 8300 and 10500 feet. Wollaston expedition to the Nassau Range, New Guinea.

Flowers: September—February.

Distribution and Habitat: Endemic to New Guinea and growing at high altitudes from 720 to 3000 m above sea level. Growing in open places in the forest or as a second growth weed in old lands.

Specimens examined:

NEW GUINEA. *Brass* 4931 (GH, NY), 10558 (GH, L), 10892 (GH, L), 11556 (GH, L); *Clemens* 7611 (GH); *Versteeg* 1098 (GH, L).

Affinities: This species is closely related to *Blumea riparia* DC. (a much more widespread species) a relationship also noted and pointed out by S. Moore. *Blumea papuana* differs from *B. riparia* in its erect habit, denser inflorescence and glabrous receptacles. It is also related to *B. arfakiana* and *B. lanceolaria* but from these, it may be distinguished mainly by its purplish brown stems, leaves and phyllaries.

5. *Blumea lanceolaria* (Roxb.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 609. 1917. Species name describing the leaves. — *Conyza lanceolaria* Roxb. Fl. Ind. 3: 432. 1832. — *Blumea myriocephala* DC. Prodr. 5: 4455. 1836. — *Blumea spectabilis* DC. Prodr. 5: 445. 1836. — *Blumea longifolia* DC. Prodr. 5: 446. 1836. — *Conyza longifolia* Heyne in Wall. Cat. no. 3026. comp. no. 126. 1831, n. n. — *Blumea nitida* Zoll. et Mor. Nat. en Geneesk. Arch. Neerl. Ind. 2: 244. 1845. — *Conyza nitida* Zoll. in Miq. Fl. Ind. Bat. 2: 54. 1856. — *Blumea squarrosa* Clarke, Comp. Ind. 87. 1876. — *Conyza squarrosa* Wall. Cat. no. 3025, comp. no. 125. 1831, n. n. — *Blumea wallichi* Clarke, Comp. Ind. 87. 1876. — *Blumea laxiflora* Elmer, Leaflets Philipp. Bot. 1: 110. 1906. — *Bilevillea (Blumea) granulatifolia* Leveille in Fedde, Rep. Spec. Nov. 8: 449. 1910. — *Gorteria setosa* Lour. Fl. Cochinch. 507. 1790, non Linn. fide Merr. — *Blumea conspicua* Hayata, Jour. Coll. Sci. Tokyo 30: 151. 1911. — *Blumea fruticosa* Koidzumi, Fl. Nov. Amami-Ohsimensis 9. 1928.

Large herb, undershrub or shrub, 0.75—2.00 m in height. *Stems* woody at the base, reaching up to 1 cm in diameter, hollow in the centre, generally unbranched except for the inflorescence, erect; branches terete, glabrate or puberulous particularly in the younger parts and on the inflorescence axes. *Leaves* 6—32 cm long, 0.8—8.0 cm wide, generally elliptic-oblancoelate, sometimes narrowly oblong-lanceolate, the upper surface often rugose and lustrous, quite glabrous, the lower surface paler, glabrate or puberulous with multicellular hairs, the apex shortly acuminate, the margins minutely to grossly serrate-dentate, the base prolonged tapering; upper epidermal cells polygonal, the lower with straight to undulate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, pyramidal panicles, almost sessile and clustered to distinctly pedunculate and lax, 6—11 mm in diameter; peduncles, when present, up to 2 cm long. *Involucre* with the phyllaries green to purplish, longer than the florets, recurved and spreading, 1—9 mm in length, the outer ones ovate-lanceolate, the inner narrowly lanceolate with prominent scarious margins, all pubescent on the back, with ciliate margins and apices. *Receptacle* 2—3 mm in diameter, flat, alveolate, fimbriate or densely pilose, very rarely glabrate. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 ovate, acute, papillate lobes that are pubescent with colleters and occasional hairs; those of the female florets filiform, 5—6 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* straw-coloured, pubescent, oblong, with pale ribs. *Pappus* yellowish-white changing to pale red on drying, up to 5 mm long.

Type specimen: *Roxburgh s.n.* (K, type drawing).

Type locality: India.

Flowers: February—April.

Distribution and Habitat: Southern and Eastern India, East Pakistan, Ceylon, Burma, Sumatra, Java, Indochina, China, Formosa, Philippines and the Ryukyu Archipelago. Growing in wooded ravines, in wet shady places and along banks of streams at altitudes up to 1500 m above sea level.

The extreme variability of this species has led to a complex nomenclatural situation as evinced by the long synonymy. Characters like the degree of pubescence of the receptacle, type of inflorescence, pedunculate vs. sessile heads, traditional and reliable in the identification of other members of the genus vary considerably and often independently of each other. As a result, I have here united the entire group under one species with two varieties.

var. *lanceolaria*.

Capitula 6—8 mm in diameter, often subsessile and clustered. *Receptacle* densely pilose or rarely glabrate. *Leaves* broadly oblanceolate, minutely serrate.

Specimens examined:

SIKKIM. *Clarke 13926 A* (CAL), *27289 A* (CAL); *Hooker s.n.* (GH, L); *Native coll. 656* (GH).

INDIA. Assam: *Burkill 38143* (CAL), *38229* (CAL); *Clarke 37594 A* (US), *37666 A* (CAL), *37952* (CAL); *Hock 741* (US); *Jenkins s.n.* (CAL); *King's coll. s.n.* (CAL); *Mann 241* (DD); *Prain's coll. 480* (CAL), *755* (E); *Simons s.n.* (DD, L); *Watt 10458* (CAL, DD, US), *s.n.* (CAL). Bengal: *Biswas 1795* (GH); *Cowan 1927* (E); *Gamble 6858 B* (DD); *Lister 342* (CAL); *Osenaston 1461* (DD), *s.n.* (DD); *Sinclair 3733* (E), *4034* (E). Bombay: *Fernandes 168* (GH); *Fischer 1831* (CAL); *Stodds, Law s.n.* (P). Madhya Pradesh: *Duthie 10426* (CAL, DD, K). Madras: *Drue s.n.* (E). Travencore: *Rama Rao 843* (CAL). Uttar Pradesh: *Champion s.n.* (DD). No locality: *Clarke 16913* (CAL); *Wallich 3026/136* (GH, type collection of *Conyza longifolia* Heyne); *No data* (DD).

PAKISTAN. *E., Schutze s.n.* (L); *Wallich 3025/135* (DD, E, GH, K, type collection of *Conyza squarrosa* Wall.).

CEYLON. *Thwaites 11030* (P).

ANDAMAN ISLANDS. *King's coll. s.n.* (CAL, DD, E); *Kirat Ram s.n.* (DD); *Prain 1500* (CAL).

NEOBBAR ISLANDS. *King's coll. 686* (CAL, DD); *Kurz s.n.* (CAL).

BURMA. *Falcooner 487* (L); *Forrest 12246* (E); *Griffith 3146* (GH, P); *Khan 26* (CAL, L, U); *Kurz 2248* (CAL); *MacGregor 1299* (E); *Meebold 15306* (CAL); *Myanig 118* (DD, E); *Parish 113* (K); *Pottinger s.n.* (CAL).

INDOCHINA. *Balansa 874* (P), *3076* (P); *Eberhardt 1371* (P), *3264* (P); *Pételot s.n.* (US).

COCHINCHINA. *Pierre 1068* (GH, MO, NY), *s.n.* (K).

SIAM. *Kerr 12336* (L), *18801* (K), *20324* (K); *Kloss 7044* (K); *Put 4441* (K); *Winit 221* (K).

INDONESIA. Java: *Dooters van Leeuwen 805* (U); *Palmer & Bryant 794* (US); *Zollinger 2341* (P, U, type collection of *Conyza nitida* Zoll.). Sumatra: *Posthumus 591* (L).

CHINA. Hainan: *Lau 5475* (GH); *Lei 527* (GH, NY); *Liang 65200* (NY, US). Kwangtung: *Chang 159* (NY); *Fung Hom 11* (GH, NY); *Tsui 62* (NY); *WNT 11416* (HK). Kweichow: *Cavalerie 3708* (GH, photographs, K, P, type collection of *Bilevillea granulatifolia* Leveille). Yunnan: *Henry 11730* (HK, K, MO, NY), *11730 A* (K, US).

FORMOSA. *Faurie 8132* (GH); *Henry 181* (MO), *721* (K, MO, NY, US); *Tanaka & Shimada 13564* (GH, L, NY, P, U, UC, US).

RYUKYUS. *Conover 1188* (US); *Koidzumi s.n.* (US); *Naito s.n.* (US); *Wright 136* (GH, US).

NO LOCALITY. *Lindley s.n.* (L); *Priaman 1045* (U).

var. *spectabilis* (DC.) Randeria, comb. nov. — *Blumea spectabilis* DC. Prodr. 5: 445. 1836.

Capitula 9—11 mm in diameter, distinctly pedunculate, in large, lax panicles. *Receptacle* fimbriate. *Leaves* narrowly oblong-lanceolate, coarsely serrate-dentate.

Type specimen: *Wight s.n.* (G—DC).

Specimens examined:

INDIA, S. *Calder & Ramaswami 1410* (CAL); *Dalzell s.n.* (CAL); *Wight 439* (E, UC), *1589* (K), *2/16* (K).

CEYLON. *Thwaites C. P. 1744* (CAL, E, GH, K, P), *C. P. 2557* (K).

COCHINCHINA. *Pierre s.n.* (NY).

FORMOSA. *Faurie 879* (GH).

PHILIPPINES. Luzon: *Clemens 1785* (UC), *17076* (NY, UC); *Edaño 17885* (L); *Elmer 8231* (K, NY, type collection of *B. laxiflora* Elm.); *Juliano s.n.* (UC); *Loher 3648* (US), *14329* (UC); *Merrill 5073* (K, L, NY, US); *Bur. Sci. 17719 Oianes* (NY, UC), *46813* (UC); *Vidal 3119* (K), *Warburg 13519* (NY). Leyte: *Edaño 11880* (L). Mindanao: *Bur. Sci. 49598 Ramos & Edaño* (NY, UC). Mindoro: *Bur. Sci. 39657 Ramos* (US). Negros: *Edaño 21892* (L). Panay: *Bur. Sci. 30963 Ramos & Edaño* (UC). Samar: *Bur. Sci. 17467 Ramos* (K, UC).

Affinities: *Blumea lanceolaria* is an extremely polymorphous species with close affinities with *B. bullata* on one hand and the *aromatica*, *macrophylla* group on the other. Its leaf form and its general lack of pubescence serve to distinguish it from all of these; it is further separated from *B. bullata* and *B. sylvatica* by its corolla lobes of the bisexual florets which are generally pubescent only with colleters.

6. *Blumea arfakiana* Martelli, Nuov. Giorn. Bot. Ital. 15: 292. 1883. Specific epithet derived from the type locality, Mt. Arfak in New Guinea. — *Blumea balfouri* Hemsley, Kew Bull. 8: 213. 1894, *vide* Mattfeld (1929).

Undershrub, 1—2 m in height. *Stems* woody at the base, reaching up to 1 cm in diameter, branched, erect, terete, pubescent particularly in the younger parts. *Leaves* 6—28 cm long, 2.8—10.0 cm wide, oblanceolate to oblanceolate-obovate, scabrous on the upper surface, pilose on the lower with multicellular hairs, both surfaces also with numerous colleters, the apex shortly acuminate, the margins serrate with indurated teeth, the base prolonged attenuate; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, more or less pyramidal panicles, 10—14 mm in diameter; ultimate peduncles 4—18 mm long. *Involucre* with the phyllaries more or less coriaceous, spreading almost equal in length to the florets, 1—9 mm long, up to 1.5 mm broad, ovate to lanceolate, acute, pubescent on the back with multicellular hairs and colleters. *Receptacle* 2—3 mm in diameter, flat to slightly convex, alveolate, minutely fimbriate. *Corollas* yellow, tubular; those of the bisexual florets 5—7 mm long, with 5 ovate, papillate lobes that are pubescent with occasional hairs and numerous colleters; those of the female florets filiform, 5.5—7.0 mm long, 2 to 3 lobed, with colleters on the lobes. *Anther* tails shorter than the thickened portion of the filament. *Achenes* pale brown, oblong, puberulous, 10-ribbed. *Pappus* yellowish-white to pale red, 5—6 mm long.

Type specimen: *Beccari 843* (FI).

Type locality: New Guinea, Mt. Arfak.

Flowers: March—October.

Distribution and Habitat: Restricted to New Guinea. Growing in rain forests, along river and stream banks, in old gardens, and in cleared and settled areas at altitudes from sea level to 1600 m above.

Specimens examined:

NEW GUINEA. *Beccari* 843 (L, type fragment and photograph); *Brass* 7306 (GH, L), 11656 (GH), 13086 (L); *Clemens* 6024 (GH), 41792 (GH, MICH); *Docters van Leeuwen* 10027 (U), 10092 (L); *Eyma* 5320 (L); *Gjellerup* 238 (L); *Idjan* 72 (L); *Kornassi* 917 (L); *Pleyte* 1072 (L); *van Römer* 167 (L), 301 (L), 958 (L); *Versteeg* 80 (L), 107 (L), 1057 (L, U), 1501 (L, U); *Warburg* 21411 (GH).

AROE ISLAND. *Buwalda* 4884 (K, L).

AMBOINA. *Robinson* 416 (US).

SOLOMON ISLAND. *Wharton* s.n. (K, type collection of *B. balfouri* Hemsl.).

Affinities: *Blumea arfakiana* is closely related to *B. aromatica* and to *B. milnei*. It is distinguishable from either by the broad, coriaceous phyllaries, the pilose under surface of the leaves, and the comparatively larger heads. It is also related to *B. papuana*, another New Guinea endemic, but may be distinguished from this by its larger leaves and lack of purplish brown leaves, stems and phyllaries.

7. *Blumea pachycephala* Koster, *Blumea* 4 (3): 487. 1941. Specific epithet referring to the gross capitula from $\pi\acute{\alpha}\chi\upsilon\varsigma$ = thick and $\kappa\epsilon\rho\acute{\alpha}\lambda\eta$ = head.

Herbs at least up to 1 m in height (*vide* Koster). *Stems* erect, simple, terete, dark brown, quite glabrous. *Leaves* shortly petiolate (petioles up to 3 mm long), ca 15—25 cm long, 3—5 cm wide, elliptic-lanceolate, bullate and glabrate on the upper surface, minutely puberulous on the lower surface and especially the veins with multicellular hairs and colleters, the apex acute, the margins minutely denticulate, the base acute; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in a large, terminal, lax panicle, pedunculate, 10—15 mm in diameter; peduncles 5—15 mm long, minutely puberulous. *Involucre* with the phyllaries coriaceous, slightly longer than the florets, 1—10 mm in length, the outer ones ovate, dark brownish-black in dried specimens, the inner linear-lanceolate, more or less scarious, all acute at the apex and minutely puberulous on the dorsal surface. *Receptacle* 3.0—4.5 mm in diameter, convex, alveolate, sparsely pilose with long, white hairs in the centre. *Corollas* yellow (?), tubular; those of the bisexual florets 6.5—8.0 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters and multicellular hairs; those of the female florets filiform, 6—7 mm long, 3 to 4 lobed, glabrous. *Anther* tails somewhat shorter than or equal in length to the thickened portion of the filament. *Achenes* (immature) oblong, pubescent, striate. *Pappus* sordid-white, up to 7 mm long.

Type specimen: *Radermacher* s.n. (L).

Type locality: Java, Soerabaia.

Flowers: August.

Distribution: Endemic to Java.

Specimens examined:

JAVA. Soerabaia: *Radermacher* s.n. (L, holotype).

Affinities: Koster (1941) states that this species is allied to *Blumea sylvatica* (Bl.) DC. but differs by the heads, the leaves and the almost glabrous stems. In my opinion, it also appears to be related to *B. bullata*.

8. *Blumea bullata* Koster, *Blumea* 4 (3): 489. 1941. Specific name derived from the bullate leaf surface. — *Conyza chinensis* Bl. Bijdr. 898. 1826, non Linn. — *Conyza chinensis* var. *poliolepis* Miq. Pl. Junghuhn. 500. 1854. — *Blumea chinensis* DC. Prodr. 5: 444. 1836 *quoad descr.*

According to Merrill (1919), Craib (1936) and Koster (1941), De Candolle as well as Blume and Miquel were mistaken in their interpretation of Linnaeus' *Conyza chinensis*, the type of which was collected in China. The species under question here occurs in Java and the adjacent islands and is obviously different.

Large herb or undershrub. *Stems* branched, erect, terete, glabrate or puberulous particularly on the inflorescences axes. *Leaves* 8—26 cm long, 2.5—10.0 cm wide, the upper sessile and passing into bracts, the lower shortly petiolate, all ovate to obovate or oblanceolate, sparsely scabrous on the upper surface with prominent-based hairs, pilose on the lower surface and particularly the veins with multicellular hairs and colleters, the apex shortly acuminate, the margins coarsely double serrate or serrulate, the base tapering into the more or less indistinct petiole; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* axillary and terminal, in a large, pyramidal panicle, pedunculate, 10—14 mm in diameter; peduncles up to 2 cm long, densely pilose. *Involucre* with the phyllaries longer than the florets, 1—10 mm in length, the outer ones oblong, the inner linear-lanceolate, tapering, all densely pubescent on the back with multicellular hairs and colleters, the margins and apices ciliate. *Receptacle* 2.5—3.0 mm in diameter, flat, alveolate, pilose. *Corollas* yellow, tubular; those of the bisexual florets 5.5—7.0 mm long, with 5 triangular, acute, papillate lobes that are pubescent with multicellular hairs and colleters; those of the female florets filiform, 5—6 mm long, 2 to 3 lobed, glabrous. *Anther* tails more or less equal in length to or longer than the thickened portion of the filament. *Achenes* pale brown, oblong, pubescent, ribbed. *Pappus* yellowish-white, rarely pale red, 5—6 mm long.

Type specimen: *Blume s.n.* (L).

Type locality: Java.

Flowers: May—January.

Distribution and Habitat: Malay Archipelago. Growing in montane forests at an altitude of 600 to 2100 m above sea level.

Specimens examined:

JAVA. *Anderson 341* (CAL), *425* (CAL), *434* (CAL); *Bakhuizen van den Brink 3745* (U); *Blume s.n.* (L, P, type collection); *Boerlage s.n.* (L); *Buysman 173* (U); *Hallier 443* (K, L, NY), *472* (NY), *473* (L), *s.n.* (K, L); *van Hasselt 2* (L); *Halstvoogd 161* (L), *211* (L); *D. T. H. 8939* (L); *Junghuhn 313* (L, U); *Kobus 112* (L); *Koorders 31910* ♂ (L), *37388* ♀ (L); *Korthals s.n.* (L); *Kuntze 4437* (K, NY), *5416* (NY), *5879* (NY); *Kurz s.n.* (CAL); *J. E. K. 698* (CAL); *Mousset 856* (L); *Palmer & Bryant 1064* (US); *Ploem s.n.* (L); *Raap 620* (L), *740* (L); *Sapiin 229* (U), *2166* (U); *Schiffner 2765* (L), *2814* (L); *van Steenis 10650* (GH, L); *Winckel s.n.* (L);

Wisse 1157 (L); Yates 2846 (UC); Zollinger 1492 (L, P), 2471 (P); No coll. 37/e (L); No data (L).

CELEBES. No data (L).

SUMBAWA. Zollinger s.n. (P, U).

MALAY ARCHIPELAGO. W. 62 (L), s.n. (L).

Affinities: *Blumea bullata* is closely allied to *B. sylvatica* var. *sylvatica* of the following section, differing from it only in its glabrate habit, its predominantly yellowish-white pappus and its usually coarsely serrate leaves. It is also related to *B. procera* and *B. riparia*; the former, however, is more pubescent and has the capitula aggregated into clusters at the ends of the branches whereas the latter may be distinguished by its climbing habit, smaller leaves and densely pubescent receptacles.

Section 2. *Macrophyllae* (Plates IX—XII).

1. Leaf surfaces and phyllaries with colleters, the abaxial laminar surface puberulous, villous or tomentose.
2. Receptacle fimbriate or pilose (glabrous in *B. macrophylla* var. *macrophylla*); leaves not purplish on the under surface.
3. Capitula 7 to 10 mm or more in diameter; inner phyllaries 8 mm long or longer; anther tails equal to or longer than the thickened portion of the filament.
4. Corolla lobes of bisexual florets with colleters and numerous multicellular hairs; upper epidermal cells of the lamina with undulate to straight walls
9. *B. sylvatica*
4. Corolla lobes of bisexual florets with colleters and none or occasional multicellular hairs; upper epidermal cells of the lamina with sinuate walls (except *B. korthalsiana*).
5. Small herbs up to 60 cm in height; leaves narrowly oblong-lanceolate, distantly denticulate; receptacles pilose . . . 10. *B. korthalsiana*
5. Herbs to undershrubs up to 3 m in height; leaves obovate to elliptic-oblongeolate, serrate-dentate; receptacles fimbriate 11. *B. aromatica*
3. Capitula 5—7 mm in diameter; inner phyllaries 6—7 mm long; anther tails considerably shorter than the thickened portion of the filament 12. *B. milnei*
2. Receptacle glabrous; leaves purplish on the under surface . . . 13. *B. bicolor*
1. Leaf surfaces and phyllaries without colleters, the abaxial laminar surface densely silky or woolly.
6. Capitula 12—17 mm in diameter; leaf margins mucronulate.
7. Leaves a maximum of 17 cm long and 5.6 cm wide; corolla lobes of female florets with colleters; inner phyllaries 8—9 mm long 14. *B. arnakidophora*
7. Leaves a maximum of 40 cm long and 15 cm wide; corolla lobes of female florets glabrous; inner phyllaries 11—12 mm long . . . 15. *B. martiniana*
6. Capitula 5—11 mm in diameter; leaf margins serrate or dentate.
8. Corolla lobes of bisexual florets with multicellular hairs in addition to colleters; leaf margins dentate with spreading teeth.
9. Plants woolly; capitula 5.5—7.0 mm in diameter . . . 16. *B. densiflora*
9. Plants silky; capitula 8—11 mm in diameter . . . 17. *B. junghuhniana*
8. Corolla lobes of bisexual florets only with colleters; leaf margins serrulate or serrate with upcurved teeth 18. *B. balsamifera*

9. *Blumea sylvatica* (Bl.) DC. Prodr. 5: 447. 1836. Specific epithet referring to the habitat. — *Conyza sylvatica* Blume, Bijdr. 898. 1826. — *Blumea macrophylla* (Bl.) DC. var. *sylvatica* (Bl.) Koster, *Blumea* 4 (3): 488. 1941. — *Blumea sessilifolia* (Bl.) DC. Prodr. 5: 447. 1836. — *Conyza sessilifolia* Blume, Bijdr. 897. 1826. — *Blumea ternatensis* (Miq.) Boerl. Handl. Fl. Ned. Ind. 2 (1): 237. 1891. — *Conyza ternatensis* Miq. Fl. Ind. Bat. 2: 49. 1856.

Herbs to undershrubs, 0.3—3.5 m in height. Stems often woody at

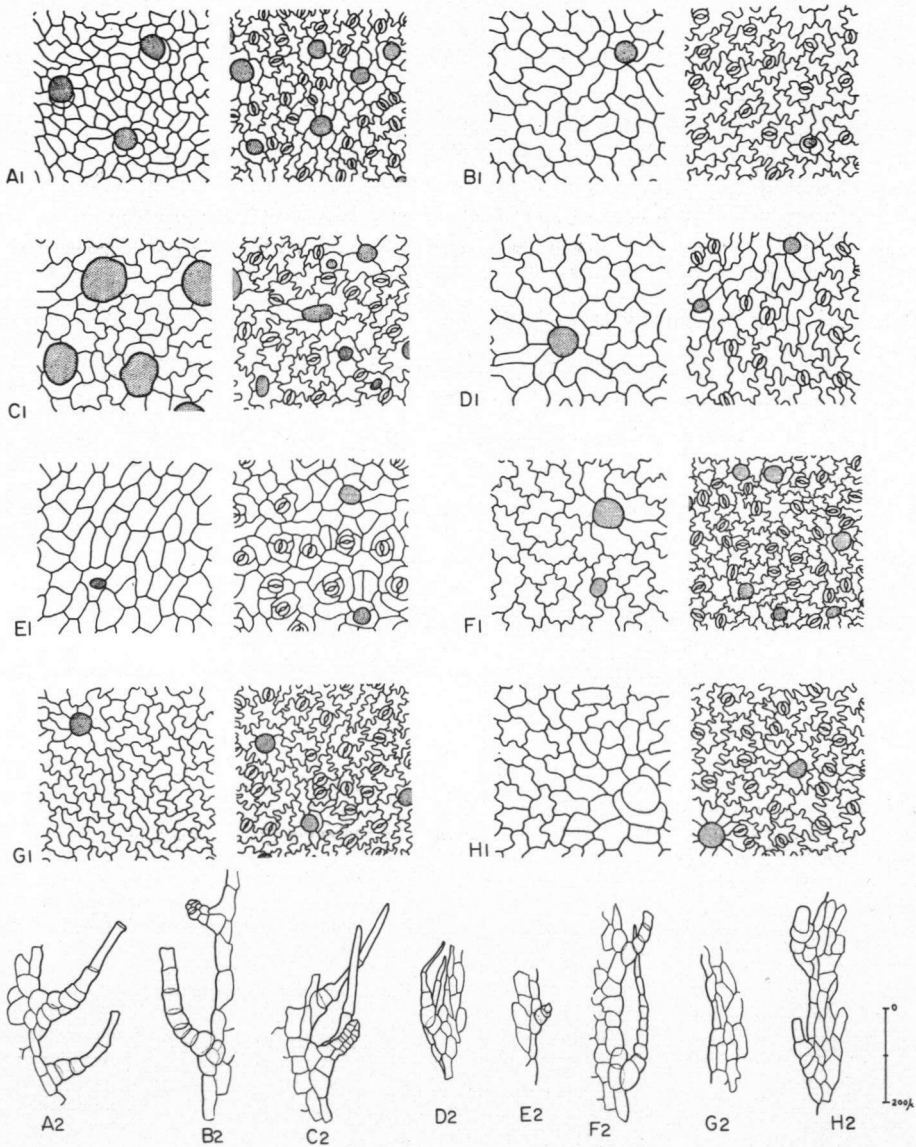


PLATE V. — Section Semivestitae. A. *Blumea procera* (Wall.) DC., India, *Wallich 3050/140* (GH, type collection). B. *B. riparia* (Bl.) DC., Indonesia, Sumatra, *Bartlett & La Rue 452* (US). C. *B. vanoverberghii* Merr., Philippines, Luzon, *Vanoverbergh 1065* (MO). D. *B. papuana* S. Moore, New Guinea, *Versteeg 1098* (GH). E. *B. lanceolaria* (Roxb.) Druce, E. Pakistan, *Wallich 3025/135* (E). F. *B. arfakiana* Martelli, New Guinea, *Clemens 6024* (GH). G. *B. pachycephala* Koster, Java, *Kadernacher s.n.* (L, type). H. *B. bullata* Koster, Java, *Blume s.n.* (L, type coll.). In each case, 1 represents leaf epidermal surface, upper to left, lower to right, 2 leaf margin.

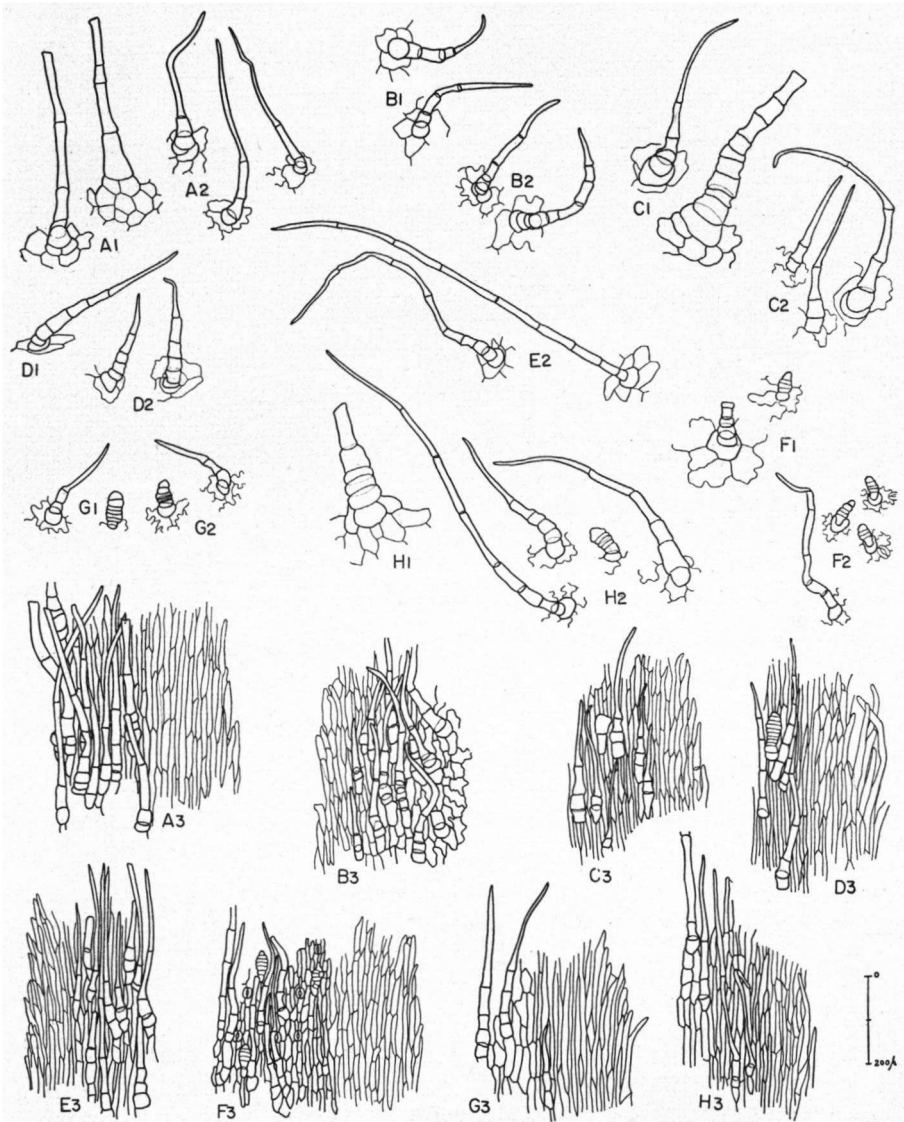


PLATE VI. — Section Semivestitae. For explanation of A—H and voucher specimens see Plate V. In each case, 1 represents trichomes on the upper laminar surface, 2 trichomes on the lower laminar surface, and 3 portion of phyllary (dorsal surface).

the base, simple or branched, erect, terete, puberulous particularly in the younger parts. *Leaves* 9—47 cm long, 2.5—18.0 cm wide, the upper smaller and passing into bracts, ovate-lanceolate to oblong-lanceolate, glabrate or minutely puberulous (particularly on the veins) on the upper surface, tomentose on the lower with multicellular hairs and scattered colleters, the apex shortly acuminate, the margins serrate with indurated teeth, the

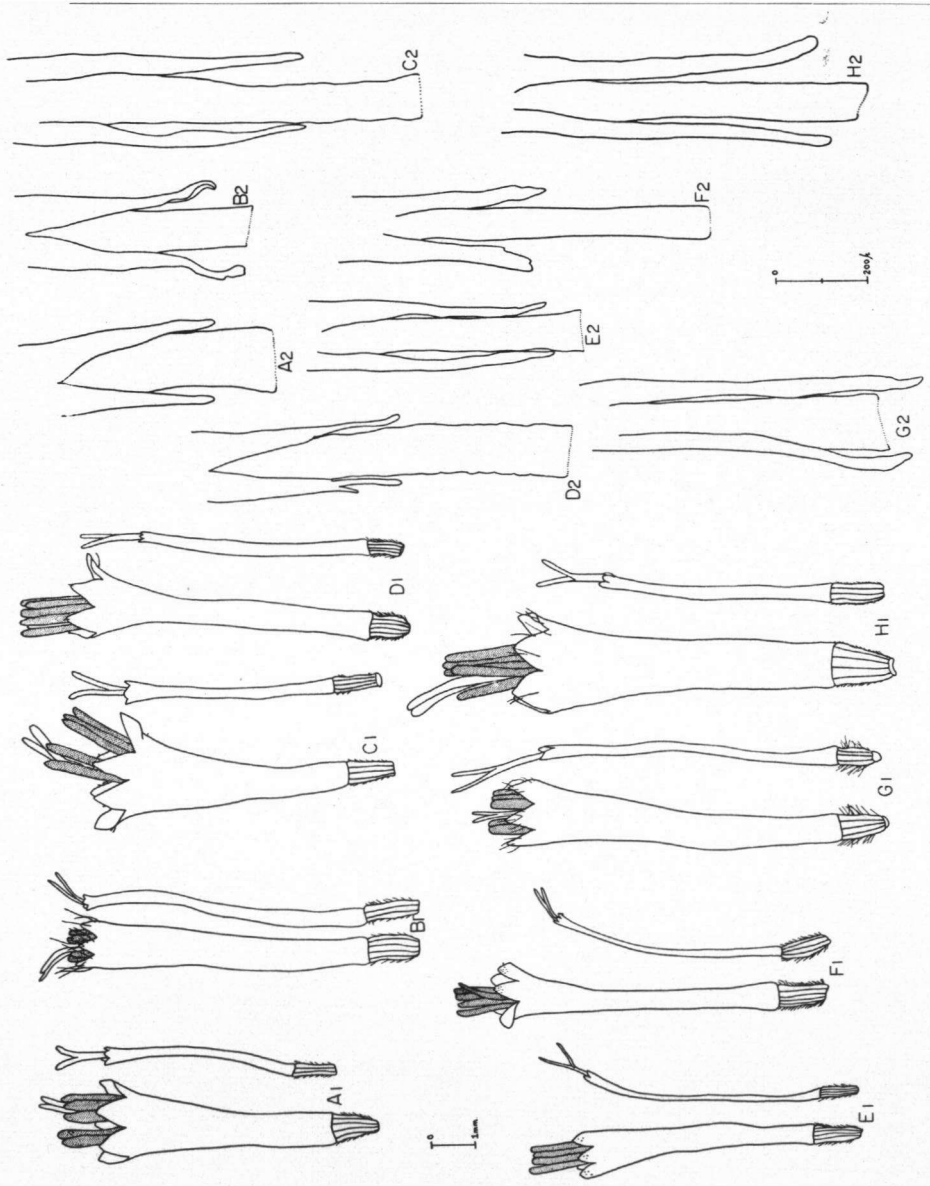


PLATE VII. — Section Semivestitae. For explanation of A—H and voucher specimens see Plate V. In each case, 1 represents florets, bisexual to left, female to right, and 2 anther tails.

base prolonged tapering; upper epidermal cells with undulate to straight walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, lax panicles, pedunculate, 7—12 mm in diameter; peduncles up to 15 mm long. *Involucre* with the phyllaries longer than the florets, 1—11 mm in length, the outer ones linear-oblong, the inner narrowly linear-lanceolate with scarios margins, all pubescent on the dorsal surface with multicellular hairs and colleters. *Receptacle* 1.5—2.5 mm in diameter, flat, alveolate, glabrous or pilose. *Corollas* yellow,

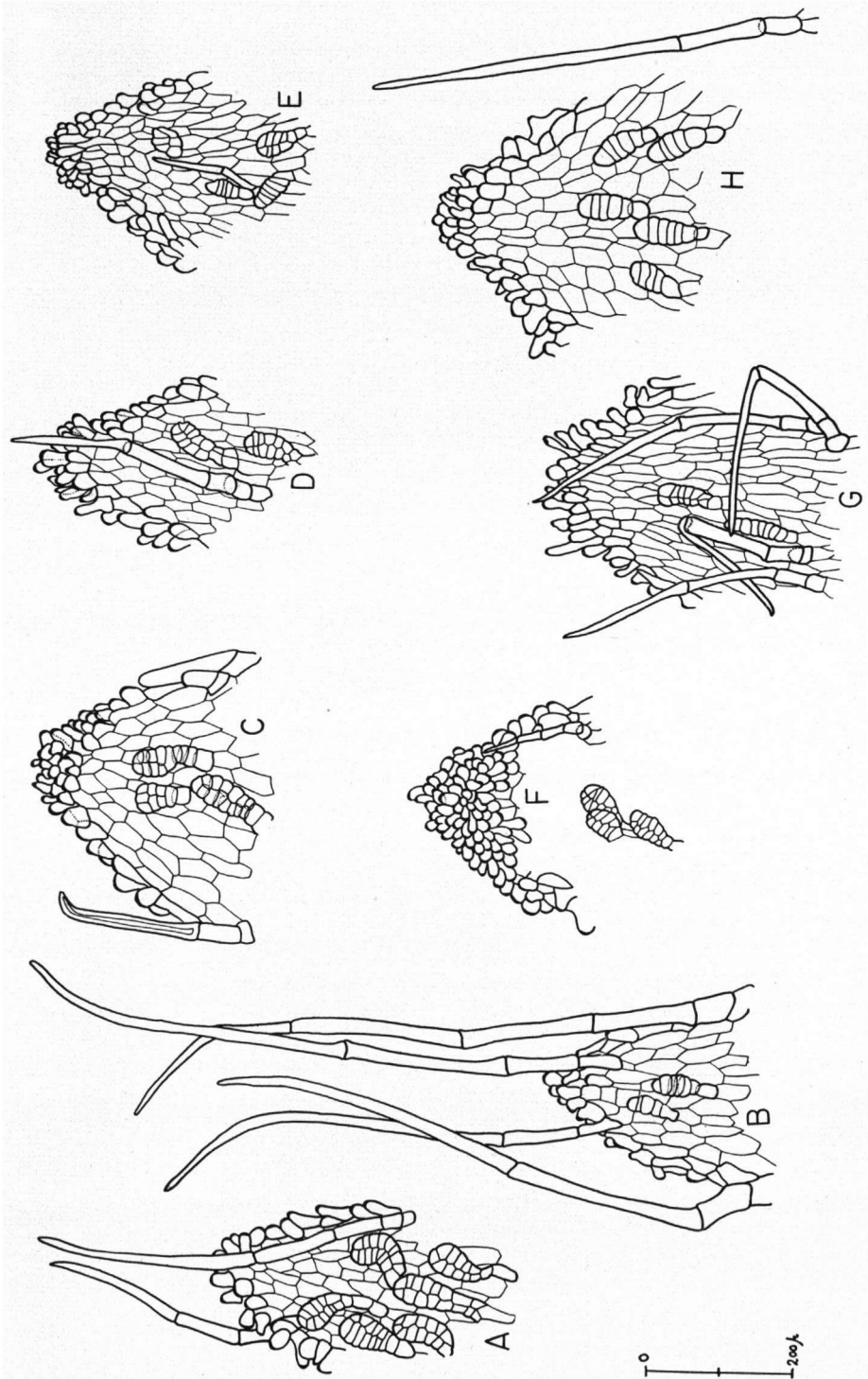


PLATE VIII. — Section Semivestitae. Corolla lobes of bisexual florets. For explanation of A—H and voucher specimens see Plate V.

tubular; those of the bisexual florets 4.5—6.0 mm long, with 5 triangular, acute, papillate lobes that are pubescent with multicellular hairs and col-leters; those of the female florets filiform, 4.5—6.0 mm long, 2 to 3 lobed, occasionally pubescent. *Anther* tails equal in length to or slightly longer than the thickened portion of the filament. *Achenes* straw-coloured, oblong, pubescent, ribbed. *Pappus* reddish, up to 6 mm long.

Note: I have here divided the species into two varieties, the typical one with a widespread geographical range, and var. *macrophylla* which is more restricted in its distribution. However, the characters that separate these two varieties are oftentimes not very clear-cut and it is quite probable that they hybridize and intergrade when they are in contact with each other.

var. *sylvatica*.

Herbs, usually unbranched. *Phyllaries* acute at the apex. *Receptacle* pilose.

Type specimen: *Blume s.n.* (L).

Type locality: Java, Megamendung.

Flowers: Throughout the year.

Distribution and Habitat: Indonesian islands and the Philippines. Growing at the edges of forests and along streams and rivers.

Specimens examined:

INDONESIA. Borneo: *Clemens & Clemens 32732* (GH, L, NY, UC); *Mjöberg 223* (NY, UC). Celebes: *Koorders 16430* β (L), *16433* β (L), *16498* β (L). Flores: *de Voogd 2327* (GH). Java: *Anderson 341* (CAL); *Arens 103* (L); *Backer 23015* (L); *Blume s.n.* (L, type collection); *Hallier 472* (L, NY); *Koorders 31824* β (L); *Kuntze 5133* (NY); *5637* (K, NY); *Ploem s.n.* (L); *Rant 414* (L); *Sapin s.n.* (L); *Schiffner 2827* (L); *van Steenis 7163* (GH), *12326* (L); *Zollinger 936* (P). No data (L). Sumbawa: *Warburg 17223* (GH). Sumatra: *Bartlett 7434* (MICH), *7512* (US), *7793* (MICH, US); *Bartlett & La Rue 275* (GH, L, US), *298* (UC, US); *Boea 9312* (GH, MICH), *10550* (L), *10332* (L); *Bünnemeyer 968* (L), *3526* (L), *9104* (L); *Forbes 2176* (L); *Galoeng 45* (L); *Lörzing 4796* (L), *8221* (L); *Schiffner 2745* (L); *van Steenis 9436* (L). Ternate: *Idjan 45* (K); *Reinwardt s.n.* (L, type collection of *B. ternatensis*). Malay Archipelago: *W. 75* (L).

PHILIPPINES. Luzon, Benguet: *Clemens 17262* (UC), *17263* (NY, UC); *Elmer 8762* (K, L, NY, US), *8791* (GH, L, NY, US); *For. Bur. 13116* (NY, US); *Merrill 1744* (GH, L, MO, NY), *6511* (US), *11705* (US); *Bur. Sci. 82408* *Quisumbing & Sulit* (GH). Bataan: *Bur. Sci. 80070* *Ramos* (GH). Laguna: *Bur. Sci. 76675* *Duyag* (NY). Zambales: *Clemens 17508* (NY, UC).

var. *macrophylla* (Bl.) Randeria, comb. nov. — *Blumea macrophylla* (Bl.) DC. Prodr. 5: 446. 1836. — *Conyza macrophylla* Blume, Bijdr. 896. 1826, non *Conyza macrophylla* Spreng. (1826), nom. prim. cf. *Dates of publication* in Van Steenis, Fl. Males. I 4: CCXIII. 1948—1954.

Usually large undershrubs. *Phyllaries* acuminate at the apex. *Receptacle* glabrous.

Type specimen: *Blumea s.n.* (L).

Type locality: Java.

Flowers: Throughout the year.

Distribution and Habitat: Celebes, Java, Sumatra and adjacent islands. Growing on mountains and along rivers in rain forests at altitudes of up to 2800 m above sea level.

Specimens examined:

CELEBES. *Eyma 1545* (K, L, U); *Koorders 16523* β (L).

JAVA. *Backer 10815* (L); *Blume s.n.* (L, NY, P), *type collection*); *Boerlage s.n.* (L); *Dorgelo 1365* (L); *Elbert 32* (L); *Junghuhn 321* (L, U); *Koorders 14954 β* (GH, L), *31818 β* (L); *Kuntze 4819* (K); *Lörzing 1231* (L); *Palmer & Bryant 1238* (US); *W. s.n.* (L); *Zollinger 2239* (P); *No coll. 882b* (L); *2054* (L); *No data* (L).

SUMATRA. *Bünnemeyer 4742* (L); *Gall 83* (L); *Korthals s.n.* (L); *Ridley s.n.* (K); *van Steenis 9366* (L).

SUMBAWA. *Elbert 1612* (L), *6785* (L).

MALAY ARCHIPELAGO. *No data* (L).

Affinities: *Blumea sylvatica* is closely related to *B. aromatica* DC. and *B. bullata* Koster. From the former it differs in having serrulate leaves with indurated teeth, and corolla lobes of bisexual florets with colleters and multicellular hairs, and from the latter in having ovate-lanceolate leaves, and herbaceous phyllaries.

10. *Blumea korthalsiana* (Miq.) Boerl. Handl. Fl. Ned. Ind. 2 (1): 239. 1891. Named after Korthals who collected the type material. — *Conyza korthalsiana* Miq. Fl. Ind. Bat. 2: 50. 1856.

Herbs, 10—60 cm in height with a fibrous root system. *Stems* simple, erect, terete, puberulous. *Leaves* 6.5—20.0 cm long, 0.8—4.0 cm wide, generally narrowly oblong-lanceolate, sometimes broadly lanceolate, darker and scabrous on the upper surface with prominent-based hairs, paler green and minutely puberulous with multicellular hairs and colleters on the lower surface, the apex acuminate, the margins distantly and minutely denticulate, the base prolonged tapering; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* few in number, in terminal, lax panicles, pedunculate, 7—9 mm in diameter; peduncles up to 15 mm long, puberulous, bracteolate. *Involucre* with the phyllaries almost equal to or slightly longer than the florets, 1—8 mm in length, the outer series lanceolate, the inner linear and with scarious margins, all acute at the apex, pubescent outside with multicellular hairs and colleters. *Receptacle* ca 1.5 mm in diameter, slightly convex, alveolate, pilose. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters; those of the female florets filiform, 4.5—5.0 mm long, 2 to 3 lobed, glabrous. *Anther* tails slightly longer than the thickened portion of the filament. *Achenes* oblong, pale brown, pubescent, ribbed. *Pappus* pale red, up to 5 mm long.

Type specimen: *Korthals s.n.* (L).

Type locality: Sumatra, Singalang.

Flowers: May—August.

Distribution and Habitat: Sumatra, Luzon and New Guinea. Growing in woods at altitudes at least up to 360 m above sea level.

Specimens examined:

SUMATRA. *Beccari 604* (L); *Korthals s.n.* (L, *type collection*); *Matthew s.n.* (K).

PHILIPPINES. Luzon: *Elmer 7387* (L, NY, US).

NEW GUINEA. *No data* (L).

NO LOCALITY. (L).

Affinities: This species is closely related to *Blumea sylvatica* var. *sylvatica* from which it may be distinguished by its narrow leaves, its upper epidermal cells of the lamina with sinuate walls and its corolla lobes of bisexual florets only with colleters.

11. *Blumea aromatica* DC. Prodr. 5: 446. 1836. Specific epithet referring to the extremely glandular nature of the plant and its odour. — *Conyza aromatica* Wall. Cat. no. 3054. comp. no. 164. 1831, *n. n.* — *Erigeron cochinchinense* Spreng ex DC. Prodr. 5: 446. 1836.

Herbs to undershrubs, 0.5—3.0 m in height. *Stems* sometimes woody at the base, solid and reaching a diameter of 1 cm, branched, erect; branches terete, viscid-tomentose particularly on the inflorescence axes with numerous glands and multicellular hairs. *Leaves* 8—35 cm long, 2.4—13.0 cm wide, obovate to elliptic-oblongate, pilose on the upper surface, villous on the lower with multicellular hairs and numerous colleters, the apex acute, the margins coarsely serrate-dentate, the base tapering; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal and axillary, lax panicles, pedunculate, 10—15 mm in diameter; peduncles up to 15 mm long, very viscid. *Involucre* with the phyllaries herbaceous, equal in length to or slightly longer than the florets, 1—10 mm in length, oblong-lanceolate, acuminate, pubescent on the back with numerous colleters and occasional multicellular hairs. *Receptacle* 2.0—3.5 mm in diameter, flat, alveolate, minutely fimbriate. *Corollas* yellow, tubular; those of the bisexual florets 6—7 mm long, with 5 broadly triangular, papillate lobes that are pubescent with colleters and occasional multicellular hairs; those of the female florets filiform, 5.0—6.5 mm long, 2 to 3 lobed, generally glabrous. *Anther* tails almost equal in length to the thickened portion of the filament. *Achenes* pale brown, oblong, ribbed, pubescent. *Pappus* pale red, up to 6 mm long.

Type specimen: *Wallich 3054/164* (K).

Type locality: Between the valleys of Nepal and Noakote.

Flowers: November—May.

Distribution and Habitat: Nepal, Bhutan, Sikkim, N.E. India, Burma, Siam, Indochina, China. Growing on the edges of rain forests or on the borders of fields and meadows at altitudes up to 1800 m above sea level.

Specimens examined:

NEPAL. *Wallich 3054/164* (E, GH, K, P, type collection).

SIKKIM. *Gamble 7164* (K); *Hooker s.n.* (CAL, E, GH, L); *Meebold 16530* (CAL); *Ribu & Rhomoo 6225* (CAL).

BHUTAN. *Clarke 26376 G* (CAL, K); *Ludlow, Sheriff & Hicks 18510* (E).

INDIA. Assam: *Badul Khan 132* (CAL); *Burkill 37477* (CAL); *Clarke 10834 D* (CAL), *13965 D* (CAL), *27514 E* (CAL). Bengal: *Biswas 2016* (GH, NY). Uttar Pradesh: *Banwari Lal s.n.* (DD); *Fischer s.n.* (DD); *Gamble 25674* (DD); *Parker s.n.* (K); *Raizada s.n.* (DD); *Strachey & Winterbottom 2* (K); *Umrao Singh 323* (NY). No locality: *Clarke 2874 A* (DD); *Griffith 3150* (NY); *Boyle 48* (DD).

BURMA. *Abdul Hawk s.n.* (CAL); *Beddome 29* (K); *Robertson 278* (K).

SIAM. *Kerr 1675* (P).

INDOCHINA. *Balansa 3035* (P); *Pételot 1764* (UC), *3187* (UC).

CHINA. Kwangsi: *Lin Fa Shan 25944* (GH); *Tsang 23223* (GH). Kwangtung: *Tsang 20761* (MO, NY). Yunnan: *Hancock 431* (UC); *Henry 10127* (MO, NY, US), *10127 A* (NY, US), *11677* (NY), *12854* (K, US), *12952* (NY), *s.n.* (NY); *Wang 72549* (GH).

Affinities: Related to *Blumea milnei* and somewhat more remotely to *B. arfakiana* from which *B. aromatica* differs mainly by its leaf form and extreme glandularity. Also related to *B. macrophylla* from which it may be distinguished by its fimbriate receptacles and its predominantiy glandular corolla lobes of the bisexual florets.

12. *Blumea milnei* Seem. Fl. Vitiensis 141. t. 27. 1866. Specific epithet after Milne who collected the type material.

Undershrub, 1—2 m in height. *Stems* branched, erect, sulcate-terete, densely silky villous particularly in the younger parts. *Leaves* petiolate (petioles 5—12 mm long), 4.5—24.0 cm long, 1.3—7.0 cm wide, the uppermost smaller and passing into inflorescence bracts, lanceolate to ovate-lanceolate, sparsely strigose on the upper surface, velutinous on the lower with multicellular hairs intermixed with minute colleters, the apex apiculate, the margins minutely mucronulate-serrate, the base tapering, attenuated into the petiole; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal panicles, subsessile or pedunculate, 5—7 mm in diameter; peduncles, when present, up to 10 mm long. Involucre with the phyllaries herbaceous, slightly shorter than the florets, 1—7 mm in length, linear, tapering, with scarious margins, pubescent on the back with multicellular hairs and colleters. *Receptacle* 1.2—2.0 mm in diameter, slightly concave, alveolate, minutely fimbriate. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 triangular, minutely papillate lobes that are pubescent with colleters and occasional multicellular hairs; those of the female florets filiform, 4—5 mm long, 2 to 3 lobed, glabrous. *Anther* tails considerably shorter than the thickened portion of the filament. *Achenes* pale brown, oblong, silky pubescent, ribbed. *Pappus* usually pale yellow, up to 5 mm long.

Type specimen: *Milne 273* (K).

Type locality: Fiji, interior of Viti Levu, on the road from Navua to Namosi.

Flowers: August—May.

Distribution and Habitat: New Guinea, Solomon Islands, New Hebrides, New Caledonia, Fiji and Samoa. Growing in dense wet forests along tracts and stream banks and sometimes in clearings at high altitudes (up to 1100 m above sea level).

Specimens examined:

NEW GUINEA. *Brass 12978* (GH); *van Römer 369* (L); *Versteeg 1649* (L, U).

SOLOMON ISLANDS. Bougainville Island: *Kajewski 1640* (GH, L). Guadalcanal Island: *Kajewski 2535* (GH); *Waterhouse 81* (K).

NEW HEBRIDES. Ejate Island: *Kajewski 215* (GH); *Saunders 57* (K).

NEW CALEDONIA. *Baudouin 743* (P); *Franco 386 bis* (UC), *456 bis* (NY); *Pancher s.n.* (US).

FLJI. Viti Levu: *Degener & Ordóñez 13573* (GH, K, NY); *Graeffe s.n.* (K); *Luerssen s.n.* (GH); *Milne 273* (GH, drawing and specimen, K, P, *isotypes*); *Smith 4798* (GH, K, US), *5491* (GH, K, US); *Yeoward 2* (K); *No data* (P).

SAMOA. *Powell 104* (K); *Vaupel 288* (NY); *Whitmee 21* (K), *s.n.* (GH).

Affinities: Related to *Blumea aromatica* from which *B. milnei* differs by its minutely serrate-dentate leaves, its smaller capitula and its phyllaries shorter than the florets. It is also related to *B. bicolor* from which it may be distinguished by its smaller, more numerous heads and its fimbriate receptacles.

13. *Blumea bicolor* Merr. Philipp. Jour. Sci. (Bot.) 7: 356. 1912. Specific epithet referring to the two colours of the laminar surface, the upper which is green and the lower, purplish.

Herbs, 20—100 cm in height. *Stems* generally unbranched except for the inflorescence, erect, terete, puberulous particularly in the younger parts. *Leaves* 5.5—23.5 cm long, 1.3—8.6 cm wide, mostly crowded in the middle portion of the stem (*vide* Merrill), elliptic-ovate to elliptic-oblong, green and minutely puberulous-pilose on the upper surface, purplish and sparsely adpressedly pilose beneath with colleters and multicellular hairs, the apex shortly acuminate, the margins denticulate, the base prolonged tapering; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* few, in a lax, terminal panicle, pedunculate, 5—7 mm in diameter; peduncles up to 1 cm long, adpressed pilose. *Involucre* with the phyllaries almost equal in length to the florets, 1.5—8.0 mm long, linear, the outer ones acute, the inner tapering and with scarious margins, all pubescent on the back with multicellular hairs and colleters, ciliate at the apex. *Receptacle* up to 2 mm in diameter, flat, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 5.0—5.5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters and a few multicellular hairs; those of the female florets filiform, 4—5 mm long, 2 to 3 lobed, glabrous. *Anther* tails equal in length to the thickened portion of the filament. *Achenes* pale brown, oblong, ribbed, pubescent. *Pappus* yellowish, up to 4.5 mm long.

Type specimen: *Merrill 8080*.

Type locality: Philippines, Mindanao, Zamboanga.

Flowers: April—November.

Distribution and habitat: Sumatra, Philippine Islands and New Guinea. Growing in moist localities in dense forests.

Specimens examined:

SUMATRA. *Hamel & Toroes 493* (GH, MICH).

PHILIPPINES. Luzon: *Loher s.n.*?¹ (US). Panay: *Bur. Sci. 30784 Ramos & Edaña* (L, NY).

NEW GUINEA. *van Römer 983* (L).

Affinities: Related to *Blumea milnei* and *B. aromatica*. From either of these, *B. bicolor* differs by its purplish under surface of the leaves², by its lax, few-headed panicles, and its glabrous receptacles.

14. *Blumea arnakidophora* Mattf. in Engl. Bot. Jahrb. 69: 286. 1938. Species name referring to the extremely woolly indumentum of the plant (*ἀρνῶνις* = wool; *φορέος* = bearing).

Undershrub, 1—2 m in height. *Stems* woody, erect, branched, densely silky-woolly with matted, tawny or greyish hairs. *Leaves* sessile, 4—17 cm long, 1.8—5.6 cm wide, the uppermost smaller and passing into bracts, lanceolate to oblanceolate, the upper surface velutinous, the lower densely woolly, the apex acute to apiculate, the margins minutely mucronulate-serrate, the base prolonged tapering; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, dense, terminal panicles, pedunculate to almost sessile, 12—15 mm in diameter; peduncles, when present, up to 15 mm long.

¹ Specimen citations followed by a question mark (?) indicate a doubtful identification.

² A character not clear-cut in dried specimens.

Involucre with the phyllaries shorter than the florets, 2—9 mm in length, linear, tapering, villous on the back with multicellular hairs, the inner ones scarious. *Receptacle* 3—4 mm in diameter, more or less flat, fimbriate and minutely puberulous, alveolate. *Corollas* yellow, tubular; those of the bisexual florets 4.5—6.0 mm long, with 5 triangular, papillate lobes that are sparsely pubescent with multicellular hairs and colleters; those of the female florets filiform, equal in length to the ones of the bisexual florets, 2 to 3 lobed, with colleters on the lobes. *Anther* tails shorter than the thickened portion of the filament. *Achenes* pale brown, conspicuously ribbed, oblong, pubescent. *Pappus* pale reddish-yellow, 4—5 mm long.

Type specimen: *Clemens 5241 A* (B).

Type locality: N. E. New Guinea, Morobe District.

Flowers: September—January.

Distribution and Habitat: Endemic to New Guinea and Borneo but perhaps not yet reported from localities in between. Growing in grassy second-growth areas and in open places at high altitudes.

Specimens examined:

NEW GUINEA. *Brass 4930* (GH, NY), *11081* (GH, L); *Carr 12991* (L, NY), *14536* (L); *Clemens 5421 A* (GH, isotype), *8959* (GH); *Hellwig 298* (K).

BORNEO. *Clemens & Clemens 34218* (GH); *Kadir A 1676* (K).

Affinities: *Blumea arnakidophora* has close affinities with *B. densiflora* DC. and *B. martiniana*, both of which are more widely distributed species. The former differs by having smaller heads and leaves which are often lyrate-pinnatifid at the base. *Blumea martiniana*, on the other hand, may be distinguished from *B. arnakidophora* in having somewhat larger heads, glabrous receptacles and the upper epidermal cells of the leaves with sinuate walls.

15. *Blumea martiniana* Vaniot, Bull. Acad. Geogr. Bot. 12: 26. 1903. The species named after its collector R. P. Martin and published in the first issue of the bulletin dated Jan. 1, 1903. — *Blumea henryi* Dunn, Jour. Linn. Soc. 35: 503. 1903. Described and published in the same year as the preceding name but at a later date (Oct. 31, 1903). — *Blumea tonkinensis* Gagnep, Bull. Soc. Bot. France 68: 45. 1921. Gagnepain noted its resemblance to *B. henryi* but, according to him, the two were distinguished clearly by the pubescence of the florets. I have examined the type collections of both these species and have not the slightest doubt that they are identical.

Large shrubs, 1.5—2.5 m in height. *Stems* branched, woody; branches terete, densely matted-woolly with long, white hairs. *Leaves* more or less sessile, 15—40 cm long, 4—15 cm wide, oblanceolate to oblong-oblanceolate, pilose on the upper surface with prominent-based, multicellular hairs, very densely woolly on the lower with long, white hairs, the apex shortly acuminate, the margins distantly denticulate-mucronulate, the base tapering into the indistinct petiole; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* in axillary clusters of 2—4, arranged ultimately in large panicles, pedunculate, 14—17 mm in diameter; peduncles up to 15 mm long, along with the rest of the panicle branches densely white-woolly. *Involucre* with the phyllaries slightly longer than the florets, 3—12 mm in length, linear, acute, the outer densely woolly on the dorsal

surface, the inner gradually scarious. *Receptacle* 4—6 mm in diameter, flat, alveolate, glabrous. *Corollas* reddish-yellow, tubular; those of the bisexual florets 6—7 mm long, with 5 triangular-ovate, acute, papillate lobes that are pubescent with long multicellular hairs and colleters; those of the female florets filiform, up to 6 mm long, with 2 to 3 lobes, glabrous. *Anther* tails equal in length to the thickened portion of the filament. *Achenes* brown, densely pubescent, finely 10-ribbed, oblong. *Pappus* yellowish-white, 5—7 mm long.

Type specimen: *Martin* (P, Bodinier herb. no. 2567).

Type locality: China, Kweichou Province, on the banks of the Hoa-kiang.

Flowers: December—May.

Distribution and Habitat: China and Indochina. Growing in evergreen forests at high elevations.

Specimens examined:

CHINA. Kweichou: *Cavalerie & Fortunat 2026* (P); *Chevalier 29278* (P, type collection of *B. tonkinensis*); *Esquirol 3942* (P). Yunnan: *Henry 10405* (GH, K, MO, NY, US, type collection of *B. henryi*), *10405 A* (MO), *10405 B* (GH, K, NY); *Rock 2361* (NY, US); *Wang 60534* (GH).

INDOCHINA. *Pételot s.n.* (US); *Poilane 17218* (P).

Affinities: *Blumea martiniana* is related to *B. densiflora* and *B. arnakidophora*; from either of these, it may be distinguished by its larger leaves and capitula.

16. *Blumea densiflora* DC. Prodr. 5: 446. 1836 — Specific epithet referring probably to the numerous capitula. — *Conyza densiflora* Wall. Cat. no. 2997, comp. no. 157. 1831, *n. n.* — *Blumea excisa* DC. Prodr. 5: 446. 1836. — *Conyza excisa* Wall. Cat. no. 3011, comp. no. 121. 1831, *n. n.* — *Blumea densiflora* var. *excisa* Clarke, Comp. Ind. 89. 1876. — *Blumea densiflora* DC. var. *pinnatifida* Miq. *vide* Gagnep. Fl. Indochina 3: 548. 1924. — *Blumea dasycoma* (Miq.) Boerl. var. *pinnatifida* (Miq.) Boerl. Handl. Fl. Ind. 2 (1): 239. 1891. — *Conyza dasycoma* Miq. var. *pinnatifida* Miq. Fl. Ind. Bat. 2: 56. 1856. — *Blumea klossii* S. Moore, Journ. Nat. Hist. Soc. Siam 4: 148. 1921 (*vide* Craib 1936).

Herbs to undershrub up to 1.8 m in height (*vide* Clarke). *Stems* branched, erect, terete, densely woolly particularly in the younger parts and on the inflorescence axes. *Leaves* more or less sessile, 7—32 cm long, 2—11 cm wide, entire or pinnately lobed to varying degrees, elliptic-oblong to lanceolate-oblong, tomentose on the upper surface, densely lanuginose on the lower or very rarely only tomentose, the apex apiculate, the margins coarsely dentate, the base tapering; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, compact, leafy panicles, ultimately clustered at the ends of the branches, sessile or shortly pedunculate, 5.5—7.0 mm in diameter; peduncles up to 5 mm long. *Involucre* with the phyllaries longer than the florets, 1—7 mm in length, linear, tapering at the apex, scarious, pubescent on the back with multicellular hairs. *Receptacle* 1.5—2.0 mm in diameter, flat, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3.5—4.5 mm long, with 5 broadly triangular, papillate lobes that are pubescent with

multicellular hairs and colleters; those of the female florets filiform, 3.5—4.5 mm long, 3 to 4 lobed, glabrous. *Anther* tails equal in length to the thickened portion of the filament. *Achenes* broadly oblong, pubescent, ribbed. *Pappus* copious, reddish, up to 4 mm long.

Type specimen: *Wallich 2997/107* (K).

Type locality: E. Pakistan, Silhet.

Flowers: November—April.

Distribution and Habitat: N.E. India, E. Pakistan, Burma, Malaya, Indochina. Growing at high altitudes, up to 1500 m above sea level.

Specimens examined:

INDIA. Assam: *Brandis s.n.* (DD); *Burkill 36401* (CAL), *37435* (CAL); *Clarke 37392 E* (CAL), *41672* (CAL), *42950* (K); *Hock 552* (DD), *758* (CAL); *Hooker & Thomson s.n.* (K); *Jenkins s.n.* (CAL); *King's coll. s.n.* (CAL, DD); *Mann 715* (DD); *Lister 152* (CAL). Himachal Pradesh: *Collett 89* (K).

E. PAKISTAN. *Griffith 5143b* (K, L, P); *Wallich 2997/107* (E, GH, type collection).

BURMA. *Beddome 31* (K); *MacGregor 1170* (CAL, E); *Shaik Mokim s.n.* (CAL); *Toppin 6044* (CAL), *6359* (CAL).

MALAYA. Penang: *Wallich 3011/121* (GH, fragment, type collection of *B. excisa*).

LAOS. *Harmand 1329* (P).

SIAM. *Garrett 1121* (K); *Kerr 5008* (K), *17194* (P).

Remarks and Affinities: The above taxon includes two species described by De Candolle: *Blumea densiflora* and *B. excisa*. Clarke (1876) and other subsequent workers have regarded the latter as a variety of the former, the two distinguished by the fact that *B. densiflora* has unlobed leaves whereas *B. excisa* has pinnately lobed leaves. With the exception of this distinction, the two are quite alike and even this difference is not sharp, the degree of incision of the leaves varying considerably. For this reason, the entire assemblage has been here united under a single species and this interpretation agrees with that of Hooker (1882, p. 269).

The affinities of *Blumea densiflora* lie with *B. aromatica* and more closely with *B. junghuhniana*. From either of these *B. densiflora* differs in its woolly indumentum and smaller capitula. From *B. aromatica* it is further separated by its smooth receptacles and by the corolla lobes of the bisexual florets with numerous multicellular hairs.

Blumea densiflora possibly hybridizes with either or both these species as is suggested by the presence of several intermediate specimens. These intermediates often possess the leaf form, corolla lobe pubescence and glabrous receptacles of one species and the tomentum and phyllary form of the other. *Blumea hookeri* Clarke, may be such a possible intermediate. Some other indeterminate specimens of similar nature are listed below.

SIKKIM. *King s.n.* (CAL).

INDIA. Assam: *Gage 98* (CAL).

INDOCHINA. *Chevalier 40635* (P); *Pételot 3188* (UC).

17. *Blumea junghuhniana* (Miq.) Boerl. *Handl. Fl. Ned. Ind.* 2 (1): 239. 1891. Specific epithet after Junghuhn. — *Conyza junghuhniana* Miq. in *Pl. Jungh.* 449. 1855. — *Blumea dasycoma* (Miq.) Boerl. *Handl. Fl. Ned. Ind.* 2 (1): 239. 1891. — *Conyza dasycoma* Miq. *Fl. Ind. Bat.* 2: 57. 1856.

Undershrubs to shrubs. *Stems* woody, up to 1.5 cm in diameter, erect,

branched, terete, densely tomentose with greyish-silky hairs. *Leaves* more or less petiolate, 4—30 cm long, 1.2—11.0 cm wide, the upper smaller and passing into bracts, oblong-ovate to oblong-lanceolate, pinnatifid-lobed, the upper surface tomentose (particularly in the younger leaves), the lower densely silky-velutinous with multicellular hairs, the apex apiculate, the margins coarsely dentate with spreading teeth, the base narrowed, usually appendiculate with linear-oblong lobes; epidermal cells with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, oblong, pyramidal panicles, pedunculate, 8—11 mm in diameter; peduncles up to 15 mm long. *Involucre* with the phyllaries longer than the florets, 1—10 mm in length, linear, tapering, with scarious margins, densely pubescent on the back with multicellular hairs. *Receptacle* 1.5—3.0 mm in diameter, flat and with a slight concavity in the centre, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 5.5—6.5 mm long, with 5 triangular lobes that are pubescent with colleters and scattered multicellular hairs; those of the female florets filiform, 5—6 mm long, 2 to 3 lobed, glabrous. *Anther* tails equal to or slightly longer than the thickened portion of the filament. *Achenes* pale brown, columnar, 10-ribbed, pubescent. *Pappus* red to whitish-yellow, 5.0—5.5 mm long.

Type specimen: *Junghuhn 366* (L).

Type locality: Java, Merapi.

Flowers: Throughout the year.

Distribution and Habitat: Java, Sumatra, Borneo, Celebes and other Indonesian islands, the Indian Archipelago, New Guinea and Mindanao. Growing in clearings at fairly high altitudes.

Specimens examined:

INDONESIA. Amboina: *Robinson 417* (L, US). Borneo: *Cuadra A 1024* (K); *Korthals s.n.* (L); *Ruttien 30* (U), *119* (L, U), *274* (U). Celebes: *Bünnemeyer 11651* (L); *Doeters van Leeuwen 1379* (U); *Forsten 67* (L); *Kaudern 78* (L); *Koorders 16428* β (L), *16429* β (L). Java: *Badker 7816* (L), *14389* (L); *Bakhuizen van den Brink 1196* (L, U), *4295* (L, U); *Blume 1997* (L); *Dorgelo 102* (L); *H.B. s.n.* (L); *Holstvoogd 435a* (L), *764* (L); *Junghuhn 350* (L, U), *366* (GH, L, U, type collection), *s.n.* (L, P); *Kobus s.n.* (K, L); *Koorders 22211* β (L), *22984* β (L); *Korthals s.n.* (L); *Reinwardt s.n.* (L); *Schimper 97* (L); *Zollinger 1325* (L, P), *3935* (L, P); *No coll. 29* (L), *55* (L), *173* (L); *No data* (L). Kei: *Beguin 1938* (L); *Jensen 360* (L). Lombok: *Elbert 1849* (L), *2037* (L). Mentawai: *Iboet 190* (L). Moluccas: *Rant 789* (L). Soemba: *Iboet 407* (L). Sumatra: *Bartlett 8364* (MICH, US); *Boeea 8731* (K, MICH); *Bünnemeyer 1079* (L), *2524* (L), *8277* (L); *Korthals s.n.* (L); *Matthews s.n.* (K); *Ouwehand 277* (L), *277a* (L); *Schiffner 2749* (K, L); *Toroos 1648* (MICH); *Yates 2552* (UC); *No coll. 45* (L). Sumbawa: *Elbert 3569* (L), *3588* (L). Malay Archipelago: *Boerlage s.n.* (L); *Waltz s.n.* (L); *No data* (L). Key Archipelago: *Warburg 21408* (GH). *No data* (L).

MALAYA. *Henderson 19604* (UC); *Yapp 16* (CAL, K).

PHILIPPINES. Mindanao: *Bur. Sci. 14652 Ramos* (L); *Beillo 16480* (L).

NEW GUINEA. *Brongersma 25* (L).

Affinities: This species has close relationship with *Blumea balsamifera*; as a matter of fact, both species have the same local names. *Blumea junghuhniana*, however, may be distinguished by the fact that its leaves are pinnately lobed and coarsely dentate with spreading teeth and its corolla lobes of bisexual florets have multicellular hairs in addition to colleters, whereas in *B. balsamifera* at least the upper foliage leaves are unlobed and minutely serrate with upcurved teeth and the corolla lobes of the

bisexual florets only have colleters.

Blumea junghuhniana is also related to *B. densiflora*; for a discussion of the affinities of these two species refer to the treatment of the latter species.

18. *Blumea balsamifera* (Linn.) DC. Prodr. 5: 447. 1836. Specific epithet referring to the resin produced by the plant, from balsam, and *ferre*, to bear. — *Conyza balsamifera* Linn. Sp. Pl. ed. 2: 1208. 1763. — *Pluchea balsamifera* (Linn.) Less. Linnaea 6: 150. 1831. — *Conyza odorata* Rumph. Amb. 6. t. 24. f. 1. 1750, *non* Linn. — *Baccharis salvia* Lour. Fl. Cochinch. 2: 494. 1793. — *Conyza vestita* Wall. Cat. no. 2998. 1831, *n. n.* — *Blumea appendiculata* (Bl.) DC. Prodr. 5: 447. 1836. — *Conyza appendiculata* Blume, Bijdr. 985. 1826, *non* Lam. — *Conyza grandis* Wall. Cat. no. 3051. comp. no. 161. 1831, *n. n.* — *Blumea grandis* (Wall.) DC. Prodr. 5: 447. 1836. — *Blumea zollingeriana* Clarke, Comp. Ind. 90. 1876.

Perennial, evergreen shrub or undershrub, sometimes an herb, usually ligneous at the base, 0.5–4.0 m in height; bark greyish-brown, smooth; wood soft, white. *Stems* erect, simple at the base and then repeatedly trifid (*vide* Clarke), varying in diameter (basal) from 2–8 cm; branches terete, densely woolly-villous with yellowish-white hairs. *Leaves* 6–30 cm long, 1.5–12.0 cm wide, petiolate or with tapering bases; petioles, when present, up to 3.5 cm long, mostly appendiculate; lamina very variable, usually narrowly oblong-lanceolate, sometimes oblong-ovate to oblong-obovate, entire or pinnately lobed to varying degrees, the upper surface rugose and pilose with blunt, multicellular hairs, the lower densely silky-woolly, the apex acute to apiculate, the margins serrulate to serrate, usually with upcurved teeth; epidermal cells with sinuate walls, the stomata only on the abaxial face. *Capitula* in axillary and terminal, large panicles varying in size from 10–50 cm long and 6–30 cm broad, pedunculate, 6–9 mm in diameter; peduncles 3–10 mm long. *Involucre* with the phyllaries herbaceous, somewhat longer than the florets, 1–9 mm in length, linear, acute, densely woolly on the back. *Receptacle* 2–4 mm in diameter, slightly convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 4–7 mm long, with 5 ovate, acute, papillate lobes that are pubescent with colleters; those of the female florets filiform, up to 6 mm long, with 2 to 4 lobes, glabrous. *Anther* tails equal in length to or somewhat longer than the thickened portion of the filament. *Achenes* brown, pubescent, oblong, ribbed. *Pappus* whitish or more often reddish-yellow, 4–6 mm long.

Type specimen: LINN.

Type locality: India.

Flowers: Throughout the year.

Distribution and Habitat: India, E. Pakistan, Burma, Malaya, Indonesia, Indochina, Siam, China, Formosa, Philippines. An extremely variable plant growing in dry fields, in thickets, on level sandy soil, in old clearings, in grasslands, on mountain slopes and even in wet habitats along river banks. Generally a second growth plant, sometimes gregarious and with little capacity to withstand shade. Growing at altitudes varying from sea level to 1200 m above.

Specimens examined:

- NEPAL. *Wallich 108 d, e, o* (E, L, NY, P).
 SIKKIM. *Clarke 16792* (CAL), *16793 C* (CAL), *27549* (CAL); *Hooker s.n.* (CAL, E, GH, L); *Kurz s.n.* (CAL); *Bibu 761* (CAL); *Thomson s.n.* (L).
 INDIA. Assam: *Burkill 36790* (CAL); *Buse s.n.* (L); *Cowan s.n.* (E); *Jenkins s.n.* (DD, E); *Khan 150* (CAL); *King s.n.* (CAL); *King's coll. s.n.* (US); *Koelz 10300* (GH, UC); *Mann 305* (DD); *Masters s.n.* (L); *Raizada 18540* (DD); *Simons s.n.* (DD); *No coll. 37525* (CAL); *No data* (NY, U). Bengal: *Clarke 20018* (CAL); *Haines 347* (K); *Parker 3200* (DD, GH). Eastern Himalayas: *Biswas 34135* (GH, NY, US), *s.n.* (GH); *Gamble 476 D* (DD); *Modder 316 K* (CAL, DD). No locality: *Brandis s.n.* (DD, E); *Buchanan-Hamilton 1890* (E); *No data* (L). Andaman Islands: *King s.n.* (CAL). Nicobar Islands: *Kurz s.n.* (CAL).
 PAKISTAN, E. *Clarke 6573* (CAL); *Cowan 1217* (E), *2053* (E), *2118* (E), *2406* (E); *Gage s.n.* (CAL, GH, U); *Khan 337* (CAL); *Lister s.n.* (GH, US).
 BURMA. *Anderson s.n.* (CAL); *Annandale 360* (CAL); *Basu 11681* (DD); *Brandis 764* (DD); *Dickason 9100* (GH); *Griffith 3143* (GH, K, P); *Herb. Econ. Prod. 17435* β (E); *Huk 136* (CAL); *Khalil s.n.* (CAL); *Khant 1297* (DD); *Kurz 899* (CAL); *Lace 2301* (CAL, DD, E); *Falconer 477.490* (DD, L); *Meebold 926* (CAL), *14311* (CAL); *Parkinson 14067* (DD, GH); *Smale 33* (DD); *Wallich 3051/161* (GH fragment, type collection of *B. grandis*); *No coll. 1577* (DD), *15324* (E), *16882* (E), *s.n.* (CAL).
 MALAYA. *Boerlage s.n.* (L); *Purseglove P 5500* (L); *Schultz-Bipontinus s.n.* (P); *Usteri s.n.* (NY); *No data* (GH, HK, NY, US).
 INDONESIA. Alor Island: *Jaag 913* (L, ZT). Bangka: *Bünnemeyer 2433* (L). Bawean Island: *Dorgelo s.n.* (L). Borneo: *Amdjah s.n.* (L, U); *Benidick bin Jaibok A 3207* (L); *Boden-Kloss 19111* (K, UC), *19203* (K, UC); *Castro & Meleghrito 1523* (UC, US); *Clemens 21436* (NY), *22185* (NY); *Cuadra A 2355* (K, L), *A 2385* (L); *Elmer 20086* (GH, K, MO, U, UC), *21846* (GH, K, L, MO, NY, P, U, UC); *Kadir A 2847* (K, L), *A 3551* (K, L); *Native coll. 5077* (NY, UC); *Noorudin 6704* (K, L); *Rutten 110* (U); *Villamil 307* (US); *Winkler 2264* (L); *No coll. 3026* (L). Celebes: *Bloembergen 4143* (L); *Bünnemeyer 11309* (L, U); *Docters van Leeuwen 1815* (U); *Elbert 2739* (L), *2960* (L); *Eyma 1091* (L), *3240* (K, L, U); *Koorders 16460* β (L); *van Steenis 61* (GH). Java: *Backer 4969* (K, L), *15048* (K, L), *16569* (L), *17203* (K, L), *17561* (K, L), *32821* (L), *s.n.* (L); *Bachuisen van den Brink 103a* (L); *Dorgelo 1318* (L), *1908* (L); *Forbes 350* (CAL); *Hochreutiner 1292* (MO); *Holstvoogd 750* (L); *Junghuhn 392* (GH, L), *s.n.* (L); *Karta 339* (L, NY); *Koorders 20563* β (L), *25143* β (L); *Korthals s.n.* (L); *Kuntze 3640* (NY); *Sargent s.n.* (MO); *de Voogd 637* (L); *Warburg 4361* (NY); *Zollinger 118* (K, L), *2603* (P); *No data* (L). Kai Islands: *Jensen 156* (L). Lombok: *Elbert 2504* (L). Moluccas: *Bloembergen 4459* (L), *4595* (L); *Boerlage s.n.* (L); *Forsten s.n.* (L); *Harvey s.n.* (CAL); *Kornassi 1346* (K, L, U); *de Wijes-Hissink 85* (L). Princes Island: *van Borssum Waalkes 633* (K, L). Riouw-Lingga Arch.: *Bünnemeyer 6056* (L), *7171* (L). Sangi & Talaud Islands: *Lam 2660* (L). Siantan Island: *van Steenis 775* (L). Sumatra: *Asdat 117* (K, L); *Backer s.n.* (L); *Bartlett 3673* (L, MICH, NY, US); *Bartlett & La Rue 2* (GH, L, UC, US), *481* (GH, L, US); *Bünnemeyer 3360* (L); *Docters van Leeuwen 3217* (L); *Elbert s.n.* (L); *Enderit 111* (L); *Hamel 1172* (MICH); *Hombroon s.n.* (P); *Iboet 323* (L); *Idenburg 35* (K, L); *Korthals s.n.* (L); *Posthumus 546* (L, U), *592* (L); *Praetorius s.n.* (L); *Schiffner 2753* (GH, K, L); *Surbeek 122* (L, ZT); *Toroës 5466* (GH, MICH, NY, US); *Verboom 50* (L); *de Voogd 203* (L); *Yates 860* (MICH, UC); *No data* (L). Sumbawa: *Elbert 3637* (K, L), *3524* (L), *3570* (L). Timor: *Bloembergen 3530* (L); *Gondichand s.n.* (P); *Leschenault s.n.* (P); *Bécharé s.n.* (P); *van Steenis 18437* (L); *Zippelius s.n.* (L); *No data* (L, NY).
 SIAM. *Garrett 1447* (K, L); *Markan 2019* (K, MO, NY).
 INDOCHINA. Annam: *Poilane 1173* (UC); *Squires 865* (GH, K, MO, NY). Tonkin: *Balansa 3049* (K, P), *4837* (GH, K, NY), *4338* (K, UC); *Pétiot 1127* (UC), *1227* (NY, UC, US), *2075* (GH); *Tsang 29835* (GH). No locality: *Talmy 59* (NY); *Thorel s.n.* (NY, US).
 CAMBODIA. *Bejand 825* (GH).
 CHINA. Hainan: *How 70339* (NY); *Katsumada 21930* (UC); *Katsumata 7965* (HK); *Lau 1258* (GH, NY), *3378* (GH); *Lei 480* (K, NY, UC); *Liang 61642* (K, NY, US), *64311* (NY); *McClure 9154* (UC, US); *Merrill 16857* (GH, UC); *Swinhoe s.n.* (K); *Wang 36349* (NY); *Chinese coll. 2167* (HK). Kwantung: *Dunn 5771* (HK);

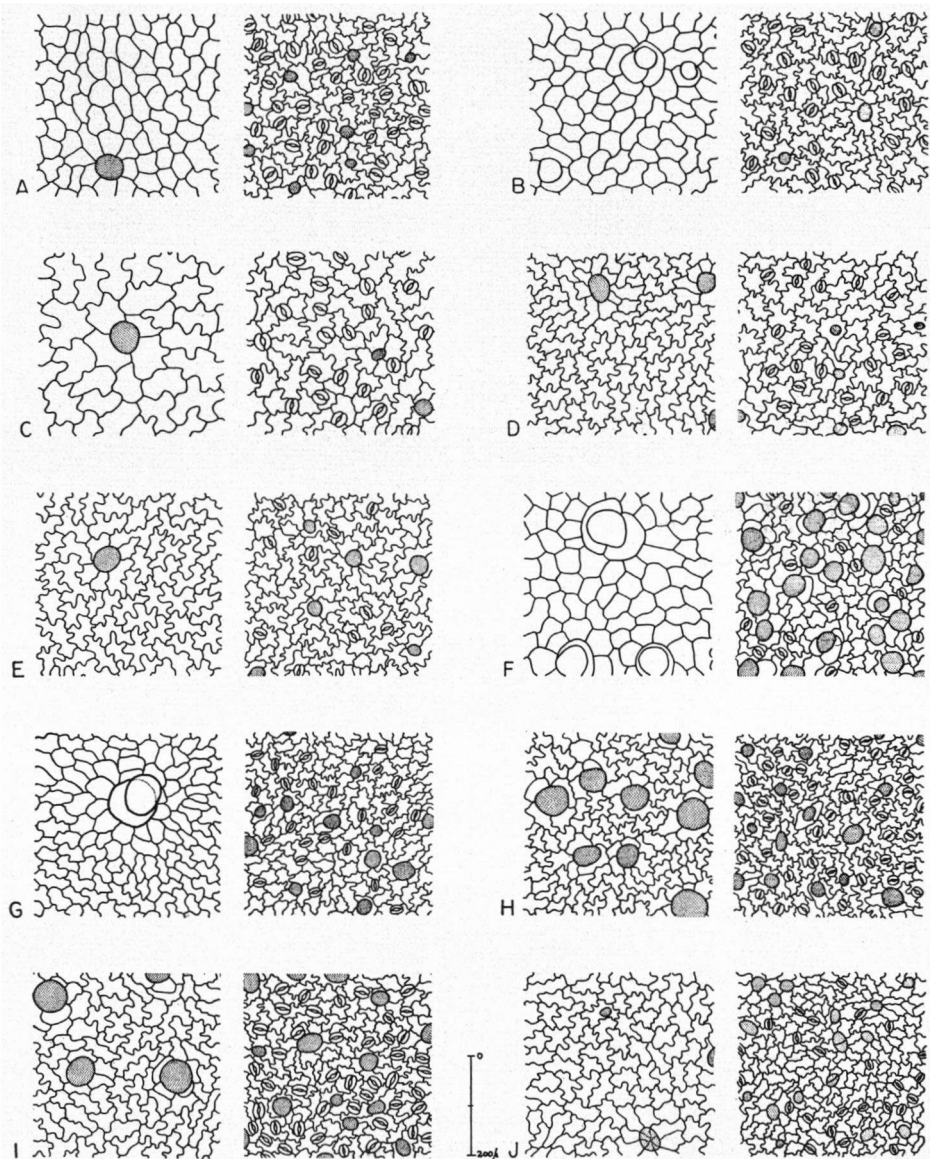


PLATE IX. — Section Macrophyllae. Leaf epidermal surfaces, upper to left, lower to right. A. *Blumea sylvatica* (Bl.) DC. var. *macrophylla* (Bl.) Randeria, Java, *Blume s.n.* (L, type collection). B. *B. korthalsiana* (Miq.) Boerl., Sumatra, *Korthals s.n.* (L, type collection). C. *B. aromatica* (Wall.) DC., Nepal, *Wallich 3054/164* (GH, type collection). D. *B. milnei* Seem., Fiji, *Smith 5491* (US). E. *B. bicolor* Merr., Philippines, Panay, *Bur. Sci. 30734 Ramos & Edaño* (L). F. *B. arnakidophora* Mattf., New Guinea, *Clemens 5421 A* (GH, isotype). G. *B. martiniana* Vant., Siam, *Poilane 17218* (P). H. *B. densiflora* (Wall.) DC., India, Assam, *Jenkins s.n.* (CAL). I. *B. junghuhniana* (Miq.) Boerl., Java, *Junghuhn 366* (L, type collection). J. *B. balsamifera* (Linn.) DC., Philippines, Mindanao, *Williams 2305* (NY).

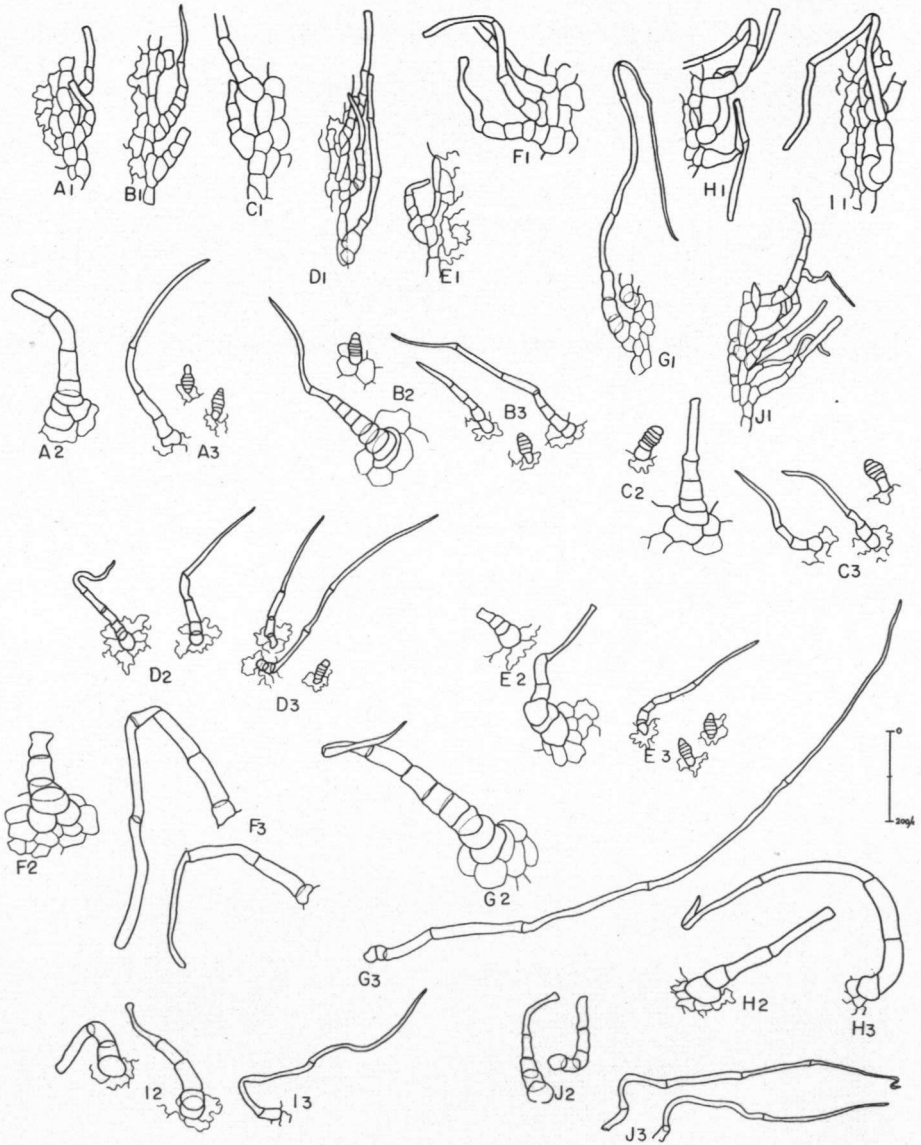


PLATE X. — Section Macrophyllae. For explanation of A—J and voucher specimens see Plate IX. In each case, 1 represents leaf margin, 2 trichomes on upper laminar surface, and 3 trichomes on lower laminar surface.

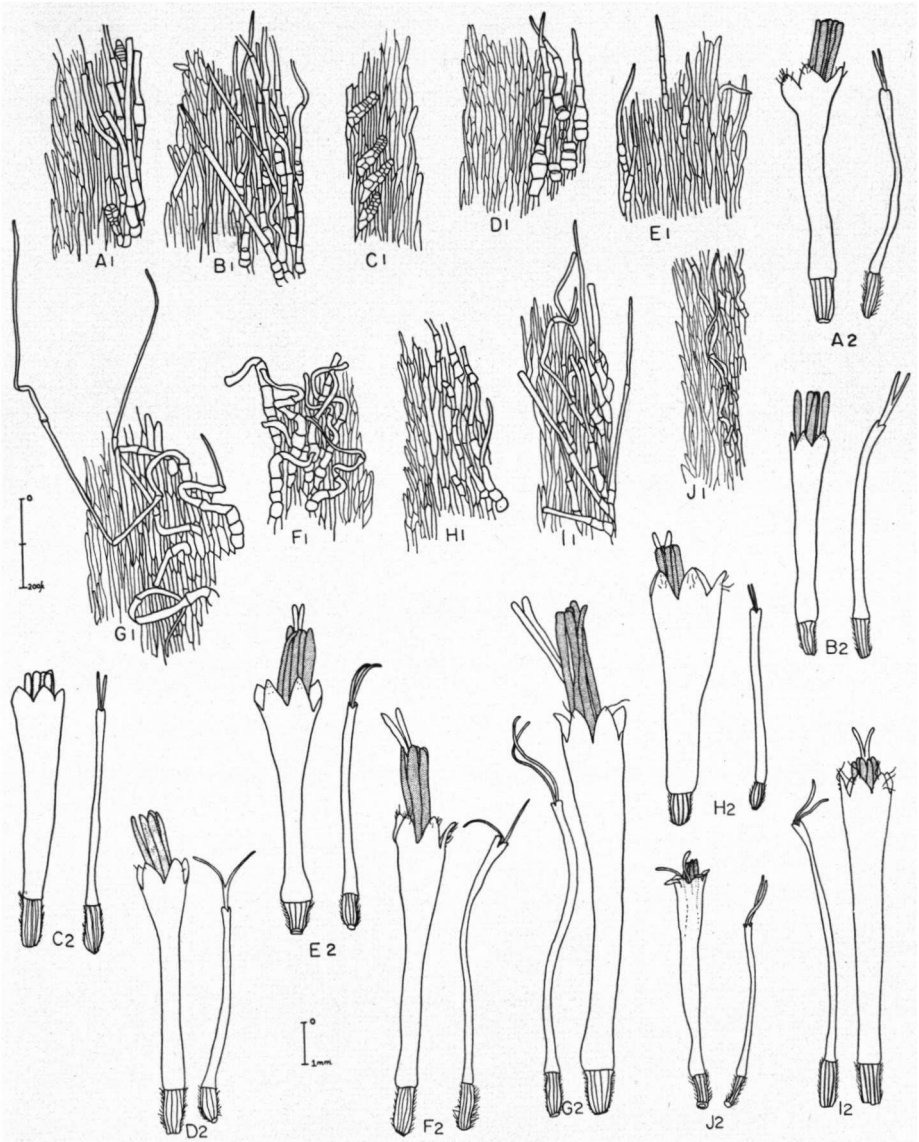


PLATE XI. — Section Macrophyllae. For explanation of A—J and voucher specimens see Plate IX. In each case, 1 represents portion of phyllary (dorsal surface), and 2 florets, bisexual to left, female to right (order reversed in I 2).

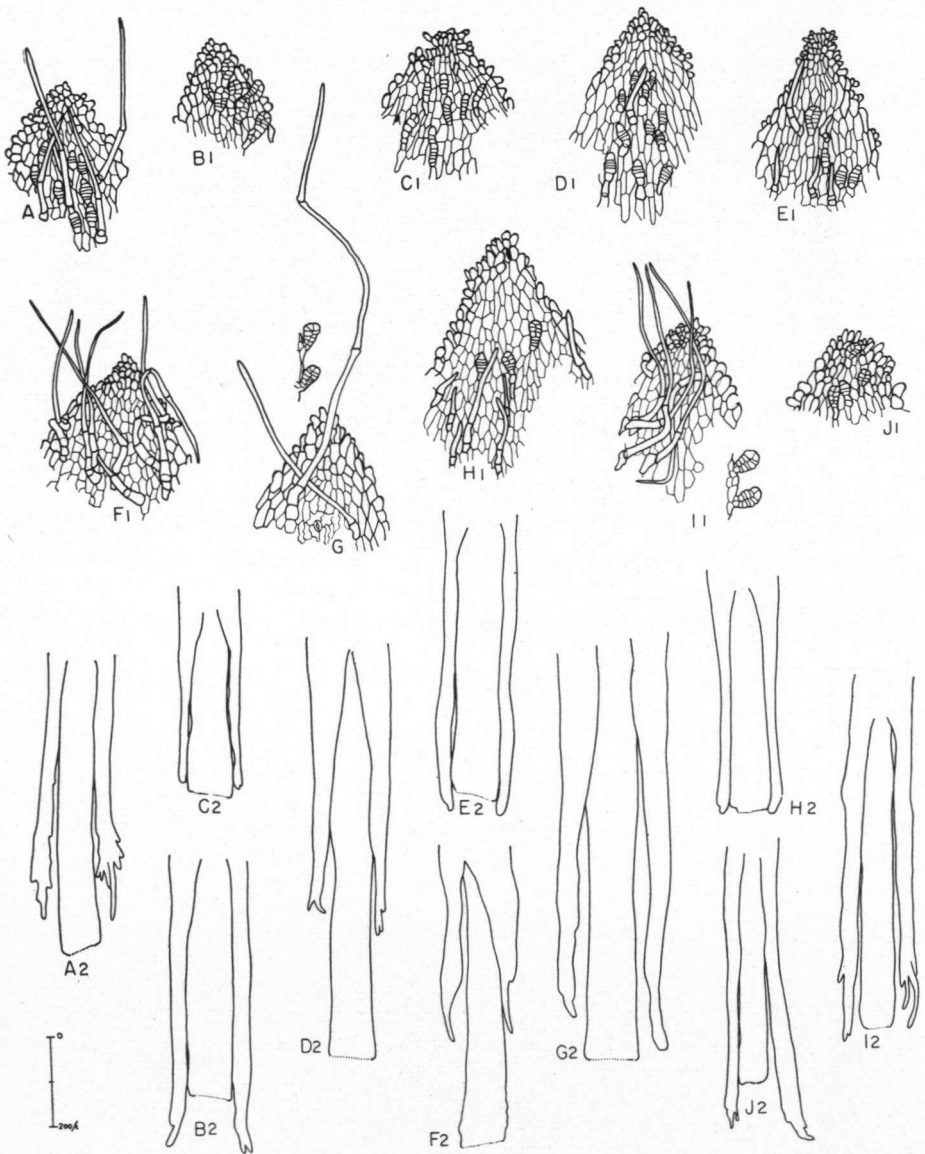


PLATE XII. — Section Macrophyllae. For explanation of A—J and voucher specimens see Plate IX. In each case, 1 represents corolla lobes of bisexual florets, and 2 anther tails.

Groff 4417 (GH); Wright 354 (GH, US). Yunnan: Henry 12332 (K, NY), 12952 (NY); Wang 73608 (GH). No locality: Farges s.n. (P).

FORMOSA. Henry 418 (MO), 621 (MO, NY), s.n. (MO, NY); Kudo & Suzuki s.n. (MO); Linsley-Gressitt 8 (GH, K, L, NY, U); Playfair 372 (K); Tanaka 10290 (NY, UC); Warburg 10318 (K); Wilford 532 (K); No coll. 1625 (HK).

PHILIPPINES. Balabac: Mangubat 465 (NY, US). Basilan: De Vore & Hoover 5 (US); Hallier 4050a (L); Santos 4204 (L). Culion: Merrill 445 (US). Leyte: Elmer 7040 (GH, NY). Luzon: Amihan 33371 (L); Bolster 2 (UC); Cuming 993 (GH, L); Elmer 5614 (HK, NY, US), 3212 (NY); Gaudichaud 204 (P); Loher s.n. (US); Merrill 279 (US), 439 (GH, K, L, MO, NY, US), 2059 (GH, NY, US), 2091 (US); Bur. Sci. 339 Ramos (U, US), 27668 (GH, US); Bur. Sci. 46682 Ramos & Edaño (UC); Whitford 36 (NY, US); Wilkes s.n. (US). Maramag: Santos 5000 (L). Mindanao: De Vore & Hoover 210 (MO, US); Bur. Sci. 1073 Edaño (L); Frake 20331 (L); Mearns 190 (P); Montao s.n. (P); Williams 2305 (NY, US); Zwickey 18 (GH). Mindoro: Britten 124 (L), 19426 (L); McGregor 112 (NY, US); Merrill 1231 (US); Santos 5214 (L). Negros: Elmer 9762 (L, MO, NY, US); Usteri s.n. (NY). Palawan: Bermejós 133 (GH, NY, US); Fox 13444 (MICH); Foxworthy 608 (NY, US). Paragua: Merrill 721 (GH, MO, NY, US). Samar: Bur. Sci. 24784 Edaño (US). Tawitawi: Bur. Sci. 43952 Ramos & Edaño (L, UC). No locality: Day 606 (MO); Marche 24 (P); For. Dept. 9763 (GH).
No DATA (L, P).

Affinities and Remarks: *Blumea balsamifera* DC. is the type species of the genus. Though widely distributed and extremely variable in its foliage and degree of pubescence, the capitula and florets are remarkably uniform in size and morphology throughout the range. The plants in general appear to be more woolly when growing in montane rather than lowland habitats.

This is the most arboreous of all *Blumea* species and most fragrant, all its parts smelling strongly of camphor. For this reason, it is sometimes reported to be cultivated in temple gardens. The distillate of leaves is used medicinally to cure throat and chest ailments, dropsy and high fever. As reported by Dr Henry (1895), camphor is commercially extracted from this plant and even exported by the Chinese and Burmese. The refined product is known in China as *ngai-pien*, and an account of its chemistry is given in Hanbury's Science Papers (1876, p. 394) and in Pharmaceutical Journal (4: 710—712, 1871).

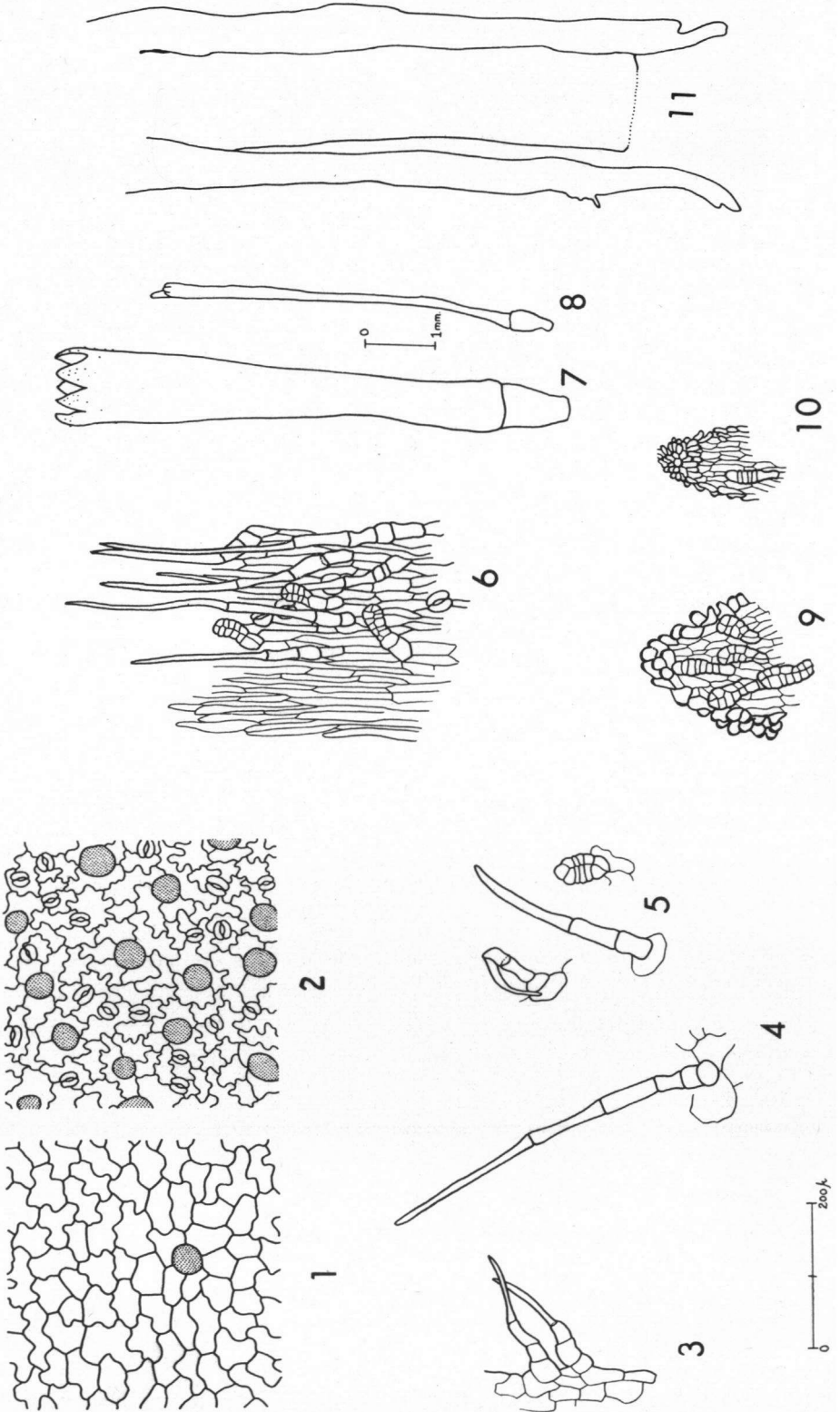
Blumea balsamifera is related to *B. densiflora* and *B. junghuhniana*. It differs from the former in having the corolla lobes of the bisexual florets only with colleters and the leaf margins minutely serrate with up-curved teeth. Its affinities with *B. junghuhniana* are very close; however, the leaves of the latter are quite often distinctly pinnatifid, the capitula and involucre are larger and the corolla lobes of the bisexual florets have multicellular hairs in addition to colleters.

Section 3. *Sagittatae* (Plate XIII).

Represented only by a single species:

19. *Blumea sagittata* Gagnep. Bull. Soc. Bot. France 68: 43. 1921. The specific epithet refers to the hastate leaf base by which it is separated from the rest of the genus.

Herbs, 0.6—1.4 m in height. *Roots* spreading. *Stems* erect, generally unbranched, terete, densely pilose with pale brown, multicellular hairs. *Leaves* sessile or very shortly petiolate (petioles, when present, up to 5 mm long), 6—20 cm long, 2.5—7.0 cm wide, the largest ones in the central



portion of the stem, smaller in size at the base, and passing into bracts above, oblong-lanceolate to lanceolate, scabrous on the upper surface with prominent-based hairs, the apex acute or shortly acuminate, the margins distantly and minutely dentate, the base sagittate with 2 distinct, acute auricles; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in pedunculate clusters of 2—4 arranged in a large, terminal, bracteate panicle, shortly pedicellate or sessile, 7—10 mm in diameter. *Involucre* with the phyllaries longer than the florets, 1—9 mm in length, linear, tapering and ciliate at the apex, pubescent on the dorsal surface with colleters and multicellular hairs, the inner ones more or less scarious. *Receptacle* 2—3 mm in diameter, alveolate, fimbriate. *Corollas* yellow, tubular; those of the bisexual florets regular, 5—6 mm long, with 5 ovate, acute lobes that are densely pubescent with colleters; those of the female florets filiform, up to 5 mm long, subequally 5-lobed, two lobes being longer than the other three, all sparsely covered with colleters. *Anther* tails longer than the thickened portion of the filament. *Achenes* (immature) dark brown, pubescent, not ribbed. *Pappus* yellowish-white, 5—6 mm long.

Type specimen: *Cavalerie 3631* (P).

Type locality: China, Kweichou Province.

Flowers: August—November.

Distribution: Indochina, Southern China.

Specimens examined:

INDOCHINA. Tonkin: *Poilane 2329* (P, UC).

CHINA. Kweichou: *Cavalerie 3631* (P, type).

Affinities: Gagnepain suggests that the affinities of this species lie with *Blumea lanceolaria*, *B. balsamifera* and *B. aromatica*. However, it is usually a smaller plant with the main stem very seldom branched. The sagittate leaf bases and the filiform, bilabiate corollas of the female florets serve to distinguish it from any of the other members of the genus.

Section 4. *Hieraciifoliae* (Plates XIV & XV).

- 1. Capitula in large, terminal, leafy panicles; leaves somewhat auriculate at the base with rounded, more or less clasping lobes 20. *B. ramosii*
- 1. Capitula in dense clusters arranged in compact panicles; leaves cuneate, acute or rounded at the base but never auriculate.
 - 2. Receptacle glabrous.
 - 3. Leaves densely white-sericeous or woolly at least on the lower surface 21. *B. hieraciifolia*
 - 3. Leaves not white-sericeous or woolly on the lower surface.
 - 4. Plants up to 1 m in height; leaves rounded at the base; capitula 9—11 mm in diameter 22. *B. crinita*
 - 4. Plants 20—30 cm in height; leaves tapering at the base; capitula 3—5 mm in diameter 23. *B. veronicifolia*
 - 2. Receptacle densely pilose 24. *B. clarkii*

PLATE XIII. — Section Sagittatae. *Blumea sagittata* Gagnep., China, Kweichou, *Cavalerie 3631* (P, type collection). 1. Upper epidermal surface of leaf; 2. Lower epidermal surface of leaf; 3. Leaf margin; 4. Trichomes on upper laminar surface; 5. Trichomes on lower laminar surface; 6. Portion of phyllary (dorsal surface); 7. Bisexual floret; 8. Female floret; 9. Corolla lobe of bisexual floret; 10. Corolla lobe of female floret; 11. Anther tails.

20. *Blumea ramosii* Merr. Philipp. Jour. Sci. (Bot) 5: 256. 1910. Specific epithet after Ramos who first collected in Zambales, Luzon.

Undershrub, at least 80 cm in height. *Stems* somewhat woody, erect, unbranched, terete, villous with white hairs, about two-thirds of the basal portion covered with crowded, persistent leaf bases, the rest leafy. *Leaves* sessile, 7—30 cm long, 1.5—7.0 cm wide, lanceolate to oblanceolate, pilose on the upper surface with stiff, prominent-based hairs, densely silky-woolly on the lower, the apex apiculate, the margins denticulate-mucronate, the base tapering and somewhat auriculate with rounded, more or less clasping lobes; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the abaxial surface. *Capitula* in large, terminal, leafy panicles, pedunculate, 8—11 mm in diameter; peduncles bracteate, up to 1 cm long. *Involucre* with the phyllaries almost equal in length to the florets, turning brownish-purple on drying, 1—7 mm long, lanceolate-oblong, acute, the inner with somewhat scarious margins, all pubescent on the back, with ciliate margins and apices. *Receptacle* 2—3 mm in diameter, flat, alveolate, minutely pilose. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 triangular, acute, grossly papillate lobes that are pubescent with short multicellular hairs and colleters; those of the female florets filiform, 3—4 mm long, with 3 lobes, glabrous. *Anther* tails subequal to or shorter than the thickened portion of the filament. *Achenes* pale brown, oblong, silky-pubescent, 10-ribbed. *Pappus* white, up to 4 mm long.

Type specimen: *Bur. Sci. 5089 Ramos* (US).

Type locality: Philippine Islands, Luzon, Zambales Province.

Flowers: March—May.

Distribution and Habitat: Endemic to Luzon. Growing in hillside thickets and along trail margins.

Specimens examined:

PHILIPPINES. Luzon: *Clemens 17261* (NY, UC); *Bur. Sci. 5089 Ramos* (NY, US, type collection); *Bur. Sci. 37678 Ramos & Edaña* (K, US); *Vanoverbergh 1191* (L, P, US).

Affinities: I agree with Merrill that the affinities of this plant lie with *Blumea hieraciifolia* DC. and with *B. sericans* Hook. f. (the latter, in this treatment, interpreted synonymous with *B. hieraciifolia*). *Blumea ramosii* may be distinguished from these by its minutely toothed leaves, distinctly pedunculate capitula and the suffrutescent stems with their lower portions leafless.

21. *Blumea hieraciifolia* (D. Don) DC. in Wight, Contrib. Bot. Ind. 15. 1834. Specific epithet referring to the leaves which resemble those of the genus *Hieracium*. — *Erigeron hieraciifolium* D. Don, Prodr. Fl. Nep. 272, 1825. — *Conyza communis* Wall. Cat. no. 3018. comp. no. 128. 1831, *n. n.* — *Blumea chinensis* Walpers, Nov. Act. Nat. Cur. 19: 294. 1843, *non* DC. — *Blumea sericans* Hook. f. Fl. Brit. Ind. 3: 262. 1882. — *Blumea barbata* DC. var. *sericans* Kurz, Jour. Asiatic Soc. 2: 188. 1877. — *Blumea subsericans* Elm. Leaflets Philipp. Bot. 7: 2582. 1915. — *Blumea crinita* Steetz in Seem. Bot. Voy. Herald. 387. 1853, *non* Arn. (1836).

Herbs, 10—150 cm in height; rootstock fibrous. *Stems* usually unbranched or sometimes branched from the base, erect, terete, densely silky-

sericeous to woolly particularly towards the apex. *Leaves* 2—20 cm long, 0.3—6.0 cm wide, the lower ones larger, often crowded at the base, obovate-spathulate, velutinous on the upper surface, becoming glabrate with age, densely sericeous to woolly on the lower surface, the apex obtuse or acute, the margins irregularly serrate-dentate, the base cuneate, attenuated into the petiole; the upper leaves usually few, elliptical to obovate, densely silky-sericeous on both surfaces, the apex generally acute, the margins uniformly serrate or dentate sometimes with blackish, indurated teeth; upper epidermal cells with undulate to sinuate walls, the lower with distinctly sinuate walls, the stomata on both surfaces. *Capitula* in axillary and terminal clusters forming a dense, interrupted-spicate inflorescence, the clusters usually sessile, sometimes on the ends of axillary branches forming a paniculate inflorescence, sessile, 6—10 mm in diameter. *Involucre* with the phyllaries straw-coloured or distinctly purple-tipped, longer than the florets, entirely reflexed at maturity, 1—10 mm long, 0.5—0.75 mm wide, oblong-lanceolate to oblanceolate, acute, woolly to glabrate outside. *Receptacle* 2—4 mm in diameter, slightly convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 4.0—4.5 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and, in var. *flexuosa*, also with multicellular hairs; those of the female florets filiform, 4—5 mm long, 3 to 4 lobed, glabrous. *Anther* tails equal to or shorter than the thickened portion of the filament. *Achenes* oblong, brown, ribbed, sparsely pubescent generally at the top. *Pappus* white, 3.0—4.5 mm long.

Blumea hieraciifolia is an extremely polymorphous and variable species. It is divided here into 4 varieties; the first two, var. *hieraciifolia* and var. *macrostachya*, are quite closely related and occupy more or less the same geographic range. Furthermore, they tend to intergrade. The third variety, *flexuosa*, is endemic to Ceylon and the fourth, *hamiltoni* is widespread and quite distinct from the rest.

Key to the varieties

1. Plants large, silky-sericeous; phyllaries usually purple-tipped; leaves distinctly irregularly serrate-dentate, at least a few cauline.
 2. Stems erect; corolla lobes of bisexual florets with colleters only.
 3. Stems unbranched; capitula in sessile clusters var. *hieraciifolia*
 3. Stems branched at the apex; capitula in pedunculate clusters
var. *macrostachya*
 2. Stems flexuous; corolla lobes of bisexual florets with colleters and multicellular hairs var. *flexuosa*
1. Plants small and slender, white-woolly; phyllaries usually straw-coloured; leaves obscurely dentate, the cauline ones minute, bracteate var. *hamiltoni*

var. *hieraciifolia*.

Plants usually unbranched, 20—150 cm in height; tomentum silky. *Leaves* mostly radical and a few cauline. *Capitula* in dense, terminal, spicate panicles. *Phyllaries* purple-tipped.

Type specimen: *Hamilton s.n.* (BM).

Type locality: Nepal.

Flowers: Throughout the year.

Distribution and Habitat: India, E. Pakistan, Burma, Indonesia, Indochina, China, Formosa, Ryukyus, Philippines and New

Guinea. A montane species growing at altitudes up to 1600 m above sea level along roadsides, in grasslands and meadows and in moist, shady places by streams and ponds.

Specimens examined:

INDIA. Assam: *Chatterjee s.n.* (GH, L); *Clarke 37111* (CAL), *38063* (US), *43212 D* (CAL); *Panda 292 K* (DD); *Wallich 3018/128* (P, type collection of *Conyza communis*); *No coll. 2485 C* (CAL). Bengal: *Sinclair 4052* (E). Garhwal: *Gamble 24376* (DD), *s.n.* (DD); *Koels 20525* (RAW). Madras: *Barnes 1145* (GH); *Cleghorn s.n.* (E); *Fischer 2961* (CAL); *Fyson 4222* (K); *Gamble 11730* (DD), *16159* (DD), *16238* (K), *17253* (CAL, K); *Perottet 24* (P). Oudh: *Harsukh 22245* (DD). Travencore: *Meebold 13314* (CAL). Uttar Pradesh: *Thomson s.n.* (L, P). No locality: *Duthie s.n.* (DD); *Hamilton 1885* (E), *1889* (E); *Wight 1576* (L). N.W. India: *Stewart 1676* (E). Peninsular India: *Wight 1433* (E, K, NY, P).

PAKISTAN, E. *Clarke 2003 D* (CAL).

BURMA. *Annandale s.n.* (CAL); *Collett 491* (CAL); *Diokason 5416* (GH); *Forrest 13683* (E); *Lace 3170* (E, K); *Mg Kon 18351* (DD).

INDONESIA. Celebes: *Eyma 416* (L). Sumatra: *Boeea 7588* (GH, MICH); *Toroes 2487?* (MICH, NY). Sumbawa: *Zollinger 2098* (P). Timor: *Bouman-Houtman 168* (L); *van Steenis 18401* (L). Timor and Flores: *Posthumus 3135* (GH, L). Lesser Sunda Islands: *Jaag 311* (ZT).

INDOCHINA. *Bon 2626* (P); *Pételot 1228* (UC), *2073* (GH, NY, US); *Balansa 4692* (P).

SIAM. *Kerr 20976* (K).

CHINA. Fukien: *Ching 2282* (US); *Chung 1710* (UC), *2120* (UC), *4977* (GH, NY), *7627* (GH, NY); *En 2123* (UC), *2289* (UC), *2675* (UC), *2848* (UC); *Tai 11230* (UC), *11522* (UC). Hainan: *Dunn s.n.* (HK); *Fung 20274* (GH, NY, US); *Henry 8613* (GH); *How 71707* (GH); *Katsumata 6641* (HK), *s.n.* (HK); *Lei 751* (NY, UC, US), *1207* (GH), *1436* (GH); *Liang 64635* (GH, NY); *Tsang 144* (GH, NY, UC, US), *734* (GH, NY, UC, US); *Tsang & Fung 377* (GH, NY). Kiangsi: *Lau 4082* (US); *Tsiang 10405* (NY). Kwangsi: *Tsang 28058* (US). Kwangtung: *Bodinier 553* (P); *Levine 324* (GH, MO, US), *s.n.* (HK); *McClure 7066* (GH); *Tsui 393* (MO, NY); *Wong Ke 1475* (HK); *Wright s.n.* (GH, US). Kweichow: *Cavalerie s.n.* (P); *Esquirol 4032* (P). Szechuen: *Wilson 3836* (HK). Yunnan: *Forrest 13633* (K); *Henry 11672* (NY). No locality: *Walpers s.n.* (GH).

FORMOSA. *Dunn 6346* (HK); *Faurie 874* (GH), *8404* (GH); *Oldham 249* (GH); *Sasaki 21477* (GH, NY); *Tanaka 94* (P), *98* (GH, L); *Tanaka & Shimada 11141* (GH, L, MO, NY, P, US).

RYUKYUS. *Amano 7309* (US); *Boehmer s.n.* (NY); *Fosberg 37049* (MICH), *37820* (MICH); *Kawagoe s.n.* (US); *Koidzumi s.n.* (US); *Walker & Tawada 6813* (US), *7233* (US).

PHILIPPINES. Luzon: *Loher 3652* (US); *Bur. Sci. 85217 Ramos & Edaña* (GH); *Vanoverbergh 198* (GH), *2727* (P), *2734* (P). Mindanao: *Elmer 11094* (L, NY), *11139* (L, MO, NY, US, type collection of *B. subsericans*); *Williams 2607* (NY), *2987* (NY).

NEW GUINEA. *Brass 4818* (GH, NY), *21765* (L), *22165* (L); *Clemens 10479 bis* (GH, MICH), *10390* (GH); *Gyldenstolpe s.n.* (L); *Hoogland 4290* (L); *Hoogland & Pullen 5990* (L); *van Boyen 3947* (L); *Warburg 21410* (GH).

Remarks: The axes, the leaves and the phyllaries vary greatly in their degree of pubescence. They may be densely silky-sericeous or nearly glabrate with almost every conceivable intermediate between. The variability seems to be largely an environmental response.

var. *macrostachya* (DC.) Hook. f. Fl. Brit. Ind. 3: 263. 1882. — *Blumea macrostachya* DC. Prodr. 5: 442. 1836. — *Conyza macrostachya* Wall. Cat. no. 3053. comp. no. 143. 1831, n. n. — *Baccharis auriculata* Wall. ex DC. Prodr. 5: 442. 1836, in syn. — *Blumea hieracifolia* DC. var. *evolutior* Clarke, Comp. Ind. 83. 1876.

Plants robust, usually paniculately branched at the apex, up to 1.5 m in height; tomentum silky. *Leaves* mostly cauline. *Capitula* in dense clusters at the ends of axillary and terminal branches, paniculate. *Phyllaries* purple-tipped.

Type specimen: *Wallich 3053/143* (K).

Type locality: Nepal.

Flowers: Throughout the year.

Distribution and Habitat: India, Burma, Indochina, China and the Philippines. Occupying the same habitats as the preceding variety.

Specimens examined:

INDIA. Assam: *Burkill 37409* (CAL); *Chatterjee 129* (CAL); *Clarke 14513* (CAL), *37650 F* (US), *37994 A* (CAL), *43250* (CAL), *43356 B* (CAL), *43491* (US); *Hock 511* (CAL); *Hooker s.n.* (P); *Jenkins s.n.* (DD, E, L, P); *Masters s.n.* (DD, E, L); *Simons s.n.* (GH, L). Bengal: *Clarke 27018 F* (CAL); *Griffith 3160* (GH, L). Madras: *Gamble 11743* (CAL); *King s.n.* (CAL).

BURMA. *Collett 361* (CAL); *Griffith s.n.* (U).

INDOCHINA. Annam: *Clemens & Clemens 3519* (NY, UC); *Poilane 1843* (UC). Tonkin: *Mouret 178 bis* (P); *Pételot 2078* (GH); *Squires 258* (GH, UC).

CHINA. Hainan: *How 71687* (GH); *Tsang 353* (NY), *15852* (GH, NY, UC, US). Kwangsi: *Tsang 24823* (GH). Kwangtung: *Bodiner 553* (P), *1260* (P); *Wang 366* (UC); *Wright s.n.* (US). Yunnan: *Henry 12844* (GH, MO, NY).

PHILIPPINES. Luzon: *Bur. Sci. 76864 Ramos* (GH); *Topping 107* (US).

LESSER SUNDA ISLANDS. *Jaag 1316* (ZT).

var. *flexuosa* (Clarke) Randeria comb. nov. — *Blumea flexuosa* Clarke, Comp. Ind. 86. 1876.

Plants usually branched, the stems flexuous; tomentum silky. *Leaves* mostly cauline. *Capitula* in pedunculate fascicles arranged in panicles. *Phyllaries* often purple-tipped. *Corolla lobes* of bisexual florets with multicellular hairs in addition to collectors.

Type specimen: *Thwaites C.P. 19* (PDA).

Type locality: Ceylon.

Flowers: April.

Distribution and Habitat: Endemic to Ceylon and growing at high altitudes from 1200 to 2100 m above sea level.

Specimens examined:

CEYLON. *Gardner s.n.* (K); *Harvey s.n.* (E); *Thomson s.n.* (GH); *Thwaites C.P. 19* (CAL, GH, P, type collection of *B. flexuosa*), *506* (P), *C.P. 532* (K), *C.P. 1735* (CAL); *Walker s.n.* (K).

var. *hamiltoni* (DC.) Clarke, Comp. Ind. 82. 1876. — *Blumea hamiltoni* DC. Prod. 5: 439. 1836. — *Gnaphalium hamiltoni* Wall. Cat. no. 3938. comp. no. 48. 1831, n.n.; DC. Prodr. 5: 439, 1836. — *Conyza necessaria* Ham. ex DC. Prodr. 5: 439. 1836. — *Blumea cavaleriei* Levl. et Vant. in Fedde, Repert. 7: 22. 1909.

Plants slender, 10–60 cm in height; tomentum woolly. *Stems* unbranched. *Leaves* mostly radical. *Capitula* in terminal, globose, interrupted-spicate clusters. *Phyllaries* straw-coloured.

Type specimen: *Wallich 3938/48* (K).

Type locality: India.

Flowers: March—June.

Distribution and Habitat: India, Burma, Sumatra, Indochina, China. Occupying the same habitats as the first two varieties.

Specimens examined:

INDIA. Assam: *Chatterjee s.n.* (GH); *Clarke 37643 D* (CAL), *38171 A* (CAL), *43287 B* (CAL), *43347* (US); *Fischer s.n.* (CAL). Bengal: *Clarke 11629* (CAL), *26512 C* (CAL). Madras: *Bourne 2095, 2097, 2103, 2693* (K); *Fyson 4206, 4224* (K); *Gamble 12048, 14433* (K). Orissa: *Mooney 2637* (DD, K), *3766* (DD). Oudh: *Inayat 22244* (DD), *22244a* (DD, K), *22244b* (CAL, DD), *22244c* (DD), *23685* (DD). Uttar Pradesh: *Gamble 26516* (DD); *Jameson s.n.* (DD); *Wallich s.n.* (L). Western Himalaya: *Duthie s.n.* (K, US). No locality: *Hamilton 1885* (E); *Inayat 25910* (DD); *Royle 3105* (DD); *Wallich 3938/48* (E, GH, K, L, NY, P, *type collection of B. hamiltoni*).

BURMA. *Lace 3140* (CAL, E).

SUMATRA. *Lörzing 4860* (L).

SIAM. *Kerr 5219* (K).

INDOCHINA. *Chevalier 40.493* (P); *Pételot 2050* (GH), *2093* (GH), *4611* (NY, US).

CHINA. *Cavalerie 3302* (K, *type of B. cavaleriei*); *Hancock 6* (K), *124* (K); *Henry 10799* (K, MO, NY), *10799 A* (K, US), *11670* (K, US); *Wang 73024* (GH).

Affinities of the species: *Blumea hieraciifolia* is an extremely variable species related to *B. clarkei*, *B. crinita* and *B. lacera*. From the first, *B. hieraciifolia* differs in its glabrous receptacles and its silky or woolly indumentum; from the second it may be distinguished also by its tomentum and by its leaves which are tapering at the base. The resemblance between *B. hieraciifolia* and the more pubescent forms of *B. lacera* is quite striking. The two, however, are separable by the fact that the former has larger capitula (up to 10 mm in diameter) which are arranged in dense, globose or oblong, spicate panicles, oblong-lanceolate outer phyllaries and distinctly ribbed achenes, while in the latter the capitula are small (up to 6.5 mm in diameter) arranged in somewhat lax panicles, the outer phyllaries are linear and the achenes subquadrangular.

22. *Blumea crinita* Arn. Nov. Act. Nat. Cur. 18: 348. 1836. The species name possibly referring to the hairy inflorescence axes and phyllaries (*crinere* = to be provided or covered with hair).

Herbs, up to 1 m in height. *Stems* erect or flexuous, simple or branched, dark brown, pilose with long, multicellular, yellowish hairs especially in the younger parts, sometimes glabrate at the base. *Leaves* rigid, sessile, 1.5—6.5 cm long, 0.5—3.7 cm wide, elliptic-oblong to obovate-oblong, pilose with long, yellow, multicellular hairs on both surfaces when young, becoming scabrid or glabrate with age, the apex apiculate, the margins denticulate or dentate with indurated teeth, the base rounded; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata only on the lower surface. *Capitula* in pedunculate clusters of 3—5 arranged in lax, terminal panicles, subsessile or shortly pedicellate, 9—11 mm in diameter; pedicels up to 2 cm long, like the rest of the inflorescence axes densely yellow-pilose. *Involucre* with the phyllaries almost equal in length to the florets, linear, tapering at the apex, densely pilose on the dorsal surface and the margins with multicellular hairs. *Receptacle* 3—4 mm in diameter, convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 5—6 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters and a few hairs; those of the female florets filiform, 4—5 mm long, 2 to 3 lobed, glabrous. *Anther* tails equal to or slightly longer than the thickened

portion of the filament. *Achenes* columnar, brown with paler ribs, glabrate. *Pappus* white, up to 4.5 mm long.

Type specimen: *Thwaites C.P. 147* (CAL).

Type locality: Ceylon.

Flowers: April—May.

Distribution and Habitat: Endemic to Ceylon. Growing in humid regions at high altitudes.

Specimens examined:

CEYLON. *Alston 1700* (K); *Gardner 395* (K), *397* (K); *Richard 222* (P); *Thwaites C.P. 147* (CAL, GH, K, type collection), *11318* (P); *Walker s.n.* (E, K).

Affinities: This species is related to *Blumea hieraciifolia* and to *B. clarkei*. From the former, *B. crinita* differs in not being woolly or silky, having denticulate leaf margins, and having rounded leaf bases; whereas from the latter it may be distinguished by its sessile leaves, glabrous receptacles, and yellowish-brown trichomes.

23. *Blumea veronicifolia* Franch. Jour. de Bot. 6: 182. 1892. The specific epithet referring to the leaves which resemble those of a *Veronica*.

Herbs, 20—30 cm in height. *Stems* branched from the base, ascending and erect, pubescent. *Leaves* shortly petiolate, mostly radical and a few cauline, 1.5—5.0 cm long, 0.3—1.0 cm wide, lanceolate to obovate, pubescent on both surfaces and the margins with multicellular hairs, the apex obtuse or apiculate, the margins serrate-dentate, the base tapering into the petiole; upper epidermal cells with shallowly undulate to straight walls, the lower with sinuate walls, the stomata on both surfaces. *Capitula* few, crowded in mostly terminal globose panicles, pedunculate, 3—5 mm in diameter; peduncles densely villous with multicellular hairs and stipitate glands, up to 5 mm long. *Involute* with the phyllaries purple, almost equal in length to the florets, 2—6 mm long, lanceolate, acute, the outer densely hairy on the back with glands and hairs, the inner with scarious margins and few or no glands. *Receptacle* about 2 mm in diameter, convex, alveolate, glabrous. *Corollas* rose-coloured (*vide* Franchet); those of the bisexual florets up to 5 mm long, with 5 triangular, acute, papillate lobes that are densely pubescent with colleters and occasional unicellular hairs; those of the female florets filiform, up to 4 mm long, usually 2-lobed, glabrous. *Anther* tails almost equal in length to the thickened portion of the filament. *Achenes* dark-brown, sparsely pubescent, oblong, 5-ribbed. *Pappus* white, 3—4 mm long.

Type specimen: *Delavay 800* (P).

Type locality: China, Yunnan Province, Kiang-yn near Hokin.

Flowers: April—May.

Distribution and Habitat: Restricted to Yunnan Province in China. Growing in moist localities.

Specimens examined:

CHINA. Yunnan: *Delavay 800* (K, P, type), *s.n.* (P); *Forrest 7560* (K).

Affinities: *Blumea veronicifolia* is related to *B. hieraciifolia*. The former differs from the latter in the smaller capitula, rose-coloured florets and lack of woolly or silky indumentum.

24. *Blumea clarkei* Hook. f. Fl. Brit. Ind. 3: 267. 1882. Named after C. B. Clarke who made many valuable contributions to the botany of India and to the study of Composites. — *Blumea elongata* DC. Prodr. 5: 445. 1936 *pro parte*. — *Conyza elongata* Wall. Cat. no. 3078. comp. no. 188. 1831, *n. n. pro parte*. According to Craib (1936) there are two sheets under *B. elongata* in the De Candolle Herbarium. The first is labelled "*C. elongata* Wall. Penang" with two specimens which may, as Clarke (Hooker 1882, p. 672) suggests, be *B. lacera*. The other sheet has no locality or collector and is identical with the present species. — *Blumea malabarica* Hook. f. Fl. Brit. Ind. 3: 267. 1882. — *Blumea hongkongensis* Vant. Bull. Acad. Geogr. Bot. 12: 22. 1903. — *Blumea lessingi* Merr. Enum. Philipp. Fl. Plants. 3: 603. 1923. — *Pluchea hirsuta* Less. Linnaea 6: 150. 1831, *non Conyza hirsuta* Linn.

Perennial herbs, 60—200 cm in height with a fibrous rootstock. *Stems* generally unbranched except for the inflorescence, erect or climbing, terete, velutinous particularly in the younger parts. *Leaves* subsessile or shortly petiolate (petioles up to 5 mm long), 4—16 cm long, 0.8—6.0 cm wide, oblong-lanceolate to oblong-linear, generally glabrate or sometimes velutinous with prominent-based hairs on the upper surface, the lower surface generally velutinous, the apex acute to apiculate, the margins distantly serrate or dentate with mucronate teeth, the base acute; upper epidermal calls with undulate walls, the lower with sinuate walls, the stomata on both surfaces. *Capitula* more or less sessile or shortly pedunculate, in dense clusters ultimately arranged in narrow, terminal, compact panicles, 8—12 mm in diameter; peduncles, when present, up to 5 mm long, velutinous. *Involucre* with the phyllaries slightly longer than the florets, often purple-tipped, 1.5—10.0 mm in length, the outer lanceolate, the inner linear-lanceolate and more or less scarious, all acute at the apex, pubescent on the dorsal surface with multicellular hairs, the margins and apices ciliate. *Receptacle* 4—5 mm in diameter, slightly convex, alveolate, densely pilose. *Corollas* yellow, tubular; those of the bisexual florets 5.5—6.0 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters and long, multicellular hairs at least when in bud; those of the female florets filiform, 5—6 mm long, 2 to 3 lobed, glabrous. *Anther* tails equal in length to the thickened portion of the filament. *Achenes* oblong, pale brown, sparsely pubescent, ribbed. *Pappus* pure white, 5—6 mm long.

Type specimen: *Clarke 27269* (K).

Type locality: Sikkim Himalaya.

Flowers: September—May.

Distribution and Habitat: India, Burma, China, Indochina, Sumatra, Celebes, Philippines. Growing along roadsides, on hillslopes and in open woods at altitudes at least up to 1000 m above sea level.

Specimens examined:

INDIA. Assam: *Clarke 15972 A* (CAL), *15972 B* (CAL), *37878* (K), *43210* (K), *43309* (K); *Keenan s.n.* (K); *Robertson s.n.* (CAL). Bombay: *Ritchie 1870* (K); *Stocks s.n.* (K); *Talbot 900* (K). Mysore: *Law s.n.* (K); *Meebold 8356* (CAL). Peninsular India: *Wight s.n.* (E). No locality: *Dalzell s.n.* (DD); *Ritchie s.n.* (E). S. Andamans: *King's coll. s.n.* (CAL).

SIKKIM. *Clarke 27269 A, B* (K, type collection); *Hooker s.n.* (K).

BURMA. Pegu: *Kurz 903* (CAL). Mergui: *Griffith s.n.* (K).

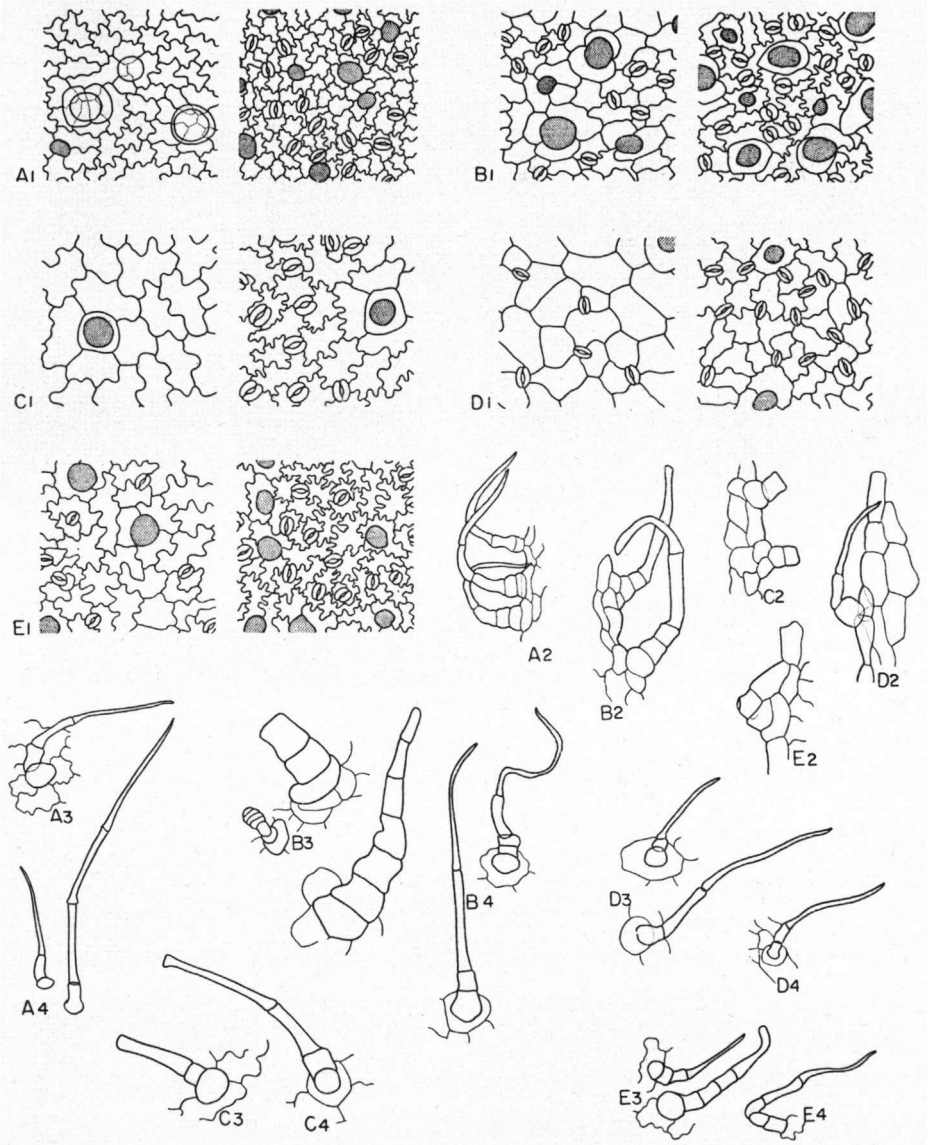


PLATE XIV. — Section Hieraciifoliae. A. *Blumea ramosii* Merr., Philippines, Luzon, *Clemens 17261* (NY). B. *B. hieraciifolia* (D. Don) DC., India, *Wight 1433* (P). C. *B. crinita* Arn., Ceylon, *Walker s.n.* (E). D. *B. veronicifolia* Franch., China, Yunnan, *Delavay 800* (P, type). E. *B. clarkei* Hook. f., China, Fukien, *Ging 7075* (UC). In each case, 1 represents leaf epidermal surfaces, upper to left, lower to right, 2 leaf margins, 3 trichomes on upper laminar surface, and 4 trichomes on lower laminar surface.

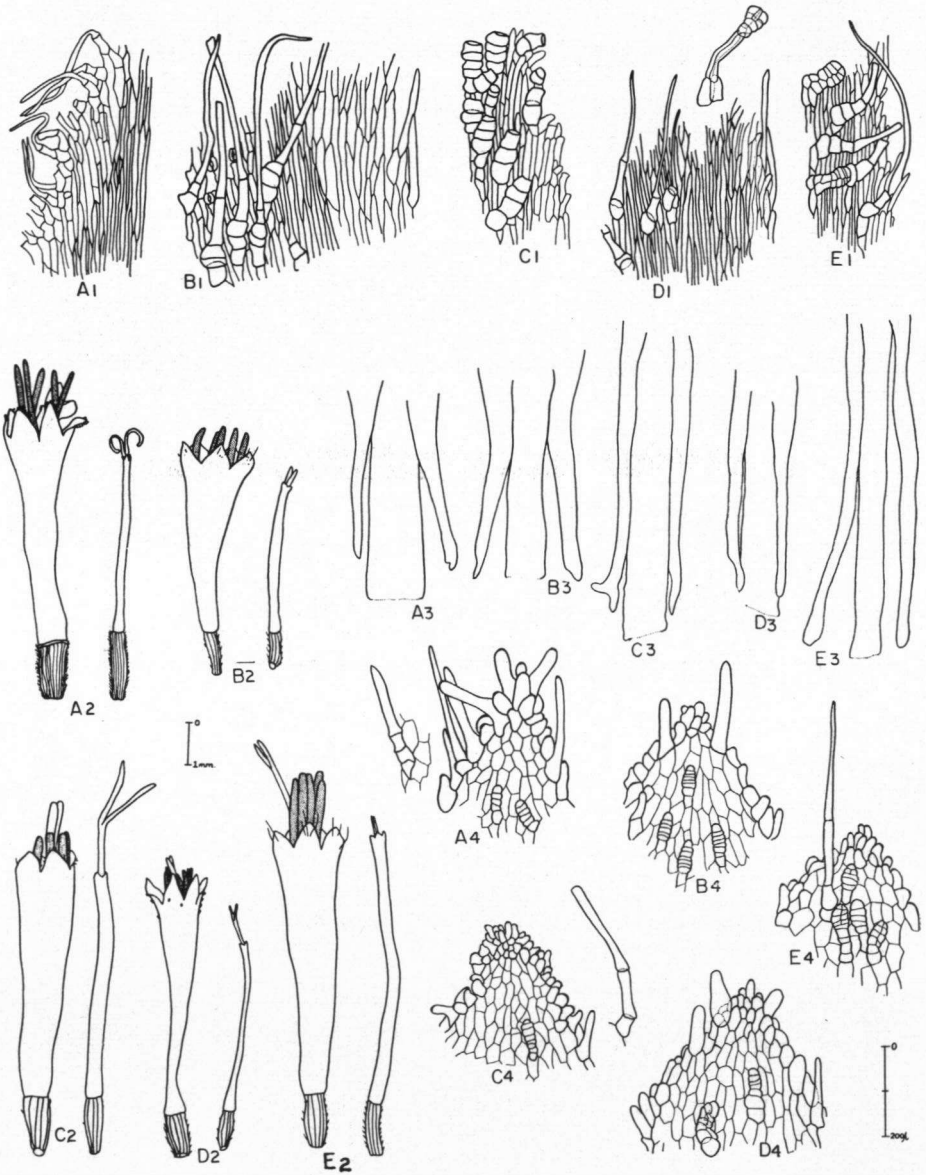


PLATE XV. — Section Hieraciifoliae. For explanation of A—E and voucher specimens see Plate XIV. In each case, 1 represents portion of phyllary (dorsal surface, 2 florets, bisexual to left, female to right, 3 corolla lobes of bisexual florets, and 4 anther tails.

CHINA. Fukien: *Ging 7075* (UC). Hainan: *Lau 5289* (GH); *Woon 410* (UC). Kiangsi: *Lau 4385* (GH, US). Kwangsi: *Tsang 23075* (GH), *24819* (GH, MO). Kwangtung: *Bodnier 372* (P); *Didricksen s.n.* (GH); *Gibbs 7561* (HK); *Ho 6016* (NY); *Lau 709* (NY, P); *Levine 344* (GH); *Metcalfe 18103* (GH); *Tsang 16620* (MO, NY, UC, US), *25880* (GH); *Tsang & Wong C. C. C. 14644* (GH, UC); *No coll. 6806* (HK).

INDOCHINA. *Chevalier 30622* (P).

SIAM. *Kerr 16770* (K, P), *17033* (K), *20424* (K).

MALAYA. *Burkill 746* (K).

SUMATRA. *Bartlett 7433* (MICH, US), *7847* (US).

CELEBES. *Binnemeyer 11711* (L).

BORNEO. *Motley 353* (K).

PHILIPPINES. Luzon: *Clemens 17077* (UC); *Elmer 8232* (NY); *Bur. Sci. 48771* *Edaño* (UC); *Hallier 621a* (NY); *Loher 3653* (K); *Merrill 5066* (NY, US); *Bur. Sci. 27449* *Ramos* (NY), *41923* (L, US), *76873* (GH); *Bur. Sci. 34046* *Ramos & Edaño* (NY), *46646* (NY, UC), *46802* (NY, UC). Mindanao: *Bur. Sci. 84018* *Ramos & Convocar* (GH); *Williams 2078* (NY, US).

NO DATA. (GH, drawing, probably of type collection of *B. elongata*).

Affinities: *Blumea clarkei* resembles *B. riparia* in its habit and capitula size but differs from it in its pubescence, leaf margins and phyllaries. It is also related to *B. hieraciifolia* from which it differs in lacking the silky-woolly indumentum and in having petiolate leaves and densely pilose receptacles.

Blumea clarkei shows great variation in leaf form from broadly oblong-lanceolate to narrowly linear-lanceolate and this variation is somewhat correlated with the distribution of the species; in the western part of its range, the leaves are predominantly of the former shape whereas in the eastern part, they are most often of the latter form.

Section 5. *Paniculatae* (*Plates XVI—XIX*).

1. Heads sessile in interruptedly spicate glomerules; phyllaries not entirely reflexed at maturity.
2. Lower leaves oblong-lanceolate, rarely lyrate; phyllaries purple or purple-tipped, acute; receptacle pilose to pubescent 25. *B. fistulosa*
2. Lower leaves lyrate-lobed; phyllaries green or straw-coloured, acuminate; receptacle glabrous 26. *B. sessiliflora*
1. Heads subsessile to pedunculate, in compact or lax panicles; phyllaries entirely reflexed at maturity
3. Receptacle pilose.
4. Stems erect; leaves lyrate-lobed 27. *B. laciniata*
4. Stems ascending; leaves not lobed 28. *B. adenophora*
3. Receptacle glabrous.
5. Achenes terete or subangulate.
6. Leaves usually not lobed; capitula 3—4 mm in diameter, in narrow spiciform panicles; corollas purple 29. *B. mollis*
6. Leaves often runcinately lobed; capitula 5—6 mm in diameter, in corymbose panicles; corollas yellow 30. *B. lacera*
5. Achenes distinctly ribbed.
7. Leaves white-silky on the lower surface, not lobed 31. *B. barbata*
7. Leaves never white-silky on the lower surface, at least the lower ones lyrate-lobed.
8. Stems, leaves and inflorescence axes glandular or variously pubescent.
9. Leaves mostly radical and rosulate, very few cauline.
32. *B. manillensis*
9. Leaves mostly cauline.
10. Panicles few-headed; terminal lobes of leaves suborbicular, obtuse 33. *B. napifolia*
10. Panicles many-headed; terminal lobes of leaves ovate-oblong, acute 34. *B. membranacea*
8. Stems, leaves and inflorescence axes glabrous or nearly so 35. *B. virens*

25. *Blumea fistulosa* (Roxb.) Kurz, Jour. As. Soc. Bengal 46 (2): 187. 1877. Species name meaning "hollow" but application not obvious. — *Conyza fistulosa* Roxb. Fl. Ind. 3: 429. 1832. — *Blumea glomerata* DC. in Wight, Contrib. Bot. Ind. 15. 1834. — *Conyza glomerata* Wall. Cat. no. 3055. comp. no. 165. 1831, *n. n.* — *Blumea racemosa* DC. Prodr. 5: 442. 1836. — *Conyza racemosa* Wall. Cat. no. 3002. comp. no. 112. 1831, *n. n.* — *Blumea purpurea* DC. Prodr. 5: 443. 1836. — *Conyza purpurea* Ham. in Wall. Cat. no. 3076. comp. no. 186. 1831, *n. n.* — *Blumea leptoclada* DC. Prodr. 5: 443. 1836. — *Blumea spinellosa* DC. Prodr. 5: 443. 1836. — *Blumea holosericea* Dalz. & Gibs. Bomb. Fl. 126. 1861, *non* DC. — *Blumea amethystina* Hance, Jour. Bot. 6: 173. 1868. — *Blumea nodiflora* Hook. f. Fl. Brit. Ind. 3: 262. 1882.

Herbs, 0.8—1.50 m in height with a tap root system. Stems branched or simple, erect, terete, glabrate at the base, puberulous to densely velutinous at the apex. Leaves sessile or the lower ones with an indistinct petiole, 3.5—17.0 cm long, 0.7—6.5 cm wide, the upper smaller and passing into bracts, oblong-lanceolate to broadly oblanceolate, very rarely sinuately incised, tomentose to puberulous on both surfaces, the apex acute to apiculate, the margins coarsely serrate-dentate with mucronate teeth, the lower leaves with a prolonged tapering base; epidermal cells with sinuate walls, the stomata on both surfaces. Capitula in compact, globose clusters arranged in interruptedly spicate panicles, sessile, 4—5 mm in diameter. Involucre with the phyllaries bright purple or at least purple-tipped, slightly longer than the florets, spreading but never entirely reflexed at maturity, 1—5 mm in length, the inner linear and with scarious margins, all acute at the apex, minutely pubescent outside with multicellular hairs and stipitate glands. Receptacle 1.5—2.0 mm in diameter, flat or slightly concave in the centre, alveolate, pubescent. Corollas yellow, tubular; those of the bisexual florets 3.5—4.0 mm long, with 5 narrowly triangular, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, up to 3.5 mm long, 2 to 3 lobed, glabrous. Anther tails equal in length to the thickened portion of the filament. Achenes brown, oblong, puberulous, 4-angled. Pappus white, up to 3.5 mm long.

Type specimen: Roxburgh *s.n.* (K, type drawing).

Type locality: India.

Flowers: December—May.

Distribution and Habitat: India, Burma, Siam, Indochina. China. Growing on hillsides, in open grasslands, and along forest paths generally in dry localities at altitudes up to 1450 m above sea level.

Specimens examined:

NEPAL. Danda Pani *s.n.* (DD); Wallich 3002/112 (GH, drawing and fragment, type collection of *B. racemosa*), 3055/165c (GH, NY, drawing and fragment, type collection of *B. leptoclada*).

SIKKIM. Clarke 16735 B (CAL), 27320 (L); Hooker *s.n.* (GH, L, P); Kinghorn 40 (CAL).

BHUTAN. King *s.n.* (CAL).

INDIA. Assam: Bor 2335 (DD); Burkill 36402 (CAL), 38145 (CAL); Clarke 37129 D (CAL); Edgeworth *s.n.* (K); Gamble 2470 A (K); Griffith *s.n.* (K); Hooker *s.n.* (P); Kingdon-Ward 7797 (K); Masters *s.n.* (DD, E); Parry 584 (K); Prain *s.n.* (CAL, DD); Simons *s.n.* (L); Wenger 408 (K), 411 (K); No data (L). Bengal:

Clarke 6537 (L), 19978 B (CAL); Gamble 2484 B (K), 8989 (K); Griffith 3145 (GH); Hooker & Thomson s.n. (CAL, E, GH, L, P); Kurz s.n. (CAL); Wallich 2076/186 (GH, drawing and fragment, type collection of *B. purpurea*). Bihar: Clarke 34795 A (CAL); Hamilton 1892 (E); Hooker s.n. (CAL, GH); Madden 501 (E), s.n. (K). Bombay: Bell 3774 (BLAT, CAL). Chota Nagpur: Campbell s.n. (CAL); Stocks s.n. (K); Wood s.n. (CAL). Madhya Pradesh: Bagohee s.n. (DD); Duthie 9525 (DD), 10427 (DD, K), 18427 (DD); Fleming 809 (DD); Marten 1901 (DD), s.n. (K). Madras: Gamble 13741 (CAL), 14068 (K), 18703 (K). Malva: No coll. 11890 (GH), 12723 (GH). Orissa: Haines 345 (K), 586 (K); Mooney 1253 (DD, K). Peninsular India: Wight 1434 (NY, type collection of *B. glomerata*). Western Himalayas: Duthie s.n. (UC). No locality: King s.n. (L); Kurz s.n. (L); Pattinayak s.n. (RAW); no coll. 713 (DD), s.n. (P).

BURMA. Abdul Huk 37 (CAL, US), s.n. (CAL); Abdul Khalil s.n. (CAL); Anderson s.n. (L); Annandale 475 (CAL); Aubert and Gage s.n. (CAL); Bor s.n. (DD); Brandis 760 (DD); Candler s.n. (CAL); Collett 106 (CAL, K); Diokason 3003 (GH); Falconer 478 (CAL); Gallatly 685 (CAL); Helfer 3162 (CAL, GH, K); King's coll. 265 (GH), s.n. (GH); Kurz 901 (CAL), 902 (CAL), 2245 (CAL), 2250 (CAL); Lace 2744 (E, K); MacGregor 1168 (E); McLelland s.n. (CAL, K); Manders s.n. (CAL); Masters s.n. (CAL); Mg Kan 18198 (DD), 18238 (DD); Parish 424 (K); Prazer 35 (CAL); Riles, s.n. (CAL); Robertson 207 (K); Rogers 934 (CAL, E); Satacre s.n. (CAL); Shaik Mokim 34 (CAL); Toppin 2528 (E); Wallich 3055/165 (E, GH, K, type collection of *B. glomerata*); White 31951 (US).

SIAM. Collins 1226 (L), 1227 (K), 2023 (US); Garrett 935 (GH, L, P); Hosseus 294 (K, L, MO), 294a (US); Kerr 940 (K, L, P), 8412 (P); Lindhard 59 (K), 60 (K); Put 4424 (L); Rock 1599 (US).

INDOCHINA. Balansa 890 (P); Handel-Mazetti 5891 (GH); Pételot 1544 (UC); Poilane 1263 (UC), 5943 (US).

COCHINCHINA. d'Alleizette s.n. (L); Pierre s.n. (NY); Spire 328 (P).

CHINA. Hainan: How & Chun 70192 (GH, K, NY); Lau 1336 (GH, NY). Kwangsi: McClure 13591 (GH, K, P, UC); No coll. 310 (GH). Kwangtang: Chum 40575 (NY); Ford s.n. (HK); Sampson 12815 (GH, K, type collection of *B. amethystina*). Kweichou: Cavalerie s.n. (GH, L); Esquirol s.n. (K). Yunnan: Hancock 249 (K); Henry 10356 (HK, K, MO, NY, US), 10356 A (K, MO); Rock 2487 (US).

NO LOCALITY. Lindley s.n. (L).

Affinities: *Blumea fistulosa* is related to *B. sessiliflora* from which it differs principally by its unlobed leaves, purple phyllaries and pubescent receptacles.

26. *Blumea sessiliflora* Decaisne, Nouv. Ann. Mus. Par. 3: 140. 1834. Specific epithet referring to the sessile capitula. — *Blumea fasciculata* DC. Prodr. 5: 442. 1836. — *Conyza fasciculata* Wall. Cat. no. 3094. comp. no. 204. 1831, n.n. — *Blumea floresiana* (Sch.-Bip.) Boerl. Handl. Fl. Ned. Ind. 2 (1): 238. 1891. — *Conyza floresiana* Sch.-Bip. in Zoll. Syst. Verz.: 121. 1854.

Herbs, up to 1 m in height. Stems branched or simple, erect, terete, glabrate at the base, tomentose above. Leaves sessile, 4–16 cm long, 1.4–6.0 cm wide, oblanceolate, the lower usually lyrate-lobed, the upper entire, all velutinous-pilose on both surfaces, the apex apiculate, the margins serrate-dentate, the base tapering; epidermal cells with sinuate walls, the stomata on both surfaces. Capitula in clusters of 3–5 arranged in an interruptedly spiciform panicle, sessile or sometimes pedunculate, 5–6 mm long; peduncles, when present, up to 10 mm long. involucre with the phyllaries herbaceous, slightly longer than the florets, spreading at maturity, 1.5–6.5 mm in length, lanceolate, shortly acuminate, densely pilose on the dorsal surface, the margins scarious. Receptacle 1.5–3.0 mm in diameter, slightly convex, alveolate, glabrous. Corollas yellow, tubular;

those of the bisexual florets 4.5—5.0 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, 3.5—4.0 mm long, 2 to 3 lobed, glabrous. *Anther* tails somewhat shorter than the thickened portion of the filament. *Achenes* brown, puberulous, oblong, ribbed. *Pappus* white, 3—4 mm long.

Type specimen: *Decaisne s.n.* (P).

Type locality: Timor.

Flowers: September—April.

Distribution and Habitat: Indonesia, Siam, Indochina, Southern China, Burma, Peninsular India. A more insular species than the former growing in moist localities at altitudes of up to 700 m above sea level.

Specimens examined:

INDONESIA. Celebes: *Eyma 3752* (L). Java: *Backer 37297* (L); *Horsfield 23* (K); *Koorders 20553 β* (L); *Koorders & Koorders-Sohumacher 43312* (L); *van der Meer 308* (L), *1040* (L), *1782* (L); *Ploem s.n.* (L); *Popta 459/13 s* (L); *Waitz s.n.* (L). Sumbawa: *Elbert 3532* (L). Timor: *Leschenault s.n.* (P); *Richard s.n.* (P). Flores: *Dorgelo 115* (L); *Zollinger 3329* (L, P, U, type collection of *B. floresiana*).

SIAM. *Kerr 11339* (L, P).

INDOCHINA. *Poilane 16276* (P), *14520* (K).

CHINA. Kwangtung: *Brigham s.n.* (GH); *Lau 921* (NY), *20054* (GH, NY); *Tsang 25962* (GH).

BURMA. *Cleghorn 7080* (CAL); *Griffith 3145* (K), *s.n.* (K); *Meebold 17318* (CAL); *Wallich 3094/204* (GH, K, fragment, type collection of *B. fasciculata*).

INDIA. *Gamble 2433b* (DD); *King s.n.* (CAL); *King's coll. s.n.* (CAL); *Talbot s.n.* (DD); *Thomson s.n.* (GH).

Affinities: This species is closely related to *Blumea fistulosa* Kurz. The two are distinguishable by the fact that in *B. sessiliflora* the lower leaves are quite commonly lyrate, the phyllaries are herbaceous and acuminate and the receptacle is glabrous, whereas in *B. fistulosa*, the lower leaves are seldom lobed, the phyllaries are purplish and acute and the receptacle is definitely pilose or pubescent. It is also related to *B. laciniata* from which it may be distinguished by its glabrous receptacles, non-ribbed achenes and interrupted spicate inflorescences.

27. *Blumea laciniata* (Roxb.) DC. Prodr. 5: 436. 1836. Specific epithet referring to the laciniate leaves. — *Conyza laciniata* Roxb. Fl. Ind. 3: 428. 1832. — *Conyza laciniata* Wall. Cat. 3100. comp. no. 210. 1831, *n. n.* — *Blumea cichoriifolia* DC. ex Decaisne, Nouv. Ann. Mus. Par. 3: 410. 1834. — *Blumea crepidifolia* DC. Prodr. 5: 437. 1836. — *Blumea runcinata* DC. Prodr. 5: 438. 1836. — *Conyza runcinata* Wall. Cat. no. 3087 A comp. no. 197, 1831, *n. n.* — *Blumea sonchifolia* DC. Prodr. 5: 438. 1836. — *Conyza sonchifolia* Ham. in Wall. Cat. no. 3085. comp. no. 195. 1831, *n. n.* — *Blumea acutata* DC. ex Decne Nouv. Ann. Mus. Par. 3: 409. 1834. — *Blumea glandulosa* Benth. Fl. Hongkong. 177. 1861, non DC. — *Blumea okinawensis* Hayata, Icon. Pl. Formos. 8: 53. 1919. — *Blumea onnaensis* Hayata, Icon. Pl. Formos. 8: 53. 1919. — *Blumea sinapifolia* Gagnep. Bull. Soc. Bot. France 68: 43. 1921.

Herbs, 20—180 cm in height with a tap root system. Stems up to 1 cm in diameter, hollow, branched often from the base; branches erect to ascend-

ing, terete, glabrate to pilose with multicellular hairs and stipitate glands particularly in the younger parts and on the inflorescence axes. *Leaves* both radical and cauline, 4.5—36.5 cm long, 0.8—21.0 cm wide, the upper smaller and passing into bracts, the lower runcinate-lyrate, petiolate, the upper less lobed, sessile, all glabrate to pilose on both surfaces, the apex apiculate, the margins grossly and distantly dentate with broadly triangular, apiculate teeth, the base tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in large, terminal, dense to lax, oblong panicles, pedunculate, 6—8 mm in diameter; peduncles glandular pubescent, up to 15 mm long. *Involucre* with the phyllaries often tinged with purple, completely reflexed at maturity, slightly longer than the florets, 1—8 mm in length, oblong-lanceolate, acute, villous on the back, the inner with scariou margins. *Receptacle* 2.5—5.0 mm in diameter, flat to slightly convex, white in dried specimens, alveolate, pilose around the alveolae. *Corollas* yellow, tubular; those of the bisexual florets 4—5 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, 3.5—4.5 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* long, ribbed, brown, sparsely pubescent. *Pappus* white, up to 4 mm long.

Type specimen: *Roxburgh s.n.* (K, type drawing).

Type locality: India.

Flowers: Throughout the year, particularly February through April.

Distribution and Habitat: India to New Guinea, Solomon Islands and Hawaii. Probably recently introduced in the last locality. Growing in old clearings, along roadsides and in waste fields at altitudes from sea level to 1200 m above.

Specimens examined:

- BHUTAN. *Ludlow, Sheriff & Hicks 20504* (E).
 SIKKIM. *Clarke 27277 D* (CAL); *Hooker s.n.* (E, GH, K).
 INDIA. Assam: *Burkill 36414* (CAL); *Chatterjee s.n.* (CAL); *Clarke 43158 A* (US), *43202 C* (CAL); *Hooker & Thomson s.n.* (K); *Prairie's coll. 474* (U); *No data* (U). Bengal: *Biswas s.n.* (GH); *Clarke 14034 A* (CAL), *21712 H, M* (CAL, L), *34728 E* (DD, K); *Hooker s.n.* (K); *Kurz s.n.* (CAL); *Mukerji 332* (K); *Sinclair 3834* (E). Bihar: *Hamilton 1901* (E); *Hooker s.n.* (K); *Wallich 3085/195* (GH, type collection of *B. sonchifolia*). Bombay: *Dalzell s.n.* (K); *No data* (CAL). Madhya Bharat: *Mukerji 3* (CAL). Madhya Pradesh: *Duthie 9526* (DD). Orissa: *Campbell 7873* (CAL, DD); *Mooney 2160* (DD, K). Oudh: *Inayat 22220* (CAL, DD), *23692* (DD). Punjab: *Drummond 1700* (E), *2238* (E), *20596* (K), *26136* (K), *26140* (K), *26141* (K), *26145* (K), *26147* (E); *Koelz 4261* (GH, UC). Uttar Pradesh: *Clarke 23446* (K); *Duthie 216* (DD); *Kanjilal 21 A* (DD), *1120* (DD); *King s.n.* (CAL); *Raizada 68* (NY), *2150* (DD), *s.n.* (DD); *Saksena 1* (DD); *Strachey & Winterbottom 3* (K) *5* (K); *Wallich 3087/197 A* (GH, fragment and drawing of type collection of *B. runcinata*); *No data* (DD). Eastern Himalayas: *Bibu & Rhomoo s.n.* (E). Gangetic Plain: *Dudgeon & Kenoyer s.n.* (MO); *Hamilton 1902* (E); *Thomson s.n.* (E, GH, K, L, P, U). N.W. India: *Edgeworth 58* (K); *Stewart 1675* (E), *1682* (E). Peninsular India: *No data* (E). No locality: *Edgeworth s.n.* (GH, K); *Jacquemont 9* (P), *323* (P); *Roxburgh s.n.* (E, K); *No coll. 390* (DD).
 PAKISTAN. *Clarke 7628* (CAL); *Gamble 22736* (K); *Madden 503* (E).
 CEYLON. *Thuwaites C.P. 2822* (P).
 BURMA. *Abdul Huk 73* (CAL); *Aubert & Gauge s.n.* (CAL); *Collett 456* (K); *Dickason 5407* (GH), *5411* (GH); *MacGregor 1305* (CAL).

- MALAYA. *Griffith 3152* (K); *Nur 18889* (UC); *Bidley s.n.* (K).
 INDOCHINA. Annam: *Boden-Kloss s.n.* (UC); *Coudero s.n.* (NY). Tonkin: *d'Alleizette s.n.* (L); *Balansa 887* (P), *891* (P), *3053* (P); *Bon 1922* (P), *2120* (P); *Eberhardt 4032* (P); *Pételot 2077* (GH, NY).
 COCHINGHINA. *Pierre 443 bis* (NY); *Poilane 2439* (UC, US).
 CHINA. Fukien: *Chung 7519* (NY); *Lin Pi 6528* (UC). Hainan: *Ford 403* (K); *How 71991* (GH); *McClure C.C.C. 9174* (NY, UC, US). Kwangsi: *Tsang 21990* (GH). Kwangtung: *Armocost 27* (NY); *Bodiner 370* (P), *373* (P); *Callery 15* (P); *Dunn 5760* (HK); *Faurie 15815* (K); *Ford 530* (K); *Furet 149* (P); *Gaudichaud 112* (P); *Kuntze 3394* (K, NY); *Tsang 29745* (US); *Tsung & Wong 3186* (GH, UC); *Wilford s.n.* (GH, K); *Wright s.n.* (GH, US); *C.C.C. 11599 Yan & Lan* (NY, UC, US); *No coll. 11622* (HK), *11684* (HK). Yunnan: *Hancock 550* (K); *Henry 9306* (K, NY), *9656* (NY), *10817* (K, MO, NY, US), *13234* (K, MO, NY); *Maire 2530* (UC), *2591* (UC). No locality: *Henry s.n.* (NY); *Iwan s.n.* (P); *No coll. 98* (HK), *300* (HK).
 FORMOSA. *Faurie 877* (GH), *1495* (P); *Henry 229* (MO), *1810* (K, MO, NY, US); *Oldham 250* (K); *Sasaki 21544* (NY, UC), *s.n.* (MO, US); *Shimada s.n.* † (GH); *Tanaka 1721* (GH); *No coll. s.n.* (HK).
 OKINAWA. *Moran 4977* (US), *5052* (US); *Tamayose s.n.* (UC).
 PHILIPPINES. Balabac: *Bur. Sci. 445 Mangubat* (NY, US); *Bur. Sci. 49711 Ramos & Edaño* (UC). Culion: *Merrill 565* (GH, NY, US). Luzon: *Cuming 659* (K); *Edaño 18042* (L); *Elmer 5621* (NY, P, US); *Hallier s.n.* (NY); *Merrill 257* (GH, L, MO, NY, P, US), *631* (US), *7438* (US); *Bur. Sci. 27691 Ramos* (US), *29248* (US); *Topping 140* (US); *Vidal 3137* (K). Mindanao: *Bur. Sci. 37418 Ramos & Edaño* (US), *48999* (NY, UC), *49094* (NY, UC). Samar: *Edaño 15612* (L); *Bur. Sci. 24730 Edaño* (NY, US), *24735* (MO), *24749* (US). Siargao: *Bur. Sci. 34919 Ramos & Pascasio* (GH). No locality: *Barthe s.n.* (P); *Cuming 629* (GH).
 INDONESIA. Borneo: *Clemens 5141* (NY), *6152* (NY), *28184* (NY). Celebes: *Elbert 2791* (L); *Koorders 16522* β (L); *Savinierre 475* (P). Java: *Baeker 17648* (K, U); *Bakhuizen van den Brink 6837* (L, P); *den Berger 472* (L); *Bovien 86* (L); *Holstvoogd 442* (L); *Kievits 220* (L), *1605* (L); *Koorders 20546* β (L); *Kuntze 5920* (NY); *Lütjeharms 4335* (L); *Waite s.n.* (L); *Zollinger 2923* (K, P), *5821* (K); *No data* (L). Lombok: *Elbert 702* (L). Sumbawa: *Elbert 3631* (L); *Warburg 17221* (GH). Timor: *Decaisne s.n.* (GH, diagram, P, type collection of *B. cichoriifolia*); *No data* (GH, fragment and drawing, type collection of *B. acutata*). No locality: *Zollinger 224* (L).
 NEW GUINEA. *Brass 22044* (L), *24288* (L); *Buwalda 4382* (L); *Clemens 40643* (GH), *s.n.* (GH); *Docters van Leeuwen 10600* (L); *Koch s.n.* (L); *Sawyer 104* (GH), *105* (GH); *Versteeg 1499* (L).
 NEW CALEDONIA. *Panoher s.n.* (GH, L).
 SAN CRISTOVAL ISLANDS. *Brass s.n.* (GH).
 GUAM. *Bryan 1067* (UC, US); *Nelson 338* (NY); *Thomson 341* (US).
 HAWAII. *Degener 5283* (NY), *5284* (NY), *5285* (NY), *17719* (GH, NY), *18109* (NY), *18110* (NY).

Affinities: Related to *B. sessiliflora*, *B. membranacea* and *B. lacera*. From the first, *B. laciniata* differs in having pedunculate heads arranged in lax panicles and receptacles ciliate around the alveoles. From the other two species, it may also be distinguished by its pubescent receptacles and from *B. lacera*, it is further separated by its ribbed achenes.

28. *Blumea adenophora* Franch. Jour. de Bot. 6: 382. 1896. The specific epithet referring to the glandular nature of the plant (ἀδην = gland. φορδός = bearing).

Herbs, 20–40 cm in height. Stems branched from the base, erect or ascending, terete, pubescent with white hairs and stipitate glands. Leaves sessile, 2–4 cm long, 0.5–1.0 cm broad, lanceolate, pubescent on both surfaces with three types of hairs-stipitate and clavate glands, short whitish hairs, and large setae, the apex apiculate, the margins distantly serrate with 2–4 teeth per side, the base tapering; epidermal cells with sinuate

walls, the stomata on both surfaces. *Capitula* axillary and terminal, in very short, dense, racemose panicles, almost sessile to shortly pedunculate, 4–6 mm in diameter. *Involucre* with the phyllaries purple-tinged, slightly longer than the florets, 1–5 mm in length, linear, acute to almost rounded at the apex, pubescent on the back with multicellular hairs and occasional glands, the margins scariosus. *Receptacle* 2–3 mm in diameter, alveolate, slightly pilose. *Corollas* yellow, tubular; those of the bisexual florets up to 4 mm. long, with 5 ovate, acute, papillate lobes that are densely pubescent with large unicellular hairs and colleters; those of the female florets about 3 mm long, with 2 to 3 lobes, generally glabrous. *Anther* tails shorter than or equal in length to the thickened portion of the filament. *Achenes* brown, puberulous, oblong, 10-ribbed. *Pappus* white, 3–4 mm long.

Type specimen: *Delavay 842* (P).

Type locality: China, Yunnan Province, Kiang-yn near Hokin.

Flowers: April.

Distribution and Habitat: Endemic to China. Rare. Growing in fields.

Specimen examined:

CHINA. Yunnan: *Delavay 842* (P, type collection).

29. *Blumea mollis* (D. Don) Merr. Philipp. Jour. Sci. (Bot.) 5: 395. 1910. Specific epithet referring to the soft indumentum. — *Erigeron molle* D. Don. Prodr. Fl. Nep. 172. 1825. — *Blumea wightiana* DC. in Wight, Contrib. Bot. Ind. 14. 1834. — *Conyza wightiana* Wall. Cat. no. 3093. comp. no. 203. 1831, *n. n.* — *Conyza bifoliolata* Wall. Cat. no. 3091, comp. no. 201, 1831, *n. n.*, non Linn. — *Blumea chamissoniana* DC. Prodr. 5: 434. 1836. — *Conyza bifoliata* Chamisso & Less. Linnaea 6: 135, 1831, non Linn. — *Blumea leschenaultiana* DC. Prodr. 5: 435. 1836. — *Blumea cunninghami* DC. Prodr. 5: 435. 1836. — *Blumea trichophora* DC. Prodr. 5: 436. 1836. Based in part on *Erigeron molle* Don. — *Blumea parvifolia* DC. Prodr. 5: 437. 1836. — *Conyza parvifolia* Wall. Cat. no. 3004, comp. no. 114, 1831. *n. n.* — *Erigeron glomeratum* Spreng. ex DC. Prodr. 5: 437. 1836, in syn. — *Blumea phyllostachya* DC. Prodr. 5: 438. 1836. — *Conyza paniculata* Wall. Cat. 3090. comp. no. 200. 1831, *n. n.* — *Blumea perottetiana* DC. Prodr. 5: 443. 1836. — *Blumea dregeanoides* C. H. Schultz in A. Rich. Tent. Fl. Abyss. 1: 393. 1847. — *Blumea neilgherriensis* Hook. f. Fl. Brit. Ind. 3: 261. 1882.

Herbs, 4–90 cm in height with a tap root system. *Stems* simple or branched from the base, erect, terete, softly pilose with white spreading hairs and glands. *Leaves* 1.0–9.5 cm long, 0.6–5.0 cm wide, the upper smaller and passing into bracts, sessile, the lower petiolate (petioles up to 2 cm long), ovate-oblong, densely silky-villous on both surfaces with soft, long, white, multicellular hairs and glands, the apex acute to apiculate, the margins closely serrate, the base tapering in the lower leaves, acute in the upper; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in dense, terminal, narrow, compact, spiciform panicles, subsessile to distinctly pedunculate, 3–4 mm in diameter; peduncles up to 7 mm long, densely villous. *Involucre* with the phyllaries longer than the florets, herbaceous to distinctly purplish tinged, entirely reflexed at maturity, 1–5 mm in length, linear, tapering, densely soft-villous on the

dorsal surface with multicellular hairs and glands, the inner series with distinctly scarious margins. *Receptacle* 1.0—1.5 mm in diameter, more or less flat, alveolate, glabrous. *Corollas* purple to lilac, sometimes whitish at the base, tubular; those of the bisexual florets 2.5—4.5 mm long, with 5 triangular, rounded or acute, papillate lobes that are pubescent with colleters; those of the female florets filiform, 2—4 mm long, 2 to 4 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* oblong, brown, shining, subangulate, pubescent. *Pappus* white, 2—4 mm long.

Type specimen: *D. Don s.n.* (BM).

Type locality: Nepal.

Flowers: January—November.

Distribution and Habitat: Africa, India, Pakistan, Ceylon, Burma, Indochina, China, Philippines, Indonesia and New Caledonia. Growing in dry places in open waste lands, in grass fields, on hillslopes, along roadsides and on old walls at altitudes up to 1500 m above sea level.

Specimens examined:

AFRICA. Belgian Congo: *Hens 93* (P); *Humbert 8180 bis* (P). Eritrea: *Dillon s.n.* (P, syntype of *B. dregeanoides*); *Schimper 653* (K, P), *659* (P), *1297* (P, US, syntypes of *B. dregeanoides*); *Schweinfurth & Riva 1105* (P, US). Kenya: *Bogdan VB 162* (UC). Nigeria: *Ejiofor FHI 19816* (K); *Holland 2109* (K); *Moiser s.n.* (K). Nyasaland: *Shortridge 17395?* (NY). Oubangi: *Le Testu 4507* (P). Senegal: *Hartal 223* (GH). Sierra Leone: *Deighton 4204* (K), *4976* (K), *5394* (K); *Morton 25023* (K); *Scott Elliott 4484* (GH, K); *Thomas 10125* (US). Sudan: *Lyns s.n.* (US). Sudan, French: *Waterlot 1473* (P). Tanganyika: *Tanner 1046* (MICH, UC), *1673* (MICH, UC); *Whyte s.n.* (K). Uganda: *Mearns 3050* (US). Paul Islands: *Antoni s.n.* (GH). No locality: *Le Testu 312* (P); *Sacleux s.n.* (P); *Tyson 1246* (GH, P).

ZANZIBAR. *Boivin s.n.* (P); *Hildebrandt 1012* (GH); *Sakur 1603* (P).

COMORES. *Boivin s.n.* (P); *Hildebrandt 1642* (K).

MADAGASCAR. *Boivin s.n.* (GH); *Cours 760* (P); *Decary 916* (P), *3054* (P), *5470* (P), *15478* (P), *15529* (P); *Hildebrandt 3105* (P), *3141* (P), *3539* (P); *Humbert 656* (P), *4923* (P), *11483* (P), *18535* (P); *Perrier de la Bathie 252* (P), *353* (P), *2777* (P), *3268* (P), *16443* (P); *Humbert & Cours 17558* (P); *Richard 889* (P); *Saboureau 4594* (P); *No coll. 249* (L).

MAURITIUS. *Ayres s.n.* (GH); *Blackburn s.n.* (GH); *Boivin s.n.* (P); *Bojer s.n.* † (K).

AFGHANISTAN. *Aitchinson 4* (DD).

PAKISTAN. Bengal: *Gage s.n.* (L, P, US). North West Frontier Province: *Aitchinson 1073* (K); *Bell 58* (CAL); *Deane 44* (K); *Gamble 24202* (K); *Qizilbash 55* (DD). Punjab: *Chaudri s.n.* (GH); *Mahindra Nath 437* (RAW); *Stewart 13837* (NY, RAW), *13854* (GH, NY, UC, US), *14120* (GH, NY); *Williams 7152* (DD, UC). Sind: *Glendow s.n.* (DD); *Sukkur 29/3504* (DD).

BHUTAN. *No data* (CAL).

NEPAL. *Bis Ram 422* (DD, NY); *Polumin, Sykes & Williams 1806* (E); *Wallich 3004/114* (GH, P, type collection of *B. parvifolia*); *Zollinger 2240* (P); *ex DC. herb. s.n.* (P, type collection of *B. trichophora*).

SIKKIM. *Hooker s.n.* (E, L).

INDIA. Assam: *Bor 16096* (DD), *16733* (DD); *Clarke 26584* (CAL), *38093 A* (CAL), *43349* (CAL); *Keenan s.n.* (K); *King's coll. 186* (CAL); *Parry 1204* (K); *No data?* (U). Bengal: *Clarke 21711* (L), *26296 B* (K), *31910* (CAL); *Griffith 3157* (K); *Kurz s.n.* (CAL); *Bottler 290* (MO); *Watt 14411* (CAL, E); *No data* (CAL, L). Bihar: *Clarke 34646* (CAL), *34681 B* (DD); *Hooker s.n.* (GH); *Mathur s.n.* (DD); *Thomson s.n.* (L). Bombay: *Datzell s.n.* (CAL); *Kuntze 7503* (NY), *7514* (NY), *7577* (NY), *7627* (NY); *McCann 4013* (K); *Randeria AR 591* (BLAT); *Sontapau 5899* (BLAT), *3346* (BLAT), *15109* (BLAT), *18265* (BLAT); *Sedgewick 3268* (BLAT);

*Stocks, Law s.n. (L); Talbot 2262 (DD), s.n. (DD). Chota Nagpur: Campbell s.n. (DD); Clarke 14090 (K); Wood s.n. (CAL). Gangetic Plain: Hamilton 1895 (E), 1897 (E); Thomson s.n. (CAL, E, GH, L). Himachal Pradesh: Brandis 4330 (DD), s.n. (CAL); Collett 506 (K). Hyderabad, Deccan: Campbell s.n. (E). Kashmir: Stewart 27232 (RAW). Madhya Bharat: Mukerji 1 (CAL). Madhya Pradesh: Duthie 4698 (DD), 8318 (DD, K), 9529 (DD), 10,435 (CAL), 10,436 (CAL, DD); Lourie 4699 (DD); Vaid 23212 (DD). Madras: Bourne 2690 (K), 2691 (K), 3508 (K), s.n. (CAL); Cole 42 (K), 58 (K); Elliott s.n. (E); Clarke 11243 B (CAL, L); Cleghorn s.n. (E); Fischer 47 (CAL), 572 (CAL), 1493 (CAL), 1625 (CAL); Gamble 13840 (CAL), 11783 (K); Hooper & Ramaswami 39415 (CAL); Hohenacker s.n. (P); Macé s.n. (P); Narayana s.n. (NY, UC); Jain & Bharadwaja 22558 (DD); Ramaswamy 1355 (CAL); Thomson s.n. (CAL, L, NY, P, U); Wallich 3090/200 (GH, fragment, type collection of *B. phyllostachya*); Wight 1427 (E), 2045 (E); Yeshoda 68 (NY). Marwar: King s.n. (CAL). Orissa: Mooney 2170 (DD), 2680 (K), 3211 (DD). Punjab: Drummond 26143 (E, UC), 26144 (E); Koels 4235 (GH, NY, US); Stoliczka s.n. (CAL). Rajasthan: McCann 1910 (K). Saurashtra: Baisada 23707 (DD). Travencore: Calder & Ramaswami 696 (CAL); Rama Rao 1620 (CAL); Rama Rao's coll. 1903 (CAL); Wight 440 (E), 441 (E). Uttar Pradesh: Anderson s.n. (E); Bis Bam 2170 (DD, E, NY); Duthie 845 (DD), 1705 (DD); Inayat 20976 (DD), 22227 (DD), 22227a (DD); 22229 (DD); King s.n. (CAL); Strachey & Winterbottom 4 (GH). N.W. India: Stewart 16771 (E), 1634 (E). Peninsular India: Wight 2038 (E), 1562 (K), 1581 (K). Western Himalaya: Duthie s.n. (UC); Griffith s.n. (L); No data (CAL). French India, Pondicherry: d'Alleizette s.n. (L); Perottet s.n. (E). No locality: Blatter & Hallberg 718 (CAL), 730 (CAL); Brandis s.n. (DD); Edgeworth s.n. (K); Jacquemont 1056 (K); Leschenault 104 (P), s.n. (P); Mami 179 (DD); Bitchie 401 (K); Royle s.n. (K).*

CEYLON. Alston 2407 (UC); Macrae 62 (NY); Walker s.n. (K).

BURMA. Annandale EB 316 (CAL); Diokason 1141 (GH, UC), 5302 (GH); Khalil s.n. (CAL); Kurz 910 (CAL), 913 (CAL), 2244 (K), s.n. (CAL); McLelland s.n. (K, P); Mg Kan 18389 (DD); Toppin 3317 (E); Wallich 3093/2030 (GH, K type collection of *B. wightiana*).

INDOCHINA. Annam: d'Alleizette 3981 (L), s.n. (L); Bauche s.n. (P); Chevalier 1347 (P, UC), 2663 (P); Clemens & Clemens 3038 (MICH, MO, NY, P, U, UC, US), 3676 (MICH, MO, NY, U, UC, US); Robinson 1248 (NY, US); Squires 766 (GH, MO, NY, P). Tonkin: Balansa 4387 (K), 4628 (K); Pételot 364 (GH, NY, UC, US), 2034 (GH), 2085 (GH), 2112 (GH, NY, US). No locality: Eberhardt 2806 (NY).

CAMBODIA. Pierre 1071 (P).

SIAM. Kerr 16871 (K); Smith 374 (K); Winit 1652 (K).

COCHINCHINA. Pierre s.n. (NY).

CHINA. Fukien: Chung 1517 (K, UC), 5425 (NY), 5626 (NY); En 2462 (UC); Po 12390 (UC); Tang 4384 (UC), 5467 (UC), 13877 (UC), 16497 (GH). Hainan: How 71325 (GH); Katsumada 22022 (UC); Katsumata 7850 (HK); Lau 3650 (GH), 3333 (GH, P), 5548 (GH), 6034 (GH); Lei 794 (GH, NY, P, US), 1142 (GH); Liang 65068 (NY); Tsang 214.16963 (GH, K, NY, UC, US), 705.17454 (GH, K, UC). Kwangsi: Steward & Cheo 560 (NY). Kwantung: Bodinier 1907 (P); Chung 44411 (NY), 44422 (NY); Dunn 5753 (HK); Fortune 173 (P); Groff 2204 (GH); Levine 1940 (GH, HK, US); Merrill 9959 (HK); Tang 1199 (HK); Tate s.n. (NY); To 11000 (NY, UC); Tsang 29743 (US); Tsang & Wong C. C. C. 14735 (GH, NY, P, UC, US); Whiting & Stewart 87 (K). Kweichow: Ducloux 66361 (NY). Szechwan: Hu 7805 (US); Legendre 826 (P); Schneider 1108 (GH); Wang 23132 (GH); Wilson 4984 (HK). Yunnan: Delavay 3155 (P), 6608 (P); Ford s.n. (HK); Henry 10897 (HK, MO, NY), 11974 (MO, NY), 11971 A (K, NY), 12955 (US); Schoch 66 (K); No data (HK).

FORMOSA. Faurie 8403! (GH).

PHILIPPINES. Luzon: Bona s.n. (US); Celestino 4390 (GH); de Chamisso s.n. (GH, fragment of type collection of *B. chamissoniana*); Clemens 16425 (UC); Co 75 (L); For. Bur. 5869 Curran (US); Elmer 8227 (MO, NY, US); Loher 3656 (US), 6453 (K); Merrill 3806 (NY, US); Pease 20212 (GH); Bur. Sci. 2074 Ramos (MO, NY, US), 2623 (US), 5757 (NY, P); Bur. Sci. 37942 Ramos & Edaña (US), Topping 50 (US), 142 (US); Vanoverbergh 2530 (P); Williams 2018 (NY, US). Mindoro: Bur. Sci. 6207 Robinson (NY). No locality: Cuming 1139 (GH, K, L, MO, P); Micholitz s.n. (K).

JAVA. Baoker 15727 (L), 31577? (K, L), 33503 (L); Bakhuizen van den Brink 1553

(L, U); *Doeters van Leeuwen* 148 (U); *Kooper* 56? (L); *Popta* 85/9 (L), 472/141 (L); *Raap* 856 (L); *No data* (L);

NEW CALEDONIA. *Deplanche* 219 (K); *Milne* 102 (K); *Pancher s.n.* (NY, US); *Schlechter* 14817 (K, GH).

AUSTRALIA. Northern Territory: *Mueller s.n.* (K); *Specht* 1188 (K, US). Queensland: *Hann* 68 (K). Western Australia: *Cunningham* 85 (K), *s.n.* (K, type of *B. cunninghami*), *Fitzgerald* 1351 (K); *Helms* 106 (K).

Affinities: *Blumea mollis* is closely related to *B. lacera* and it is rather difficult to distinguish the two in herbarium specimens. Some authors like Thwaites (1864, p. 163) and Harvey & Sonder (3: 120. 1864—65) have even considered the two as belonging to one species. *Blumea mollis*, however, may be distinguished from *B. lacera* by its purple corollas, its seldom lobed leaves, smaller capitula and softer pubescence.

30. *Blumea lacera* (Burm. f.) DC. in Wight, Contrib. Bot. Ind. 14. 1834. Specific epithet referring to the leaves. — *Conyza lacera* Burm. f. Fl. Ind. 180. t. 59. f. 1. 1768. — *Conyza javanica* Blume, Bijdr. 897. 1826. — *Blumea musra* (Ham.) DC. Prodr. 5: 435. 1836. — *Conyza musra* Ham. in Wall. Cat. no. 3095. comp. no. 205. 1831, *n. n.* — *Blumea lactucaefolia* DC. Prodr. 5: 435. 1836. — *Blumea cernua* DC. Prodr. 5: 436. 1836. — *Conyza nutans* Ham. in Wall. Cat. no. 3080. comp. no. 190. 1831, *n. n.* — *Blumea dregeana* DC. Prodr. 5: 436. 1836. — *Blumea trigona* DC. Prodr. 5: 437. 1836. — *Blumea glandulosa* DC. in Wight, Contrib. Bot. Ind. 14. 1834. — *Blumea cinerascens* DC. Prodr. 5: 438. 1836. — *Blumea heyneana* DC. Prodr. 5: 441. 1836. — *Conyza heyneana* Wall. Cat. no. 3089. comp. no. 199. 1831, *n. n.* — *Blumea timorensis* DC. in Decaisne, Nouv. Ann. Mus. Par. 3: 411. 1834. — *Blumea subcapitata* DC. Prodr. 5: 439. 1836. — *Conyza capitata* Wall. Cat. no. 3056. comp. no. 166. 1831, *n. n.* — *Blumea holosericea* (Wall.) DC. Prodr. 5: 442. 1836. — *Conyza holosericea* Wall. Cat. no. 3102. comp. no. 213. 1831, *n. n.* — *Conyza sericea* Wall. Cat. no. 3021. comp. no. 131. 1831, *n. n.* — *Blumea bodinieri* Vaniot, Bull. Acad. Geogr. Bot. 12: 23. 1903. — *Conyza acrocephala* Miq. Fl. Ind. Bat. 2: 43. 1856. — *Blumea cuneifolia* DC. Prodr. 5: 441. 1836. — *Conyza cuneifolia* Wall. Cat. no. 3101. comp. no. 211. 1831, *n. n.* — *Blumea commersoni* Edgw. Jour. As. Soc. Bengal 21: 38. 1853. — *Blumea fontinalis* Edgw. l.c. 21: 173. 1853. — *Blumea leptoclada* Dalz & Gibs. Bomb. Fl. 125. 1861, *non* DC. — *Blumea thyrsoides* Sch.-Bip. Bot. Zeit. 24: 166. 1866.

Herbs, 18—100 cm in height. *Stems* simple or more often branched, erect, terete, tomentose to densely velutinous with silky whitish hairs, glandular trichomes usually present, the stems sometimes glabrate. *Leaves* 3—15 cm long, 1.2—5.4 cm wide, sessile or petiolate (petioles, when present, up to 12 mm long), elliptic-oblong to obovate-oblong, entire or lyrate-lobed to varying degrees, tomentose to velutinous on the upper surface, tomentose to woolly on the lower, glands present or not, the laminar surfaces rarely glabrate, the apex acute, obtuse or apiculate, the base acute or prolonged tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* arranged in axillary and terminal, dense to lax panicles, pedunculate, 5.0—6.5 mm in diameter; peduncles up to 1 cm long, densely velutinous. *Involucre* with the phyllaries slightly longer than the florets, herbaceous, entirely reflexed at maturity, 1—7 mm in length, linear,

tapering at the apex, densely velutinous on the dorsal surface with multicellular hairs and glands, ciliate on the margins and apices, the inner series with scarious margins. *Receptacle* 2—3 mm in diameter, convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3.0—4.5 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, 3—4 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* brown, oblong, subangulate, terete, sparsely hairy. *Pappus* white, up to 4 mm long.

Type specimen: *Burm. f.* (G).

Type locality: Java.

Flowers: Throughout the year.

Distribution and Habitat: Africa, S. E. Asia from India to the Ryukyus and New Guinea to Northern Australia and Guam. Growing in dry fields, in grasslands, by roadsides, in open places and along the edges of forests at altitudes from 10 to 1400 m above sea level.

Specimens examined:

CAPE VERDE ISLANDS. *Chevalier 45421* (P); *Lowe s.n.* (GH, K); *St. Hilaire s.n.* (P). AFRICA. Angola: *Gossweiler 1220* (P). Belgian Congo: *coll. illegible 4556* (GH). Eritrea: *Pappi 247* (GH); *Schimper 810* (US). Gambia: *Pirie 44* (K). Katanga: *No coll. 28* (GH), *29* (GH). Lagos, W.: *Rouland s.n.* (P). Mombasa: *Schlechter 11693* (P). Natal: *Drège s.n.* (GH, L, NY, P); *Schimper (Drège) 213* (P, type collection of *B. dregeana*). Niger: *Barter 1164* (GH). Nyasaland: *Whyte s.n.* (P). Oubangi: *Chevalier 7399* (P). Rhodesia: *Shantz 40* (US). Senegal: *Heudelot 10* (P), *670* (P), *677 bis* (P), *s.n.* (P). Sierra Leone: *Thomas 8874* (K). Uganda: *Mearns 5043* (US). Central Africa: *Schweinfurth 1149* (P), *1250* (P), *2808* (P).

REUNION ISLANDS. *Pourret s.n.* (P).

CEYLON. *Brodie s.n.* (E); *Gardner 1216* (K); *Simpson 8529* (NY); *Thwaites 1734* (P), *1735* (GH); *No data* (CAL, DD).

PAKISTAN. Bengal: *Badul Khan 462* (CAL, E); *Cowan 234* (E), *276* (E), *2233* (E), *2235* (E), *s.n.* (E); *Hooker & Thomson s.n.* (GH, L). Punjab: *Stewart s.n.* (NY).

INDIA. Assam: *Badul Khan 106* (CAL), *129* (CAL); *Bor 16090* (DD, GH); *Burkill 36996* (CAL); *Chatterjee s.n.* (P); *Clarke 37659* (US), *38072 A, G* (CAL, US); *Gammie 288* (CAL), *294* (CAL); *Jenkins s.n.* (DD); *Mann s.n.* (CAL); *Simons s.n.* (DD); *Watt 5823* (CAL); *No coll. 247* (DD), *406* (DD); *No data* (U). Bengal: *Clarke 16820* (CAL), *21713* (CAL), *27031* (CAL), *33375 A* (CAL), *33376 C* (DD), *33461* (CAL), *34819 C* (DD); *Gamble 7727* (CAL, DD), *5833 A* (K); *Griffith 3157/1* (GH, K, L); *Hooker & Thomson s.n.* (GH); *ex Hort. Bot. Calo.* (L); *Klatt s.n.?* (L); *Kurz s.n.* (CAL, DD); *Sinclair 3867* (E); *Wallich 3045/156* (E). Bihar: *Campbell s.n.* (CAL); *Madden 502* (E). Bombay: *Bor 9664* (DD); *Dalzell s.n.* (K); *Law s.n.* (K); *Ritchie 402* (E); *Santapau 538?* (BLAT), *16515* (BLAT), *17493* (BLAT), *17893* (BLAT), *18147* (BLAT); *Sedgewick 2199* (BLAT); *Stocks, Law s.n.* (E, GH). Madhya Pradesh: *Beddome s.n.* (CAL); *Duthie 10433* (DD). Madras: *Bembower 43* (MO, NY); *Bourne s.n.* (K); *Cole 57* (K), *67* (K), *72* (K), *94* (K), *113* (K); *Fischer 128* (CAL); *Goughs s.n.* (GH); *Hooker & Thomson s.n.* (CAL, E, L, NY, U); *Leschenault 146* (P); *Mace s.n.* (P); *Mairet 1033* (E, GH, P), *2145* (GH, L, P); *Narayana s.n.* (NY); *Prasad s.n.* (DD); *Richard 62* (P), *69* (P); *Schmid s.n.* (GH, P); *Vaid 23278* (DD); *Wight 442* (E), *525* (E), *530* (E), *1429* (E, GH, NY), *1432* (E), *1578?* (GH); *Yeshoda 483* (NY); *No coll. 536* (CAL), *s.n.* (L). Mysore: *Wight s.n.* (E). Orissa: *Haines 4895* (K); *Mooney 935* (K). Oudh: *Wallich 3082/192 C* (E). Rajasthan: *Parry s.n.* (CAL). Travencore: *Bourne s.n.* (K); *Calder & Ramaswamy 1282* (CAL). Utter Pradesh: *Gamble 23446* (DD); *Gill 566* (CAL); *Inayat 22233* (DD), *22255* (CAL, DD); *Jameson s.n.* (DD); *No data* (D). E. Himalayas: *Biswas 5467* (GH). No locality: *Clarke 34883 A, C* (CAL, DD); *Cleghorn s.n.* (E); *Dalzell s.n.* (DD); *Debbarman 647* (CAL); *Franquetville s.n.* (P); *Prairn s.n.* (CAL); *Wallich 3089/199* (GH, darwing and fragment, type collection of *C. heyneana*); *No data* (GH, drawings and fragments of type collection of

C. lacera. Andaman Islands: *Heinig 516/683* (DD); *King's coll. s.n.* (CAL). Nicobar Islands: *Kurz s.n.* (CAL).

BURMA. *Kurz 913/6* (CAL); *Mason 759* (DD); *Po Khant 1132* (DD).

MALAYA. *Cuming 2441* (K); *Curtis 1699* (CAL); *Griffith s.n.* (K); *Murton 129* (K); *Bidley 14911* (K); *No coll. 1494* (CAL).

INDOCHINA. Annam: *Coudere s.n.* (K); *Pételet 3775* (GH, NY), *6540* (GH). Cambodia: *Geoffray 417* (P). Laos: *Pételet 5542* (GH). Tonkin: *Balansa 4392* (MO, NY); *Pételet 1125* (UC), *1129* (P), *2085* (GH, NY). No locality: *Eberhardt 4804* (F).

COCHINCHINA. *Debeaux 219* (US); *Pierre 1103* (P), *s.n.* (GH); *Squires 293* (K); *Talmy 64* (K).

SIAM. *Didriksen s.n.* (GH); *Haniff & Nur 4054* (K); *Hosseus 482* (P); *Kerr 3945* (K), *6735* (K), *6737* (K, P); *Schomburgk 150* (K).

CHINA. Chekiang: *Ling 2873* (NY). Fukien: *Chung 2841* (GH, UC). Hainan: *How 70531* (GH, K, NY, US), *71410* (GH). Kwangtung: *Morse 209* (K); *Wright s.n.* (US). Kweichow: *Cavalerie 2766* (UC), *3698* (P). Szechwan: *Faber 262/408* (HK, NY). Yunnan: *Cavalerie 2766* (K); *Henry 10863* (HK, NY); *Maire s.n.* (GH). No locality: *Bodinier 1578* (P, type collection of *B. bodinieri*); *Iwan s.n.* (GH); *Krone s.n.* (P); *No coll. 8591* (HK).

FORMOSA. *Faurie 396* (P); *Henry 674/1727* (NY), *1198* (HK, MO, NY, US); *Playfair 348* (NY); *Sasaki 21409* (UC); *Tanaka 11* (US); *Tanaki & Shimada 11139* (L, MO, NY, UC, US); *Yamamoto 2509* (NY).

RYUKYUS. *Boehmer 31* (NY); *Fosberg 37819* (MICH) *Kawagoe s.n.* (US); *Walker & Tawad 6815* (US), *6846* (US).

PHILIPPINES. Alabat: *Bur. Sci. 48325 Ramos & Edaña* (UC). Batan: *Bur. Sci. 80355 Ramos* (GH). Camiguin: *Bur. Sci. 79115 Edaña* (GH). Culion: *Merrill 672* (GH, K, NY, US). Luzon: *For. Bur. 16488 Bacani?* (US); *Barthe s.n.* (P); *Bernhardt s.n.* (K); *Clemens 5954* (UC), *19027?* (NY); *Convocar 2950* (GH); *Cuming 1663* (K, P); *Loher 3653* (US); *Bur. Sci. 11365 McGregor* (US); *Merrill 27* (US), *997* (US), *1296?* (US), *1428* (US), *5076* (NY, P, US); *Ramos 2086* (GH, L, MO, NY); *Bur. Sci. 27243 Ramos* (US), *27507* (US); *Bur. Sci. 37668 Ramos & Edaña* (US), *38006* (US), *45087* (NY, UC), *45313* (UC); *Topping 85* (US); *Vanoverbergh 1100* (K); *Warburg 11550* (NY); *Williams 1797* (NY), *2019* (NY). Mindanao: *Bur. Sci. 26017 Fenix* (US); *Bur. Sci. 39213 Ramos & Edaña* (US); *Warburg 14313* (NY). Mindoro: *Conklin 17592* (K); *Bur. Sci. 39516 Ramos* (US). Negros: *Merrill 208* (U, US). Palawan: *Elmer 13248* (GH, MO, NY). Panay: *Cuming 1663* (K), *1664* (K); *Bur. Sci. 18075 Robinson* (US), *18096* (US). Samar: *Bur. Sci. 24735 Edaña* (US).

INDONESIA. Amboina: *Robinson 415* (L, US). Borneo: *Motley 388* (K). Celebes: *Eyma 397* (U); *Robinson 2458* (US). Java: *Backer 17648* (L); *Bakhuizen van den Brink 937* (U), *3004* (U), *3984* (L), *4852* (L), *6337* (U), *6949* (L); *Blume s.n.* (L, P, type collection of *C. javanica*); *Boerlage s.n.* (L); *Buyzman 82* (U); *Coert 398* (L); *Denker 738* (L); *Dokters van Leeuwen s.n.* (U); *Le Guillou s.n.* (P); *van Harreveld s.n.* (L); *Hallier 163b, c* (K, L), *s.n.* (L); *Holstvoogd 419a* (L), *4850* (L), *509a* (L); *Horsfield 19* (K); *Howing 44* (L), *841* (L), *842* (L), *s.n.* (L); *Junghuhn 342* (L), *s.n.* (L, U); *Karsten 4* (L); *Kievits 2778* (L), *3386* (L); *Kooper 6* (L), *44* (L), *79* (L), *507* (L), *s.n.* (L); *Koorders 24523* β (L), *24901* β (L), *27860* β (L), *31295* β (L); *Kuntze 4218* (NY), *4248* (NY), *4345* (NY); *Leschenault s.n.* (P); *van der Meer & den Hoed 711* (L); *Popta 466/139* (L); *Raap 328* (L), *337* (L); *Radermacher s.n.* (L); *Schiffner 2342* (L), *2875* (L); *van Steenis 10555* (GH, L); *Teysman 1569* (GH); *Waltz s.n.* (L); *Winckel s.n.* (L); *Winterbottom s.n.* (K); *Zollinger 25* (GH, K), *221* (K, L, P), *305* (K, L), *337* (L), *371* (P), *816* (L), *1098* (P), *1247* (P), *2930* (P); *No coll. 23* (L), *47* (L), *977* (L); *No data* (L, U). Lombok: *Elbert 540* (L), *534* (L). Princes Islands: *van Borssum Waalkes 639* (K, L). Soemba: *Grevenstuk 7* (GH). Sumatra: *Bartlett 6399* (MICH, US), *7799* (MICH); *Cuming 2441* (K); *Lörzing 13043* (P); *Bidley s.n.* (K); *Schiffner 2750* (L); *Toroos 1051* (NY), *2121* (NY, UC, US), *2598* (NY, US), *4232* (NY, UC), *5118* (MICH, NY, US); *No data* (L). Timor: *No data* (GH), probably type collection of *B. musra*; *Baudin s.n.* (P, type collection of *B. timorensis*); *Bédél s.n.* (K). Malay Archipelago: *W. s.n.* (L).

NEW GUINEA. *Brass 6351* (GH), *11658* (L); *Clemens 10759 F* (GH, MICH); *Fryar 3646* (L); *Hollrung 871* (K); *Koch s.n.* (L); *Sawyer 183* (GH); *Versteeg 1844* (K). Bismark Archipelago: *Warburg 21747* (GH).

ARU ISLAND: *Lebrun 3715* (NY).

MARIANAS. Guam: *Rodin 540* (UC).

AUSTRALIA. *Brown 2096* (K); *Dietrich 2280* (GH), *2449* (GH), *2500* (GH); *Moore s.n.* (K); *von Mueller s.n.* (K, L, MICH); *Strange s.n.* (K).

Affinities and Remarks: Related to *Blumea mollis* and *B. hieraciifolia*. For a discussion of its relationships see remarks under those species.

Blumea lacera is the most widespread and definitely the most variable species of the genus. A great degree of diversity is exhibited by its vegetative organs in the lobing of the leaves, the relative amount of pubescence, and the degree of compactness and laxity of the panicles. At least up to 10 varieties have been recognized in the literature based on these variations. In the present treatment, however, the entire assemblage is treated as one unit since the differences between them do not appear to be adequate enough to distinguish these subspecific categories.

Blumea lacera has also been reported to hybridize with other species. *Blumea intermedia* Koster according to her (1941) is a hybrid between *B. lacera* and *B. riparia* DC. It possibly also hybridizes with *B. mollis* where the ranges of the two species overlap.

31. *Blumea barbata* DC. in Wight, Contrib. Bot. Ind. 14. 1834. Specific epithet referring to the indumentum of long, stiff hairs.

Herbs, 20—50 cm in height. *Stems* reddish-brown, generally simple, erect, strigose or pilose with spreading, multicellular hairs particularly in the younger parts. *Leaves* more or less sessile, 2—11 cm long, 0.8—3.2 cm wide, elliptic-oblong to obovate-oblong, strigose on the upper surface with prominent-based hairs, densely velutinous-woolly on the lower with white, cottony hairs, the apex apiculate, the margins serrate with apiculate teeth, the base tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in terminal and axillary, small, lax, corymbose panicles, pedunculate, 4—6 mm in diameter; peduncles up to 15 mm long, pilose. *Involucre* with the phyllaries slightly longer than the florets, herbaceous, entirely reflexed at maturity, 1—6 mm in length, linear, tapering, pubescent on the dorsal surface with multicellular hairs and stipitate glands, the inner with scarious margins. *Receptacle* 1.0—1.5 mm in diameter, convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3.5—4.0 mm long, with 5 ovate, papillate lobes that are pubescent with unicellular hairs and colleters; those of the female florets filiform, up to 3.5 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* brown, oblong, sparsely pubescent, ribbed. *Pappus* white, up to 4 mm long.

Type specimen: *Wight 1426* (K).

Type locality: Peninsular India.

Flowers: December—February.

Distribution and Habitat: South India and Ceylon. Growing in evergreen forests in cool places at altitudes up to 1500 m above sea level.

Specimens examined:

INDIA. Madras: *Meebold 12099* (CAL). Travencore: *Lawson 242* (CAL); *Rama*

Rao 689 (DD); Wright 428 (E, K), 1426 (E, K, type collection), 1573 (K); s.n. (K).
No locality: *Beddome s.n.* (CAL).

CEYLON. Thwaites C. P. 1751 (GH).

Affinities: *Blumea barbata* is related to *B. lacera* and *B. hieraciifolia*. From the former it differs in its strigose indumentum, its lax panicles and its ribbed achenes whereas from the latter it may be distinguished by its narrowly linear phyllaries, smaller capitula and lax panicles.

32. *Blumea manillensis* (Less.) DC. Prodr. 5: 435. 1836. Specific epithet after the type locality. — *Conyza manillensis* Less. *Linnaea* 6: 135. 1831.

Herbs, 15—50 cm in height. *Stems* simple except for the inflorescence branches, erect, terete, sparsely pilose with long white hairs and scattered stipitate glands. *Leaves* mostly radical and a few cauline, the radical ones rosulate, 3—10 cm long, 1.5—3.0 cm broad, obovate to obovate-oblongate, strigose on both surfaces with multicellular hairs, the lower surface paler, the apex acute to apiculate, the margins serrate-dentate with apiculate teeth, lyrate-lyrate lobed, the base tapering, semiamplexicaulous; those on the stem smaller, few, distant, more or less entire; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in terminal, simple or paniculate racemes, the heads ultimately either solitary and pedunculate or in clusters of 2 to 3, the younger ones more or less sessile, 4—5 mm in diameter. *Involucre* with the phyllaries slightly longer than the florets, herbaceous, sometimes purplish tinged, 1—5 mm in length, linear, acute, with scarious margins, pubescent on the back with multicellular hairs and colleters. *Receptacle* 1—2 mm in diameter, flat, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 2.5—3.5 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and occasional unicellular hairs; those of the female florets filiform, up to 2 mm long, 3-lobed, the lobes with colleters. *Anther* tails shorter than the thickened portion of the filament. *Achenes* brown, oblong, with 5 pale ribs, pubescent. *Pappus* white, up to 3.5 mm long.

Type specimen: *de Chamisso s.n.* (W).

Type locality: Philippines, Luzon.

Flowers: January—March.

Distribution: Restricted to Luzon.

Specimens examined:

PHILIPPINES. Luzon: *de Chamisso s.n.* (GH, fragment and drawing of type collection); *Cuming 1038* (L, P); *Foxworthy 92* (GH, US); *Loher 3646* (US); *Merrill 5052* (L, NY, P, US), *10642* (HK, K, L, NY, US); *Bur. Sci. 27224 Ramos* (NY, P, US).

Affinities: De Candolle suggests affinities with *Blumea wightiana* var. γ (synonymous with *B. mollis*). However, *B. manillensis* appears to be more closely related to *B. sessiliflora*. Anatomically, and in their types of inflorescences, the two are extremely similar. They can be distinguished by the fact that *B. manillensis* has fewer capitula and predominantly radical leaves that are semiamplexicaulous at the base, whereas *B. sessiliflora* has numerous capitula and predominantly cauline leaves that are tapering at the abse.

33. *Blumea napifolia* DC. Prodr. 5: 440. 1836. Species name referring to the shape of the leaves (*napus*, turnip). — *Conyza napifolia* Wall. Cat. no. 3075. comp. no. 185. 1831, *n. n.*

Herbs, 15—70 cm in height. *Stems* branched, erect, terete, subglabrate at the base, densely puberulous with numerous colleters above, especially on the inflorescence axes. *Leaves* 1—12 cm long, 0.5—5.6 cm wide, the lower ones distinctly petiolate (petioles up to 3 cm long), the upper sessile, obovate, the upper ones entire, the lower lyrate-lobed with the terminal lobe more or less orbicular, the lateral lobes considerably smaller, linear-oblong, all sparsely pilose on the upper surface, puberulous on the lower with multicellular hairs and colleters, the apex obtuse-apiculate, the margins dentate with broadly triangular, apiculate teeth, the base tapering; epidermal cells with sinuate walls, the stomata on both faces. *Capitula* at the ends of axillary branches, clustered, ultimately disposed into a lax panicle, pedunculate, 3—5 mm in diameter; peduncles up to 15 mm long, densely glandular, elongating in fruit. *Involucre* with the phyllaries longer than the florets, entirely reflexed at maturity, 1—5 mm long, linear, tapering, puberulous on the dorsal surface with numerous colleters, the inner series with broad, scarious margins. *Receptacle* 1—2 mm in diameter, flat, alveolate, glabrous. *Corollas* orange-yellow, tubular; those of the bisexual florets 3—5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters; those of the female florets filiform, 2—3 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* brown, oblong, sparsely pubescent, 5-ribbed. *Pappus* white, up to 3 mm long.

Type specimen: *Wallich 3075/185* (K).

Type locality: Burma, Tavoy.

Flowers: January and February.

Distribution and Habitat: Eastern India, Burma, Indochina, Hainan. Growing in open scrub areas, grasslands and hillslopes at altitudes from sea level to 350 m above.

Specimens examined:

INDIA. Bengal: *Sinclair 3960* (E).

BURMA. *Forrest 12153* (L), *13618* (E); *McClelland s.n.* (K); *Po Khant 1130* (DD); *Wallich 3075/185* (GH, K, fragment of type collection); *Walker-Arnott 980* (CAL, E).

MALAYA. *Ridley 14901* (K).

INDOCHINA. Hue: *Squires 119* (MICH, UC). Laos: *Pételot 2059* (GH).

COCHINCHINA. *Didriksen s.n.* (GH); *Harmand 893* (P); *Pierre 1063* (GH, UC, US); *Talmy s.n.* (NY).

SIAM. *Didriksen s.n.* (GH); *Kerr 4370* (P), *3923* (K), *13790* (P); *Put 2629* (L, P), *Schmidt 161* (K), *Smith 365* (K); *Zimmermann 99* (L, MO, U, US).

CHINA. Hainan: *Hou & Chun 70049* (GH, K, US), *70191* (GH, NY, P, US).

No LOCALITY. *Lefèvre 891* (P).

Affinities: This species is closely related to *Blumea membranacea* from which it differs principally in its leaf form with the terminal lobe almost orbicular and in its panicles with fewer heads.

34. *Blumea membranacea* DC. Prodr. 5: 440. 1836. Species name describing the membranous leaves. — *Conyza membranacea* Wall. Cat. no. 3019. comp. no. 129. 1831, *n. n.* — *Blumea paucifolia* DC. Prodr. 5:

440. 1836. — *Blumea muralis* DC. Prodr. 5: 440. 1836. — *Conyza muralis* Wall. Cat. no. 3077. comp. no. 187. 1831, *n. n.* — *Blumea viscosula* DC. Prodr. 5: 441. 1836. — *Blumea visculosa* DC. *β hispidula* DC. Prodr. 5: 441. 1836. — *Conyza viscosula* Wall. Cat. no. 3081. comp. no. 191. 1831, *n. n.* — *Blumea subsimplex* DC. Prodr. 5: 441. 1836. — *Conyza subsimplex* Wall. Cat. no. 3003. comp. no. 113. 1831, *n. n.* — *Conyza paniculata* Willd. Sp. Pl. 3: 1920. 1797, *fide* Spreng. (*in litt. ad Wallich sed descr. non rite quadrat*). — *Blumea senecioides* DC. Prodr. 5: 439. 1836. — *Conyza senecioides* Ham. *in* Wall. Cat. no. 3012. comp. no. 212. 1831, *n. n.* — *Blumea glandulosa* Thw. Enum. Ceyl. Pl. 163. 1864, *non* DC. — *Blumea hispidula* DC. *ex* C. B. Clarke *in* Hook. f. Fl. Brit. Ind. 3: 267. 1882. — *Blumea balansae* Gagnep. Bull. Soc. Bot. France 68: 41. 1921.

Herbs, 15—150 cm in height. *Stems* simple (except for the inflorescence branches) or branched from the base, erect, terete, pilose with multicellular hairs and glands particularly in the younger parts and on the inflorescence axes. *Leaves* 4—18 cm long, 1.5—6.0 cm wide, the upper sessile, the lower petiolate (petioles up to 2 cm long), ovate-lanceolate to obovate-lanceolate, the upper ones entire, the lower distinctly lyrate-lyobed with the terminal lobe elliptic-ovate and the lateral ones more or less triangular, all pilose on both surfaces, the apex acute, the margins serrate-dentate, the base prolonged tapering in the lower leaves, acute in the upper; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in terminal, large or small, lax panicles, pedunculate or subsessile and clustered at the ends of the branches, 5—8 mm in diameter; peduncles up to 3 cm long, pilose with multicellular hairs and glands, bracteolate. *Involucre* with the phyllaries somewhat purplish-tinged, slightly longer than the florets, entirely reflexed at maturity, 1—9 mm in length, linear, tapering, pubescent outside with multicellular hairs and colleters or stipitate glands, the inner series with distinctly scarious margins. *Receptacle* 2—4 mm in diameter, flat or slightly convex, alveolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 4.5—5.5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with unicellular hairs and colleters; those of the female florets filiform, 4—5 mm long, 2 to 3 lobed, glabrous. *Anther* tails equal in length to or slightly longer than the thickened portion of the filament. *Achenes* oblong, brown, ribbed, pubescent. *Pappus* white, up to 5 mm long.

Blumea membranacea like *B. lacera* also has several described varieties based on differences in panicle size and density, type of pubescence, etc.; these traditional varieties have not been recognized in this treatment. The group, however, is subdivided here into 2 other varieties.

var. *membranacea*.

Heads 5—7 mm in diameter. *Phyllaries* herbaceous. Plants pilose and slender.

Type specimen: *Wallich 3019/129* (K).

Type locality: Burma, Prome.

Flowers: August—May.

Distribution and Habitat: India, Pakistan, Burma, Ceylon, Indochina, China, Indonesia. Growing in forests and along streams at altitudes up to 1800 m above sea level.

Specimens examined:

INDIA. Assam: *Bor 16065* (DD); *Burkill 36630* (CAL); *Chatterjee s.n.* (CAL); *Clarke 37209 A* (US); *43055 B* (CAL), *43273* (CAL), *s.n.* (CAL); *Fischer s.n.* (CAL); *Gommie 215?* (CAL); *Hack 550* (CAL); *Jenkins s.n.* (DD, E); *Meebold 7560* (K). Bengal: *Clarke 26965 A* (CAL), *27009 D* (CAL, K), *27016* (K), *33362 B* (CAL, DD); *Edgeworth 5003* (K), *5010* (K); *Gamble 10136* (CAL); *Boy 64 K* (DD); *Wallich 3077/187* (GH, type collection of *B. muralis*). Bihar: *Clarke 14074 B* (CAL), *24998 D* (CAL), *24788 F* (DD), *s.n.* (CAL); *Hooker s.n.* (K). Bombay: *Dalzell s.n.* (K); *Kuntze 7617* (NY); *Law s.n.* (E, K); *Randeria AR 594* (BLAT), *AR 600* (BLAT); *Santapau 3208* (BLAT), *5868* (BLAT), *8057* (K), *12753* (BLAT), *12755* (BLAT); *Ritchie 345* (E), *395* (K); *Stocks, Law s.n.* (K, NY). Chota Nagpur: *Gamble 10136* (K). Himachal Pradesh: *Clarke 23637 A* (K). Hyderabad, Deccan: *Saksena s.n.* (DD). Madhya Pradesh: *Duthie 8314* (CAL), *8315* (DD), *8321* (DD), *9528* (DD), *10428* (DD), *10429* (CAL, DD); *Witt 24* (DD). Madras: *Barnes s.n.* (DD); *Bourne 1120* (K), *1187* (K), *1515* (K), *2065* (K); *Clarke 10736 B* (CAL); *Cleghorn s.n.* (E); *Fischer 865* (CAL), *919* (CAL), *1802* (CAL), *4425* (CAL); *Gamble 11304* (CAL, K), *13844* (CAL, K); *Meebold 8434* (CAL); *Richard s.n.?* (P); *Sauliere 142* (NY, UC); *Wight 524* (E, NY), *526* (E), *576* (GH), *1574* (K), *1576* (K), *1577* (K), *s.n.* (CAL). Mysore: *Anglade 913* (K); *Thomson s.n.* (GH). Orissa: *Haines 538* (CAL, K), *4832* (K); *Mooney 2021* (DD, K), *2198* (DD, K); *No coll. 124* (DD). Rajasthan: *McCann 1945* (K). Saurashtra: *Santapau 15063* (BLAT), *15188* (BLAT). Uttar Pradesh: *Bell 58 D* (DD, K); *Duthie 6420* (CAL), *6975* (DD); *Gamble 22534* (CAL, K), *24009* (DD, K), *27510* (K), *25300* (K), *25306* (K); *Inayat 22232* (DD), *22232a* (DD), *22241* (CAL, DD); *Madden 9* (K); *No data* (DD). No locality: *Burkill 32631* (CAL); *Cleghorn s.n.* (E); *Dalzell 239?* (DD); *Hamilton 1893* (E, type collection of *B. senecioides*), *1900* (E); *Harsukh 23112* (DD); *Jacquemont 63* (K, P); *Madden 507* (E).

SIKKIM. *Hooker s.n.* (GH, P); *Modder 64* (CAL).

PAKISTAN. *Clarke 16910 E* (CAL, K); *Gamble 6742 B* (CAL), *7758* (CAL); *Griffith 3155* (K); *Lister 27* (CAL); *Wallich 3003/113* (E, GH, K, type collection of *B. sub-simpler*), *3037/147a* (E).

CEYLON. *Thuwaites C. P. 560* (CAL, GH), *2822* (P); *Walker s.n.* (E).

ANDAMAN ISLANDS. *Batoshi 9070* (DD); *King's coll. s.n.* (US); *Lawrie 11853* (DD); *Prairie s.n.* (CAL).

BURMA. *Bor 114* (DD); *Collett 17* (CAL); *Griffith 980* (K); *Kurz 904* (CAL), *905* (CAL), *907* (CAL), *2242* (CAL), *s.n.* (CAL); *MacGregor 1155* (E); *Mason 756* (DD); *McClelland s.n.* (K); *Meebold 14068* (CAL), *17309* (CAL); *Po Khant 3* (GH); *Rogers 935* (E), *936* (E); *Shaik Mokim 793* (CAL); *Wallich 3019/129* (GH, K, drawing and fragment of type collection); *Walker-Arnott 931?* (E).

MALAYA. *Henderson 29120* (K); *Ridley 8310* (K), *s.n.* (K).

INDONESIA. Borneo: *Clemens & Clemens 21437* (NY).

INDOCHINA. Tonkin: *Balansa 3022* (P, type collection of *B. balansae*), *4790* (GH, K, NY, P, UC, US); *Pételot 399* (P, US), *451* (NY), *1217* (UC). Hue: *Squires 312* (NY, UC, US).

SIAM. *Kerr 941* (P), *16415* (K); *Lindhard 57* (K); *Smith 299* (K).

CHINA. Hainan: *Lau 1146* (NY, P); *Tang & Fung 17998* (NY). Kwangtung: *Dunn 5772* (HK). Yunnan: *Forrest 13618* (K); *Henry 12954* (US), *12954 A* (NY).

FORMOSA. *No coll. 230?* (HK).

var. *jacquemontii* (Hook. f.) *Randeria* comb. nov. — *Blumea jacquemontii* Hook. f. Fl. Brit. Ind. 3: 265. 1882. — *Blumea kingii* Clarke ex Hook. f. Fl. Brit. Ind. 3: 265. 1882. — *Blumea obovata* Clarke, Comp. Ind. 7. 1876, non DC.

Heads 7—8 mm in diameter. *Phyllaries* rigid. Plants more or less strigose and robust.

Type specimen: *Hooker 386* (K).

Type locality: India, Bihar State.

Flowers: January—April.

Distribution and Habitat: Restricted to India. Growing in forests in shady localities at altitudes up to 1500 m above sea level.

Specimens examined:

INDIA. Bengal: *Griffith 3153* (K). Bihar: *Campbell s.n.* (CAL); *Clarke 14034 B* (CAL, K); *14056 C* (CAL), *34677 B* (DD), *34705 B* (US); *Hooker 386* (K, type collection); *No data* (CAL). Bombay: *Lambert s.n.* (K); *Saaton 702* (CAL). Madhya Pradesh: *Hole 120* (CAL, DD). Madras: *Barnes 509, 606* (GH); *Clarke 11275* (CAL, K), *10872 C* (K); *Fischer & Gage 44* (CAL); *Gamble 14127* (K), *15968* (K). Orissa: *Haines 4350* (K); *Mooney 2397, 3256* (DD). Rajasthan: *McCann 1923* (K). Uttar Pradesh: *Duthie 6971* (DD).

Affinities: *Blumea membranacea* is closely related to *B. virens* and *B. laciniata*. From the former, it is chiefly distinguished by its pubescence whereas from the latter it can be separated by its glabrous receptacles.

35. *Blumea virens* DC. in Wight, Contrib. Bot. Ind. 14. 1834. — *Conyza virens* Wall. Cat. no. 3037. comp. no. 147. 1831, *n. n.* — *Blumea lapsanoides* DC. in Wight, Contrib. Bot. Ind. 15. 1834. — *Blumea hymenophylla* DC. Prodr. 5: 440. 1836. — *Conyza hymenophylla* Wall. Cat. no. 3038. comp. no. 138. 1831, *n. n.* — *Blumea diffusa* Kurz, Jour. As. Soc. Bengal 46 (II): 187. 1877, *non* R. Br. *ex* Benth.

Herbs, 10—180 cm in height with a fibrous rootstock. Stems simple or branched, erect, terete, quite glabrous or rarely sparingly pilose. Leaves sessile, 3—22 cm long, 0.7—10.0 cm wide, the lower ones oblanceolate, lyrate lobed with the terminal lobe obovate and the lateral lobes broadly triangular to oblong, the margins serrate with apiculate teeth, the apex apiculate; the upper ones obovate to oblanceolate, lobed or not, apiculate-serrate with minute teeth, both surfaces glabrate or sparingly pilose; epidermal cells with sinuate walls, the stomata on both surfaces. Capitula usually in large, spreading, lax, terminal, leafy panicles, pedunculate, 5—7 mm in diameter; ultimate peduncles about 3 cm long, slender, bracteate, quite glabrous. Involucre with the phyllaries spreading, herbaceous, longer than the florets, entirely reflexed at maturity, 1.0—7.5 mm long, linear, mucronate, sparsely pilose on the dorsal surface with white, spreading hairs and colleters, the inner series with prominent scarious margins. Receptacle 2.0—2.5 mm in diameter, convex, alveolate, glabrous. Corollas yellow, tubular; those of the bisexual florets 4.5—5.0 mm long, with 5 triangular, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, 4.0—4.5 mm long, 2 to 3 lobed, glabrous. Anther tails somewhat longer than the thickened portion of the filament. Achenes pale brown, oblong-columnar, ribbed, sparsely hairy. Pappus white, up to 4 mm long.

Type specimen: *Wight 1430* (E).

Type locality: India, Negapatam.

Flowers: October—June.

Distribution and Habitat: N.E. and S. India, Ceylon, Burma, Malaya, Indochina, China and Philippines. Usually growing in dry places, either in open thickets or in dry, deciduous forests.

Specimens examined:

INDIA. Assam: *Masters s.n.* (DD, L). Bengal: *Clarke 6590, 19636 B* (CAL); *Helper 197* (E, L, NY, US); *Mukerji 3* (CAL). Bombay: *Dhruva 80* (CAL); *Ritchie 402/3* (K); *Santapan 18630* (BLAT); *Sedgewick 2487, 5926* (BLAT); *Sedgewick and Bell 3818* (CAL); *Stocks, Law s.n.* (L, U); *Thomson-Eclipse s.n.* (K). Madhya Pradesh: *Duthie 6420* (CAL), *8315* (DD). Madras: *Barber 5182* (CAL); *Bauran 2137* (CAL);

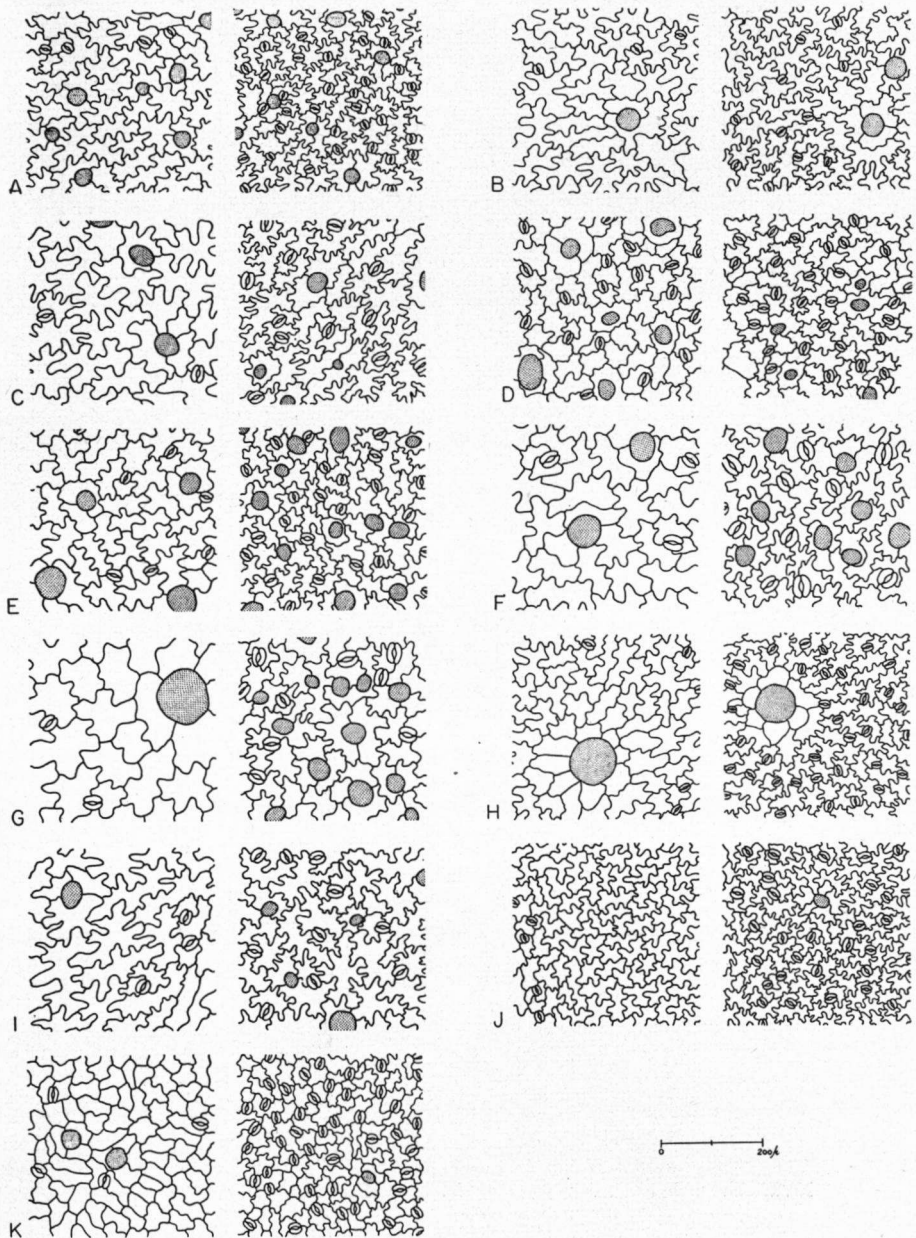


PLATE XVI. — Section Paniculatae. Leaf epidermal surfaces, upper to left, lower to right. A. *Blumea fistulosa* (Roxb.) Kurz, Nepal, *Wallich 3002/112* (E). B. *B. sessiliflora* Decsne., Timor, *Richard s.n.* (P, type collection). C. *B. laciniata* (Roxb.) DC., New Guinea, *Docters van Leeuwen 10600* (L). D. *B. adenophora* Franch., China, Kweichou, *Delavay 842* (P, type). E. *B. mollis* (D. Don) DC., Indochina, *Chevalier 2663* (P).

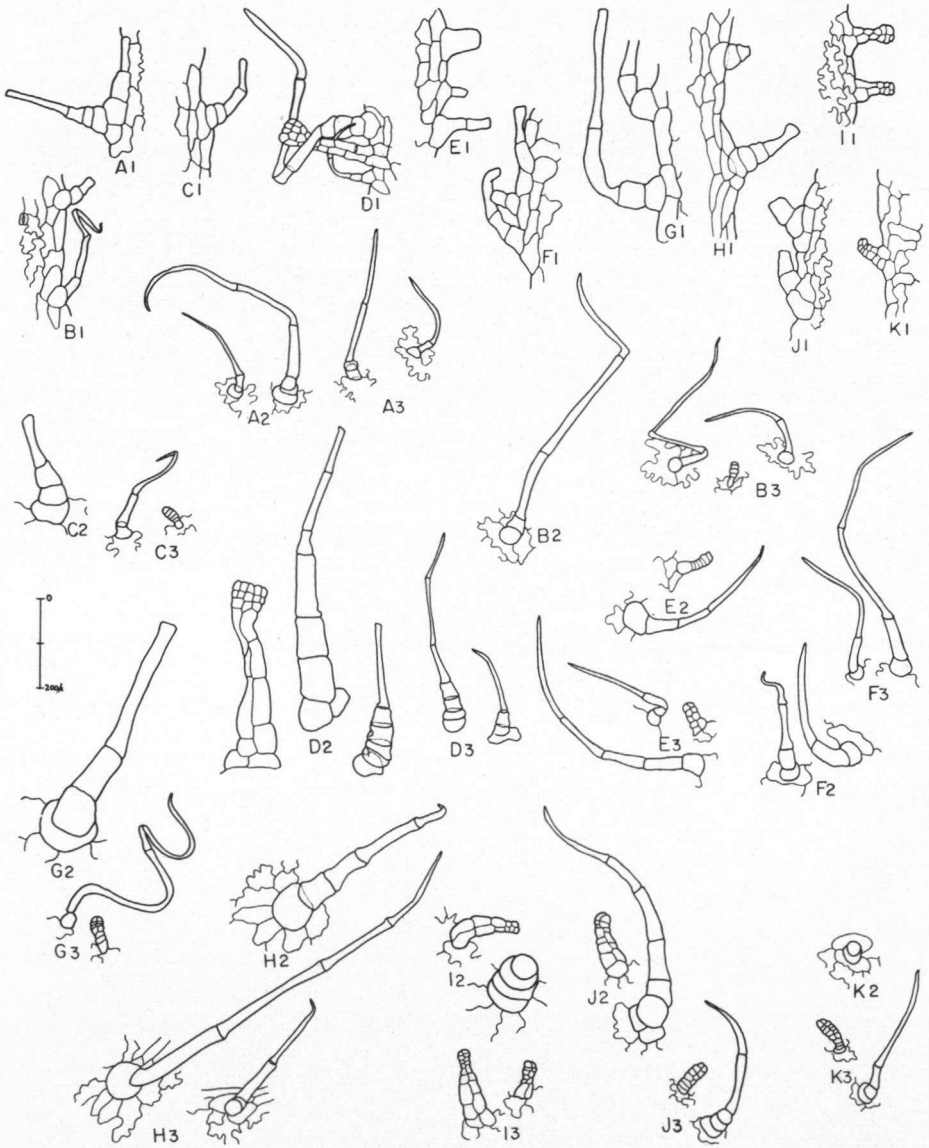


PLATE XVII. — Section *Paniculatae*. For explanation of A—K and voucher specimens see Plate XVI. In each case, 1 represents leaf margins, 2 trichomes on upper laminar surface, and 3 trichomes on lower laminar surface.

F. *B. lacera* (Burm. f.) DC., Java, Zollinger 305 (P). G. *B. barbata* DC., India, Wight 528 (E). H. *B. manillensis* (Less.) DC., Philippines, Luzon, Foxworthy 92 (US). I. *B. napifolia* (Wall.) DC., Siam, Zimmermann 99 (MO). J. *B. membranacea* (Wall.) DC., India, Wight 526 (E). K. *B. virens* (Wall.) DC., India, Wight 1430 (E, type collection).

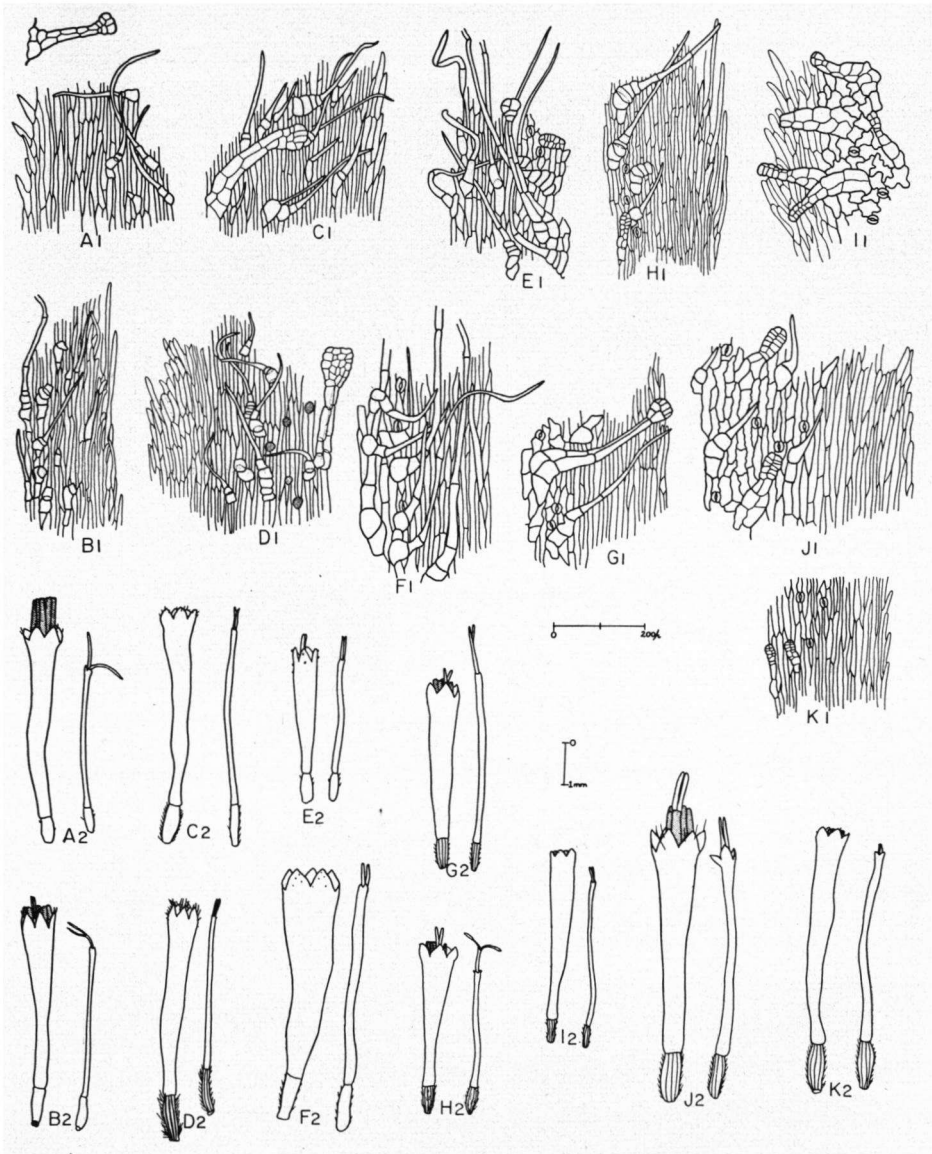


PLATE XVIII. — Section Paniculatae. For explanation of A—K and voucher specimens see Plate XVI. In each case, 1 represents portion of phyllary (dorsal surface), and 2 florets, bisexual to left, female to right.

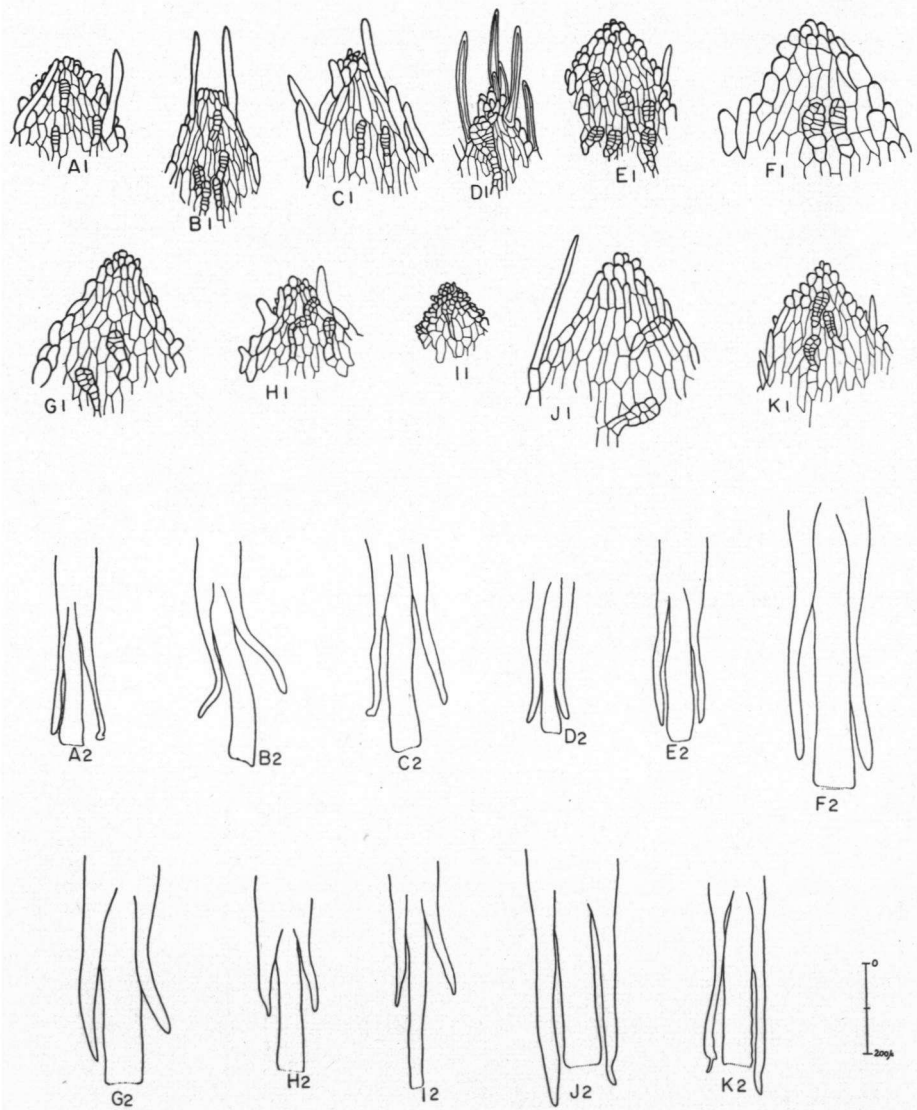


PLATE XIX. Section *Paniculatae*. For explanation of A—K and voucher specimens see Plate XVI. In each case, 1 represents corolla lobe of bisexual floret, and 2 anther tails.

Bourne 3554 (CAL, K); Fischer 1570, 1594 (CAL), 1618 (DD); Gamble 10939 (CAL), 13844, 14000 (DD); Hooker & Thomson s.n. (K); Wight 1563 (CAL, GH, K, L, NY, P), 1567 (K), 1575 (K), s.n. (K). Mysore: Meebold 8269 (CAL); B. O. 47 (DD). Orissa: Haines 4038 (K). Travencore: Meebold 795 (CAL); Yeshoda 482 (NY). Peninsular India: Wight 527 (E), 1430 (E, GH, K, NY, type collection), 1431 (CAL, E, K, UC, type collection of *B. lapsanoides*). No locality: Eoxburgh s.n. (E).

BHUTAN. King s.n. (CAL).

PAKISTAN. Hooker & Thomson s.n. (GH).

BURMA. Beddome 28 (K); Griffith 3155 (K, P); Khalil s.n. (CAL); Kurz 2247, s.n. (CAL); Toppin 4443 (CAL); Wallich 3088/148 (E, GH, K, type collection of *B. hymenophylla*).

ANDAMAN ISLANDS. King's coll. s.n. (CAL, GH); Prain s.n. (CAL); Prain's coll. s.n. (CAL, GH).

MALAYA. Kuntze 3626 (NY).

INDOCHINA. Annam: Pételot 3772 (NY, P, US); Poilane 9641 (P); Robinson 1314 (NY); Couderc s.n. (P). Laos: Pételot 3375 (NY, P, US).

COCHINCHINA. Pierre s.n. (GH, NY, UC, US).

SIAM. Kerr 6744, 10319 (P), 10535 (K), 16457 (K), 20421 (K); Marcan 3929 (K).

CHINA. Yunnan: Henry 10188 (K, MO, NY, US), 10188 bis (K).

PHILIPPINES. Luzon: Clemens 5959, 181916, s.n. (UC); Cuming 1023 (GH, L, MO, P), 1920 (K); Edaño 13038 (L); Elmer 5732 (HK, NY, US); Foxworthy 123 (US); Merrill 1214 (GH, L, MO, NY, P), 1456 (US); Bur. Sci. 17993 Otanes (US); Bur. Sci. 22451 Ramos (GH, NY, US), 27639 (NY, US); Bur. Sci. 19194 Reillo (L, US). Culion: Merrill 622 (GH, MO, NY, US).

Affinities: *Blumea virens* is very closely related to *B. membranacea* and differs from it in its glabrate, non-glandular habit.

Section 6. *Oxyodontae* (Plates XX & XXI).

1. Female florets few; phyllaries lanceolate; corollas of both bisexual and female florets with unicellular hairs in addition to colleters; connective appendage rounded at the apex 36. *B. belangeriana*
1. Female florets numerous; phyllaries linear; corollas of both bisexual and female florets with multicellular hairs in addition to colleters; connective appendage tapering at the apex.
2. Plants densely white-woolly; capitula terminal and fasciculate in the axils of the upper leaves 37. *B. malcolmii*
2. Plants silky but not white-woolly; capitula in pedunculate clusters arranged in panicles.
3. Erect herbs; corollas of bisexual and female florets pubescent on the lobes as well as the tubes 38. *B. eriantha*
3. Prostrate herbs; corollas of bisexual and female florets pubescent only on the lobes 39. *B. oxyodonta*

36. *Blumea belangeriana* DC. Prodr. 5: 444. 1836. Specific epithet after Belanger who first collected the material. — *Blumea metziana* Sch.-Bip. ex Hook. f. Fl. Brit. Ind. 3: 266. 1882.

Herbs, 0.3—2.0 m in height. *Stems* generally unbranched except for the inflorescence, erect, terete, reddish-brown, glabrate at the base, densely pilose with long, white, multicellular hairs and stipitate glands at the apex. *Leaves* subsessile, 1.6—15.5 cm long, 1—8 cm wide, obovate, the upper surface darker, strigose, the lower densely velutinous with white, silky hairs, the apex apiculate, the margins serrate-dentate with sharp teeth, the base more or less abruptly tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in dense, axillary and terminal leafy clusters, sessile or nearly so, 5—7 mm in diameter. *Involucre* with the

phyllaries longer than the florets, purple-tipped, entirely reflexed at maturity, 2—8 mm long, lanceolate, acute, more or less scarious, pubescent on the back with multicellular hairs and glands, ciliate on the margins. *Receptacle* 1.0—2.5 mm in diameter, convex, glabrous, alveolate. *Florets* relatively few in number, the central bisexual, the marginal female, few. *Corollas* yellow, tubular; those of the bisexual florets 4.5—5.0 mm long, with 5 broadly triangular, papillate lobes that are pubescent with unicellular hairs and colletes; those of the female florets filiform, 3.0—3.5 mm long, 2 to 3 lobed, pubescent with unicellular hairs on the lobes. *Anther* tails longer than the thickened portion of the filament. *Achenes* oblong, pale brown, terete, pubescent. *Pappus* white, 3—4 mm long.

Type specimen: *Belanger s.n.* (G-DC).

Type locality: India, Malabar Coast.

Flowers: November—April.

Distribution and Habitat: Endemic to the west coast of Peninsular India. Growing in shady places along stream beds, roadsides and forest margins at altitudes up to 600 m above sea level and rainfall up to 900 cm.

Specimens examined:

INDIA. Concan & Malabar Coasts: *Cole* 71 (K); *Dhillon s.n.* (DD); *Drew s.n.* (E); *Fischer* 2438, 3355 (CAL); *Kunize* 7618 (NY); *Law s.n.* (K); *Lawson s.n.* (K); *Lowrie* 83 (DD); *Meebold* 8442 (CAL); *Kaizada* 21038 (DD); *Rama Rao* 46 (CAL); *Randeria* 535 (BLAT); *Rémy* 14 (P); *Ritchie* 398 (K), *s.n.* (E); *Santapau* 161.57, 1453, 8665, 9851, 12572, 17492 (BLAT); *Schultz-Bipontinus* 777 (P); *Sedgewick* 3292 (BLAT), 3392 (CAL); *Stocks, Law s.n.* (E); *Talbot* 2652 (K); *Vaid* 23392 (DD); *Wight* 1564 (K).

Affinities: *Blumea belangeriana* is related to *B. eriantha*, *oxydonta*, and *malcolmii*. It is distinguishable from these by its leafy cluster of heads, purple-tipped phyllaries, and the reduced number of florets, especially the female.

37. *Blumea malcolmii* (Clarke) Hook. f. Fl. Brit. Ind. 3: 266. 1882. — *Pluchea malcolmii* Clarke, Comp. Ind. 95. 1876. — *Pluchea lanuginosa* Hook. f. Fl. Brit. Ind. 3: 266. 1882, *in syn.* — *Blumea lanuginosa* Law ex Cooke, Fl. Bombay 2: 23. 1908.

Stout, highly turpentine-scented herbs, 10—60 cm in height; roots fibrous with several, globose, woolly buds clustered at the crown. *Stems* often branched from the base, erect or ascending, terete, densely woolly with silky-white hairs. *Leaves* sessile, stiff and brittle, 1.6—12.5 cm long, 0.8—4.5 cm wide, obovate to oblanceolate, densely white-woolly on both surfaces, the upper becoming scabrous with age, the apex obtuse, the margins very closely and irregularly spinulose serrate, the base shortly tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* terminal and fasciculate or clustered in the axils of the upper leaves, subsessile to distinctly pedunculate, 7—10 mm in diameter; peduncles up to 2 cm long, densely woolly. *Involucre* with the phyllaries slightly longer than the florets, entirely reflexed at maturity, 2—8 mm in length, linear, acute, densely woolly on the dorsal surface, the margins long-ciliate. *Receptacle* 1.5—2.0 mm in diameter, convex, alveolate, glabrous. *Florets*

numerous, the central bisexual, the marginal female. *Corollas* yellow, tubular; those of the bisexual florets 4—5 mm long, with 5 triangular-ovate, sparsely papillate lobes, densely pubescent outside (tubes and particularly the lobes) with white, multicellular hairs; those of the female florets filiform, 3.5—4.0 mm long, 2 to 3 lobed, densely pubescent. *Anther* tails longer than the thickened portion of the filament. *Achenes* dark brown, shining, sparsely pubescent, somewhat angled. *Pappus* white, up to 4 mm long.

Type specimen: *Law s.n.* (K).

Type locality: India, Concan.

Flowers: November—April.

Distribution and Habitat: Narrow endemic occurring only in Bombay State. Generally growing on hillslopes at altitudes of up to 1350 m above sea level and rainfall up to 675 cm.

Specimens examined:

INDIA. Bombay; *Dalzell s.n.* (DD, K); *Kuntze 7533* (NY); *Law s.n.* (K, type); *McCann 1951* (K), *4149* (K); *Richard s.n.* (P); *Etichie s.n.* (E); *Santapau 8185, 13902* (BLAT); *Sedgewick 4632* (BLAT); *Stocks, Law s.n.* (P); *Wight s.n.* (E); *No data* (CAL).

Affinities: From *Blumea eriantha*, the present species is distinguished by the fact that *B. malcolmii* is densely silvery-woolly, its capitula are larger and often fasciculate whereas *B. eriantha* is not woolly, its capitula are smaller and generally pedunculate. In their extreme forms the two species are quite distinct and clear-cut. However, where they overlap, the boundaries between them become indistinct and all possible intermediate conditions occur. A list of such intermediates is given following the treatment of the next species.

38. *Blumea eriantha* DC. in Wight, Contrib. Bot. Ind. 15. 1834.

Perennial herbs, 10—100 cm in height; roots fibrous. Stems branched, the branches often dichotomously forked, erect, terete, reddish-yellow, pilose with long, white, silky hairs and stipitate glands particularly in the younger parts. *Leaves* 2—19 cm long, 0.6—6.0 cm wide, the lower shortly petiolate (petioles up to 1 cm long), obovate, the apex apiculate, the margins irregularly and closely spinulose-serrate, the base tapering; upper leaves sessile, often more or less cordate-clasping at the base, elliptic-ovate to oblanceolate, the apex apiculate, the margins spinulose-serrate; all densely silky-pilose on both surfaces when young, the upper surface becoming scabrous with age; epidermal cells with sinuate walls, the stomata on both faces. *Capitula* axillary and terminal, solitary or in few-headed clusters, pedunculate, 5—6 mm in diameter; peduncles up to 3.5 cm long, glandular, elongating in fruit. *Involucre* with the phyllaries herbaceous, slightly longer than the florets, completely reflexed at maturity, 1—7 mm long, linear, acute, pubescent on the back with multicellular hairs and glands, the margins scarious and ciliate. *Florets* numerous, the central usually with abortive anthers, rarely bisexual, the marginal female. *Corollas* yellow, tubular; those of the central florets 3.5—4.0 mm long, with 5 triangular-ovate, sparsely papillate lobes, densely pubescent outside with white, multicellular hairs, the lobes also with a few colleters; those of the female florets filiform, 3.0—3.5 mm long, 2 to 3 lobed, pubescent. *Anther* tails, when

present, longer than the thickened portion of the filament. *Achenes* brown, shining, very sparsely pilose, obscurely angled. *Pappus* white, up to 3.5 mm long.

Type specimen: *Wight 1435* (P).

Type locality: India, Madras.

Flowers: November—April.

Distribution and Habitat: Endemic to India. Growing in clumps in open forests and in fields.

Specimens examined:¹

INDIA. Bombay: *Bole 1083* (BLAT); *Clarke 33340 C* (CAL); *Dalzell 14*, s.n. (DD, K); *Edgeworth s.n.* (K); *Herb. Econ. Prod. Ind. s.n.* (CAL); *Kuntze 7513, 7525, 7573* (NY); *Law s.n.* (K); *McCann 4015* (K); *Randeria 593* (BLAT); *Ritchie 400* (K); *Santapau 161.59**, *161.62**, *1200†* (DD), *5717, 8235* (BLAT), *6126* (K), *8817* (MO), *12176**, *17331, 17332, 18451, 18454* (BLAT); *Sedgewick 4582* (CAL), *5714* (K), s.n. (RAW). Madhya Bharat: *Maries 23* (CAL). Madhya Pradesh: *Duthie 9526* (DD). Madras: *Elliott s.n.* (E); *Gamble 16368* (CAL); *Wight s.n.* (L). Bihar, Orissa: *Haines 601a, 762* (CAL), *4896* (K); *Hooker s.n.* (K); *Mooney 2157* (K). Uttar Pradesh: *Bell 58 A* (CAL). Deccan: *Dymock s.n.* (CAL); *Wight 1435** (K, P, type collection), s.n. (E). No locality: *Hamilton 1894* (E); *Stocks s.n.* (DD).

Affinities: This species is related to *Blumea oxyodonta* and *B. malcolmii*. From the former species, *B. eriantha* differs in having an erect habit and the corollas being densely hairy outside both on the lobes and on the tubes. From the latter, it may be distinguished in being less woolly and more branched and almost always having abortive anthers.

The high degree of abortion of the anthers indicates that *B. eriantha* is most probably an apomictic species. This apomict then hybridizes perhaps with *B. oxyodonta* and almost certainly with *B. malcolmii* to form agamic complexes. A few such intermediates are listed below.

INDIA. Bombay: *Acland ACK 565* (BLAT); *Forest Chemist 11101* (DD); *Ritchie s.n.* (E); *Talbot 1363* (DD), *2891* (CAL); *Tulu s.n.* (CAL); *No data* (CAL).

39. *Blumea oxyodonta* DC. in *Wight, Contrib. Bot. Ind.* 1834. Species name referring to the sharp-toothed leaf margins ($\xi\acute{\xi}\acute{\upsilon}\acute{\varsigma}$ = sharp). — *Conyza oxyodonta* Wall. Cat. no. 3015. comp. no. 125. 1831, n. n. — *Conyza tenera* Wall. Cat. no. 3023. comp. no. 133. 1831, n. n. — *Blumea bovina* Edgw. Jour. As. Soc. Bengal 21: 173. 1853. — *Conyza bovina* Buch.-Ham. ex DC. Prodr. 5: 444. 1836, in syn. — *Erigeron graminosum* Russ. ex DC. Prodr. 5: 444. 1836, in syn.

Annual (?) herbs with prominent tap roots. Stems numerous from the root, spreading, procumbent or partially ascending, 5—40 cm in length, simple or branched, terete, villous with long, whitish, silky hairs, sometimes woolly at the base. Leaves often crowded at the base, all (particularly the younger ones) villous with long, white, silky hairs and stipitate glands on both surfaces, the apex spinulose-acute or apiculate, the margins serrate-dentate with hard spinulose teeth; the lower ones 3.5—7.0 cm long, 1.2—3.0 cm wide, obovate to obovate-oblong, prolonged at the base into an indistinct petiole; the upper 0.7—3.0 cm long, 0.3—1.5 cm wide, elliptic or narrowly obovate, rounded or briefly tapering at the base; epidermal

¹ Specimens marked with an asterisk (*) indicate plants with well-developed anthers and pollen grains.

cells with sinuate walls, the stomata on both faces. *Capitula* in terminal and axillary, compact or lax, few-headed corymbose panicles, subsessile or long pedicellate, 6—9 mm in diameter; pedicels up to 3 cm long, densely villous and with numerous glands. *Involucre* with the phyllaries somewhat longer than the florets, completely reflexed at maturity, 1—6 mm in length, linear, acute, with narrow, scarious margins, densely villous on the back with long, white, multicellular hairs and glands. *Receptacle* about 2 mm in diameter, flat or slightly convex, alveolate, glabrous. *Florets* numerous, multiseriate, the central most commonly with abortive anthers, rarely bisexual, the marginal female. *Corollas* yellow, tubular; those of the central florets 3.0—4.5 mm long, with 5 triangular, papillate lobes that are densely pubescent with multicellular hairs and colleters; those of the female florets filiform, 2.5—4.0 mm long, 2 to 3 lobed, pubescent on the lobes. *Anther* tails, when present, longer than the thickened portion of the filament. *Achenes* brown, oblong, pubescent, not ribbed, those of the central florets mostly abortive. *Pappus* white, deciduous, 3—4 mm long.

Type specimen: *Wight 1436* (K).

Type locality: India, Negapatam.

Flowers: October—May.

Distribution and Habitat: Throughout India, Pakistan, Burma, Indochina, and Southern China growing from sea level to 1500 m above. A weed common in stream beds, on river banks, in grassy clearings, pastures and rice fields and along railway lines and roadsides.

Specimens examined:¹

INDIA. Assam: *Bor 109* (DD); *Chatterjee s.n.* (CAL); *Clarke 38724 B* (US); *Kurz 52* (CAL). Bengal: *Clarke 34314* (DD, K), *26370 A* (CAL); *Griffith 3151* (GH, K, L); *Kurz s.n.* (DD); *Sinclair 3954* (E); *No data* (DD). Bihar: *Hamilton 180* (GH); *Dalzell s.n.* (K); *Delessert s.n.* (L); *Hohenacker s.n.** (E, K, P); *Kuntze 7424, 7572, 7574* (NY); *Law s.n.* (K); *McCann 4012* (K); *Meebold 2643** (CAL); *Metrius s.n.* (P); *Rémy 14** (P); *Ritchie 399** (E, K); *Santapau 161.53, 161.54** (DD), *6070, 17427, 18440* (BLAT), *18443†* (BLAT); *Sedgewick 3190* (BLAT), *s.n.* (RAW); *Stooks s.n.** (E, P); *Talbot 939†* (K); *No coll. 20454* (BLAT). Chota Nagpur: *Clarke 36434 A* (CAL), *36434 B* (K), *36434 C* (DD), *36484 A* (US), *36487 C* (CAL); *Gamble 8955* (K), *10143* (K). Madhya Pradesh: *Duthie 9527, s.n.* (DD). Madras: *Bourne 2691* (K); *Campbell s.n.* (E); *Hooker & Thomson s.n.* (K); *Metrius s.n.* (P); *Perrottet 222* (P); *Richard s.n.†* (P). Malabar: *Fischer 1821* (CAL); *Lawson s.n.* (K); *Stocks, Law s.n.* (E, GH, L, NY, P, U). Mysore: *Thomson s.n.* (GH, L). Orissa: *Haines 600* (CAL, K); *Mooney 2408* (DD), *2478* (DD, K), *2158* (K). Oudh: *Harsukh 22238* (CAL, DD, K); *Inayat 22240* (CAL, DD), *22240a* (DD, K), *23688* (DD, K). Rajasthan: *Sen s.n.* (DD). Travencore: *Calder & Ramaswamy 1513* (CAL); *Wight 532* (E). Uttar Pradesh: *Anderson s.n.* (E); *Gamble 24473* (K); *Raizada 15* (NY); *Strachey & Winterbottom 7* (K). Portuguese Goa: *No coll. 2579** (CAL). No locality: *ex DC herb.* (P); *Deschamps s.n.* (P); *Dudgeon & Kenoyer s.n.* (MO); *Duthie s.n.* (RAW, US); *Edgeworth 53* (K); *Jacquemont 388* (P); *1053* (K); *Jameson 508* (K); *Stewart s.n.* (E); *Thomson s.n.* (E, GH, K, L, P, U); *Wight 1436* (E, K, NY, P, type collection); *1583bis* (K); *1589 bis* (K); *No data* (NY). Nepal: *Wallich 3023/133* (GH, K, type collection of *C. tenera*).

BURMA. *Kermode 16599* (DD); *Kurz 906* (CAL); *Meebold 17320* (CAL); *Rama Rao's coll. 1156* (CAL).

¹ Specimens marked with an asterisk (*) indicate plants with well-developed anthers and pollen grains.

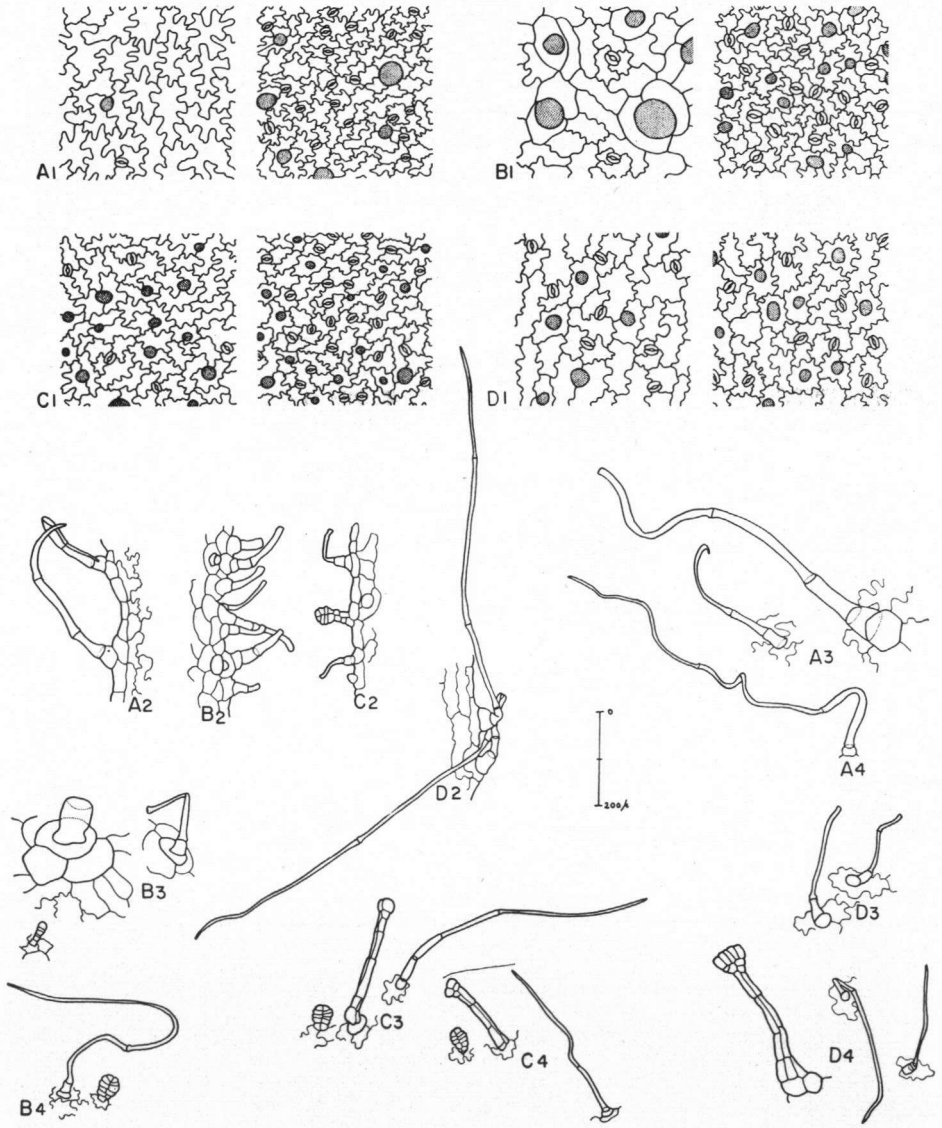


PLATE XX. — Section Oxyodontae. A. *Blumea belangeriana* DC., India, Bombay, *Randeria 585* (BLAT). B. *B. malcolmii* (Clarke) Hook. f., India, *Wight s.n.* (E). C. *B. eriantha* DC., India, Bombay, *Randeria 598* (BLAT). D. *B. oxyodonta* (Wall.) DC., India, *Wight 1436* (E, type collection). In each case, 1 represents leaf epidermal surfaces, upper to left, lower to right, 2 leaf margins, 3 trichomes on upper laminar surface, and 4 trichomes on lower laminar surface.

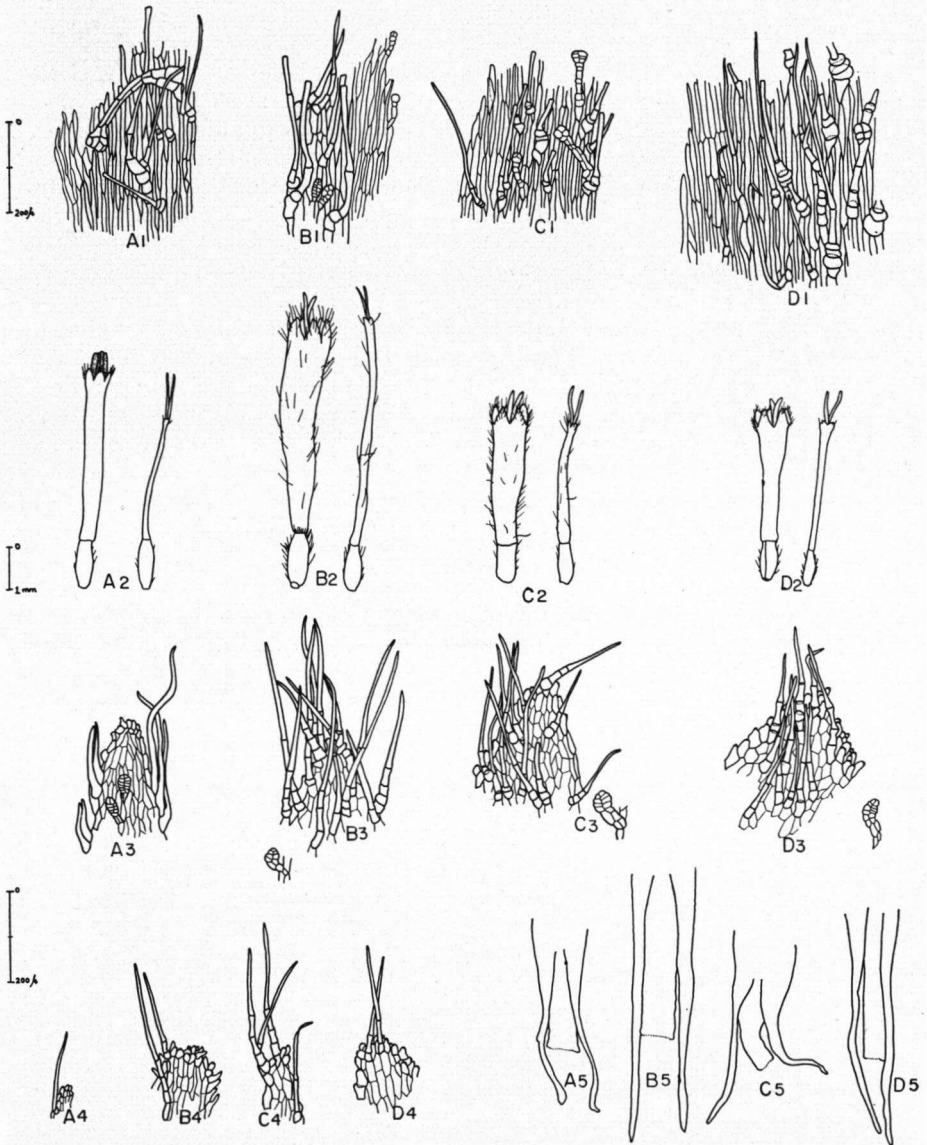


PLATE XXI. — Section *Oxyodontae*. For explanation of A—D and voucher specimens see Plate XX. In each case, 1 represents portion of phyllary (dorsal surface), 2 florets, bisexual to left, female to right, 3 corolla lobes of bisexual florets, 4 corolla lobes of female florets, and 5 anther tails.

INDOCHINA. Tonkin: *Pételot 2092* (GH, MO, NY, UC, US).

CHINA. Yunnan: *Henry 11915* (K, NY).

NO DATA (GH).

Affinities and Remarks: De Candolle has three varieties under *Blumea oxyodonta*: (1) the typical, which embraces *Conyza oxyodonta* Wall., (2) var. *tenera*, plants densely villous, panicles lax, many-headed, based on *Conyza tenera* Wall. and *C. bovina* Buch.-Ham., and (3) var. *glabrata*, plants more or less glabrous, capitula pedicellate, also based on *C. tenera* Wall. *pro parte*. An examination of the specimens from the type collections of both the varieties as well as several others show that the differences which De Candolle has used to separate the varieties are not very clear-cut. The extremes of each form are fairly distinct but there exist all possible intermediate conditions; furthermore, anatomically they are all fairly uniform. I am inclined to go along with Clarke (1876) and Hooker (1882) in placing the entire assemblage under *B. oxyodonta* DC. without any recognizable and well-defined varieties.

The specific status of *B. oxyodonta* has also been under question. Clarke reports that he was unable to find pollen in many of the specimens he examined and the anthers that were non-polliniferous were tailless and imperfect or aborted. Kurz suspects that it is a hybrid or a polygamous form of some other species.

The results of my investigations agree with those of Clarke in respect to pollen abortion. Of a total of 69 specimens studied, only 7 had good pollen grains and anthers with well-developed tails. Interestingly, these were all distributed in Bombay State; however, not all plants collected from that locality had good pollen. The rest had anthers merely represented by minute flaps of tissue at the base of the corolla tube. In spite of that, a majority of the specimens showed reasonably good fruit set. From this data, it appears that *B. oxyodonta*, or part of it, is possibly facultatively apomictic like the preceding species.

The affinities of this species lie with *Blumea eriantha* from which *B. oxyodonta* may be distinguished by its prostrate habit and only the corolla lobes of the florets pubescent. Where their ranges overlap, it is quite possible that the two hybridize.

Section 7. *Dissitiflorae* (Plates XXII—XXIV).

1. Corolla lobes of bisexual florets pubescent with multicellular hairs in addition to colleters.
2. Stems generally branched from the base; leaves distantly denticulate; connective appendage tapering at the apex; African species.
3. Capitula 5—9 mm in diameter; corolla lobes of female florets glabrous
 40. *B. bovei*
 3. Capitula 8—15 mm in diameter; corolla lobes of female florets pubescent
 41. *B. cafra*
2. Stems dichotomously branched; leaves serrate-dentate; connective appendage rounded at the apex; Indian species 42. *B. obliqua*
1. Corolla lobes of bisexual florets with unicellular or no hairs in addition to colleters.
4. Capitula solitary, axillary and terminal.
5. Cauline leaves cordate and often stem-clasping at the base, the margins variously toothed.
6. Leaves, phyllaries and peduncles glandular; leaves minutely dentate.
7. Uppermost pair of leaves subopposite; Indian species 43. *B. bifoliata*

7. Uppermost pair of leaves alternate; Australian species 44. *B. diffusa*
 6. Leaves, phyllaries and peduncles non-glandular; leaves grossly dentate
 45. *B. tenella*
 5. Cauline leaves tapering at the base, the margins subentire 46. *B. integrifolia*
 4. Capitula in lax, narrow, few-headed racemes or panicles.
 8. Peduncles woolly; corolla lobes of bisexual florets with collectors only; lower
 laminar epidermal cells with straight walls 47. *B. angustifolia*
 8. Peduncles not woolly; corolla lobes of bisexual florets with collectors and
 unicellular hairs; lower laminar epidermal cells with sinuate walls.
 9. Stems erect; leaf margins distantly denticulate; heads 12—15 mm in
 diameter 48. *B. stenophylla*
 9. Stems ascending; leaf margins serrate-dentate; heads 5—7 mm in diameter
 49. *B. saxatilis*

40. *Blumea bovei* (DC.) Vatke, *Linnaea* 39: 485. 1875. — *Conyza bovei* DC. *Ann. Sci. Nat. Bot.* 261. 1834. — *Blumea abyssinica* C. H. Schultz in A. Rich. *Tent. Fl. Abyss.* 1: 392. 1847.

Perennial (?) herb, 25—40 cm in height with a tap root system; rootstock woody. *Stems* branched from the base, ascending, terete, quite glabrous. *Leaves* sessile, 1.5—8.0 cm long, 0.2—0.8 cm wide, linear-oblong to lanceolate-oblong, sparsely pubescent on both surfaces and the margins with multicellular hairs, the apex apiculate, the margins distantly denticulate, the base auriculate with rounded lobes; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* axillary and terminal, solitary or in lax corymbs, pedunculate, 5—9 mm in diameter; peduncles 1.3—4.5 cm long. *Involucre* with the phyllaries herbaceous and purplish-tinged, almost equal in length to the florets, 2—6 mm long, linear, tapering at the apex, the margins narrow, scarious, pubescent on the back with multicellular hairs. *Receptacle* 2—4 mm in diameter, flat, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3—4 mm long, with 5 ovate, acute, papillate lobes that are pubescent with multicellular hairs and collectors; those of the female florets filiform, up to 3 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* dark brown, oblong, pubescent, subangulate. *Pappus* white, 3—4 mm long.

Type specimen: *Bové* (G-DC).

Type locality: In wet montane areas of Sinai.

Flowers: August—April.

Distribution and Habitat: N.E. Africa, Somaliland, Eritrea, Sinai. Growing in montane and wet habitats particularly along river banks.

Specimens examined:

ARABIA. *Barten s.n.* (K); *Ehrenberg s.n.* (K); *McDonald s.n.* (K); *Schweinfurth 1069* (K); *Wakefield Exped. 39, 39bis* (K).

N.E. AFRICA. Somaliland: *Baily 7295* (K); *Gillett 4647* (K, P), *Phillips 1897* (K). Eritrea: *Schimper 111* (US), *411* (K), *1842* (GH, K, L, NY, P, type collection of *B. abyssinica*); *Schweinfurth & Riva 1097* (K). Egypt: *Bent s.n.* (K); *Schweinfurth 44* (K).

SINAI. *Aucher-Eloy-Herbier d'Orient 3106* (K), *4727* (K); *Bové 118* (K, type collection); *Shabetai 545* (K).

PALESTINE. *Schimper s.n.* (K).

ADEN. *Macwell-Darling 207* (K).

Affinities: This species has close affinities with *Blumea cafra*

Hoffm., another African member of the genus, from which *B. bovei* differs in possessing narrower leaves, smaller capitula and glabrous corollas of the female florets.

41. *Blumea cafra* (DC.) O. Hoffm. in Engl. Bot. Jahrb. 10: 274. 1889. Species name from the type locality — *Conyza cafra* DC. Prodr. 5: 381. 1836. First recognized by Bentham (1873, p. 284) as belonging to the genus *Blumea*, the transfer accordingly made by Hoffmann. — *Conyza (Blumea) natalensis* Sch.-Bip. in Walp. Rep. 2: 971. 1843. — *Vernonia pechuelii* O. Kze. in Engl. Bot. Jahrb. 4: 264. 1885.

Perennial herb, 25—100 cm in height with a tap root system; root-stock woody. *Stems* erect, generally branched from the base, terete, almost glabrous or pubescent with fine, white, multicellular hairs. *Leaves* sessile, 2—9 cm long, 0.4—2.0 cm wide, oblong to oblong-lanceolate, velutinous on the surfaces and the margins with multicellular hairs and colleters, the apex acute to apiculate, the margins distantly dentate, the base distinctly auriculate with rounded, subequal auricles; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* axillary and terminal, solitary or in a corymbose inflorescence, pedunculate, 8—15 mm in diameter; peduncles bracteate, 5—35 mm long. *Involucre* with the phyllaries longer than the florets, 3—7 mm in length, linear, taper-pointed, with very narrow scarious margins, densely pubescent on the back with colleters and multicellular hairs. *Receptacle* 4—7 mm in diameter, flat, minutely areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets, 4—5 mm long, with 5 triangular-ovate, acute, papillate lobes that are densely pubescent with numerous, long, multicellular hairs and occasional colleters; those of the female florets filiform, up to 3 mm long, with 2 to 3 sparsely pubescent lobes. *Anther* tails shorter than the thickened portion of the filament. *Achenes* dark brown, densely pubescent, oblong, not ribbed. *Pappus* reddish-yellow, 3—5 mm long.

Type specimen: *Drège s.n.* (G-DC).

Type locality: Southern Africa, Cafra, around Key River.

Flowers: April—November.

Distribution and Habitat: Madagascar, S.E. and S.W. Africa; growing in humid and montane habitats.

Specimens examined:

MADAGASCAR. *d'Alleizette s.n.* (L); *Decary 9290* (P); *Humbert & Swingle 5423* (GH, NY, P, US); *Perrier de la Bathie 3357, 3414* (P).

AFRICA. *Borle 919* (K); *Codd & de Winter 5544* (K); *Dieterlen 623* (P); *Dinter 538* (K, P); *Drège s.n.* (L, P); *Drège s.n.* (GH, K, fragment of type collection); *Gerrard 355* (K); *Jensen 3* (K); *Krauss 227* (K); *Munro s.n.* (K); *Pearson 3336* (K); *Bodin 2145* (K, UC, US); *Schultz-Bipontinus 227* (P); *Schweickerdt & Verdoorn 550* (K); *Welwitsch 2414* (K), *s.n.* (P); *Wood 1957* (K); *Wylie s.n.* (L); *No data* (L).

Affinities: *Blumea cafra* is related to the preceding species *B. bovei* and also to *B. obliqua*. From both of these, *B. cafra* may be distinguished by its larger heads (up to 15 mm in diameter) and by its pubescent corollas of the female florets.

42. *Blumea obliqua* (Linn.) Druce, Rep. Bot. Exch. Club Brit. Isles 4: 609. 1916. (1917). — *Erigeron obliquum* Linn. Mant. 2: 573. 1771. — *Blumea amplexens* DC. in Wight, Contrib. Bot. Ind. 13. 1834. — *Conyza*

obliqua Willd. Sp. Pl. 3: 1930. 1797. — *Conyza amplexicaulis* Lam. Dict. 2: 85. 1786. — *Blumea arenaria* DC. in Wight, Contrib. Bot. Ind. 13. 1834. — *Blumea anagallidifolia* DC. in Wight, Contrib. Bot. Ind. 13. 1834. — *Conyza anagallidifolia* Wall. Cat. no. 3098. comp. no. 208. 1831, *n. n.* — *Blumea pubiflora* DC. Prodr. 5: 434. 1836. — *Erigeron asteroides* Roxb. ex Wall. Cat. no. 2975. comp. no. 85. 1831, *n. n., non alior.*

Herbs, 5—60 cm in height with a top root system. *Stems* erect, virgate, dichotomously much-branched, terete, puberulous. *Leaves* sessile, 0.5—6.0 cm long, 0.25—2.0 cm wide, elliptic-oblong to lanceolate-oblong, scabrous to velutinous on both surfaces with multicellular hairs and col-leters, the apex apiculate, the margins serrate-dentate to subentire, the base obtuse, more or less cordate-clasping; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* solitary, terminal and in the axils of the upper leaves, 6—10 mm in diameter, pedunculate, the peduncles up to 5 cm long. *Involucre* with the phyllaries slightly longer than the florets, reflexed at maturity, 1—8 mm long, linear-lanceolate, pubescent on the dorsal surface, the outer ones tapering at the apex, the inner prolonged acuminate, often tinged with purple and with scarious margins. *Receptacle* 1.5—4.0 mm in diameter, slightly convex, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 4—5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with white multicellular hairs and colleters; those of the female florets filiform, 3—4 mm long, 2 to 3 lobed, glabrous. *Anther* tails of the same length as the thickened portion of the filament. *Achenes* dark brown, oblong, pubescent, not ribbed. *Pappus* yellowish-white, 3.5—4.0 mm long.

Type specimen: LINN.

Type locality: India.

Flowers: July—March.

Distribution and Habitat: In India and Ceylon. Growing in comparatively dry localities on poor sandy soil or in swampy areas. Extremely variable according to its habitat, the plants having small thick leaves and large heads in physiologically dry localities and having large membranous leaves and normal-sized heads when growing under ordinary conditions.

Several authors have recognized taxonomic varieties based on these variations. I have not shared the same view here since this variability appears to be entirely ecological and no really clear-cut forms can be distinguished.

Specimens examined:

CEYLON. *d'Almeida* 3981 (L); *Thwaites* C. P. 1732 (GH, P).
 CHINA. Assam: No data (L). Bengal: *Clarke* 21613 A, F, I, Z (CAL, E, K, L); *Duthie* 6418 (MICH); *Griffith* 3154 (K); *Haines* 4834 (K); *Heinig & Gammie* 11 (US), 47 (CAL, L). Bombay: *Dalzell* 5 (K), *s.n.* (DD); *Sedgewick* 2200 (BLAT, CAL), 3850 (BLAT); *Shah* 1589 (BLAT); *Stocks, Law* *s.n.* (GH, L); *Tikah* 124 (GH). Madhya Bharat: *Maries* 192 (CAL). Madhya Pradesh: *George* 1703 (DD). Madras: *Bourne* 5058 (K); *Cleghorn* *s.n.* (E); *Cole* *s.n.* (GH, P); *Fischer* 825, 4115, 4173, 4780 (CAL); *Gamble* 12306 (DD, K), 16438 (K), 18624 (CAL); *Thomson* *s.n.* (E, GH, K, L, NY, P, U); *Wallich* 3098/208a (GH, type collection of *B. anagallidifolia*), 2975/85b (E, NY, type collection of *B. pubiflora*); *Wight* 1421 (K, type collection of *B. arenaria*), 1423 (E, K, NY, type collection of *B. amplexicaulis*), 1565 (K), 1566 (K), 1584 (K), 2044

(E), *s.n.* (CAL, E); *Woodrow s.n.* (UC); *No coll.* (L). Punjab: *Drummond 6308* (K). Rajasthan: *Edgeworth 5012* (K); *No data* (GH). Uttar Pradesh: *Duthie 4697* (CAL, DD, K), *4697 A* (DD). No locality: *Boyle s.n.* (K); *Stocks 554* (CAL, K); *No data* (P). Goa: *Perottet s.n.* (E, K). Andamans: *Kurz s.n.* (CAL, K).

PAKISTAN, W. *Jafri C. 14* (E); *Koelz 7570* (US); *Bamchandani 1* (CAL); *Bitchie s.n.* (E).

CEYLON. *Thwaites C. P. 1730* (K).

Affinities: This species is related to the other members of the section and also to members of related genera like *Laggera* (*Laggera aurita*) and *Conyza*. From both these genera, *Blumea obliqua* differs in having tailed anthers; from *Laggera* it further differs in having the leaves not lobed and decurrent at the base and from *Conyza* in its cylindrical achenes.

43. *Blumea bifoliata* (Linn.) DC. in Wight, Contrib. Bot. Ind. 14. 1834. Specific epithet referring to the uppermost pair of leaves which are subopposite. — *Conyza bifoliata* Linn. Sp. Pl. 1207. 1753. — *Blumea oligocephala* DC. in Wight, Contrib. Bot. Ind. 13. 1834. — *Conyza foliolosa* Wight in Wall. Cat. no. 3092. 1831, *n. n., non alior.* — *Conyza amplexicaulis* Wight in Wall. Cat. no. 3104. 1831, *n. n., non Lam.* — *Conyza bracteolata* Rottl. ex DC. Prodr. 5: 434. 1836, *in syn.*

Herbs, 5–60 cm in height. *Stems* simple or more often branched from the base, ascending or rarely procumbent, terete, villous with multicellular hairs and stipitate glands on both surfaces and the margins, the apex acute or apiculate, the margins distantly and minutely serrate; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* terminal and axillary, solitary at the ends of the peduncles, 6–8 mm in diameter; peduncles exceeding the leaves, 5–35 mm long. *Involucre* with the phyllaries herbaceous, equal in length to the florets, 2.0–6.5 mm long, entirely reflexed at maturity, linear-lanceolate, acute, the inner with scarios margins, all pubescent on the back with multicellular hairs and glands. *Corollas* yellow, tubular; those of the bisexual florets, 3.5–4.5 mm long, with 5 ovate, papillate lobes that are pubescent with unicellular hairs and collectors; those of the female florets filiform, up to 3.5 mm long, with 2 to 3 lobed, sparsely pubescent on the lobes. *Anther* tails shorter than the thickened portion of the filament. *Achenes* pale brown, oblong, pubescent, not ribbed. *Pappus* white, 3–4 mm long.

Type specimen: *Wight 1425* (K).

Type locality: India, Tanjore and Travencore States.

Flowers: December–May.

Distribution and Habitat: India, Pakistan, Burma. Growing in damp forests as well as in grasslands, dried fields and along roadsides from sea level to 600 m altitude.

Specimens examined:

BURMA. *Huk s.n.* (CAL); *White 31961* (US).

INDIA. Assam: *No data* (K, L, U). Bengal: *Clarke 34825 B* (K); *Hooker s.n.* (K); *Kurz s.n.* (CAL, DD); *Meebold 10647* (E); *Raizada 21710* (DD). Bombay: *Dalzell s.n.* (K); *Bitchie 1815* (E, K); *Sedgewick 2233* (BLAT, CAL). Madhya Pradesh: *Duthie 10.432* (CAL, DD, K); *Kuntze 7371* (NY). Madras: *Blatter & Hallberg 729* (CAL); *Bourne 2691* (K); *Cleghorn s.n.* (E); *Cole 33* (K), *s.n.* (K); *Fischer 845* (CAL); *Gamble 10885* (K), *14184* (K), *18591* (K), *s.n.* (K); *Hooker & Thomson s.n.* (K, U); *Macé s.n.* (P); *Narayana s.n.* (UC); *Perottet s.n.* (P); *Schmid s.n.* (CAL);

Thomson s.n. (K). Orissa: *Mooney 2210* (DD, RAW), *3277* (DD, K). Uttar Pradesh: *Bell 260* (K); *Duthie 6979* (DD); *Inayat 20980a* (K). No locality: *Barnes s.n.* (DD); *Brandis s.n.* (DD); *Dalzell s.n.* (DD); *Gaudichaud 119* (P); *Roxburgh s.n.* (E); *Wight 1421* (E), *1424* (K), *1425* (E, K, NY, P, type collection), *1561* (K), *1579* (K), *3092/202b* (GH); *ex hort. bot. Calc.* (DD, E); *ex hort. Ups.* (E).

PAKISTAN, *E. Griffith 3142* (CAL, GH, K).

CEYLON. *Thwaites C. P. 3523* (K).

Affinities: This species is quite closely related to *Blumea obliqua* and extends over approximately the same geographic range. *Blumea bifoliata*, however, differs from *B. obliqua* in having stipitate glands on the leaves and the phyllaries and unicellular hairs on the corolla lobes of the bisexual florets. In addition to these characters, it is the only member of the genus with subopposite upper leaves.

44. *Blumea diffusa* R. Br. *ex Benth. Fl. Austral. 3: 525. 1866.* Specific epithet referring to the diffuse habit.

Diffusa, annual herbs. *Stems* branched from the base; branches 15—25 cm long including the peduncles, decumbent at the base and then ascending, slender, terete, woolly at the base, the branches pilose with long, white hairs. *Leaves* mostly radical and a few cauline, sessile, the radical ones 2—6 cm long, 1.0—2.5 cm wide, obovate or rarely oblanceolate, pilose on both surfaces with colleters and multicellular hairs, the apex acute to apiculate, the margins distantly dentate to dentate-serrate, the base acute, the cauline ones smaller, ovate-oblong to lanceolate, more or less amplexicaulous; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* solitary on the branches, long-pedunculate, 4—6 mm in diameter. *Involucre* with the phyllaries slightly longer than the florets, 1.0—6.5 mm long, linear, acute, with narrow, scarious margins, pilose on the back with long, white hairs, entirely reflexed at maturity. *Receptacle* 2—3 mm in diameter, convex, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3—4 mm long, with 5 triangular, minutely papillate lobes; those of the female florets filiform, slightly shorter, 2 to 3 lobed, glabrous. *Anther* tails almost equal in length to the thickened portion of the filament. *Achenes* pale brown, oblong, sparsely pilose, 10-ribbed. *Pappus* white, about 3 mm long.

Type specimen:

Type locality: N. Australia, Islands of the Gulf of Carpentaria.

Flowers: June and July.

Distribution: Endemic to Northern Australia.

Specimens examined:

N. AUSTRALIA. Arnhem land: *Mueller s.n.* (K); *SSchultz 279* (K), *656* (K); *Specht 743* (K, L, US). Bickerton Islands: *Specht 614* (L, US). Queensland: *Hann 91* (K). No locality: *Braun 2092* (K).

Affinities: Related to *Blumea saxatilis* and *B. integrifolia*. From either of these it may be recognized by its diffuse habit and by its ovate-oblong to obovate leaves.

45. *Blumea tenella* DC. *in Wight, Contrib. Bot. Ind. 13. 1834.*
— *Blumea humifusa* (Miq.) Boerl. *Handl. Fl. Ned. Ind. 2: 237. 1891.* — *Conyza humifusa* Miq. *Fl. Ind. Bat. 2: 41. 1856.*

Annual herbs, 8—50 cm in height, with a tap root system. *Stems*

generally branched from the base, ascending or trailing, diffuse, terete, minutely puberulous-villous. *Leaves* sessile, 15—55 mm long, 3—20 mm wide, oblong to elliptic-lanceolate, scabrous on both surfaces, the apex apiculate, the lower leaves with grossly and distantly dentate margins, the upper subentire, all with an obtuse, more or less semiamplexicaulous base; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* solitary, axillary and terminal, 4—6 mm in diameter, long pedunculate, the peduncles up to 10 cm in length. *Involucre* with the phyllaries herbaceous, slightly longer than the florets, entirely reflexed at maturity, 1.5—6.0 mm in length, linear-lanceolate, tapering at the apex, pubescent on the back with multicellular hairs and colleters, ciliate at the apex, the inner series with scarious margins. *Receptacle* 2.5—3.0 mm in diameter, convex, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3.5—4.5 mm long, with 5 broadly triangular, papillate lobes that are pubescent with colleters; those of the female florets filiform, 3—4 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* brown with pale striations, oblong, sparsely pubescent. *Pappus* white, 3—4 mm long.

Type specimen: *Baudin s.n.* (G-DC).

Type locality: Timor.

Flowers: June—November.

Distribution and Habitat: From Java to New Guinea and Australia. Growing in grasslands, in fields and on the outskirts of forests at low altitudes ranging from 10—100 m above sea level.

Specimens examined:

JAVA. *Backer* 7735 (L), 15356 (K, L); *Bakhuizen van den Brink* 2679 (U), 3445 (L), 5587 (K, L, UC); *Coert* 898 (L); *Horsfield s.n.* (K, U, type collection of *B. humifusa*); *Houwing* 2 (L); *Kostermans* 4007 (L); *van der Meer & den Hoed* 678 (L); *Radermacher s.n.* (L); *van Steenis* 5305 (K, L), 6634 (GH, L), 11562 (L); *No data* (P).

BORNEO. *Korthals s.n.* (L).

TIMOR. *Decaisne* 5 (P); *Praetorius s.n.* (L); *de Voogd* 2318 (GH, L); *No data* (P).

NEW GUINEA. *Anta* 265 (L); *Brass* 7837 (L); *Koch s.n.* (L).

AUSTRALIA. *Clemens s.n.* (MICH); *Dietrich* 514 (GH); *Morrison s.n.* (K); *Mueller s.n.* (K).

NO DATA. (L).

Affinities and Remarks: This species has close affinities with *Blumea saxatilis* and *B. obliqua*. From the former, *B. tenella* differs chiefly in possessing leaves that are semiamplexicaulous at the base, and solitary heads.

Concerning the latter, several authors have regarded *B. tenella* as a variety of *B. obliqua*. The two, however, are quite distinct. *B. obliqua* is a dichotomously branched species with the bisexual corollas densely hairy on the lobes whereas in *B. tenella*, the stems are branched from the base and the corolla lobes of the bisexual florets are devoid of multicellular hairs.

De Candolle cites two specimens with the original description, the first collected from Timor and the second collected from S. India. However, Hooker (1882, p. 671) states that the South Indian plant may be referable to *B. bifoliata*. The Timor one, then, should be the type of this species.

46. *Blumea integrifolia* DC. Prodr. 5: 433. 1836. Specific epithet referring to the entire or subentire margins of the leaves.

Herbs, 10—30 cm in height with a slender tap root. *Stems* erect, branched, terete, villous with long, spreading, multicellular hairs and minute colleters. *Leaves* sessile, 0.5—3.0 cm long, 0.1—0.4 cm wide, the upper minute and bracteiform, lanceolate or linear-lanceolate, villous on both surfaces and the margins with long, white, multicellular hairs and colleters, the apex apiculate, the margins subentire, the base tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* solitary and terminal on the branches, 4—6 mm in diameter; peduncles up to 8 cm long, villous with multicellular hairs and colleters. *Involucre* with the phyllaries slightly longer than the florets, herbaceous, linear, acute, pubescent on the dorsal surface with multicellular hairs, colleters and stipitate glands, the entire series with broad, scarious margins, reflexed at maturity. *Receptacle* 1.5—2.5 mm in diameter, slightly convex, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets up to 4 mm long, with 5 triangular, acute, papillate lobes that are pubescent with colleters and unicellular hairs; those of the female florets filiform, up to 3 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Achenes* straw-coloured, oblong, pubescent, striate. *Pappus* up to 3 mm long, white.

Type specimen: *Cunningham s.n.* (G-DC).

Type locality: Australia, New Holland, N.W. of Port Kealts.

Flowers: September.

Distribution and Habitat: Northern Territory, Australia. Known to grow in arid woods and in mixed open forests at the base of sandstone scarps.

Specimens examined:

N. AUSTRALIA. *Schultz 427* (K); *Specht 1052* (K, L, US).

Affinities: This species is closely related to *Blumea diffusa*, another Australian endemic, and to *B. saxatilis*. From the former, *B. integrifolia* differs in having narrow, linear leaves and from the latter, in its subentire leaves and its glandular, stems, leaves and phyllaries.

47. *Blumea angustifolia* Thw. Enum. Pl. Zeyl. 164. 1864. Specific epithet referring to the narrow leaves.

Herbs, 15—30 cm in height. *Stems* mostly branched from the base, erect, terete, almost glabrous. *Leaves* radical and cauline, 2—7 cm long, 0.3—1.0 cm wide, narrowly oblanceolate, sparsely pilose on the surfaces and the margins with multicellular hairs and colleters, the apex obtuse, the margins obscurely denticulate, the base prolonged tapering; epidermal cells with straight walls, the stomata on both surfaces. *Capitula* in axillary and terminal, few-headed racemes, pedunculate, 4—6 mm in diameter; peduncles woolly. *Involucre* with the phyllaries herbaceous, slightly longer than the florets, 1—5 mm in length, linear, sparsely pubescent on the back, fibrillate at the apex. *Receptacle* about 1.0—1.5 cm in diameter, flat, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets up to 3 mm long, with 5 broad, obtuse, papillate lobes that are pubescent with colleters; those of the female florets filiform, up to 3 mm long, with 2 to 3 lobes, glabrous. *Anther* tails shorter than the thickened

portion of the filament. *Achenes* pale brown, oblong, sparsely hairy, not ribbed. *Pappus* white, 2—3 mm long.

Type specimen: *Thwaites C. P. 691*.

Type locality: Ceylon, Central Province.

Distribution and Habitat: Endemic to Ceylon, growing at altitudes from 300—900 m above sea level.

Specimens examined:

CEYLON. Central Province: *Thwaites C. P. 691* (CAL, GH, K, P, *type collection*).

Affinities: *Blumea angustifolia* is somewhat distantly related to the rest of the members of the section and may be most easily distinguished from them by its woolly peduncles and its laminar epidermal cells with straight walls.

48. *Blumea stenophylla* Merr. Philipp. Jour. Sci. 29: 495. 1926. Specific epithet referring to the narrow leaves of the plant.

Herbs, at least 60 cm in height (*vide* Merrill). *Stems* erect, much-branched, terete, sparsely puberulous. *Leaves* subsessile to shortly petiolate (petioles 2—8 mm long), 2.3—13.0 cm long, 0.3—1.0 cm wide, linear or linear-lanceolate, the upper surface glabrate or with scattered, prominent-based hairs, the lower sparsely puberulous particularly on the veins, the apex apiculate to shortly cuspidate-acuminate, the margins very distantly denticulate, the base unequally tapering; upper epidermal cells with undulate walls, the lower with sinuate walls, the stomata on both surfaces. *Capitula* few, arranged in narrow panicles at the ends of the branches, pedunculate, 12—15 mm in diameter; peduncles 5—10 mm long. *Involucre* with the phyllaries herbaceous, slightly longer than the florets, 2—10 mm in length, linear-lanceolate, tapering, pubescent on the back with multicellular hairs, ciliate on the margins, the inner series more or less scarious, purplish-tinged. *Receptacle* about 3—4 mm in diameter, flat, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 4.0—4.5 mm long, with 5 triangular, acute, papillate lobes that are pubescent with a few unicellular hairs and colleters; those of the female florets filiform, 3.5—4.0 mm long, 2 to 3 lobed, glabrous. *Anther* tails shorter than the thickened portion of the filament. *Ovary* pubescent, angled. *Achenes* immature. *Pappus* yellowish-white, 4.0—4.5 mm long.

Type specimen: *Bur. Sci. 43281* (UC).

Type locality: Philippines, Bohol, Valencia.

Flowers: October.

Distribution and Habitat: Narrow endemic known only from one locality on Bohol Island. Growing along streams in damp forests, altitude about 300 m above sea level.

Specimens examined:

PHILIPPINES. Bohol: *Bur. Sci. 43281 Ramos* (K, UC, *type*).

Affinities: The affinities of *Blumea stenophylla* seem to lie with the next species *B. saxatilis* from which this species differs principally by its larger capitula and remotely denticulate leaves.

49. *Blumea saxatilis* Zoll. et Mor. Nat. en Geneesk. Arch. Neerl. Ind. 2: 243. 1845. Specific epithet describing the rocky habitat. — *Blumea*

zollingeriana (Sch.-Bip.) Boerl. Handl. Fl. Ned. Ind. 2 (1): 237. 1891, non Clarke — *Conyza zollingeriana* Sch.-Bip. in Zollinger, Syst. Verzeichn. Ind. Arch. Pfl. 121. 1854. — *Blumea spinidens* (Miq.) Boerl. Handl. Fl. Ned. Ind. 2 (1): 237. 1891. — *Conyza spinidens* Miq. in Pl. Jungh. 499. 1855. — *Blumea tenera* Merr. Philipp. Jour. Sci. (Bot.) 7: 250. 1912. — *Blumea thorelii* Gagnep. Bull. Soc. Bot. France 68: 44. 1921. Gagnepain himself suggested the close resemblance between his species and *B. zollingeriana* which he did not know except from descriptions. Comparative examination of the type specimens leaves little doubt that *B. thorelii* is synonymous with *B. saxatilis*.

Herb, 10—40 cm in height with a tap root system. *Stems* simple or branched from the base, slender, ascending, terete, glabrate or sparsely pubescent. *Leaves* sessile, 3—11 cm long, 0.3—2.0 cm wide, the lower ones radical and rosulate, the cauline ones smaller and passing into bracts, lanceolate, oblanceolate or lanceolate-spathulate, pilose on both surfaces, the apex apiculate, the margins distantly serrate with rigid teeth, the base tapering; epidermal cells with sinuate walls, the stomata on both surfaces. *Capitula* in terminal, lax to fasciculate, few-headed panicles, pedunculate, 5—7 mm in diameter; peduncles up to 1.8 cm long. *Involucre* with the phyllaries herbaceous, longer than the florets, 1.0—7.5 mm in length, completely reflexed at maturity, linear, acute, pubescent on the back, with scarious margins. *Receptacle* 1.5—2.5 mm in diameter, convex, areolate, glabrous. *Corollas* yellow, tubular; those of the bisexual florets 3—4 mm long, with 5 triangular-ovate, papillate lobes that are pubescent with colleters and occasional unicellular hairs; those of the female florets filiform, up to 3 mm long, 2 to 3 lobed, glabrous. *Anther* tails somewhat longer than the thickened portion of the filament. *Achenes* brown with paler ribs, columnar, pubescent. *Pappus* white, 3—4 mm long.

Type specimen: *Zollinger 2233* (L).

Type locality: Java, foot of Mt. Waliran.

Flowers: January—September.

Distribution and Habitat: Java, Indochina, Philippines, New Guinea and Australia. Growing among rocks or in open sunny grasslands or clearings from sea level to 700 m above.

Specimens examined:

JAVA. *Junghuhn 310* (L, U), *332* (GH, L, type collection of *B. spinidens*); *Zollinger 2233* (L, P, U, type collection).

TIMOR. *van Steenis 18045* (L).

WETAR. *Bloembergen 3742* (K).

INDOCHINA. Annam: *Coudero s.n.* (P). Laos: *Thorel 3188* (P, type collection of *B. thorelii*).

SIAM. *Kerr 8483* (K).

PHILIPPINES. Culion: *Merrill 679* (NY, US). Luzon: *Clemens 17514* (NY), *19026*, *19029* (NY, UC); *For. Bur. 5874 Curran* (US); *Loher 3631* (US); *Merrill 7363* (K, type collection of *B. tenera*). Palawan: *Merrill 9397* (GH, L, MO, NY, P, US). Panay: *Bur. Sci. 30648 Ramos & Edaño†* (GH, UC, US); *Bur. Sci. 42463 Ramos* (U).

NEW GUINEA. *Brass 5332* (GH, NY), *7887* (GH, L), *8012a* (GH), *27779* (L); *Carr 11310* (K); *Clemens 10905* (GH), *40733* (GH); *Koch s.n.* (L); *Schlechter 13900* (K).

AUSTRALIA. Arnhem land: *Mueller s.n.* (K); *Specht 345* (L, US). Queensland: *Clemens s.n.* (MICH). No locality: *Brown 2097* (K).

Affinities: This species is related to *Blumea tenella* from which it may be distinguished by its leaves tapering at the base and by its capitula arranged in lax panicles.

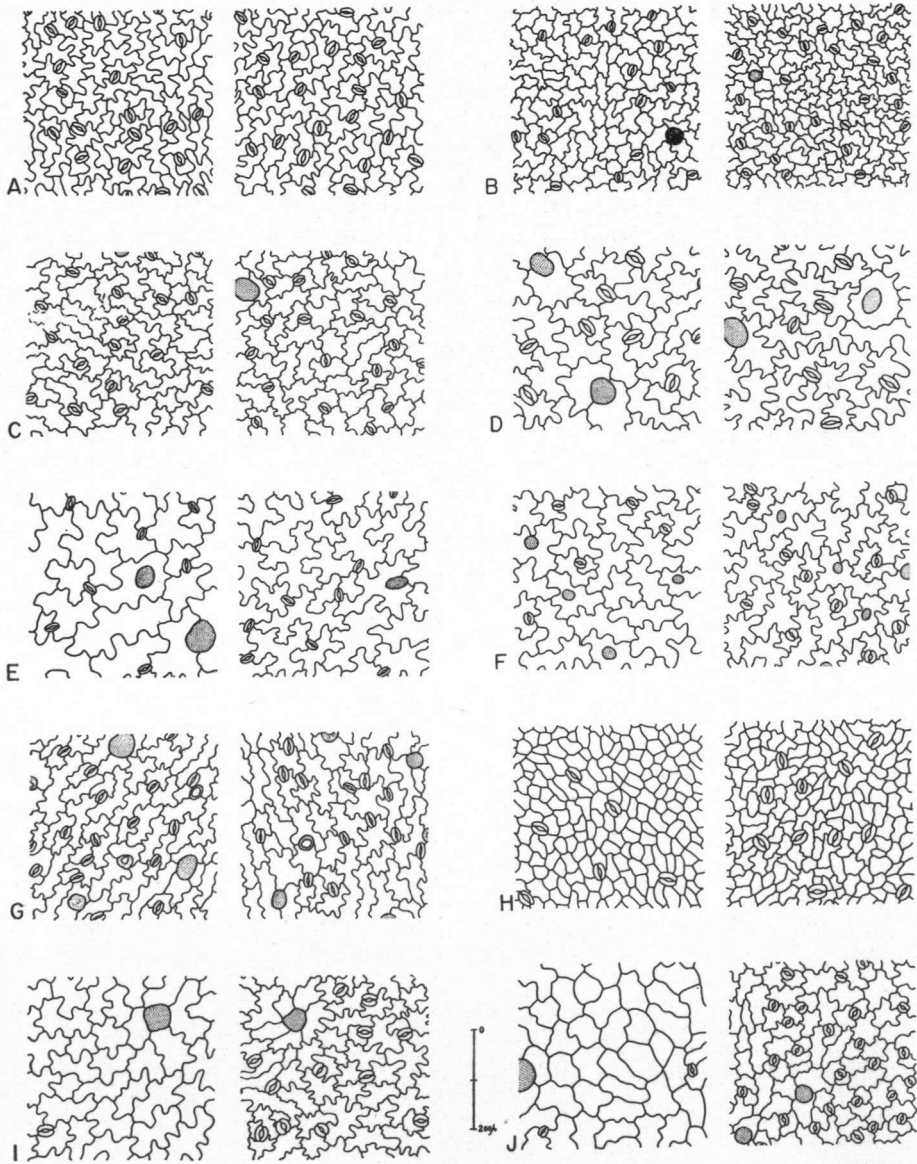


PLATE XXII. — Section Dissitiflorae. Leaf epidermal surfaces, upper to left, lower to right. A. *Blumea bovei* (DC.) Vatke, Abyssinia, *Schimper 1842* (L). B. *B. cafra* (DC.) Hoffm., S.W. Africa, *Rodin 2145* (UC). C. *B. obliqua* (Linn.) Druce, India, Madras, *Wight 1423* (E). D. *B. bifoliata* (Linn.) DC. India, *Wight 1425* (E). E. *B. diffusa* R. Br. ex Benth., Australia, *Specht 743* (US). F. *B. tenella* DC., Java, *Bakhuizen van den Brink 5587* (L). G. *B. integrifolia* DC., Australia, *Specht 1052* (US). H. *B. angustifolia* Thw., Ceylon, *Thwaites C. P. 691* (P, type). I. *B. stenophylla* Merr., Philippines, Bohol, *Bur. Sci. 43281 Ramos* (UC, type). J. *B. saxatilis* Zoll. & Mor., Java, *Zollinger 2233* (P, type).

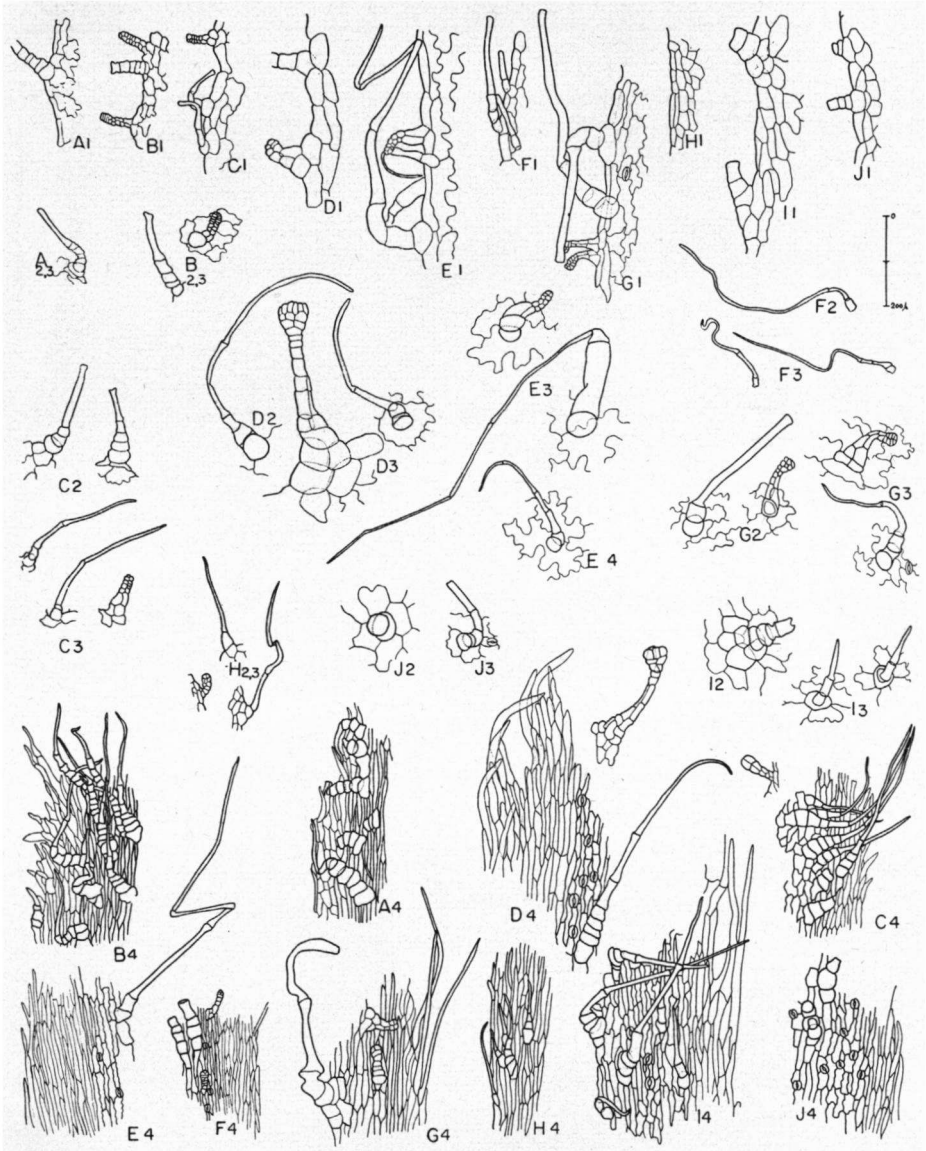


PLATE XXIII. — Section Dissitiflorae. For explanation of A—J and voucher specimens see Plate XXII. In each case, 1 represents leaf margins, 2 trichomes on upper laminar surface, 3 trichomes on lower laminar surface, and 4 portion of phyllary (dorsal surface).

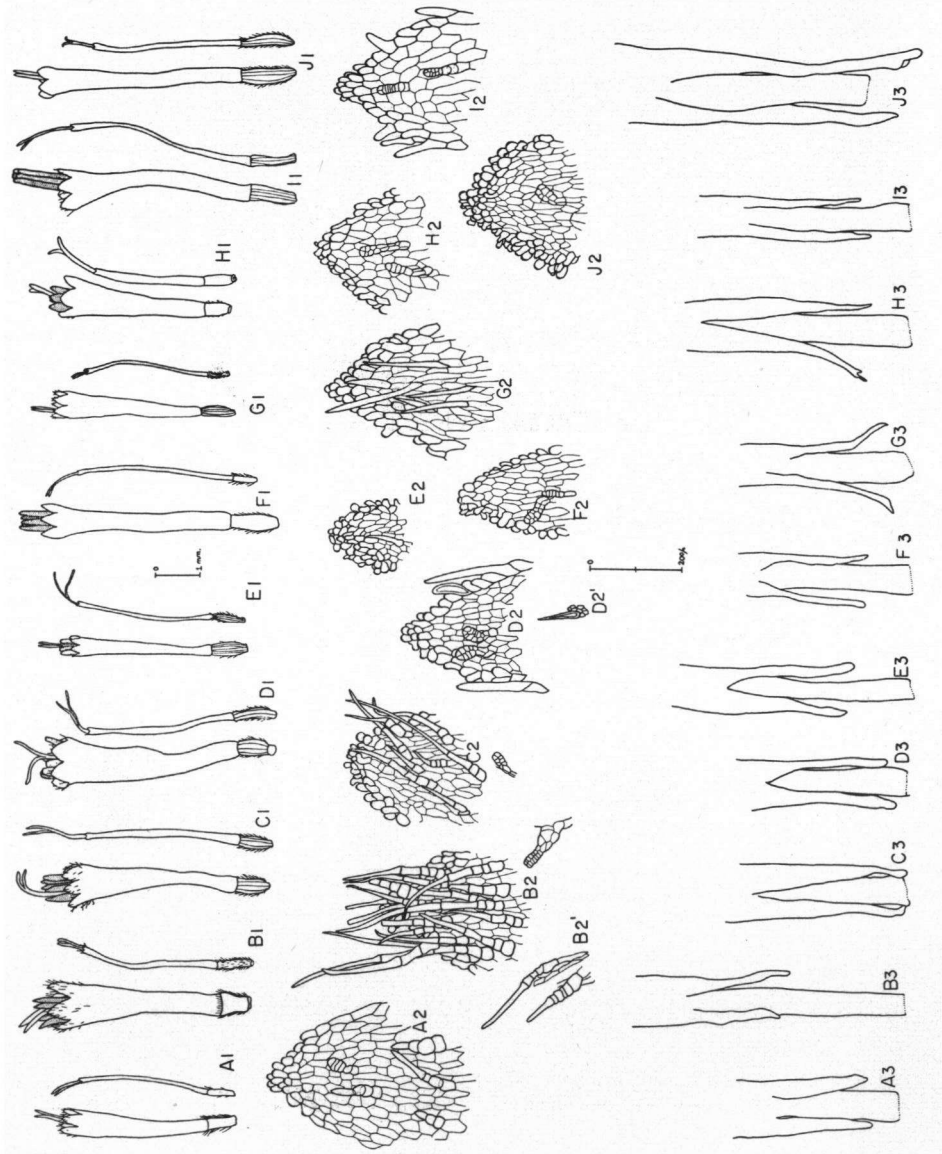


PLATE XXIV. — Section Dissitiflorae. For explanation of A—J and voucher specimens see Plate XXII. In each case, 1 represents florets, bisexual to left, female to right, 2 corolla lobes of bisexual florets, 2' corolla lobes of female florets, and 3 anther tails.

TAXA AND NAMES OF UNCERTAIN STATUS

The materials for the following names and taxa were not available for study and are consequently not included in the systematic treatment.

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- Blumea serrata** Chiov. Fl. Somala. 2: 259. 1932.
- Blumea sikkimensis** Hook. f. Fl. Brit. Ind. 3: 268. 1882.
- Blumea sinuata** Merr. Trans. Am. Phil. Soc. n.s. 24 (II): 388. 1935.
- Blumea solidaginoides** DC. Prodr. 5: 443. 1836.
- Blumea somaliensis** Thellung, Vierteljahresschr. Nat. Ges. Zürich 68: 443. 1923.
- Blumea subalpina** Lautb. in Fedde, Repert. 13: 241. 1914.
- Blumea subracemosa** Boerl. Handl. Fl. Ned. Ind. 2 (1): 238. 1891.
- Blumea sumbawensis** Boerl. l. c. 239.
- Blumea suessenguthii** Merxm. Mitt. Bot. Staatssamml. München 2: 35. 1950.
- Blumea tomentosa** A. Rich. Tent. Fl. Abyss. 1: 394. 1847.
- Blumea velutina** Levl. & Vant. in Fedde, Repert. 8: 401. 1910.
- Blumea vestita** Kitamura, Bot. Mag, Tokyo 55: 345. 1941.
- Blumea viminea** DC. Prodr. 5: 442. 1836.

EXCLUDED SPECIES¹

- Blumea alata* DC. = **Laggera alata** Sch.-Bip.
- Blumea arnottiana* Steud. = **Inula cappa** DC.
- Blumea aurita* DC. = **Laggera aurita** Sch.-Bip. *ex* Schw.
- Blumea baccharoides* Sch.-Bip. = **Pluchea dioscorides** DC.
- Blumea bojeri* Baker = **Laggera aurita** Sch.-Bip. *ex* Schw.
- Blumea chinensis* Hook. & Arn. = **Inula cappa** DC.
- Blumea crassifolia* Sch.-Bip. = **Laggera crassifolia** Sch.-Bip. *ex* Hochst.
- Blumea compactiflora* Levl. & Vant. = *cf.* **Conyza japonica** Less.
- Blumea conyzoides* Levl. & Vant. = **Conyza viscidula** Wall. *ex* DC.
- Blumea copelandi* Elm. = *cf.* **Conyza japonica** Less.
- Blumea flava* DC. = **Blumeopsis falcata** (D. Don) Merr.
- Blumea gariepina* DC. = **Laggera gariepina**
- Blumea grandiflora* Zipp. *ex* Span. = **Capparis spinosa** Linn.
- Blumea guineensis* DC. = **Laggera aurita** Sch.-Bip. *ex* Schw.
- Blumea oloptera* DC. = **Laggera oloptera**
- Blumea phagnaloides* A. Rich. = **Phagnalon scoparium** Sch.-Bip. *ex* Schw.
- Blumea pterodonta* DC. = **Laggera purpurascens** Sch.-Bip. *ex* Hochst.
- Blumea purpurascens* A. Rich. = **Laggera purpurascens** Sch.-Bip. *ex* Hochst.
- Blumea pappii* Gandoger = **Erythraea**
- Blumea salvifolia* DC. = **Laggera salvifolia** Sch.-Bip. *ex* Hochst.
- Blumea senecionoides* Edgw. = **Pulicaria foliolosa** DC.
- Blumea senegalensis* DC. = **Conyza senegalensis** Willd.

¹ Synonymy mainly after Index Kewensis.

- Blumea tetraptera* Rolfe = *Laggera alata* Sch.-Bip.
Blumea trisulca DC. = *Conyza stricta* Willd.
Blumea vernonioides DC. = *Laggera alata* Sch.-Bip.

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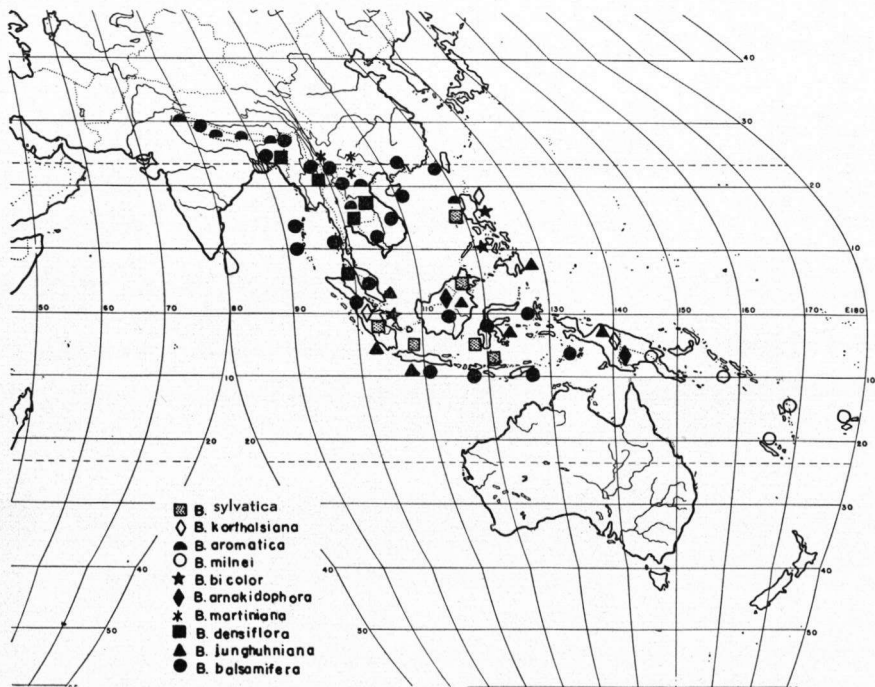
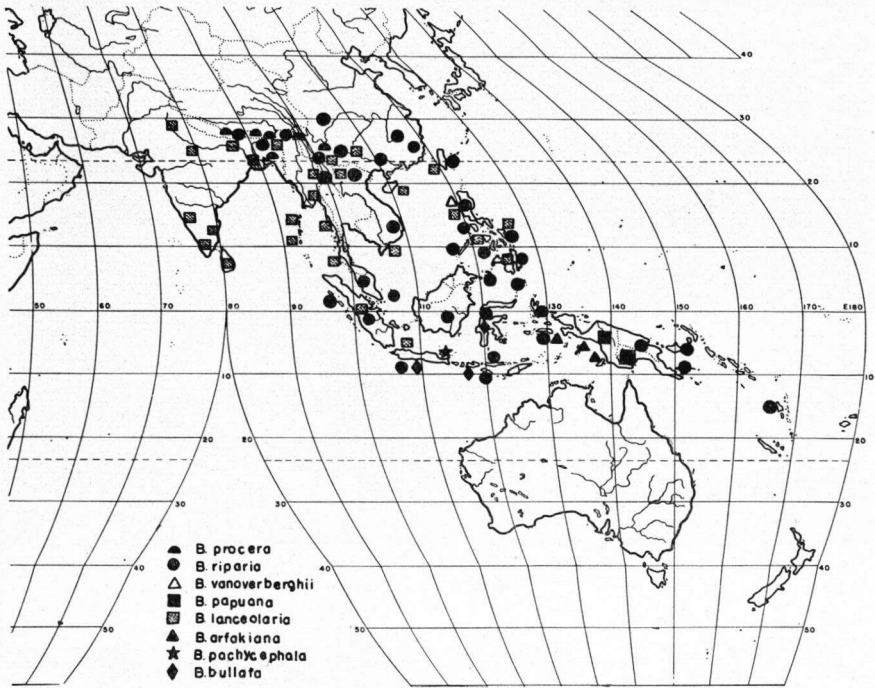
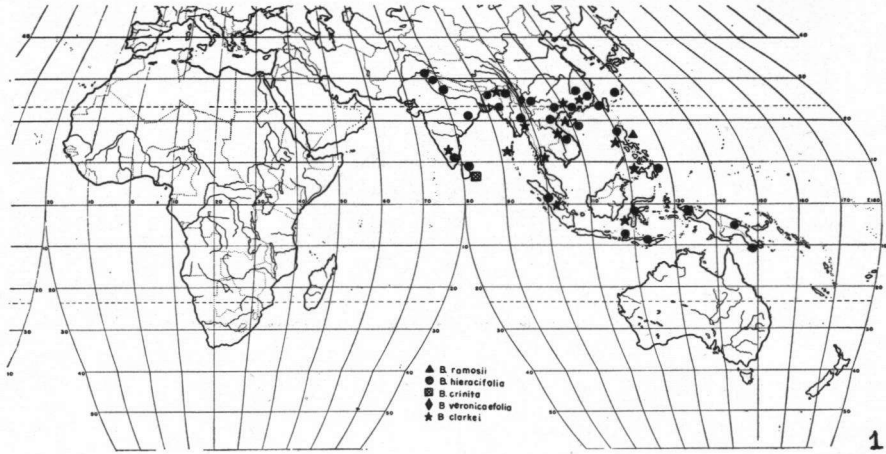
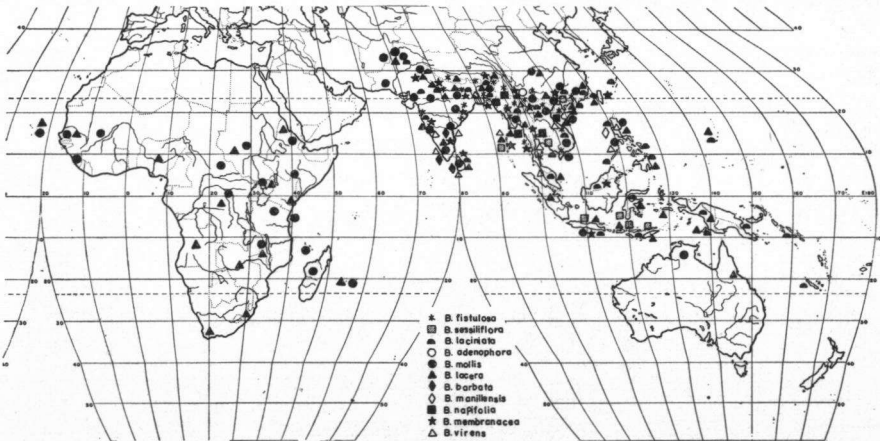


PLATE XXV. — Geographic distribution of *Blumea*. 1. Section *Semivestitae*. 2. Section *Macrophyllae*. (Goode's series of base maps, University of Chicago Press).



1



2

PLATE XXVI. — Geographic distribution of *Blumea*. 1. Section *Hieraciifoliae*. 2. Section *Paniculatae*. (Goode's series of base maps, University of Chicago's Press).

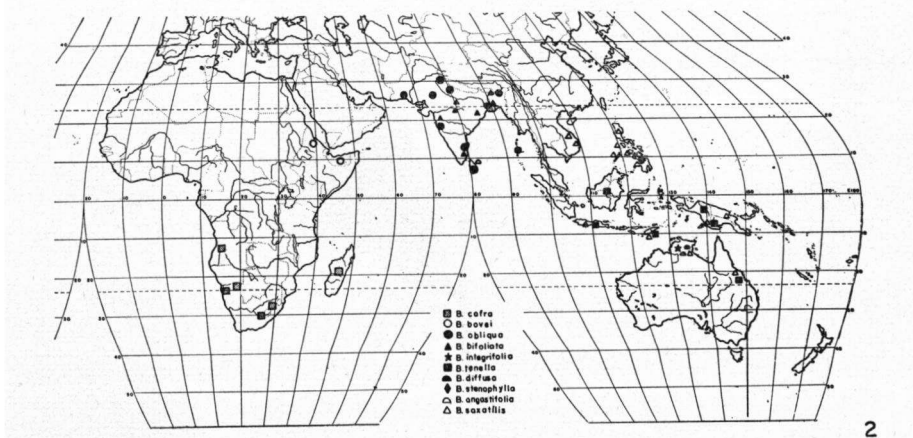
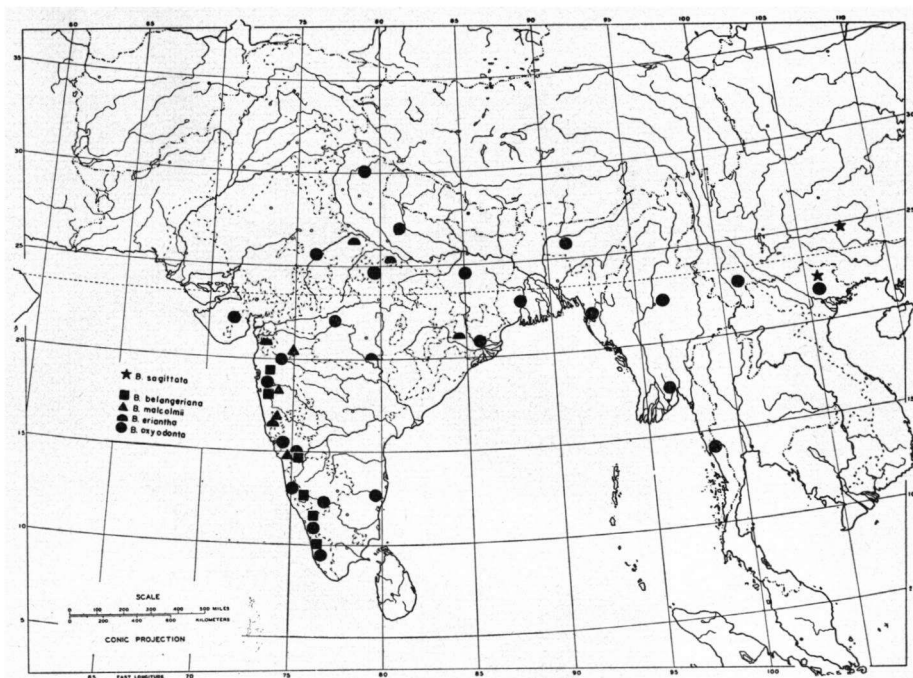


PLATE XXVII. — Geographic distribution of *Blumea*. 1. Sections Oxyodontae and Sagittatae. 2. Section Dissitiflorae. (Base map for 1 by R. B. Hall; for 2 by J. P. Goode).

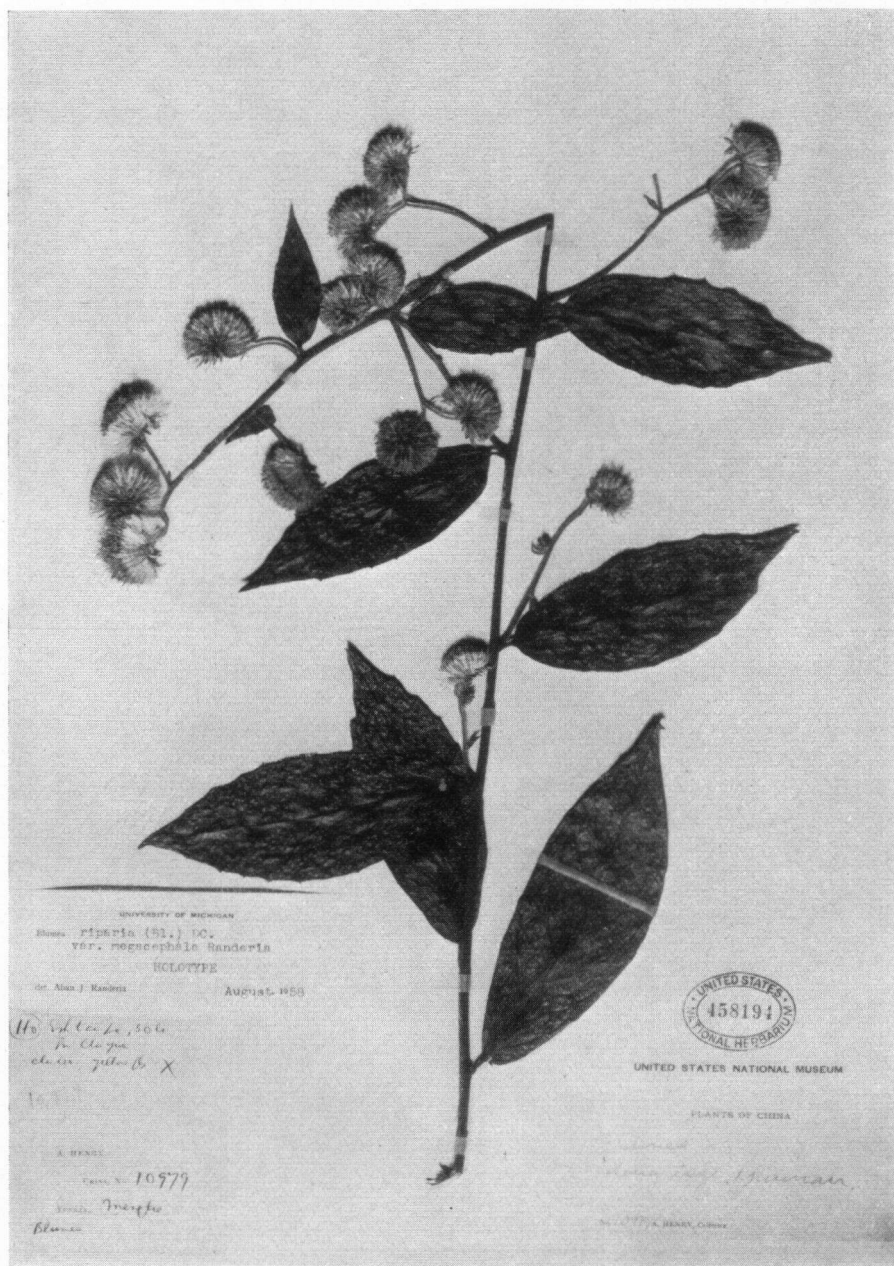


PLATE XXVIII. — Representative specimen of *Blumea riparia* (Bl.) DC. var. *meacephala* Banderia — holotype. China, Chi-Yuan, Yunnan Province, A. Henry 10779 (US).

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(21); Duthie 216 (27), 845 (29), 1705 (29), 4697 (42), 4697 A (42), 4698 (29), 6418 (42), 6420 (34), 6420 (35), 6971 (34), 6975 (34), 6979 (45), 8314 (34), 8315 (34), 8315 (35), 8318 (29), 8321 (34), 9525 (25), 9526 (27), 9526 (38), 9527 (39), 9528 (34), 9529 (29), 10426 (5), 10427 (25), 10428 (34), 10429 (34), 10432 (45), 10433 (30), 10435 (29), 10436 (29), 18427 (25), s.n. (21), s.n. (25), s.n. (29), s.n. (39); Dijk, van 48 (2); Dymock s.n. (38); — Ebaló 877 (21), 1077 (2); Eberhardt 1371 (5), 2806 (29), 3264 (5), 4032 (27), 4804 (30); Edaño 11880 (5), 13038 (35), 15612 (27), 17825 (5), 18042 (27), 21892 (5); Edgeworth 53 (29), 58 (27), 5003 (34), 5010 (34), 5012 (42), s.n. (25), s.n. (27), s.n. (29), s.n. (38); Ehrenberg s.n. (40); Ejiofor FHI 19816 (29); Elbert 32 (9), 540 (30), 584 (30), 1612 (9), 1849 (17), 2037 (17), 2504 (18), 2721 (2), 2789 (18), 2791 (27), 2792 (2), 2960 (18), 3037 (2), 3199 (2), 3524 (18), 3569 (17), 3570 (18), 3582 (26), 3588 (17), 3631 (27), 3637 (18), 6785 (9), s.n. (18); Elliott s.n. (29), s.n. (38); Elmer 5614 (18), 5621 (27), 5732 (35), 7040 (18), 7387 (10), 8212 (18), 8231 (5), 8232 (24), 8762 (9), 8791 (9), 8827 (29), 9762 (18), 9782 (2), 11094 (21), 11139 (21), 13248 (30), 13863 (2), 20086 (18), 20500 (2), 21846 (18); En 2123 (21), 2289 (21), 2462 (29), 2675 (21), 2848 (21); Enderit 111 (18); Eng 2731 (2); Esquirol 438 (2), 3942 (15), 4032 (21), s.n. (2), s.n. (25); Eyma 397 (30), 416 (21), 1091 (18), 1117 (2), 1545 (9), 3240 (18), 3752 (26), 5320 (5); — Faber 262/408 (30); Farges s.n. (18); Falconer 478 (25), 487 (5), 447.490 (18); Faurie 874 (21), 877 (27), 879 (5), 896 (30), 1495 (27), 8132 (5), 8403 (29), 8404 (21), 15815 (27); Feng 335 (2); Fernandes 168 (5); Fischer 47 (29), 128 (30), 572 (29), 825 (42), 845 (43), 865 (34), 1493 (29), 1570 (35), 1594 (35), 1618 (35), 1625 (29), 1802 (34), 1821 (39), 1831 (5), 1919 (34), 2438 (36), 2961 (21), 3855 (36), 4115 (42), 4173 (42), 4425 (34), 4780 (42), s.n. (11), s.n. (21), s.n. (34); Fischer & Gage 44 (34); Fitzgerald 1351 (29); Fleming 809 (25); Floyd 6604 (2); Fong 17 (2); Forbes 350 (18), 1244 (2), 2176 (9); For. Bur. 5869 (29), 5874 (49), 16488 (30), 18116 (9); Ford 403 (27), s.n. (25), s.n. (29); For. Dept. 9763 (18); Forrest 7560 (23), 9602 (2), 9681 (2), 9752 (1), 12153 (33), 12246 (5), 13618 (34), 13683 (21), 21072 (1), 26210 (2); Forsten 67 (17), s.n. (18); Fortune 173 (29); Fosberg 37049 (21), 37819 (30), 37820 (21); Fox 13444 (18); Foxworthy 92 (32), 123 (35), 608 (18); Frake 20331 (18); Franc 386 bis (18), 456 bis (12); Franquerville s.n. (30); Fryar 3646 (30); Fung 20274 (21); Fung Hom 11 (5); Furet 147 (2), 149 (27); Fyson 4206 (21), 4222 (21), 4224 (21); — Gage 98 (16), s.n. (18), s.n. (29); Gall 83 (9); Gallatly 685 (25); Galoengi 45 (9); Gamble 476 D (18), 2433 b (26), 2470 A (25), 2484 B (25), 5833 A (30), 6742 B (34), 6585 B (5), 7164 (11), 7727 (30), 7758 (34), 8955 (39), 8989 (25), 10136 (34), 10143 (39), 10264 (1), 10885 (43), 10939 (35), 11304 (34), 11730 (21), 11743 (21), 11783 (29), 12048 (21), 12806 (42), 13741 (25), 13840 (29), 13844 (34), 13844 (35), 14000 (35), 14068 (25), 14127 (34), 14184 (43), 14433 (21), 15968 (34), 16159 (21), 16238 (21), 16368 (38), 16438 (42), 17253 (21), 18591 (43), 18624 (42), 18703 (25), 22534 (34), 22736 (27), 23446 (30), 24009 (34), 24202 (29), 24376 (21), 24473 (39), 25300 (34), 25306 (34), 25674 (11),

26516 (21), 27510 (34), s.n. (21), s.n. (43); Gammie 215 (34), 288 (30), 294 (30), Gardner 395 (22), 397 (22), 1216 (30), s.n. (21); Garrett 935 (25), 1121 (16), 1447 (18); Gaudichaud 39 (2), 112 (27), 119 (43), 204 (18), s.n. (2), s.n. (18); Geoffray 417 (30); George 1703 (42); Gerrard 355 (41); Gibbs 7561 (24); Gill 566 (20); Gillett 4647 (40); Ging 7075 (24); Gjellerup 238 (6), 313 (2); Glendow s.n. (30); Gosswiler 1220 (30); Goughs s.n. (30); Graeffe s.n. (12); Grevenstuck 7 (30), 54 (2); Griffith 980 (34), 3142 (43), 3143 (18), 3143 b (16), 3145 (25), 3145 (26), 3146 (1), 3146 (5), 3150 (11), 3151 (39), 3152 (27), 3153 (34), 3154 (42), 3155 (34), 3155 (35), 3157 (29), 3157/1 (30), 3160 (21), 3163 (1), s.n. (21), s.n. (24), s.n. (25), s.n. (26), s.n. (29), s.n. (30); Groff 2204 (29), 4417 (18); Gyldenstolpe s.n. (21); — Hack 550 (34); Haines 345 (25), 347 (18), 538 (34), 586 (25), 600 (39), 601a (38), 762 (38), 4038 (35), 4350 (34), 4832 (34), 4834 (42), 4895 (30), 4896 (38); Hallier 163 b, c (30), 443 (2), 454 (2), 472 (2), 472 (9), 473 (8), 621a (24), 4050a (18), 4454 (2), s.n. (2), s.n. (8), s.n. (27); Hamel 1172 (18); Hamel & Toroes 493 (13); Hamilton 1396 (39), 1885 (21), 1889 (21), 1892 (25), 1893 (34), 1894 (38), 1895 (29), 1897 (29), 1901 (27), 1902 (27); Hancock 6 (21), 249 (25), 481 (11), 550 (27); Handel-Mazetti 5891 (25); Haniff & Nur 4054 (30); Hann 68 (29), 91 (44); Harmand 893 (33), 1329 (16); Harreveld, van 8939 (2), s.n. (30); Harsukh 22238 (39), 22245 (21), 23112 (34); Hartal 223 (29); Harvey s.n. (18), s.n. (21); Hasselt, van 2 (8); H. B. s.n. (17); Heinig 230 (2), 516/683 (30); Heinig & Gammie 11 (42), 47 (42); Helfer 197 (35), 3146 (1), 3162 (25); Hellwig 298 (14); Helms 106 (29); Henderson 19604 (17), 29120 (34); Henry 181 (5), 229 (27), 418 (18), 621 (19), 674/1727 (30), 721 (5), 1198 (30), 1810 (27), 8613 (21), 9306 (27), 9656 (27), 10127 (11), 10127 A (11), 10188 (35), 10188 bis (35), 10356 (25), 10356 A (25), 10405 (15), 10405 (15), 10405 B (15), 10481 (1), 10481 A (1), 10766 A (21), 10799 (21), 10817 (27), 10863 (30), 10897 (29), 10979 A (1), 10979 (2), 10979 A (2), 10979 C (2), 11587 (1), 11587 A (1), 11670 (21), 11672 (21), 11677 (11), 11730 (5), 11730 A (5), 11811 (2), 11811 A (2), 11912 (39), 11971 A (29), 11974 (29), 12332 (18), 12844 (21), 12854 (11), 12951 (1), 12952 (11), 12952 (18), 12954 (34), 12954 A (34), 12955 (29), 13284 (27), 18109 (2), s.n. (2), s.n. (11), s.n. (18), s.n. (27); Hens 93 (29); Herb. Econ. Prod. 17435 (18), s.n. (38); Herre 368 (2); Heudelot 10 (30), 670 (30), 677 bis (30), s.n. (30); Hildebrandt 1012 (29), 1642 (29), 3105 (29), 3141 (29), 3539 (29); Hill 149 (2); Ho 6016 (24); Hochreutiner 1292 (18); Hoek 511 (21), 552 (16), 741 (5), 758 (16); Hohenacker s.n. (29), s.n. (39); Hole 120 (34); Holland 2109 (29); Hollrung 871 (30); Holstvoogd 161 (8), 211 (8), 435a (17), 442 (27), 485c (30), 509a (30), 519a (2), 750 (18), 754 (17); Hombron s.n. (18); Hoogland 4290 (21); Hoogland & Pullen 5990 (21); Hooker 386 (34), s.n. (1), s.n. (2), s.n. (5), s.n. (11), s.n. (18), s.n. (21), s.n. (24), s.n. (25), s.n. (27), s.n. (29), s.n. (34), s.n. (38), s.n. (39), s.n. (43); Hooker & Thomson s.n. (16), s.n. (25), s.n. (27), s.n. (30), s.n. (35), s.n. (39), s.n. (43); Hooper & Ramaswami 39415 (29); Horsfield 19 (30), 23 (25), s.n. (45); Hosseus 294 (25), 482 (30); Houwing 2 (45), 44 (30), 841 (30), 842 (30), s.n. (30); How 70339 (18), 70531 (30), 71325 (29), 71410 (30), 71687 (21), 71707 (21), 71991 (27); How & Chun 70049 (35), 70191 (35), 70192 (25); Hu 7805 (29); Huk 136 (18), s.n. (43); Humbert 656 (29), 4923 (29), 8180 bis (29), 11483 (29), 18535 (29); Humbert & Cours 17558 (29); Humbert & Swingle 5423 (41); — Iboet 40 (2), 89 (2), 190 (17), 249 (2), 323 (18), 353 (2), 407 (17), 412 (2); Idenburg 35 (18); Idjan 45 (9), 72 (6), 96 (2); Inayat 20976 (29), 20980a (45), 22220 (27), 22227 (29), 22227a (29), 22229 (29), 22232 (34), 22232a (34), 22233 (30), 22240 (39), 22240a (39), 22242 (34), 22244 (21), 22244a (21), 22244b (21), 22244c (21), 22255 (30), 23685 (21), 23688 (39), 23692 (27), 25910 (21); Iwan s.n. (27), s.n. (30); — Jaag 311 (21), 913 (18), 1316 (21); Jacquemont 9 (27), 63 (34), 323 (27), 388 (39), 1053 (39), 1056 (29); Jafri C-14 (42); Jain & Bharadwaja 22558 (27); Jameson 508 (39), s.n. (21), s.n. (30); J. E. K. 698 (8); Jenkins s.n. (5), s.n. (16), s.n. (18), s.n. (21), s.n. (30), s.n. (34); Jensen 3 (41), 156 (18), 337 (2), 360 (17); J. L. s.n. (2); Junghuhn 50 (2), 310 (49), 313 (8), 321 (9), 332 (49), 342 (30), 350 (17), 366 (17), 382 (2), 392 (18), s.n. (17), s.n. (18), s.n. (30); — Kadir A 1676 (14), A 2847 (18), A 3551 (18); Kajewski 215 (12), 1640 (12), 1768 (2), 2535 (12); Kanjilal 21 A (27), 6812 (2); Karsten 4 (30); Karta 389 (18); Katsumada 21930 (18), 22022 (29); Katsumata 6641 (21), 7850 (29), 7965 (18), s.n. (21); Kaudern 78 (17), 83 (2), 222 (2); Kawagoe s.n. (21), s.n. (30); Keenan s.n. (24), s.n. (29); Kerr 940 (25), 941 (34), 1675 (11), 3923 (33), 3945 (30), 4870 (33), 5008 (16), 5219 (21), 6737 (30), 6744 (35), 8412 (25), 8483 (49), 9499 (2), 10319 (35), 10535

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(30); Koorders 14954 β (9), 16423 β (17), 16429 β (17), 16430 β (9), 16433 β (9), 16454 β (2), 16460 β (18), 16461 β (2), 16462 β (2), 16498 β (9), 16522 β (27), 16523 β (9), 16528 β (2), 20546 β (27), 20547 β (2), 20548 β (2), 20553 β (26), 20563 β (18), 22211 β (17), 22984 β (17), 24501 β (2), 24523 β (30), 24901 β (30), 25143 β (18), 27860 β (30), 29182 β (2), 31129 β (2), 31295 β (30), 31818 β (9), 31824 β (9), 31910 β (2), 37388 β (2), 40890 β (2); Koorders & Koorders-Schumacher 43312 (26), 44161 β (2); Kornassi 917 (6), 1346 (18); Korthals s.n. (2), s.n. (8), s.n. (9), s.n. (10), s.n. (17), s.n. (18), s.n. (45); Kostermans 2603 (2), 4007 (45); Krauss 227 (41); Krone s.n. (30); Kudo & Suzuli s.n. (18); Kuntze 3394 (27), 3605 (2), 3626 (35), 3640 (18), 4218 (30), 4248 (30), 4345 (30), 4437 (8), 4819 (9), 5133 (9), 5207 (2), 5416 (8), 5637 (9), 5870 (8), 5920 (27), 7371 (43), 7424 (39), 7503 (29), 7513 (38), 7514 (29), 7525 (38), 7533 (37), 7572 (39), 7573 (38), 7574 (39), 7577 (29), 7617 (34), 7618 (36), 7627 (29); Kurz 52 (39), 899 (18), 901 (25), 902 (25), 903 (24), 904 (34), 905 (34), 906 (39), 907 (34), 910 (29), 913 (29), 913/6 (30), 2242 (34), 2244 (29), 2245 (25), 2247 (35), 2248 (5), 2250 (25), 2436 (2), s.n. (2), s.n. (5), s.n. (8), s.n. (18), s.n. (25), s.n. (27), s.n. (29), s.n. (30), s.n. (34), s.n. (35), s.n. (39), s.n. (42), s.n. (43); — Lace 2744 (25), 2801 (18), 3140 (21), 3170 (21); Lam 2420 (2), 2660 (18); Lambert s.n. (1), s.n. (34); Langlasse 44 (2); La Rue s.n. (2); Lau 626 (2), 709 (24), 921 (26), 1146 (34), 1258 (18), 1336 (25), 2326 (2), 3378 (48), 3650 (29), 3833 (29), 4082 (21), 4385 (24), 4704 (2), 5289 (24), 5475 (5), 5548 (29), 6034 (29), 20054 (26); Law s.n. (24), s.n. (30), s.n. (34), s.n. (36), s.n. (37), s.n. (38), s.n. (39); Lawrie 11853 (34); Lawson 242 (31), s.n. (36), s.n. (39); Lebrun 3715 (30); Ledermann 8554 (2); Lefèvre 891 (33); Legendre 826 (29); Le Guillou s.n. (30); Lei 480 (18), 527 (5), 751 (21), 794 (29), 1142 (29), 1207 (21), 1436 (21); Leschenault 104 (29), 146 (30), s.n. (18), s.n. (26), s.n. (29), s.n. (30); Le Testu 312 (29), 4507 (29); Levine 324 (21), 344 (24), 1940 (29), s.n. (21); Levine & Groff 148 (2); Liang 61642 (18), 64685 (21), 65068 (29), 65200 (5); Lindhard 57 (34), 59 (25), 60 (25); Lindley s.n. (5), s.n. (25); Lin Fa Shan 25944 (11); Ling 2878 (30); Lin Pi 6528 (27); Linsley-Gressitt 8 (18); Lister 27 (34), 152 (16), 342 (5), s.n. (2), s.n. (18); Loher 3631 (49), 3646 (32), 3648 (5), 3652 (21), 3653 (30), 3656 (29), 3658 (24), 6453 (29), 14329 (5), s.n. (13), s.n. (18); Lörzing 1281 (9), 4860 (21), 5929 (2), 6289 (2), 8221 (9), 13043 (30); Lowe s.n. (30); Lowrie 83 (36), 4699 (29); Ludlow, Sheriff & Hicks 18510 (11), 20504 (27); Luerssen s.n. (12); Lütjeharms 4208 (2), 4835 (27); Lynes s.n. (29); — Macé s.n. (29), s.n. (30), s.n. (43); McGregor 112 (18), 1155 (34), 1168 (25), 1170 (16), 1176 (2), 1299 (5), 1305 (27); Macrae 62 (29); Madden 9 (34), 501 (25), 502 (30), 503 (27), 507 (34), s.n. (25); Mahindra Nath 437 (29); Maire 2530 (27), 2591 (27), s.n. (30); Mairat 2145 (30), s.n. (30); Manders s.n. (25); Mangubat 465 (18); Mani 179 (29); Mann 241 (5), 305 (18), 715 (16), s.n. (30); Marche 24 (18); Maries 28 (38), 192 (42); Markan 2019 (18), 3929 (35); Marten 1901 (25), s.n. (25); Mason 756 (34), 759 (30); Masters s.n. (18), s.n. (21), s.n. (25), s.n. (35); Mathur s.n. (29); Matthew s.n. (10); Matthews s.n. (17); Maxwell-Darling 207 (40); McCann 1910 (29), 1923 (34), 1945 (34), 1951 (37), 4012 (39), 4013 (29), 4015 (38), 4159 (37); McClelland s.n. (25), s.n. (29), s.n. (33), s.n. (34); McClure 3537 (2), 7066 (21), 9154 (18), 13591 (25), McDonald s.n. (40); Mearns 190 (18), 3043 (30), 3050 (29); Mecbold 795 (35), 926 (18), 2643 (39), 6060 (2), 7560 (34), 8269 (35), 8336 (24), 8434 (34), 8442 (36), 10647 (43), 12099 (31), 13314 (21), 14068 (34), 14311 (18), 15306 (5), 16530 (11), 17309 (34), 17318 (26), 17320 (39); Meer, van der 308 (25), 1040 (25), 1782 (25); Meer, van der & den Hoed 678 (45), 711 (30); Mendoza & Convocar 10223 (2); Merrill 27 (30), 208 (30), 257 (27), 279 (18), 439 (18), 445 (18), 565 (27), 622 (35), 631

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(49); Mukerji 1 (29), 3 (27), 3 (35), 332 (27); Munro s.n. (41); Murton 129 (30); — Naito s.n. (5); Nakahara 29 (2); Narayana s.n. (29), s.n. (30), s.n. (43); Nelson 338 (27); Noorudin 6704 (18); Nur 18889 (27), 34322 (2); — Oerry s.n. (30); Oldham 249 (21), 250 (27); Osenaston 1461 (5), s.n. (5); Ouwehand 228 (2), 277 (17), 277a (17), 379 (2); — Palmer & Bryant 794 (5), 1064 (8), 1238 (9); Pancher s.n. (12), s.n. (27), s.n. (29); Panda 292 (21); Paniza 9403 (2); Pappi 247 (30); Parish 113 (5), 424 (25); Parker 3200 (18); s.n. (11); Parkinson 14067 (18); Parry 584 (25), 1204 (29); Pattanayak s.n. (25); Payfair 373 (18); Pearson 3836 (41); Pease 20212 (29); Perottet 24 (21), 222 (39), s.n. (29), s.n. (42), s.n. (43); Perrier de la Bathie 252 (29), 333 (29), 2777 (29), 3268 (29), 3357 (41), 3414 (41), 16443 (29); Pételot 364 (29), 399 (34), 1125 (30), 1127 (18), 1129 (30), 1215 (2), 1222 (2), 1227 (18), 1228 (21), 1233 (2), 1544 (25), 1764 (11), 2050 (21), 2059 (33), 2073 (21), 2077 (27), 2078 (21), 2084 (29), 2085 (29), 2085 (30), 2092 (39), 2093 (21), 2112 (29), 3187 (11), 3188 (16), 3385 (2), 3772 (25), 3775 (30), 3875 (35), 4611 (21), 5542 (30), 6540 (30), s.n. (5), s.n. (15); Phillips 1897 (40); Pierre 443 bis (27), 1063 (33), 1068 (5), 1071 (29), 1103 (30), s.n. (5), s.n. (25), s.n. (29), s.n. (30), s.n. (35); Pirie 44 (30); Playfair 348 (30); Ploem s.n. (8), s.n. (9), s.n. (26); Pleyte 609 (2), 1072 (6); Po 12390 (29); Poilane 1173 (18), 1263 (25), 1843 (21), 2329 (19), 2489 (27), 5943 (25), 9641 (35), 14520 (26), 16276 (26), 17218 (15), 17258 (2), 18780 (2), 18784 (1); Po Khant 1130 (33), 1132 (30); Polunin, Sykes & Williams 1806 (29); Popta 85/9 (29), 459/13 S (26), 466/139 (30), 472/141 (29), 878/225 (2); Pourret s.n. (21); Posthumus 546 (18), 591 (5), 592 (18), 699 (2), 3135 (21); Pottinger s.n. (2), s.n. (5); Powell 104 (12); Praetorius s.n. (18), s.n. (45); Prain 67 (2), 1500 (5), s.n. (25), s.n. (30), s.n. (34), s.n. (35); Prain's coll. 474 (27), 480 (5), 755 (5), s.n. (35); Prasad s.n. (30); Pratt 815 (2); Prazer 35 (25); Priaman 1044 HB (2), 1045 (5), 2485 HB (2); Price 1090 (2); Pulle 3216 (2); Purselove 4376 (2), P 5500 (18); Put 2629 (33), 4424 (25), 4441 (5); — Qizilbash 35 (29); — Baap 328 (30), 357 (30), 620 (8), 740 (8), 856 (29), Radermacher s.n. (7), s.n. (30), s.n. (45); Rahmat 921 (2), 1568 (2); Raizada 15 (39), 68 (27), 2150 (27), 18540 (18), 21088 (36), 21710 (43), 23707 (29), s.n. (11), s.n. (27); Rama Rao 46 (36), 843 (5), 689 (31), 1620 (29); Rama Rao's coll. 1156 (39), 1903 (29); Ramaswamy 1355 (29); Ramchandani 1 (42); Ramos 1336 (2), 2086 (30); Randeria 585 (36), AR 591 (29), 593 (38), AR 594 (34), AR 600 (34); Rant 414 (9), 789 (17); Reillo 16289 (2), 16480 (17); Reinwardt s.n. (9), s.n. (17); Rémy 14 (36), 14 (39); Ribu 761 (18); Ribu & Rhomoo 6225 (11), s.n. (27); Richard 62 (30), 69 (30), 222 (22), 889 (29), s.n. (18), s.n. (26), s.n. (34), s.n. (37), s.n. (39); Ridley 8310 (34), 14901 (33), 14911 (30), s.n. (9), s.n. (27), s.n. (30), s.n. (34); Riedel s.n. (30); Riles s.n. (25); Ritchie 345 (34), 395 (34), 398 (36), 399 (39), 400 (38), 401 (29), 402 (30), 402/3 (35), 1815 (43), 1870 (24), s.n. (24), s.n. (36), s.n. (37), s.n. (42); R. O. 47 (35); Robertson 207 (25), 278 (11), s.n. (24); Robinson 415 (30), 416 (6), 417 (17), 421 (2), 1248 (29), 1309 (2), 1314 (35), 2458 (30); Rock 1599 (25), 2340 (2), 2361 (15), 2487 (25), 7959 (2); Rodin 540 (30), 2145 (41); Rogers 934 (25), 935 (34), 936 (34); Römer, van 167 (6), 301 (6), 869 (12), 958 (6), 983 (13); Ross 11436 (2); Rottler 290 (29); Rowland s.n. (30); Roxburgh s.n. (27), s.n. (35), s.n. (43); Roy 64 K (34); Royen, van 3947 (21); Royle 48 (11), 388 (39), 3105 (21), s.n. (29), s.n. (42); Rutten 30 (17), 110 (18), 119 (17), 251 (2), 274 (17); — Saboureau 4594 (29); Sacleux s.n. (29); Sailur 1603 (29); St. Hilaire s.n. (30); Saksena 1 (27), s.n. (34); Sampson 12815 (25); Santapau 538 (30), 1200 (38), 1453 (36), 3208 (34), 5717 (38), 5868 (34), 5899 (29), 6070 (39), 6126 (38), 8057 (34), 8185 (37), 8235 (38), 8346 (29), 8665 (36), 8817 (38), 9851 (36), 12176 (38), 12572 (36), 12733 (34),

12755 (34), 13902 (37), 15065 (34), 15109 (29), 15188 (34), 161.53 (39), 161.54 (39), 161.57 (36), 161.59 (38), 161.62 (38), 16515 (30), 17331 (38), 17332 (38), 17427 (29), 17492 (36), 17493 (30), 17893 (30), 18265 (29), 18440 (39), 18443 (39), 18447 (30), 18451 (38), 18454 (38), 18630 (35); Santos 4204 (18), 5000 (18), 5214 (18); Sapin 229 (8), 2103 (2), 2166 (8), 2214 (2), s.n. (9); Sargent s.n. (18); Sasaki 21409 (30), 21477 (21), 21544 (27), s.n. (27); Satacre s.n. (25); Sauliere 142 (34); Saunders 57 (12); Savinierre 101 (2), 475 (27); Sawyer 104 (27), 105 (27), 183 (30); Saxton 702 (34); Schiffner 2475 (9), 2749 (17), 2750 (30), 2753 (18), 2765 (8), 2787 (2), 2804 (2), 2814 (8), 2827 (9), 2843 (30), 2875 (30); Schimper 97 (17), 111 (40), 213 (30), 411 (40), 633 (29), 639 (29), 810 (30), 1297 (29), 1842 (40), s.n. (40); Schlechter 11693 (30), 13900 (49), 14817 (29), 16708 (2); Schmid s.n. (30), s.n. (43); Schmidt 161 (33); Schneider 1108 (29); Schoch 66 (29); Schomburgk 150 (30); Schultz 279 (44), 427 (46), 656 (44); Schultz-Bipontinus 227 (41), 777 (36), s.n. (18); Schutze s.n. (5); Schweickerdt & Verdoorn 550 (41); Schweinfurth 44 (40), 1069 (40), 1149 (30), 1250 (30), 2808 (30); Schweinfurth & Riva 1097 (40), 1105 (29); Scortechini s.n. (2); Scott Elliott 4484 (29); Sedgewick 2199 (30), 2200 (42), 2233 (43), 2487 (35), 3190 (39), 3268 (29), 3292 (36), 3392 (36), 3850 (42), 4582 (38), 4632 (37), 5714 (38), 5926 (35), s.n. (39), s.n. (39); Sedgewick & Belt 3818 (35); Sen s.n. (39); Shabetai 545 (40); Shah 1589 (42); Shaik Mokim 34 (25), 93 (1), 793 (94), s.n. (1), s.n. (16); Shantz 40 (30); Shimada s.n. (27); Shortridge 17395 (29); Simons s.n. (1), s.n. (2), s.n. (5), s.n. (18), s.n. (21), s.n. (25), s.n. (30); Simpson 8529 (30); Sinclair 3733 (5), 3867 (30), 3884 (27), 3954 (39), 3960 (33), 4052 (21); Sinclair & Kiah bin Salleh 40746 (2); Sm. 125 (2); Smales 33 (18); Smith 299 (34), 365 (33), 374 (29), 4798 (12), 5491 (12); Specht 614 (44), 743 (44), 845 (49), 1052 (46), 1188 (29); Spire 828 (25); Splitgerber s.n. (2); Steenis, van 61 (18), 762 (2), 775 (18), 5305 (45), 6634 (45), 7163 (9), 8777 (2), 9366 (9), 9436 (9), 10555 (30), 10650 (8), 11562 (45), 12473 (2), 18045 (49), 18401 (21), 18427 (18); Stewart 1675 (27), 1676 (21), 1677 (29), 1682 (27), 1684 (29), 13837 (29), 13854 (29), 14120 (29), 27282 (29), s.n. (30), s.n. (39); Steward & Cheo 560 (29), 1112 (2); Stocks s.n. (24), s.n. (25), s.n. (33), s.n. (39), 544 (42); Stocks, Law s.n. (5), s.n. (29), s.n. (30), s.n. (34), s.n. (35), s.n. (36), s.n. (37), s.n. (39), s.n. (42); Stoliczka s.n. (29); Stomps s.n. (2); Strachey & Winterbottom 2 (11), 3 (27), 4 (29), 7 (39); Strange s.n. (30); Squires 119 (33), 258 (21), 293 (30), 312 (34), 411 (2), 766 (29), 865 (18); Sukkur 29/3504 (29); Su Koe 9122 (1); Sulit 14350 (2); Surbeck 122 (18); Suzuki 9230 (2); Swinhoe s.n. (18); — Taam 108 (2); Tai 11230 (21), 11522 (21); Talbot 900 (24), 939 (39), 2262 (29), 2652 (36), s.n. (26), s.n. (29); Talmay s.n. (33); Talmy 59 (18); Tamayose s.n. (27); Tanaka 11 (30), 94 (21), 98 (21), 1721 (27), 1738 (2), 10290 (18); Tanaka & Shimada 11141 (21), 13463 (2), 13564 (5); Tanaki & Shimada 11139 (30); Tang 238 (2), 1181 (2), 1199 (29), 1458 (2), 4334 (29), 5467 (29), 5886 (2), 13877 (29), 16497 (29); Tang & Fung 17998 (34), 51. 19171 (2); Tanner 1046 (29), 1673 (29); Tate s.n. (29); Teysman 1569 (30); Thomas 8874 (30), 10125 (29); Thomson 341 (27), s.n. (18), s.n. (21), s.n. (26), s.n. (27), s.n. (29), s.n. (34), s.n. (39), s.n. (42), s.n. (43); Thomson-Eclipse s.n. (35); Thorel 3188 (49), s.n. (18), Thwaites 19 (21), 147 (22), 306 (21), 532 (21), 560 (34), 691 (47), 1730 (42), 1731 (31), 1732 (42), 1734 (30), 1735 (30), 1744 (5), 2557 (5), 2822 (27), 2822 (34), 3523 (43), 11030 (5), 11318 (22); Tikah 124 (42); To 11000 (29); Toppin 2528 (25), 3317 (29), 4443 (35), 6044 (16), 6329 (1), 6359 (16); Topping 50 (29), 85 (30), 107 (21), 140 (27), 142 (29); Toroes 1051 (30), 1648 (17), 2121 (30), 2487 (21), 2598 (30), 4232 (30), 5118 (30), 5466 (18); Tsang 144 (21); 353 (21), 734 (21), 15852 (21), 16620 (2), 16620 (24), 20690 (2), 20761 (11), 21990 (27), 23049 (2), 23075 (24), 23166 (2), 23223 (11), 24605 (2), 24819 (24), 24823 (21), 25795 (2), 25880 (24), 25962 (26), 27115 (2), 28058 (21), 28288 (2), 29139 (2), 29743 (29), 29745 (27), 29835 (18), 280.8939 (2), 214.16963 (29), 705.17454 (29); Tsang & Wong 14393 (2), 14644 (24), 14735 (29); Tsang & Fung 377 (21); Tsung & Wong 3186 (27); Tsui 51853 (2), 52616 (2), 55609 (2), 56969 (2); Tsiang 1264 (2), 9305 (2), 10405 (21); Tsui 62 (5), 393 (21), 694 (2); Tyson 1246 (29); — Umrao Singh 323 (11); Usteri s.n. 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s.n. (21), s.n. (22), s.n. (29), s.n. (34); Walker & Tawada 6813 (21), 6815 (30), 6846 (30); Walker-Arnott 931 (34), 980 (33); Wallich 3L51/161 (18), 108 d, e, o (18), 2076/186 (25), 2975/85b (42), 2996A/106A (1), 2997/107 (16), 3002/112 (25), 3003/113 (34), 3004/114 (29), 3011/121 (16), 3018/128 (21), 3019/129 (34), 3023/133 (39), 3025/135 (5), 3026/136 (5), 3043/153 (2), 3045/155 (30), 3050/140 (1), 3054/164 (11), 3055/165 (25), 3055/165c (25), 3075/185 (33), 3077/187 (34), 3082/192C (30), 3085/195 (27), 3087/197A (27), 3088/148 (35), 3089/199 (30), 3090/200 (29), 3093/203c (29), 3094/204 (26), 3098/208a (42); 3938/48 (21), s.n. (21); Walpers s.n. (21); Walt 5823 (30); Wang 314 (2), 324 (2), 366 (21), 23132 (29), 36349 (18), 60384 (15), 72549 (11), 73024 (21), 73608 (18); Wan-wen Ma 2335 (2); Warburg 4361 (18), 10318 (18), 11550 (30), 13519 (5), 14313 (30), 15097 (2), 17221 (27), 17223 (9), 21404 (2), 21407 (2), 21408 (17), 21410 (21), 21411 (6), 21747 (30); Waterhouse 81 (12); Waterlot 1478 (29); Watt 5119 (1), 5859 (2), 10458 (5), 14411 (29), s.n. (5); Welford s.n. (2); Welwitsch 2414 (41), s.n. (41); Wenger 408 (25), 411 (25); Went s.n. (2); Wenzel 1174 (2); Wharton s.n. (6); White 31951 (25); 31951 (43); Whitford 36 (18); Whiting & Stewart 87 (29); Whitmee 21 (12), s.n. (12); Whyte s.n. (29), s.n. (30); Wight 2/16 (5), 439 (5), 440 (29), 441 (29), 442 (30), 524 (34), 525 (30), 526 (34), 527 (35), 530 (30), 532 (39), 576 (34), 1421 (42), 1421 (43), 1423 (42), 1424 (43), 1425 (43), 1427 (29), 1429 (30), 1430 (35), 1431 (35), 1432 (30), 1433 (21), 1434 (25), 1435 (38), 1436 (39), 1561 (43), 1562 (29), 1563 (35), 1564 (36), 1565 (42), 1566 (42), 1567 (35), 1574 (34), 1575 (35), 1576 (21), 1576 (34), 1577 (34), 1578 (30), 1579 (43), 1581 (29), 1583 bis (39), 1584 (42), 1589 (5), 1589 bis (39), 2038 (29), 2044 (42), 2045 (29), 3092/202b (43), s.n. (24), s.n. (30), s.n. (34), s.n. (35), s.n. (37), s.n. (38), s.n. (42); Wilford 532 (18), s.n. (27); Wilkes s.n. (18); Williams 1797 (30), 2018 (29), 2019 (30), 2078 (24), 2305 (18), 2338 (2), 2607 (21), 2987 (21), 7152 (29); Wilson 3886 (21), 4963 (2), 4984 (29); Winckel 1357 (2), 1357 β (2), s.n. (8), s.n. (30); Winit 221 (5), 1652 (29); Winkler 2264 (18), 2785 (2); Winterbottom s.n. (30); Wisse 1157 (8); Witt 24 (34); WINT 11416 (5); Wong Ke 1475 (21); Wood 1957 (41), s.n. (25), s.n. (29); Woodrow s.n. (42); Woon 410 (24); Wright 316 (5), 274 (2), 354 (18), 428 (31), 1426 (31), 1573 (31), s.n. (21), s.n. (27), s.n. (30), s.n. (31); Wylie s.n. (41); — Yamamoto 2509 (30); Yapp 16 (17); Yates 860 (18), 1002 bis (2), 2552 (17), 2846 (8); Yeoward 2 (12); Yeshoda 68 (29), 482 (35), 483 (30); Zimmermann 99 (33); Zollinger 25 (30), 221 (30), 224 (27), 230 (2), 305 (30), 337 (30), 371 (30), 667 (2), 816 (30), 936 (9), 1098 (30), 1325 (17), 1347 (30), 1492 (8), 2098 (21), 2233 (49), 2239 (9), 2240 (29), 2341 (5), 2471 (8), 2923 (27), 2930 (30), 3329 (26), 3935 (17), 5821 (27), s.n. (8); Zwickey 18 (18).