



SOUTH PACIFIC

FIJI ISLANDS

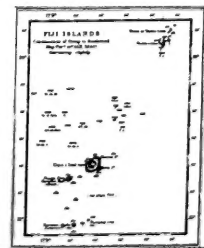
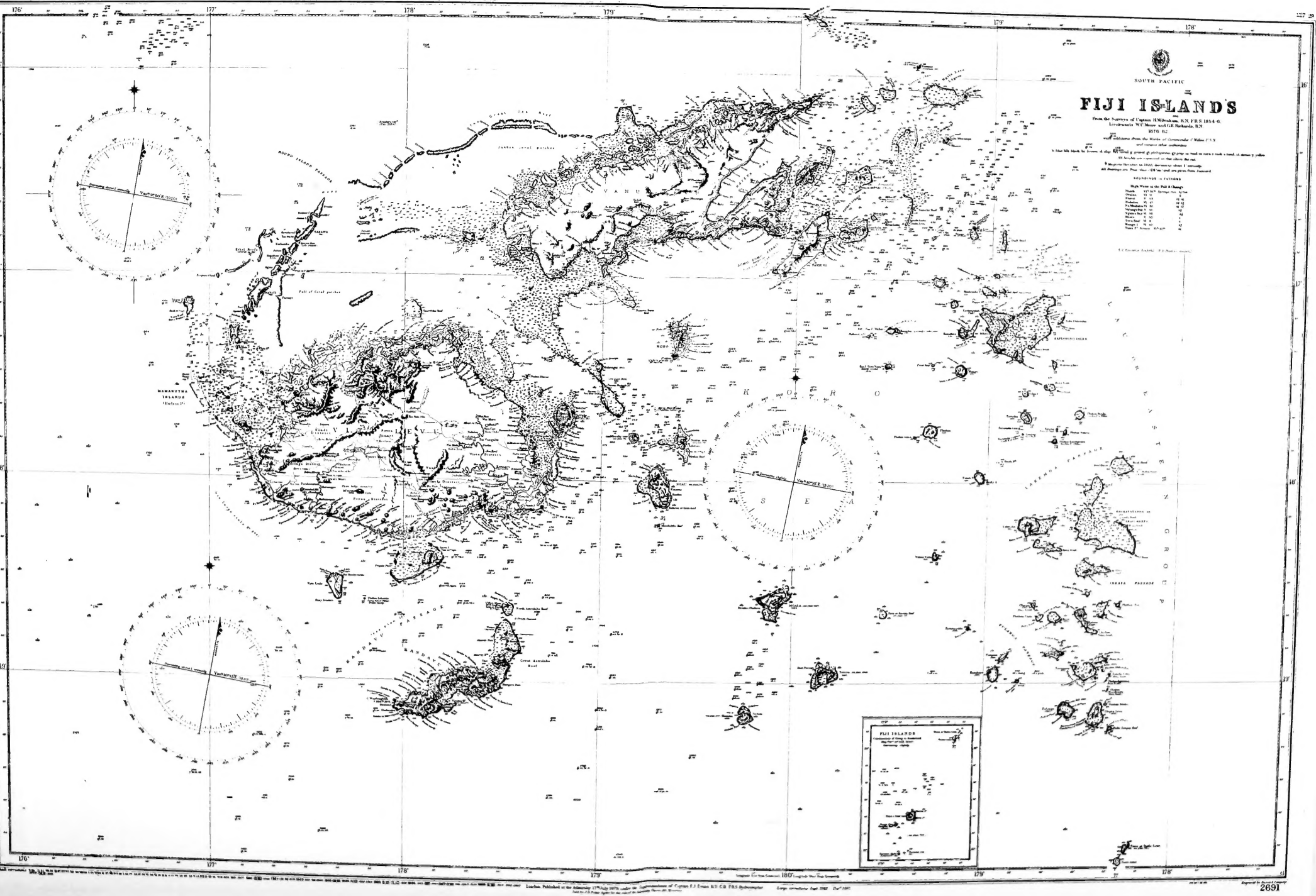
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Scale of miles
Scale of fathoms
Scale of feet
Scale of feet
Scale of feet

HEIGHTS IN FEET

High Water on the Tide & Change	100
Low Water on the Tide & Change	100
High Water on the Tide & Change	100
Low Water on the Tide & Change	100
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FLORA VITIENSIS NOVA

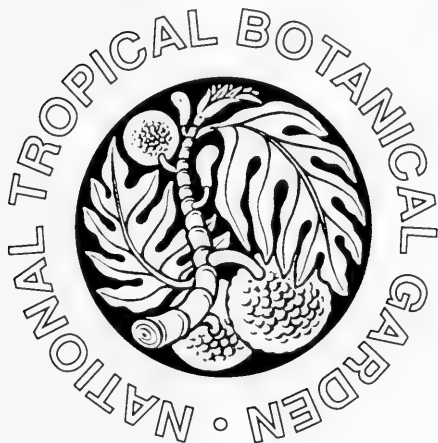
VOLUME 5

FLORA VITIENSIS NOVA
A NEW FLORA OF FIJI
(SPERMATOPHYTES ONLY)

ALBERT C. SMITH

VOLUME 5

Angiospermae: Dicotyledones, Families 170 - 186
Monocotyledones, Family 32
Addenda et Corrigenda
Index



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1991

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INTRODUCTION

In this final volume of *Flora Vitiensis Nova* comparatively few new names are proposed; these are here listed for the convenience of compilers of plant name indices: Acanthaceae: *Graptophyllum repandum* (comb. nov.).

Verbenaceae: *Premna protrusa* (sp. nov.), *Faradaya ampliflora* (sp. nov.), *F. glabra* (comb. et stat. nov.).

Orchidaceae: *Bulbophyllum phillipsianum* (sp. nov.).

Several professional colleagues have kindly advised me on nomenclatural matters during the preparation of this volume; thanks to them are expressed in comments on the families concerned.

In respect to three families I have been fortunate in enlisting even more active collaboration and coauthorship; the individuals concerned as coauthors, and who merit my sincere thanks for their work in difficult families, are Steven P. Darwin (Department of Ecology, Evolution, and Organismal Biology, Tulane University, New Orleans, Louisiana) (families Verbenaceae and Lamiaceae) and Gerald D. Carr (Department of Botany, University of Hawaii, Honolulu, Hawaii) (family Asteraceae).

Intensive study of the orchids of Fiji and neighboring areas has been undertaken by Paul J. Kores (Department of Ecology, Evolution, and Organismal Biology, Tulane University, New Orleans, Louisiana), who is the author of the treatments of Orchidales and Orchidaceae included in the present volume, for which contributions I am deeply indebted. A precursory study, extending far beyond Fiji in its consideration of the classification and nomenclature of orchids, has already been published by him (1989)¹. The treatment of orchids in the present *Flora* conforms in general to the style adopted for other groups, but hopefully the reader will refer back to the preliminary study for more extended comments on pertinent nomenclatural problems and on the relationships of Fijian orchids to those of other Pacific archipelagoes, as well as to those of Malesia, southeastern Asia, and Africa.

Once again I express my indebtedness to the Trustees and Director of the National Tropical Botanical Garden (formerly the Pacific Tropical Botanical Garden) for making possible the close collaboration of the three colleagues who have contributed to the completion of this final volume by their authorship or coauthorship of large families.

The monocotyledons have been examined in depth during the past decade by students of many disciplines, with the result that botanists concerned with phylogenetic relationships have made significant changes in their classifications. A treatment

¹References indicated in this *Flora* by parenthetical dates, if not otherwise modified by an adjacent textual reference, are listed in Volume 1, pp. 84-88, in Volume 2, p. 3, in Volume 3, p. 2, in Volume 4, p. 3, and in the present volume, p. 3.

of the monocotyledonous family Phormiaceae as it occurs in Fiji, by R. J. F. Henderson (Queensland Herbarium, Brisbane), is included in the Addenda et Corrigenda of the present volume. Dr. Henderson's willingness to contribute this revision is deeply appreciated.

Substantial assistance toward the completion of this project by staff members of the National Tropical Botanical Garden is also acknowledged to Janet L. Leopold and Gregory A. Koob for their preparation of the Index, and to David H. Lorence for aid in proofreading this final volume.

With the publication of the seventh volume of the second edition of *Taxonomic Literature* (Stafleu & Cowan, 1988), that invaluable work has reached its conclusion. In the eyes of plant taxonomists, no previously published compendium approaches "TL-2" in the breadth, depth, and accuracy of its coverage. In fact, it would already appear to be a truism that no working plant taxonomist can afford to pursue his studies without having a set of the volumes at his side. Personally, I probably consult the work, for one or another reason, several times a day, and I join all other botanists in sincere congratulations to Frans Stafleu and Dick Cowan (and their many contributors, consultants, and close colleagues) for their production of this indispensable classic.

The most significant botanical publication on Pacific plants in recent decades may be the *Manual of the Flowering Plants of Hawai'i* (Wagner, Herbst, & Sohmer, 1990). With the aid of many collaborating specialists, the authors have produced a comprehensive *Manual*, with full descriptions, keys to taxa at all ranks, excellent illustrations, and extensive comments on Hawaiian geology, climate, vegetation, ethnobotany, etc. As suitable to a *Manual* format, bibliographic references and comments on typification are omitted from the text, although the names of synonyms are listed. A supporting publication, in preparation, will supply this information on bibliographic detail and typification. Indigenous and naturalized plants are included, but not those known only in cultivation in Hawaii. Since the Hawaiian and Fijian floras are comparable to a degree in origin and size (Fiji having a greater number of indigenous taxa but a smaller percentage of endemism), the new *Manual of the Flowering Plants of Hawai'i* will be of the utmost value to students of the Fijian as well as of all other Pacific floras.

Botanists concerned with Pacific floras should also be aware of the completion of the *Flora of South-eastern Queensland* (Stanley & Ross, 1983, 1986, 1989). This valuable work, prepared with the aid of a number of specialists, presents keys to taxa at all levels, brief descriptions, and excellent illustrations of the indigenous and naturalized gymnosperms and angiosperms of the region covered. Although a limited number of species occur indigenously in both Queensland and Fiji, the *Flora* will be of interest in its treatment of such taxa; perhaps it will be even more useful to students of Fijian plants because of the considerable number of adventive species common to the two areas. In earlier volumes of *Flora Vitiensis Nova* the work of Stanley and Ross was not at hand (except during preparation of the final part of Volume 4), but in the present volume it is frequently cited for the value of its descriptions of genera and species.

This being the concluding volume of a project started in 1977, it is fitting that I mention again the colleagues who have contributed to it by authorship or coauthorship of various families. In addition to Stephen P. Darwin, Gerald D. Carr, Paul J. Kores, and R. J. F. Henderson, whose contributions to Volume 5 are mentioned above, I wish once more to express my sincere thanks to Tetsuo Koyama (author of Cyperaceae in Volume 1), John W. Parham (author of Poaceae in Volume 1), Harold

E. Moore, Jr. († 1980) (author of Araceae in Volume 1), Dan H. Nicolson (author of Araceae in Volume 1), and again Stephen P. Darwin (coauthor of Rubiaceae in Volume 4). It is obvious that the mentioned families require the skill of specialists, and I have been fortunate that the listed botanists were willing to make such significant contributions.

It seems fitting also to conclude the Introduction to this final volume by acknowledging again the generous aid of the institutions, granting agencies, and individuals listed in the first two pages of Volume 1, for their support and encouragement during phases preliminary to the present publication. As sponsor and publisher of this *Flora*, the National Tropical Botanical Garden, through its Trustees, Director, and staff members, has been constantly supportive of the project since it began to take form in publication.

SUPPLEMENTARY REFERENCES

- KORES, P. J. 1989. A precursory study of Fijian orchids. *Allertonia* 5: 1-222.
- STAFLEU, F. A., & R. S. COWAN. 1988. *Taxonomic Literature*. Ed. 2. Vol. 7: W-Z. *Regnum Veg.* 116: 1-LVI, 1-653. Utrecht.
- STANLEY, T. D., & E. M. ROSS. 1983, 1986, 1989. *Flora of South-eastern Queensland*. Vol. 1: 1-545. 1983. Vol. 2: 1-623. 1986. Vol. 3: 1-532. 1989. Queensland Department of Primary Industries, Brisbane.
- WAGNER, W. L., D. R. HERBST, & S. H. SOHMER. 1990. *Manual of the Flowering Plants of Hawai'i*. i-xviii, 1-1854 (in 2 volumes). University of Hawaii Press & Bishop Museum Press, Honolulu.

DIVISION ANGIOSPERMAE (MAGNOLIOPHYTA) (continued)

CLASS DICOTYLEDONES (MAGNOLIATAE) (continued)

SUBCLASS LAMIIDAE (continued)

ORDER SOLANALES

KEY TO FAMILIES OCCURRING IN FIJI

Terrestrial plants, sometimes growing in wet places but the leaves not floating or immersed; ovary superior, usually 2-locular and with 2 or more ovules per locule (but with exceptions).

Plants autotrophic; stem with internal phloem; leaves simple to compound, obvious; flowers small to large and showy, lacking obvious scales within; fruit a capsule or berry, sometimes nutlike.

Ovules (1-) few-many in each ovary locule, the placentation axile, the seeds usually numerous; style simple, the stigma 2-lobed; anthers dehiscing by longitudinal slits or terminal pores; corolla lobes plicate or contorted, less often imbricate or valvate; calyx gamosepalous, lobed or dentate; herbs, shrubs, or small trees, infrequently vines; plants without latex. 170. SOLANACEAE

Ovules usually 2 per locule, basal or basal-axile, erect, the seeds 1-4(-10); style simple, divided, or styles distinct; anthers dehiscing by longitudinal slits; corolla lobes usually induplicate-valvate and also contorted in bud; calyx composed of free sepals or these connate proximally; herbs, usually twining and climbing, sometimes prostrate, rarely shrubs or trees; plants often with latex.

171. CONVOLVULACEAE

Plants parasitic, twining, not rooted in ground at maturity, with no (or very little) chlorophyll, the stems attaching to host plants by intrusive haustoria, without internal phloem; leaves greatly reduced and scalelike; flowers small, the corolla tube usually with basal, fringed or cleft scales opposite stamens; ovules 2 per locule, erect; fruit capsular, circumscissile near base or irregularly dehiscent, sometimes indehiscent and subcarinate, the seeds 4 or fewer. 172. CUSCUTACEAE

Aquatic or marsh herbs; stems without internal phloem but with intercellular canals and spaces; leaves floating or submerged; corolla lobes valvate, induplicate-valvate, or imbricate, often conspicuously fimbriate or crested; ovary superior to half-inferior, unilocular, the placentae 2, parietal, often intruded, the ovules numerous, the seeds few-many. 173. MENYANTHACEAE

FAMILY 170. SOLANACEAE

SOLANACEAE Juss. Gen. Pl. 124, as *Solaneae*. 1789.

Herbs, shrubs, or small trees, infrequently vines, estipulate, often armed with prickles and pilose with diverse types of indument; leaves alternate (sometimes in floral areas in alternate pairs due to complex sympodial growth), simple to pinnately compound, the blades entire or variously lobed; inflorescences terminal or axillary, usually modified-cymose, often racemiform or paniculiform, sometimes 1-flowered; flowers usually ♂ and actinomorphic, infrequently zygomorphic, usually 5-merous; calyx gamosepalous, tubular to campanulate, lobed or dentate, usually persistent, often enlarging in fruit; corolla sympetalous, rotate to tubular, usually regular but sometimes irregular, rarely bilabiate, usually with 5 lobes, these plicate or contorted, less often imbricate or valvate; nectary disk often present around base of ovary; stamens borne on corolla tube, usually as many as and alternate with corolla lobes, sometimes fewer or more numerous, the anthers 2-locular (1 cell rarely undeveloped), sometimes connivent, dehiscing by longitudinal slits or terminal pores; gynoecium usually composed of 2 carpels (oriented obliquely to median plane of flower), these united into a superior, 2-locular ovary (locules occasionally 4, sometimes more numerous in cultivars), the placentation axile, the ovules (1-) few-many in each locule, anatropous to slightly amphitropous, the style simple, the stigma 2-lobed; fruit a berry or capsule, seldom a drupe (not in our genera), the seeds usually numerous, often flattened, unwinged, the embryo straight to curved, the endosperm usually fleshy.

DISTRIBUTION: A nearly cosmopolitan family, best developed in tropical America, with 85-90 genera and 2,500-2,800 species.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Solanaceae. Fl. Java 2: 464-483. 1965. D'ARCY, W. G. Flora of Panama. Family 170. Solanaceae. Ann. Missouri Bot. Gard. 60: 573-780. 1973. HEINE, H. Solanaceae. In: Aubréville, A., & J.-F. Leroy (eds.). Fl. Nouv.-Caléd. et Dépend. 7: 119-205. 1976. D'ARCY, W. G. The classification of the Solanaceae. In: Hawkes, J. G., R. N. Lester, & A. D. Skelding (eds.). The Biology and Taxonomy of the Solanaceae, 3-47. 1979. HUNZIKER, A. T. South American Solanaceae: a synoptic survey. In: Hawkes, J. G., R. N. Lester, & A. D. Skelding (eds.). The Biology and Taxonomy of the Solanaceae, 49-85. 1979. SYMON, D. E. The solanaceous genera, *Browallia*, *Capsicum*, *Cestrum*, *Cyphomandra*, *Hyoscyamus*, *Lycopersicon*, *Nierembergia*, *Physalis*, *Petunia*, *Salpiglossis*, and *Withania*, naturalized in Australia. J. Adelaide Bot. Gard. 3: 133-166. 1981. PURDIE, R. W., D. E. SYMON, & L. HAEGI. Solanaceae. Fl. Australia 29: 1-208. 1982. SYMON, D. E. The Solanaceae of New Guinea. J. Adelaide Bot. Gard. 8: 1-171. 1985. HEPPEL, F. N. Solanaceae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 6: 365-409. 1987.

The family includes important food plants such as potato, eggplant, tomato, and peppers. Many species are sources of alkaloids and are used medicinally or as narcotics or hallucinogens, while others are ornamentals and still others may become noxious weeds. Twelve genera are known to be represented in Fiji, but only *Solanum* has indigenous species there. In the following key the sequence and delimitation of subfamilies and tribes are adapted from Hunziker (1979).

KEY TO GENERA

- Seeds orbicular or more or less kidney-shaped, flat, compressed; embryo circinnate or curved (subfam. Solanoideae).
- Flower buds with corolla lobes never overlapping (aestivation valvate, induplicate, plicate, or conduplicate); filaments inserted at or near base of anthers.
- Corolla aestivation valvate, induplicate, or plicate, never conduplicate-contorted (tribe Solaneae); inflorescences 1-many-flowered; fruit baccate.
- Filaments united at base, forming a ring adnate to base of corolla; anthers dehiscing by terminal or subapical pores, these remaining small or becoming longitudinal slits; inflorescences appearing axillary, extra-axillary, lateral, or leaf-opposed, several-many-flowered (rarely 1-flowered); leaves simple to pinnately lobed or divided; shrubs or small trees or annual or perennial herbs, sometimes armed with prickles.
- Anthers free and divergent or loosely connivent into a cone around style, dehiscing by terminal pores, these remaining small or developing into slits; leaf blades simple to pinnatisect or pinnate; shrubs or small trees or annual or perennial herbs, sometimes armed with straight or curved prickles, usually pilose, the hairs simple, branched, glandular, or stellate; indigenous, cultivated, naturalized, and adventive species. 1. *Solanum*
- Anthers loosely connivent into a cone around style, dehiscing by subapical pores soon becoming longitudinal slits, each anther with an apical, sterile, conical appendage; leaf blades pinnately lobed or divided; annual or perennial herbs, unarmed, pilose with simple, glandular and nonglandular hairs; a single cultivated species, sometimes naturalized. 2. *Lycopersicon*
- Filaments inserted toward base of corolla tube; anthers dehiscing by longitudinal slits; flowers 1-few in leaf axils and stem forks; leaves simple, the blades entire to toothed or lobed; annual or perennial herbs or short-lived shrubs, unarmed; cultivated, naturalized, or adventive species.
- Calyx short-tubular, truncate or with short lobes, not or slightly accrescent; corolla stellate, the lobes valvate in bud; fruit a somewhat fleshy or dryish berry; indument (if present) of simple hairs. 3. *Capsicum*
- Calyx tubular to campanulate, conspicuously accrescent; corolla broadly campanulate to rotate, the limb expanded, shallowly 5-lobed, folded in bud; fruit a subglobose or ellipsoid berry, enclosed by the inflated, reticulate, narrow-mouthed calyx; indument (if present) of simple, forked, stellate, or glandular hairs. 4. *Physalis*
- Corolla aestivation conduplicate-contorted (tribe Datureae); inflorescences 1-flowered, the flowers large; fruit capsular; cultivated taxa, often naturalizing, or adventive.
- Annual herbs or coarse, short-lived perennials; flowers actinomorphic, erect or erecto-patent in stem forks and short-pedicellate; calyx circumscissile near base after anthesis, the lobes (3-)5(-9), the base persistent and forming a frill around mature fruit; ovary 2-locular or proximally falsely 4-locular, spiny or tuberculate; fruit spiny or tuberculate. 5. *Datura*
- Large shrubs or small trees; flowers actinomorphic or subzygomorphic, inclined or pendulous; calyx not circumscissile, 5-lobed or spatheous, caducous or persisting as an envelope about fruit; ovary 2-locular, glabrous; fruit unarmed. 6. *Brugmansia*

- Flower buds with overlapping corolla lobes (aestivation imbricate, cochlear, or quincuncial); filaments inserted at base of anthers, straight at point of insertion on corolla; calyx and corolla not separated by a long internode (tribe Solandreae); flowers solitary, terminal, large; fruit a pulpy berry; our species a cultivated, climbing or scrambling shrub. 7. *Solandra*
- Seeds prismatic, reniform, subglobose, or of a different form but never orbicular-compressed; embryo straight or bent, but then with incumbent or oblique cotyledons (subfam. Cestroideae); our taxa cultivated or naturalized, not indigenous.
- Pedicels articulated; corolla actinomorphic; stamens 5, included; shrubs or trees (tribe Cestreae).
8. *Cestrum*
- Pedicels lacking an articulation; corolla actinomorphic or zygomorphic; herbs or shrubs.
- Stamens 5 (in our genera), usually inserted at same level, the anthers of one flower similar to each other; corolla actinomorphic or slightly zygomorphic (tribe Nicotianeae); annual or short-lived perennial herbs, rarely shrubby.
- Inflorescences paniculiform or racemiform, the flowers infrequently solitary and axillary; corolla throat often asymmetrically swollen, the lobes usually contorted-plicate in bud; plants erect, more than 60 cm. tall. 9. *Nicotiana*
- Flowers solitary, axillary; corolla limb shallowly 5-lobed and plicate in bud, the lobes often slightly unequal; plants sprawling, less than 60 cm. tall. 10. *Petunia*
- Stamens 4 (in our genera), in two pairs; corolla clearly zygomorphic (tribe Salpiglossideae).
- Erect, branching herbs; corolla tube swollen at apex, contracted at mouth, the lobes induplicate in bud; fruit septicidally short-dehiscent from apex, the valves 2-dentate. 11. *Browallia*
- Shrubs or trees; corolla tube narrow, curved and broadened distally, the lobes imbricate in bud; fruit septicidally dehiscent, with entire valves, or an indehiscent berry. 12. *Brunfelsia*

1. SOLANUM L. Sp. Pl. 184. 1753; Seem. Fl. Vit. 173. 1866; Backer & Bakh. f. Fl. Java 2: 470. 1965; Purseglove, Trop. Crops, Dicot. 556. 1968; D'Arcy in Ann. Missouri Bot. Gard. 60: 680. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 132. 1976; Symon in J. Adelaide Bot. Gard. 4: 17. 1981; Purdie et al. in Fl. Australia 29: 69. 1982; Symon in J. Adelaide Bot. Gard. 8: 20. 1985.

Shrubs or small trees, sometimes trailing or climbing, or annual or perennial herbs, unarmed or with straight or curved prickles, rarely glabrous, usually pilose, the hairs simple, branched, or stellate, often glandular, the roots fibrous or tuber-bearing; leaves usually alternate and petiolate, the blades simple to pinnatisect or pinnate; inflorescences initially terminal but soon overtopped and appearing axillary, extra-axillary, or leaf-opposed, cymose to racemiform, subumbellate, or paniculiform, rarely 1-flowered; flowers usually ♂, less often unisexual (plants then andromonoecious or dioecious), actinomorphic or essentially so; calyx campanulate or cupuliform to rotate, (4 or)5(-10)-dentate or -lobed, infrequently entire, sometimes ascendent and closely investing fruit; corolla stellate or rotate to campanulate, (4 or)5(-10)-lobed, rarely slightly zygomorphic, the tube short, the lobes plicate in bud; nectariferous disk lacking; stamens (4 or) 5 (or 6), inserted on corolla throat, alternating with corolla lobes, usually exserted, the filaments usually shorter than anthers, united at base, forming a ring adnate to base of corolla, the anthers oblong to lanceolate, free and divergent or loosely connivent into a cone around style, sometimes unequal, dehiscent by terminal pores, these remaining small or developing into lateral or introrse slits; ovary superior, 2(rarely 3-6)-locular, the ovules many, the style simple, erect or sigmoid, the stigma usually small, capitate or bifid; fruit a berry, globose to ovoid or rarely conical, when ripe succulent or sometimes papery or bony, rarely dry and subcapsular, the seeds few to many, orbicular or subreniform, compressed, often pitted or reticulate, infrequently muricate or pilose, the embryo curved, submarginal.

LECTOTYPE SPECIES: *Solanum nigrum* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 164. 1913), one of the 23 species first included in the genus by Linnaeus.

DISTRIBUTION: Cosmopolitan but primarily in the Southern Hemisphere, with centers of speciation in tropical America, Australia, and Africa, with about 1,500 species. The genus includes many important food plants, such as potato and eggplant,

as well as drug-producing plants and ornamentals. Eleven species have been recorded from Fiji, of which three are indigenous.

USEFUL TREATMENTS OF GENUS: ROE, K. E. Terminology of hairs in the genus *Solanum*. *Taxon* 20: 501-508. 1971. SYMON, D. E. A revision of the genus *Solanum* in Australia. *J. Adelaide Bot. Gard.* 4: 1-367. 1981. WHALEN, M. D., D. E. COSTICH, & C. B. HEISER. Taxonomy of *Solanum* section *Lasiocarpa*. *Genes Herb.* 12: 41-129. 1981. WHALEN, M. D. Conspectus of species groups in *Solanum* subgenus *Leptostemonum*. *Genes Herb.* 12: 179-282. 1984. SYMON, D. E. The phytogeography of New Guinea *Solanum* (Solanaceae). *Blumea* 31: 319-328. 1986.

The following notes on species rely extensively on the treatments of *Solanum* by Heine (1976), Symon (1981, 1985), and Purdie et al. (1982). A logical sequence of the species occurring in Fiji and their placement in subgenera and sections, as suggested by Symon (1985, q. v. for descriptions and typifications of sections, although not all of our species are there treated), would be:

Subgen. <i>Solanum</i>	Subgen. <i>Leptostemonum</i>
Sect. <i>Solanum</i>	Sect. <i>Acanthophora</i>
<i>S. americanum</i>	<i>S. mammosum</i>
Subgen. <i>Lycianthes</i>	Sect. <i>Lasiocarpa</i>
Sect. <i>Cypellocalyx</i>	<i>S. repandum</i>
<i>S. vitiense</i>	Sect. <i>Dunaliana</i>
Subgen. <i>Potatoe</i>	<i>S. inamoenum</i> , <i>S. viride</i>
Sect. <i>Petota</i>	Sect. <i>Torva</i>
<i>S. tuberosum</i>	<i>S. torvum</i>
Subgen. <i>Brevantherum</i>	Sect. <i>Melongena</i>
Sect. <i>Brevantherum</i>	<i>S. melongena</i> , <i>S. linnaeanum</i>
<i>S. mauritianum</i>	

A key to sections would be too technical and uninformative for use in a local flora, and the following key and sequence are strictly artificial.

I am indebted to Dr. Symon not only for his many publications on the genus, but also for advice and suggestions in reference to *Solanum* in the Pacific; however, opinions here stated about the species indigenous in Fiji are those of the present author.

KEY TO SPECIES

Inflorescence usually pedunculate, sometimes lateral on stem and distant from leaves, the flowers rarely axillary; calyx lobes clearly developed; herbs, slender shrubs, or small trees, not more than 5 m. high and usually much smaller, often with prickles, often with (sometimes minute) stellate hairs; leaf blades often lobed.

Petiole (1.5-) 3-9 cm. long, with 1 or 2 auricle-like leaflets (pseudo-stipules) in axils at base, these sessile, ovate, up to 2 × 2.5 cm.; large shrubs or small trees to 4 m. high, unarmed, all parts with a dense indument of mostly sessile stellate hairs (sessile to multiseriate-stalked, some with a long central ray, occasionally simple, uniseriate, multicellular, and glandular); leaf blades elliptic- to lanceolate-ovate, 10-30 × 4-12 cm., entire; inflorescence terminal, dichotomous-corymbiform, many-flowered, the peduncle obvious, to 20 cm. long, the pedicels 2-5 mm. long; calyx lobes 1.2-3 mm. long, slightly accrescent in fruit; corolla violet, 10-20 mm. in diameter; anthers 2-3 mm. long; fruit globose, 10-15 mm. in diameter, becoming dull yellowish; naturalized and infrequent. 1. *S. mauritianum*

Petiole without basal auricle-like leaflets (pseudo-stipules).

Prickles present on branchlets and often on leaves.

Leaf blades (3-) 5-9 × (2-) 4-7.5 cm., deeply lobed, the major lobes 2 or 3 per side, rounded or obtuse and sinuate-margined, the sinuses rounded, cut about 3/4 of distance to costa; indument present, especially on lower leaf blade surfaces, the hairs stellate (sessile or multiseriate-stalked, sometimes with a long central ray) and also minute, simple, and glandular; petioles 1-2 cm. long; inflorescences lateral, racemiform, (1-) 2-6-flowered (1-few lower flowers ♂, upper flowers ♂), the peduncle short or none; corolla about 20 mm. in diameter, purple-blue; anthers 5-6 mm. long; fruit globose, 1.5-3 cm. in diameter, yellow to brown or blackish; an infrequent adventive.

. 2. *S. linnaeanum*

Leaf blades (8-) 10-20 × 5-15 cm., entire to repand-dentate or shallowly lobed.

- Margins of leaf blades with major lobes 2 or 3 per side, these obtuse to acute and sometimes irregular-margined, the sinuses rounded, cut about 1/4 (rarely to 3/4) of distance to costa or less; anthers 6-10 mm. long.
- Shrub to 5 m. high; indument composed of sessile to multiseriate-stalked stellate hairs sometimes with a long central ray; petioles 1-5 cm. long; inflorescences terminal and eventually lateral (never axillary), compact, many-flowered, with ♂ and often a few ♀ flowers, the peduncle (0.5-) 1-2 cm. long; calyx lobes apiculate, 1-3 mm. long, slightly accrescent in fruit; corolla 15-25 mm. in diameter, white; fruit globose, 1-1.8 cm. in diameter, yellow to orange or red; a pernicious weed, often locally abundant. 3. *S. torvum*
- Annual or short-lived shrub 0.5-2 (-5) m. high; indument composed of simple or occasionally stellate hairs; petioles 2-10 cm. long; inflorescences subsessile, 1-4-flowered; calyx lobes subulate-acuminate, 3-4 mm. long; corolla 30-40 mm. in diameter, violet to pale purple-blue; fruit ovoid, 3-8 cm. long, with nipple-like apex and basal outgrowths, yellow to orange; cultivated for its unusual fruit but uncommon. 4. *S. mammosum*
- Margins of leaf blades subtire to slightly repand; indument lacking or composed of sparse stellate hairs; petioles 3.5-5 cm. long; inflorescences lateral, to 5 cm. long, the flowers 10-15; corolla 15-18 mm. in diameter, white; anthers about 2 mm. long; indigenous. . . . 11. *S. sp.*
- Prickles lacking (sometimes present on calyces of sp. no. 7).
- Leaves large, pinnate or pinnatisect, the rachis and petioles narrowly winged, the leaflets 5-9, ovate, with interstitial leaflets often present on leaf rachis; sprawling perennial herb to 80 cm. high, with tubers borne on underground stolons, the indument sparse, composed of simple or glandular few-celled (never stellate) hairs; inflorescences leaf-opposed, cymose-paniculiform, few-flowered, the peduncle 5-10 cm. long; calyx lobes lanceolate, 5-8 mm. long; corolla subrotate, about 20 mm. in diameter, white or pale violet; anthers 5-7 mm. long; fruit globose, 1.5-2 cm. in diameter; sparingly cultivated. 5. *S. tuberosum*
- Leaves simple, the blades entire or shallowly lobed.
- Herbs or soft-wooded perennials, seldom exceeding 1 m. in height.
- Indument lacking or sparse, the hairs curved, simple; petioles 1-4 (-9) cm. long; leaf blades ovate to ovate-lanceolate, 2-10 (-12) × 1-7 cm., entire or with blunt, rounded lobes; inflorescences extra-axillary, umbellate-cymose, 4-8-flowered, the peduncle 0.8-2.5 cm. long (to 4 cm. long in fruit), the pedicels 5-8 mm. long; calyx lobes about 1 mm. long, rounded or bluntly obtuse; reflexed and slightly accrescent in fruit; corolla deeply stellate, 5-9 mm. in diameter, white; anthers 1-1.8 (-2) mm. long; fruit globose, 5-10 mm. in diameter, purple to black, glossy; adventive and sometimes abundant. 6. *S. americanum*
- Indument sparse or copious, the hairs stellate, sessile or stalked; petioles 1.5-8 cm. long; leaf blades ovate or ovate-oblong, (8-) 10-22 × 5-13 cm., entire or with 2-4 rounded, sinuate lobes per side, the sinuses shallow and rounded; inflorescences lateral, composed of a single large ♀ flower below and a short raceme with few, smaller ♂ flowers, the pedicels of ♀ flowers 15-30 mm. long, deflexed; calyx accrescent in fruit, with acuminate lobes 10-15 mm. long; corolla broadly stellate, 30-40 mm. in diameter, lavender; anthers 5-8 mm. long; fruit pedicels massive, the fruit globose to oblong or obovoid, 10-20 cm. long, dark purple at maturity; cultivated for its edible fruit. 7. *S. melongena*
- Shrubs or slender trees usually exceeding 1 m. in height.
- Indument copious, the hairs of lower leaf blade surfaces dense, stellate (multiseriate-stalked and/or sessile), sometimes simple with small or obsolete lateral branches and often glandular as on upper surfaces; petioles 3-11 cm. long; leaf blades broadly ovate to elliptic, 16-35 × 11-27 cm., usually inaequilateral at base, repand with several broadly triangular lobes, the sinuses broad, shallow; inflorescence a condensed cyme with 5-12 flowers (lower flowers ♀, the upper ones ♂); calyx lobes ovate to broadly deltoid, 5-9 mm. long; corolla deeply stellate, about 25 mm. in diameter, white; anthers 6-9 mm. long; fruit globose to ovoid, sometimes apiculate, 4-5 cm. in diameter, pubescent but eventually subglabrate, yellow when ripe; cultivated in villages and also a naturalized weed. 8. *S. repandum*
- Indument lacking or comparatively inconspicuous, the hairs stellate, sessile; petioles usually less than 3.5 cm. long (but sometimes to 10 cm. long in cultivars); leaf blades entire or sinuate to repand-dentate or shallowly lobed; calyx lobes broadly deltoid to ovate-deltoid, 0.5-2 mm. long at anthesis; anthers 2-4 mm. long; fruit glabrous, bright orange-red when ripe or drying black; indigenous species.
- Leaf blades lanceolate to obliquely ovate-elliptic, (6-) 10-19 × (1.5-) 2.5-9 cm., entire (or shallowly repand when juvenile), obviously pilose beneath, the hairs usually with contiguous or overlapping rays; petioles (10-) 15-35 mm. long; inflorescence a lateral, congested cyme, the peduncle 4-6 mm. long, the rachis 1-4 cm. long, with 10-20 flowers, these occasionally 4-merous; pedicels at anthesis usually 4-6 mm. long; corolla 10-15 mm. in diameter, white or pale blue; anthers 2-3 mm. long; calyx scarcely accrescent in fruit, the fruit globose, 8-13 mm. in diameter, the seeds about 2 mm. in diameter.
9. *S. inamoenum*

Leaf blades lanceolate-ovate to oblong-ovate, often inaequilateral, 5-17 × 2.5-8 cm., subtire to shallowly and irregularly repand at margin, glabrous beneath or infrequently with scattered (not contiguous) hairs; petioles 7-25 (-30) mm. long; inflorescence a lateral or axillary cyme, the peduncle 5-10 mm. long, the rachis 2-3 cm. long, with 3-10 flowers (lower ones often caducous); pedicels at anthesis 7-20 mm. long; corolla 15-25 mm. in diameter, white; anthers 3-4 mm. long; fruiting calyx 10-15 mm. in diameter, the fruit subglobose, 15-20 mm. in diameter, the seeds 2.5-3.5 in diameter. (In cultivars the petioles to 10 cm. long, the leaf blades to 30 × 25 cm. and sometimes obviously repand-margined, the rachis sometimes to 5 cm. long and with as many as 20 flowers, the fruit ovoid, ellipsoid, oblate, or broadly fusiform, often to 35 × 25 mm., occasionally to 50 mm. in diameter, often 3- to 4-locular.) 10. *S. viride*

Inflorescence a cluster of 4-9 (-20) pedicellate flowers borne between two leaf bases (sometimes on a short vermiform axis 5-8 mm. long); calyx cupulate, 2-3 (-5) mm. long, the margin subtire or with very shallow lobes; corolla white to lavender or purple, the tube 2-3 mm. long, the lobes 5-8 mm. long; anthers 2.5-4 mm. long; fruits in clusters of 1-6, pedicellate, the fruiting calyx patelliform, 6-10 mm. in diameter, coriaceous, entire or irregular-margined, the berries 10-15 mm. in diameter, bright red at maturity; unarmed tree 2-15 m. high, monoecious, the flowers ♂ and ♀; indument composed of brownish, crisped hairs on young tips only, otherwise lacking; leaves paired, the smaller often about half the size of the larger, the blades elliptic to ovate or sublanceolate, entire, the larger ones 7-24 × 3-13 cm.; indigenous. 12. *S. vitiense*

1. *Solanum mauritianum* Scop. Delic. Fl. Faun. Insubr. 3: 16. t. 8. 1788; Backer & Bakh. f. Fl. Java 2: 471. 1965; Roe in Brittonia 24: 253. 1972; J. W. Parham, Pl. Fiji Isl. ed. 2. 330. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 137. pl. 28. 1976; Symon in J. Adelaide Bot. Gard. 4: 95. fig. 26. 1981; Purdie et al. in Fl. Australia 29: 115. fig. 24, J, 29, G. 1982; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 127. 1985.

Solanum auriculatum Ait. Hort. Kew. 1: 246. 1789; Dunal in DC. Prodr. 13 (1): 115. 1852; Benth. Fl. Austral. 4: 450. 1868; F. M. Bailey, Queensland Fl. 4: 1082. 1901.

Solanum verbascifolium var. *auriculatum* Kuntze, Rev. Gen. Pl. 1: 455. 1891; Yuncker in Bishop Mus. Bull. 220: 238. 1959.

Shrub or small tree to 4 m. high, sparingly naturalized near sea level, copiously stellate-pilose and with attractive violet corollas.

TYPEFICTION: *Solanum mauritianum* is based on a collection by D. Dombey from Mauritius, but no type specimen is known; Scopoli's original illustration may be taken as the type (Roe, 1972). The type of *S. auriculatum* is a specimen in the L'Héritier Herbarium (G-DC HOLOTYPE), from Madagascar, Mauritius, or La Réunion.

DISTRIBUTION: Indigenous in Uruguay and southeastern Brazil, but now introduced and widely naturalized throughout the tropics. In the Pacific it occurs as far east as the Societies and Hawaii.

LOCAL NAMES AND USE: Although no local name has been noted in Fiji, the species is often known elsewhere as *tree tobacco* or *wild tobacco tree*; it may have been brought into Fiji as an ornamental during the present century.

AVAILABLE COLLECTION: FIJI without further locality: DA 13938.

2. *Solanum linnaeanum* Hepper & P.-M. Jaeger in Kew Bull. 41: 435. 1986.

Solanum sodomeum L. Sp. Pl. 187. 1753; Greenwood in Proc. Linn. Soc. 154: 101, as *S. sodomaeum*. 1943; J. W. Parham, Pl. Fiji Isl. ed. 2. 330. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 144. pl. 30, as *S. sodomaeum*. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 128, as *S. sodomaeum*. 1985. Nom. rejic.

Solanum hermannii Dunal, Hist. Nat. Solanum, 212. t. 2. fig. B. nom. illeg. 1813; Hepper in Bot. J. Linn. Soc. 76: 292. 1978, in Taxon 27: 55. 1979; Symon in J. Adelaide Bot. Gard. 4: 264. fig. 117. 1981; Purdie et al. in Fl. Australia 29: 162. 1982.

In Fiji *Solanum linnaeanum* is a shrub to about 1 m. high, occasionally seen as a weed in waste places and along roadsides near sea level; the corolla is purple-blue and the fruit turns through yellow to brown or blackish.

TYPEFICTION AND NOMENCLATURE: The nomenclatural complications surrounding *Solanum sodomeum* and *S. hermannii* are too complex for full discussion here. The Committee for Spermatophyta (in Taxon 32: 279. 1983) accepted Hepper's proposal

(1978, 1979) formally to reject the name *S. sodomeum* L., as now permitted under ICBN Art. 69, also remarking: "It is further noted that *S. hermannii* was an illegitimate replacement for *S. sodomeum*, and further investigation of the correct name for the species concerned is being made by Hepper." The name first suggested by Hepper (1978) as a replacement, *S. hermannii* Dunal, was a substitution for *S. sodomeum* (LECTOTYPE: *Hermann 95* (BM); cf. Hepper, 1979) and hence illegitimate. No legitimate name being available for the species, Hepper and Jaeger described it as new under the name *S. linnaeanum*, typifying it by *W. J. Burchell 3238* (K HOLOTYPE), collected in June, 1813, at Bosch Berg, Somerset Div., South Africa.

DISTRIBUTION: Indigenous either in southern Europe or the Cape of Good Hope, Africa, and a very early introduction from one to the other, now known also as a weed in Australia, New Zealand, New Caledonia, Fiji, Hawaii, and perhaps elsewhere in the Pacific. It has been noted in Fiji since about 1920 (Greenwood, 1943).

LOCAL NAME: *Apple of Sodom*.

AVAILABLE COLLECTION: VITI LEVU: MBA or RA: Along road between Tavua and Penang, *Greenwood 793* (K).

3. *Solanum torvum* Sw. Nov. Gen. & Sp. Prodr. 47. 1788; Turrill in J. Linn. Soc. Bot. 43: 35. 1915; B. E. V. Parham in J. Dept. Agr. Fiji 9 (3): 2. 1938; Greenwood in Proc. Linn. Soc. 154: 101. 1943; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 104. 1948; Mune & J. W. Parham in op. cit. 26: 86. 1955, in Dept. Agr. Fiji Bull. 31: 38. fig. 10. 1957; J. W. Parham in op. cit. 35: 124. fig. 62, 63. 1959, Pl. Fiji Isl. 239. 1964, ed. 2. 330. 1972; Backer & Bakh. f. Fl. Java 2: 475. 1965; Mune & J. W. Parham in Dept. Agr. Fiji Bull. 48: 56. fig. 15. 1967; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 166. pl. 37. 1976; Hepper in J. Linn. Soc. Bot. 76: 289. 1978; Henty in Papua New Guinea Dept. Forests Bull. 12: 129. fig. 74. 1980; Symon in J. Adelaide Bot. Gard. 4: 115. fig. 36. 1981; Purdie et al in Fl. Australia 29: 122. fig. 27, H. 1982; Whalen in Gentes Herb. 12: 237. 1984; Symon in J. Adelaide Bot. Gard. 8: 152. fig. 77. 1985.

Solanum repandum sensu Gibbs in J. Linn. Soc. Bot. 39: 158. 1909; non Forst. f.

Solanum torvum var. *torvum*; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 168. 1976.

Freely branching shrub (0.3-) 1-5 m. high, in Fiji occurring from near sea level to 900 m. as a pernicious weed, often forming dense thickets and locally abundant, in clearings, waste places open fields, pastures, and along roadsides. The corolla is white and the anthers yellow; the fruit is yellow to orange or red at maturity. Flowers and fruits occur throughout the year.

TYPIFICATION: The type is a West Indian collection of Swartz, probably at s. Comments on the legitimacy and typification of the name are given by Heine (1976), Hepper (1978), and Symon (1981).

DISTRIBUTION: Originally from the West Indies, the species is now a pantropical weed. It was firmly established on Viti Levu by 1906 and was declared a noxious weed in 1926. Although about 70 Fijian collections are at hand, all but a few are from Viti Levu. Most Fijian collections fall into var. *torvum* as defined by Heine (1976), but some vary toward var. *datrifolium* (Dunal) O. E. Schulz in their robust foliage (cf. Heine, 1976, pl. 38).

LOCAL NAMES AND USES: The prickly *Solanum* or *devil's fig* is known in Fijian as *soni*, *kausoni*, *kaisurisuri*, and *kauvotovotoa*, in Hindi as *katari* and *bhankatiya*. The fruits are eaten by pigeons, and the roots have been noted as part of a remedy for tuberculosis. Notes on the control of this noxious weed are given by Mune and Parham

(1967). In some areas the plant is believed to cause poisoning in livestock (Henty, 1980).

REPRESENTATIVE COLLECTIONS: VITI LEVU: Mba: Nandi airport, *DA 9697*; Nalotawa and vicinity, eastern base of Mt. Evans Range, *Smith 4306*; Nandarivatu, *Gibbs 840*, *im Thurn 273*. NANDRONGA & NAVOSA: Upper Singatoka Valley road, *DA 10163*; Lawangga, Singatoka, *DA 9771*. SERUA: Korovisilou, *DA L.9600*. NAMOSI: Hills east of Wainikoroiuva River, near Namuamua, *Smith 9071*; Nambukavesi Creek, *DA L.9601*. RA: Mburotu Valley, *DA 9497*. NAITASIRE: Vunindawa, *DA 11031*; Nanduruloulou, *DA 3695*. TALEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7024*; Londoni, *DA 9982*; Wainimbokasi River, *DA 10584*. REWA: Suva Range, Ngoyoa, *DA L.9561*; Suva, *DA 13898*. TAVEUNI: Matei, near airfield, *DA 11519*; without detailed locality, *Weiner 71-7-17b*.

4. *Solanum mammosum* L. Sp. Pl. 187. 1753; Backer & Bakh. f. Fl. Java 2: 474. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 330. 1972; Henty in Papua New Guinea Dept. Forests Bull. 12: 128. 1980; Symon in J. Adelaide Bot. Gard. 4: 103. fig. 30, 31. 1981; Whalen in Gentes Herb. 12: 253. 1984; Symon in J. Adelaide Bot. Gard. 8: 83. fig. 33. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 127. 1985.

As noted in Fiji, *Solanum mammosum* is an annual or short-lived shrub 0.5–2 m. high, infrequently cultivated near sea level. The corolla is violet to pale purple-blue, and the fruit is yellow or orange, 3–6 cm. long, with nipple-like apex and basal outgrowths.

TYPIFICATION: Linnaeus mentioned the species as from Virginia and Barbados, and the type is Herb. Linn. 248.32 (LINN HOLOTYPE).

DISTRIBUTION: Tropical or subtropical America, now occasionally cultivated in many tropical or subtropical areas.

LOCAL NAME AND USE: The *nipple fruit* is occasionally cultivated for its bizarre fruit; it was presumably introduced into Fiji during the present century but is considered a potentially pernicious weed and so is not encouraged.

AVAILABLE COLLECTION: VITI LEVU: REWA: Department of Agriculture insectary, Suva, *DA 8992* (*L.2952, L.3437*).

5. *Solanum tuberosum* L. Sp. Pl. 185. 1753; Seem. Fl. Vit. 175. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 247. 1892; Yuncker in Bishop Mus. Bull. 178: 107. 1943; J. W. Parham, Pl. Fiji Isl. 239. 1964, ed. 2. 330. 1972; Backer & Bakh. f. Fl. Java 2: 472. 1965; Purselove, Trop. Crops, Dicot. 560. fig. 88. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 199. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 141. 1976; Symon in J. Adelaide Bot. Gard. 4: 59. 1981, in op. cit. 8: 77. fig. 30. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 128. 1985.

In Fiji *Solanum tuberosum* is sparingly cultivated at mostly low elevations, as a spreading herb seldom exceeding 50 cm. in height, regenerating from underground tubers. The corolla is white to pale violet, and the fruit is greenish, infrequent in cultivation.

LECTOTYPIFICATION: Linnaeus cited "*Habitat in Peru*" and several earlier publications. Hawkes (in Scott. Pl. Breed. Stat. Ann. Rep. 106. 1956) takes as the LECTOTYPE Herb. Linn. 248.12 (LINN).

DISTRIBUTION: Tropical and subtropical America, with a main center of diversity in the Andes. There are many cultivars and a vast literature discussing this extremely important vegetable.

LOCAL NAMES AND USE: The *potato* is known to Fijians as *vateta* or *alu*. Although it is one of the world's most important crop plants, the edible tubers are scarcely used by Fijians, but the species is being grown experimentally on a small scale, especially in the Singatoka Valley. No herbarium specimens from Fiji seem to be available.

6. *Solanum americanum* Mill. Gard. Dict. ed. 8. 1768; Edmonds in J. Arnold Arb. 52: 634. 1971, in Kew Bull. 27: 103. 1972; R. J. Henderson in Contr. Queensland Herb. 16: 33. pl. 3. 1974, in Austrobaileya 1: 20. 1977; Edmonds in Bot. J. Linn. Soc. 75: 148. 1977, in op. cit. 76: 33. 1978; Schilling in Syst. Bot. 6: 181. 1981; Symon in J. Adelaide Bot. Gard. 4: 37. fig. 1. 1981; Purdie et al. in Fl. Australia 29: 95. 1982; Symon in J. Adelaide Bot. Gard. 8: 25. fig. 1. 1985.
- Solanum nodiflorum* Jacq. Collect. 2: 288. 1789, Icon. Pl. Rar. 2: 11. t. 326. 1789; R. J. Henderson in Contr. Queensland Herb. 16: 28. pl. 1. 1974; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 219: 144. 1977; Heiser, Burton, & Schilling in Hawkes et al. Biol. Tax. Solan. 524. 1979.
- Solanum oleraceum* sensu Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, in J. Bot. 1: 207, p. p. 1863, Fl. Vit. 175. 1866; Greenwood in Proc. Linn. Soc. 154: 101. 1943; non Dunal.
- Solanum forsteri* Seem. in J. Bot. 1: 207. 1863, Fl. Vit. 174. 1866; Yuncker in Bishop Mus. Bull. 220: 238. 1959.
- Solanum nigrum* sensu Drake, Ill. Fl. Ins. Mar. Pac. 246. 1892; Witasek in Denkschr. Akad. Wiss. Wien 85: 342. 1910; Christophersen in Bishop Mus. Bull. 128: 195. 1935; Yuncker in op. cit. 178: 106. 1943, in op. cit. 184: 62. 1945, in op. cit. 220: 238. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 127. 1959, Pl. Fiji Isl. 238. 1964, ed. 2. 330. 1972; Backer & Bakh. f. Fl. Java 2: 471. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 197. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 69, 102. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 148. pl. 32. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 127. 1985; non L.
- Solanum americanum* var. *nodiflorum* Edmonds in J. Arnold Arb. 52: 634. 1971.
- Solanum nodiflorum* subsp. *nodiflorum*; R. J. Henderson in Contr. Queensland Herb. 16: 29. pl. 7, H. 1974.
- Solanum nodiflorum* subsp. *nutans* R. J. Henderson in Contr. Queensland Herb. 16: 30. pl. 2, 7, I. 1974.

As seen in Fiji, *Solanum americanum* is an herb or a short-lived perennial 0.3–1.3 m. high, occasional to abundant from near sea level to an elevation of about 1,130 m. as a weed in villages, clearings, gardens, canefields, and plantations, and on open gravel banks and waste land. The corolla is white, sometimes yellow-green at base within, the anthers are yellow, and the fruit is purple to black. Flowers and fruits are to be seen throughout the year.

TIPIFICATION AND NOMENCLATURE: The type of *Solanum americanum* is from a plant cultivated at the Chelsea Physic Garden and said to have been introduced from Virginia, North America, represented by *Miller s. n.* (BM LECTOTYPE; cf. Edmonds, 1971). *Solanum nodiflorum* was based on a plant cultivated in Vienna from seed of unknown origin (BM LECTOTYPE; cf. Henderson, 1974) but described as native to Mauritius. *Solanum forsteri* was based by Seemann on G. Forster's concept of *S. nigrum* (Forst. f. Fl. Ins. Austr. Prodr. 18. 1786) as occurring on Easter Island (*J. R. & G. Forster*, BM HOLOTYPE fide Seemann). The type of *S. nodiflorum* subsp. *nutans* is *Henderson 518* (BRI 86633 HOLOTYPE; ISOTYPES at K, NSW, MEL).

The identity of the widespread tropical weedy species of *Solanum* has been the subject of much discussion. In the comprehensive treatment of Henderson (*Solanum nigrum* L. (Solanaceae) and related species in Australia. Contr. Queensland Herb. 16: 1–78. 1974) the common herbaceous weedy species of the Pacific seems best referred to *S. nodiflorum* subsp. *nutans*. Heiser et al. (in Hawkes et al. Biol. Tax. Solan. 513–527. 1979) agreed with Henderson in distinguishing *S. nodiflorum* from *S. americanum*, remarking (p. 524): "Although we must admit that some uncertainty may exist as to the correct application of Miller's *S. americanum*, we shall continue to use this name for the widespread eastern North American plant, as has been done in most recent Floras. If this name is employed in this sense it means that another lectotype must be selected, or if none is available a neotype will have to be designated. This course of action also means that the well established name, *S. nodiflorum*, can continue to be used for the

widespread tropical plant." Subsequently, however, Schilling (1981) decided to accept the lectotypification of *S. americanum* suggested by Edmonds and to reduce *S. nodiflorum* to outright synonymy. This solution is now widely accepted (Symon, 1981, etc.) and is here adopted. The eastern North American species formerly considered as *S. americanum* is therefore to be known as *S. ptycanthum* Dunal ex DC. (cf. Schilling, 1981, p. 183).

Differences between *Solanum nigrum* L. (which does occur in Australia and other southern areas) and *S. americanum* (as now taken to include *S. nodiflorum*) are discussed by Henderson (1974), Sykes (1977), and Symon (1981), among others.

DISTRIBUTION: *Solanum americanum* is common in disturbed areas from southern Georgia to Florida, west to California, and south through Mexico to Central and South America (Schilling, 1981); additionally it now occurs as an abundant weed throughout much of the Paleotropics. From Fiji only 22 collections from five islands have been noted, but this is certainly misleading, as the species is to be seen as a weed in or near villages on practically all inhabited islands of the group.

LOCAL NAMES AND USES: The *black nightshade* or *glossy nightshade* is known to Fijians as *mboro*, *mboro laukana*, *mboro ni veiwere*, *mboro ni yaloka ni ngata*, *mburosousou ni valalangi*, *malahome*, and *thevuthevu*. The entire plant is considered edible as a potherb, even though the berries are sometimes reputed to be poisonous. Heated juice from the plant is said to relieve swellings.

REPRESENTATIVE COLLECTIONS: YASAWAS: YANGGETA: *Weiner 248*. VITI LEVU: M̄BA: Wakandra, Nandi, *DA 9675*; Mt. Evans Range, *Greenwood 105*; summit of Mt. Nanggaranambuluta, *Gillespie 4348*. NANDRONGA & NAVOSA: Singatoka, *DA*, Oct. 4, 1950. SERUA: Ngaloa, *Smith 9450*. NAMOSE: Mt. Voma, *DA 1908*; hills east of Wainikoroiuva River, near Namuamua, *Smith 9070*. RA: Ndombulevu, *DA 9544*. NAITASIRE: Navuso, *DA 11049*; Nasinu, *DA 11088*. REWA: Suva, *DA 12268*. KANDAVU: Mt. Mbuke Levu, in banana plantation, *Smith 206*. TAVEUNI: Waiyevo, *DA 5717*. FULANGA: On limestone, *Smith 1174*. FIJI without further locality, *Seeman 344*.

Although the species here discussed is to be known as *Solanum americanum* in a broad sense, as treated by recent students of the Australian flora, the taxon so abundant in New Zealand and most Pacific areas may be referred to *S. americanum* subsp. *nutans* (R. J. Henderson) R. J. Henderson (in *Austrobaileya* 2: 555. 1988).

7. *Solanum melongena* L. Sp. Pl. 186. 1753; Yuncker in Bishop Mus. Bull. 178: 107. 1943; J. W. Parham, Pl. Fiji Isl. 238. 1964, ed. 2. 330. 1972; Backer & Bakh. f. Fl. Java 2: 474. 1965; Pursglove, Trop. Crops, Dicot. 557. fig. 87. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 197. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 152. 1975; Symon in J. Adelaide Bot. Gard. 4: 262. fig. 116. 1981; Whalen in Gentes Herb. 12: 263. 1984; Hepper & P.-M. Jaeger in Kew Bull. 40: 389. 1985; Symon in J. Adelaide Bot. Gard. 8: 154. fig. 78. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 127. 1985.

Solanum melongena in Fiji is cultivated and also apparently naturalized on the edges of cultivated areas from near sea level to an elevation of about 200 m. The corolla is lavender, the anthers yellow, and the fruit at first green, becoming dark purple at maturity. Flowers and fruits have been obtained in June but the seasons are doubtless much longer.

LECTOTYPIFICATION: Several earlier references having been stated by Linnaeus, the species was lectotypified by LINN 248.28 by D'Arcy (in Ann. Missouri Bot. Gard. 61: 852. 1974) (Hepper & Jaeger, 1985).

DISTRIBUTION: The eggplant was probably first domesticated in India; it is now cultivated in most warmer parts of the world, and many cultivars have been developed. It was an early European introduction into Fiji and was listed in Thurston's 1886 *Catalogue*.

LOCAL NAMES AND USE: The eggplant is known to Fijians as *mbaingani*, from *baigan* (Hindi). The fruit is a commonly used vegetable, and parts of the plant are said to be used to ease abdominal pains.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Tholo-i-suva, *Bryan 204*. MBENGGGA: Savusavukalou, *Weiner 225*.

8. *Solanum repandum* Forst. f. *Fl. Ins. Austr. Prodr.* 18. 1786; Seem. in *Bonplandia* 9: 258. 1861; A. Gray in *Proc. Amer. Acad. Arts* 6:44. 1862; Seem. *Viti*, 440. 1862, in *J. Bot.* 1: 210. 1863, *Fl. Vit.* 177. t. 38. 1866, op. cit. 431. 1873; Engl. in *Bot. Jahrb.* 7: 472. 1886; Drake, *Ill. Fl. Ins. Mar. Pac.* 247. 1892; Reinecke in *Bot. Jahrb.* 25: 673. 1898; Yuncker in *Bishop Mus. Bull.* 178: 106. 1943; J. W. Parham, *Pl. Fiji Isl.* 239. 1964, ed. 2. 330. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 198. 1970; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 124. 1972; Whalen et al. in *Gentes Herb.* 12: 81. fig. 13, 14. 1981; Fosberg & Sacht in D. J. Carr, *Sydney Parkinson*, 101. pl. 93. 1983; Whalen in *Gentes Herb.* 12: 251. 1984; van Balgooy in *Pacific Pl. Areas* 4: 252. map 316. 1984; Symon in *J. Adelaide Bot. Gard.* 8: 89. fig. 36. 1985.

Solanum seedii Horne, *A Year in Fiji*, 268, nom. nud. 1881.

Solanum seedii Horne ex Baker in *J. Linn. Soc. Bot.* 20: 369. 1883; J. W. Parham, *Pl. Fiji Isl.* 239. 1964, ed. 2. 330. 1972.

In Fiji *Solanum repandum* is a shrub 0.6–3 m. high found from near sea level to an elevation of about 900 m., cultivated in villages and also naturalized in gardens, on the edges of cultivated areas, and in clearings. The corolla is white, the anthers are yellow, and the fruit is yellow-green to yellow, at first copiously pilose but becoming glabrate and 3- or 4(-6)-locular. No seasonal pattern of flowering and fruiting is discernible.

TYPIFICATION: Forster's original citation was "Marchionis et Societatis insulae." Whalen et al. (1981) remark: "Type: Society Islands. *Forster*, not found. A further search should be conducted before a neotype is selected." Symon (1985) notes: "There is at κ a specimen from the Forster herbarium that may be part of the type collection, photo ADW." In fact, the κ Forster specimen is clearly indicated as from the Marquesas, and I suggest the citation: *J. R. & G. Forster* (κ LECTOTYPE), obtained in the Marquesas Islands during Cook's second voyage. Cook's only stop in the Marquesas was at the island of Tahuata in April, 1794. G. Forster's record of the species from the Societies is presumably from *Banks & Solander* (BM), a specimen which doubtless came from the plant illustrated by Parkinson (reproduced by Fosberg and Sacht, 1983, and by Symon, 1985). Clearly representing the same species is *S. seedii* Horne ex Baker, typified by *Horne 332* (κ HOLOTYPE), collected in January, 1878, along the Waindalithi River, Tailevu Province, Viti Levu.

DISTRIBUTION: Pacific Islands from eastern New Britain (Symon, 1985) and the Solomon Islands to Pitcairn Island and Hawaii (Fosberg & Sacht in *Smithsonian Contr. Bot.* 21: 21. 1975). The distribution stated by Whalen et al. (1981) and van Balgooy (1984) lacks documented occurrences in New Britain, the Solomon Islands, the New Hebrides, Pitcairn, and Hawaii. In their interesting discussion of *Solanum* sect. *Lasiocarpa*, Whalen, Costich, and Heiser (in *Gentes Herb.* 12: 41–129. 1981) point out that eleven species of the section are centered in northwestern South

America, while the other two species occur from southeastern Asia into the Pacific. These two species, *S. lasiocarpum* Dunal and *S. repandum*, were thought to have exclusive distributions, but it is now known that there is an area of overlap in New Britain and the Solomons (Symon, 1985). Each of the Old World species is believed closely related to different neotropical species (Whalen et al., 1981), and it is still debatable whether they were early European introductions from America and that differentiation of a specific nature could have occurred in so short a period. Symon (1985) thinks it possible that *S. repandum* is a cultivar derived from *S. lasiocarpum* being selected for spinelessness and large fruits.

From Fiji 15 collections from only three islands have been examined, but actually the species is to be seen in or near villages on various other islands.

LOCAL NAMES AND USES: A plant well known to Fijians, *Solanum repandum* is called *sou*, *sousou*, *sou vuti*, *mboro sou*, and *vuani*. The boiled fruit is edible and is usually used in soups or with yams.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Gillespie 4329*. NAMOSI: Wainimakutu, Wainavindrau Creek, *Smith 8821*; Namosi and vicinity, *Gillespie 2693*, *Anderson & Tauleka 69-71*. NAITASIRI: Nuku Village, Wainimala River, *DA 14011*, *14012*; Wauidina River basin, *MacDaniels 1065*, *Tothill 635* (coll. *MacDaniels*); Naisonggo Village, *DA 15336*. TAILEVU: Namara, *Seemann 342*, p. p.; Viwa Island, *Harvey*, 1855. VITI LEVU without further locality, *Graeffe 1478*. OVALAU: *Bryan 611*. RAMBI: *Seemann 342*, p. p.

In view of the fact that *Solanum repandum* is found only in association with human disturbances, it is probably not truly indigenous in the Pacific. Its American relative, *S. sessiliflorum* Dunal, could conceivably have been brought to the Marquesas as early as 1595 by the Mendana-Quiros expedition; the two taxa are separable primarily by quantitative characters. If they should be combined, Forster's name of course has priority (Whalen et al., 1981).

9. *Solanum inamoenum* Benth. in *London J. Bot.* **2**: 228. 1843; Seem. in *Bonplandia* **9**: 258. 1861, Viti, 440. 1862; A. Gray in *Proc. Amer. Acad. Arts* **6**: 44. 1862; Turrill in *J. Linn. Soc. Bot.* **43**: 34. 1915; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 330. 1972; Heine in *Fl. Nouv.-Caléd. et Dépend.* **7**: 154, pro syn. 1976; Symon in *J. Adelaide Bot. Gard.* **4**: 122, pro syn. 1981; Whalen in *Gentes Herb.* **12**: 216, pro syn. 1984.

FIGURE 1.

Solanum sp. Seem. in *Bonplandia* **9**: 258. 1861, Viti, 440. 1862.

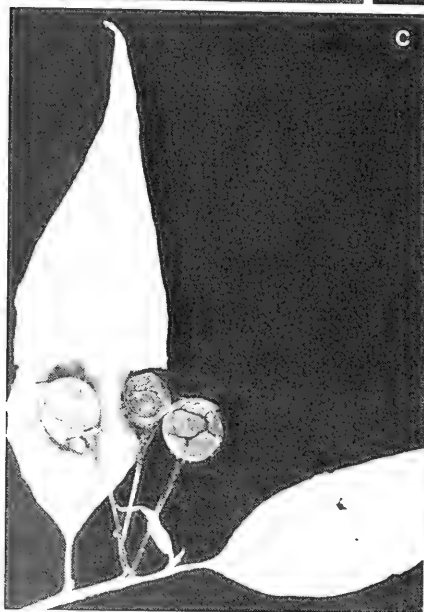
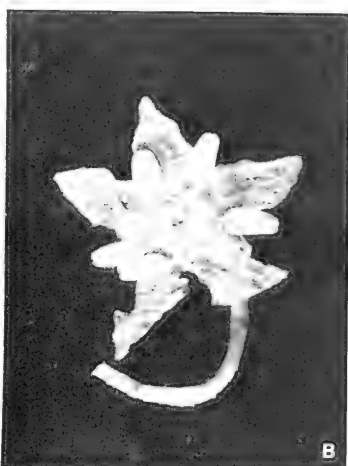
Solanum tetrandrum sensu Seem. in *J. Bot.* **1**: 209. 1863, *Fl. Vit.* 176. 1866, op. cit. 431. 1873; Drake, *Ill. Fl. Ins. Mar. Pac.* 247. 1892; Gibbs in *J. Linn. Soc. Bot.* **39**: 158. 1909; Greenwood in *Proc. Linn. Soc.* **154**: 101. 1943; J. W. Parham, *Pl. Fiji Isl.* 239. 1964; non R. Br. (1810).

Solanum aff. *inamoenum* Benth. ex Christophersen in *Bishop Mus. Bull.* **154**: 40. 1938.

Slender shrub or tree 1.5–4 m. high, found at elevations from near sea level to about 1,150 m. in dense, thin, or open forest or on its edges, and in the forests of ridges and crests, sometimes in thickets and clearings. The corolla is white or faintly bluish-tinged, the anthers are yellow, and the fruit turns from yellow to red, drying black. Insofar as specimens are dated, flowers have been observed between June and December, fruits between June and March.

TIPIFICATION: The type is *Hinds* (K HOLOTYPE), collected in (May or) June, 1840, on Nukulau Island, Rewa Province, Viti Levu. *Barclay 3446* (BM), from Nukulau, was probably taken from the same plant.

DISTRIBUTION: Frequent in Fiji, less abundant in Samoa and Tonga, and perhaps also occurring in the New Hebrides and New Caledonia. All Fijian specimens examined by me, from ten islands, are here cited.



LOCAL NAMES: Names recorded (only once each) are *kai ni mara* (Mba), *tukitu-kiyandre* (Mathuata), and *moloa* (Thakaundrove).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Lautoka, *Greenwood* 579; Nandarivatu and vicinity, *in Thurn* 294, *Gibbs* 615, *Gillespie* 4048, *Degener* 14324; Sovutawambu, near Nandarivatu, *Degener* 14594; western and southern slopes of Mt. Tomanivi, *Smith* 5273. NANDRONGA & NAVOSA: Thuvu, west of Singatoka, *Greenwood* 71. SERUA: *Bola* 42; hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith* 9223; Ngaloa, *DA* 12452. TAILEVU: Viwa Island, *Harvey*, in 1855. REWA: Near Suva, *Horne* 679. VITI LEVU without further locality, *Seemann* 343, p. p., 345. KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith* 141. OVALAU: *MacGillivray*, Oct., 1854. WAKAYA: *Milne* 373. NAIRAI: *Milne* 151. NGAU: *Milne* 161. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA* 12792, 12793, 12811; summit ridge of Mt. Numbiuloa, east of Lambasa, *Smith* 6467; near Tutu, *Horne* 595; mountains of Mathuata coast, *Greenwood* 648; mountains near Lambasa, *Greenwood* 619. THAKAUNDRIVE: Southwestern slope of Mt. Mbatini, *Smith* 603. VANUA LEVU without further locality, *Seemann* 343, p. p. RAMBI: *Horne* 678. TOTOA: *Milne* 81. KANATHEA: *Graeffe* 1481. FIJI without further locality, *U. S. Expl. Exped.*, *Horne* 56, *Tohill s. n.*

Of the species of *Solanum* thus far here enumerated, *S. inamoenum* is the first that is indubitably indigenous. Careful examination of the cited specimens inclines me to support Turrill's (1915) separation of *S. inamoenum* from *S. tetrandrum* R. Br. The two taxa are considered synonymous by Heine (1976), Symon (1981), and Whalen (1984), and indeed they are closely allied and perhaps merely represent the extremes of a spectrum. While typical *S. tetrandrum* occurs in northern Australia (Symon in *J. Adelaide Bot. Gard.* **4**: 120, *fig. 39*, 1981), New Guinea (Symon in *op.cit.* **8**: 139, *fig. 71*, 1985), and the Solomons, the alliance becomes very complex in New Caledonia, where several binomials are referred to its synonymy (Heine, 1976). Until a specialist in *Solanum* makes a detailed study of this alliance, I believe it advisable to recognize the easternmost portion of it as distinct. Separating characters are suggested by the following key:

Indument composed of sessile, stellate hairs with all rays essentially equal; leaf blades lanceolate to obliquely oblong-ovate, (6-) 10-19 × (1.5-) 2.5-9 cm., acuminate (rarely subobtuse) at apex (acumen 1-3.5 cm. long), the veins colorous with blade surface; calyx lobes broadly deltoid, 0.5-1 mm. long; corolla 10-15 mm. in diameter; anthers 2-3 mm. long; fruit 8-13 mm. in diameter, drying black.

S. inamoenum

Indument composed of sessile, stellate hairs, these often with a long central ray; leaf blades broadly elliptic, 8-18 × 5-15 cm., rounded or acute at apex, the veins distinctly pale above; calyx lobes lanceolate, 2-3 mm. long; corolla about 25 mm. in diameter; anthers 4-5 mm. long; fruit 5-7 mm. in diameter, drying brownish orange. *S. tetrandrum*

Of course, if further study indicates that the complex is more logically treated as a single species, Brown's binomial (1810) has priority.

10. *Solanum viride* Solander ex Forst. f. *Pl. Esc. Ins. Oc. Austr.* 72, nom. nud. 1786, *Fl. Ins. Austr. Prodr.* 89, nom. nud. 1786; Spreng. in *Biehler, Pl. Nov. Herb. Spreng.* 14. (May) 1807, *Mant. Prima Fl. Halensis*, 37. (July) 1807; A. Gray in *Proc. Amer. Acad. Arts* **6**: 44. 1862; Seem. *Fl. Vit.* 176, pro syn. 1866; Witasek in *Denkschr. Akad. Wiss. Wien.* **85**: 346. 1910; Yuncker in *Bishop Mus. Bull.* **220**: 239. 1959; Garnock-Jones in *Taxon* **35**: 127. 1986; non R. Br. (1810). FIGURE 2.

Solanum uporo Dunal in *DC. Prodr.* **13** (1): 138. 1852; Seem. in *J. Bot.* **1**: 208. 1863; Drake, *Ill. Fl. Ins. Mar. Pac.* 247. 1892; Reinecke in *Bot. Jahrb.* **25**: 674. 1898; Yuncker in *Bishop Mus. Bull.* **178**: 106. 1943, in *op.cit.* **220**: 238. 1959; J. W. Parham, *Pl. Fiji Isl.* 239, *fig. 82*. 1964, ed. 2. 331. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 200. 1970; Heine in *Fl. Nouv.-Caléd. et Dépend.* **7**: 136. 1976; Fosberg & Sacht in *D. J. Carr, Sydney Parkinson*, 102, *pl. 94*. 1983; Whalen in *Gentes Herb.* **12**: 216. 1984.

FIGURE 1. *Solanum inamoenum*; A, ♂ flower, × 6; B, inner surface of corolla of ♂ flower and stamens, × 4; C, foliage and fruits, × 1; D, lower surface of leaf blade, showing costa, secondaries, and indument, × 10. A & B from *Smith* 6467, C from *Degener* 11594, D from *Smith* 603.

- Solanum anthropophagorum* Seem. in *Bonplandia* 9: 258, nom. nud. 1861, in op. cit. 10: 274. t. 14. 1862, Viti, 440. 1862; Hook. in *Bot. Mag.* 90: pl. 5424. 1864; Seem. *Fl. Vit.* 175. t. 37. 1866; Engl. in *Bot. Jahrb.* 7: 472. 1886.
- Solanum savaiense* Witasek in *Repert. Sp. Nov.* 5: 163. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 349. 1910.
- Solanum patameense* Witasek in *Repert. Sp. Nov.* 5: 163. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 348. 1910.
- Solanum patameense* var. *grandifolium* Witasek in *Repert. Sp. Nov.* 5: 164. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 348. 1910.
- Solanum patameense* var. *parvifolium* Witasek in *Repert. Sp. Nov.* 5: 164. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 348. 1910.
- Solanum upolense* Witasek in *Repert. Sp. Nov.* 5: 164. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 347. 1910.
- Solanum ornans* Witasek in *Repert. Sp. Nov.* 5: 165. 1908, in *Denkschr. Akad. Wiss. Wien* 85: 349. 1910; Christophersen in *Bishop Mus. Bull.* 128: 195. 1935; St. John & A. C. Sm. in *Pacific Sci.* 25: 342. 1971.
- Solanum polynesianum* St. John in *J. Jap. Bot.* 34: 333. fig. 1. 1959.
- Solanum tongaense* St. John in *J. Jap. Bot.* 34: 335. fig. 2. 1959; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 198. 1970.
- Solanum tuamotuense* St. John in *J. Jap. Bot.* 34: 337. fig. 3. 1959.

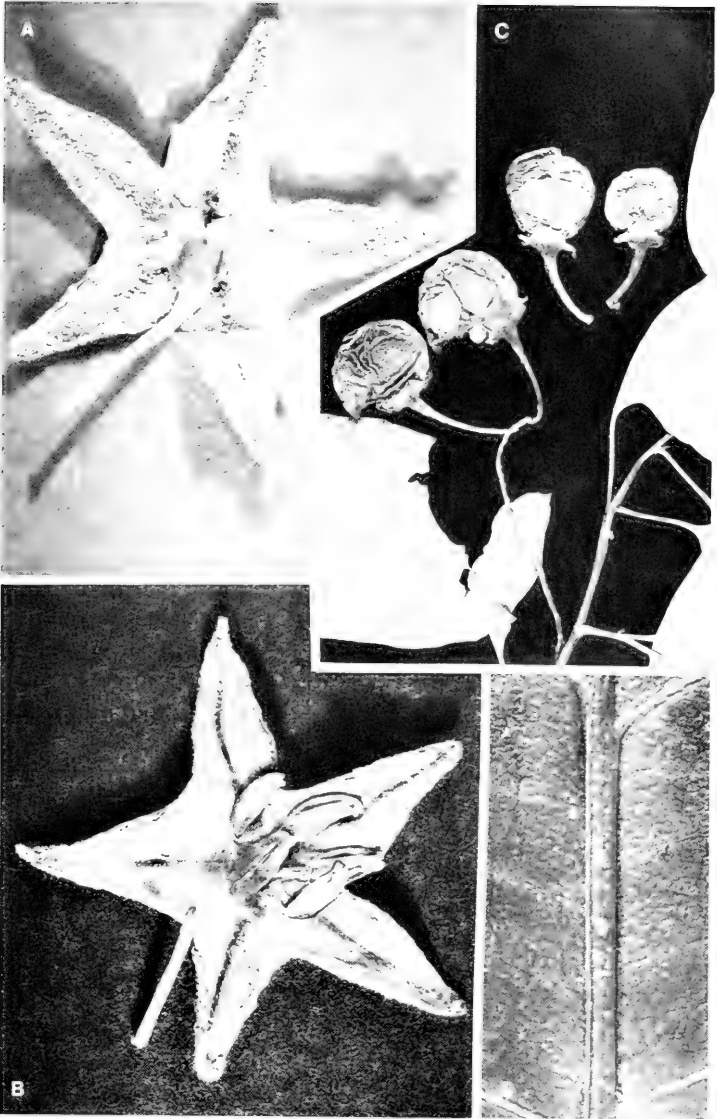
As it seemingly occurs indigenously in Fiji, *Solanum viride* is found at elevations from near sea level to perhaps 100 m., possibly always on limestone, as an erect (but sometimes subsucculent or sprawling) shrub 1–3 m. high, on cliffs and limestone rock faces, on edges of forest, and in open places. The corolla is white or faintly yellowish white, the anthers are yellow or orange, and the fruit, at first green, turns through yellow to orange to red at maturity. Flowers have been obtained between March and August, fruits between February and August.

TIPIFICATION AND NOMENCLATURE: Although Sprengel (1807) in the first valid publication of the binomial *Solanum viride* indicated its locale as New Zealand, he was clearly basing his species on the Tahitian plant listed in G. Forster's two 1786 publications. An illustration of this species had been prepared by Parkinson and has now been published (Fosberg and Sachet, 1983, as *S. uporo*). A correct citation of the type of *S. viride* is: *J. R. & G. Forster* (K LECTOTYPE designated by Garnock-Jones, 1986), collected on Tahiti, Society Islands, during Cook's second voyage. *Solanum viride* Spreng. antedates *S. viride* R. Br. (1810), of Australia and New Guinea, which is now to be known as *S. viridifolium* Dunal (cf. Symon in *J. Adelaide Bot. Gard.* 8: 141. fig. 73. 1985).

Solanum uporo was based on *Moerenhout* (G-DC HOLOTYPE), from Tahiti.

In his first valid publication of *Solanum anthropophagorum*, Seeman (1862) cited only his no. 341, and a correct citation of the type is: *Seemann 341* (K HOLOTYPE; ISOTYPE at BM), collected in 1860 in Fiji without further locality. A second sheet in the type cover at K is *Seemann bis*, with an indication that this sheet served in part for the illustration in *Bonplandia* (1862) (reproduced in 1864 and 1866). This unnumbered Seemann specimen bears the inscription: "vulgo 'Boro dina.' Leaves eaten. Flowers white, fruit red and shaped like a tomato. Collected at Bau. Shrub 3–4 feet high." I believe that these two specimens did not come from the same plant, the leaves of *Seemann bis* being notably the larger, but there are flower sketches and an attached fruit on no. 341. (Both specimens may have come from the islet of Mbau, but this is not certain.) Seemann almost immediately (1863) reduced his own species to *S. uporo*, but in *Flora Vitiensis* he restored the name *S. anthropophagorum*, including as synonyms *S. uporo* and also *S. viride* Solander (non R. Br.). Seemann (1866) retained his epithet

FIGURE 2. *Solanum viride*; A, calyx and outer surface of corolla, $\times 4$; B, inner surface of corolla and stamens, $\times 4$; C, foliage and fruits, $\times 1$; D, lower surface of leaf blade, showing costa, secondaries, and finer venation, $\times 10$. A & B from *Smith 1286*, C & D from *Smith 1178* (detached fruits in C from *Smith 1286*).



anthropophagorum "because *Uporo* is but a corruption, 'Poroporo' being the correct Tahitian name of the plant."

Several taxa described by Witasek from Samoa are to be placed with *Solanum viride*. *Solanum savaiense* is based on three syntypes (w) collected by *Rechinger 1117*, from Malo, Savai'i, and *1183* and *76*, from Lealatele, Savai'i, all obtained in July, 1905. For *S. patameense* Witasek described two varieties, neither being indicated as the "typical" one: var. *grandifolium*, based on *Rechinger 129* (w HOLOTYPE), collected at Patamea, Savai'i, in June, 1905, and var. *parvifolium*, based on *Rechinger 92* (w HOLOTYPE), also obtained at Patamea in July, 1905. *Solanum upolense* is typified by *Rechinger 482* (w HOLOTYPE), collected near Lau'ii, Upolu, in June, 1905, and *S. ornans* by *Rechinger 1775* (w HOLOTYPE), obtained in 1905 near Moa-moa, Upolu.

Solanum polynesianum is typified by *J. W. Moore 463* (BISH HOLOTYPE), collected Dec. 25, 1926, in a valley south of Faaroa Bay, Raiatea, Society Islands; paratypes were listed from the Marquesas and Austral Islands. The type of *S. tongaense* is *Yuncker 15584* (BISH HOLOTYPE), obtained April 1, 1953, between Mua and Ha'aluma, 'Eua, Tonga. *Solanum tuamotuense* is based on *Whitney Expedition 2059* (BISH HOLOTYPE), collected April 5, 1923, on Hiti Atoll, Tuamotu Islands; many other Tuamotuan specimens were listed as paratypes.

DISTRIBUTION: Widespread in the southern Pacific from Fiji and Tonga to the Tuamotus and Hawaii. It seems probable that the taxon is indigenous in Fiji, Tonga, and Samoa, from which area it may have been aboriginally extended eastward to Niue and such island groups as the Tokelau and Danger Islands, and eventually eastward as far as the Tuamotus and Hawaii. The occurrence of *Solanum viride* has not been noted in the New Hebrides, and it is presumably lacking from New Caledonia (cf. Heine, 1976, in his discussion of *S. uporo*).

What appears to be the indigenous, "wild" form of *Solanum viride* is probably represented by material referred to *S. savaiense*, *S. upolense*, *S. ornans*, and *S. tongaense*. *Solanum patameense*, at least as to its var. *grandifolium*, shows some differences from the "wild type" of *S. viride*, its leaves having petioles to 4.5 cm. long and blades to 18 × 9 cm., these irregularly repand-lobed, the lobes sometimes being deltoid, subacute, and 2-3 cm. long; it may merit the status of a cultivar. In eastern Polynesia there seems to have been a selection for forms with larger leaves (petioles to 6 cm. long and blades to 20 × 11 cm.) and larger fruits, these sometimes (especially in the Austral Islands) having pedicels to 40 mm. long and berries as much as 35 × 25 mm. The Tahitian plant originally described by Sprengel (1807) and also as *S. uporo* is doubtless well illustrated by Parkinson (cf. Fosberg and Sachet, 1983); it differs from the "wild type" of Fiji and western Polynesia primarily in its larger fruits, which are ellipsoid to broadly fusiform rather than subglobose. *Solanum polynesianum* and *S. tuamotuense* are scarcely to be separated from *S. uporo*, although a careful field study may permit the suggestion of more than one cultivar in eastern Polynesia.

Perhaps the most obvious variant of *Solanum viride* deserving of cultivar status is the Fijian *S. anthropophagorum*, further discussed below.

LOCAL NAME AND USE: *Mboro*; it is possible that the "wild form" was used as a potherb, but collectors' notes do not so indicate.

AVAILABLE COLLECTIONS: MOALA: *Milne*, Sept., 1854. MATUKU: *Milne 115*. KAMBARA: On limestone cliff, *Smith 1286*. MARAMBO: Rough limestone face of high plateau, *Bryan 516*. FULANGA: On limestone, *Smith 1178*. ONGEA NDIRIKI: *Bryan 385*. FIJI without further locality, *Gillespie 3216*.

10a. *Solanum viride* cv. 'Anthrophagorum.'

A Fijian variant of *Solanum viride* that has long been cultivated in and near villages is characterized by its large leaves (petioles to 10 cm. long and blades to 30 × 25 cm., shallowly repand-margined) and by its predominantly oblate-subglobose fruits up to 50 mm. in diameter and often 3- or 4-locular. Cultivated forms from other parts of the range of the species (Samoa and eastern Polynesia) were probably independently derived and may be found to merit other cultivar names.

TYPIFICATION: *Solanum anthropophagorum* Seem. may be considered the type of the cultivar, although even the type material probably came from two plants, as noted above.

DISTRIBUTION: Fiji only, or possibly aboriginally spread to nearby archipelagoes. For instance, the taxon described by Sykes (1970) as *Solanum uporo* is very suggestive of cv. 'Anthrophagorum,' although its corolla (from a glasshouse plant as indicated in Sykes's footnote) would appear too large for the species.

LOCAL NAMES AND USES: *Mboro ndina*; *sou mbokola*. The cultivar is (or was in the not too distant past) used as a potherb for its young stems, foliage, and fruits. More grisly uses in earlier times, suggested by the cultivar epithet, were detailed by Seemann (1866).

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Nanduruloulou Cocoa Station, DA 15273 (grown from seed of the following collection). TAILEVU: Nambitu, Nakalo, DA L.12399.

11. *Solanum* sp.

FIGURE 3.

Shrub 1-2 m. high, apparently rare in thickets on limestone at elevations from near sea level to 80 m.; stems copiously armed with straight, slender, spreading or slightly retrorse prickles 4-7 mm. long and 0.5-1 mm. in diameter at base (these occasional on petioles and inflorescence peduncles); vegetative parts glabrous or when very young with sparse, sessile, stellate, few-rayed, noncontiguous hairs about 0.5 mm. in diameter; petioles slender, 3.5-5 cm. long; leaf blades membranaceous, ovate, 10-18 cm. long, 5-9.5 cm. broad, inaequilaterally rounded or obtuse at base, gradually acuminate at apex (acumen acute, about 15 mm. long), subtentire to slightly repand at margin, the secondary nerves 5-7 per side, spreading, slightly elevated on both sides, the veinlets laxly reticulate; inflorescence a lateral, lax, simple, 10-15-flowered cyme about 5 cm. long at anthesis, the peduncle about 25 mm. long to first flower, the pedicels at anthesis slender, 12-14 mm. long; calyx about 4 mm. in diameter at anthesis, slightly accrescent in young fruit, the lobes deltoid-apiculate, 1-1.5 mm. long at anthesis; corolla deeply stellate, 15-18 mm. in diameter, white, copiously stellate-pilose without when young, the indument becoming sparse; anthers about 2 mm. long, yellow.

DISTRIBUTION: Known from a single collection from the island of Fulanga.

AVAILABLE COLLECTION: FULANGA: In thickets on limestone of southwestern part of island, Smith 1180 (BISH and many duplicates), Feb. 24, 1934.

The collection described above in its basic characters is very suggestive of *Solanum viride* Spreng., although no other specimens referable to that species have any trace of the prickles that are so profuse on the Fulanga specimens. These prickles are slender and comparatively soft, copious on branchlets and occasional on petioles and inflorescence peduncles. In other respects the Fulanga collection, in comparison with the "wild form" of *S. viride*, has slightly longer petioles, slightly larger leaf blades with conspicuously inaequilateral bases, a longer-pedunculate inflorescence, and slightly shorter anthers.

It is conceivable that the Fulanga collection, which seems certainly indigenous, represents an atavistic state of *Solanum viride*, of which the ancestral condition could have been prickly (Symon, in litt.). In the Australian-New Guinean *S. viridifolium*

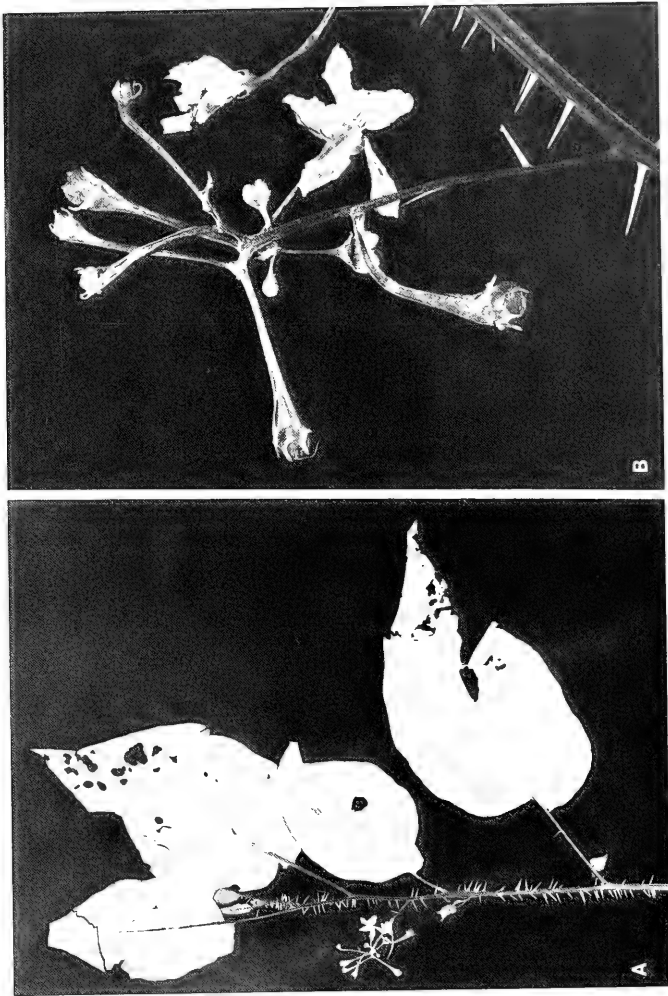


FIGURE 3. *Solanum* sp., from *Smith 1180*: A, distal portion of branchlet, with foliage and an inflorescence, $\times 1/3$; B, inflorescence, $\times 2$.

Dunal prickles are present on the stems of young plants (Symon in J. Adelaide Bot. Gard. **4**: 123, as *S. viride* R. Br. 1981, in op. cit. **8**: 141. 1985). In view of the many taxa already reducible to *S. viride* Spreng., it seems inadvisable at present to propose a new species of this alliance.

12. *Solanum vitiense* Seem. in J. Bot. **1**: 206. 1863, Fl. Vit. 176. *t.* 36. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 248. 1892; Gibbs in J. Linn. Soc. Bot. **39**: 158. 1909; Witasek in Denkschr. Akad. Wiss. Wien **85**: 342. 1910; Christophersen in Bishop Mus. Bull. **128**: 195. 1935; Yuncker in op. cit. **220**: 239. 1959; J. W. Parham, Pl. Fiji Isl. 239. *fig.* 83. 1964, ed. 2. 331. *fig.* 94. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 93, 134. 1972; Symon in J. Adelaide Bot. Gard. **8**: 65. *fig.* 24. 1985. FIGURES 4, 5.

Solanum viride sensu Seem. in Bonplandia **9**: 258. 1861, Viti, 440. 1862; non Spreng. nec R. Br.

Brachistus feddei Reinecke in Bot. Jahrb. **25**: 674. 1898.

In Fiji *Solanum vitiense* occurs as an often slender tree (rarely noted as a shrub) 2–15 m. high, often locally frequent at elevations from near sea level to 1,150 m. in dense or secondary forest or on its edges. The fragrant flowers have the calyx white, the corolla white and sometimes purplish proximally, the anthers yellow or white with faint blue markings; the fruit at maturity turns from orange to red. Flowers and fruits are found throughout the year.

TYPIFICATION AND NOMENCLATURE: The type cover at K contains two Seemann collections: (1) no. 340, in flower and fruit, from Port Kinnaird, Ovalau, dated July, 1860 (cited by Seemann, 1866, "ex parte," with the comment that "by some mischance specimens of an *Ardisia* were mixed with my n. 340.") (however, no myrsinaceous specimen bearing the number *Seemann 340* has been located by me); (2) *Seemann "bis,"* including a sketch of floral details used in *t.* 36 and indicated as from Ovalau,



FIGURE 4. *Solanum vitiense*, from *Smith 8930*; foliage and inflorescences, from a forested area in Namosi Province, Viti Levu, \times about 1/3.

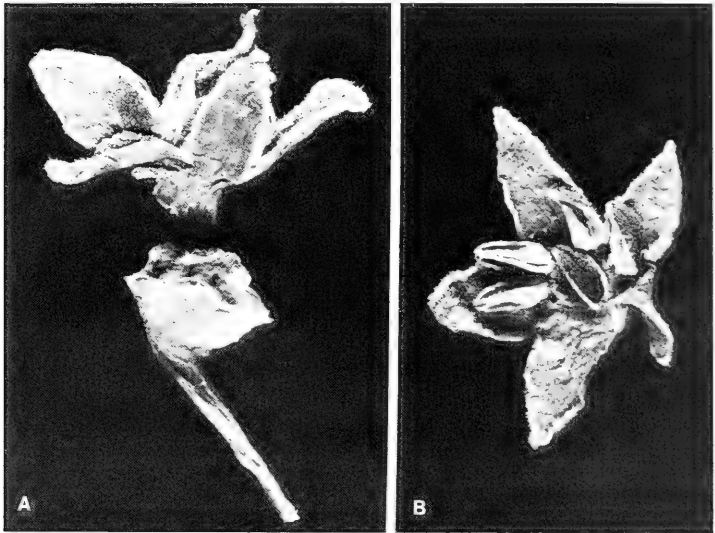


FIGURE 5. *Solanum vitiense*, from Smith 7343; A, calyx and corolla, $\times 6$; B, inner surface of corolla and stamens, $\times 6$.

October, 1860. Although Seemann (1866) cited his locality as Viti Levu, it seems more likely that all of his material came from Ovalau. Perhaps the best citation is: *Seemann 340* (κ HOLOTYPE, 2 sheets), collected on Ovalau and probably at or near Port Kinnaird, in July and October, 1860. ISOTYPES have been noted (Symon, 1985) at BM, GH, MEL, NSW, and OXF. For *Brachistus feddei*, Reinecke cited three of his own Samoan collections: *58a* (κ ISOSYNTYPE), from Savai'i, and *58* (κ ISOSYNTYPE) and *78* (BISH ISOSYNTYPE), from Upolu. The position of Reinecke's taxon as a synonym of *S. vitiense* seems not to have been questioned.

DISTRIBUTION: New Guinea, the Solomon Islands, Fiji, Samoa (abundant), and Tonga (rare); not known from New Caledonia or the New Hebrides (Symon, 1985). Symon (in Pacific Pl. Areas 4: 246. map 313. 1984) indicated *Lycianthes* subgen. *Cypellocalyx* to comprise about 20 species extending from Sumatra and Malaya to Samoa, but subsequently (1985, pp. 38-71) he treated *Cypellocalyx* as a section of *Solanum*. This most abundant and most distinctive species of the genus in Fiji is now known from about 65 collections from seven islands.

LOCAL NAMES: In spite of its frequency the species seems to have no standard Fijian name, these having been recorded only once or twice each: *mbau ni wa*, *malawathe*, *nggalinggawa*, and *vualiku* (Mba), *kando* (Nandronga & Navosa), *matiavi* (Naitasiri), *telenivia* (Ovalau), and *tungasele* (Kambara).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1151*; Savundamatau Creek, west of Nandarivatu, *Webster & Hildreth 14251*; Nandarivatu, *Gibbs 568*; Mt. Nanggaranambuluta, *DA 2145*; Nandala, south of Nandarivatu, *Degener 14832*; slopes of Mt. Tomanivi, *Smith 5250*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5501*; Mbulu, near Sovi Bay, *Degener 15032*. SERUA: Near Namboutini, *DA 14007*; Tawavulu Creek, north of Ngaloa, *Webster & Hildreth 14340*. NAMOSI: Hills east of Wainikoroiluva River, near Namuamua, *Smith 8930*; Nambukavesi Creek, *DF 150*. NAITASIRI: Waimbua, Sawani-Sereva road, *DA 11198*; Tamavua River, *Horne 714*. TAILEVU: Near Ndakuivuna, *DA 11018*. OVALAU: Hills east of Lovoni Valley, *Smith 7343*; range west of Levuka, *Gillespie 4446*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7797*. VANUA LEVU: MBUA: Near Nasarowangga, *DA 14312*. MATHUATA: Vicinity of Natua, *DA 15350*; Mt. Ndelaikoro, *DA 12807*. THAKAUNDROVE: Mt. Kasi, Yanawai River region, *Smith 1826*; Nakoroutari, south of Lambasa, *DA 15232*; Navonu Creek, Natewa Peninsula, *DA 15051*. TAVEUNI: *Seemann 387*. VANUA MBALAVU: Nambavatu, northern limestone section, *Tothill 633*. KAMBARA: On limestone, *Smith 1244*.

2. *Lycopersicon* Mill. Gard. Dict. Abrigid. ed. 4. 1754; Backer & Bakh. f. Fl. Java 2: 476. 1965; Purselove, Trop. Crops, Dicot. 530. 1968; D'Arcy in Ann. Missouri Bot. Gard. 60: 647. 1973; Symon in J. Adelaide Bot. Gard. 3: 144. 1981; Purdie et al. in Fl. Australia 29: 175. 1982; Symon in J. Adelaide Bot. Gard. 8: 14. 1985.

Annual or perennial herbs, sprawling, aromatic, unarmed, pubescent (hairs simple, glandular and nonglandular); leaves alternate, petiolate, the blades pinnately lobed or divided, the leaflets entire or lobed, sessile or petiolulate; inflorescences usually lateral, several-flowered, racemiform- or paniculiform-cymose; flowers ♀ (or upper ones or an inflorescence sometimes ♂), actinomorphic, the pedicels articulate above middle; calyx deeply 5-lobed, the lobes lanceolate; corolla stellate, 5-lobed (to 9-lobed in cultivars), the lobes valvate in bud; nectariferous disk lacking; stamens 5, equal, inserted on throat of corolla tube, the filaments short, united at base, forming a ring adnate to base of corolla, the anthers basifixed, coherent by short marginal hairs into a cone around style, each with a sterile apical appendage, dehiscing by subapical pores becoming introrse longitudinal slits; ovary 2-locular (or multilocular in cultivars), the placenta enlarged, the ovules numerous, the stigma capitate; fruit a berry, the seeds numerous, elliptic-reniform, compressed, pilose.

LECTOTYPE SPECIES: *Lycopersicon esculentum* Mill. (*Solanum lycopersicum* L.) (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 167. 1913).

DISTRIBUTION: South America and Galapagos Islands, with about ten species, one of which, the cultivated tomato, is an important crop throughout the world.

1. *Lycopersicon esculentum* Mill. Gard. Dict. ed. 8. 1768; Yuncker in Bishop Mus. Bull. 178: 107. 1943; Greenwood in J. Arnold Arb. 25: 401. 1944; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Purselove, Trop. Crops, Dicot. 531. fig. 85. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 194. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; D'Arcy in Ann. Missouri Bot. Gard. 60: 649. 1973; Symon in J. Adelaide Bot. Gard. 3: 144. 1981, in op. cit. 8: 14. 1985. Nom. cons.

Solanum lycopersicum L. Sp. Pl. 185. 1753; Witasek in Denkschr. Akad. Wiss. Wien 85: 350. 1910; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 141. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 127. 1985.

Lycopersicon lycopersicum Karsten, Deutsche Fl. 966, as *Lycopersicum lycopersicum*. 1882; Karsten ex Farwell in Ann. Rep. Commissioners Parks Boulevards Detroit 11: 83. 1900; Backer & Bakh. f. Fl. Java 2: 477. 1965; Nicolson in Taxon 24: 390. 1975; Purdie et al. in Fl. Australia 29: 175. 1982.

Cultivated herb often naturalized in waste places, viscid-pubescent and aromatic, the stems flexuous, thickened at nodes, the corolla yellow, the fruit variable in shape and size, red to orange or less often yellow when ripe.

LECTOTYPIFICATION: *Lycopersicon esculentum* was presumably based on a cultivated plant. Several references were given by Linnaeus for *Solanum lycopersicum*, but there seems to be agreement that LINN 248.16 is the appropriate lectotype (cf. Committee for Spermatophyta in Taxon 36: 74. 1987). Both Linnaeus and Miller provided references to Bauhin's *Pinax*, 167. 1623. It has been suggested that such paratautonyms as *Lycopersicon lycopersicum* be nomenclaturally rejected by one means or another (Terrell in Taxon 26: 129-131. 1977; Terrell et al. in op. cit. 32: 310-314. 1983; Rajwar in op. cit. 34: 720. 1985), but the Committee for Spermatophyta (1987) concluded that *L. lycopersicum* continues to be the correct name under the ICBN (Sydney edition, 1983). Nevertheless, the General Committee, at the Berlin Congress of 1987 (cf. Taxon 37: 439. 1988), overrode the Committee for Spermatophyta and conserved the binomial *Lycopersicon esculentum*, which is listed as conserved in the current edition of ICBN (1888, App. IIIB).

DISTRIBUTION: Indigenous in South America, the tomato is now widely cultivated.

LOCAL NAME AND USE: *Tomato*; frequently seen in Fijian gardens as a food plant, the fruits edible raw or cooked in a great variety of ways. It is commonly ignored by collectors.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, H. W. Simmonds "B" (κ).

3. CAPSICUM L. Sp. Pl. 188. 1753; Seem. Fl. Vit. 177. 1866; Backer & Bakh. f. Fl. Java 2: 469. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 590. 1973; Symon in J. Adelaide Bot. Gard. 3: 135. 1981; Purdie et al. in Fl. Australia 29: 177. 1982; Symon in J. Adelaide Bot. Gard. 8: 9. 1985.

Herbs or short-lived, soft-wooded shrubs, unarmed, glabrous or sparsely pilose (hairs then simple, sometimes glandular); leaves alternate or geminate, simple, petiole, the blades usually entire; flowers 1-few in leaf axils and stem forks, ♂, actinomorphic, 5-merous, pedicellate, the pedicels often decurved at anthesis and erect in fruit; calyx short-tubular, truncate or with short lobes or teeth, sometimes accrescent but not enclosing fruit; corolla stellate, the limb deeply lobed, the lobes 5, valvate in bud; stamens 5, equal, the filaments inserted at base of corolla tube, the anthers bilocular, loosely connivent, basifixed, dehiscing by longitudinal slits; ovary 2(-4)-locular, the ovules numerous, the style filiform or clavate, the stigma capitate; fruit a berry, somewhat fleshy or dryish, the seeds reniform to suborbicular, compressed.

LECTOTYPE SPECIES: *Capsicum annum* L. (vide Britton, Fl. Bermuda, 338. 1918).

DISTRIBUTION: Tropical America, with 10-12 (-25?) species, several of which are widely cultivated and often naturalized. Five species of *Capsicum* have been widely cultivated in many parts of the world, but the correct application of specific names has proved difficult. The nomenclatural problems were reviewed by Heiser and Pickersgill (in Taxon 18: 277-283. 1964, in Bailey 19: 151-156. 1975), whose conclusions now seem generally accepted. Only two of the five species seem to occur in southwestern Pacific areas and Australia.

KEY TO SPECIES

- Pedicels after first flowering usually 2 or more per node; corolla white or greenish white, usually 1-1.5 cm. in diameter; fruit ellipsoid-lanceolate, usually erect, 1-1.5 cm. long, about 5 mm. broad; cultivated as a pungent condiment and widely naturalized. 1. *C. frutescens*
 Pedicels after first flowering usually 1 per node; corolla pure white to bluish white, usually 1.5-2 cm. in diameter; fruit globose, ovoid, or oblong-conical, erect or pendent, mostly 1.5-2 cm. long and broad or much larger; cultivated and sparsely naturalized. 2. *C. annum*

1. ***Capsicum frutescens*** L. Sp. Pl. 189. 1753; Seem. in *Bonplandia* 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 177. 1866; Engl. in *Bot. Jahrb.* 7: 473. 1886; Drake, Ill. Fl. Ins. Mar. Pac. 248. 1892; Reinecke in *Bot. Jahrb.* 25: 674. 1898; Witasek in *Denkschr. Akad. Wiss. Wien* 85: 342. 1910; Greenwood in *Proc. Linn. Soc.* 154: 102. 1943; Yuncker in *Bishop Mus. Bull.* 178: 105. 1943, in op. cit. 184: 61. 1945, in op. cit. 220: 237. 1959; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 328. 1972; Backer & Bakh. f. Fl. Java 2: 469. 1965; Pursglove, *Trop. Crops, Dicot.* 526. fig. 84, B. 1968; Heiser & Pickersgill in *Taxon* 18: 280. fig. 1, 2. 1969; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 192. 1970; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 102. 1972; D'Arcy in *Ann. Missouri Bot. Gard.* 60: 594. 1973; Heine in *Fl. Nouv.-Caléd. et Dépend.* 7: 204. 1976; Symon in *J. Adelaide Bot. Gard.* 3: 137. 1981; Purdie et al. in *Fl. Australia* 29: 178. 1982; Symon in *J. Adelaide Bot. Gard.* 8: 10. 1985; Morat & Veillon in *Bull. Mus. Nat. Hist. Nat. (Paris) IV.* 7, Sect. B, *Adansonia* 3: 318. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 124. 1985.

Coarse, perennial, suffrutescent herb or low shrub 0.6–2 m. high, freely escaped from cultivation and naturalized in coconut plantations, cultivated fields, and clearings, and along rocky coasts and on open hillsides from near sea level to about 400 m. The corolla is greenish white or pale yellow, the anthers are blue to violet, rarely yellow, and the fruits become red. Flowers and fruits are seen throughout the year.

LECTOTYPIFICATION: Heiser and Pickersgill (1969) indicate as LECTOTYPE the specimen of *Capsicum frutescens* in van Royen's herbarium (L).

DISTRIBUTION: Probably originating in South America but early widespread throughout the New World and subsequently into all tropical and subtropical areas.

LOCAL NAMES AND USE: Fijian names are *mboro*, *mboro nganga*, *mboro ni vavalangi*, and *rokete*; also known as *mircha* (Hindi), *chilli*, *birds-eye chilli*, *birds-eye pepper*, *bird pepper*, and *hot pepper*. The edible fruit is used as a pungent condiment.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood* 221. NANDRONGA & NAVOSA: Singatoka Experiment Station, *DA* 5948. RA: Penang, *Greenwood* 221A. REWA: Department of Agriculture compound, Suva, *DA* 12187. KANDAVU: Western end of island, near Cape Washington, *Smith* 304. OVALAU: North of Levuka, *Gillespie* 4499. NGAU: Sawaieke, shore of Herald Bay, *Smith* 7933. TAVEUNI: Somosomo, *Seemann* 346; Waiyevo, *Gillespie* 4656.1. MATUKU: *Bryan* 285. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones* 934.

2. ***Capsicum annum*** L. Sp. Pl. 188. 1753; Reinecke in *Bot. Jahrb.* 25: 674. 1898; Yuncker in *Bishop Mus. Bull.* 184: 61. 1945; Backer & Bakh. f. Fl. Java 2: 469. 1965; Pursglove, *Trop. Crops, Dicot.* 525. fig. 84, A. 1968; Heiser & Pickersgill in *Taxon* 18: 278. 1969; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 102. 1972; D'Arcy in *Ann. Missouri Bot. Gard.* 60: 591. 1973; St. John in *Phytologia* 36: 373. 1977; Symon in *J. Adelaide Bot. Gard.* 3: 136. 1981.

In Fiji and most of the Old World tropics, *Capsicum annum* is represented only by cultivated forms which may be considered cultivars of var. *annuum*.

- 2a. ***Capsicum annum*** var. *annuum*; J. W. Parham, Pl. Fiji Isl. 236. 1964, ed. 2. 328. 1972; D'Arcy in *Ann. Missouri Bot. Gard.* 60: 591. 1973; Symon in *J. Adelaide Bot. Gard.* 3: 136. 1981; Purdie et al. in *Fl. Australia* 29: 178. 1982; Symon in *J. Adelaide Bot. Gard.* 8: 10. 1985.

Annual herbs or short-lived perennials, seldom exceeding 1 m. in height, cultivated as a crop in gardens (although no herbarium vouchers from Fiji are available) and

sparsely naturalizing. The corolla is white, sometimes with a bluish tinge, the anthers are bluish, drying green, and the fruits vary greatly in shape and size (1.5–15 cm. long), at first green or purple-flushed and finally bright red. The crop does not appear seasonal in Fiji.

LECTOTYPIFICATION: Of the several references listed by Linnaeus, the lectotype may be taken as Hort. Cliff. 59 (BM) (D'Arcy, 1973).

DISTRIBUTION: The wild forms of *Capsicum annum* have a wide distribution from the southern U. S. to Colombia, and var. *annuum* was probably domesticated somewhere within this area, perhaps in Mexico, at least 7,000–8,500 years ago. It is now cultivated and sometimes naturalized throughout much of the world.

LOCAL NAMES AND USES: There are many cultivars of the common garden pepper, differing in the shape and color of their edible fruits. Some cultivars have fruits that may be eaten raw in salads or cooked; these, with large and mild fruits, have often been referred to var. *grossum* (L.) Sendt. and var. *longum* (DC.) Sendt. (cf. J. W. Parham, 1964, 1972; Purseglove, 1968) and are commonly known as *sweet pepper*, *bell pepper*, *long pepper*, or *green chilli*. Cultivars with more pungent and smaller fruits are utilized as seasonings, as an ingredient of curry powder, etc.; these have been referred to var. *acuminatum* Fingerh. and var. *cerasiforme* (Mill.) Irish (cf. J. W. Parham, 1964, 1972; Purseglove, 1968) and are often known as *long cayenne*, *cherry pepper*, and *hot pepper*. It is generally considered that the botanical varieties here listed and other named ones are best treated as cultivars.

However, a spontaneous form of *Capsicum annum*, var. *glabriusculum* (Dun.) Heiser & Pickersgill (in *Baileya* 19: 156. 1975), has been noted as occurring in Australia (Symon, 1981, Purdie et al., 1982), although not in New Guinea (Symon, 1985). It could well be anticipated in Pacific areas; its fruit is comparatively small, usually less than 1 cm. long and broad.

4. *PHYSALIS* L. Sp. Pl. 182. 1753; Seem. Fl. Vit. 178. 1866; Backer & Bakh. f. Fl. Java 2: 467. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 660. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 126. 1976; Symon in J. Adelaide Bot. Gard. 3: 149. 1981; Purdie et al. in Fl. Australia 29: 179. 1982; Symon in J. Adelaide Bot. Gard. 8: 18. 1985.

Annual or perennial herbs or short-lived shrubs, unarmed, glabrous or pilose (hairs then simple, forked, stellate, or glandular); leaves alternate (sometimes geminate but then unequal and not opposite), petiolate, simple, the blades entire, toothed, or lobed; flowers ♂, actinomorphic, solitary in leaf axils and stem forks; calyx tubular to campanulate, 5-lobed, conspicuously accrescent in fruit; corolla broadly campanulate to rotate, the tube short, the limb expanded, shallowly 5-lobed, folded in bud; stamens 5, equal or unequal, inserted toward base of corolla tube, the anthers oblong, 2-locular, basifixed, loosely connivent, dehiscing by longitudinal slits; ovary 2-locular, the ovules numerous on enlarged placentae, the style filiform, the stigma capitate; fruit subglobose or ellipsoid, baccate, enclosed by the inflated, reticulate, narrow-mouthed calyx, the seeds numerous, disk-shaped to broadly reniform.

LECTOTYPE SPECIES: *Physalis alkekengi* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 156. 1913).

DISTRIBUTION: North and South America, but with some species indigenous in temperate and tropical Asia and Africa, with about 100 species, several of which are widely cultivated and sometimes naturalized. Two species are present in Fiji.

KEY TO SPECIES

Biennial or perennial, suffrutescent or soft-wooded plants, the stems green or purple-tinged, hollow; stems, petioles, leaf blades, and outer surfaces of flowers obviously pilose with spreading hairs to 1 mm. long; petioles 1-7 cm. long; leaf blades ovate, 3.5-15 × 2-11 cm., entire or bluntly lobed, often obliquely cordate or broadly cuneate at base, acute to acuminate at apex; pedicels 6-15 mm. long at anthesis, 15-20 mm. long in fruit; calyx 8-15 mm. long at anthesis, 3-5 cm. long in mature fruit and then inflated and angular; corolla 10-15 mm. long, yellow, with 5 large purple-brown blotches toward base; filaments 2-6 mm. long; anthers 3-4.5 mm. long; style 5-8 mm. long; fruits ellipsoid, 12-20 mm. in diameter.

1. *P. peruviana*

Annual herbs, the stems mostly green, hollow, angular-ribbed distally; stem ribs, petioles, and pedicels with very short, upcurved hairs, glabrescent; petioles 2-11 cm. long; leaf blades ovate to oblong-lanceolate, 5-10 × 2.5-8 cm., short-pilose on both surfaces, glabrate, usually obviously and irregularly dentate but sometimes merely sinuate, obliquely acute to rounded at base, acuminate to obtuse at apex; pedicels to 15 mm. long at anthesis and 25 mm. long in fruit; calyx 3-6 mm. long at anthesis, 2-4 cm. long in mature fruit and then subglobose-acuminate and with 10 slightly projecting angles; corolla 6-10 mm. long, pale yellow, greenish at base, with 5 sometimes obscure blotches within; filaments 2.5-4 mm. long; anthers 2-2.5 mm. long; style 4-5 mm. long; fruits globose, 10-12 mm. in diameter. 2. *P. angulata*

1. *Physalis peruviana* L. Sp. Pl. ed. 2. 1670. 1763; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 178. 1866; Gibbs in J. Linn. Soc. Bot. 39: 158. 1909; Christophersen in Bishop Mus. Bull. 128: 194. 1935; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Yuncker in Bishop Mus. Bull. 178: 105. 1943, in op. cit. 220: 237. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 124. 1959, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Backer & Bakh. f. Fl. Java 2: 468. 1965; Pursseglove, Trop. Crops, Dicot. 523. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 197. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 127. pl. 27, fig. 1-9. 1976; Symon in J. Adelaide Bot. Gard. 3: 154. 1981; Purdie et al. in Fl. Australia 29: 183. fig. 86, H, L. 1982; Symon in J. Adelaide Bot. Gard. 8: 19. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 126. 1985.

As noted in Fiji, *Physalis peruviana* is a coarse, suffrutescent herb or soft-wooded shrub to 2 m. high, seen at elevations from near sea level to 900 m. in gardens and also naturalized in forest along trails and streams, in clearings, and in cultivated areas. The corolla is pale yellow, blotched with purple at throat; the filaments are purplish and the anthers dull blue; the style is dull blue; and the berry is yellow, enclosed in the purple-stripped calyx. Flowers and fruits have been noted between June and February.

TYPIFICATION: The type is a plant cultivated at Uppsala, grown from seeds sent to Linnaeus from Lima, Peru, by Alstroemer (LINN HOLOTYPE).

DISTRIBUTION: South American in origin, now widespread in many tropical areas. It was widely established in Fiji prior to Seemann's visit in 1860.

LOCAL NAMES AND USE: The *Cape gooseberry* is sometimes known to Fijians as *mbotembote yandra*, *tukiyandra*, *maulanggua*, and *kospeli*. The fruit is edible raw or made into preserves.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, Greenwood 802, Parks 20575, Gillespie 4304; between Nandarivatu and Navai, Gibbs 707. NANDRONGA & NAVOSA: Agricultural Station, Nathotholevu, DA 16704. NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, Smith 8692. REWA: Suva, DA 11437. TAVEUNI: Seemann 338.

2. *Physalis angulata* L. Sp. Pl. 183. 1753; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 178. 1866; Yuncker in Bishop Mus. Bull. 220: 236. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 123. fig. 61. 1959, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Backer & Bakh. f. Fl. Java 2: 468. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 196. 1970; D'Arcy in Ann. Missouri Bot. Gard. 60: 662. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 132. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 126. 1985.

Physalis minima sensu Drake, Ill. Fl. Ins. Mar. Pac. 248, saltem p. p. 1892; Christophersen in Bishop Mus. Bull. 128: 194. 1935; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Yuncker in Bishop Mus. Bull. 178: 105. 1943, in op. cit. 220: 236. 1959; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; forsan non L.

Coarse annual herb 0.2–1.2 m. high, often locally abundant as a weed in villages, waste places, pastures, plantations, and canefields, along roads, on open slopes, and in forest along creeks from near sea level to about 600 m.; the corolla is pale yellow or nearly white, brownish or purplish within at throat; the filaments are pale green and the anthers dull bluish green; and the berry is green to yellow. Flowers and fruits are seen throughout the year.

LECTOTYPIFICATION: Linnaeus listed several references, and the LECTOTYPE may be taken as Herb. Linn. 247.9 (LINN) (D'Arcy, 1973).

DISTRIBUTION: This widespread species presumably had an indigenous range of North and South America, but it is now also of extensive occurrence in the Old World. About 35 Fijian collections have been seen from three islands, the species being very abundant on Viti Levu.

LOCAL NAMES AND USES: The weedy *Physalis* in Fiji is known as *wild Cape gooseberry*, *kospeli*, *mbotembote yandra*, *mburasu*, *mborosousou*, *mborosousou ni vavalangi*, *mokoai*, and *thevuthevu*. The fruit is sometimes considered edible, and on Viti Levu the leaves have been used as part of an internal remedy for difficulty in childbirth.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 188*; north of Lomolomo, *Degener & Ordenez 13688*; Nandi, *DA 9695*; vicinity of Nalotawa, eastern base of Mt. Evans Range, in forest along creek, *Smith 4442*; Tavua, *DA 9487*. SERUA: Ngaloa, *Smith 9445*. RA: Ndombulevu, *DA 9553*. NAITASIRI: Nathokaika, *DA 10046*; Nanduruloulou, *DA 9568*; Nasinu, *DA 11086*. TAILEVU: Londoni, *DA 9971*; Raralevu, *DA 10603*. REWA: Department of Agriculture compound, Suva, *DA 3169*. VANUA LEVU: MATHUATA: Semaniura, Lambasa, *DA 10473*. TAVEUNI: Waimanggere, *DA 8926*. FIJI without further locality, *Seemann 339*.

The differences between *Physalis angulata* and *P. minima* L. (lectotypified by *Hermann* (BM); cf. Heine, 1976) are not clear. Symon (in *J. Adelaide Bot. Gard.* 3: 153. 1981), discussing *P. minima* in Australia, remarks: "The *Hermann* specimen also matches six duplicates from MO determined as *P. angulata* L. (type Herb. LINN 247.9 microfiche AD! 'Habitat in India utraque'). I doubt that these two names represent different species but as far as I can trace they have not been formally treated as synonyms."

In Java (Backer & Bakhuizen, 1965) and New Caledonia (Heine, 1976) both species are said to be present, and a distinction between them is suggested somewhat as follows:

Stems mostly green, hollow, strongly angular-ribbed distally; stem ribs, petioles, and pedicels with very short, upcurved hairs, glabrescent; petioles 2–11 cm. long; leaf blades 5–10 × 2.5–8 cm., short-pilose on both surfaces, glabrate, usually obviously and irregularly dentate but sometimes merely sinuate; pedicels 7–15 mm. long at anthesis, to 25 mm. long in fruit; calyx appressed-pilose without, glabrescent; corolla 7–12 mm. in diameter, with 5 sometimes very obscure blotches within; fruiting calyx 20–40 mm. long, subglobose-acuminate, with 10 slightly projecting angles, glabrous; fruits 10–12 mm. in diameter, with an inconspicuous stipe scarcely 1 mm. long. *P. angulata*

Stems often purple-tinged, with only a narrow cavity, inconspicuously angular-ribbed distally; stems, petioles, and pedicels pilose (sometimes sparsely so) with spreading hairs, glabrescent; petioles 0.5–3 (–6.5?) cm. long; leaf blades 1.5–5 (–9?) × 1–3 (–6?) cm., spreading-pilose on both surfaces, glabrescent, entire or sparsely dentate toward apex; pedicels 2–5 (–10?) mm. long at anthesis, to 9 (–15?) mm. long in fruit; calyx short-spreading-pilose without, glabrescent; corolla 4–5 (–7) mm. in diameter, with 5 very distinct brown blotches within; fruiting calyx 12–25 mm. long, ovoid-acuminate, with 5 pronounced angles, sparsely pilose on nerves; fruits 5–7 mm. in diameter, sessile. *P. minima*

In Australia (Symon, 1981; Purdie et al., 1982) and New Guinea (Symon, 1985) only the name *Physalis minima* is used for the plant of this relationship. In Melanesia and Polynesia both species have been reported, but in my observation the plant of the Fijian Region seems better referred to *P. angulata* than to *P. minima* (in the sense of usages of Java and New Caledonia). It is to be hoped that a specialist on the genus will consider the suitable treatment of these two names.

5. *Datura* L. Sp. Pl. 179. 1753; Seem. Fl. Vit. 178. 1866; Backer & Bakh. f. Fl. Java 2: 477. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 621. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 189, p. p. 1976; Haegi in Austral. J. Bot. 24: 421. 1976; Purdie et al. in Fl. Australia 29: 189. 1982; Symon in J. Adelaide Bot. Gard. 8: 13. 1985.

Annual herbs or short-lived perennials, coarse, malodorous, unarmed, glabrous or pilose with simple, glandular or eglandular hairs; leaves alternate, petiofate, simple, the blades entire or lobed; flowers ♂, actinomorphic, large, solitary in stem forks, erect or erecto-patent, short-pedicellate; calyx tubular, circumscissile near base after anthesis, the lobes (3-) 5 (-9), the base persistent, becoming accrescent and forming a frill subtending mature fruit; corolla infundibular and dilated distally, rarely multiple, the limb shortly 5(-10)-lobed, folded and twisted in bud, the lobes acuminate; stamens 5 (-8), equal, the filaments filiform and adnate to corolla tube proximally, the anthers narrowly ellipsoid, 2-locular, basifixed, dehiscent by longitudinal slits; ovary 2-locular or proximally falsely 4-locular, spiny or tuberculate, the ovules numerous, the style slender, the stigma saddle-shaped, 2-lobed; fruit capsular, ovoid or globose, 2-4-locular, spiny or tuberculate, dehiscent regularly or irregularly from apex, the seeds numerous, compressed, approximately D-shaped, pitted or coarsely sculptured, comparatively small (up to 6 × 4.5 mm.).

LECTOTYPE SPECIES: *Datura stramonium* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 169. 1913), one of the three original species.

DISTRIBUTION: Tropical and warm-temperate Central and South America, but also with indigenous taxa in Asia and Australia, with about ten species. Some species have been used as drug plants and some are toxic to stock. Two species have become naturalized in Fiji.

USEFUL TREATMENT OF GENUS: HAEGI, L. Taxonomic account of *Datura* L. (Solanaceae) in Australia with a note on *Brugmansia* Pers. Austral. J. Bot. 24: 415-435. 1976.

KEY TO SPECIES

- Erect, bushy, annual herb or short-lived perennial; leaf blades ovate to angular-ovate, 10-17 × 5-15 cm., oblique at base and truncate to obtuse, sinuate to coarsely serrate, the major lobes 2 or 3 per side; pedicels erect or nodding, 8-15 mm. long; calyx 3-9 cm. long, with 5 (-9) conspicuous longitudinal veins, the lobes 8-25 mm. long; corolla often double or triple, usually 15-20 cm. long, deep purple without, pale lavender to white within, the lobes 5 (-9), with acumens 10-25 mm. long; stamens 5 (-9), the anthers 10-12 mm. long; style 10-14 cm. long; persistent calyx base in fruit discoid, thick-coriaceous, 2-5 mm. long; capsule deflexed, globose or nearly so, 3-4 cm. in diameter, dehiscent irregularly at apex, with 100-200 conical tubercles 2-5 mm. long and more or less equal in length, the seeds 4-5 mm. long. 1. *D. metel*
- Stout annual herb; leaf blades rhombic to angular-ovate, 8-36 × 5-20 cm., oblique at base and obtuse to acute, deeply lobed, the major lobes 3-5 per side and usually coarsely toothed or sinuate; pedicels usually erect, 5-10 mm. long; calyx 3-5 cm. long, with 5 prominent longitudinal ribs, the lobes 5-8 mm. long; corolla single, 6-8.5 cm. long, white or pale lavender, the lobes 5, with acumens about 10 mm. long; stamens 5, the anthers 3-6 mm. long; style 4.5-6 cm. long; persistent calyx base in fruit cylindrical to conical, 4-10 mm. long; capsule usually erect, ovoid to narrowly ovoid, usually 2.5-4 × 2-3 cm., dehiscent nearly to base into 4 entire valves, with 100-200 sharp conical spines of various lengths, the longest 6-10 (-16) mm. long, the seeds 2.5-4.5 mm. long. 2. *D. stramonium*

1. *Datura metel* L. Sp. Pl. 179. 1753; Backer & Bakh. f. Fl. Java 2: 478. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 194. 1970; D'Arcy in Ann. Missouri Bot. Gard. 60: 622. fig. 8. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 190. 1976; Haegi in Austral. J. Bot. 24: 433. fig. 2, C, D, 4, F, 5, F. 1976; Purdie et al. in Fl. Australia 29: fig. 52, E. 1982; Symon in J. Adelaide Bot. Gard. 8: 13. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 125. 1985.

Datura fastuosa L. Syst. Nat. ed. 10. 932. 1759; Witasek in Denkschr. Akad. Wiss. Wien 85: 350. 1910; Greenwood in Proc. Linn. Soc. 154: 101. 1943; Yuncker in Bishop Mus. Bull. 178: 106. 1943; J. W. Parham in Dept. Agr. Fiji Bull. 35: 122. 1959, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Henty in Papua New Guinea Dept. Forests Bull. 12: 125. fig. 73. 1980.

Coarse, annual, subligneous herb or shrub 0.5–2 m. high, sometimes cultivated but also naturalized as a weed of waste places and sandy beaches. The corolla (often double or triple but sometimes single) is purple or purple-tinged without and white within; the anthers are purple, and the tuberculate fruit is greenish. Flowers have been noted between October and April and fruits slightly later.

LECTOTYPIFICATION AND NOMENCLATURE: Of the several references for *Datura metel* given by Linnaeus, the lectotype may be taken as Hort. Cliff. 55.2 (BM) (D'Arcy, 1973). The type of *D. fastuosa* is LINN 243.3 (LINN HOLOTYPE) (D'Arcy, 1973). Recent students of the group consider the two taxa synonymous.

DISTRIBUTION: Believed to have originated in Asia; now widely cultivated in the tropics and as an indoor plant in temperate regions, and established as a weed in warm areas. Greenwood (1943) suggests that the species had been present on Viti Levu for about the prior 30 years.

LOCAL NAMES AND USE: The *thorn apple* or *datura* is sometimes cultivated as an ornamental.

AVAILABLE COLLECTIONS: YASAWAS: YASAWA: Tethi Village, DA 13654. VITI LEVU: MBA: Lautoka, on coast, Greenwood 354. NAITASIRI: Vunimbua Arboretum, DA 5619; Nanduruloulou, DA 5595. REWA: Suva, in private garden, DA 16778. KANDAVU: Western end of island, near Cape Washington, Smith 296. VANUA LEVU: MATHUATA: Lambasa, DA L.11635. FIJI without further locality, DA 4001.

If varieties are recognized, the commonly cultivated plant, with the corolla purple or distinctly purple-tinged and often double or triple, is referable to var. *metel* (cf. Backer & Bakhuizen, 1965). The double- or triple-flowered form is also sometimes referred to cv. 'Pleniflora' (Sykes, 1970).

2. *Datura stramonium* L. Sp. Pl. 179. 1753; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 178. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 249. 1892; Greenwood in Proc. Linn. Soc. 154: 101. 1943; Yuncker in Bishop Mus. Bull. 220: 240. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 123. 1959, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Backer & Bakh. f. Fl. Java 2: 478. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 624. 1973; Haegi in Austral. J. Bot. 24: 422. fig. 1, A, B, 4, A, 5, A. 1976; Purdie et al. in Fl. Australia 29: 190. fig. 51, 52, C. 1982; McKee, Pl. Intro. Cult. Nouv.-Caléd. 125. 1985.

Coarse annual herb 0.3–1.5 m. high, sparingly naturalized near sea level as a weed of waste places and canefields. The corolla is white or pale lavender-tinged, and the anthers are white or purplish. Flowers have been noted in August, fruits in August and January.

LECTOTYPIFICATION: Choosing among the references originally cited by Linnaeus, D'Arcy (1973) noted as the lectotype Hort. Cliff. 55.1 (BM). However, Purdie et al. (1982) suggest LINN 243/1, presumably from the earlier lectotypification of Schönbeck-Temesy in Rechinger f. Fl. Iran. 100: 45. 1972.

DISTRIBUTION: Origin uncertain, but now widely naturalized in temperate and warm-temperate regions of the world, as well as in some tropical areas.

LOCAL NAMES AND USE: *Thorn apple*, *datura*, *hurhur* (Hindi). Probably originally introduced as an ornamental, the species was already established as a weed on Ovalau at the time of Seemann's 1860 visit.

AVAILABLE COLLECTIONS: VITI LEVU: MRA: Wailoaloa Creek, Nandi, DA 8989. OVALAU: Seemann 348. VANUA LEVU: MATHUATA: Wainikoro River, Greenwood 686.

6. *BRUGMANSIA* Pers. Syn. Pl. 1: 216. 1805; Backer & Bakh. f. Fl. Java 2: 467. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 582. 1973; Haegi in Austral. J. Bot. 24: 420. 1976; Symon in J. Adelaide Bot. Gard. 8: 8. 1985.

Datura sensu Bristol in Bot. Mus. Leaflet. 21: 229. 1966; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 189, p. p. 1976; non L.

Large shrubs or small trees, unarmed, the indument sparse to dense, the hairs simple; leaves alternate, petiolate, simple, the blades entire or shallowly lobed; inflorescence composed of a solitary, inclined or pendulous flower; flowers ♂, large, actinomorphic or subzygomorphic, pedicellate; calyx tubular, not circumscissile, 5-lobed or spathaceous, caducous or persisting as an envelope about fruit; corolla single or double, large, long-infundibular or tubular and flaring distally, the tube long and slender, the limb strongly plicate in bud, the lobes 5, cuspidate or acuminate; stamens 5, the filaments slender, inserted on distal part of corolla tube, the anthers linear, basifixed, free or coherent, longitudinally dehiscent; ovary 2-locular, glabrous, the ovules numerous, the style slender, elongate, the stigma 2-lobed; fruit a 4-valved, indehiscent capsule, lanceolate-ellipsoid, unarmed, the seeds numerous, compressed, obovoid-semicircular, coarsely rugose-tuberculate, comparatively large (7-12 × 5-8 mm.).

LECTOTYPE SPECIES: *Brugmansia candida* Pers. (*Datura arborea* Ruiz & Pavón, non L.) (vide Britton, Fl. Bermuda, 339. 1918).

DISTRIBUTION: Andean South America, with five or six species and a number of hybrids and cultivars. Some of the taxa are now widely cultivated and naturalized.

USEFUL TREATMENT OF GENUS: BRISTOL, M. L. Notes on the species of tree daturas. Bot. Mus. Leaflet. 21: 229-248. 1966.

1. *Brugmansia suaveolens* (Willd.) Bercht. & Presl, Prir. Rostlin 1: Solan. 45. 1823; Sweet, Hort. Brit. ed. 3. 506. 1839; D'Arcy in Ann. Missouri Bot. Gard. 60: 585. 1973.

Datura suaveolens Humb. & Bonpl. ex Willd. Enum. Pl. Hort. Berol. 227. 1809; Reinecke in Bot. Jahrb. 25: 674. 1898; Backer & Bakh. f. Fl. Java 2: 467. 1965; Bristol in Bot. Mus. Leaflet. 21: 240, pl. 27. 1966;

Heine in Fl. Nouv.-Caléd. et Dépend. 7: 192. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 125. 1985.

Datura arborea sensu Guillaumin in J. Arnold Arb. 13: 25. 1932; non L.

Datura candida sensu J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 193. 1970; non Safford.

As noted in Fiji, *Brugmansia suaveolens* is a shrub 1-3 m. high, occurring from near sea level to about 600 m., sometimes cultivated and becoming a village weed, or sometimes naturalized in dense forest along streams. The corolla is white, the tube being greenish toward base. Flowers have been obtained between April and October, but no fruits have been observed.

TIPIFICATION: The type of *Datura suaveolens* is *Humboldt & Bonpland* (B HOLOTYPE, in Herb. Willd.), from a cultivated Mexican plant.

DISTRIBUTION: Tropical and subtropical America, now widely cultivated and naturalized elsewhere.

LOCAL NAMES AND USE: Fijian names for the trumpet flower or angel's trumpet have been recorded as *ndavui*, *mbondavui*, *mbo ni wai*, *mbua ni wai*, and *uvuvu*. It is a garden ornamental that may have been introduced by Thurston, who listed *Brugmansia candida* in his 1886 *Catalogue*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nalotawa, eastern base of Mt. Evans Range, *Smith 4499*. NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8846*. NAITASIRI: Principal Agricultural Station, Koronivia, *DA 12116*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuvuna, *Smith 7199*.

The available collections of *Brugmansia* from the Fijian Region and New Caledonia seem to represent *B. suaveolens*, although it may well be that *B. candida* Pers. (Syn. Pl. 1: 216. 1805) is also to be found in the area, as it is in Australia (Haegi, 1976) and New Guinea (Symon, 1985). The identity of the Crosby specimen from Tonga cited by Yunker (in Bishop Mus. Bull. 220: 239. 1954) as *B. arborea* has not been checked. *Brugmansia candida* (cf. Bristol, 1966) has the calyx spathe-like, 1.5–3 cm. broad, usually 1–3-toothed, and the flowers rarely exceed 30 cm. in length; the slender basal part of the corolla is usually concealed by the calyx; the corolla lobes are 4–9 cm. long; and the anthers are distinct. In contrast, *B. suaveolens* has the calyx 2–4 cm. broad, usually 3–5-toothed, and the flowers often exceed 30 cm. in length; the slender basal part of the corolla tube conspicuously exceeds the calyx; the corolla lobes are 2–5 cm. long; and the anthers are connivent.

7. SOLANDRA Sw. in Kongl. Vetensk. Acad. Nya Handl. 8: 300, 1787; D'Arcy in Ann. Missouri Bot. Gard. 60: 675. 1973. Nom. cons.

Scandent shrubs or high-climbing lianas, sometimes epiphytic, unarmed, glabrous or with simple or dendritic hairs; leaves petiolate, simple, the blades entire; flowers usually solitary, terminal, large, the pedicels stout; calyx tubular, loosely enveloping base of corolla tube, unequally 2–5-lobed and irregular in flower; corolla large, much exceeding calyx, infundibular to hypocrateriform-cyathiform, often slightly zygomorphic, the tube sometimes 5-angled, often abruptly enlarged upward, the lobes 5, broad, shallow, overlapping in bud, often reflexed; androecium zygomorphic, the stamens 5, subequal, exserted, the filaments inserted at base of corolla tube, curved, declinate, attached to anthers at their base in a depression between thecae, the anthers laterally dehiscent; ovary slightly immersed in receptacle, 4-locular, the ovules numerous, the style filiform, curved, declinate, exserted; fruit a pulpy berry, the seeds reniform, with abundant endosperm, the embryo curved.

TYPE SPECIES: *Solandra grandiflora* Sw.

DISTRIBUTION: Tropical America, with nine or ten species, some of which are widely cultivated as ornamentals.

1. *Solandra maxima* (Sessé & Moc.) P. S. Green in Bot. Mag. 176: t. 506. 1967; J. W. Parham, Pl. Fiji Isl. ed. 2. 329. 1972; D'Arcy in Ann. Missouri Bot. Gard. 60: 679. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 205. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 126. 1985.

Datura maxima Sessé & Moc. Pl. Nov. Hisp. in Naturaleza (Mexico City) II. 1: App. 25. 1888.

Solandra hartwegii N. E. Br. ex C. F. Ball in Gard. Chron. III. 49: 383. fig. 173. 1911.

Solandra nitida sensu J. W. Parham, Pl. Fiji Isl. 238. 1964; et auct.; non Standl.

Cultivated near sea level in Fiji; a robust, climbing or scrambling shrub, with a stem that will grow to 60 m. in length if given the opportunity. The thick, lustrous, broadly elliptic leaf blades are 10–18 × 4–9 cm.; the fragrant, solitary, terminal flowers have striking, golden-yellow, hypocrateriform-cyathiform corollas 16–20 cm. long, abruptly enlarged into a cup 10–17 cm. in diameter with reflexed lobes; the large stamens have yellow filaments to 12 cm. long and pale anthers 9–13 mm. long. Flowers have been noted in August and November, but fruits are not to be expected in Fiji.

TYPIFICATION: The type of *Datura maxima* is *Sessé* (BM HOLOTYPE), from Mexico (D'Arcy, 1973). *Solandra hartwegii*, the name utilized for this well-known species prior to 1967, is based partly on cultivated material and partly on a collection made in 1839 by Hartweg in Mexico (Green, 1967).

DISTRIBUTION: Mexico (Guerrero, Oaxaca, Puebla, and Veracruz) (Green, 1967), now widely cultivated.

LOCAL NAME AND USE: The *cup of gold* is a striking ornamental, requiring substantial space if it is to be seen effectively.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Mbatiki, Nanduruloulou, DA 10897; Cocoa Station, Nanduruloulou, DA 12247.

8. **CESTRUM** L. Sp. Pl. 191. 1753; Backer & Bakh. f. Fl. Java 2: 478. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 594. 1973; Symon in J. Adelaide Bot. Gard. 3: 138. 1981; Purdie et al. in Fl. Australia 29: 35. 1982; Symon in J. Adelaide Bot. Gard. 8: 11. 1985.

Shrubs or small trees, unarmed, glabrous or pilose, the hairs then simple, forked, or dendritic; leaves alternate (sometimes geminate), petiolate, simple, the blades entire; inflorescences axillary or sometimes appearing terminal, usually racemiform or paniculiform, often congested; flowers articulated on peduncles, ♂, (4 or) 5(-7)-merous, sometimes slightly zygomorphic, often subtended by a small bract; calyx tubular to cyathiform, persistent, the lobes shorter than tube; corolla tubular (as in our species) or hypocrateriform, the tube sometimes slightly inflated distally, the lobes inflexed-valvate and slightly contorted in bud, erect to spreading or reflexed at anthesis; stamens equal or subequal, inserted on corolla tube and included, the filaments longer than anthers, the anthers small, subglobose to oblong, 2-locular, versatile, longitudinally dehiscent, the thecae proximally free from each other; ovary borne on a small disk or short stipe, 2-locular, the ovules usually few, the style erect, filiform, the stigma capitate; fruit a succulent berry, subglobose or ellipsoid to obovoid, the seeds comparatively few (1-10), prismatic or ovoid, not or slightly compressed.

LECTOTYPE SPECIES: *Cestrum nocturnum* L. (vide Britton & Millspaugh, Bahama Fl. 385. 1920), one of the two original species.

DISTRIBUTION: Tropical Central and South America, with about 250 species. Several species are widely cultivated for their fragrant flowers, sometimes becoming naturalized. Two species are recorded in Fiji.

KEY TO SPECIES

- Leaf blades elliptic-oblong to lanceolate-ovate, 5-11 cm. long; corolla white, sometimes purplish distally, 12-18 mm. long, the lobes obtuse to subacute, reflexed at anthesis; flowers fragrant mostly during the daytime hours; fruits black to purple, subglobose to ellipsoid, about 10 mm. in diameter at maturity.
1. *C. diurnum*
- Leaf blades elliptic-ovate to lanceolate-elliptic, (7-) 10-20 cm. long; corolla greenish yellow or cream-white, (15-) 20-22 mm. long, the lobes acute, erect or spreading at anthesis; flowers fragrant mostly at night; fruits white, subglobose, 6-10 mm. in diameter at maturity. 2. *C. nocturnum*

1. ***Cestrum diurnum*** L. Sp. Pl. 191. 1753; Witasek in Denkschr. Akad. Wiss. Wien 85: 350. 1910; Christophersen in Bishop Mus. Bull. 154: 40. 1938; Yuncker in op. cit. 184: 62. 1945, in op. cit. 220: 240. 1959; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 328. 1972; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 113. 1972; Henty in Papua New Guinea Dept. Forests Bull. 12: 125. 1980; Morat & Veillon in Bull. Mus. Nat. Hist. Nat. (Paris) IV. 7, Sect. B, Adansonia 3: 318. 1985.

Shrub 2–3 m. high, occasionally cultivated near sea level. The flowers are fragrant during the daytime; the corolla is white at base, shading to rich purple distally; and the fruits are black (but not seen in Fiji). Flowers were observed in March.

TYPFICATION: Linnaeus listed several prior references, including one from *Hortus Cliffortianus*, but I have not noted a lectotypification.

DISTRIBUTION: Tropical America, now widely cultivated but probably not as extensively as the following species. It has probably been introduced into Fiji during the present century.

LOCAL NAMES AND USE: *Thauthau* or *day cestrum*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16446; Suva, in private garden, H. B. R. Parham 306.

2. *Cestrum nocturnum* L. Sp. Pl. 191. 1753; Gibbs in J. Linn. Soc. Bot. 39: 158. 1909; Yuncker in Bishop Mus. Bull. 178: 106. 1943; Greenwood in J. Arnold Arb. 25: 401. 1944; Yuncker in Bishop Mus. Bull. 184: 62. 1945; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Backer & Bakh. f. Fl. Java 2: 479. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 193. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 113. 1972; D'Arcy in Ann. Missouri Bot. Gard. 60: 607. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 204. 1976; Henty in Papua New Guinea Dept. Forests Bull. 12: 125. fig. 72. 1980; Symon in J. Adelaide Bot. Gard. 3: 140. 1981; Purdie et al. in Fl. Australia 29: 36. 1982; Morat & Veillon in Bull. Mus. Nat. Hist. Nat. (Paris) IV. 7, Sect. B, Adansonia 3: 318. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 125. 1985.

Shrub 2–5 m. high occurring from near sea level to about 900 m., cultivated in towns and villages and also abundantly naturalized in thickets and open forest. The corolla is pale yellowish green or pale yellow or cream-colored, and the fruits (abundant in Fiji) are white. Flowers and fruits have been observed between May and December.

LECTOTYPIFICATION: Of the several references given by Linnaeus, the LECTOTYPE may be taken as Hort. Cliff. (BM) and the type locality as Jamaica (D'Arcy, 1973).

DISTRIBUTION: West Indies and parts of Central America, including Panama; now widely cultivated in tropical areas for its strongly scented flowers. It was an early European introduction into Fiji, being listed in Thurston's 1886 *Catalogue*.

LOCAL NAMES AND USE: This attractive ornamental, fragrant at night, is known as *thauthau*, *thauthau ni mbongi*, *kara*, *lady of the night*, and *night queen*. In some areas it is reported to cause poisoning of livestock (Henty, 1980).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Road to Waikumbukumbu, Gibbs 686; Nandarivatu and vicinity, Tothill 631 (coll. W. Teulon), Gillespie 3980, Smith 5016; Nandala, O. & I. Degener 32051; hills between Nggaliwana and Nandala Creeks, south of Nauwanga, Smith 5802. SERUA: Ngaloa, Smith 9448. NAITASIRI: Between Naisonggo and Nukulau, Gillespie 4381. REWA: Suva Botanical Gardens, DA 12109. OVALAU: Valley of Mbureta and Lovoni Rivers, Smith 7507. VANUA LEVU: MATHUATA: Nanduri, Tothill 534.

9. *Nicotiana* L. Sp. Pl. 180. 1753; Seem. Fl. Vit. 179. 1866; Backer & Bakh. f. Fl. Java 2: 480. 1965; Pursglove, Trop. Crops, Dicot. 538. 1968; D'Arcy in Ann. Missouri Bot. Gard. 60: 657. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 194. 1976; Purdie et al. in Fl. Australia 29: 38. 1982; Symon in J. Adelaide Bot. Gard. 8: 16. 1985.

Annual or short-lived perennial herbs, rarely shrubby, glabrous or pilose, the hairs then simple and multicellular, glandular or nonglandular; leaves alternate, radical and/or cauline, simple, petiolate or sessile, the blades entire to sinuate; inflorescences terminal, paniculiform or racemiform (infrequently 1-flowered and axillary); flowers ♂, subtended by bracts, actinomorphic or slightly zygomorphic, the pedicels erect to cernuous; calyx tubular to narrowly campanulate, 5-lobed, persistent in fruit, the connate margins of lobes often thin and translucent; corolla tubular or hypocrateriform, 5-lobed, the throat cup often asymmetrically swollen, the lobes usually contorted-plicate in bud; stamens 5, equal or unequal in length (1 often below the other 4), the filaments filiform, the anthers 2-locular, dorsifixed, dehiscing by longitudinal slits; ovary 2-locular, the ovules numerous, the style filiform, the stigma capitate, slightly 2-lobed; fruit capsular, ellipsoid or ovoid, thin-walled, surrounded by the persistent and often slightly enlarged calyx, 4(or 2)-valved from apex, the seeds minute, numerous, reniform or tightly curved, often angled.

LECTOTYPE SPECIES: *Nicotiana tabacum* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2: 3: 170. 1913), one of four original species.

DISTRIBUTION: Widespread but concentrated in South America, also indigenous in North America, southwestern Africa, Australia, and some southwestern Pacific areas, with 60–70 species.

1. *Nicotiana tabacum* L. Sp. Pl. 180. 1753; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 179. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 250. 1892; Priessecker in Denkschr. Akad. Wiss. Wien 85: 350. 1910; Christophersen in Bishop Mus. Bull. 128: 196. 1935; Yuncker in op. cit. 178: 107. 1943, in op. cit. 220: 240. 1959; J. W. Parham, Pl. Fiji Isl. 237. 1964, ed. 2. 329. 1972; Backer & Bakh. f. Fl. Java 2: 480. 1965; Pursglove, Trop. Crops, Dicot. 540. fig. 86. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 196. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 122. 1972; D'Arcy in Ann. Missouri Bot. Gard. 60: 658. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 196. 1976; Symon in J. Adelaide Bot. Gard. 8: 17. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 126. 1985.

As seen in Fiji, *Nicotiana tabacum* is a coarse herb or short-lived perennial 1–3 m. high, cultivated and also naturalized on edges of cultivated areas and in *talasinga* from near sea level to about 400 m. The corolla is pink or brick-red, with the tube greenish white; the filaments and style are pale green, and the fruit is brown. Flowers and fruits have been collected between July and January.

LECTOTYPIFICATION: Several prior references were indicated by Linnaeus, and the LECTOTYPE is taken as Herb. Linn. 245.1 (LINN) (D'Arcy, 1973).

DISTRIBUTION: Early distributed in the West Indies and Central and South America, *Nicotiana tabacum* is now grown throughout the world. It was widely cultivated in Fiji at the time of Seemann's visit, although his voucher (*Seemann 347*) has not been seen at K or BM. The species is the source of most commercial tobacco and is highly polymorphic, with numerous cultivars. The cured leaf is the source of one of the most widely used narcotics.

LOCAL NAMES AND USES: Fijian names for tobacco are *tavako*, *tavako ni Viti*, and *topako*. The species is cultivated in villages as an ornamental as well as for smoking.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Wainimakutu, valley of Wainavindrau Creek, *Smith 8820*; vicinity of Namosi Village, *Gillespie 2820*. NAITASIRE: Plant Introduction and Quarantine Station, Nanduruloulou, *DA 3790*. MBENGGGA: Raviravi Village, *DA 6055*. NGAU: *Milne 144*. MATUKU: *H. M. Denham* (or collectors), *Bryan 237*. LAKEMBA: Northwestern side of island, *Simon Best*, Aug., 1977 (CHR).

10. *PETUNIA* Juss. in Ann. Mus. Hist. Nat. (Paris) 2: 214. 1803; Backer & Bakh. f. Fl. Java 2: 480. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 658, p. p. 1973; Symon in J. Adelaide Bot. Gard. 3: 146, p. p. 1981; Purdie et al. in Fl. Australia 29: 58, p. p. 1982. Nom. cons. prop.

Annual or short-lived perennial herbs, unarmed, pilose with glandular, viscid hairs; leaves alternate (or upper ones paired), petiolate or sessile, simple, the blades entire; flowers axillary, solitary, ♂, usually slightly zygomorphic; calyx campanulate, persistent, deeply 5-lobed, the lobes oblong-linear; corolla (often double in cultivars) tubular and distally spreading or hypocrateriform, the limb shallowly 5-lobed and plicate in bud, the lobes often slightly unequal; stamens 5 (4 in 2 pairs, the fifth the shortest), inserted below middle of corolla tube, the filaments curved at base, the anthers 2-locular, ovoid-globose, not cohering, versatile, dehiscent by longitudinal slits; ovary 2-locular, the ovules numerous, the style filiform, the stigma broadly capitate; fruit capsular, depressed-ovoid, smooth, 2-valved, dehiscent septicidally from apex, the valves entire or shortly 2-dentate, the seeds globular to angular.

LECTOTYPE SPECIES: *Petunia nycotaginiflora* Juss., typ. cons. prop. = *P. axillaris* (Lam.) Britton, Sterns, & Pogg. (*Nicotiana axillaris* Lam.).¹

DISTRIBUTION: South America, with about four species. Many hybrids and cultivars are widely grown.

1. *Petunia* × *hybrida* Vilm. Fl. Pleine Terre, 615. 1863; Yuncker in Bishop Mus. Bull. 178: 107. 1943; J. W. Parham, Pl. Fiji Isl. 239. 1964, ed. 2. 331. 1972; Backer & Bakh. f. Fl. Java 2: 481. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 196. 1970; Symon in J. Adelaide Bot. Gard. 3: 148. 1981; Purdie et al. in Fl. Australia 29: 60. 1982.

Petunia violacea (Lindl. in Bot. Reg. 19: t. 1626. 1833-1834) sensu Heine in Fl. Nouv.-Caléd. et Dépend. 7: 205. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 126. 1985.

Although no herbarium specimens are at hand, the domesticated species of *Petunia* is commonly cultivated in Suva and elsewhere in Fiji. It has a comparatively large (more than 3 cm. long) corolla, white or variously colored, single or double, and is derived from *P. axillaris* (Lam.) Britton, Sterns, & Pogg., *P. integrifolia* (Hook.) Schinz & Thell., and complex hybrids between them (Backer & Bakhuizen, 1965; Symon, 1981; Purdie et al. 1982).

TYPIFICATION: The type is apparently a garden plant.

DISTRIBUTION: Now widespread in cultivation.

LOCAL NAME AND USE: *Petunia*; a common garden ornamental, presumably an early European introduction, being listed in Thurston's 1886 *Catalogue* as *Petunia violacea*.

11. *BROWALLIA* L. Sp. Pl. 631. 1753; Backer & Bakh. f. Fl. Java 2: 481. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 576. 1973; Symon in J. Adelaide Bot. Gard. 3: 134. 1981; Purdie et al. in Fl. Australia 29: 61. 1982; Symon in J. Adelaide Bot. Gard. 8: 7. 1985.

Erect, branching herbs, unarmed, glabrous or pilose, the hairs then simple and glandular; leaves alternate (sometimes geminate), petiolate, simple, the blades entire;

¹The division of *Petunia* Juss. into two genera (Wijsman & de Jong in Acta Bot. Neerl. 34: 337-349. 1985) is now widely accepted by horticulturists, but the name *Petunia* can be utilized for the garden *petunia* only by a change in lectotypification from that proposed by Britton and Brown (Ill. Fl. N. U. S. ed. 2. 3: 171. 1913), *P. parviflora* Juss. (cf. ING, 1979). It has been proposed by Wijnands et al. (in Taxon 35: 748-749. 1986) to conserve *Petunia* with *P. nycotaginiflora* Juss. as the conserved type species. Most species of *Petunia* sensu lat. will necessitate transfer to *Calibrachoa* Llave & Lex. The proposal has been approved by the Committee for Spermatophyta (in Taxon 38: 301. 1989) and will doubtless be reflected in future editions of ICBN.

inflorescences terminal or axillary, composed of solitary flowers or racemiform cincinni, the flowers ♂, zygomorphic; calyx tubular to campanulate, accrescent, 4- or 5-lobed, the lobes deltoid to lanceolate; corolla tubular and spreading distally, the tube swollen at apex, contracted at mouth, the limb 4- or 5-lobed, the lobes induplicate in bud; stamens usually 4, inserted in upper part of corolla tube and paired, a staminode or fifth stamen sometimes present, the anthers 2-locular (those of upper pair of stamens with an obsolete theca), basifixed, not cohering; ovary 2-locular, the ovules numerous, the style slender, the stigma expanded; fruit capsular, 2-valved, exceeded but not enveloped by calyx, septicidally dehiscent from apex, the valves 2-dentate, the seeds numerous, minute, prismatic, reticulate.

TYPE SPECIES: *Browallia americana* L., the only original species.

DISTRIBUTION: Tropical America, with (two?) six species, cultivated elsewhere and sometimes naturalized.

1. *Browallia americana* L. Sp. Pl. 631. 1753; Greenwood in J. Arnold Arb. 30: 79. 1949; J. W. Parham, Pl. Fiji Isl. 236. 1964, ed. 2. 328. 1972; Backer & Bakh. f. Fl. Java 2: 482. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 578. 1973; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 203. 1976; Symon in J. Adelaide Bot. Gard. 3: 134. 1981; Purdie et al. in Fl. Australia 29: 62. 1982; Symon in J. Adelaide Bot. Gard. 8: 7. 1985; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 124. 1985.

Annual herb 15–60 cm. high, erect or suberect, cultivated and also sparingly naturalized near habitations from near sea level to about 850 m. The leaf blades are ovate, up to about 7 × 5 cm.; the corolla is blue, sometimes purple or white, with a tube to 20 mm. long and a limb about 15 mm. in diameter; and the anthers are yellow. Flowers and fruits have been collected between June and August.

TYPIFICATION: Of the two references originally given by Linnaeus, the LECTOTYPE is Hort. Cliff. (BM) (D'Arcy, 1973), a specimen from cultivated material grown from seed collected in Panama.

DISTRIBUTION: Tropical America, now widely cultivated and sometimes sparingly naturalized, as in Fiji. It may have been introduced into Fiji by Thurston, who listed three species of *Browallia* in his 1886 *Catalogue*; these were doubtless referable to the variable *B. americana*. The species is noted by Greenwood (1949) as naturalized or weedy at Nandarivatu, Mba Province, as well as in southeastern Viti Levu.

USE: A garden ornamental.

AVAILABLE MATERIAL: VITI LEVU: NAITASIRI: Nanduruloulou compound, DA 811; Plant Introduction and Quarantine Station, Nanduruloulou, DA 12139 (coll. S. Pillay, July 6, 1960). TAILEVU: Near Nausori, Greenwood 1116. FIJI without further locality, DA 5050.

12. *BRUNFELSIA* L. Sp. Pl. 191, as *Brunsfelsia*. 1753, corr. Gen. Pl. ed. 5. 87. 1754; Backer & Bakh. f. Fl. Java 2: 482, as *Brunsfelsia*. 1965; D'Arcy in Ann. Missouri Bot. Gard. 60: 586. 1973; Plowman in Hawkes et al. Biol. Tax. Solan. 475. 1979.

Unarmed shrubs or trees, glabrous or with simple hairs; leaves alternate, petiolate, simple, the blades entire or undulate; flowers ♀, terminal, 1–4 borne at apices of short side-shoots; calyx cylindrical to campanulate, 5-dentate or 5-lobed, slightly accrescent in fruit, the lobes ovate-deltoid; corolla hypocrateriform, zygomorphic, the tube narrow, curved and broadened distally, the limb spreading, the lobes 5, imbricate in bud, broad, rounded; stamens 4, inserted within corolla tube in 2 pairs, the filaments short, curved distally, the anthers short, enclosed within apex of corolla tube, 2-locular, longitudinally dehiscent; ovary 2-locular, the ovules numerous, the style filiform, curved and thickened distally, the stigma 2-lobed; fruit a capsule or berry, the pericarp coriaceous, indehiscent or septicidally dehiscent with entire valves, the seeds numerous.

TYPE SPECIES: *Brunfelsia americana*, the only original species.

DISTRIBUTION: Tropical America, with about 40 species, some of which are cultivated elsewhere. Two species have been noted in Fiji.

USEFUL TREATMENT OF GENUS: PLOWMAN, T. The genus *Brunfelsia*: a conspectus of the taxonomy and biogeography. In: Hawkes, J. G., R. N. Lester, & A. D. Skelding (eds.). The Biology and Taxonomy of the Solanaceae, 475-491. 1979.

KEY TO SPECIES

Corolla tube long and narrow, many times as long as calyx, 4-9 cm. long, the limb 4.5-6.5 cm. in diameter; filaments 8-13 mm. long; stigma clavate, bilobed; calyx narrowly campanulate, 0.5-1 cm. long; flowers solitary, fragrant in early evening, moth-pollinated; leaf blades oblong to obovate, up to 12 × 6 cm.

1. *B. americana*

Corolla tube 1-2 times as long as calyx, 1.3-2 cm. long, the limb 2-3.5 cm. in diameter; filaments 4-6 mm. long; stigma distinctly bifurcate; calyx cylindrical or obconical, 1-1.5 cm. long; flowers solitary or paired, not fragrant, butterfly-pollinated; leaf blades oblong-lanceolate, up to 10 × 3 cm. . . . 2. *B. uniflora*

1. *Brunfelsia americana* L. Sp. Pl. 191, as *Brunfelsia a.* 1753; J. W. Parham, Pl. Fiji Isl. 236. 1964; Backer & Bakh. f. Fl. Java 2: 482, as *Brunfelsia a.* 1965; Plowman in Hawkes et al. Biol. Tax. Solan. 475. fig. 37.1. 1979.

Shrub to about 3 m. high, sparingly cultivated near sea level. The large corolla is white, fading to yellow with age, and fragrant in the early evening.

TYPIFICATION: Linnaeus based his species on a reference to Plumier.

DISTRIBUTION: West Indies from Hispaniola to St. Lucia, now widely cultivated elsewhere. In his 1886 *Catalogue*, Thurston listed a species of *Franciscea* (probably referable to *Brunfelsia uniflora*) as well as *B. americana*, and so he may have been responsible for the introduction of both species into Fiji. Although no herbarium specimens of *B. americana* seem available, this beautiful shrub may occasionally be seen in Suva gardens.

LOCAL NAME AND USE: *Lady of the night*; a garden ornamental.

2. *Brunfelsia uniflora* (Pohl) D. Don in Edinburgh New Philos. J. 7: 85, as *Brunfelsia u.* 1829; Backer & Bakh. f. Fl. Java 2: 482, as *Brunfelsia u.* 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 328. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 203. 1976; Plowman in Hawkes et al. Biol. Tax. Solan. 486. 1979; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 124. 1985.

Franciscea uniflora Pohl, Pl. Bras. Ic. Descr. 1: 2. t. 1. 1826.

Shrub 2-4 m. high, occasionally cultivated near sea level. The corolla is violet with a white eye in throat, fading to pale violet or pure white with age, and is not fragrant. Flowers have been noted in January and March.

TYPIFICATION: Pohl cited a number of references as well as a collection from near Rio de Janeiro, Brazil.

DISTRIBUTION: South America from Venezuela and Brazil to Andean Bolivia and northern Argentina, sometimes cultivated elsewhere.

USE: No name was noted in Fiji, but this garden ornamental is interesting for the change in its flower color during the day or two after anthesis.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16436; Suva, in private garden, DA 16093.

FAMILY 171. CONVULVULACEAE

CONVOLVULACEAE Juss. Gen. Pl. 132, as *Convolvuli*. 1789.

Annual or perennial herbs, sometimes with tuberous roots or stems, often with latex, usually twining or climbing, sometimes prostrate, or shrubs, rarely trees, estipulate; leaves petiolate (rarely essentially sessile), alternate, simple (entire or toothed) or pinnately divided or sometimes lobed or palmately compound; inflorescences terminal or axillary dichasia, sometimes racemiform or paniculiform or with solitary, axillary flowers; flowers ♂ or rarely unisexual (in none of our genera), often large and showy, actinomorphic or essentially so, usually subtended by a pair of bracts, these sometimes enlarged and forming an involucre, 5-merous (as to calyx, corolla, and androecium) or rarely 4-merous (not in our genera); sepals imbricate, often unequal, free or connate proximally, occasionally accrescent in fruit; corolla sympetalous, salverform to hypocrateriform or campanulate, obviously or scarcely 5-lobed to subtentate, regular, usually induplicate-valvate and also contorted in bud; stamens as many as and alternate with corolla lobes, usually attached toward base of corolla tube, the filaments often unequal, usually slender, the anthers linear or oblong, dorsifixed, dehiscing by usually introrse longitudinal slits, the pollen grains smooth or spinulose; nectary disk usually present around base of ovary, annular, often lobulate, infrequently lacking; ovary superior, 2(3-5)-locular (rarely unilocular), the ovules usually 2 per locule, basal or basal-axile, erect, anatropous, apotropous, the style usually terminal and simple, often divided or styles distinct, rarely gynobasic (not in our genera), the stigmas (1 or) 2, linear to globose or branched; fruit capsular (loculicidal or sometimes irregularly dehiscent), sometimes indehiscent and baccate or nutlike, the seeds 1-4 (-10), sometimes pilose, the embryo large, straight or curved, the endosperm hard, often cartilaginous.

DISTRIBUTION: A cosmopolitan family, best developed in tropical and subtropical areas and including 50-55 genera and about 1,600 species. Many species of the family are widely distributed, often littoral, and many have been disseminated by man as ornamentals, some of these having become pantropical weeds. As a result the nomenclature of many species is extremely complex, the same taxon having received different names in different parts of the world. It is frequently impossible to ascertain whether certain taxa are indigenous or intentionally or unintentionally introduced. In Fiji six genera are represented by 25 species, of which 14 are here considered indigenous (only one of them endemic). Many species of the family have such wide distributions that floristic studies of distant areas include highly pertinent comments.

USEFUL TREATMENTS OF FAMILY: OOSTROOM, S. J. VAN. The Convolvulaceae of Malaysia, I. *Blumea* 3: 62-94. 1938; II. op. cit. 3: 267-371. 1939; III. op. cit. 3: 481-582. 1940; IV. op. cit. 5: 339-411. 1943; V. op. cit. 5: 689-691. 1945 (continuing portions of this scholarly series are not pertinent to Fijian taxa). OOSTROOM, S. J. VAN. Convolvulaceae. *Fl. Males. I.* 4: 388-512. 1953. VERDCOURT, B. Convolvulaceae. *In: Hubbard, C. E., & E. Milne-Redhead (eds.). Fl. Trop. E. Afr. Convolv.* 1-161. 1963. BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Convolvulaceae. *Fl. Java* 2: 483-498. 1965. FOSBERG, F. R. & M.-H. SACHET. Flora of Micronesia, 3: Convolvulaceae. *Smithsonian Contr. Bot.* 36: 1-34. 1977. AUSTIN, D. F. Convolvulaceae. *In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon* 1: 288-363. 1980. HEINE, H. Convolvulacées. *In: Leroy, J.-F., & H. S. MacKee (eds.). Fl. Nouv.-Caléd. et Dépend.* 13: 1-91. 1984.

KEY TO GENERA

- Styles 2, free or basally united, each style deeply bifid for at least half its length, the stigmas long, terete, filiform to subclavate; leaves sessile or subsessile, the blades linear-lanceolate; small herbaceous plants, never twining but sometimes creeping. 1. *Evolvulus*
- Style 1, entire or with 2 inconspicuous branches hidden by stigmas; leaves distinctly petiolate, the blades rarely linear-lanceolate; herbs, vines, lianas, or shrubs.

- Outer 3 sepals enlarged, decurrent on pedicel, much longer and broader than inner sepals; corolla campanulate or hypocrateriform, white; leaf blades rounded to acute at base. 2. *Aniseia*
- Outer and inner sepals equal or unequal, but the outer ones not markedly longer and broader than the inner ones.
- Corolla usually broadly hypocrateriform or campanulate, usually yellow or yellowish or white, sometimes with a red or purple eye; pollen smooth, colpate; large climbing plants.
- Capsule circumscissile, the upper part of the epicarp separating from the lower part; corolla usually white or yellow throughout; stems terete or often winged. 3. *Operculina*
- Capsule dehiscent by 4-6 valves or irregularly; corolla white to yellow or orange, often with a red or purple center; stems terete. 4. *Merremia*
- Corolla hypocrateriform to salverform or campanulate, variously colored; pollen spinose, porate.
- Calyx accrescent, completely enclosing ripe fruit; corolla mauve, scarlet, or crimson; leaf blades with minute black glandular trichomes beneath. 5. *Stictocardia*
- Calyx not or slightly accrescent, not enclosing fruit; corolla purple, red, pink, white, or yellow; leaf blades without black glandular trichomes beneath. 6. *Ipomoea*

1. *Evolvulus* L. Sp. Pl. ed. 2. 391. 1762; van Ooststr. in Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 19. 1934, in *Blumea* 3: 74. 1938, in *Fl. Males. I.* 4: 395. 1953; Verdcourt in *Fl. Trop. E. Afr. Convolv.* 16. 1963; Backer & Bakh. f. *Fl. Java* 2: 485. 1965; Fosberg & Sachet in *Smithsonian Contr. Bot.* 36: 6. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* 1: 309. 1980; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 16. 1984.

Herbs or small shrubs, annual or perennial, not twining, sometimes creeping; leaves sessile or subsessile, the blades small, simple, ovate to linear, entire; inflorescences axillary, dichasial, pedunculate, several-flowered (or flowers solitary); sepals 5, free, equal or subequal, not accrescent; corolla small to medium-sized, hypocrateriform to salverform, blue to bluish white, the limb rotate, plicate, entire or lobed, the interplacae pilose without; stamens 5, attached near mouth of corolla tube, the filaments filiform, the anthers ovate to oblong or linear; ovary 2-locular with locules 2-ovulate (sometimes 1-locular and 4-ovulate), the styles 2, filiform, free or basally united, each deeply bifid for at least half its length, the stigmas long, terete, filiform to subclavate; fruit capsular, globose to ovoid, 4-valvate, the seeds (1-) 4, small, smooth or minutely verrucose.

LECTOTYPE SPECIES: *Evolvulus nummularius* (L.) L. (*Convolvulus nummularius* L.) (vide Britton & Brown, *Ill. Fl. N. U. S.* ed. 2. 3: 42. 1913), one of the five original species.

DISTRIBUTION: America, mostly tropical, with about 100 species; two species in the Old World are probably escapes from cultivation or adventive. A single species is infrequent in Fiji.

USEFUL TREATMENT OF GENUS: OOSTSTROOM, S. J. VAN. A monograph of the genus *Evolvulus*. Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 1-267. 1934.

1. *Evolvulus alsinoides* (L.) L. Sp. Pl. ed. 2. 392. 1762; van Ooststr. in Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 26. 1934, in *Blumea* 3: 74. 1938, in *Fl. Males. I.* 4: 395. 1953; Verdcourt in *Fl. Trop. E. Afr. Convolv.* 18. 1963; Backer & Bakh. f. *Fl. Java* 2: 485. 1965; Fosberg & Sachet in *Smithsonian Contr. Bot.* 36: 6. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* 1: 309. 1980; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 17. 1984.

Convolvulus alsinoides L. Sp. Pl. 157. 1753.

LECTOTYPIFICATION: From among the several references given by Linnaeus for *Convolvulus alsinoides*, the lectotype is Herb. Hermann 3, fol. 55 (BM), from Ceylon, presumably from the vicinity of Columbo (Verdcourt, 1963; Stearn in *Taxon* 21: 649. 1972).

DISTRIBUTION: Tropical and subtropical parts of the Old World and America. Although van Ooststroom (1934) recognized 16 varieties of *Evolvulus alsinoides*, most

of these intergrade, and floristic students are usually inclined to treat the species as too polymorphic to divide into infraspecific taxa. Austin (1980) suggests that two varieties might be acceptable in Ceylon, while Heine (1984) indicates that var. *alsinoides* is the prevailing taxon of the species in New Caledonia. If at least some of van Ooststroom's varieties are to be recognized, the Fijian specimens are referable to var. *decumbens*.

- 1a. *Evolvulus alsinoides* var. *decumbens* (R. Br.) van Ooststr. in Meded. Bot. Mus. Herb. Rijks Univ. Utrecht **14**: 38. 1934, in *Blumea* **3**: 74. 1938, in *Fl. Males. I*. **4**: 396. *fig. 5*. 1953.

Evolvulus decumbens R. Br. Prodr. Fl. Nov. Holl. 489. 1810.

The variety is found infrequently in Fiji on ledges and in pockets of soil on bare rock at elevations of 50–300 m.; annual or perennial herb; leaf blades elliptic to linear-oblong, 5–20 (–30) mm. long, 1.5–3.5 (–5) mm. broad, sericeous on both surfaces; sepals narrowly lanceolate, 2.5–3 mm. long; corolla blue, 7–8 mm. long and broad; capsule brown, globose, 3–4 mm. in diameter, the seeds pale brown to black, 1.5–1.7 mm. long. Flowers and fruits have been noted in July and August.

TYPIFICATION: *Evolvulus decumbens* is based on *R. Brown 2783* (HOLOTYPE presumably at BM), from Queensland, Australia.

DISTRIBUTION: Southeastern Asia, Malesia, and Australia eastward to Fiji; transitional forms to var. *alsinoides* occur on the mainland (van Ooststroom, 1934). The Fijian specimens appear to be adventives, not escapes from cultivation.

LOCAL NAME: *O-chichi* (Yasawas).

AVAILABLE COLLECTIONS: YASAWAS: WAYA: Nakawa Gulch, west side of Mbatinaremba, *St. John 18134*. NAVUTU-I-LOMA: Northeastern side of summit ridge, *Bryan 465*.

2. *ANISEIA* Choisy in Mém. Soc. Phys. Genève **6**: 481. 1834 (repr. *Convolv. Orient.* **99**. 1834); Seem. *Fl. Vit.* **173**. 1866; van Ooststr. in *Blumea* **3**: 279. 1939, in *Fl. Males. I*. **4**: 435. 1953; Verdcourt in *Fl. Trop. E. Afr. Convolv.* **48**. 1963; Backer & Bakh. f. *Fl. Java* **2**: 487. 1965; Fosberg & Sachet in *Smithsonian Contr. Bot.* **36**: 5. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* **1**: 291. 1980.

Herbaceous vines, prostrate or twining; leaves short-petiolate, the blades linear to ovate or elliptic, entire, often mucronate; inflorescences axillary, few-flowered dichasia (or flowers solitary); sepals 5, herbaceous, the 3 outer ones much the larger and often decurrent on pedicel, enlarged in fruit; corolla campanulate or hypocrateriform, white, the limb 5-dentate or subentire, with pubescent interplacae; disk small or absent; stamens and style included, the filaments adnate to corolla; ovary glabrous, 2-locular, the ovules 2 per locule, the style 1, simple, filiform, the stigma biglobose or oblong; fruit capsular, 4-valvate, globose to ovoid, 2-celled, the seeds 4 or fewer, glabrous, trigonous or globose, black.

LECTOTYPE SPECIES: *Aniseia uniflora* (Burm. f.) Choisy (*Convolvulus uniflorus* Burm. f.) (vide O'Donell in *Lilloa* **29**: 367. 1959) = *A. martinicensis* (Jacq.) Choisy.

DISTRIBUTION: Neotropical, with four or five species, one of which has been introduced throughout the Old World tropics and has become widely naturalized.

1. *Aniseia martinicensis* (Jacq.) Choisy in Mém. Soc. Phys. Genève. **8**: 144. 1837 (repr. *Convolv. Diss. Secunda*, **66**. 1837); van Ooststr. in *Blumea* **3**: 279. 1939, in *Fl. Males. I*. **4**: 435. *fig. 21*. 1953; Yuncker in *Bishop Mus. Bull.* **220**: 224. 1959; Verdcourt in *Fl. Trop. E. Afr. Convolv.* **48**. *fig. 13*. 1963; J. W. Parham, *Pl. Fiji Isl.* **240**. 1964, ed. 2. **331**. 1972; Backer & Bakh. f. *Fl. Java* **2**: 488. 1965; Fosberg & Sachet in *Smithsonian Contr. Bot.* **36**: 5. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* **1**: 291. 1980.

Convolvulus martinicensis Jacq. Select. Stirp. Amer. 26. t. 17. 1763.

Convolvulus uniflorus Burm. f. Fl. Ind. 47. t. 21, fig. 2. 1768.

Ipomoea martinicensis G. F. W. Meyer, Prim. Fl. Esseq. 98. 1818.

Ipomoea uniflora Roemer & Schultes, Syst. Veg. 4: 247. 1819; Drake, Ill. Fl. Ins. Mar. Pac. 244. 1892.

Aniseia uniflora Choisy in Mém. Soc. Phys. Genève 6: 483. t. 2, fig. 9. 1834 (repr. Convolv. Orient. 101. 1834); Seem. in Bonplandia 9: 258. 1861, Viti, 439. 1862, Fl. Vit. 173. 1866, op. cit. 431. 1873.

A creeping or twining vine found sparingly as a weed in cultivated areas, sometimes in swamps and forest in open country near sea level; leaf blades narrowly lanceolate to ovate, 4–8 cm. long, up to 2 (–5) cm. broad, obtuse to acute at base; 3 outer sepals 12–20 mm. long, becoming scarious and venose in fruit; corolla white, 20–30 mm. long; filaments pilose at base; fruit ovoid, 1.5–2 cm. long, subtended by enlarged calyx, the seeds 4–6 mm. in diameter, sometimes woolly at angles. Dated Fijian material was in flower and fruit in October.

TYPEFICTION: *Convolvulus martinicensis* was based on a specimen from Martinique, "vicum Roberti" (no specimen traced, Verdcourt, 1963). Although for *C. uniflorus* Burman cited a Javan specimen collected by D. Pryon, possibly this was a garbling of F. A. Prayan, who collected in Java (1759–1764) and whose material is said to be in the Burman Herbarium at G (Index Herbariorum, part II (5), 708. 1983).

DISTRIBUTION: Originally from tropical America, now pantropical and occurring eastward in the Pacific at least to Fiji and Tonga.

LOCAL NAME AND USE: *Watumtua*. The species is used as a vegetable in Malesia but has not been so reported from Fiji; presumably it was an early introduction that has now become sparingly naturalized.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Navolau, on Rewa River, DA 2711. OVALAU: Seemann 329. VANUA LEVU: MATHUATA: Ndranomburemburewa Creek, lower Ndreketi River drainage, DA 12916. FIJI without further locality, Harvey, Nov. 1855, Horne s. n.

3. OPERCULINA A. Silva Manso, Enum. Subst. Braz. 16. 1836; van Ooststr. in Blumea 3: 361. 1939, in Fl. Males. I. 4: 454. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 61. 1963; Backer & Bakh. f. Fl. Java 2: 490. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 29. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 356. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 24. 1984.

Herbaceous vines or lianas, the stems, petioles, and pedicels often winged; leaf blades entire to lobed, often cordate; inflorescences axillary, cymose and few-flowered (or flowers solitary); sepals large, glabrous, enlarging and becoming coriaceous in fruit, often irregularly erose on margins; corolla large, broadly campanulate, hypocrateriform, or salverform, white or yellow, sometimes reddish; stamens included, the filaments adnate to corolla tube, filiform, the anthers twisted at least in age; ovary glabrous, 2-locular, the ovules 2 per locule, the style included, filiform, the stigma biglobose; fruit dehiscent at or above middle by a circumscissile epicarp, 2-locular, the upper part more or less fleshy and separating from lower part and endocarp, the seeds 4 or fewer, glabrous or pubescent.

TYPE SPECIES: *Operculina turpethum* ("turpethum") (L.) A. Silva Manso (*Convolvulus turpethum* L.) (ING, 1979). However, Heine (1984) presents an argument that the type species must be considered *O. macrocarpa* (L.) Urb. (*Operculina convolvulus* A. Silva Manso, nom. illeg.).

DISTRIBUTION: Pantropical, with 15–20 species. One widespread and highly variable species occurs in Fiji.

1. ***Operculina turpethum*** (L.) A. Silva Manso, Enum. Subst. Braz. 16. 1836; Christophersen in Bishop Mus. Bull. **154**: 39. 1938; van Ooststr. in Blumea **3**: 362. 1939; A. C. Sm. in Sargentia **1**: 113. 1942; van Ooststr. in Fl. Males. **1**: 4: 456. fig. 32, a, b. 1953; Yuncker in Bishop Mus. Bull. **220**: 228. 1959; J. W. Parham in Dept. Agr. Fiji Bull. **35**: 130. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. **61**. fig. 15. 1963; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 335. 1972; Backer & Bakh. f. Fl. Java **2**: 490. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 74. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 41. 1972; Fosberg & Sachet in Micronesica **8**: 49. 1972, in Smithsonian Contr. Bot. **36**: 29. 1977; Heine in Fl. Nouv.-Caléd. et Dépend. **13**: 30. pl. 8. 1984.

Convolvulus turpethum L. Sp. Pl. 155. 1753.

Ipomoea turpethum R. Br. Prodr. Fl. Nov. Holl. 485. 1810; Seem. in Bonplandia **9**: 258. 1861, Viti, 439. 1862, Fl. Vit. 172. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 244. 1892; Reinecke in Bot. Jahrb. **25**: 670. 1898; Rechinger in Denkschr. Akad. Wiss. Wien **85**: 335. 1910; Guillaumin in J. Arnold Arb. **13**: 24. 1932; Greenwood in Proc. Linn. Soc. **154**: 101. 1943; Yuncker in Bishop Mus. Bull. **184**: 59. 1945.

Ipomoea sepiaria sensu Seem. in Bonplandia **9**: 258, p. p. 1861, Viti, 439, p. p. 1862; non Koen. ex Roxb. *Ipomoea maxima* sensu J. W. Parham, Pl. Fiji Isl. 241, p. p. 1964, ed. 2. 334, p. p. 1972; non G. Don ex Sweet.

Prostrate or scrambling vine, sometimes locally common from near sea level to about 200 m. on grass-covered ridges and hillsides, in thickets, on edges of forest, and also along roadsides, in waste places, gardens, etc.; stems perennial, narrowly 3-5-winged; petioles 2.5-25 cm. long; leaf blades variable, orbicular to lanceolate, 5-23 cm. long and broad, entire to shallowly lobed, cordate to hastate at base, nearly glabrous to short-pilose, especially beneath; sepals ovate, 1.5-3.2 cm. long, accrescent in fruit; corolla 3-5.5 cm. long, white, sometimes noted as faintly pink-tinged or with a yellowish base; fruit depressed-globose, 1.5-3 cm. in diameter, brown, the seeds black, 5-7 mm. long, glabrous. In Fiji flowers are abundant between May and October, fruits between June and November.

LECTOTYPIFICATION: The type is Hermann Herb. 2: 68 (BM LECTOTYPE) (fide Verdcourt, 1963). A probable isolectotype is Hermann Herb. 2: 135 (L) (Austin, 1980). The Ceylon reference was one of four originally given by Linnaeus.

DISTRIBUTION: Tropical Africa and Madagascar to southern Asia and Australia and eastward in the Pacific to the Society and Marquesas Islands; introduced in the West Indies. Although its habitat in Fiji often suggests that of an adventive, it is presumably indigenous throughout its Pacific range. Twenty-two Fijian collections have been examined, from seven islands.

LOCAL NAMES: *Wa kai, wa uvi, wa mbutho, wa vulavula, wa ika, wa sala, wa ndamundamu.*

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, Greenwood 332; Kavuli, DA 9477. NANDRONGA & NAVOSA: Upper Singatoka Valley, DA 10829. RA: Rakiraki, DA, Nov. 25, 1949; vicinity of Rewasa, near Vaileka, Degener 15404. TAILEVU: Wailevu, Wainimbuka River, DA 10962; Navuloa River, DA 2710. REWA: Near Lomanikoro, DA 430; Nukulau Island, Barclay 3457. OVALAU: Seemann 327, p. p. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, Smith 7952. VANUA LEVU: MBUA: Rukuruku Bay, H. B. R. Parham 346. THAKAUNDOVE: Wainigata Station, Savusavu, DA 12031. TAVEUNI: Seemann 327, p. p. MATUKU: Bryan 241. MOTHE: Bryan 483. FIJI without further locality, Seemann 328, p. p. (BM).

Although the available Fijian collections of the genus appear to represent *Operculina turpethum*, *O. ventricosa* (Bertero) Peter (indigenous in tropical America) may also be anticipated in Fiji, since it occurs in Micronesia (cf. Fosberg & Sachet, 1977)

and also in Samoa, Tonga, and Niue. In the latter archipelagoes it is a comparatively recent arrival, usually occurring in more weedy habitats than *O. turpethum* and perhaps more aggressive. *Operculina turpethum* is sometimes found in apparently natural habitats, although it also invades gardens and establishes itself along roadsides. *Operculina ventricosa* differs from *O. turpethum* in having its stems terete (rather than strongly angled or alate), its stems and leaves persistently appressed-pubescent (rather than short-pilose and often glabrate), its peduncles with more numerous flowers (sometimes as many as 7 rather than 1-3), and its corollas, capsules, and seeds somewhat larger.

4. *MERREMIA* Dennst. ex Endl. Gen. Pl. 1403. 1841; Hall. f. in Bot. Jahrb. 16: 581. 1893; van Ooststr. in Blumea 3: 292. 1939, in Fl. Males. I. 4: 439. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 48. 1963; Backer & Bakh. f. Fl. Java 2: 488. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 25. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 346. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 34. 1984. Nom. cons.

Vines or lianas, rarely shrubby, herbaceous or lignescent; leaf blades entire, dentate, lobed, or palmately compound (then with 3-7 leaflets), glabrous or pubescent; inflorescences axillary, dichasial or subumbellate, the flowers sometimes solitary; sepals subequal, oblong to elliptic to orbicular; corolla campanulate or hypocrateriform, large or small, white, yellow, or orange, sometimes purplish, the limb slightly 5-lobed; stamens included, the filaments equal or subequal, usually glabrous at base, the anthers spirally twisted when completely dehisced; disk often annular; ovary usually glabrous, the locules 2 or 4, the ovules 4 (-6), the style filiform, included, the stigma globose or biglobose; fruit capsular, 2-4-locular, longitudinally dehiscent by 4-6 valves or irregularly, the pericarp thin, fragile, the seeds 4 (-6) or fewer by abortion, glabrous or pubescent.

TYPE SPECIES: *Merremia hederacea* (Burm. f.) Hall. f. (*Evolvulus hederaceus* Burm. f.; *Merremia convolvulacea* Dennst., nom. nud.). *Merremia* is conserved against *Operculina* (1836), but that does not prevent the use of the latter name if both genera are maintained, the common practice by specialists on the family.

DISTRIBUTION: Pantropical, with about 80 species. Seven species are recorded from Fiji, three of them indigenous (one apparently endemic).

USEFUL TREATMENTS OF GENUS: OOSTSTROOM, S. J. VAN. Two new species of *Merremia* from Fiji, representatives of a new section, *Wavula* (Convolvulaceae). *Blumea* 3: 263-266. 1939. BACON, P. S. The weedy species of *Merremia* (Convolvulaceae) occurring in the Solomon Islands and a description of a new species. *Bot. J. Linn. Soc.* 84: 257-264. 1982.

KEY TO SPECIES

Leaves palmately lobed to palmately compound with 5-7 segments or leaflets; flowers of moderate size or large, the buds ovoid or conical, mostly acute; midpetaline bands of corolla in dried state often with 5 dark lines (sect. *Streptandra*); cultivated or adventive.

Peduncles glandular in upper part, the glands sometimes mixed with spreading, bristly hairs; sepals narrowly ovate to oblong, obtuse, to 8 mm. long; corolla not more than 2.5 cm. long, pale yellow or whitish; leaves palmately compound, with 5 leaflets. 1. *M. quinquefolia*

Peduncles glabrous or pilose, but not glandular; sepals larger, the outer ones 15-30 mm. long; corolla larger, 3-6 cm. long; leaves palmately 5-7-lobed, not palmately compound.

Plant entirely glabrous; leaves palmately divided to far below middle, with 7 entire, oblong-lanceolate segments; outer sepals ovate to broadly ovate, to 30 mm. long; corolla 4-6 cm. long, yellow.

2. *M. tuberosa*

Plant pilose; leaves palmately divided nearly to base, the segments 5-7, coarsely dentate to irregularly pinnately lobed; peduncles hirsute, the pedicels and sepals glabrous; outer sepals ovate-lanceolate, 15-25 mm. long; corolla 3-4.5 cm. long, white with a purple throat. 3. *M. dissecta*

Leaves neither palmately lobed nor compound.

Pedicels without a thick, lobed ring at apex.

Leaves not peltate; inflorescences usually with short, pubescent peduncles, usually cymosely branched at apex with short or very short branches, the flowers thus in umbelliform cymes (sometimes solitary); flower buds ovoid, obtuse or subacute; sepals broadly elliptic or oblong to orbicular, emarginate, 5–8 mm. long; corolla white or yellow to orange, 2–3.5 cm. long, pilose at upper parts of midpetaline bands, these indistinctly defined and without dark lines (sect. *Xanthips*); cultivated and occasionally naturalized. 4. *M. umbellata*

Leaves peltate (sometimes those of inflorescences or extreme distal parts of stem merely cordate at base and not or indistinctly peltate); inflorescences corymbose, often forming terminal panicles, the lower bracts often foliaceous; flower buds ovoid or narrowly ovoid, acute or subacute; sepals ovate, 15–25 mm. long; corolla white or yellowish, 4.5–6 cm. long, the midpetaline bands without distinct dark lines (sect. *Hailale*); indigenous. 5. *M. peltata*

Pedicels with a thick, lobed ring immediately below calyx; inflorescences subumbelliform, the flowers moderate-sized to large, the buds narrowly ovoid to oblong, subacute; corolla white, yellow within toward base, the midpetaline bands lacking distinct dark lines; leaves not peltate, the blades broadly ovate to orbicular, abruptly acuminate (sect. *Wavula*); indigenous.

Petioles 3–9 cm. long; pedicels 2–3.5 cm. long, with a thickened, undulate annulus at apex 3–4 mm. in diameter; sepals 8–12 mm. long at anthesis; anthers about 2.5 mm. long. 6. *M. pacifica*

Petioles 10–13 cm. long; pedicels 3–4 cm. long, with an "epicalyx" at apex about 9 mm. in diameter and composed of 4 small triangular lobes; sepals 17–20 mm. long at anthesis; anthers about 5 mm. long. 7. *M. calyculata*

1. *Merremia quinquefolia* (L.) Hall. f. in Bot. Jahrb. 16: 552. 1893; van Ooststr. in Blumea 3: 324. 1939, in Fl. Males. I. 4: 446. fig. 28. 1953; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 335. 1972; Backer & Bakh. f. Fl. Java 2: 489. 1965.

Ipomoea quinquefolia L. Sp. Pl. 162. 1753; Greenwood in Proc. Linn. Soc. 154: 101. 1943.
Convolvulus quinquefolius L. Syst. Nat. ed. 10. 923. 1759.

Merremia quinquefolia is seen in Fiji as an infrequent weed near sea level, in canefields or climbing on rocks and low shrubs or prostrate on the ground; petiole 2–5 (–9) cm. long; leaf blades palmately compound, the leaflets 5, short-petiolulate, oblong to lanceolate, 2.5–6 cm. long; sepals 4–8 mm. long, subequal or the outer ones the shorter; corolla pale yellow or white, 18–25 mm. long; stamens with filaments dilated and short-pubescent at base; capsule globose, stramineous, 4-valved, about 9 mm. long, the seeds blackish, about 4.5 mm. long, shortly curled-pilose. Flowers and fruits have been noted in September.

TYPIFICATION: Linnaeus cited two prior references for *Ipomoea quinquefolia*, but I have not noted a lectotypification.

DISTRIBUTION: Tropical America, introduced into cultivation in the Old World and sometimes, as occasionally in Fiji, becoming an infrequent weed.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, Greenwood 199; Mba, along roadside, Krauss 1421. VANUA LEVU: MATHUATA: Lambasa, Greenwood 199A.

2. *Merremia tuberosa* (L.) Rendle in This.-Dyer, Fl. Trop. Afr. 4 (2): 104. 1905; van Ooststr. in Blumea 3: 325. 1939, in Fl. Males. I. 4: 447. fig. 29. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 60. 1963; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 335. 1972; Backer & Bakh. f. Fl. Java 2: 489. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 74. 1970; Fosberg & Sachtet in Smithsonian Contr. Bot. 36: 28. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 353. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 36. pl. 10, fig. 6, pl. 11. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 44. 1985.

Ipomoea tuberosa L. Sp. Pl. 160. 1753; Yuncker in Bishop Mus. Bull. 178: 99. 1943.

A cultivated liana, infrequently becoming naturalized near sea level, the stem arising from a large subterranean tuber, woody near base, herbaceous distally; petioles 6–18 cm. long; leaf blades orbicular in outline, 6–16 cm. in diameter, usually

7-lobed nearly to base or at least halfway, the lobes lanceolate to elliptic; sepals unequal, the outer ones to 30 mm. long, enlarging in fruit to 6 cm. long; corolla campanulate or hypocrateriform, yellow, 4-6 cm. long, 5-6 cm. in apical diameter; fruit subglobose, 30-35 mm. in diameter, enclosed by sepals, the seeds black, 16-17 mm. long, densely short-tomentose.

TYPIFICATION: Syntypes are Linn. Herb. 219.4 (LINN) and the illustration of *Convolvulus major* . . . in Sloane, Voy. Jam. Nat. Hist. 1: t. 96, fig. 2. 1707 (Verdcourt, 1963).

DISTRIBUTION: Of tropical American origin, cultivated and occasionally naturalized in the Old World, as in tropical Africa, India, Ceylon, Malesia, and parts of the Pacific. Although no Fijian herbarium specimens are at hand, the species is seen in Suva gardens and is sometimes abundantly naturalized on sloping banks.

LOCAL NAME AND USE: The *wood rose* is a handsome ornamental.

3. *Merremia dissecta* (Jacq.) Hall. f. in Bot. Jahrb. 16: 552. 1893; Christophersen in Bishop Mus. Bull. 154: 39. 1938; van Ooststr. in Blumea 3: 328. 1939, in Fl. Males. I. 4: 448. 1953; Yuncker in Bishop Mus. Bull. 220: 224. 1959; J. W. Parham, Pl. Fiji Isl. 243. 1964; Backer & Bakh. f. Fl. Java 2: 489. 1965; D. Austin in Rev. Handb. Fl. Ceylon 1: 349. 1980.

Convolvulus dissectus Jacq. Obs. Bot. 2: 4. t. 28. 1767.

Ipomoea sinuata Ortega, Nov. Pl. Descr. Dec. 7: 84. 1798.

Herbaceous vine, perhaps still cultivated or naturalized near sea level in Fiji, the stems hirsute with yellow-brown hairs; petioles 2.5-7 cm. long; leaf blades suborbicular in outline, 5-20 cm. in diameter, palmately divided nearly to base, the lobes 5-9, sinuate to sinuate-dentate; sepals unequal, the 3 outer ones ovate-lanceolate, 15-25 mm. long, enlarged and coriaceous in fruit; corolla broadly campanulate, 3-4.5 cm. long, white with a purple center; fruit depressed-globose, 1-2 cm. in diameter, partially surrounded by the accrescent calyx, the seeds black, subrounded, glabrous.

TYPIFICATION: *Convolvulus dissectus* was described from a plant grown in Vienna from seeds collected by Jacquin in "America." *Ipomoea sinuata* is based on a plant from Cuba grown in the Madrid Botanical Garden.

DISTRIBUTION: Florida and the West Indies to Argentina and Uruguay; introduced elsewhere in the tropics and sometimes naturalized.

USE: An ornamental plant. No Fijian specimens seem available, but Parham (1964) indicates that the species was cultivated by Thurston (who listed it in his 1886 *Catalogue as Ipomoea sinuata*). It may, of course, persist in Fiji in cultivation or as an escape; specimens are at hand from Tonga, Samoa, and the Society Islands.

4. *Merremia umbellata* (L.) Hall. f. in Bot. Jahrb. 16: 552. 1893; Merr. Interpret. Rumph. Herb. Amb. 440. 1917; van Ooststr. in Blumea 3: 333. 1939, in Fl. Males. I. 4: 449, fig. 24, a, b. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 54. 1963; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 335. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 28. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 354. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 40. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 44. 1985.

Convolvulus umbellatus L. Sp. Pl. 155. 1753.

Convolvulus cymosus Desr. in Lam. Encycl. Méth. Bot. 3: 556. 1792.

Ipomoea cymosa Roemer & Schultes, Syst. Veg. 4: 241. 1819; Seem. in Bonplandia 9: 258. 1861, Viti, 439. 1862.

TYPIFICATION: Linnaeus (1753) gave references to prior works of Plukenet, Plumier, and Sloane; "*Habitat in Martinica, Domingo, Jamaica.*" No specimen seems available in LINN (Austin, 1980); Merrill (1917) notes that Desrousseaux (1792)

reduced *Convolvulus laevis minor* Rumph. (Herb. Amb. 5: 431. t. 158. 1747) to *C. cymosus*, but the description was based on an actual specimen collected by Sonnerat in the East Indies (P HOLOTYPE, fide Verdcourt, 1963).

DISTRIBUTION: Pantropical; the Old World population is now generally referred to the following subspecies.

- 4a. *Merremia umbellata* subsp. *orientalis* (Hall. f.) van Ooststr. in Fl. Males. I. 4: 449. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 54. 1963; Backer & Bakh. f. Fl. Java 2: 489. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 28. 1977.

FIGURES 6A & B.

Merremia umbellata var. *orientalis* Hall. f. in Verslag Staat Lands Plantentuin Buitenzorg 1895: 132. 1896; van Ooststr. in Blumea 3: 341. fig. 1, p. 1939.

Perennial, creeping, sprawling, or twining vine, cultivated and also occasionally naturalized in thickets and on edges of forest from near sea level to about 400 m., the stems with white latex and becoming woody; petioles 1.5–10 cm. long; leaf blades entire, narrowly deltoid to broadly ovate, 4–12 (–16) cm. long, truncate to cordate or hastate at base, usually long-acuminate; sepals broadly elliptic or oblong to orbicular, 5–10 mm. long, subequal or the outer ones slightly the shorter; corolla hypocrateriform, 2–3 (–3.5) cm. long, yellow (sometimes white or orange); fruit ovoid to conical, 10–12 mm. long, the seeds dark brown, 5–6.5 mm. long, densely pubescent. Flowers have been noted in May, June, and October, fruits only in October.

TYPIFICATION: The trinomial is based on material from the vicinity of Batavia, Java, but no specimens were cited; van Ooststroom (1939) mentions *Koorders 31153β* and *Keulemans s. n.* as presumably having been seen by Hallier.

DISTRIBUTION: Although the species as a whole is pantropical, the New World population is referable to subsp. *umbellata*. Most material from the Paleotropics seems referable to subsp. *orientalis* (cf. van Ooststroom, 1953, for distinctions), but occasionally plants of subsp. *umbellata* may also occur.

LOCAL NAME AND USE: *Sovivi*. Introduced into Fiji as an ornamental but becoming naturalized, as it is also in Samoa and the Society Islands.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Mt. Korombamba, *DA 18854*; Nambukalou Creek, *DA 10190, 10193*. OVALAU: Levuka, *DA 16997*. Seemann (1861, 1862) recorded his no. 334 (without locality) as *Ipomoea cymosa*, but that collection was not located at K or BM.

5. *Merremia peltata* (L.) Merr. Interpret. Rumph. Herb. Amb. 441. 1917; Christophersen in Bishop Mus. Bull. 154: 39. 1938; van Ooststr. in Blumea 3: 352. 1939; Yuncker in Bishop Mus. Bull. 178: 98. 1943; van Ooststr. in Fl. Males. I. 4: 452. 1953; Yuncker in Bishop Mus. Bull. 220: 224. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. 50. 1963; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 334. 1972; Backer & Bakh. f. Fl. Java 2: 489. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 73. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 27. 1977; St. John in Phytologia 36: 372. 1977; Bacon in Bot. J. Linn Soc. 84: 259. fig. 1. 1982; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 38. pl. 12, 13. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 43. 1985.

FIGURES 6C & D.

Convolvulus peltatus L. Sp. Pl. 1194. 1753.

Ipomoea nymphaeifolia Bl. Bijdr. Fl. Ned. Ind. 719. 1826.

Ipomoea peltata Choisy in Mém. Soc. Phys. Genève 6: 452. 1834 (repr. Convolv. Orient. 70. 1834); Seem. in Bonplandia 9: 258. 1861, Viti, 439. 1862, Fl. Vit. 172. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 243. 1892; Reching in Denkschr. Akad. Wiss. Wien 85: 337. fig. 22. 1910.

Operculina peltata Hall. f. in Bot. Jahrb. 16: 549. 1893.

Merremia nymphaeifolia Hall. f. in Verslag Staat Lands Plantentuin Buitenzorg 1895: 127. 1896; Reinecke in Bot. Jahrb. 25: 671. 1898; A. C. Sm. in Sargentia 1: 113. 1942.

Liana or scrambling woody vine arising from a large tuber, occurring from near sea level to about 400 m. in forest or on its edges or in thickets, on open hillsides and along roadsides, becoming locally abundant and weedy in disturbed areas; petioles 3–20 cm. long; leaf blades peltate (except occasionally on very distal leaves), ovate-orbicular to obovate, 7–30 cm. long and broad, usually rounded at base, acuminate to cuspidate at apex; sepals ovate, 15–25 mm. long, equal or the outer ones slightly the shorter; corolla 4.5–6 cm. long, white or yellowish, the tube sometimes purplish, the limb slightly lobed; fruit ovoid, 2–2.5 cm. long, the seeds yellowish to dark brown, tomentose and long-villous. Flowers have been recorded between June and January, fruits between August and December.

TYPEFICTION: According to Merrill (1917), Rumphius's *Convolvulus laevis indicus major* (Herb. Amb. 5: 428. t. 157, fig. 1, 2. 1747) is the sole basis of *Convolvulus peltatus* L. *Ipomoea nymphaeaeifolia* was based on a collection from near Buitenzorg, Java, presumably collected by Blume (L HOLOTYPE; fide Verdcourt, 1963).

DISTRIBUTION: Indian Ocean islands and throughout Malesia and eastward into Polynesia to the Society Islands. In the Solomon Islands (Bacon, 1982), as sometimes in Fiji, this species can be a troublesome, smothering weed in forests; nevertheless, there seems no reason to doubt that it is indigenous in its Pacific range.

LOCAL NAMES AND USES: Recorded Fijian names are *wa mbula*, *wa ndamu*, *viliyawa*, *viliviwa*, *veliyana*, and *wiliao*. The stems are sometimes used as binding cords, and the largest leaves are sometimes used to cover cooking pots.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Hills west of Waiuvunu Creek, between Ngaloa and Korovou, *Smith 9211*. NAMOSI: Vicinity of Namuamua, *Gillespie 2938*. NAITASIRI: Sawani-Serea road, *DA 11503*; Tholo-i-suva and vicinity, *Meebold 16995*, *DA 11968*. TAILEVU: *Berry*, Jan. 30, 1969; near road junction to Verata, *DA 11041*. REWA: Queen's Road, 15 miles west of Suva, *Vaughan 3293*; trail to Mt. Korombamba, *H. B. R. Parham 15*, p. p.; Vilamaria, *DA 6095*; vicinity of Suva, *Meebold 16988*, *26554*. MBENGA: Malambi, *Weiner 221*. KANDAVU: Namalata isthmus region, *Smith 191*. VANUA LEVU: MBUA: Near Nambouwalu, *DA 16958*. MATHUATA: Vuniwambua Creek, Korovuli River tributary, *DA 12930*; Seanggangga Plateau, in drainage of Korovuli River, *Smith 6634*, *DA 10484*; Lambasa, *Greenwood 528*. TAVEUNI: Somosomo, *Seemann 325*. VANUA MBALAVU: *Bryan 584*; near Ndakuilomaloma, *Garnock-Jones 1135*.

6. *Merremia pacifica* van Ooststr. in *Blumea* 3: 263. fig. 1, a-g. 1939, in *Fl. Males.*

I. 5: 560. fig. 4. 1958; J. W. Parham, *Pl. Fiji Isl.* 243. 1964, ed. 2. 334. 1972; Bacon in *Bot. J. Linn. Soc.* 84: 259. fig. 2. 1982.

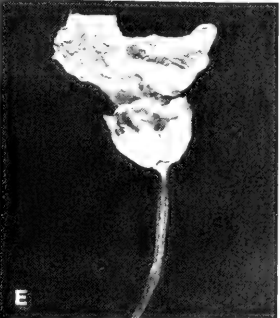
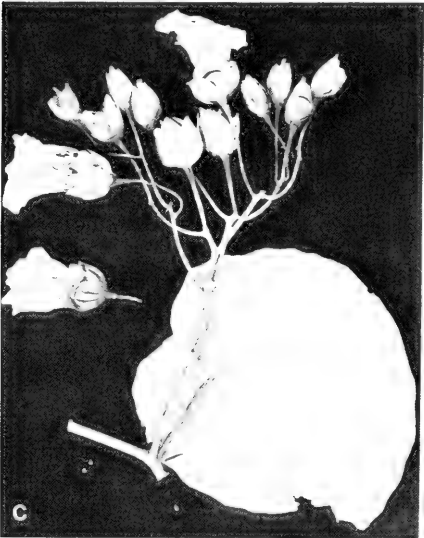
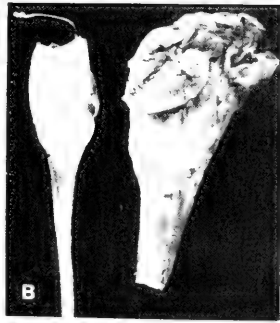
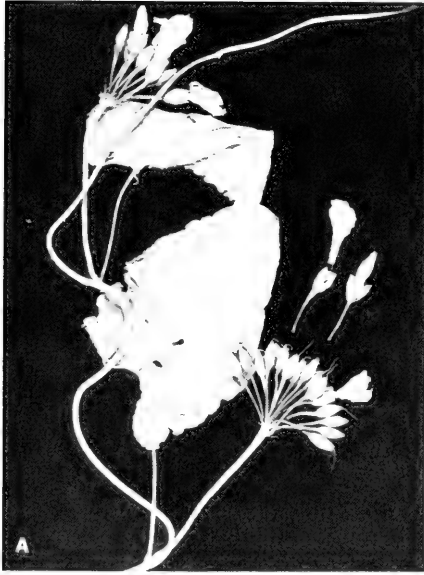
FIGURE 6E.

High-climbing vine with fistulose stems, infrequent in sometimes dense forest at elevations of 100–400 m.; petioles 3–9 cm. long; leaf blades broadly ovate to orbicular, 10–14 cm. long and broad, broadly cordate at base, abruptly acuminate at apex; inflorescences 12–40 cm. long, the pedicels 2–3.5 cm. long, with a thickened, undulate annulus at apex; sepals obovate to suborbicular, 8–12 mm. long, accrescent to 18 mm. long in fruit; corolla campanulate to hypocrateriform, 3–5 cm. long, white with a yellow center; anthers about 2.5 mm. long; fruit ovoid to subglobose, about 2 cm. in diameter. Flowers have been noted in Fiji in April and May.

TYPEFICTION: The type is *Smith 1690* (L HOLOTYPE; many ISOTYPES), collected April 28, 1934, on the southern slope of Mt. Seatura, Mbua Province, Vanua Levu.

DISTRIBUTION: Louisiade Archipelago (van Ooststroom, 1958) and several islands of the Solomons (Bacon, 1982), where it is abundant, as well as Fiji, where it seems to be infrequent. In the Solomons it can be a troublesome weed in forests.

FIGURE 6. A & B, *Merremia umbellata* subsp. *orientalis*; A, distal portion of stem, with foliage and inflorescences, $\times 1/2$; B, calyx with attached style, and corolla, $\times 2$. C & D, *Merremia peltata*; C, distal portion of stem, with leaf and inflorescence, $\times 1/3$; D, flower, $\times 1$. E, *Merremia pacifica*; flower, showing broad ring below calyx characteristic of sect. *Wavula*, $\times 1$. A & B from *DA 18854*, C from *Smith 191*, D from *Bryan 584*, E from *DA 13194*.



LOCAL NAME: *Veliyawa*.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Nanduna, Sawani-Serea road, DA 13194.

7. *Merremia calyculata* van Ooststr. in *Blumea* 3: 265. fig. 1, h-t. 1939; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 334. 1972.

Ipomoea campanulata sensu Seem. in *Bonplandia* 9: 257. 1861, Viti, 439. 1862; non L.

An apparently rare vine, with fistulose stems; petioles 10–13 cm. long; leaf blades suborbicular, 12–15 cm. long and broad, broadly cordate at base, abruptly acuminate at apex; inflorescences to 25 cm. long, the pedicels 3–4 cm. long, with an “epicalyx” at apex about 9 mm. in diameter and composed of 4 small triangular lobes; sepals suborbicular, 17–20 mm. long; corolla white, yellow toward base within; anthers about 5 mm. long. Flowers were obtained in June.

TYPEIFICATION: The type is *Seemann 324* (K HOLOTYPE; ISOTYPE at BM), collected in June, 1860, on Taveuni without detailed locality.

DISTRIBUTION: Endemic to Fiji and thus far known only from the type collection.

LOCAL NAME: *Wavula*.

The local name given by Seemann was used by van Ooststroom (1939) for his new section of three species; this section, extending from the Philippines to Fiji, is readily characterized by the thick, lobed ring at the apex of the pedicel.

5. *STICTOCARDIA* Hall. f. in *Bot. Jahrb.* 18: 159. 1893; van Ooststr. in *Blumea* 5: 346. 1943, in *Fl. Males. I.* 4: 491. 1953; Verdcourt in *Fl. Trop. E. Afr. Convolv.* 68. 1963; Backer & Bakh. f. *Fl. Java* 2: 498. 1965; Gunn in *Brittonia* 24: 169. 1972; Fosberg & Sachet in *Smithsonian Contr. Bot.* 36: 30. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* 1: 359. 1980; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 42. 1984.

Perennial vines, woody or herbaceous; leaf blades entire, cordate at base, acuminate at apex, glabrate above, with small black glandular trichomes beneath; inflorescences 1-many-flowered axillary cymes; sepals slightly unequal, orbicular to ovate, with black glandular trichomes, becoming coriaceous and clasping in fruit; corolla hypocrateriform, red, scarlet, purplish, or mauve, the limb usually entire; stamens included, the filaments inserted near base of corolla, glandular-pubescent at base, filiform distally, the anthers oblong; ovary 2- or 4-locular, the ovules 4, the style longer than stamens, the stigma capitate, biglobose; fruit subglobose, indehiscent and thin-walled (or pericarp breaking irregularly), surrounded by the enlarged fleshy sepals, the seeds 4, ovoid, grayish brown, minutely pubescent.

TYPE SPECIES: *Stictocardia tiliifolia* (“*tiliaefolia*”) (Desr.) Hall. f. (*Convolvulus tiliifolius* (“*tiliaefolius*”) Desr.).

DISTRIBUTION: Pantropical, but presumably paleotropical, with a single species introduced into the New World, with 6–12 species. One species is indigenous in Pacific areas.

1. *Stictocardia tiliifolia* (Desr.) Hall. f. in *Bot. Jahrb.* 18: 159, as *S. tiliaefolia*. 1893; van Ooststr. in *Blumea* 5: 346. fig. 1, g, h. 1943, in *Fl. Males. I.* 4: 491. fig. 57, c-f. 1953; Yuncker in *Bishop Mus. Bull.* 220: 228. 1959; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 335. 1972; Backer & Bakh. f. *Fl. Java* 2: 498. 1965; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 116. 1972; D. Austin, D. Powell, & Nicolson in *Brittonia* 30: 196. fig. 1, A. 1978; D. Austin in *Rev. Handb. Fl. Ceylon* 1: 360. 1980; Fosberg & Sachet in *D. J. Carr, Sydney Parkinson*, 99. pl. 91. 1983; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 44. pl. 14. 1984.

Convolvulus tiliaefolius Desr. in Lam. Encycl. Méth. Bot. 3: 544. 1792.

Stictocardia campanulata sensu Merr. in Philipp. J. Sci. 9: 133. 1914; Christophersen in Bishop Mus. Bull. 154: 37. 1938; Gunn in Brittonia 24: 170. fig. 1, 2. 1972; Fosberg & Sacht in Smithsonian Contr. Bot. 36: 30. 1977; non *Ipomoea campanulata* L.

Ipomoea campanulata sensu Greenwood in Proc. Linn. Soc. 154: 101. 1943; Yuncker in Bishop Mus. Bull. 184: 59. 1945; non L.

In Fiji *Stictocardia tiliifolia* is infrequent in coastal areas, a liana climbing over low vegetation, the stems becoming woody with age; petioles 3–15 cm. long; leaf blades cordate-ovate, 6–25 cm. long and broad, acute to short-acuminate at apex; flowers 1–3 (or 4) per inflorescence, often long-pedicellate; sepals suborbicular, 1–2 cm. long, enlarging to 5 cm. long in fruit; corolla 7–10 cm. long, reddish purple with a darker center, the limb 8–10 cm. in diameter; fruit globose, 2.5–3.5 cm. in diameter, surrounded by the accrescent calyx, which disintegrates and leaves a vascular framework; seeds obovoid, 8–10 mm. long, pubescent with minute trichomes.

TYPIIFICATION: The type of *Convolvulus tiliaefolius* is *Commerson* (P HOLOTYPE), from Mauritius. Gunn (1972) gave a detailed synonymy for the present species, referring it to *Stictocardia campanulata* (L.) Merr., under the assumption that *Ipomoea campanulata* L. (typified by Rheede, Hort. Ind. Malabar. 11: 115. t. 56. 1692, cf. Merrill, 1914) is applicable to the type species of *Stictocardia*. This conclusion was refuted by Austin et al. (1978), who take the Linnaean concept to represent a true species of *Ipomoea* and conclude that *Convolvulus tiliaefolius* provides the correct epithet for the species. Differences between the two taxa are well summarized by Austin (1980).

DISTRIBUTION: Now circumtropical, apparently originally from Africa or Asia, cultivated widely and introduced into the New World. The seeds appear to be dispersed by ocean currents.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Thuvu, west of Singatoka, Greenwood 306. VANUA LEVU: THAKAUNDOVE: Savusavu, Guppy, in 1898 (K).

6. *IPOMOEA* L. Sp. Pl. 159. 1753; Seem. Fl. Vit. 171, p. p. 1866; van Ooststr. in Blumea 3: 481. 1940, in Fl. Males. I. 4: 458. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 81. 1963; Backer & Bakh. f. Fl. Java 2: 490. 1965; Gunn in Brittonia 24: 150. 1972; Fosberg & Sacht in Smithsonian Contr. Bot. 36: 6. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 313. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 48. 1984. Nom. cons.

Batatas Choisy in Mém. Soc. Phys. Genève 6: 434. 1834 (repr. Convolv. Orient. 52. 1834); Seem. Fl. Vit. 170. 1866.

Pharbitis Choisy in Mém. Soc. Phys. Genève 6: 438. 1834 (repr. Convolv. Orient. 56. 1834); Seem. Fl. Vit. 171. 1866. Nom. cons. sed non vs. *Ipomoea*.

Calonyction Choisy in Mém. Soc. Phys. Genève 6: 441. 1834 (repr. Convolv. Orient. 59. 1834); Seem. Fl. Vit. 171. 1866.

Vines, usually twining, sometimes prostrate or floating, less frequently shrubs, rarely trees; leaves alternate, petiolate, often highly variable even on the same plant, the petiole occasionally with pseudostipules at base, the blades entire, lobed, divided, or rarely compound; inflorescences mostly axillary 1–many-flowered dichasia, rarely paniculate; sepals membranaceous to subcoriaceous, closely imbricated, variable in size and shape, glabrous or pubescent, often somewhat accrescent in fruit; corolla small to large, rarely slightly zygomorphic, usually hypocrateriform or campanulate, less often salverform or tubular, purple, red, pink, white, or yellow, the limb shallowly (rarely deeply) lobed, the interlobes with 2 distinct nerves; stamens included or rarely exserted, the filaments filiform, often deltoid-dilated at base, usually unequal in length; ovary 2(or 3 or 4 or rarely 5)-locular, glabrous or pubescent, each locule usually

with 2 ovules, the style simple, filiform, included or rarely exerted, the stigma capitate, entire or bi- or triglobose; fruit a globose or ovoid capsule, usually septicidally 4(-6)-valved, infrequently 3-10-valved, rarely irregularly dehiscent, the seeds often 4 (rarely 3-10), glabrous or pubescent.

LECTOTYPE SPECIES AND NOMENCLATURE: The lectotype species of *Ipomoea* is *I. pes-tigridis* L. (vide House in Ann. New York Acad. Sci. **18**: 181. 1908), one of Linnaeus's 17 original species. The generic name is listed as conserved (ICBN), although no names are rejected in its favor, apparently in order to list *I. pes-tigridis* as the "typ. cons." The lectotype species of *Batatas* is *B. edulis* (Thunb.) Choisy (*Convolvulus edulis* Thunb.) (vide Roberty in Boissiera **10**: 147. 1964), one of Choisy's original four species, = *I. batatas* (L.) Lam. *Pharbitis* is typified by *P. hispida* Choisy, nom. illeg. (*Convolvulus purpureus* L., *P. purpurea* (L.) J. O. Voigt); the generic name is conserved, but not against *Ipomoea*. The lectotype species of *Calonyction* is *C. speciosum* Choisy (vide Verdcourt in Taxon **6**: 151. 1957), one of three original species, = *I. alba* L. Seemann (1866) and many of his contemporaries recognized all of these genera, but there is now general agreement that the latter three are to be included in *Ipomoea*.

DISTRIBUTION: Cosmopolitan, with more than 500 species, especially abundant in the Americas and Africa. Many species have extraordinarily wide distribution patterns. In Fiji 14 species are known to occur, but it is often difficult to be certain whether or not they are indigenous. Probably four were definitely introduced as ornamentals, often becoming naturalized, one was introduced as a food plant and is now naturalized and confusingly diverse in appearance, and nine are very probably indigenous, although some of these are found in habitats so characteristic for adventive plants that a degree of skepticism may accompany their placement, for statistical purposes, as true indigens. The following key is in general suggested by that of Austin (in Rev. Handb. Fl. Ceylon, 1980). All three subgenera recognized by Austin (in Taxon **29**, 1980) are represented in Fiji; sections are noted in the key.

USEFUL TREATMENTS OF GENUS: HOUSE, H. D. The North American species of the genus *Ipomoea*. Ann. New York Acad. Sci. **18**: 181-263. 1908. VERDCOURT, B. Typification of the subdivision of *Ipomoea* L. (Convolvulaceae) with particular regard to the East African species. Taxon **6**: 150-152. 1957. ST. JOHN, H. Classification and distribution of the *Ipomoea pes-caprae* group (Convolvulaceae). Bot. Jahrb. **89**: 563-583. 1970. GUNN, C. R. Moonflowers, *Ipomoea* section *Calonyction*, in temperate North America. Brittonia **24**: 150-168. 1972. AUSTIN, D. F. Typification of the New World subdivisions of *Ipomoea* L. (Convolvulaceae). Taxon **24**: 107-110. 1975. AUSTIN, D. F. *Ipomoea carnea* Jacq. vs. *Ipomoea fistulosa* Mart. ex Choisy. Taxon **26**: 235-238. 1977. AUSTIN, D. F. The *Ipomoea batatas* complex—I. Taxonomy. Bull. Torrey Bot. Club. **105**: 114-129. 1978. AUSTIN, D. F. An infrageneric classification for *Ipomoea* (Convolvulaceae). Taxon **28**: 359-361. 1979. AUSTIN, D. F. Additional comments on infrageneric taxa in *Ipomoea* (Convolvulaceae). Taxon **29**: 501-502. 1980.

KEY TO SPECIES

Corolla salverform, the long and narrow tube only slightly widened near or above middle and abruptly flaring near apex; anthers exerted (included in *I. macrantha*); flowers (when white) open during night and closing in morning or (when red or scarlet) open most of day.

Sepals acute to obtuse at apex, often mucronulate (sect. *Eriospermum*); corolla white (rarely tinged with greenish or bluish yellow), the tube 5-8 cm. long, the limb 8-10 cm. in diameter at anthesis; leaf blades entire or rarely few-toothed, 5-16 (-19) cm. long and broad; seeds with short, stiff trichomes.

1. *I. macrantha*

Sepals acute to acuminate, the outer ones with long, fleshy-caudate apices (mucronate only in *I. quamoclit*).

- Corolla 2-4 cm. long, red to orange or yellowish; flowers open all day or most of day; fruit 5-8 mm. long (sect. *Mina*).
 Leaf blades divided more than halfway to midrib with linear, acute lobes, the leaf appearing pinnately compound. 2. *I. quamoclit*
 Leaf blades entire, angled, or 3-7-lobed, the lobes broad or narrow, obtuse, the leaf not appearing compound. 3. *I. hederifolia*
 Corolla white, the tube 7-15 cm. long, the limb 8-16 cm. in diameter at anthesis; flowers open during night and closing in early morning; fruit 20-35 mm. long (sect. *Calonyction*). 4. *I. alba*
 Corolla hypocrateriform to campanulate, the short to long tube expanding from below middle, gradually or abruptly flaring near apex; anthers mostly included; flowers open during morning, closing near noon.
 Glabrous perennials (rarely annuals) with procumbent stems, usually not twining; leaf blades often fleshy or leathery; sepals ovate-oblong to orbicular (infrequently lanceolate); plants of coastal dunes and beaches or inland waterway margins or cultivated areas; or, if twining plants of forest and thickets with herbaceous leaf blades, then these hastate or sagittate and narrower than long (sect. *Eripiomoea*).
 Leaf blades hastate or sagittate, 3-15 × 1-9 cm., the midlobe obviously larger than the lateral lobes.
 Peduncle with minute bracts; sepals 6-12 mm. long, acute or mucronulate. 5. *I. aquatica*
 Peduncle with 2-4 bracts 5-15 mm. long and conspicuously aristate; sepals 15-25 mm. long, gradually narrowed to a conspicuously subulate tip, the outer ones dorsally acutely tricarinate and appressed-denticulate at proximal margins. 6. *I. fimbriosepala*
 Leaf blades ovate or suborbicular to reniform, 3-14 cm. long and broad, emarginate or bilobed at apex. 7. *I. pes-caprae*
 Glabrous or pubescent annuals or perennials with twining or erect stems, not usually rooting at nodes (except in *I. batatas*); leaf blades chartaceous to fleshy; sepals lanceolate to ovate or suborbicular; plants of various habitats; leaf blades not hastate or sagittate.
 Sepals herbaceous, soft-pubescent without with slender trichomes or rarely glabrous, 10-22 mm. long; corolla 5-8 cm. long, blue or purple, rarely white, the inflorescences with linear to filiform bracts; ovary (2 or) 3- or 4-locular; stigma lobes usually 2 (sect. *Ipomoea*). 8. *I. indica*
 Sepals coriaceous or membranaceous, rarely somewhat herbaceous, glabrous or at least without reflexed trichomes; corolla mostly pink to lavender, sometimes blue or white, the inflorescences with caducous or squamiform bracts; ovary 2(or 3)-locular.
 Large perennial vines or shrubs; sepals mostly coriaceous; corolla large (5-9 cm. long), hypocrateriform; seeds oblong, woolly at least on margins (sect. *Eriosperrum*).
 Leaf blades deeply palmately lobed; vines. 9. *I. mauritiana*
 Leaf blades entire; shrubs. 10. *I. fistulosa*
 Small annual or perennial vines; sepals membranaceous to chartaceous; corolla small to large, hypocrateriform to campanulate; seeds suborbicular to pyriform, glabrous to densely short-pubescent.
 Sepals smooth or pubescent dorsally, not obviously scarious on margins, mostly oblong or elliptic to lanceolate, 6-15 mm. long; leaf blades cordate, sometimes only slightly so, ovate, orbicular, or 3-lobed to palmately 5-7-lobed; plants often rooting at nodes (sect. *Batatas*).
 Outer sepals elliptic to broadly ovate, broadest near middle, mostly with a single raised central vein; filaments pubescent on lower half. 11. *I. littoralis*
 Outer sepals sublanceolate to oblong, broadest above middle, with 3-5 large, raised central veins; filaments glabrous except at base. 12. *I. batatas*
 Sepals verrucose or cristate dorsally, obviously scarious on margins, mostly oblong or ovate, 3-7 mm. long; leaf blades deeply lobed to dissected or cordate and entire; plants not rooting at nodes (sect. *Orthipomoea*).
 Leaf blades palmately divided to base into 5-7 lobes; pseudostipules (small leaves on axillary shoots) often present; corolla usually 4.5-6 cm. long, purplish, mauve, bluish, or white. 13. *I. cairica*
 Leaf blades entire, cordate; inflorescences of solitary flowers or few-flowered cymes; corolla to 2.5 cm. long, white to yellow with a red-purple center. 14. *I. obscura*
1. *Ipomoea macrantha* Roemer & Schultes, Syst. Veg. 4: 251. 1819; Gunn in Brittonia 24: 158. fig. 3. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 16. 1977; D. Powell, Nicolson, & D. Austin in Brittonia 30: 201. fig. 1, A-E. 1978; D. Austin in Rev. Handb. Fl. Ceylon 1: 331. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 82. pl. 29. 1984.

Convolvulus grandiflorus Jacq. Hort. Bot. Vindob. 3: 39. t. 69. 1777; non *Ipomoea grandiflora* (L. f.) Lam. (1797).

Ipomoea longiflora R. Br. Prodr. Fl. Nov. Holl. 484, nom. illeg. 1810; non H. B. K. ex Willd. (1809).

Convolvulus tuba Schlechtendal in Linnaea 6: 735. 1831.

Ipomoea glaberrima Bojer ex Bouton in J. Bot. (Hooker) 1: 357. 1835.

Calonyction comosperma Bojer, Hort. Maurit. 228, nom. illeg. 1837; Seem. in Bonplandia 9: 258. 1861, Viti, 439. 1862, Fl. Vit. 171. 1866.

Ipomoea tuba G. Don, Gen. Hist. Dichlam. Pl. 4: 271. 1838; van Ooststr. in Blumea 3: 575. 1940, in Fl. Males. I. 4: 487. 1953; Yuncker in Bishop Mus. Bull. 220: 227. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. 137. 1963; J. W. Parham, Pl. Fiji Isl. 243. 1964, ed. 2. 334. 1972; Backer & Bakh. f. Fl. Java 2: 492. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 73. 1970.

Ipomoea comosperma Drake, Ill. Fl. Ins. Mar. Pac. 242, nom. illeg. 1892.

Ipomoea grandiflora Hall. f. in Bot. Jahrb. 18: 153, nom. illeg. 1893; Yuncker in Bishop Mus. Bull. 178: 99. 1943; non Lam. (1797).

Perennial herb with twining or prostrate stems, occurring near sea level or at low elevations on beaches, arid shores, lagoon cliffs, and in thickets; petioles 3.5–16 cm. long; leaf blades broadly ovate to reniform-ovate, 5–16 (–19) cm. long and broad, entire or rarely few-toothed, deeply cordate at base, acute to broadly acuminate; sepals ovate to ovate-elliptic, 15–25 mm. long, slightly enlarging in fruit, the outer ones the shorter; corolla white to greenish or bluish yellow, the tube 5–8 cm. long, the limb campanulate to rotate, 8–10 cm. in diameter at full anthesis; filaments inserted near base of corolla tube, pilose at base; fruit ovoid to subglobose, 2–3 cm. in diameter, tardily dehiscent, the seeds black, about 10 mm. long, pubescent with short, stiff trichomes. Flowers have been noted in Fiji between December and August.

TIPIFICATION AND NOMENCLATURE: *Ipomoea macrantha* was based on *I. longiflora* R. Br. (nom. illeg.; non H. B. K. ex Willd.), the type of which is *Brown 2741* (BM HOLOTYPE), from Sweer's Island in the Gulf of Carpentaria, Queensland, Australia. *Convolvulus grandiflorus* was based on a specimen cultivated at Vienna, originally from Martinique but probably not preserved (Verdcourt, 1963); although Jacquin's epithet is the oldest for this taxon, it cannot be used in *Ipomoea* because of *I. grandiflora* (L. f.) Lam. (1797), a different species. *Convolvulus tuba* was based on a plant from St. Thomas, West Indies. *Ipomoea glaberrima* was described from plants from the Seychelles, the east coast of Africa, Madagascar, and Diego Garcia, the type presumably having been in cultivation in England. *Calonyction comosperma* is an illegitimate name because it was based on plants from the same sources as *I. glaberrima*, cultivated in the Jardin du Roi in Paris. The complex synonymy of this species is well clarified by Powell et al. (1978).

DISTRIBUTION: Pantropical; the region of origin cannot be stated, but the species occurs in practically all Pacific archipelagoes.

LOCAL NAMES: *Tombili*, *tombithi*, *wa ika*.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Korovou, near Nandi, *Degener 15328*; shores of Mba River near its mouth, *Smith 4731*. REWA: Suva, *Meebold 16427*. VITI LEVU without further locality, *Parks 20458*. TAVEUNI: Somosomo, *Seemann 333*. YATHATA: *DA 13622*. LAKEMBA: Vicinity of Tumbou Village, *Garnock-Jones 924*. FULANGA: On limestone formation, *Smith 1209*.

Although *Ipomoea macrantha* and *I. alba* (species no. 4 as here treated) are somewhat similar in their foliage and corolla shape, the latter has even larger corollas and is readily distinguished by the fleshy, aristate spurs of its sepals and its glabrous seeds.

2. *Ipomoea quamoclit* L. Sp. Pl. 159. 1753; Reching in Denkschr. Akad. Wiss. Wien 85: 336. 1910; Christophersen in Bishop Mus. Bull. 154: 39. 1938; van Ooststr. in Blumea 3: 555. 1940; Greenwood in Proc. Linn. Soc. 154: 101. 1943; Yuncker in Bishop Mus. Bull. 178: 99. 1943, in op. cit. 184: 59. 1945; van Ooststr. in Fl. Males.

I. 4: 482. 1953; J. W. Parham, Pl. Fiji Isl. 242. 1964, ed. 2. 334. 1972; Backer & Bakh. f. Fl. Java 2: 491. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 73. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 23. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 338. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 50. pl. 16. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 43. 1985.

Convolvulus pennatus Desr. in Lam. Encycl. Méth. Bot. 3: 567, nom. illeg. 1792.

Quamoclit vulgaris Choisy in Mém. Soc. Phys. Genève 6: 434, nom. illeg. 1834 (repr. Convolv. Orient. 52. 1834).

Quamoclit pennata Bojer, Hort. Maurit. 224, as *Q. pinnata*. 1837; A. C. Sm. in Sargentia 1: 114. 1942; J. W. Parham in Dept. Agr. Fiji Bull. 35: 127. 1959.

Annual vine, climbing or sprawling or scrambling, frequently abundant as a weed in cultivated areas and along streets from near sea level to about 200 m., sometimes cultivated; petioles 8–40 mm. long, often with pseudostipules at base; leaf blades ovate to elliptic in outline, 2–10 × 1–6 cm., deeply pinnatisect with 9–19 alternate or opposite pairs of linear lobes; sepals elliptic to oblong, 4–7 mm. long, mucronate, the outer ones slightly the shorter; corolla bright red, the tube slightly paler, 2–3.5 cm. long, the limb about 2 cm. in diameter; filaments pilose at base; fruit brown, ovoid, 6–8 mm. long, the seeds dark brown to black, 5–6 mm. long, with irregular patches of short trichomes. Flowers and fruits have been noted between March and August.

TYPIFICATION AND NOMENCLATURE: Of the several references cited by Linnaeus, the type may be considered a specimen from India, Herb. Linn. 219.1 (LINN LECTOTYPE) (fide Austin, 1980). *Convolvulus pennatus* was described from a plant from the East Indies cultivated at the Jardin du Roi, but *I. quamoclit* was cited as a synonym. *Quamoclit vulgaris* is illegitimate because *C. pennatus* was listed as a synonym.

DISTRIBUTION: Originally from tropical America but now widely cultivated and naturalized throughout tropical areas. Although it was presumably first introduced into Fiji as an ornamental, it is now widely established as a weed and was first so noted by Greenwood about 1918 (Greenwood, 1943).

LOCAL NAME AND USE: *Cypress vine*; sometimes considered an ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nawaka, Nandi, DA 8555; Lautoka, Greenwood 150. OVALAU: Lovoni Village, Smith 7476. VANUA MBALAVU: Central volcanic section, near Lomaloma, Smith 1421. LAKEMBA: Bryan 536.

Although no specimens from Suva are at hand, the species is a common weed along streets there, surely one of the most attractive of tropical "weeds."

3. *Ipomoea hederifolia* L. Syst. Nat. ed. 10. 925. 1759; van Ooststr. in Fl. Males. I. 5: 563. 1958; Yuncker in Bishop Mus. Bull. 220: 226. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. 132. 1963; J. W. Parham, Pl. Fiji Isl. 241. 1964; Backer & Bakh. f. Fl. Java 2: 491. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 12. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 325. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 72. pl. 25. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 43. 1985.

Ipomoea angulata Lam. Tabl. Encycl. Méth. Bot. 1: 464. 1793; van Ooststr. in Blumea 3: 553. 1940, in Fl. Males. I. 4: 481. fig. 54. 1953; J. W. Parham, Pl. Fiji Isl. ed. 2. 331. 1972.

Quamoclit coccinea var. *hederifolia* House in Ann. New York Acad. Sci. 18: 262. 1908; A. C. Sm. in Sargentia 1: 114. 1942; J. W. Parham in Dept. Agr. Fiji Bull. 35: 127. 1959.

Ipomoea coccinea sensu Rechner in Denkschr. Akad. Wiss. Wien 85: 336. 1910; Greenwood in Proc. Linn. Soc. 154: 101. 1943; non L.

Annual, scrambling, creeping, or twining vine, occurring as a roadside weed and in canefields, sometimes cultivated; petioles 3–12 cm. long; leaf blades ovate to suborbiculate in outline, 2–15 cm. long, cordate, entire or dentate or 3-lobulate, the lobes sometimes 5–7; sepals oblong to elliptic, 1.5–3 mm. long, the outer ones aristate with

spurs to 4 mm. long; corolla bright red or crimson or brick-red, the tube 2.8–4 cm. long, the limb 1.8–2.5 cm. in diameter; stamens and style exerted; fruit brown, subglobose, 5–8 mm. long, the seeds dark brown or black, 3.5–4 mm. long, usually with 2 lines of short dark trichomes dorsally. In Fiji flowers and fruits are seen between May and October.

LECTOTYPIFICATION: The lectotype may be taken as the West Indian plant illustrated as *Ipomoea foliis cordatis* by Plumier, Pl. Amer. t. 93, fig. 2. 1757 (fide Verdcourt, 1963). *Ipomoea angulata* was based on a plant collected in Mauritius by Commerson (P HOLOTYPE) (fide Verdcourt, 1963).

DISTRIBUTION: Originally from the Americas, but now introduced and naturalized in most tropical countries of the world.

USES: Although it is sometimes grown as an ornamental in Fiji, it was probably introduced early in the present century and was first observed as a weed about 1919 (Greenwood, 1943).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 249*; near Ndrasa, Lautoka, *DA 10337, 11392*; Votua, near mouth of Mba River, *DA 10437*. NANDRONGA & NAVOSA: Viro Creek, near Saru, Tamanua Creek, *Tabualewa 15615*. RA: Ndombuilevu, *DA 3005*. REWA: Suva, *Bryan 202*. VANUA LEVU: MATHUATA: Lambasa, *DA 11784*.

4. *Ipomoea alba* L. Sp. Pl. 161. 1753; Christophersen in Bishop Mus. Bull. **154**: 37. 1938; van Ooststr. in *Blumea* **3**: 547. 1940, in *Fl. Males. I.* **4**: 480. fig. 53. 1953; Yuncker in Bishop Mus. Bull. **220**: 224. 1959; Verdcourt in *Fl. Trop. E. Afr. Convolv.* **130**. 1963; J. W. Parham, Pl. Fiji Isl. **241**. 1964, ed. 2. 331. 1972; Backer & Bakh. f. *Fl. Java* **2**: 491. 1965; Gunn in *Brittonia* **24**: 151. fig. 1, 2. 1972; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* **85**: 40. 1972; Fosberg & Sachtet in *Smithsonian Contr. Bot.* **36**: 8. 1977; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **219**: 98. 1977; D. Austin in *Rev. Handb. Fl. Ceylon* **1**: 317. 1980; Heine in *Fl. Nouv.-Caléd. et Dépend.* **13**: 80. pl. 28. 1984.

Ipomoea bona-nox L. Sp. Pl. ed. 2. 228, nom. illeg. 1762; Drake, Ill. Fl. Ins. Mar. Pac. **242**. 1892; Greenwood in *Proc. Linn. Soc.* **154**: 101. 1943.

Calonyction speciosum Choisy in *Mém. Soc. Phys. Genève* **6**: 441, nom. illeg. pl. 1, fig. 4. 1834 (repr. *Convolv. Orient.* **59**. 1834); Seem. in *Bonplandia* **9**: 258. 1861, Viti, 439. 1862, Fl. Vit. **171**. 1866, op. cit. **431**. 1873; Reinecke in *Bot. Jahrb.* **25**: 671. 1898; Reehinger in *Denkschr. Akad. Wiss. Wien* **85**: 337. 1910.

Calonyction bona-nox Bojer, Hort. Maurit. **227**. 1837.

Annual or perennial sprawling vine or high-climbing liana, found from near sea level (but apparently not directly on beaches) to about 750 m. in dense forest and thickets; petioles 5–25 cm. long; leaf blades rounded-ovate, 5–20 cm. long and broad, entire or 3–5-lobed, cordate, acuminate; sepals ovate to elliptic, 4–20 mm. long, aristate with spurs to 13 mm. long, the outer ones the shorter; corolla white, the tube 7–15 cm. long, the limb rotate and 8–16 cm. in diameter at anthesis; stamens inserted in upper part of corolla tube, the filaments glabrous; fruit ovoid to subglobose, 2–3.5 cm. long, apiculate, the seeds brown to black, 7–12 mm. long, glabrous. In the Fijian Region flowers have been obtained between May and September.

TYPIIFICATION AND NOMENCLATURE: For *Ipomoea alba* Linnaeus cited only *Convolvulus malabaricus flore amplo* . . . in Rheede, Hort. Ind. Malabar. **11**: t. 50. 1692, which may be taken as the HOLOTYPE. In 1762 Linnaeus combined *I. alba* and *Convolvulus aculeatus* L. (1753) under the name *I. bona-nox*, which is thus illegitimate. *Calonyction speciosum* is based on *I. bona-nox* and is hence illegitimate; a specimen at G substantiates this interpretation (Verdcourt, 1963). For a full synonymy and discussion of this taxon, which has been very diversely treated, cf. Gunn (1972); only references bearing on the Fijian Region and nearby areas are listed above.

DISTRIBUTION: Pantropical. There is no solid evidence concerning the origin of *Ipomoea alba* (Gunn, 1972); in addition to its potential transferal by man, the seeds are presumably carried by ocean currents, like those of *I. macrantha*.

LOCAL NAMES: *Morning glory*; *wa ia*. *Moonflower*, the frequent name in many areas, has not been so recorded in Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Lautoka, *Greenwood 331*. NANDRONGA & NAVOSA: Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 3525*. VITI LEVU without further locality, *Seemann 332*, p. p. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7847*. TAVEUNI: Vicinity of Somosomo, *Seemann 332*, p. p.; Waitavala Estate, *DA 14413*.

5. *Ipomoea aquatica* Forssk. Fl. Aegypt.-Arab. 44. 1775; van Ooststr. in Blumea 3: 528. 1940, in Fl. Males. I. 4: 473. fig. 47, 47A, 48. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 120. 1963; J. W. Parham, Pl. Fiji Isl. 241. 1964, ed. 2. 331. 1972; Backer & Bakh. f. Fl. Java 2: 496. 1965; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 139. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 8. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 318. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 64. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 42. 1985.

Ipomoea reptans sensu Poir. in Lam. Encycl. Méth. Bot. Suppl. 3: 460. 1814; J. W. Parham in Dept. Agr. Fiji Bull. 35: 128. fig. 64, a. 1959; non *Convolvulus reptans* L. (basionym).

Annual or perennial, sprawling or floating vine, with hollow stems often rooting at nodes, occurring from near sea level to about 200 m. in wet, open places, canefields, roadsides, and cultivated areas; petioles 3–20 cm. long; leaf blades hastate, 3–15 × 1–9 cm., the terminal lobe deltoid to lanceolate, the basal lobes smaller, spreading, often inconspicuous; sepals ovate-oblong, subequal, 6–12 mm. long, mucronulate; corolla white to rich pink or purple with a deeper center, 3–7.5 cm. long, the limb 3–5 cm. in diameter; filaments pilose at base; fruit ovoid to globose, 8–10 mm. long, the seeds densely soft-pilose. In Fiji flowers have been obtained between May and September, fruits between June and December.

TYPIFICATION: The type is *Forsskal* (C HOLOTYPE; ISOTYPE at BM, fide Verdcourt, 1963), from Zebid, Yemen.

DISTRIBUTION: Indigenous in the Old World tropics, but now also grown in the New World.

LOCAL NAMES AND USE: This *morning glory* is also known as *ota karisa*, *ota karisi*, *wa kumala*, *ndrinikava*, and *luve ni tombithi*. The leaves are cooked and used as greens. Possibly the species was an early (aboriginal?) introduction into Fiji and is now thoroughly naturalized, but it could also have been spontaneous; for statistical purposes, lacking evidence to the contrary, it may be considered indigenous.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near Ndrasa, Lautoka, *DA 11389*. SERUA: Tokotoko area, Navua, *DA 9436*, *10543*. RA: Waimare, *DA 9537*. NAITASIRE: Nanduruloulou, *DA 422*. TAILEVU: Matavata-thou, *DA 9228* (*McKee 2793*); Nakailé, *DA 5653*; Visama, *DA 10585*. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, *Smith 7967*. VANUA LEVU: MATHUATA: Seangangga Farm, *DA 13489*; Namara road, Lambasa, *DA 10463*; between Nakama and Nathavalevu, Lambasa, *Harwood 11*. VANUA MBALAVU: Lomaloma, *DA 10245*.

6. *Ipomoea fimbriosepala* Choisy in DC. Prodr. 9: 359. 1845; Hall. f. in Bot. Jahrb. 18: 143. 1893, in Bull. Soc. Bot. Belg. 37: 97. 1898; Baker & Rendle in This.-Dyer, Fl. Trop. Afr. 4 (2): 199. 1906; van Ooststr. in Fl. Males. I. 5: 561. fig. 5. 1958; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 62. pl. 21. 1984. FIGURE 7A & B.

Aniseia hastata Meisn. in Mart. Fl. Bras. 7: 319. 1869; non *Ipomoea hastata* L. (1771).

Ipomoea phylloneura Baker in J. Linn. Soc. Bot. 21: 426. 1885; Greenwood in Proc. Linn. Soc. 154: 101. 1943; J. W. Parham, Pl. Fiji Isl. 242. 1964, ed. 2. 334. 1972.

Ipomoea denticulata sensu Guillaumin in J. Arnold Arb. 13: 24. 1932; non Choisy.

Ipomoea setifera var. *fimbriosepala* Fosberg in Smithsonian Contr. Bot. 36: 24. 1977.

Creeping or twining vine, occasional from near sea level to about 300 m. in thickets or on edges of open forest, and also as an occasional weed in canefields and other cultivated areas; petioles 1-7 cm. long; leaf blades membranaceous, predominantly ovate-hastate, 3-12 × 1-6 cm., the terminal lobe deltoid to lanceolate, the basal lobes distinctly smaller; peduncle with 2-4 persistent, conspicuously aristate bracts 5-15 mm. long, the flowers often solitary; sepals deltoid-ovate to lanceolate, 15-25 mm. long, gradually narrowed to a conspicuously subulate tip, the outer ones the longer and dorsally acutely tricarinate, appressed-denticulate at proximal margins; corolla 2.5-4 cm. long, purple to pale pink, deeper at center; filaments pilose proximally; fruit ovoid or globose, 1-1.5 cm. long, the seeds blackish, about 5 mm. long, minutely puberulent. Flowers and fruits have been observed in Fiji between October and February.

TIPIFICATION AND NOMENCLATURE: Syntypes of *Ipomoea fimbriosepala* are a collection from Madagascar in the Lindley herbarium (presumably at CGE) and material cultivated in Mauritius and represented by a Bouton collection. *Aniseia hastata* Meisn. was based on a Burchell specimen from Brazil; the epithet not being available in *Ipomoea*, Baker proposed *I. phylloneura* as a new name for Meisner's species, also citing three specimens from Madagascar, *Baron 2516, 2605, and 2671* (all at κ). Fosberg (1977) reduced *I. fimbriosepala* to varietal status under *I. setifera* Poir. The illustrations of van Oostroom (1958) and Heine (1984) permit an excellent understanding of the species, and Heine (1984) provides a justification for maintaining the taxon at the specific rather than varietal level.

DISTRIBUTION: Indian Ocean islands, parts of Africa (but apparently not in East Africa; Verdcourt, in litt.), New Guinea (rare), Marianas Islands (rare), New Caledonia, the New Hebrides, Fiji, and (according to van Oostroom) the Austral Islands; also in tropical America.

LOCAL NAME: *Au luna* (Gillespie).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 422*, March 22, 1922; Wakandra, Nandi, *DA 9692*; Korovuto, Nandi, *DA 10698*. TAILEVU: Vuthi road, Raralevu, *DA 10607*. VANUA LEVU: MATHUATA: Ndranombumbua, *DA 12917*. FIJI without further locality, *Gillespie*, Dec. 28, 1927.

The true relationships of *Ipomoea fimbriosepala* remain uncertain. It was placed in sect. *Leiocalyx* by Hallier (1893, 1898), and that section (sensu str.) was included by Verdcourt (1963) in sect. *Eripomoea*, which also includes *I. aquatica* and *I. pes-caprae*. Although *I. fimbriosepala* is very distinct from those two species in its calyx ornamentation, it is here keyed as a relative of *I. aquatica* because of its narrow, hastate or sagittate leaf blades. Possibly *I. fimbriosepala* would be better placed in sect. *Pharbitis* (Austin, in litt.). The original source of the species is speculative; however, its present scattered occurrence in the Old World does not give the impression of an adventive, and so, lacking evidence to the contrary, this highly distinctive species may be treated as still another *Ipomoea* with an unexpectedly vast and sporadic natural range.

7. *Ipomoea pes-caprae* (L.) R. Br. in Tuckey, Narr. Exped. Zaire, 477. (March) 1818; Sweet, Hort. Suburb. Lond. 35. (July) 1818; G. F. W. Meyer, Prim. Fl. Esseq. 97. (Nov.) 1818; House in Ann. New York Acad. Sci. 18: 212. 1908; van Ooststr. in Blumea 3: 532. 1940, in Fl. Males. I. 4: 475. 1953; St. John in Ninth Pacific Sci. Congr. Abstr. 65. 1957; Stearn in Taxon 10: 238. 1961; Verdcourt in Fl. Trop. E. Afr. Convolv. 121. 1963; St. John in Bot. Jahrb. 89: 566. fig. 1. 1970; Fosberg & Sacket in Smithsonian Contr. Bot. 36: 20. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 334. 1980.

Convolvulus pes-caprae L. Sp. Pl. 159. 1753.

TYPIFICATION: Four citations were given by Linnaeus. Verdcourt (1963) indicates as the lectotype a specimen from India, Herb. Linn. 218.59 (LINN LECTOTYPE). The apparently same specimen had been designated as the lectotype by St. John (1957), with the statement that "It doubtless came from Ceylon."

DISTRIBUTION: Circumtropical; subsp. *pes-caprae* occurs from Arabia through tropical Asia, principally in the Indian Ocean. Subsp. *brasiliensis* has a wider distribution. St. John (1970) presents a good case for the recognition of two species in this complex, but I here follow what appears to be the majority opinion.

- 7a. *Ipomoea pes-caprae* subsp. *brasiliensis* (L.) van Ooststr. in *Blumea* 3: 533. 1940, in *Fl. Males. I.* 4: 475. *fig. 49, 50* (right). 1953; Verdcourt in *Fl. Trop. E. Afr. Convolv.* 121. 1963; Backer & Bakh. f. *Fl. Java* 2: 496. 1965; Fosberg & Sacht in *Smithsonian Contr. Bot.* 36: 20. 1977; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 52. *pl. 17.* 1984; A. C. Sm. *Fl. Vit. Nova* 4: *fig. 132* (upper), sphalm. as var. *brasiliensis*. 1988. FIGURE 132 (upper) in Vol. 4.

Convolvulus brasiliensis L. Sp. Pl. 159. 1753.

Ipomoea brasiliensis Sweet. Hort. Suburb. Lond. 35. (July) 1818; G. F. W. Meyer, *Prim. Fl. Esseq.* 97. (Nov.) 1818; Rechinger in *Denkschr. Akad. Wiss. Wien* 85: 335. 1910; St. John in *Ninth Pacific Sci. Congr. Abstr.* 66. 1957, in *Bot. Jahrb.* 89: 573. *fig. 2, 3, 4.* 1970; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 333. 1972; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 37, 38. 1972; St. John in *Phytologia* 36: 372. 1977.

Ipomoea pes-caprae sensu Seem. in *Bonplandia* 9: 258. 1861, Viti, 439. 1862, *Fl. Vit.* 172. 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* 244. 1892; Reinecke in *Bot. Jahrb.* 25: 670. 1898; Guillaumin in *J. Arnold Arb.* 13: 24. 1932; Christophersen in *Bishop Mus. Bull.* 154: 38. 1938; Greenwood in *Proc. Linn. Soc.* 154: 101. 1943; Yuncker in *Bishop Mus. Bull.* 184: 59. 1945, in op. cit. 220: 227. 1959; J. W. Parham in *Dept. Agr. Fiji Bull.* 35: 128. 1959, *Pl. Fiji Isl.* 242. 1964; non sensu subsp. *pes-caprae*.

Perennial, prostrate vine with a thickened taproot and copious white latex, often abundant near sea level or at low elevations on beaches, river banks near the sea, lowland roadsides, and in coconut plantations, the stems long-trailing, hollow, often rooting at nodes; petioles 1.5–20 cm. long; leaf blades ovate or suborbicular to reniform, 3–14 cm. long and broad, emarginate or shallowly bilobed at apex; sepals unequal or subequal, ovate to orbicular, 5–16 mm. long, the inner ones the larger; corolla 3–7 cm. long, rich pink or mauve to rich purple, paler proximally, magenta at throat within; filaments pilose at base; fruit ovoid to depressed-globose, 12–20 mm. in diameter, the seeds dark brown to black, 6–10 mm. long, densely brown-tomentose. Flowers and fruits occur throughout the year.

LECTOTYPIFICATION: For *Convolvulus brasiliensis* Linnaeus gave two prior references, of which St. John (1957) indicated Plumier, *Descr. Pl. Amér.* 89. *pl. 104.* 1693 as the LECTOTYPE; no specimen seems available in the Linnaean Herbarium.

DISTRIBUTION: Shores of the tropical Atlantic, Pacific, and southern Indian Oceans, and throughout the tropical Pacific. For the distribution of the two subspecies of *Ipomoea pes-caprae* (although there treated as species), cf. the excellent maps of St. John (1970, *fig. 5, 6*). In Fiji this widespread taxon is to be anticipated on or near most beaches.

LOCAL NAMES AND USES: The *beach morning glory* is commonly known in Fiji as *lawere*, *lauwere*, *lauivi*, *wa vui*, *wa vulavula*, *yale*, and *yaleyale*. It serves a useful purpose as a sand-binder and is also used medicinally, the leaves being applied to boils or used as part of a remedy for stomach pains.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 203, Tothill 461.* NANDRONGA & NAVOSA: Volivoli, *DA 10671.* SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9624;* Ndeumba beach, *DA 8622, 11453;* Navua beach, *Parks 20414.* REWA: Near Lami, *H. B. R. Parham 72;* Suva Point, *DA 7539.* MBENGGGA: Naisaisomo Village, *Weiner 228.* NGAU: Shore of Herald Bay, near Sawaieke, *Smith 7940.* VANUA LEVU: MATHUATA: Banks of lower Lambasa River, *Smith 6614.* THAKAUNDROVE: Nasinu, *Natewa*

Bay, DA 16844. TAVEUNI: Waiyevo, DA 5707. VANUA MBALAVU: Near Sawana Village, DA 10242, Garnock-Jones 1076. THITHIA: Silia Yalewa, DA 13256. LAKEMBA: Near Tumbou Jetty, Garnock-Jones 795. KAMBARA: On limestone beach, Smith 1302. Seemann 326 (Seemann, 1861, 1862), without locality, was not found at κ or BM.

8. *Ipomoea indica* (Burm.) Merr. Interpret. Rumph. Herb. Amb. 445. 1917; Christophersen in Bishop Mus. Bull. 154: 38. 1938; Fosberg in Micronesica 2: 151. 1966, in Bot. Notiser 129: 37. 1976; Fosberg & Sacht in Smithsonian Contr. Bot. 36: 12. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 327. 1980; Heine in Fl. Nouv.-Caléd. et Dépénd. 13: 66. pl. 22. 1984.

Convolvulus indicus Burm. Ind. Univ. Herb. Amb. 7: 6. 1755.

Ipomoea congesta R. Br. Prodr. Fl. Nov. Holl. 485. 1810; Seem. Fl. Vit. 431. 1873; Guillaumin in J. Arnold Arb. 13: 24. 1932; van Ooststr. in Blumea 3: 500. 1940, in Fl. Males. I. 4: 465. fig. 39A. 1953; Verdcourt in Taxon 6: 231. 1957; Yuncker in Bishop Mus. Bull. 220: 226. 1959; J. W. Parham, Pl. Fiji Isl. 241. 1964, ed. 2. 333. 1972; Backer & Bakh. f. Fl. Java 2: 494. 1965.

Pharbitis insularis Choisy in Mém. Soc. Phys. Genève 6: 439. 1834 (repr. Convolv. Orient. 57. 1834); Seem. in Bonplandia 9: 258. 1861, Viti, 439. 1862, Fl. Vit. 171. 1866; Reinecke in Bot. Jahrb. 25: 670. 1898.

Ipomoea insularis Steudel, Nomencl. Bot. ed. 2. 1: 817. 1840; Drake, Ill. Fl. Ins. Mar. Pac. 243. 1892.

Sprawling or creeping vine, sometimes locally frequent at elevations from near sea level to 750 m. in forest or on its edges, in thickets, on reeds in open places, and as an occasional weed in plantations and waste places and along roadsides; stems much-branched, often retrorsely pilose; petioles 2–18 cm. long; leaf blades rounded-ovate to orbicular, 5–17 cm. long and broad, entire or 3-lobed, cordate, acuminate, appressed-pilose to glabrous; inflorescence peduncle often retrorsely pilose, the bracts linear to filiform; sepals lanceolate to ovate, 10–22 mm. long, acuminate; corolla rich purple or rich blue or deep pink, paler or white proximally, 5–8 cm. long, the limb 6–8 cm. broad; filaments with curled hairs at base; fruit subglobose, to 1 cm. in diameter, the seeds brown, glabrous. Flowers have been noted between April and December, fruits between September and November.

TIPIFICATION AND NOMENCLATURE: *Convolvulus indicus* was based on *C. caeruleus* Rumph. Herb. Amb. 5: 432. 1747, the whole basis of Burman's name. Fosberg (1976) notes that Rumphius did not prepare a plate of this species but included references to five earlier publications, among which he designated *Convolvulus indicus flore violaceo* Besler, Hort. Eystett. 13 (8): fig. 2. 1613 as the LECTOTYPE. This selection preserves the name *Ipomoea indica* for the widespread Indo-Pacific species frequently passing as *I. congesta* or *I. insularis*. *Ipomoea congesta* was based on Banks material from the first Cook voyage, from the vicinity of Endeavour River, Bay of Islands, etc., Australia. Choisy based *Pharbitis insularis* on "*Convolvulus multiflorus* h. Br. Mus. mss. (e N. Holl.);" "(V. s. primo ex Gaudichaud, demum in N. Lambert et n. Br. Mus.)- Hab. Polynesiam (ins. Mariannes, Sandwich, Norfolk Isl., N. S. W. Endeavour River)."

DISTRIBUTION: Pantropical and usually coastal (but in Fiji extending into middle elevation forests). Fosberg recognizes three varieties, our taxon representing var. *indica*, an Indo-Pacific plant occurring at least from Ceylon and the Ryukyu Islands to the Societies and Hawaii, and also from Mexico to Brazil and Argentina. From Fiji about 30 collections from six islands are at hand.

LOCAL NAMES AND USES: Recorded names in Fiji are *wa vuti*, *wa vuli*, *wa sasala*, *wa salasala vuti*, *wa sovivi*, and *wa voji*. The leaves are reputed to be part of an internal remedy to treat scabies, as well as part of external remedies for bone fractures and for relieving swollen breasts after childbirth.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mountains inland from Lautoka, *Greenwood 300*; Mt. Natondra, Mt. Evans Range, *Smith 4275*. NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8755*; vicinity of Namosi Village, *Weiner 278*. NAITASIRE: Wailoku road, *Weiner 153*; Tamavua, *H. B. R. Parham 379*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7094*; near road junction to Verata, *DA 11042*. REWA: Vatuwangga, near Suva, *H. B. R. Parham 15*, p. p. OVALAU: Hills southeast of valley of Mbureta River, *Smith 7402*. VANUA LEVU: MATHUATA: Mt. Uluimbau, south of Lambasa, *Smith 6596*. THAKAUNDROVE: Hills south of Nakula Valley, Nasuvusuva, *Smith 358*; Wainigata Station, *DA 12037*. TAVEUNI: Trail to lake above Somosomo, *Weiner 71-7-45b*; Waitavala Estate, *DA 14412*. VANUA MBALAVU: Narothiso Village, *Garnock-Jones 1120*. LAKEMBA: Near Tumbou, *Garnock-Jones 885*. FIJI without further locality, *Seemann 331*.

9. *Ipomoea mauritiana* Jacq. Collect. **4**: 216. 1791; Verdcourt in Fl. Trop. E. Afr. Convolv. **135**. 1963; van Ooststr. in Fl. Males. I. **6**: 940. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. **36**: 19. 1977; D. Austin in Rev. Handb. Fl. Ceylon **1**: 331. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. **13**: 60. *pl.* 20. 1984.

Convolvulus paniculatus L. Sp. Pl. 156. 1753.

Ipomoea paniculata R. Br. Prodr. Fl. Nov. Holl. 486, nom. illeg. 1810; Drake, Ill. Fl. Ins. Mar. Pac. 243. 1892; non Burm. f. (1768).

Batatas paniculata Choisy in Mém. Soc. Phys. Genève **6**: 436. 1834 (repr. Convolv. Orient. 54. 1834); Seem. in Bonplandia **9**: 258. 1861, in op. cit. **10**: 297. 1862, Viti, 439. 1862, Fl. Vit. 170. 1866.

Ipomoea digitata sensu auct.; van Ooststr. in Blumea **3**: 558. 1940, in Fl. Males. I. **4**: 483. *fig.* 55. 1953; Backer & Bakh. f. Fl. Java **2**: 495. 1965; non L.

Large liana with tuberous roots, infrequent in Fiji at low elevations; leaves orbicular in outline, 6–24 × 6–18 cm., rarely entire, usually palmately lobed, the lobes (3–) 5–7 (–9), ovate, acuminate; sepals orbicular or elliptic, 6–12 mm. long; corolla 4–6 cm. long, reddish purple to rose-pink; fruit ovoid, 1.2–1.4 cm. long, the seeds black, comose with silky hairs 6–7 mm. long. As far as dates are available, flowers were noted in December.

TYPIFICTION AND NOMENCLATURE: *Ipomoea mauritiana* was based on a plant from Mauritius cultivated at Vienna and probably not preserved. The plate published by Jacquin, Pl. Rar. Hort. Schoenbr. **2**: 39. *t.* 200. 1797 may be taken as the LECTOTYPE (Austin, 1980). For *Convolvulus paniculatus* Linnaeus referred only to the illustration of *Flos passionis spurius malabaricus* . . . in Rheede, Hort. Ind. Malabar. **11**: *t.* 49. 1692; however, the epithet is not available in *Ipomoea*. The name *I. digitata* is applicable to a rare endemic Haitian species (Verdcourt, 1963).

DISTRIBUTION: Pantropical, but related to species from the West Indies and South America.

LOCAL NAMES: *Wa uvi*, *ndambithi*.

AVAILABLE COLLECTIONS: VITI LEVU: Without further locality, *Seemann 330*, p. p. OVALAU: Without further locality, *Seemann 330*, p. p. MOTURIKI: *Storck 902*.

It is probable that the occurrences noted by Seemann and Storck were of indigenous plants, since the species is not rare in certain other Pacific areas (Fosberg & Sachet, 1977; Heine, 1984); however, no modern collections from Fiji seem to be available.

10. *Ipomoea fistulosa* Mart. ex Choisy in DC. Prodr. **9**: 349. (Jan.) 1845; House in Ann. New York Acad. Sci. **18**: 189. 1908; van Ooststr. in Fl. Males. I. **4**: 599. 1954; Verdcourt in Fl. Trop. E. Afr. Convolv. **82**. 1963; Backer & Bakh. f. Fl. Java **2**: 493. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 334. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. **36**: 11. 1977; Heine in Fl. Nouv.-Caléd. et Dépend. **13**: 65. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 43. 1985.

Batatas crassicaulis Benth. Bot. Voy. Sulphur, 134. (Apr.) 1845.

Ipomoea crassicaulis Robinson in Proc. Amer. Acad. Arts 51: 530. 1916; van Ooststr. in Fl. Males. I. 4: 485. 1953.

Ipomoea carnea subsp. *fistulosa* D. Austin in Taxon 26: 237. fig. 2. 1977, in Rev. Handb. Fl. Ceylon 1: 322. 1980.

Shrub 1-5 m. high, cultivated and occasionally naturalized near sea level; stems hollow; petiole 2.5-15 cm. long; leaf blades ovate to lanceolate, 10-25 cm. long, truncate to shallowly cordate at base, long-acuminate; sepals suborbicular, 5-6 mm. long; corolla 5-9 cm. long, finely tomentose without, rich pink, deeper pink to purple at base, the limb spreading to 11 cm. in diameter; filaments unequal, dilated and pilose at base; fruit ovoid to subglobose, 1.5-2 cm. long, the seeds covered with long, woolly, brown trichomes. Flowers are seen in Fiji between March and June.

TYPIFICATION AND NOMENCLATURE: *Ipomoea fistulosa* was based on specimens in the Martius herbarium collected by Martius and Pohl in Brazil. The lectotype is *Martius 2398* (M LECTOTYPE) (Austin, 1977); syntypes are *Martius 567* (M), *569* (M), and *Pohl 1341* (M). The type of *Batatas crassicaulis* is *Sinclair* (K HOLOTYPE), from Guayaquil, Ecuador.

DISTRIBUTION: Circumtropical in cultivation, but originally from tropical America.

USE: An attractive garden ornamental and roadside shrub.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16443. LAKEMBA: Yandra Village, Garnock-Jones 960.

The species is probably well established in parts of Fiji; at least along the Queen's Road near Lami it appears common. In accepting specific rather than subspecific rank for this taxon I accept the argument presented by Heine (1984), whose comments are based on those of Verdcourt (1963) and Fosberg and Sacht (1977).

11. *Ipomoea littoralis* Bl. Bijdr. Fl. Ned. Ind. 713. 1826; Fosberg in *Micronesica* 2: 151. 1966; Fosberg & Sacht in *Smithsonian Contr. Bot.* 36: 14. 1977; D. Austin in *Bull. Torrey Bot. Club* 105: 122. fig. 9. 1978, in *Rev. Handb. Fl. Ceylon* 1: 330. 1980; Heine in *Fl. Nouv.-Caléd. et Dépend.* 13: 74. pl. 26. 1984.

FIGURE 7C & D.

Convolvulus denticulatus Desr. in *Lam. Encycl. Méth. Bot.* 3: 540. 1792.

Ipomoea denticulata Choisy in *Mém. Soc. Phys. Genève* 6: 467, nom. illeg. 1834 (repr. *Convolv. Orient.* 85. 1834); Seem. *Fl. Vit.* 172. 1866, op. cit. 431. 1873; Drake, *Ill. Fl. Ins. Mar. Pac.* 242. 1892; Reinecke in *Bot. Jahrb.* 25: 671. 1898; Reehinger in *Denkschr. Akad. Wiss. Wien* 85: 335. 1910; non R. Br. (1810).

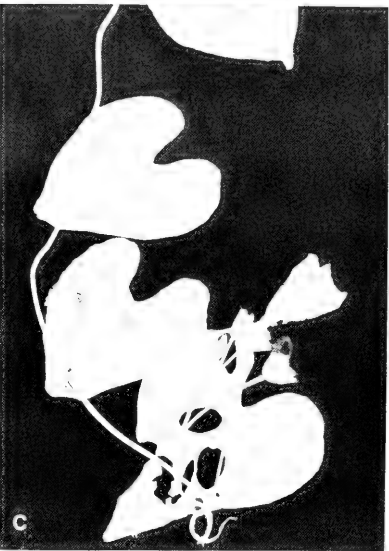
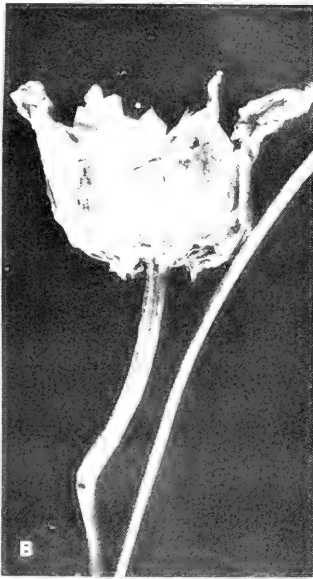
Ipomoea sepiaria sensu Seem. in *Bonplandia* 9: 258, p. p. 1861, Viti, 439, p. p. 1862; non Koenig ex Roxb. *Ipomoea gracilis* sensu House in *Ann. New York Acad. Sci.* 18: 148. 1908; Christophersen in *Bishop Mus. Bull.* 154: 38. 1938; van Ooststr. in *Blumea* 3: 516, p. p. 1940; Yuncker in *Bishop Mus. Bull.* 178: 99. 1943, in op. cit. 184: 59. 1945; van Ooststr. in *Fl. Males. I.* 4: 470. fig. 42, 43. 1953; Yuncker in *Bishop Mus. Bull.* 220: 226. 1959; Backer & Bakh. f. *Fl. Java* 2: 496. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 73. 1970; St. John & A. C. Sm. in *Pacific Sci.* 25: 341. 1971; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 334. 1972; non R. Br. (1810).

Calystegia affinis sensu J. W. Parham, *Pl. Fiji Isl.* 241. 1964; non Endl.

Ipomoea maxima sensu J. W. Parham, *Pl. Fiji Isl.* 241, p. p. 1964, ed. 2. 334, p. p. 1972; non G. Don ex Sweet.

Prostrate or climbing vine, often locally abundant from near sea level to about 300 m. on sandy beaches and dunes, in open forest and thickets, and as a weed in clearings and along roadsides; petioles slender, 0.5-13 cm. long; leaf blades broadly ovate to oblong or orbicular, very variable in size, 1-14 cm. long, cordate at base, undulate-margined or angular-dentate or 3(-7)-lobed; sepals elliptic to ovate, 6-12 mm. long, mucronulate, the outer ones the shorter; corolla 3-4.5 cm. long, pink or pale lavender

FIGURE 7. A & B, *Ipomoea fimbriosepala*; A, portion of stem, with leaf and fruit, $\times 1$; B, dehiscent fruit, $\times 2$. C & D, *Ipomoea littoralis*; C, portion of stem, with foliage and inflorescences, $\times 1/3$; D, flower, $\times 2$. A & B from *Kajewski 320* (Eromanga, New Hebrides), C from *DA 10997*, D from *Bryan 340*.



or blue, deeper within at center, the tube paler without and proximally; filaments with glandular trichomes on lower half; fruit depressed-globose, 9–10 mm. long, the seeds black or brown, 3.5–4 mm. long, glabrous. Flowers and fruits occur throughout the year.

TIPIFICATION AND NOMENCLATURE: The type of *Ipomoea littoralis* is *Blume 1710* (L HOLOTYPE) (Austin, 1978, 1980), from Java. *Convolvulus denticulatus* is based on Commerson collections from the Seychelles, in the Thouin herbarium (presumably at SBT); the combination in *Ipomoea*, however, is illegitimate. Fosberg (1966) clarified the use of *I. littoralis* for this widespread species, perhaps the commonest *Ipomoea* in Fiji. *Ipomoea gracilis* R. Br. is apparently rare and is confined to northern Australia.

DISTRIBUTION: Malesia eastward in the Pacific as far as the Tuamotus, Marquesas, and Hawaii, and also westward along coasts of the Indian Ocean to Madagascar; also in Mexico. About 35 Fijian collections from eleven islands are at hand.

LOCAL NAMES: Occasionally recorded names are *sovivi*, *wa sovivi*, *sivivi*, *suani mbu*, *tangithi*, and *tokatolu*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Tothill 460*. NANDRONGA & NAVOSA: Natumbakula, near Singatoka, *Degener 15110*; Korolevu, *DA 9282 (McKee 2851)*. SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9610*. NATIASIRI: Vunindawa, *DA 10031*. TAILEVU: Matavatathou, *DA 9946*; Mbuthalevu, *DA 10956*. REWA: Veisari, *DA 10997*; near Korovou, Suva, *H. B. R. Parham 107*. KANDAVU: Namalata isthmus region, *Smith 182*. WAKAYA: Milne 40. KORO: East coast, *Smith 1088*. NGAU: Shore of Herald Bay, vicinity of Sawaieke, *Smith 7939*. VANUA LEVU: MATHUATA: Southern base of Mathuata Range, north of Natua, *Smith 6838*; Lambasa, *Greenwood 591*. THAKAUNDROVE: Mbutha Bay, *DA 2736*. TAVEUNI: Somosomo, *Seemann 328*, p. p. (κ). MOALA: *Bryan 340*. VANUA MBALAVU: Near Ndakuilomaloma, *Garnock-Jones 1138*. LAKEMBA: Near Tumbou, *Garnock-Jones 883*. FULANGA: On limestone formation, *Smith 1198*. FIJI without further locality, *U. S. Expl. Exped.*

Seemann's allusions to *Ipomoea sepiaria* and Parham's to *I. maxima* are based on *Seemann 328*, which in part belongs to the present species and in part to *Operculina turpethum*. *Calystegia affinis*, as noted by Parham (1964), had been carried in several popular lists of Fijian plants as the appropriate name for *I. gracilis* and *I. denticulata*.

12. *Ipomoea batatas* (L.) Lam. Tabl. Encycl. Méth. Bot. 2: 465. 1793; Drake, Ill. Fl. Ins. Mar. Pac. 242. 1892; House in Ann. New York Acad. Sci. 18: 255. 1908; Rechinger in Denkschr. Akad. Wiss. Wien 85: 336. 1910; van Ooststr. in Blumea 3: 512. 1940; B. E. V. Parham in Agr. J. Dept. Agr. Fiji 13: 41. 1942; Yuncker in Bishop Mus. Bull. 178: 98. 1943; van Ooststr. in Fl. Males. I. 4: 469. 1953; Yuncker in Bishop Mus. Bull. 220: 225. 1959; C. Walker in Agr. J. Dept. Agr. Fiji 29: 27. fig. 1, 2. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. 114. 1963; J. W. Parham, Pl. Fiji Isl. 241. fig. 84. 1964, ed. 2. 331. fig. 95. 1972; Backer & Bakh. f. Fl. Java 2: 492. 1965; Purseglove, Trop. Crops, Dicot. 79. fig. 11. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 72. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 139. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 219: 98. 1977; Fosberg & Sacht in Smithsonian Contr. Bot. 36: 9. 1977; D. Austin in Bull. Torrey Bot. Club 105: 115. fig. 1. 1978, in Rev. Handb. Fl. Ceylon 1: 320. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 57. pl. 19. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 42. 1985; D. Austin in Taxon 37: 185. 1988.

Convolvulus batatas L. Sp. Pl. 154. 1753.

Convolvulus edulis Thunb. Fl. Jap. 84. 1784.

Batatas edulis Choisy in Mém. Soc. Phys. Genève 6: 435. 1834 (repr. Convolv. Orient. 53. 1834); Seem. Viti, 439. 1862, Fl. Vit. 170. 1866.

Ipomoea tiliacea sensu Yuncker in Bishop Mus. Bull. 220: 227. 1959; non Choisy.

Ipomoea tiliacea var. *smithii* Fosberg in Smithsonian Contr. Bot. 21: 15. 1975.

Handwritten notes: *Aug. 14, 203, 1984*

Handwritten initials: *Aug*

Sprawling vine with underground, fusiform, edible tubers and often succulent stems, cultivated at elevations from near sea level to about 800 m. and sometimes naturalized (up to 1,050 m.) near cultivated areas, along roadsides, and in thickets along rivers and streams; petioles 4–20 cm. long; leaf blades variable, predominantly ovate, 4–14 × 4–16 cm., entire, dentate, or deeply 3–7-lobed; sepals oblong or sublancoolate, 7–15 mm. long, cuspidate, the inner ones the larger; corolla 3–7 cm. long, pink to purple-red, often with a darker throat, sometimes white; fruit (rarely formed) ovoid, the seeds glabrous. In Fiji flowers are most commonly found between April and June.

TYPIFICATION AND NOMENCLATURE: Many references were listed by Linnaeus for *Convolvulus batatas*; Verdcourt (1963) indicates as the lectotype a specimen from India (collector unknown), Herb. Linn. 218.12 (LINN LECTOTYPE). *Convolvulus edulis* was based on material from Nagasaki, Japan, *Thunberg* (U HOLOTYPE). The type of *Ipomoea tiliacea* var. *smithii* is *Smith 4468* (US 1965307 HOLOTYPE; many ISOTYPES), collected May 16, 1947, in the vicinity of Nalotawa, eastern base of Mt. Evans Range, Mba Province, Viti Levu; this variety (and also var. *merremioides* Fosberg, from the Marquesas) was reduced by Austin (1988) to *I. batatas*. Some of the specimens naturalized in Pacific areas do bear a striking resemblance to *I. tiliacea* (Willd.) Choisy; Austin (1988) noted: "There are several traits that may be used to distinguish the sweet potato from *I. tiliacea*, but the pubescent 'unequal, orbicular, gradually caudate-aristate' sepals are the best markers. Sepals in *I. tiliacea* are always glabrous, subequal, and ovate. . . . As far as I am aware, *I. tiliacea* has not been found in this part of the Pacific. There are, however, numerous specimens of *I. batatas* which have been confused with the species. Some areas also have the closely related *I. littoralis*. For the most part, *I. tiliacea* is a species of the Caribbean, although it has been introduced into Malaysia."

DISTRIBUTION: Originally from the New World, this food plant is now cultivated over most of the world, mostly in tropical areas (Austin, 1980). A detailed account of the sweet potato in the Pacific is that of D. E. Yen: The sweet potato and Oceania (in Bishop Mus. Bull. 236: 1–389. 1974). Walker (1959) gives an account of the varieties grown in Fiji.

LOCAL NAMES AND USES: The *sweet potato* is commonly known to Fijians as *kumala* or *kumara*; also used names are *kawai ni vavalangi*, *wa uvi*, and *ndambithi*. The tuber is edible, and the leaves are frequently used locally as a substitute for spinach.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 256*; slopes of Mt. Nairosa, eastern slopes of Mt. Evans Range, *Smith 4057*; shores of the Mba River near its mouth, *Smith 4740*. SERUA: Near Nukusere, *Smith 9077*. NAITASIRE: Mbatiki, *DA 1208*. TAILEVU: Near Navuloa, *DA 2714*. REWA: Bypass road, Suva, *DA 6092*. LAKEMBA: Near Tumbou, *Garnock-Jones 882*. FIJI without further locality, *U. S. Expl. Exped.*

13. *Ipomoea cairica* (L.) Sweet, Hort. Brit. 287. 1827; House in Ann. New York Acad. Sci. 18: 222. 1908; van Ooststr. in Blumea 3: 542. 1940, in Fl. Males. I. 4: 478. 1953; Yuncker in Bishop Mus. Bull. 220: 225. 1959; Verdcourt in Fl. Trop. E. Afr. Convolv. 125. 1963; J. W. Parham, Pl. Fiji Isl. 241. 1964, ed. 2. 333. 1972; Backer & Bakh. f. Fl. Java 2: 495. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 72. 1970; D. Austin in Rev. Handb. Fl. Ceylon 1: 322. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 56. pl. 18, 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 42. 1985.

Convolvulus cairicus L. Syst. Nat. ed. 10. 922. 1759.

Ipomoea palmata Forssk. Fl. Egypt.-Arab. 43. 1775; J. W. Parham, Pl. Fiji Isl. 241, pro syn. 1964, ed. 2. 333, pro syn. 1972.

Convolvulus tuberculatus Desr. in Lam. Encycl. Méth. Bot. 3: 545. 1792.

Ipomoea tuberculata Roemer & Schultes, Syst. Veg. 4: 208. 1819; Greenwood in Proc. Linn. Soc. 154: 101. 1943; J. W. Parham in Dept. Agr. Fiji Bull. 35: 129. fig. 64, b, c. 1959.

Perennial vine, sprawling or climbing, with a tuberous rootstock, introduced as a cultivated plant but now an often locally abundant weed near sea level in open places, along roadsides, on open slopes, in gardens, etc.; petioles 2–6 cm. long, often with pseudostipules at base; leaf blades ovate to orbicular in outline, 3–10 cm. in diameter, palmately divided to base into 5–7 lobes, these lanceolate to ovate, mucronulate; sepals ovate, 4–7 mm. long, slightly accrescent in fruit, the outer ones slightly the shorter; corolla (3–) 4.5–7 cm. long, pale blue to pale pink or mauve, sometimes yellowish or darker toward base; filaments pilose at base; fruit subglobose, 1–1.2 cm. in diameter, glabrous, the seeds subglobose to ovoid, 4.2–6 mm. long, blackish to tan, densely short-tomentose. Flowers are seen throughout the year, fruits mostly between May and October.

TYPIFICATION AND NOMENCLATURE: Verdcourt (1963) notes the illustration of *Convolvulus aegyptius* Vesling, Obs. in Prosp. Alp. Pl. Aegypt. 75. fig. 1638 as a SYNTYPE of *Convolvulus cairicus*; Linnaeus also gave a reference to "C. B. 295." *Ipomoea palmata* is typified by *Forskål* (C HOLOTYPE), from Egypt. *Convolvulus tuberculatus* was cultivated in the Jardin du Roi, said to have come originally from La Réunion (P HOLOTYPE). Several other names, not noted in literature referring to the Fijian Region, have also been applied to this now widespread species.

DISTRIBUTION: It appears likely that the species was originally from the Western Hemisphere, but it is now widely cultivated and naturalized throughout the tropics and subtropics of the Old World. Twenty-one Fijian collections, although only from the two largest islands, are at hand from Fiji.

LOCAL NAMES AND USES: *Morning glory*; *wasovivi*. Its occasional use as an ornamental probably antedates the present century, although it is now more frequently seen as a weed. The leaves are reputed to be part of an internal remedy for dysentery.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 419*; Walangi Old Reservoir Road, *DA 11336*. NAMOSI: Mua, *DA 5746*. RA: Nananu-i-thake, *DA 2763*. NAITASIRI: Nasinu, *DA 11078*. REWA: Lami, *Krauss 1411*; Suva, *DA 12305*. VANUA LEVU: MATHUATA: Lambasa, *Greenwood 419A*, *DA 10496*.

14. *Ipomoea obscura* (L.) Ker-Gawl. in Bot. Reg. 3: pl. 239. 1817; van Ooststr. in Blumea 3: 519. 1940; Greenwood in J. Arnold Arb. 30: 79. 1949; van Ooststr. in Fl. Males. I. 4: 471. fig. 44. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. 116. 1963; J. W. Parham, Pl. Fiji Isl. 241. 1964, ed. 2. 334. 1972; Backer & Bakh. f. Fl. Java 2: 495. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 36: 19. 1977; D. Austin in Rev. Handb. Fl. Ceylon 1: 333. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. 13: 78. pl. 27, fig. 7–12. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 43. 1985.

Convolvulus obscurus L. Sp. Pl. ed. 2. 220. 1762.

Perennial, sprawling or creeping vine, sometimes locally frequent near sea level in thickets and open places, along roadsides and in canefields; petioles to 9 cm. long; leaf blades ovate to orbicular, 2–10 cm. in diameter, cordate at base; sepals ovate to ovate-lanceolate, 3–4 mm. long, acute or apiculate; corolla 1.4–2.5 cm. long, white, yellow, orange, or cream-colored, often purplish at throat, the limb 2.5–3 cm. in diameter; filaments unequal in length, pilose at base; fruit globose, 8–12 mm. in diameter, the seeds ovoid, black, 4–5.5 mm. long, appressed-pubescent. Flowers and fruits have been noted between July and November.

TYPIFICATION: The only literature citation given by Linnaeus was to Dill. Hort. Eltham. 98. t. 83, fig. 95. 1732, an illustration apparently from a Javan plant; this is listed by Verdcourt (1963) as a SYNTYPE, presumably because other geographic areas were also listed by Linnaeus.

DISTRIBUTION: Tropical Africa and Indian Ocean islands through tropical Asia to Queensland and eastward to the Tuamotu Islands.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 821*, Oct. 10, 1939, 1289; near Ndreketi Inlet, Vunda Point, *DA 10320*; Tonge Road, *DA 10436*; Narewa, Nandi, *DA 10893*. VANUA LEVU: MATHUATA: Banks of lower Lambasa River, *Smith 6625*; Mbalivaliva road, *DA 10519*.

Although it was first collected in Fiji by Greenwood in 1939 (Greenwood, 1949), and although its habitat often suggests that of an adventive, there seems no reason to doubt the indigenoussness of *Ipomoea obscura* in the Pacific.

FAMILY 172. CUSCUTACEAE

CUSCUTACEAE Dumort. Anal. Fam. Pl. 20, 25. 1829.

Twining, parasitic herbs, mostly annual, with no (or very little) chlorophyll, the stems threadlike, usually yellow or orange, attaching to host plants by intrusive haustoria, the terrestrial root system small and soon degenerating; leaves greatly reduced and scalelike, functionless; inflorescences basically cymose, subcapitulate or shortly spiciform; flowers ♂, sessile or short-pedicellate, small, actinomorphic, often ebracteate, (3 or 4)5-merous (as to calyx, corolla, and androecium); sepals connate proximally or essentially throughout; corolla sympetalous, urceolate to globose or campanulate, usually white or pink, the lobes imbricate, the tube usually with basal, fringed or cleft scales opposite stamens; stamens as many as and alternate with corolla lobes, the filaments borne on corolla tube above scales, the anthers short, dehiscing by longitudinal slits, the pollen grains smooth; ovary superior, 2(or 3)-locular (partitions sometimes incomplete), the base sometimes nectariferous, the ovules 2 per locule, erect, anatropous, the placentation basal-axile (or intruded-parietal), the styles terminal, separate or united proximally, the stigmas capitate to linear; fruit globose or ovoid, capsular (circumscissile near base or irregularly dehiscent), sometimes indehiscent and subcarinose, the seeds 4 or fewer, subglobose or annular, glabrous, the embryo slender, filiform, cylindrical, peripheral and curved or spiralled, without well-differentiated cotyledons, the endosperm starchy.

DISTRIBUTION: Subcosmopolitan and composed of a single genus.

Many authors include *Cuscuta* in the Convolvulaceae, but the differences are significant and a separate family is perhaps now more frequently recognized (Hutchinson, 1973; Dahlgren, 1980; Cronquist, 1981; Ehrendorfer, 1983; Takhtajan, 1986, 1987).

1. *CUSCUTA* L. Sp. Pl. 124. 1753; Yuncker in Mem. Torrey Bot. Club **18**: 121. 1932; van Ooststr. in Blumea **3**: 63. 1938, in Fl. Males. I. **4**: 391. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. **3**. 1963; Backer & Bakh. f. Fl. Java **2**: 484. 1965; Fosberg & Sacht in Smithsonian Contr. Bot. **36**: 5. 1977; D. Austin in Rev. Handb. Fl. Ceylon **1**: 305. 1980; Heine in Fl. Nouv.-Caléd. et Dépend. **13**: 7. 1984.

LECTOTYPE SPECIES: *Cuscuta europaea* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. **2**: 3: 48. 1913), one of the two original species.

DISTRIBUTION: Subcosmopolitan but centering in America, with about 160 species, only one of which has been found in Fiji.

USEFUL TREATMENT OF GENUS: YUNCKER, T. G. The genus *Cuscuta*. Mem. Torrey Bot. Club **18**: 113-331. 1932.

1. *Cuscuta campestris* Yuncker in Mem. Torrey Bot. Club **18**: 138. fig. 14. 1932; van Ooststr. in Blumea **3**: 68. 1938, in Fl. Males. I. **4**: 392. 1953; Verdcourt in Fl. Trop. E. Afr. Convolv. **5**. 1963; J. W. Parham, Pl. Fiji Isl. **253**. 1964, ed. 2. **345**. 1972; Backer & Bakh. f. Fl. Java **2**: 485. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 80. 1970; Fosberg & Sachet in Smithsonian Contr. Bot. **36**: 5. 1977; Heine in Fl. Nouv.-Caléd. et Dépend. **13**: 8. pl. 1, fig. 9-16. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **41**. 1985.

Cuscuta pentagona var. *calycina* Engelm. in Amer. J. Sci. Arts **45**: 76. 1845.

Cuscuta arvensis sensu Engelm. in A. Gray, Manual Bot. ed. 2. **336**, p. 1856; non Beyr. nec auct.

Cuscuta densiflora sensu Gibbs in J. Linn. Soc. Bot. **39**: 158. 1909; non Hook. f.

Cuscuta australis sensu Greenwood in Proc. Linn. Soc. **154**: 101. 1943, in J. Arnold Arb. **30**: 79. 1949; J. W. Parham in Dept. Agr. Fiji Bull. **35**: 130. 1959; non R. Br.

Parasitic vine, often locally abundant from near sea level to an elevation up to 1,050 m., naturalized in thickets, cultivated areas, plantations, and clearings and along roadsides; stems yellowish or orange to salmon-pink; flowers in compact globular clusters, short-pedicellate, often glandular, 1.5-3 mm. long and broad; calyx not angled at sinuses, the sepals ovate to orbicular, pale green, about as long as corolla tube; corolla white or pale green, the lobes about as long as tube, the scales exerted, abundantly fimbriate; filaments white, about 1 mm. long, the anthers yellow; gynoeceum pale green, the styles distinct; fruit depressed-globose, 2.5-3 mm. in diameter, indehiscent, the seeds often 2, ovate, 1-1.5 mm. long. Flowers and fruits are found throughout the year.

TYPIIFICATION: *Cuscuta campestris* was a new name for *C. pentagona* var. *calycina* Engelm. and is typified by *Lindheimer 126* (MO HOLOTYPE), from Texas, U. S. A. Yuncker proposed the new epithet because *calycina* was not available at the specific level.

DISTRIBUTION: Presumably originally American but now widely dispersed in the Old World. It parasitizes many hosts, including clover and alfalfa (Yuncker, 1932), and presumably owes its wide distribution to the association of its seeds with those of hosts of both cultivated and adventive plants. About 35 specimens from five islands have been seen from Fiji, but in certain areas the species is more abundant than this would suggest. The earliest record of the species in Fiji appears to have been the collection made by Yeoward in 1894.

LOCAL NAMES AND USES: This *dodder* is known to Fijians as *naveverelangi*, *wa vereverelangi*, *wa lawala*, *wa mbosuthu*, *wa ndanga*, *wa tikaivu*, and *ndithangi*. The plants are sometimes crushed and applied to wounds, while the young shoots are boiled and the resultant liquid is drunk for constipation.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Naruarua Gulch, west side of Mbatinaremba, *St. John 18059*. VITI LEVU: MBA: Lautoka, *Greenwood 390*; slopes of Mt. Nairosa, eastern flank of Mt. Evans Range, *Smith 4003*; Nandarivatu, *Gibbs 814*; Nandala, south of Nandarivatu, *Degener 14934*. NANDRONGA & NAVOSA: Ndumbalevu, Singatoka River, *DA 11345*; near Singatoka, *Vaughan 3201*; inland from Mbalo, near Vatukarasa, *O. & I. Degener 32120a*. NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8759*. RA: Ndombuilevu, *DA 8997*. NAITASIRI: Langgere, *DA 11179*; vicinity of Nasinu, *Gillespie 3419*; Tamavua, *Setchell & Parks 15023*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7228*. REWA: Suva, *Yeoward 84* (Dec. 13, 1894), *Yuncker 18004*. KANDAVU: Namalata isthmus region, *Smith 9*. VANUA LEVU: MATHUATA: Namara road, Lambasa, *DA 10464*. THAKAUNDOVE: Nalembalemba, Savusavu, *DA 10783*. TAVEUNI: Vicinity of Waiyevo, *Gillespie 4664.8*.

FAMILY 173. MENYANTHACEAE

MENYANTHACEAE Dumort. Anal. Fam. Pl. 20, 25, as *Menyanthideae*. 1829.

Aquatic or marsh herbs, estipulate, the stem rhizomatic and with intercellular canals and spaces, or the rootstock tufted; leaves submerged or floating, radical, alternate, simple, petiolate, the petiole sheathing at base, the blades reniform to linear or trifoliolate, sometimes peltate; inflorescences racemose, fasciculate, or cymose (or flowers solitary); flowers ♂, actinomorphic, 5 (or 6–8)-merous as to calyx, corolla, and androecium; calyx shallowly to deeply lobed; corolla sympetalous, the lobes valvate, induplicate-valvate, or imbricate, often fimbriate or crested on inner surface distally or on margins; disk often present around base of ovary; fringed scales often present in corolla tube and alternate with stamens; stamens inserted at base of or on corolla tube, alternate with corolla lobes, the anthers versatile, usually sagittate, dehiscing by longitudinal slits; ovary superior to half-inferior, unilocular, the placentae 2, parietal, often intruded, the ovules numerous, anatropous, the style terminal, short to long, the stigma 2-lobed; fruit capsular or baccate, dehiscent by 2 or 4 valves or irregularly, sometimes indehiscent, the seeds few-many, sometimes winged, with a linear embryo, the endosperm copious, oily.

DISTRIBUTION: Cosmopolitan, with five genera and 30–40 species.

USEFUL TREATMENT OF FAMILY: CRAMER, L. H. *Menyanthaceae*. In: Dassanayake, M. D., & F. R. Fosberg (eds.). *Rev. Handb. Fl. Ceylon* 3: 206–212. 1981.

Although Cronquist (1981) is in the minority in placing the Menyanthaceae in Solanales rather than Gentianales, the arguments outlined by him (pp. 902–903) seem reasonable; his conclusion is admittedly not overly resolute.

1. *Nymphoides* Hill, *Brit. Herb.* 77. 1756; Kuntze, *Rev. Gen. Pl.* 2: 429, as *Nymphodes*. 1891; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 207. 1981; Aston in *Muelleria* 5: 35. 1982.

Limnanthemum S. G. Gmelin in *Novi Comment. Acad. Sci. Imp. Petrop.* 14(1): 527. 1770; *Seem. Fl. Vit.* 167. 1866.

Aquatic or marsh herbs, the stem rhizomatic; leaves floating, single or several, the blades ovate or orbicular, entire or obscurely sinuate, with a deep sinus at base, sometimes gland-dotted beneath; flowers fasciculate, nodal or lateral on petioloid stems, 5- or 6(–8)-merous, heterostylous, the pedicels erect to semierect and emergent when in flower, submerged when in fruit; calyx deeply lobed, persistent; corolla rotate, submembranaceous, pilose in throat, the lobes valvate, fimbriate, often glandular; nectaries hypogynous; filaments short, the anthers with a dorsal connective; fruit ellipsoid, surrounded by the persistent calyx, usually indehiscent, ripening when submerged, the seeds few-many.

TYPE SPECIES AND NOMENCLATURE: *Nymphoides* Hill is based on *Menyanthes nymphoides* L. = *Nymphoides peltata* (S. G. Gmelin) Kuntze; the same species, as *Limnanthemum peltatum* S. G. Gmelin, is the type species of *Limnanthemum*. The generic name *Nymphoides* has generally been accredited to J. Hill (1756) (as in ING, 1979), but Cramer (1981) lists the prior publication of Séguier (*Pl. Veron.* 3: 121. 1754) as establishing the generic name, with *Menyanthes trifoliata* L. as the type species. If such is the case, *Nymphoides* would presumably become a synonym of *Menyanthes* L., of which *M. trifoliata* is the lectotype species (ING, 1979). Séguier's generic names are apparently to be considered as validly published (Stafleu & Cowan, *Tax. Lit. ed.* 2. 5:

488. 1985). Perhaps the desirability of conserving the later publication of *Nymphoides* by Hill should be considered. Although Kuntze (1891), in taking the generic name *Nymphoides* (as *Nymphodes*) to replace *Limnanthemum*, used it as neuter, it should be treated as feminine (ICBN, Rec. 75A.4).

DISTRIBUTION: Pantropical and extending into temperate areas, with about 20 species, one of which is indigenous in Fiji.

1. *Nymphoides indica* (L.) Kuntze, Rev. Gen. Pl. 2: 429. 1891; L. Cramer in Rev. Handb. Fl. Ceylon 3: 207. 1981; A. C. Sm. Fl. Vit. Nova 4: fig. 132 (lower). 1988.

FIGURE 132 (lower) in Vol. 4.

Menyanthes indica L. Sp. Pl. 145. 1753.

Limnanthemum indicum Griseb. Gen. Sp. Gent. 343. 1838; Greenwood in Proc. Linn. Soc. 154: 100. 1943; J. W. Parham, Pl. Fiji Isl. 229. fig. 80. 1964, ed. 2. 318. 1972; A. C. Sm. Fl. Vit. Nova 1: fig. 8 (lower). 1979.

Limnanthemum kleinianum Griseb. Gen. Sp. Gent. 344. 1838; Seem. in Bonplandia 9: 257. 1861, Viti, 439. 1862, Fl. Vit. 167. t. 33. 1866, op. cit. 431. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 239. 1892.

Limnanthemum kleinianum var.? A. Gray in Proc. Amer. Acad. Arts 6: 42. 1862.

Limnanthemum forsteri Seem. Fl. Vit. 168, nom. provis. 1866.

Perennial herb rooting in mud, occasional in ponds or wet places from near sea level to an elevation of about 825 m.; rhizome thick, with simple, flexible, petioloid branches up to 1.5 m. long; petioles to 16 cm. long; leaf blades floating, suborbicular, up to 27 cm. long and nearly as broad, deeply cordate, reddish purple on lower surface and lacking glands; flowers in umbelliform fascicles of 20 or more, the pedicels to 12 cm. long; calyx lobes ovate-lanceolate, about 7 mm. long; corolla white, the limb spreading to about 4 cm. in diameter, the lobes 5–7, to 16 mm. long, copiously fimbriate, eglandular-pilose adaxially; disk composed of suborbicular, ciliolate glands; fruit obovoid, about 8 mm. long, the seeds globose or lenticular, 25 or more per capsule, smooth, glabrous, pale yellow. Insofar as specimens have been dated, flowers have been noted in July, September, and February, but are probably to be expected in most months.

TIPIFICATION AND NOMENCLATURE: Of the two references given by Linnaeus, Cramer (1981) lists a Hermann specimen as the holotype, but perhaps a better citation is: Ceylon: *Hermann* (BM LECTOTYPE, cf. Cramer, 1981). *Limnanthemum kleinianum* is based on an Indian plant collected by Klein and presumably represented in the Willdenow and Hooker herbaria. Seemann (1866) was not entirely convinced that the Pacific plant, first obtained by the Forsters in New Caledonia, was identical with *L. kleinianum* and suggested that, if it should prove distinct, it be named *L. forsteri*.

DISTRIBUTION: Paleotropical, extending eastward in the Pacific at least to New Caledonia, the New Hebrides, and Fiji.

LOCAL NAMES: Fijians know this distinctive plant, which is doubtless more frequent than suggested by herbarium collections, as *mbekambekakeiranga*, *mbekambekakairanga*, *ndambendambe ni nga*, *vothevothe ni nga*, *ndalinga ni nduna*, *ndambandambaseringa*, and *mberambera*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains inland from Lautoka, in slowly running water of taro plantations, *Greenwood 41*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5387*; near Singatoka, in swamps near coast, *Greenwood 778*. NAITASIRI: Upper Rewa River, *DA L26222*. TAILEVU: Between Mburetu and Ndaku, *DA 889*. REWA: In swamps at Rewa, *Seemann 323*. OVALAU: Without further locality, *Graeffe*, Dec. 1864. FIJI without further locality, *Harvey*, Nov., 1855.

ORDER SCROPHULARIALES

Cronquist (1981) defines the Scrophulariales as composed of twelve families (six of these represented in Fiji), the largest of which are the Scrophulariaceae, Acanthaceae, and Gesneriaceae. Takhtajan's (1987) treatment of the order includes 17 families, one of these being the Plantaginaceae, separated into its own order by Cronquist (1981).

KEY TO FAMILIES OCCURRING IN FIJI

Corolla usually 4-lobed, actinomorphic or essentially so; stamens 4; ovary superior or semisuperior, the locules usually 2, the placentation axile, the ovules several-many in each locule; woody plants with opposite or whorled leaves, rarely herbs. 174. BUDDLEJACEAE

Corolla usually 5-lobed and zygomorphic.

Seeds usually with well-developed endosperm (although this may be lacking in many Gesneriaceae).

Placentation axile, the ovary bilocular (rarely 1- or 3-locular), superior, the ovules 2-numerous per locule; fruit a capsule (rarely a berry or schizocarp). 175. SCROPHULARIACEAE

Placentation basically parietal, the ovary superior to inferior, the ovules numerous, the 2 placentae commonly intruded and bifurcate, rarely joined in the center; fruit a capsule (infrequently a berry). 176. GESNERIACEAE

Seeds without endosperm (or this scanty).

Fruit explosively dehiscent (with infrequent exceptions), the seeds with a hook-shaped jaculator derived from an enlarged, specialized funiculus; cystoliths usually present in some epidermal and parenchyma cells. 177. ACANTHACEAE

Fruit indehiscent or if dehiscent not explosively so, the seeds lacking a specialized funiculus; cystoliths not present.

Herbs (rarely shrubs), the indument composed of specialized mucilaginous hairs; leaves simple to dentate or lobed, sometimes compound; ovules 1-many per locule; fruit commonly with horns or hooks or bristles, or sometimes winged. 178. PEDALIACEAE

Trees, shrubs, or woody vines, rarely herbaceous, without specialized mucilaginous hairs; ovules usually numerous in each locule; leaves sometimes simple but more often compound; fruit lacking hooks or bristles. 179. BIGNONIACEAE

FAMILY 174. BUDDLEJACEAE

BUDDLEJACEAE K. Wilhelm, Samenpflanzen, 90, as *Buddleiaceae*. 1910.

Shrubs, trees, or infrequently climbers or herbs, often with glandular, stellate, or lepidote indument, the stipules commonly reduced to interpetiolar lines; leaves simple, opposite or verticillate, rarely alternate, petiolate (infrequently sessile), the blades entire to dentate or lobed; inflorescences terminal or axillary, cymose (rarely racemose, paniculate, or 1-flowered), sometimes with leafy bracts; flowers ♂ (often functionally unisexual), 4 (infrequently 5)-merous, actinomorphic (often with unequal sepals) or rarely zygomorphic; calyx gamosepalous, persistent, sometimes deeply cleft; corolla sympetalous, usually regular, the lobes imbricate, rarely valvate; stamens borne on corolla tube, alternate with lobes, included or exerted, the filaments often elongate at anthesis, the anthers 2-locular, dehiscent by longitudinal slits; ovary superior or semisuperior, the locules 2 (rarely 4), the placentation axile, the ovules several-many, hemitropous or amphitropous, the style solitary, terminal, the stigma capitate or bilobed; fruit usually a septicidal capsule, rarely fleshy and indehiscent, the seeds several-many, small, often winged, with copious to scanty endosperm, the embryo straight.

DISTRIBUTION: Tropical and subtropical, with 7-10 genera and about 150 species. Only *Buddleja* is found in Fiji, with two cultivated species.

The family is sometimes placed in the Loganiaceae as tribe Buddlejeae (Leenhouts in Fl. Males. I. 6: 295. 1963; Leeuwenberg & Leenhouts in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 28bI: 11, 61. 1980).

1. *Buddleja* L. Sp. Pl. 112. 1753; Leenh. in Fl. Males. I. 6: 336. 1963; Backer & Bakh. f. Fl. Java 2: 212. 1965; Leeuwenb. & Leenh. in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 28b1: 67. 1980; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 288. 1986.

Shrubs (infrequently trees, lianas, or suffrutescent herbs), monoecious or dioecious, usually with stellate or capitate-glandular hairs, the stipules leafy or reduced to a line; leaves opposite (infrequently alternate), petiolate or sometimes sessile or connate-perfoliate, the blades frequently dentate or crenate; inflorescences often cymose-paniculate, usually many-flowered, bracteate; flowers 4-merous, actinomorphic to slightly zygomorphic; calyx campanulate, the lobes subequal; corolla cupuliform to infundibular or salverform, the lobes spreading, usually shorter than tube; stamens variously inserted on tube from base to mouth, the filaments shorter or longer than anthers, these oblong to suborbicular, usually cordate at base; ovary usually laterally compressed, 2- or 4-locular, the ovules several-many, the style included or exerted, the stigma large, clavate, capitate, or bilobed; fruit capsular or less often baccate, usually bivalved, the calyx and corolla often persistent, the seeds winged or not.

TYPE SPECIES: *Buddleja americana* L., the only original species.

DISTRIBUTION: Tropical and subtropical America, Africa, and Asia, with 100-120 species. Two species are known to be cultivated in Fiji.

KEY TO SPECIES

- Petioles 2-5 mm. long; corolla lilac, orange-yellow in throat, about 11 mm. long including lobes; ovary and style glabrous, the style about 2 mm. long; fruit a dehiscent capsule about 8 mm. long, the seeds winged, about 4 mm. long. 1. *B. davidii*
 Petioles about 1.5 cm. long; corolla yellow to orange, 6-8 mm. long including lobes; ovary and style densely pilose, the style about 4.5 mm. long; fruit subglobose, indehiscent, the seeds ellipsoid, about 1 mm. long. 2. *B. madagascariensis*

1. *Buddleja davidii* Franch. in Nouv. Arch. Mus. Hist. Nat. II. 10: 65, as *Budleia davidi*. 1887; Leenh. in Fl. Males. I. 6: 340. 1963; J. W. Parham, Pl. Fiji Isl. 179, as *B. davidi*. 1964, ed. 2. 253, as *B. davidi*. 1972; Backer & Bakh. f. Fl. Java 2: 212. 1965; Cronquist, Integr. Syst. Class. Fl. Pl. 946. fig. 6-20. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 90. 1985.

Infrequently cultivated near sea level as a shrub 1-3 m. high, the fragrant flowers with lilac corollas orange-yellow in throat. The only available collection was in flower and fruit in January.

TYPIFICATION: The type is *David* (HOLOTYPE probably at P), from Tibet.

DISTRIBUTION: Tibet and central China, cultivated elsewhere and naturalized in parts of Malesia (Leenhouts, 1963).

USE: An attractive ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, in private garden, DA 16089.

2. *Buddleja madagascariensis* Lam. Encycl. Méth. Bot. 1: 513, as *Budleia m.* 1785; Leenh. in Fl. Males. I. 6: 340. 1963; J. W. Parham, Pl. Fiji Isl. ed. 2. 253. 1972; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 90. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 288. 1986.

Sparingly cultivated and known in Fiji only from an elevation of about 800 m.; shrub 1-3 m. high, the flowers fragrant and with the corolla yellow or orange. The only collection at hand was flowering in December.

TYPIFICATION: The type is from Madagascar, *Sonnerat* in Herb. Commerson (HOLOTYPE presumably at P).

DISTRIBUTION: Indigenous in Madagascar, now cultivated and sometimes naturalized (Leenhouts, 1963) in tropical and subtropical areas.

USE: An attractive ornamental.

AVAILABLE COLLECTION: VITI LEVU: MBA: Nandarivatu, in Dept. Forestry compound, DA 11113.

FAMILY 175. SCROPHULARIACEAE

SCROPHULARIACEAE Juss. Gen. Pl. 117, as *Scrophulariae*. 1789.

Herbs or sometimes shrubs, small trees, or climbers, occasionally root-hemiparasites, estipulate; leaves alternate, opposite, or sometimes verticillate, petiole or not, simple to pinnately dissected; inflorescences axillary or terminal, thyrsoid, racemose, or spicate, sometimes 1-flowered, usually bracteate and bracteolate; flowers ♂, usually obviously zygomorphic; calyx (2-)4- or 5-lobed, the segments imbricate or valvate; corolla sympetalous, tubular or campanulate, sometimes rotate, sometimes spurred or saccate at base, often bilabiate, the lobes (4 or)5(-8), usually imbricate or valvate; stamens inserted on corolla tube, usually 4 and didynamous, sometimes 5 but the uppermost then usually staminodial, sometimes only 2 or 3, the filaments free from each other, the anthers 2-locular, dehiscing by longitudinal slits or by a single continuous slit; disk commonly present at base of ovary, unilateral or annular; ovary superior, 2-locular (rarely 1- or 3-locular), the placentation axile, the ovules (2-) numerous in each locule, usually anatropous or hemitropous, the style terminal, slender, the stigma capitate or 2-lobed; fruit usually a septicidal capsule (infrequently loculicidal or poricidal), rarely a berry or schizocarp, the calyx persistent, the seeds small, angular or winged, the embryo straight or slightly curved, the endosperm oily.

DISTRIBUTION: Cosmopolitan but primarily in temperate regions and at higher elevations in tropical areas, with about 220 genera and 3,000 species. In Fiji eight genera have been recorded, but only *Limnophila* and possibly one species of *Lindernia* seem to be indigenous.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Scrophulariaceae. Fl. Java 2: 498-515. 1965. CRAMER, L. H. Scrophulariaceae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 3: 386-449. 1981. STANLEY, T. D. Scrophulariaceae. In: Stanley, T. D., & E. M. Ross, Fl. S.-E. Queensland 2: 433-449. 1986.

KEY TO GENERA

Corolla tube ventrally spurred or saccate, the throat sometimes constricted to completely closed by a raised palate; calyx without bracteoles at base.

Leaves essentially sessile, opposite or verticillate (or distal ones alternate); corolla subrotate to bilabiate, the limb widely cupuliform, short-spurred, 5-lobed, the lobes spreading, 4 of them broad and flat, the lower one cupuliform in lower half, the throat broadened into a saclike cup; capsule globose or ellipsoid, loculicidally 2-valved, rarely indehiscent. 1. *Angelonia*

Leaves short-petiole or subsessile, opposite (or distal ones alternate); corolla bilabiate, the tube ventrally saccate or gibbous, the upper lip 2-lobed, the lower lip 3-lobed, appressed against upper lip, the throat closed by a prominent palate, the lobes decurved; capsule obliquely ovoid, asymmetrical, the larger locule opening by 2 terminal pores, the smaller locule by a simple terminal pore.

2. *Antirrhinum*

Corolla tube not ventrally spurred or saccate, the throat open; leaves opposite or verticillate (upper ones rarely alternate).

Corolla bright red, tubular to tubular-campanulate, in our species 15-25 mm. long, the lobes about 3 mm. long; strongly branched shrubs, the stem angular-ribbed, the leaves verticillate or opposite, small, the upper ones often minute or reduced to scales; calyx small, deeply 5-partite nearly to base.

3. *Russelia*

Corolla white, yellowish, blue, or purplish, often with yellow spots, but not red; annual or perennial herbs, often repent (in *Scoparia* sometimes shrubby).

Flowers solitary along axis of a terminal raceme, obviously pedicellate; anterior filaments distinct from deep within corolla tube; capsule shorter than calyx, loculicidally 2-valved; basal leaves subrotulate; calyx ebracteolate, broadly campanulate, the lobes about half the total length. . . . 4. *Mazus*

Flowers often axillary and solitary; anterior filaments seeming to arise from distal part of corolla, their proximal portions fused with corolla tube; capsule septicidally dehiscent; leaves opposite or verticillate, not rosulate.

Corolla rotate, nearly regular, 4-lobed nearly to base, densely pilose at throat, the lobes subequal, obtuse; herbs or low shrubs, freely branched; calyx ebracteolate, 4- or 5-lobed nearly to base; style filiform, the stigma not thickened, capitate or slightly bifid; capsule septicidally 2-valved or loculicidally and septicidally 4-valved, the valves entire. 5. *Scoparia*

Corolla bilabiate, the upper lip entire, emarginate, or 2-lobed, the lower lip 3-lobed; annual or perennial herbs, the stems erect or prostrate, sometimes rooting at nodes; stigma bilamellate.

Stamens 2 or 4, the longer filaments often with a tubercular or dentiform to clavate appendage near base, the anther locules connivent or coherent in pairs, parallel or divaricate; style slender, erect; capsule 2-valved, the valves entire.

Calyx smooth, the lobes linear to narrowly lanceolate or subulate or deltoid; fertile stamens 4 or 2 6. *Lindernia*

Calyx tube angular or winged, the limb 3-5-dentate; fertile stamens 4. 7. *Torenia*

Stamens 4, the posterior pair the shorter, the filaments inappending at base, the anther locules separated; style filiform, deflexed at apex; capsule 4-valved, the valves bifid.

8. *Limnophila*

1. *ANGELONIA* Humb. & Bonpl. Fl. Aequinoct. 2:92. 1812; Backer & Bakh. f. Fl. Java 2: 501. 1965; L. Cramer in Rev. Handb. Fl. Ceylon 2: 392. 1981.

Erect, creeping, or climbing herbs, rarely shrubs, pilose or viscid-pubescent, sometimes glabrate; leaves opposite or verticillate (or distal ones alternate), essentially sessile, the blades oblong or lanceolate; inflorescences terminal racemes or flowers solitary or paired in leaf axils; flowers zygomorphic; calyx deeply 5-lobed, without bracteoles at base; corolla subrotate to 2-lipped, the limb widely cupuliform, short-spurred, 5-lobed, the lobes spreading, 4 of them broad and flat, the lower one cupuliform in lower half, the throat broadened into a saclike cup; stamens 4, borne on dorsal side of cupuliform part of corolla limb, the filaments short, thick, curved, the anthers 2-locular; ovary globose or ovoid, the style subulate, the stigma capitate; capsule globose or ellipsoid, loculicidally 2-valved, rarely indehiscent.

TYPE SPECIES: *Angelonia salicariifolia* (as *A. salicariaefolia*) Humb. & Bonpl.

DISTRIBUTION: Tropical America, with about 30 species; cultivated elsewhere in tropical areas and sometimes naturalized. Two species have been noted in Fiji.

KEY TO SPECIES

Stems, pedicels, and calyces persistently viscid-glandular-pilose with spreading hairs 0.5-1 mm. long; corolla white or rich blue and paler proximally, the limb spreading, 2-2.8 cm. broad.

1. *A. biflora*

Stems, pedicels, and calyces glabrous, or pedicels glandular-pilose proximally and glabrate; corolla blue or purplish, sometimes noted as white, the limb spreading, about 2 cm. broad. ... 2. *A. angustifolia*

1. *Angelonia biflora* Benth. in DC. Prodr. 10: 254. 1846; J. W. Parham, Pl. Fiji Isl. ed. 2. 335. 1972.

Perennial herb to 1 m. high, cultivated in villages and sometimes sparingly naturalized from near sea level to about 200 m.; the corolla is white or rich blue and paler proximally, the tube spotted within. Our specimens were flowering in April and May.

TYPEFICTION: The type is *Gardner 1795* (HOLOTYPE probably at K), collected in Ceara, Brazil.

DISTRIBUTION: South America, cultivated elsewhere, in the southern Pacific from the New Hebrides to the Marquesas and Pitcairn Island, sometimes naturalizing.

LOCAL NAME AND USE: *Mata ni mangge*; often cultivated in Fijian villages.

AVAILABLE COLLECTIONS: VIII LEVU: TAILEVU: Naturalized in pasture near Ndakuivuna, *Smith 7020*. OVALAU: Lovoni Village, cultivated, *Smith 7489*.

Both species of *Angelonia* seen in southern Pacific cultivation have sessile leaves with the largest blades lanceolate, up to 9 × 1 cm. (but usually smaller), and minutely glandular-serrulate to subentire. Both have flowers solitary or paired. The presence or absence of glandular indument seems reasonably reliable in Pacific specimens, and the usually larger corollas of *A. biflora* as a rule are paler than those of *A. angustifolia*. However, whether the two taxa (simultaneously described by Bentham) merit specific recognition is perhaps questionable.

2. *Angelonia angustifolia* Benth. in DC. Prodr. 10: 254. 1846; Greenwood in J. Arnold Arb. 30: 80. 1949; J. W. Parham, Pl. Fiji Isl. 243. 1964; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 123. 1985.

Perennial herb to 60 cm. high, cultivated in gardens and locally naturalized from near sea level to about 550 m.; the corolla is blue or purplish or sometimes is noted as white. Flowering was observed in June (Greenwood, 1949).

TYPIFICATION: Bentham originally cited three Mexican collections collected near Xalapa and Veracruz, Mexico, *Alaman*, *Galeotti 1013*, and *Linden 206* (SYNTYPES at G-DC and K).

DISTRIBUTION: Mexico, Central America, and West Indies, cultivated elsewhere, in the Pacific at least in Micronesia, New Caledonia, Fiji, Samoa, and Niue, and sometimes naturalizing.

USE: Commonly cultivated in gardens and naturalizing.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Between Lautoka and Mt. Evans Range, *Greenwood 25* (coll. 1920); between Mulamula and Yavuna, *Greenwood* (obs. 1949, but no specimen cited). REWA: Suva, *Lady Cecil 239* (coll. 1926).

2. ANTIRRHINUM L. Sp. Pl. 612. 1753; Backer & Bakh. f. Fl. Java 2: 502. 1965.

Herbs or shrubs, sometimes scandent, often glandular; leaves opposite or upper ones alternate, short-petiolate or sessile; inflorescences axillary or terminal, racemose (or flowers solitary); calyx without bracteoles at base, deeply lobed; corolla bilabiate, the tube ventrally saccate or gibbous, the upper lip 2-lobed and external in bud, the lower lip 3-lobed, appressed against upper lip, the throat closed by a prominent palate, the lobes decurved; stamens 4, included, didynamous, the filaments often dilated toward apex, the locules divergent; style filiform, the stigma small; capsule obliquely ovoid, asymmetrical, the larger cell opening by 2 terminal pores, the smaller cell by a simple terminal pore, the seeds numerous, with longitudinal, corky, tuberculate ridges.

LECTOTYPE SPECIES: *Antirrhinum majus* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 178. 1913).

DISTRIBUTION: Northern Hemisphere of the Old and New Worlds, with 30-40 species, often cultivated and naturalized elsewhere.

1. *Antirrhinum majus* L. Sp. Pl. 617. 1753; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 336. 1972; Backer & Bakh. f. Fl. Java 2: 502. 1965.

Perennial, short-lived herb 20-90 cm. high, with linear to lanceolate leaf blades up to 10 × 1.5 cm. and with a many-flowered racemose inflorescence; the corolla is blue or purple to white or marked with red or yellow.

TYPIFICATION: Linnaeus cited a number of references.

DISTRIBUTION: Mediterranean area, now widely cultivated and naturalized.

LOCAL NAME AND USE: The *snapdragon* is cultivated in Fijian gardens during the cool season but apparently is not naturalized. No Fijian specimens are available.

3. RUSSELIA Jacq. Enum. Syst. Pl. Carib. 6, 25. 1760; Backer & Bakh. f. Fl. Java 2: 502. 1965.

Strongly branched shrubs, erect or straggling, the stem angular-ribbed; leaves verticillate or opposite, small, the upper ones often minute or reduced to scales; inflorescences cymose-paniculate, 1-4-flowered; flowers showy, the pedicels ebracteolate; calyx small, deeply 5-partite nearly to base, the lobes lanceolate to ovate,

subequal; corolla bright red, tubular to tubular-campanulate, the tube long, widened toward apex, not ventrally spurred or saccate, the throat open, the limb small, 5-lobed, the lobes erecto-patent to spreading, rounded, subequal, the 2 posterior ones external in bud, connate about halfway, not hooded nor enclosing anthers; stamens 4, included within corolla tube, didynamous, the anthers 2-locular, the locules divergent or not, the staminode absent (or very minute); style filiform, upcurved and slightly 2-lobed at apex, the stigma single, entire or slightly bilobed; capsule globose or broadly ellipsoid, septicidally 4-valved, the valves bifid, the seeds numerous, small, oblong.

TYPE SPECIES: *Russelia sarmentosa* Jacq.

DISTRIBUTION: Mexico to tropical South America, with about 40 species, at least one of which is widely cultivated and naturalized.

1. *Russelia equisetiformis* Schlechtendal & Cham. in *Linnaea* 6: 377. 1831; Yuncker in *Bishop Mus. Bull.* 178: 107. 1943, in op. cit. 184: 62. 1945, in op. cit. 220: 241. 1959; Backer & Bakh. f. *Fl. Java* 2: 502. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 192. 1970; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 336. 1972.

Shrub to 1.5 m. high, with sprawling or dependent whorled branches, cultivated and freely naturalized in sandy clearings and along streets and roadsides near sea level; leaves up to 7 in a whorl, ovate, to 2 cm. long, but mostly reduced to linear scales; corolla tubular, bright red, 15-25 mm. long, the lobes about 3 mm. long. Our specimens were flowering in March.

TYPIFICATION: The type is *Schiede & Deppe*, from Panantla, Veracruz, Mexico.

DISTRIBUTION: Mexico, now widely cultivated throughout the tropics and readily naturalizing. Specimens are noted from most Pacific archipelagoes.

USE: A frequent ornamental and also naturalized, frequent on banks near dwellings in Suva but presumably untended.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Suva, along streets, *DA 16737*. KAMBARA: On limestone, *Smith 1289*.

4. *Mazus* Lour. *Fl. Cochinch.* 385. 1790; Backer & Bakh. f. *Fl. Java* 2: 504. 1965; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 445. 1981; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* 2: 447. 1986.

Low herbs, the stems simple or stoloniferous; lower leaves opposite, the upper ones alternate, or all nearly rosulate; inflorescence a terminal raceme, the flowers solitary along axis of raceme, the bracts very shortly stalked; calyx ebracteolate, broadly campanulate, the lobes 5, about half the total length; corolla bilabiate, very short, the upper lip external in bud, entire or shallowly dentate, the lower lip much larger, 3-lobed, with 2 tubercles at base; stamens 4, inserted in corolla tube, didynamous, the long filaments connivent, the anther locules divergent; stigma bilamellate; capsule much shorter than calyx, subglobose or compressed, loculicidally 2-valved, the valves entire, the seeds minute, ellipsoid.

TYPE SPECIES: *Mazus rugosus* Lour. = *M. pumilus* (Burm. f.) van Steenis (*Lobelia pumila* Burm. f.).

DISTRIBUTION: Eastern and southeastern Asia to Australia and New Zealand, with about 20 species. The type species is presumably cultivated or is an occasional adventive in Fiji.

1. *Mazus pumilus* (Burm. f.) van Steenis in *Nova Guinea n. s.* 9: 31. 1958; Backer & Bakh. f. *Fl. Java* 2: 505. 1965; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 445. 1981.

Lobelia pumila Burm. f. *Fl. Ind.* 186. t. 60, fig. 3. 1768.

Lindernia japonica Thunb. *Fl. Jap.* 253. 1784.

Mazus japonicus Kuntze, *Rev. Gen. Pl.* 1: 462. 1891; Greenwood in *J. Arnold Arb.* 30: 80. 1949; J. W. Parham, *Pl. Fiji Isl.* 244. 1964, ed. 2. 336. 1972.

A naturalized weed in gardens and on damp shady banks near sea level, in habit a sprawling herb with ascending branches to 40 cm. high, the leaf blades obovate-spathulate, 1-3 × 0.5-2.5 cm., mostly rosulate; racemes lax, to 35 cm. long, the pedicels 2-6 mm. long, glandular-puberulent; corolla blue, 6-7 mm. long, the tube about as long as the limb, the upper lip pale lilac, the lower lip white, the lobes of the palate yellow. Flowers have been noted in August.

TYPIFICATION AND NOMENCLATURE: The type of *Lobelia pumila* is *Burman* (G HOLOTYPE); that of *Lindernia japonica* is a Thunberg collection from Japan. In combining the two taxa, van Steenis noted that the Burman type specimen does not entirely agree with his figure, but it represents the common Malesian form of the species and grades into specimens from China and Japan.

DISTRIBUTION: India and Ceylon eastward to China, Japan, and Malesia; cultivated and perhaps adventive elsewhere.

USE: The species was very probably introduced into Fiji as a ground cover, as in Hawaii, and is now sparingly naturalized. It has not been noted from nearby southern Pacific archipelagoes.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Koronivia Cocoa Nursery, DA 14426. TAILEVU: Near Nausori, Greenwood 1105.

5. *SCOPARIA* L. Sp. Pl. 116. 1753; Backer & Bakh. f. Fl. Java 2: 512. 1965; L. Cramer in Rev. Handb. Fl. Ceylon 3: 439. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 445. 1986.

Herbs or low shrubs, freely branched; leaves opposite or verticillate, the blades entire or serrate-crenate, gland-dotted beneath; flowers axillary, solitary or paired; calyx ebracteolate, 4- or 5-lobed nearly to base, the lobes imbricate; corolla rotate, nearly regular, densely pilose at throat, 4-lobed nearly to base, the lobes subequal, obtuse, the 2 posterior ones internal in bud; stamens 4, subequal, exerted, the anther locules parallel or divaricate, separated; style filiform, exerted, the stigma not thickened, capitate or slightly bifid; capsule ovoid or globose, septicidally 2-valved or septicidally and loculicidally 4-valved, the valves entire, the seeds numerous, tuberculate or scrobiculate.

TYPE SPECIES: *Scoparia dulcis* L., the only original species.

DISTRIBUTION: Tropical America, with about 20 species, one of which has become a pantropical adventive.

1. *Scoparia dulcis* L. Sp. Pl. 116. 1753; Seem. Fl. Vit. 180. 1866; Greenwood in J. Arnold Arb. 25: 401. 1944, in op. cit. 30: 79. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 131. 1959, Pl. Fiji Isl. 244. 1964, ed. 2. 336. 1972; Backer & Bakh. f. Fl. Java 2: 512. 1965; L. Cramer in Rev. Handb. Fl. Ceylon 3: 439. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 445. 1986.

Subligneous herb 20-75 cm. high, naturalized at elevations from near sea level to about 200 m. in villages, cultivated areas, pastures, etc., said to be common but apparently local in distribution; stem angular-ribbed; leaves verticillate in 3's or 4's, the blades oblong-obovate or oblanceolate, up to about 4 × 1.5 cm.; corolla white to pale blue or pale purple with a darker center, the lobes spreading, the limb 6-8 mm. in diameter; fruits ovoid or subglobose, 2-4 mm. long. Flowers and fruits have been collected between February and October.

TYPIFICATION: Several references were given by Linnaeus in 1753.

DISTRIBUTION: Tropical America, but now widespread in tropical areas. Seemann (1866) mentioned it from Hawaii and the Societies but did not observe it in Fiji. Greenwood's (1944) record is the earliest, but the species was probably in Fiji long before he collected it in the 1920's.

USE: The dried plants are said to be used as brooms in some Fijian villages.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Wainivau, DA 457, 735, 10818; Waindravu, DA 9920; Viria, Meebold 16521; Nanduruloulou, DA 2624; near Nasinu, Greenwood 525A. TAILEVU: Near Nausori, Greenwood (obs. 1949; no specimen seen); Wainimbokasi, DA 817. VANUA LEVU: MATHUATA: Lambasa, Greenwood 525.

6. *LINDERNIA* All. in *Mélange Philos. Math. Soc. Turin* 3: 178. 1766; Philcox in *Taxon* 14: 30. 1965; Backer & Bakh. f. *Fl. Java* 2: 509. 1965; Philcox in *Kew Bull.* 22: 6. 1968; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 404. 1981; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* 2: 438. 1986.

Vandellia P. Br. ex L. *Syst. Nat. ed. 12.* 384, 422. 1767, *Mant. Pl.* 12, 89. 1767; Seem. *Fl. Vit.* 180. 1866.

Annual herbs, glabrous or pilose, the stems slender, erect or creeping, often rooting at nodes, often quadrangular; leaves opposite, sessile or petiolate, the blades entire, crenate, or serrate; inflorescences axillary or terminal racemes or flowers solitary or a few clustered in leaf axils; flowers pedicellate or subsessile; calyx ebracteolate, the lobes deltoid to narrowly lanceolate or subulate; corolla bilabiate, the tube slightly widened distally, the upper lip external in bud, entire, emarginate, or 2-lobed, the lower lip 3-lobed or 3-fid, the palate with 2 pilose ridges; fertile stamens 4 or 2, didynamous, if 4 the posterior ones shortest, inserted near apex of corolla tube, the anterior ones in throat, if 2 the posterior ones only, the anterior ones reduced to staminodes, the long filaments often with a tubercular to clavate appendage arising near base, the anthers coherent in pairs, divaricate or not; style slender, erect, the stigma bilamellate; capsule globose to linear, septically 2-valved, the valves entire, the seeds numerous.

TYPE SPECIES: *Lindernia pyxidaria* All., nom. illeg. = *L. procumbens* (Krocker) Philcox (*Anagalloides procumbens* Krocker); cf. Philcox (1965). The type species of *Vandellia* is *V. diffusa* L. (*Lindernia diffusa* (L.) Wettst.).

DISTRIBUTION: Pantropical and subtropical but predominantly paleotropical, with about 100 species. Four species are here recorded from Fiji, probably all adventive, although one of them may be indigenous.

USEFUL TREATMENT OF GENUS: PHILCOX, D. Revision of the Malesian species of *Lindernia* All. (*Scrophulariaceae*). *Kew Bull.* 22: 1-72. 1968.

KEY TO SPECIES

Stamens 4, all antheriferous.

Pedicels very short, 1-3 mm. long; calyx lobes as long as tube or slightly longer, lanceolate to linear-subulate; capsule oblong-cylindric, obviously longer than calyx (sect. *Nummularia*).

1. *L. nummulariifolia*

Pedicels obvious, 5-30 mm. long; calyx lobes much shorter than tube, deltoid; capsule ellipsoid to ovoid, about as long as calyx (sect. *Torenioides*). 2. *L. crustacea*

Stamens 2; staminodes 2, simple; calyx lobed nearly to base; leaves essentially sessile (sect. *Bonnaya*).

Flowers in racemes, infrequently axillary and solitary; calyx lobes linear-lanceolate, 3-5 mm. long; capsules linear- to subulate-cylindric, often 3 times as long as calyx. 3. *L. antipoda*

Flowers axillary, solitary or paired; calyx lobes ovate, usually 1-2 mm. long; capsules ovoid-subglobose, as long as or slightly longer than calyx. 4. *L. rotundifolia*

1. *Lindernia nummulariifolia* (D. Don) Wettst. in *Engl. & Prantl, Nat. Pflanzenfam.* IV. 3B: 79, as *L. nummulariaefolia*. 1891; Philcox in *Kew Bull.* 22: 11, as *L. numularifolia*. 1968; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 417, as *L. nummularifolia*. 1981. FIGURE 8A.

Vandellia nummularifolia D. Don, *Prodr. Fl. Nepal.* 86. 1825; Benth. in *DC. Prodr.* 10: 416, as *V. numularifolia*. 1846; Hook. f. *Fl. Brit. Ind.* 4: 282. 1884.

Torenia sessiliflora Benth. in *Wallich, Num. List*, no. 3959, nom. nud. 1831.

Vandellia sessiliflora Benth. *Scroph. Ind.* 37. 1835.

Lindernia sessiliflora Wettst. in Engl. & Prantl, Nat. Pflanzenfam. IV. 3B: 79. 1891; Backer & Bakh. f. Fl. Java 2: 510. 1965; Philcox in Kew Bull. 22: 10. fig. 1 (1-4). 1968.

Lindernia diffusa sensu Greenwood in J. Arnold Arb. 25: 397. 1944, in op. cit. 30: 79. 1949; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 336. 1972; non Wettst.

Sprawling or semiprostrate herb occurring from near sea level to about 850 m. as a naturalized weed in villages and plantations or on clay banks or forest floor; slender branches minutely pilose on angles; petioles short, mostly 1-2 mm. long, the leaf blades ovate to suborbicular, to 2.5 × 2.2 cm., serrate; flowers axillary, solitary, sparse, the pedicels very short, to 1 (-3) mm. long; calyx 5-9 mm. long, the lobes as long as tube or slightly longer, lanceolate to linear-subulate, with stiff antrorse hairs on margins; corolla 6-8 mm. long, white, the upper lip purplish-tinged, the lower lip with yellow hairs; stamens 4, white, all fertile; capsule oblong-cylindric, 8-12 mm. long. Flowers and fruits have been noted between November and July.

TYPE: *Vandellia nummularifolia* is based on a collection from Nepal, presumably collected by Wallich, *V. sessiliflora* on Wallich 3959 (K HOLOTYPE; ISOTYPE in Wallich Herbarium at K), from Burma.

DISTRIBUTION: Subtropical Himalayas, India, and Ceylon to Malesia, adventive in other areas such as Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Ngaloa, weed in village, *Smith 9621*. NAMOSI: Wainambua Creek, *DA 14211*; hills east of Navua River, *Greenwood 1001*. NAITASIRI: Agricultural School, Navuso, *DA 11473*; Koronivia, *DA 6039*. REWA: Forest Reserve, Queen's Road about 25 miles west of Suva, *Vaughan 3364*.

Philcox (1968) does not mention the occurrence of *Lindernia sessiliflora* east of Java, although he has so identified *Vaughan 3364*. The specimens cited above seem precisely to agree with Philcox's 1968 description and illustration. However, *Greenwood 1001* was identified by F. W. Pennell as *L. diffusa* (L.) Wettst. (based on *Vandellia diffusa* L. Mant. Pl. 89. 1767), an American species which, however, may be adventive elsewhere; at least on the basis of Pennell's identification it has been so recorded in Fiji.

In discussing *Lindernia sessiliflora*, Philcox (1968) mentioned opinions of J. D. Hooker (1884) and others that it might not be separable from *L. nummularifolia*. Apparently he later accepted this position, since Cramer's (1981) use of *L. nummularifolia* was predicated upon Philcox's identifications. The taxon should be critically compared with *L. diffusa* (based on the oldest of the three basionyms) by a specialist on the family.

Philcox (1968), following Bentham (1846), used the spellings *numularifolia* for the epithet and *Numularia* for the section, but I believe that these should be corrected to *nummularifolia* and *Nummularia* respectively.

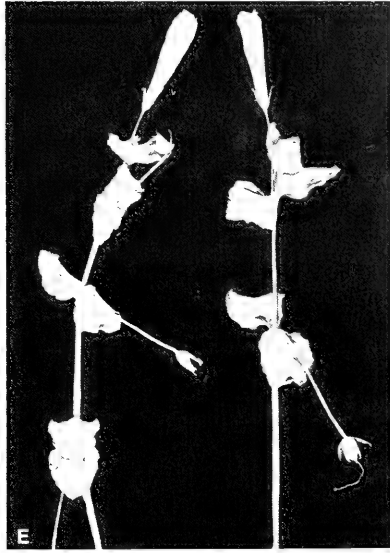
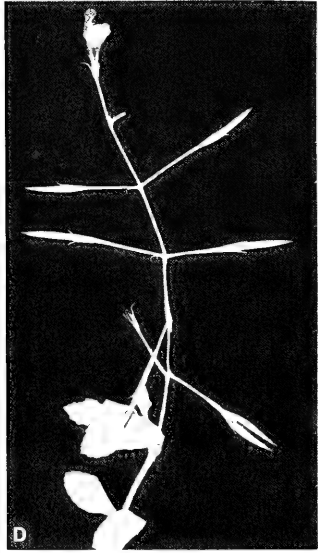
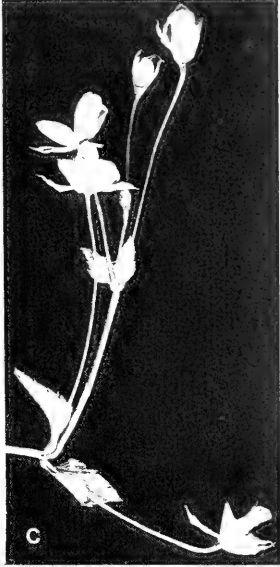
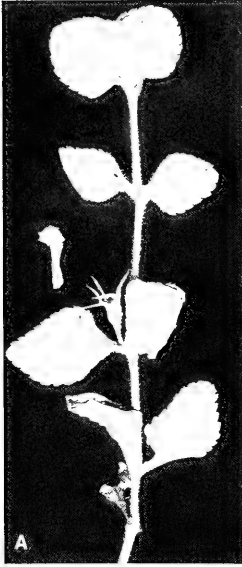
2. *Lindernia crustacea* (L.) F. v. Muell. Syst. Census Austral. Pl. 97. 1882; Reinecke in Bot. Jahrb. 25: 675. 1898; Reehinger in Denkschr. Akad. Wiss. Wien 85: 356. 1910; Christophersen in Bishop Mus. Bull. 128: 197. 1935; Yuncker in op. cit. 184: 62. 1945, in op. cit. 220: 241. 1959; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 336. 1972; Backer & Bakh. f. Fl. Java 2: 509. 1965; Philcox in Kew Bull. 22: 17. fig. 1 (9-12). 1968; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 35, 62. 1972; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 439. 1986.

FIGURE 8B & C.

Capraria crustacea L. Mant. Pl. 87. 1767.

Antirrhinum hexandrum Forst. f. Fl. Ins. Austr. Prodr. 43. 1786.

Vandellia crustacea Benth. Scroph. Ind. 35. 1835; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 180. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 251. 1892; Greenwood in Proc. Linn. Soc. 154: 102. 1943.



Sprawling or prostrate herb from near sea level to about 300 m., possibly indigenous, sometimes noted as moderately common, occurring on rocks, on banks of creeks, and near hot springs, but sometimes also in plantations; ascending branches to 30 cm. high, glabrous or with a few scattered hairs, 4-angled; petioles 1-8 mm. long, the leaf blades ovate or elliptic, 0.5-2.5 × 0.3-1.5 cm.; flowers axillary or in loose leafy racemes, the pedicels 5-30 mm. long; calyx 3-5 mm. long, 5-toothed, the lobes in flower 0.6-1.5 mm. long; corolla 5-12 mm. long, bluish to purple or mauve, the lower lip with a yellow spot at base; stamens 4, all fertile; capsule ellipsoid to ovoid, 3-4 mm. long. Flowers and fruits have been noted between July and November.

TYPEFICTION: For *Capraria crustacea* Linnaeus cited material from two sources, Amboina (a Rumphius illustration) and China; Philcox (1968) indicated the type as Herb. Linn. 785.3 (LINN LECTOTYPE). The type of *Antirrhinum hexandrum* is *J. R. & G. Forster* (K LECTOTYPE; cf. Philcox, 1968), collected in Tahiti during Cook's second voyage.

DISTRIBUTION: Tropical and subtropical Asia from India eastward into Australasia and Polynesia at least to the Society and Marquesas Islands, and also in tropical Africa and America. Although *Lindernia crustacea* is generally noted as being pantropical in distribution, its presence in Pacific archipelagoes may have been due to inadvertent aboriginal introductions. However, for statistical purposes, perhaps it may be considered as the only "indigenous" species of the genus in Fiji, a contrary explanation being impossible to prove.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near Lautoka, *Greenwood 252*. NAMOSI: Between Saliandra and Nanggarawai, Wainikoroiluva River, *Gillespie 3214*; vicinity of Namosi, *DA 16150*. NAITASIRI: Navuso, *DA 11474*. OVALAU: Wet places in mountains, *MacGillivray*, Oct. 1854. VANUA LEVU: MATHUATA: Lambasa, *Greenwood 252A*; Vunimoli, *DA 5773*; Wainikoro River, *Greenwood 252B*. FIJI without further locality, *Harvey*, Nov. 1855, *Seemann 349*.

3. *Lindernia antipoda* (L.) Alston in Trimen, *Handb. Fl. Ceylon* 6: 214. 1931; Philcox in *Kew Bull.* 17: 484. 1964, in op. cit. 22: 57. *fig. 11 (5-8)*. 1968; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 336. 1972; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 413. 1981.

FIGURE 8D.

Ruellia antipoda L. Sp. Pl. 635. 1753.

Gratiola veronicaefolia Retz. Obs. Bot. 4: 8. 1786.

Bonnaya veronicaefolia Spreng. Syst. Veg. 1: 41. 1824; Greenwood in *J. Arnold Arb.* 30: 79. 1949; J. W. Parham, *Pl. Fiji Isl.* 244. 1964, ed. 2. 335. 1972.

Ilysanthes antipoda Merr. Interpret. Rumph. Herb. Amb. 467. 1917.

? *Lindernia anagallis* sensu Greenwood in *J. Arnold Arb.* 25: 397. 1944, in op. cit. 30: 79. 1949; J. W. Parham, *Pl. Fiji Isl.* 244. 1964, ed. 2. 336. 1972; non Pennell.

Repent herb with ascending branches to 15 cm. high, adventive and sometimes locally frequent in villages, cultivated areas, and along roads and paths from near sea level to about 200 m.; leaves essentially sessile, the blades ovate- to obovate-oblong or oblanceolate, 6-45 × 2-14 mm.; flowers in racemes to 12 cm. long or sometimes axillary and solitary, the pedicels 2-17 (-25) mm. long; calyx lobed nearly to base, the lobes linear-lanceolate, 3-5 mm. long; corolla 6.5-13 mm. long, pale blue or purplish white, the lower lip 5-12 mm. across; stamens 2, the anthers yellow; capsule linear- or subulate-cylindric, 8-15 mm. long, often dull purple. Flowers and fruits have been observed between January and July.

FIGURE 8. A, *Lindernia nummulariifolia*; distal portion of branchlet, with calyx and detached corolla, × 2. B & C, *Lindernia crustacea*; B, flower, × 8; C, distal portion of lateral branchlet with calyces and capsules, some of them dehiscent, × 2. D, *Lindernia antipoda*; lateral branchlet bearing flowers and capsules, × 1. E, *Lindernia rotundifolia*; distal portions of branchlets, showing flowers and developing capsules, × 2. A from *Smith 9621*, B from *DA 11174*, C from *DA 16150*, D from *Smith 7077*, E from *Anderson 70265*.

TYPIFICATION: The type of *Ruellia antipoda* is *Hermann 235* (BM LECTOTYPE; cf. Philcox, 1964, p. 482), from Ceylon; that of *Gratiola veronicaefolia* is *Koenig s. n.* (LD HOLOTYPE), presumably from India.

DISTRIBUTION: Tropical and subtropical Asia from India and Ceylon, throughout Malasia, and eastward to northern Australia; apparently adventive farther eastward.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Wainandoi River Valley, *Vaughan 3439*. NAITASIRI: Viria, *Meebold 16524*; Mbatiki, *DA 11438, 11749*; Tamavua, *DA 11223*; Koronivia, *DA 7552*. TAILEVU: Ndakuivuna, weed in village, *Smith 7077*; Nausori, *R. Veitch 330*.

The occurrence of *Lindernia anagallis* in Fiji is based solely on observations by Greenwood in Serua and Naitasiri Provinces, Viti Levu; no specimens have been seen to support these observations. It is possible that Greenwood was alluding to *L. antipoda*, with which *L. anagallis* has been confused (cf. Philcox in *Kew Bull.* 17: 481-484. 1964). The two taxa differ principally in the number of fertile stamens and in minor details of foliage (cf. Philcox, 1968, p. 9 (key) and *figs. 10 (1-7), 11 (5-8)*).

4. *Lindernia rotundifolia* (L.) Alston in *Trimen, Handb. Fl. Ceylon* 6: 214. 1931; C. Adams, *Fl. Pl. Jam.* 665. 1972; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 416. 1981.

FIGURE 8E.

Gratiola rotundifolia L. *Mant. Pl.* 274. 1767; Roxb. *Pl. Coromandel* 3: 3. t. 204. 1811.

Lindernia microcalyx Pennell ex Stehlé in *Bull. Soc. Bot. France* 83: 632, nom. nud. 1937; Pennell & Stehlé in Stehlé & Quentin, *Fl. Guadeloupe* 2: 217. *fig.* 1938; Greenwood in *J. Arnold Arb.* 30: 79. 1949; J. W. Parham, *Pl. Fiji Isl.* 244. 1964, ed. 2. 336. 1972.

Semiprostrate herb to 40 cm. long, freely rooting at lower nodes, from near sea level to about 200 m. in damp places, marshes, and swamps, and on edges of rivers; leaves essentially sessile, the blades ovate to suborbicular, palmately 3-5-nerved, 5-8 (-15) × 4-7 (-11) mm.; flowers axillary, solitary or paired, the pedicels 8-10 (-18) mm. long; calyx very small, 1-2 (-3) mm. long, the lobes ovate, nearly free; corolla 7-13 mm. long, pale blue or purplish, nearly white proximally, the tube longer than lobes, the lobes of the lower lip with bluish spots; stamens white, the 2 posterior ones fertile, the 2 anterior ones sterile, with clavate knobs in place of anthers; style rich blue distally; capsule ovoid-globose, 2.5-3.5 mm. long, yellowish brown. The species probably flowers and fruits throughout the year, but mostly during the rainy months, October to May.

TYPIFICATION: The type of *Gratiola rotundifolia* is a specimen in the Linnaean Herbarium (LINN 30.4 HOLOTYPE; cf. Cramer, 1981); that of *L. microcalyx* is *H. & M. Stehlé 2280* (PH HOLOTYPE; ISOTYPE at US 1859944), obtained Nov. 18, 1937, in ditches about the Hospital of Camp Jacob (Saint-Claude), Guadeloupe.

DISTRIBUTION: Indian Ocean islands, western and southern India, and Ceylon; known as an adventive in tropical America and Fiji, and doubtless to be expected elsewhere.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Rosikulu, Tanguso Creek, *DA 16035*; vicinity of Mbelo, near Vatukarasa, *Degener 15217*. NAMOSI: Namosi Village, *Anderson 70265*. SERUA: Vicinity of Ngaloa, pasture swamp, *Smith 9626*; Tokotoko road, Navua, *DA 10550*. NAITASIRI: Nanduna, *DA 9603*; Sawani-Serea road, *DA 12324*; Sawani, *Vaughan 3162*; Tamavua, *DA 11227*; near Nasinu, *Greenwood 1110*. TAILEVU: Vuthi road, *Raralevu, DA 10633*. REWA: Suva, Rodwell road, *DA 12224*.

The occurrence of *Lindernia microcalyx* in Fiji was first noted by Greenwood (1949) on the basis of the identification of *Greenwood 1110* by F. W. Pennell; previously the species had been thought limited to the West Indies and northern South America. The identity of several other Fijian specimens as this taxon was kindly verified by D. Philcox (in litt., 1970). However, C. D. Adams (1972) referred *L.*

microcalyx to the synonymy of *L. rotundifolia* without discussion; that species was not included in Philcox's 1968 treatment of Malesian species, but in perusing the description of *L. rotundifolia* by Cramer (1981) I find no reason to doubt Adams's decision. Therefore, instead of having a rare American species (*L. microcalyx*) appear as a Fijian adventive, it would seem that a somewhat more widely distributed paleotropical species (*L. rotundifolia*) is an occasional adventive in America as well as in Fiji. Other Pacific localities have not come to my attention; it seems likely that the Fijian introduction was made by a mixture of the seeds of the *Lindernia* with rice, since *L. rotundifolia* commonly occurs in paddy fields in Ceylon (Cramer, 1981).

7. *TORENIA* L. Sp. Pl. 619. 1753; Backer & Bakh. f. Fl. Java 2: 508. 1965; L. Cramer in Rev. Handb. Fl. Ceylon 3: 441. 1981.

Perennial herbs, erect, ascending, or straggling, the stem quadrangular; leaves opposite, the blades serrate to dentate or crenate; inflorescences cymose-racemose or flowers solitary and axillary; calyx ebracteolate, 3-5-dentate, tubular, the tube angular or winged; corolla tube gradually widening distally, the limb bilabiate, the upper lip external in bud, entire or 2-lobed, the lower lip broader, 3-lobed; stamens 4, didynamous, the 2 anterior ones in corolla throat with long filaments, these with a dentiform or spurlike appendage, the 2 posterior ones inserted lower on corolla, with shorter filaments, the anthers connivent in pairs, the locules parallel; stigma bilamellate; capsule included in calyx, septicidally 2-valved, the valves entire, the seeds numerous.

TYPE SPECIES: *Torenia asiatica* L., the only original species.

DISTRIBUTION: Paleotropical, with about 50 species. Two species are noted in Fiji, one adventive and one only in cultivation.

KEY TO SPECIES

Erect herb; petioles 6-30 mm. long, the leaf blades 2.5-6.5 cm. long; calyx 15-20 mm. long, broadly 5-winged; corolla purple or blue, 25-30 mm. long; longer filaments inappendiculate; cultivated only.

1. *T. fournieri*

Prostrate herb; petioles 5-7 mm. long, the leaf blades 0.8-2.5 cm. long; calyx 6-10 mm. long, broadly 3-winged; corolla pale cream or yellow, 7-12 mm. long; longer filaments with a basal appendage; adventive. 2. *T. polygonoides*

1. *Torenia fournieri* Linden ex Fourn. in Illustr. Hort. 23: 129. pl. 249. 1876; Backer & Bakh. f. Fl. Java 2: 509. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 336. 1972; L. Cramer in Rev. Handb. Fl. Ceylon 3: 445. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 124. 1985.

Erect, glabrous herb 15-50 cm. high, cultivated from near sea level to about 250 m.; petioles 0.6-3 cm. long, the leaf blades ovate or ovate-oblong, 2.5-6.5 × 1.5-4.5 cm., conspicuously crenate-serrate; flowers solitary or upper ones in a terminal raceme, the bracts linear-lanceolate, 12-19 mm. long, the pedicels 1-2 cm. long; calyx 1.5-2 cm. long, broadly 5-winged; corolla 2.5-3 cm. long, blue or purple with a yellow spot at base of midlobe of lower lip, the limb 2-4 cm. across, the upper lip carinate, to 2 cm. broad, the lower lip to 2.5 cm. broad; longer filaments inappendiculate; capsule narrowly ovoid, the seeds orbicular-oblong, about 1 mm. long, foveolate. Our specimens were flowering in February and March.

TIPIFICATION: The type was said to be a cultivated plant originally from Cochinchina.

DISTRIBUTION: Continental southeastern Asia, frequently cultivated elsewhere.

LOCAL NAME AND USE: *Torenia*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16712. REWA: Suva Botanical Gardens, DA 12329.

2. *Torenia polygonoides* Benth. Scroph. Ind. 39. 1835; Greenwood in J. Arnold Arb. 30: 80. 1949; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 336. 1972; Backer & Bakh. f. Fl. Java 2: 508. 1965.

Prostrate, creeping, glabrous herb, adventive in lawns and in shady, damp places from near sea level to about 150 m.; petioles 5–7 mm. long, the leaf blades ovate, 8–25 mm. long, crenate-serrate; flowers in 2–4-flowered terminal or axillary inflorescences, the bracts inconspicuous, 2–5 mm. long, the pedicels 3–15 mm. long; calyx 6–10 mm. long, broadly 3-winged, the wings mucronate at base; corolla pale cream-colored or yellow, the tube 7–10 mm. long, the lower lip much broader than upper lip; longer filaments with a short, thick appendage at base. Our specimens were flowering in June and October.

TYPE SPECIES: The type is a Wallich specimen from Singapore.

DISTRIBUTION: Continental Asia into parts of Malesia, adventive elsewhere.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Vicinity of Nasinu, Gillespie 3423, Greenwood 1099.

8. LIMNOPHILA R. Br. Prodr. Fl. Nov. Holl. 442. 1810; Backer & Bakh. f. Fl. Java 2: 505. 1965; Philcox in Kew Bull. 24: 106. 1970; L. Cramer in Rev. Handb. Fl. Ceylon 3: 426. 1981; Wannan & Waterhouse in Austral. J. Bot. 33: 368. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 443. 1986. Nom. cons.

Annual or perennial herbs of humid or marshy areas, aromatic when bruised, the stems with air cavities, erect, prostrate, or creeping and rooting at nodes; leaves opposite or verticillate, sessile or petiolate, the blades often gland-dotted, entire to serrate or lacinate; inflorescences terminal or axillary, racemose or spicate, or flowers axillary and solitary, sessile or pedicellate; calyx tubular, with 2 bracteoles at base or these lacking, the lobes 5, narrow; corolla bilabiate, tubular or infundibuliform, the tube cylindrical, pilose within on dorsal side, the upper lip external in bud, entire or 2-lobed, the lower lip spreading, 3-lobed; stamens 4, included, didynamous, the posterior pair the shorter, the anther locules separated; ovary glabrous, the style filiform, deflexed at apex, the stigma bilamellate; capsule ellipsoid to globose, septically 4-valved, the valves bifid, the seeds numerous, small, ribbed or angular.

TYPE SPECIES: *Limnophila gratiolooides* R. Br., nom. illeg. = *L. indica* (L.) Druce (*Hottonia indica* L.).

DISTRIBUTION: Paleotropical, with about 35 species. The two species known from Fiji and extending eastward are presumed to be indigenous.

USEFUL TREATMENTS OF GENUS: PHILCOX, D. A taxonomic revision of the genus *Limnophila* R. Br. (*Scrophulariaceae*). Kew Bull. 24: 101–170. 1970. WANNAN, B. S., & J. T. WATERHOUSE. A taxonomic revision of the Australian species of *Limnophila* R. Br. (*Scrophulariaceae*). Austral. J. Bot. 33: 367–380. 1985.

KEY TO SPECIES

- Leaves sessile, the blades elliptic- to oblong-ovate, 8–30 × 3–12 mm., narrowed or subamplexicaul at base; flowers bibracteolate; calyx 3–5.5 mm. long, the lobes regular, glabrous; corolla 4–10 mm. long; posterior filaments about 1.5 mm. long, the anterior ones about 3 mm. long. 1. *L. fragrans*
- Leaves with petioles 0.5–3 cm. long, the blades oblong or subobovate, 15–90 × 7–50 mm.; flowers ebracteolate; calyx 8–19 mm. long, the lobes irregular, glandular, the adaxial lobe enlarged and subleaflike; corolla 13–20 mm. long; posterior filaments about 3 mm. long, the anterior ones about 6 mm. long. 2. *L. rugosa*

1. *Limnophila fragrans* (Forst. f.) Seem. Fl. Vit. 180. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 250. 1892; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 335. 1972; Philcox in Kew Bull. 24: 139. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 51, 122. 1972; Wannan & Waterhouse in Austral. J. Bot. 33: 376. 1985. FIGURE 9A.

Ruellia fragrans Forst. f. Fl. Ins. Austr. Prodr. 44. 1786.

Limnophila serrata Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 448. 1829, Atlas, pl. 57, fig. 2. 1828; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862.

Annual herb, forming mats on edges of ponds in open country and in swampy fields from near sea level to about 200 m.; leaves sessile, the blades elliptic to oblong-ovate, 8–30 × 3–12 mm., crenate-serrate, semiamplexicaul at base; flowers sessile, solitary or in short axillary spikes; bibracteolate, the bracteoles linear-lanceolate, 1.5–3 mm. long; calyx 3–5.5 mm. long, the lobes narrowly lanceolate; corolla (4–) 5.5–7 (–10) mm. long, white or pale yellow, the tube with faint purple lines; capsule compressed, ovoid-ellipsoid, 4–5 mm. long. Our specimens were flowering between November and March.

TYPIFICATION: The type of *Ruellia fragrans* is J. R. & G. Forster "149" (BM LECTOTYPE; cf. Philcox, 1970) (the specimen being numbered both 149 and 243, the latter number having been listed in G. Forster's publication), collected on Tahiti, Society Islands, during Cook's second voyage. The type of *Limnophila serrata* is Gaudichaud (ISOTYPES at BM, FI), from the Marianas Islands.

DISTRIBUTION: Malesia eastward from the Philippines and Moluccas, northern Australia, and eastward in the Pacific to Micronesia, Melanesia, and Polynesia to the Society and Austral Islands.

LOCAL NAME: *Vono ni wai* (DA 14301).

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Namara, Seemann 350. VANUA LEVU: MATHUATA: Ndreketi Plantations, DA 14301; Seanggangga Plateau, in drainage of Korovuli River, vicinity of Natua, Smith 6882; Wainikoro River, Greenwood 694. FIJI without further locality, Horne 1067.



FIGURE 9. A, *Limnophila fragrans*: distal portion of branchlet, with a flower and a young capsule, × 2. B, *Limnophila rugosa*: distal portion of branchlet, with inflorescences and young capsules, × 1. A from Smith 6882, B from Degener & Ordóñez 13910.

2. *Linnophila rugosa* (Roth) Merr. Interpret. Rumph. Herb. Amb. 466. 1917; A. C. Sm. in Sargentia 1: 116. 1942; J. W. Parham, Pl. Fiji Isl. 244. 1964, ed. 2. 335. 1972; Backer & Bakh. f. Fl. Java 2: 505. 1965; Philcox in Kew Bull. 24: 135. 1970; L. Cramer in Rev. Handb. Fl. Ceylon 3: 429. 1981. FIGURE 9B.

Herpestis rugosa Roth, Nov. Pl. Sp. 290. 1821.

Adenosma triflora sensu Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 184. 1866; non Nees.

Cardanthera triflora sensu Drake, Ill. Fl. Ins. Mar. Pac. 257. 1892; non Buch.-Ham.

Annual repent herb with branches ascending to 50 cm., occurring from near sea level to about 400 m. in moist clearings and on forested hillsides; petioles 0.5–3 cm. long, the leaf blades oblong or subobovate, 15–90 × 7–50 mm., serrate; flowers sessile, solitary or in headlike spikes, ebracteolate; calyx 8–19 mm. long, the lobes narrowly ovate-lanceolate, glandular; corolla 13–20 mm. long, pale blue or yellow with purple lines, the tube 10–15 mm. long, the limb lilac, the upper lip to 4.5 × 5.5 mm., the lower lip smaller; capsule broadly ovoid, 5–6.5 mm. long. Flowers and fruits on dated specimens were obtained in December and January.

TIPIFICATION: *Herpestis rugosa* is based on *Heyne* (ISOTYPE at L), from India.

DISTRIBUTION: India and China eastward through Malaysia to Fiji and Samoa.

LOCAL NAME AND USE: *Tamola*; Seemann (1866) indicated the species to be used for coughs and colds.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Sawani-Serea road, DA 11187. TAILEVU: Namara, Seemann 352, p. p. KANDAVU: Seemann 352, p. p. VANUA LEVU: THAKAUNDOVE: Mbalanga, Savu-savu Bay region, Degener & Ordenez 13910.

FAMILY 176. GESNERIACEAE

GESNERIACEAE Dumort. Comment. Bot. 57, as *Gessneriidae*. 1822.

Herbs, shrubs, or small trees, sometimes lianas or epiphytes, sometimes rhizomatous or stoloniferous, estipulate, commonly with uniseriate hairs or stalked glands; leaves opposite, infrequently whorled or alternate, usually simple, rarely pinnatifid, those of a pair equal or unequal (sometimes one altogether reduced), the blades entire or dentate; inflorescences cymose or infrequently racemose or fasciculate or with solitary, axillary (sometimes epiphyllous) flowers; flowers ♂ (very rarely unisexual), often large and showy, usually zygomorphic; sepals 5, valvate or rarely imbricate, free or united into a lobed tube, sometimes fewer or the calyx spathaceous; corolla sympetalous, zygomorphic (rarely essentially regular), usually bilabiate, often saccate-spurred at base, the lobes 5, imbricate (rarely valvate), the lateral ones usually external; fertile stamens commonly 4 (the posterior one lacking or reduced) and didynamous, often 2, rarely 5 or 6, borne on corolla tube alternate with lobes, often replaced by 1–3 staminodes, the anthers 2-locular, dehiscing by longitudinal slits or pores, often connate or connivent in pairs; disk usually present at base of ovary, annular or cupular, sometimes unilateral or composed of separate glands; ovary superior to partially (or wholly) inferior, usually unilocular, the placentae 2, parietal, often intrusive and bifurcate, rarely joined and the ovary then 2-locular, the ovules numerous, anatropous, the style terminal, slender, the stigma usually 2-lobed; fruit capsular (loculicidal or rarely septicidal), infrequently baccate, the embryo straight, the endosperm abundant or lacking.

DISTRIBUTION: Pantropical (with comparatively few temperate taxa), with about 120 genera and 2,500 species. Five genera have been recorded in Fiji, but only *Cyrtandra* has indigenous species. The family includes many beautiful plants of horticultural value. I am indebted to L. E. Skog for comments (here included) on some of the taxa in cultivation in Fiji. The following key to genera is largely abstracted from Moore (1957).

USEFUL TREATMENTS OF FAMILY: MOORE, H. E., JR. African Violets, Gloxinias, and their Relatives: A Guide to the Cultivated Gesneriads. i-xii, 1-323. 1957. BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Gesneriaceae. Fl. Java 2: 518-534. 1965.

KEY TO GENERA

Plants with scaly rhizomes at base; anther-bearing stamens 4; fruit capsular.

Corolla blue (or purple or lavender in our species), strongly pouched on lower side at base and blotched with violet in pouch; disk pale, low, annular; ovary almost completely inferior, 10-ribbed.

1. *Gloxinia*

Corolla variously colored, lacking a strongly pouched base; disk low or high, cuplike; ovary semi-inferior or almost completely so. 2. *Achimenes*

Plants without specialized rhizomes; ovary superior or essentially so.

Flowers with 2 anther-bearing stamens (in all of our taxa).

Corolla with the limb longer than the very short tube, pale mauve to deep violet (in cultivars red, pink, or white); calyx deeply 5-lobed; anthers shedding pollen through irregular pores; style and often anthers protruding; fruit capsular; leaves radical or on very short stems. 3. *Saintpaulia*

Corolla with the tube longer than the limb, white to green or red; calyx spathaceous or with 2-5 lobes; anthers dehiscent by longitudinal slits; disk small, annular, cupuliform, or unilateral at base of superior ovary; style and anthers usually not protruding; fruit a berry; leaves opposite or verticillate along well-developed stems. 4. *Cyrtandra*

Flowers with 4 (or 5) anther-bearing stamens, these dehiscent by longitudinal slits; corolla variable in color from red to white, often spotted with purple or lavender; sepals shortly united or distinct; disk composed of a single dorsal gland at base of ovary; fruit capsular; plants creeping by means of runners. 5. *Episcia*

1. *GLOXINIA* L'Hér. in Ait. Hort. Kew. 2: 331. 1789; H. E. Moore, Afr. Violets, Glox. 141. 1957; Backer & Bakh. f. Fl. Java 2: 532. 1965.

Herbs with squamate, subterranean rhizomes; leaves opposite, on well-developed stems; inflorescence a terminal raceme or flowers axillary; calyx tube campanulate, with 10 strong grooves or furrows, the lobes 5, elliptic-oblong; corolla tube ventricose-campanulate, saccate on one side at base, the limb oblique, the segments 5, imbricate in bud, becoming spreading; fertile stamens 4, inserted on base of corolla tube, didynamous, the filaments glabrous, the anthers cohering crosswise, the staminode minute; disk annular, low; ovary nearly completely inferior, the style pubescent, the stigma broad, subbilobate; fruit a capsule, 2-valved at apex, the seeds ellipsoid, smooth.

TYPE SPECIES: *Gloxinia maculata* L'Hér., nom. illeg. (*Martynia perennis* L.) = *Gloxinia perennis* (L.) Fritsch.

DISTRIBUTION: Tropical America, with six or seven species, one of which is cultivated in Fiji.

Plants of *Gloxinia* in cultivation are likely to represent true species, which have been widely grown and often naturalized but not often hybridized. The common *gloxinia* of florists is *Sinningia speciosa* (Lodd.) Hiern.

1. *Gloxinia perennis* (L.) Fritsch in Engl. & Prantl, Nat. Pflanzenfam. IV. 3b: 174. 1894; Druce in Bot. Exch. Club Brit. Isles 3: 418. 1914; H. E. Moore, Afr. Violets, Glox. 141. pl. IV, B; fig. 16. 1957; Backer & Bakh. f. Fl. Java 2: 533. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 344. 1972.

Martynia perennis L. Sp. Pl. 618. 1753.

Gloxinia maculata L'Hér. Stirp. Nov. 149. 1791; Yuncker in Bishop Mus. Bull. 178: 108. 1943, in op. cit. 184: 63. 1945; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 99. 1970.

As seen in Fiji, *Gloxinia perennis* is an erect, subligneous herb to 2 m. high; leaf blades ovate, to 18 × 15 cm., rounded or cordate at base, crenate-margined; bracts green, marked with purple; flowers solitary, the corolla about 4 cm. long, purple or lavender, copiously pilose. Flowers have been observed in March, July, and August, but fruits have not been noted.

TYPIFICATION: *Martynia perennis* was based by Linnaeus entirely on Hort. Cliff. 322. t. 18. 1738; the holotype may be in the Clifford Herbarium at BM.

DISTRIBUTION: Northern South America from Colombia to Peru and Brazil, now widespread in cultivation.

LOCAL NAME AND USE: *Gloxinia*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Principal Agricultural Station, Koronivia, DA 12138. REWA: Lami, in private garden, DA 16794; also observed in Department of Agriculture compound in Suva.

2. *ACHIMENES* Pers. Syn. Pl. 2: 164. 1806; H. E. Moore, Afr. Violets, Glox. 99. 1957; Backer & Bakh. f. Fl. Java 2: 533. 1965. Nom. cons.

Erect herbs, sparingly branched or not, with scaly, subterraneous rhizomes; leaves opposite or ternate, the petioles short, the blades equal or strongly unequal at each node, serrate or dentate; flowers axillary, pedicellate, solitary, paired, or fasciculate; calyx deeply 5-lobed, the lobes subequal, narrow; corolla usually red, violet, or white, tubular to campanulate, the tube exceeding calyx in length, narrow, usually curved, the lobes 5, equal or unequal, rounded, entire or fringed; fertile stamens 4, included, attached at base of corolla tube, the filaments slender, distinct, the anthers cohering, the staminode small; disk annular or undulating with 5 lobes; ovary almost completely inferior (sometimes semi-inferior), globose, the style long, filiform, the stigma concave or bilobate; fruit a capsule, 2-valved at apex.

TYPE SPECIES: *Achimenes coccinea* (Scop.) Pers. (*Buchnera coccinea* Scop.), typ. cons. = *A. erecta* (Lam.) H. P. Fuchs.

DISTRIBUTION: America from northern Mexico to northern Argentina, with one species in Jamaica. About 25 species are generally recognized, one of which is cultivated in Fiji.

1. *Achimenes longiflora* DC. Prodr. 7: 536. 1839; H. E. Moore, Afr. Violets, Glox. 107. pl. I, B; fig. 6, C, 7, A. 1957; J. W. Parham, Pl. Fiji Isl. ed. 2. 339. 1972.

As infrequently cultivated in Fiji, *Achimenes longiflora* is a perennial herb 10-45 cm. high; leaf blades ovate to lanceolate, to about 9×3 cm., dentate, pale or reddish beneath; flowers solitary on short pedicels, the corolla slender, 6-7 cm. long, blue, violet, reddish, or white with colored markings, the tube longer than the obliquely flattened limb. Flowers were noted in February.

TYPIFICATION: The type is Sessé & Moçino, Icon. Fl. Mex. (ined.) pl. 719 (G) (= Fl. Mexic. Ic. 358 of Sessé & Moçino) (L. E. Skog, in litt.).

DISTRIBUTION: Mexico to Panama, cultivated elsewhere and with various cultivars.

LOCAL NAME AND USE: *Achimenes*; a garden ornamental which dies back after flowering until the following season. Cultivated plants such as the one grown in Fiji are very probably cultivars.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16716.

3. *SAINTPAULIA* H. Wendl. in Gartenflora 42: 321. 1893; H. E. Moore, Afr. Violets, Glox. 143. 1957; Backer & Bakh. f. Fl. Java 2: 520. 1965.

Perennial, pubescent herbs, the leaves in a radical rosette, sometimes alternate to subopposite on very short stems, petiolate; inflorescences axillary, cymose, 2-10-flowered, pedunculate; calyx deeply 5-lobed, the lobes linear or lanceolate, erect; corolla rotate to broadly campanulate, much longer than calyx, the tube short, the limb 5-lobed, 2-lipped, the upper lip 2-lobed and the shorter; stamens inserted near apex of corolla tube, the 2 anterior ones antheriferous and shortly exerted, the filaments glabrous, the anthers ovate-reniform, united at tips, shedding pollen through

irregular pores, the staminodes 2 or 3, dentiform or papillate; disk short, annular; ovary superior, with deeply intruding T-shaped placentae, the style longer than stamens, the stigma not broadened; fruit a capsule, longer than calyx, dehiscent by decay of pericarp, the seeds ellipsoid.

TYPE SPECIES: *Saintpaulia ionantha* H. Wendl.

DISTRIBUTION: East Africa, with about eleven species. These have been freely hybridized, and innumerable cultivars are in cultivation. At least one such taxon is grown in Fiji.

1. *Saintpaulia ionantha* H. Wendl. in *Gartenflora* 42: 321. t. 1391; fig. 66. 1893; H. E. Moore, *Afr. Violets*, *Glox.* 151. fig. 18, D. 1957; J. W. Parham, *Pl. Fiji Isl.* 253. 1964, ed. 2. 344. 1972; Backer & Bakh. f. *Fl. Java* 2: 520. 1965.

Commonly cultivated as a pot plant in houses and gardens; stems very short or scarcely evident; leaves basal, the petioles pilose, the blades suborbicular to oblong-ovate, up to 8 cm. long and broad, often purplish beneath; peduncles with 2-8 flowers, the corollas up to 3 cm. across and often violet; mature capsules subglobose, about 7 mm. long. No herbarium vouchers from Fiji are available.

TYPIFICATION: The species was based on a greenhouse-grown plant originating from Usambara, Tanganyika, Africa.

DISTRIBUTION: East Africa.

LOCAL NAMES AND USE: *Saintpaulia*, *African violet*; a commonly grown ornamental.

It would probably be advisable not to apply a specific epithet to this taxon, as any cultivated *saintpaulia* is less likely to represent a true-breeding species than one of the thousands of cultivars arising from hybridization among several species (L. E. Skog, in litt.). However, *Saintpaulia ionantha* is widely used in the literature and is accepted by Moore (1957), who also comments on cultivars in the genus (pp. 154-155).

4. *CYRTANDRA* J. R. & G. Forst. *Char. Gen. Pl.* 3. 1775, ed. 2. 5. 1776; Seem. *Fl. Vit.* 181. 1866; A. C. Sm. in *J. Arnold Arb.* 34: 37. 1953; H. E. Moore, *Afr. Violets*, *Glox.* 178. 1957; Backer & Bakh. f. *Fl. Java* 2: 528. 1965; G. Gillett in *Contr. U. S. Nat. Herb.* 37: 112. 1967, in *Univ. Calif. Publ. Bot.* 66: 13. 1973.

Herbs, vines, shrubs, or small trees, often with conspicuous indument, the trichomes septate, uniseriate, capitate or noncapitate, the stems terete to angled; leaves opposite or verticillate, those of a pair equal to very unequal (leaves sometimes appearing alternate), petiolate to sessile or connate-perfoliate, the blades simple; inflorescences cymose, congested or elongate, sessile or pedunculate, axillary or sometimes cauliflorous, the bracts persistent or caducous, variable as to size and texture, the flowers ♂ (infrequently unisexual), often protandrous; calyx caducous or persistent, spatheaceous to variously cleft into 2-5 lobes, these valvate, equal or unequal; corolla fleshy to chartaceous, often white but sometimes green, yellow, or shades of red to lavender, the tube terete-infundibuliform, the limb subactinomorphic or bilabiate, 5-lobed, the lobes imbricate (rarely valvate) in bud, spreading to erect, equal or not; stamens inserted in or above middle of corolla tube, usually included, the 2 anterior ones antheriferous (or fertile stamens very rarely 4-6, but in none of our species), the 2 or 3 posterior ones reduced to minute, glabrous staminodes (these rarely 1 or none), the antheriferous filaments usually glabrous and often proximally twisted, the anthers coherent or free at apices, dehiscent by longitudinal slits; disk annular, cupuliform, or unilateral, glabrous, often persistent in fruit; gynoecium glabrous or variously pilose, the ovary superior, ovoid to linear, the stigma capitate to applanate and bilobed; fruit a berry, ovoid to oblong or subcylindric, succulent to coriaceous, white to variously colored at maturity, indehiscent, the style base often persistent, the seeds numerous, ellipsoid, smooth, often embedded in the fleshy placentae.

LECTOTYPE SPECIES: *Cyrtandra biflora* J. R. & G. Forst. (vide St. John in Bishop Mus. Bull. 229: 3-5. 1966).

DISTRIBUTION: Southeastern Asia through Malesia to Queensland and into the Pacific to the Marquesas, Society, and Austral Islands and Hawaii, probably with more than 600 species.

USEFUL TREATMENTS OF GENUS: CLARKE, C. B. *Cyrtandreae*, DC. Monogr. Phan. 5: 1-303. 1883. SMITH, A. C. Studies of Pacific Island plants, XIV. Notes on the Fijian species of *Cyrtandra*. J. Arnold Arb. 34: 37-51. 1953. GILLETT, G. W. The genus *Cyrtandra* in Fiji. Contr. U. S. Nat. Herb. 37: 107-159. 1967. GILLETT, G. W. The genus *Cyrtandra* (Gesneriaceae) in the South Pacific. U. Calif. Publ. Bot. 66: 1-59. 1973. BURTT, B. L., & M. H. BOKHARI. Studies in the Gesneriaceae of the Old World XXXVI: Foliar sclereids in New Guinea and Pacific *Cyrtandra*. Notes Roy. Bot. Gard. Edinburgh 32: 397-402. 1973.

The present treatment, including keys (expanded to incorporate many descriptive aspects of taxa), is in large part abstracted from that of Gillett (1967), who recognized 35 species in Fiji, all endemic. I here restore two species reduced to synonymy by Gillett, bringing the total of indigenous (and endemic) Fijian species to 37. Every floristic student working within the range of *Cyrtandra* has found the genus extraordinarily difficult, perhaps in large part because herbarium material of it is very unsatisfactory, the fragile inflorescences often losing their essential characters and certainly their striking beauty. I feel that I cannot substantially improve on Gillett's Fijian revision, at least not without additional field study and an expenditure of time that is not available.

In treating the Fijian species, Gillett (1967) arranged them in six informal groups, but in extending his studies of the genus to other southern Pacific archipelagoes he (1973) found his 1967 rationale weakened. Nevertheless, the use of six artificial species groups seems useful in considering the Fijian species and is here maintained. In discussing the Hawaiian species, W. L. Wagner, D. R. Herbst, and S. H. Sohmer (Man. Fl. Pl. Haw. 735-781. 1990) refer to their relationships with species of southern Pacific groups, utilizing six sectional names proposed by either C. B. Clarke (1883), W. Hillebrand (Fl. Haw. Isl., 1888, pp. 324-338), or H. St. John. The sections as thus defined for Hawaiian *Cyrtandrae* seem very difficult to reconcile with Gillett's admittedly artificial groups. Until the entire genus has been taxonomically reassessed, it appears to me that weak and informal (regional) groupings of species provide the most satisfactory approach.

Cyrtandra is notorious for its mixed populations and presumed interspecific hybridization, often across "sectional" lines (Wagner et al., 1990). Certainly numerous hybrid populations may be anticipated in Fiji, but at present these can be only speculative; herbarium material has been assigned to one or another species, even when it appears intermediate in many characters, however unsatisfactory the results must appear to a taxonomist. The Fijian population of the genus being doubtless older than the Hawaiian population, the problem of hybridization has perhaps become less intractable, as putative hybrids in the course of time tend either to diminish in volume or completely to absorb the parent populations.

The preceding remarks should not obscure the fact that in Fiji several (or many) taxa of *Cyrtandra* are extraordinarily distinct, to such a degree that one may hypothesize for them separate introductions of ancestral populations and inability to hybridize with any other Fijian congener; different insect pollinators may have secured this stability. Such taxa, among others, are *C. cyathibracteata*, *C. occulta*, *C. cephalophora*, *C. chlorantha*, *C. dolichocarpa*, *C. spathacea*, *C. taviunensis*, *C. montana*, *C.*

denhamii, *C. tempestii*, and *C. prattii*. On the other hand, no fewer than eleven species (as here interpreted) are found on the slopes of Mt. Tomanivi (the highest peak of the archipelago). Although some of these eleven are reasonably distinct in morphology, others are so reticulately interrelated that one may confidently expect the occurrence of a degree of hybridization. A solution to such problems would demand careful field observation and experimental cultivation—a solution now quite improbable because of the deplorable forestry practices of the past two or three decades.

KEY TO SPECIES GROUPS

- Inflorescences capitate to subcapitate, the pedicels concealed by the congested flowers and bracts; bracts, calyces, and corollas gradually decaying and caducous, exposing the white fruits. GROUP 1.
- Inflorescences branching cymes, not capitate or subcapitate, the pedicels visible, not obscured by congested flowers or bracts.
- Calyx persistent, not abscising from the maturing fruit. GROUP 2.
- Calyx deciduous, abscising at or shortly after anthesis.
- Inflorescences branched cymes of dichasia, axillary or borne on stems but lacking an elongated, woody axis.
- Styles and anthers restricted to corolla tube, the filaments 1-4 (-5) mm. long, the anthers not exerted; flowers always ♂, the ovary sessile.
- Calyx with the lobes about as long as the tube (or the lobes lacking if the calyx is spathaceous). GROUP 3.
- Calyx with the lobes 2-5-times longer than the tube. GROUP 4.
- Styles or anthers exerted above corolla tube, displayed in or above the broad corolla throat, the filaments 8-12 mm. long; flowers sometimes unisexual (plants gynodioecious), the ovary borne on a short stalk or gynophore. GROUP 5.
- Inflorescences with an elongate, woody axis to 40 cm. long (frequently forked) arising from lower part of stem or at ground level among adventitious roots, bearing at intervals connate-perfoliate bracts that subtend solitary flowers. GROUP 6.

KEYS TO SPECIES

GROUP 1

- Outer inflorescence bracts fused into a cup-shaped involucre; leaf blades ovate to obovate or oblanceolate, up to 40 × 18 cm.
- Young parts with a pruinose indument, soon glabrate; petioles stout, 1-6 cm. long, winged to base; leaf blades glabrous at maturity, the secondary nerves 7-12 per side; inflorescence peduncles about 1 cm. long, the bracts glabrous without, pilose within with hairs to 2 mm. long; pedicels 10-20 mm. long; calyx about 12 mm. long, glabrous without; corolla at anthesis about 20 mm. long.
1. *C. cyathibracteata*
- Young parts densely sericeous, the hairs septate, noncapitate, up to 7 mm. long; petioles 2-8 cm. long, winged to base; leaf blades densely sericeous beneath, very tardily subglabrate, the secondary nerves 18-22 per side; inflorescence peduncles up to 3.5 cm. long, the bracts pilose on both sides with hairs 2-3 mm. long; pedicels 5-10 mm. long; calyx 20-25 mm. long, densely sericeous on both surfaces; corolla at anthesis 30-35 mm. long. 2. *C. occulta*
- Outer inflorescence bracts free, not fused into a cup-shaped involucre.
- Inflorescences capitate-cylindric, borne on stout peduncles 10-15 mm. long, conspicuously and persistently bracteate, the bracts 5-10 mm. long, rigidly pilose on both surfaces with dark brown, glistening, noncapitate hairs; calyx persistent, about 10 mm. long, pilose like bracts; corolla about 12 mm. long, with 2 clavate, conspicuous staminodes borne near apex of corolla tube; petioles 3-9 cm. long, flattened or grooved above but nonalate; leaf blades lanceolate to ovate, up to 24 × 12 cm., with 5-7 strongly ascending nerves per side, subglabrate. 3. *C. cephalophora*
- Inflorescences spreading, not capitate-cylindric, the peduncle 2-10 mm. long; bracts and calyx glabrous or with pale brown, capitate or noncapitate (but not rigid) hairs; calyx 10-40 mm. long; corolla 15-45 mm. long, the staminodes 2 or 3, borne at approximately the same level as the filaments.
- Outer surfaces of calyx and bracts glabrous or soon glabrate; corolla glabrous or becoming glabrate at maturity; calyx 15-40 mm. long; corolla 17-45 mm. long; petioles 4-25 cm. long, winged nearly to base, glabrous or soon glabrate; leaf blades 40-85 × 12-22 cm. or larger, faintly pubescent to soft-pilose beneath, subglabrate.
- Calyx 15-25 mm. long, long-pilose within; corolla 17-28 mm. long, sericeous without but soon glabrate; petiolar wings gradually broadened to 5-10 mm. on each side of petiole toward its apex; foliar sclereids lacking in hypodermis or mesophyll. 4. *C. vitiensis*

Calyx 35-40 mm. long, weakly pilose within toward base; corolla 40-45 mm. long, glabrous without; petiolar wings more obvious, broadened to 10-20 mm. on each side of petiole toward its apex; foliar sclereids lacking in hypodermis but present in mesophyll. 5. *C. amicta*

Outer surfaces of calyx and sometimes of bracts moderately to densely pilose with capitate or noncapitate hairs; corolla glandular-pilose without at least distally at maturity; calyx 10-25 mm. long; corolla 15-30 mm. long; petioles 3-20 cm. long, not winged, copiously spreading-pilose or villous; leaf blades copiously to moderately pilose beneath, persistently so or tardily subglabrate.

Petiole 3-10 cm. long, with copious, spreading, brown, pluriseptate hairs 0.5-0.8 (-2) mm. long, these shorter than petiole diameter; leaf blades 20-37 × 7.5-15 cm., copiously pilose on both surfaces with hairs to 1.5 mm. long; inflorescence bracts 6-10 mm. in diameter, essentially glabrous; calyx 15-17 cm. long, pilose without with hairs 0.5-1 mm. long; corolla white, 20-25 mm. long, glandular-pilose without with hairs 0.5-1 mm. long, glabrous within; staminodes 2.

6. *C. leucantha*

Petiole with copious, spreading, brown, multiseptate, capitate and noncapitate hairs 2-6 mm. long, these longer than petiole diameter; leaf blades dispersed-pilose on both surfaces with hairs 1.5-3 mm. long; corolla greenish white (or white) to bright green; staminodes 3.

Corolla bright green, 15-22 mm. long, without finely glandular-pilose with hairs 2-3 mm. long, glabrous within; calyx 15-18 mm. long, pilose without with hairs 2-3 mm. long; inflorescence bracts 12-16 mm. long, sparsely pilose on both surfaces with capitate-glandular hairs 1-2 mm. long; petiole 3-5 cm. long; leaf blades 14-19 × 5-8 cm. 7. *C. chlorantha*

Corolla greenish white to white, 20-30 mm. long, with glandular and nonglandular hairs on both surfaces; calyx 10-25 mm. long, with capitate hairs on both surfaces; inflorescence bracts to 20 × 10 cm., sparsely to densely capitate-glandular without, glabrous within; petiole to 20 cm. long; leaf blades up to 50 × 21 cm. 8. *C. milnei*

GROUP 2

Fruit narrowly cylindric, up to 5.5 cm. long and 5-7 mm. in diameter, scarcely tapering proximally; indument of young parts, foliage, and inflorescences composed of ferruginous, septate, capitate and noncapitate hairs up to 6 mm. long; petioles 1-5 cm. long; leaf blades lanceolate-ovate, up to 21 × 6 cm., pilose on both surfaces but densely so beneath; calyx cylindric, 20-30 mm. long, the lobes connivent except along 1 or 2 sinuses; corolla up to 55 mm. long, distinctly bilabiate, the limb capitate-pilose on both surfaces. 9. *C. dolichocarpa*

Fruit fusiform to ellipsoid or ovoid, up to 2.5 cm. long, conspicuously tapering to base of style; calyx lobes not connivent; corolla to 35 mm. long, not bilabiate.

Calyx cylindric to utricle or ventricose, concealing the fruit, the lobes erect.

Leaf blades densely pilose on both surfaces with multiseptate hairs to 7 mm. long, at length subglabrate above but retaining indument on venation beneath; branches distally terete or obscurely and obtusely 4-angled.

Indument composed of hairs up to 3 mm. long, the hairs of the petiole subequal to petiole diameter; calyx ventricose, 30-35 mm. long; corolla with coarse, noncapitate hairs without, glabrous within; fruit fusiform, up to 25 × 10 mm.; leaf blades elliptic to obovate, 20-30 × 7-10 cm.

10. *C. multiseptata*

Indument composed of hairs up to 7 mm. long, the hairs of the petiole 2-3-times as long as petiole diameter; calyx persistently cylindric, 15-22 mm. long, constricted at throat; corolla glabrous on both surfaces; fruit ovoid, about 12 × 7 mm.; leaf blades ovate to lanceolate-ovate, up to 22 × 12 cm. 11. *C. ventricosa*

Leaf blades lanceolate to elliptic or ovate, up to 23 × 8 cm., essentially glabrous above but densely brown-sericeous beneath with septate hairs up to 1 mm. long, at length glabrate beneath and then with conspicuous veins perpendicular to primary veins; branches distally sharply quadrangular; calyx up to 35 mm. long; fruit ovoid, about 20 × 10 mm. 12. *C. acutangula*

Calyx campanulate to cylindric, not concealing the developing fruit, the lobes spreading.

Indument of stems, foliage, and inflorescences composed of brown, appressed-sericeous, noncapitate hairs 1-3 mm. long; leaf blades up to 32 × 16 cm.; inflorescences often 3(1-4)-flowered; calyx densely pilose on both surfaces, 15-18 mm. long; corolla 20-25 mm. long.

Distal portion of branchlets coarse, woody (pith only 1/3-1/4 the diameter of stem); inflorescences often borne on trunk and branches, sometimes axillary, the bracts connate into an involucre, up to 10 mm. long; petioles 1-5 cm. long; calyx lobes 5-7 mm. long; corolla lobes 5-8 mm. long and broad; staminodes 3; ovary and style about 12 mm. long. 13. *C. trichophylla*

Distal portion of branchlets slender; inflorescences axillary, the bracts lanceolate, about 15 mm. long, not connate; petioles 4-12 cm. long, slender; calyx lobes 8-11 mm. long; corolla lobes 2-3 mm. long and broad; staminodes 2; ovary and style 7-14 mm. long. 14. *C. muskarimba*

Indument of stems, foliage, and inflorescences composed of ferruginous or light brown, spreading, velutinous hairs 2-8 mm. long.

Calyx white, 17-35 mm. long at anthesis, enlarging to 50 mm. long in mature fruit, somewhat bilabiate, copiously sericeous within toward base, the lobes thick, coriaceous; corolla 30-40 mm. long; ovary and style about 18 mm. long; fruit ovoid, up to 2 × 1.5 cm.; petioles 2-6 cm. long; leaf blades up to 35 × 15 cm.; peduncles 0.5-1 cm. long, the bracts 3-5 cm. long, subtending 2-4 flowers. 15. *C. victoriae*

Calyx 10-25 mm. long at anthesis, not enlarging in fruit, not bilabiate, the lobes foliaceous; corolla 20-30 mm. long; ovary and style 10-12 mm. long.

Petioles to 10 cm. long; leaf blades ovate (sclereids present in mesophyll), up to 28 × 13 cm., cuneate or obtuse at base; peduncles 1-3 cm. long, the bracts up to 40 mm. long; pedicels 5-20 mm. long; calyx 12-25 mm. long, the lobes half or 2/3 its length; fruit ovoid, about 3 × 1.8 cm.

16. *C. chippendalei*

Petioles up to 6 cm. long; leaf blades oblong-lanceolate (sclereids lacking from mesophyll), 15-35 × 2.5-9 cm., long-attenuate at base; peduncles essentially none, the bracts small, up to about 4 mm. long; pedicels 1-5 mm. long; calyx 10-20 mm. long, the lobes 4-10 mm. long; fruit subglobose or ellipsoid, about 1-1.5 × 0.8-1.3 cm. 17. *C. tomentosa*

GROUP 3

Calyx spathaceous, membranous, 15-17 mm. long, with a single cleft nearly to base; corolla campanulate, 25-33 mm. long; filaments 2-5 mm. long; staminodes 3; ovary and style about 15 mm. long; fruit up to 12 × 8 mm.; indument of young parts composed of dark brown hairs about 0.2 mm. long; petioles 1.5-8 cm. long; leaf blades oblong-elliptic, 22-25 × 12-14 cm.; inflorescences borne on trunk or branches, less often associated with leaves, 1-4-flowered. 18. *C. spathacea*

Calyx not spathaceous, variously cleft or lacerated.

Inflorescences open branching cymes with (2-) 4-8 or more flowers.

Petioles 2-9 cm. long, the leaf blades oblong-elliptic, 14-25 × 6-14 cm., densely pilose on nerves; peduncles 3-9 cm. long, the pedicels 1-4 cm. long; calyx divided approximately half its length, with ovate lobes, sparsely pubescent without with capitate and noncapitate hairs; corolla 15-27 mm. long, minutely pale-puberulent without, glabrous within; filaments 2-3 mm. long; ovary and style 10-12 mm. long. 19. *C. kandavuensis*

Petioles 1-3 cm. long, the leaf blades lanceolate to ovate, to 15 × 7 cm., essentially glabrous on both surfaces; peduncles 1-6 cm. long, the pedicels to 6 cm. long; calyx divided 1/3-1/2 its length, with deltoid-lanceolate, attenuate lobes, glabrous or very early glabrate on outer surface; corolla about 40 mm. long, glabrous without, capitate-glandular-pilose within; filaments 4-5 mm. long; ovary and style about 15 mm. long. 20. *C. natewaensis*

Inflorescences comparatively compact or slender (if elongated), with 1-3 (-4) flowers.

Bracts terminating the peduncle ovate, connate-perfoliate, foliaceous, deciduous, 5-15 mm. long, the peduncle 3-45 mm. long, the pedicels to 20 mm. long; calyx 6-11 mm. long, pilose on both sides, the lobes lanceolate, about half as long; corolla about 15 mm. long, copiously pilose without; ovary and style about 10 mm. long, the style with capitate hairs; fruit about 20 × 12 mm.; indument of leaves and inflorescences copious on young parts, the hairs about 1 mm. long, dark brown; petioles up to 5 cm. long; leaf blades lanceolate to elliptic, up to 20 × 10 cm. 21. *C. involucrata*

Bracts terminating the peduncle free, 2-15 mm. long, the peduncle 1-60 mm. long, the pedicels 3-30 mm. long.

Corolla with dense outer indument of capitate or noncapitate hairs.

Outer surface of corolla with dense, ascending, noncapitate hairs (hairs of inner surface capitate).

Indument of young parts golden-brown, velutinous, the hairs up to 1.5 mm. long; petioles 1-5 cm. long; leaf blades ovate-lanceolate, up to 30 × 12 cm., the secondary nerves 8-12 per side; peduncles 1-30 mm. long; calyx 5-7 mm. long; corolla 12-15 mm. long.

22. *C. anthropophagorum*

Indument of young parts light to dark brown, spreading, the hairs 0.4-0.7 mm. long; petioles (0.5-) 1-2.5 (-3) cm. long; leaf blades lanceolate or lanceolate-elliptic, (6-) 10-19 × 2.5-5 (-6) cm., the secondary nerves 5-8 per side; peduncles (10-) 20-60 mm. long; calyx 10-14 mm. long; corolla 18-24 mm. long. 23. *C. jugalis*

Outer surface of corolla pilose with capitate-glandular hairs (hairs of inner surface similar), the corolla about 18 mm. long; ovary and style about 12 mm. long; fruit about 10 × 6 mm.; indument of young parts brown, densely sericeous, the hairs to 0.5 mm. long, mostly evanescent; petioles to 6 cm. long; leaf blades lanceolate to elliptic, up to 21 × 7 cm., subglabrate except for nerves beneath; peduncles 6-12 mm. long, the bracts lanceolate, about 4 mm. long, caducous, the pedicels 5-15 mm. long; calyx about 8 mm. long.

24. *C. reticulata*

Corolla glabrous without.

Calyx 8-16 mm. long, irregularly splitting or lacerated into 2 or 3 unequal lobes, glabrate without, pilose within with ascending, noncapitate hairs; leaf blades lanceolate to elliptic or ovate, (4-) 6-22 × (2-) 3-10 cm., copiously puberulent or tomentose beneath at least on nerves, at length subglabrate; petioles (0.5-) 1-3 (-3.5) cm. long; pedicels 3-15 mm. long; corolla 20-25 mm. long; fruit 15-25 × 8-15 mm.

Inflorescences 1-4-flowered; calyx thick and fleshy, becoming coriaceous in drying, the lobes ovate-deltoid; corolla glabrous within; staminodes about 0.5 mm. long. .25. *C. esothrix*

Inflorescences 1-flowered; calyx thin, not fleshy, not drying coriaceous, the lobes lanceolate-attenuate; corolla minutely glandular-pilose within; staminodes about 1.5 mm. long.

26. *C. hornei*

Calyx 4-8 (-13) mm. long, divided into equal, valvate lobes; leaf blades glabrous on both surfaces or minutely and very closely pilose beneath on costa and secondaries.

Fruit orange to bright red, 15-17 × about 10 mm.; inflorescences filiform, 1-3-flowered, with 2-5 pairs of obvious bracts spaced along the very slender peduncles but mostly not subtending inflorescence branches or flowers; corolla white to greenish white, 10-16 mm. long; style glabrous; petioles 0.4-2.5 cm. long; leaf blades lanceolate to elliptic or ovate, (9-) 14-23 × (2-) 3.5-6 cm.

Young stems glabrous, wrinkled when dry and then with a flaky surface; inflorescence bracts lanceolate, 10-15 mm. long, about 4 mm. broad, with 1 or 3 longitudinal nerves.

27. *C. taviunensis*

Young stems ferruginous-tomentose but glabrescent, drying to a smooth surface; inflorescence bracts linear to oblanceolate, subulate, 2-7 mm. long, 0.8-1.2 mm. broad, 1-nerved. 28. *C. montana*

Fruit white, 15-20 × 6-12 mm.; inflorescences not filiform, 1-3-flowered, mostly borne on older branchlets, terminated by a single pair of minute, caducous bracts about 0.5 mm. long; corolla white, 15-18 mm. long; style with indument of capitate hairs; petioles 1-2.5 (-4.5) cm. long; leaf blades elongate-elliptic or lanceolate, 8-25 × 2-8 cm. .29. *C. pritchardii*

GROUP 4

Calyx white, 10-15 mm. long, cleft nearly to base into 5 linear or lanceolate lobes; indument of young parts of short, noncapitate hairs up to 0.25 mm. long.

Petioles 1-3 cm. long; leaf blades lanceolate to elliptic, up to 19 × 6 cm., the secondary nerves 5-7 per side; inflorescences with peduncles 4-9 cm. long terminated by a pair of lanceolate to ovate bracts up to 15 mm. long subtending pedicels 5-30 mm. long; calyx at maturity glabrous without; corolla about 10 mm. long, with capitate hairs on both surfaces; style with a dense indument of capitate hairs; mature fruit to 25 × 13 mm. 30. *C. denhamii*

Petioles 5-7 cm. long; leaf blades ovate, up to 20 × 10 cm., the secondary nerves 8-10 per side; inflorescences with peduncles 0.5-1.5 cm. long terminated by a pair of minute bracts subtending 2-4 branches, the pedicels 10-20 mm. long; calyx at maturity puberulent without with dark brown, noncapitate hairs; corolla about 20 mm. long, glabrous without, with capitate hairs within; style glabrous; mature fruit to 16 × 10 mm. 31. *C. tempestii*

Calyx green to white, 4-10 mm. long, cleft nearly to base or about 2/3 its length into 5 linear or lanceolate lobes but these not exceeding 8 mm. in length; indument of young parts of comparatively elongate, noncapitate hairs often 1-7 mm. long; corolla 10-27 mm. long, pilose with capitate hairs without and glabrescent; fruit white, up to 18 × 10 mm.

Inflorescences comparatively elongate, the peduncles 5-50 mm. long, terminated by linear bracts 1-2 mm. long, the pedicels 8-50 mm. long; calyx 4-8 mm. long, glabrous without, the lobes with rounded apices; corolla 20-27 mm. long; young parts with noncapitate hairs up to 1 mm. long; petioles 2-6 cm. long; leaf blades lanceolate to ovate, up to 28 × 12 cm., glabrous above, tomentose beneath on veins and margins. 32. *C. ciliata*

Inflorescences comparatively compact, the peduncles 3-30 mm. long, terminated by lanceolate-ovate bracts 15-17 mm. long, the pedicels 5-15 mm. long; calyx 5-10 mm. long, the outer surface with dense, velutinous indument, the lobes acute to acuminate; leaf blades pilose on both surfaces.

Indument of young parts composed of dark brown hairs 0.8-1.5 mm. long; petioles 0.5-3 cm. long; leaf blades lanceolate to elliptic, (8-) 11-18 × (3-) 4-6 cm.; inflorescences with the peduncle 5-30 mm. long terminated by a pair of connate bracts up to 17 × 5 mm.; corolla 22-25 mm. long; staminodes 2, about 1.5 mm. long; ovary and style 8-11 mm. long. 33. *C. xanthantha*

Indument of young parts composed of ferruginous hairs 2-7 mm. long; petioles 1-5 cm. long; leaf blades lanceolate to elliptic-oblong, 10-22 × 4-8 cm.; inflorescences with the peduncle 3-12 (-15) mm. long terminated by a pair of lanceolate-ovate bracts 15-17 mm. long and, within them, several smaller bracts 7-10 mm. long; corolla 10-16 mm. long; staminodes 3, about 0.5 mm. long; ovary and style 5-6 mm. long. 34. *C. aloisiana*

GROUP 5

Indument of young parts composed of dark brown, closely appressed, noncapitate hairs 0.2–1 mm. long, these sparse but evident on mature foliage and inflorescences; petioles 2–9 cm. long; leaf blades lanceolate to ovate, up to 25 × 10 cm.; inflorescences usually associated with foliage, the peduncles 3–15 mm. long, the bracts 2–3 mm. long; calyx 7–12 mm. long, cleft nearly half its length into ovate or lanceolate lobes; corolla 20–30 mm. long, the tube and very short lobes with conspicuous capitate hairs without, glabrous within; staminodes 3, about 1 mm. long. 35. *C. harveyi*

Indument of young parts pruinose, the vegetative and inflorescence parts glabrous; petioles 1–6 cm. long; leaf blades elliptic to ovate, 14–20 × 4–9 cm.; inflorescences borne on leafless stems, the peduncles 1 mm. long or essentially none, the bracts less than 0.5 mm. long, caducous; calyx about 10 mm. long, with short, irregular lobes; corolla 25–35 mm. long with lobes about 5 mm. long, glabrous on both surfaces; staminodes 2, about 2.5 mm. long. 36. *C. coleoides*

GROUP 6

A single species in Fiji; indument of young parts pilose with noncapitate hairs less than 1 mm. long, the foliage glabrate; petioles stout, 1–3.5 cm. long; leaf blades lanceolate to elliptic, 16–22 × 5–9 cm.; inflorescence bracts about 8 × 3 mm., the pedicels 3–7 mm. long; calyx and corolla densely appressed-pilose without; calyx 15–20 mm. long, cleft about half its length into unequal, lanceolate lobes; corolla 18–30 mm. long; fruit white, ovoid, 14–20 × 5–12 mm. 37. *C. prattii*

1. *Cyrtandra cyathibracteata* Gillett in Contr. U. S. Nat. Herb. 37: 117. 1967; J. W. Parham, Pl. Fiji Isl. ed. 2. 340. 1972.

Shrub about 2 m. high, with a stem approximately 2 cm. in diameter, apparently rare along creeks in dense forest at an elevation of about 500 m. The corolla and fruits are white and were observed only in August.

TYPIFICATION: The type is *St. John 18191* (BISH HOLOTYPE; ISOTYPES at BISH, US), collected Aug. 3, 1937, near Matawailevu, Wainamo Creek, Wainimala River Valley, Naitasiri Province, Viti Levu.

DISTRIBUTION: This apparently rare species is still known only from the type collection.

LOCAL NAME: *Tavo*.

The closest relationship of *Cyrtandra cyathibracteata* seems to be with the Samoan *C. pogonantha* A. Gray (Gillett, 1973, p. 23), but the alliance seems not to extend farther eastward.

2. *Cyrtandra occulta* A. C. Sm. in J. Arnold Arb. 34: 39. 1953; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 342. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 118. 1967.

Simple-stemmed shrub 1–3 m. high, infrequent in dense forest at elevations of 250–1,300 m. The bracts and calyx are white or greenish white with brown indument, and the corolla and young fruit are white. Flowers have been noted in September, fruits in July and September.

TYPIFICATION: The species is based on *Smith 5913* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Sept. 6, 1947, on the upper western slopes of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from central and north-central Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Tomanivi, *Parks 20841*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8507*. NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5927*.

The only close relationship of *Cyrtandra occulta* seems to be with the preceding Fijian species, but the two are sharply distinct in indument, flower size, etc.

3. *Cyrtandra cephalophora* Gillespie in Bishop Mus. Bull. 74: 21. fig. 26. 1930; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 340. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 119. 1967.

Aporosa sp. A. C. Sm. in Bishop Mus. Bull. 141: 84. 1936; J. W. Parham, Pl. Fiji Isl. 124. 1964.

Shrub 2–3 m. high, infrequent in dense forest at elevations of 150–1,150 m. The corolla is white, the fruits pale green or orange. Flowers and fruits have been found between July and September, fruits persisting until November.

TIPIFICATION: The type is *Gillespie 3121* (BISH HOLOTYPE; ISOTYPES AT BISH, K, NY, UC), collected Sept. 28, 1927, just below the summit of Mt. Naitarandamu, Namosi Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji but uncommon, known from central and southern Viti Levu and also from interior Vanua Levu.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Below Korolevaleva, *DA 1464*. NAITASIRI: Tamavua, *Gillespie 2416*. NAITASIRI-REWA boundary: Mt. Kombalevu, *Parks 20924*. VANUA LEVU: THAKAUNDOVE: Mt. Mariko, *Smith 463*.

Cyrtandra cephalophora seems a species without close relatives, readily distinguished by its capitate-cylindric and persistently bracteate inflorescences and its rigid indument. The ill-advised reference to *Aporosa* (Euphorbiaceae) refers entirely to *Smith 463*; unfortunately this record was picked up by van Balgooy (in *Blumea Suppl. 6*: 171. 1971); the genus *Aporosa* may be excluded from Fiji.

4. *Cyrtandra vitiensis* Seem. in *Bonplandia 9*: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; A. Gray in *Proc. Amer. Acad. Arts 6*: 41, nom. nud. 1862; Seem. *Fl. Vit.* 182. 1866; Horne, *A Year in Fiji*, 260. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 234. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 257. 1892; J. W. Parham, *Pl. Fiji Isl.* 253. 1964, ed. 2. 344, p. p. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 120, p. p., excl. syn. 1967; Burt & Bokhari in *Notes Roy. Bot. Gard. Edinburgh 32*: 400. 1973.

Succulent, simple-stemmed shrub or coarse herb 1.5–5.5 m. high, occurring in dense forest, often along creeks, from low elevations (perhaps about 200 m.) to about 1,300 m. The bracts and bracteoles are white and greenish-tinged, the calyx is white or greenish white, the corolla is white to pale yellow, and the fruit is at length white or turning brownish. Flowers and fruits have been collected between April and November.

TIPIFICATION: The type is *Seemann 277* (K HOLOTYPE; ISOTYPE AT GH), collected in August or September, 1860, near Namosi, Namosi Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from Viti Levu, where it occurs from the southern and southeastern hills northward through the center of the island to the vicinity of Nandarivatu and Mt. Tomanivi.

LOCAL NAMES: *Mbeta mbiambi*, *mendiri tambua*, *tulenga*, *kombi ni ura*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Smith 5048*; upper western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Stauffer & Koroiveibau 5830*; Nandala Creek, *Degener 14925*; between Nggalivana and Nandala Creeks, south of Nauwanga, *Smith 5848*; slopes of Mt. Tomanivi, *Smith 5103, 5315*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5654*. SERUA: North of Korovou, *St. John 18941*; Ngaloa Nature Reserve, *DA 16594*. NAMOSI: Northern drainage of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8649*; Wainivisoa Creek, Navunikambi, *DA 14994*; Wainikoro Creek, *DA 16164*; Wainisarava Creek, *DA 14584*; vicinity of Namosi, *Parks 20239, 20271*; slopes of Mt. Voma, *Gillespie 2480*; hills east of Wainikoroi-luva River, near Namuama, *Smith 8940*. NAITASIRI: Wainamo Creek, near Matawailevu, Wainimala Valley, *St. John 18184*; Tamavua-Sawani road, *Setchell & Parks 15156*. REWA: Lami (probably slopes of Mt. Korombamba), *Tothill 649*; "Suva" (probably hills in vicinity), *Tothill 642*. VITI LEVU without further locality, *Parks 20429*.

Toward the northern part of its range this species is sympatric with *Cyrtandra amicta*, and it is not surprising that Gillett (1967) found it desirable to combine the two taxa; he believed that differences in the size of the calyx and corolla provided the only separation between them and that such variation was of minor consequence. However,

I find that there are correlative and reasonably constant differences in pubescence of flowers and robustness of petioles. The separating characters are certainly not entirely convincing, but in the present state of our knowledge I am inclined to retain *C. amicta* as a taxon distinct from *C. vitiensis*. In this decision some support is derived from the study of foliar sclereids by Burt and Bokhari (1973, p. 400). Several species of *Cyrtandra* are known from the slopes of Mt. Tomanivi and adjacent areas, and it is almost certain that hybrids among them occur. Detailed field studies will be required to provide an understanding of the relationships of such species.

5. *Cyrtandra amicta* A. C. Sm. in J. Arnold Arb. **34**: 38. 1953; J. W. Parham, Pl. Fiji Isl. 247. 1964; Burt & Bokhari in Notes Roy. Bot. Gard. Edinburgh **32**: 400. 1973.

Simple-stemmed shrub 1.5–4 m. high, infrequent in dense, wet forest at elevations of 850–1,300 m.; bracts, calyx, and corolla white; fruit becoming white at maturity. Flowers and fruits have been obtained between May and November.

TYPIFICATION: The type is *Smith 5914* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected in flower and fruit Sept. 6, 1947, on the upper western slopes of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known with certainty only from northwestern and north-central Viti Levu at high elevations.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 319*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4243, 4244*; hills east of Nandala Creek, south of Nandarivatu, *Smith 6223*; near summit of Mt. Tomanivi, *Gillespie 4095*; upper slopes of Mt. Tomanivi, *Webster & Hildreth 14189*.

6. *Cyrtandra leucantha* A. C. Sm. in J. Arnold Arb. **34**: 41. 1953; J. W. Parham, Pl. Fiji Isl. 250. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 122. 1967.

Succulent herb, suffruticose toward base, or simple-stemmed or sparingly branched shrub 1–3 m. high, occurring in dense forest at elevations between approximately 300 and 1,100 m.; bracts, calyx, corolla, and fruit white. Flowers and fruits have been obtained in scattered months between February and November.

TYPIFICATION: The species was based on *Smith 6312* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected in flower Oct. 2, 1947, on the western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and now known from central and north-central Viti Levu and Taveuni. Only Viti Levu specimens were first referred to the species, but Gillett added to his concept of the species by including material from the "crater lake" area of Taveuni; I believe this to be correctly placed, although Fijian species of *Cyrtandra* do not usually show this type of distribution.

LOCAL NAMES: *Mbeta, mbeta kai*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Degener & Ordenez 13523*; slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Tothill 644, Gillespie 3689, Smith 4767*; Nandala, south of Nandarivatu, *Degener 14836*. NAITASIRI: Track to Mendrausuthu Range, *DA 15026*. TAVEUNI: Vicinity of Somosomo (doubtless hills east of), *Gillespie 4780*; hills east of Somosomo, west of old crater occupied by small swamp and lake, *Smith 8375, DA 14392*; valley between Mt. Manuka and main ridge of island, east of Wairiki, *Smith 8253*.

7. *Cyrtandra chlorantha* A. C. Sm. in J. Arnold Arb. **34**: 42. 1953; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 340. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 123. 1967.

Shrub 3–4 m. high, apparently rare in dense forest at an elevation of 870–970 m.; bracts, bracteoles, and calyx pale green; corolla bright green; anthers white; young fruit green.

TYPEFICTION: The type is *Smith 5789* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Aug. 21, 1947, on the northern portion of the Rairaimatuku Plateau between Mt. Tomanivi and Nasonggo, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the type collection.

8. *Cyrtandra milnei* Seem. ex A. Gray in Proc. Amer. Acad. Arts 6: 40. 1862; Horne, A Year in Fiji, 260. 1881; C. B. Clarke in DC. Monogr. Phan. 5: 230. 1883; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 342. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 124. 1967.

Cyrtandra des-voeuxii Horne, A Year in Fiji, 260, nom. nud. 1881.

Cyrtandra desvoeuxii Horne ex C. B. Clarke in DC. Monogr. Phan. 5: 265. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 252. 1892; J. W. Parham, Pl. Fiji Isl. 249. 1964.

Cyrtandra vitiensis sensu Gibbs in J. Linn. Soc. Bot. 39: 158. 1909; non Seem.

Cyrtandra glandulosa Gillespie in Bishop Mus. Bull. 74: 22, fig. 28. 1930; J. W. Parham, Pl. Fiji Isl. 249. 1964.

Unbranched or simple-stemmed shrub or coarse herb 1–4 m. high, occurring in dense forest, usually in damp places, at elevations of 250–1,323 m.; bracts pale green; calyx pale green to greenish white or white; corolla pale yellow to white; fruits white. Flowers and fruits have been obtained in months scattered throughout the year.

TYPEFICTION AND NOMENCLATURE: The type of *Cyrtandra milnei* (which name Gray derived from Seemann lists mentioning *Seemann 281*, actually now referred to *C. chippendalei*; in fact neither Seemann nor Milne appears to have collected the present species) is *U. S. Expl. Exped.* (US 9951 HOLOTYPE; ISOTYPE at GH), collected in Fiji in 1840 without further locality. Gillett (1967) designated Ovalau as the type locality on the basis of "indirect evidence;" his conclusion may indeed be correct, since the species is known from Ovalau. *Cyrtandra desvoeuxii* is based on *Horne 179* (K HOLOTYPE; ISOTYPE at GH), collected in January, 1878, in the Lovoni Valley of Ovalau; at the time of Horne's visit Desvoeux was Lieutenant Governor of Fiji. The type of *C. glandulosa* is *Gillespie 3852* (BISH HOLOTYPE; ISOTYPES at BISH, UC), obtained Nov. 17, 1927, in the vicinity of Nandarivatu, Mba Province, Viti Levu. I believe that Gillett correctly combined the type material of these taxa, although some of the specimens cited by him in 1967 are in my opinion better placed in *C. vitiensis* and *C. amicta*.

DISTRIBUTION: Endemic to Fiji and now known from three of the high islands.

LOCAL NAMES: *Mbeta*, *mbeta levu*, *mendiri tambua*, *kau mbimbi*.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4129*; vicinity of Nandarivatu, *Greenwood 319A*, *Tohill 646* (coll. *W. Teulon*), *Gillespie 4253*; Nauwanga, south of Nandarivatu, *Degener 14686*; slopes of Mt. Tomanivi, *Smith 5101*, *Gillespie 4108*, *Degener 14335a*, *DA 13071*, *14656*; summit of Mt. Tomanivi, *Gibbs 797*. SERUA: Summit of Mt. Tuvutau, *DA 14499*; near summit of Mt. Tikituru, *DA 14483*. NAMOSI: Hills east of Wainikoroiluva River, near Namuamua, *Smith 8963*; vicinity of Namosi, *Gillespie 2601*; track to Mt. Voma, *DA 577*; near summit of Mt. Voma, *Gillespie 2749*. NAITASIRI: Tholo-i-suva, *DA 982*. KANDAVU: Summit of Mt. Mbuke Levu, *Smith 287*. OVALAU: Near summit of main range west of Levuka, *Gillespie 4445*. FIJI without further locality, *Greenwood 321*.

9. *Cyrtandra dolichocarpa* A. Gray in Proc. Amer. Acad. Arts 6: 40. 1862; Seem. Fl. Vit. 183. 1866; Horne, A Year in Fiji, 260. 1881; C. B. Clarke in DC. Monogr. Phan. 5: 284. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 252. 1892; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 126. 1967.

Cyrtandra microstigma C. B. Clarke in DC. Monogr. Phan. 5: 284. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 255. 1892; J. W. Parham, Pl. Fiji Isl. 251. 1964.

Coarse herb or shrub or small, spreading tree 1–4 m. high, with succulent branchlets, found in dense forest from near sea level to about 850 m.; flowers borne on stems and also with leaves, the calyx and corolla white. Flowers have been collected between April and November, fruits only in May (but month not known for type material).

TIPIFICATION: The type of *Cyrtandra dolichocarpa* is *U. S. Expl. Exped.* (us 9952 HOLOTYPE; ISOTYPE at GH), collected in 1840 at Mbua Bay (doubtless inland from), Mbua Province, Vanua Levu. For *C. microstigma* Clarke designated *Horne 439* and *439a*, both from the island of Rambi; Gillett did not see the latter and designated them as syntypes. The two specimens, both at K, are equally good, but no. *439a* is better documented, a suitable citation being: *Horne 439a* (K LECTOTYPE), collected in May, 1878, on Rambi about 100 feet above sea level.

DISTRIBUTION: Endemic to Fiji and thus far known only from Vanua Levu and the adjacent island of Rambi.

LOCAL NAME: *Muskarimba*.

AVAILABLE COLLECTIONS: VANUA LEVU: MBUA: Upper Ndama River Valley, *Smith 1594*; above Nandi, *Milne 257*. MATHUATA: Northwestern slopes of Mt. Numbuloa, east of Lambasa, *Smith 6530*. THAKAUNDROVE: Track to Mt. Nasoroalevu, *DA 17144*; southwestern slope of Mt. Mbatini, *Smith 612*; Waiwai (doubtless inland from), Savusavu Bay, *Horne 578*.

Cyrtandra dolichocarpa, one of the most beautiful Fijian species of the genus, is highly distinctive for its connivent calyx lobes, very large and bilabiate corolla, and narrowly cylindrical fruits.

10. *Cyrtandra multiseptata* Gillespie in Bishop Mus. Bull. 74: 23. fig. 31. 1930; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 342. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 127. 1967.

Shrub or slender tree 2–4 m. high, occurring at elevations of about 200–1,000 m. in dense forest, usually on creek banks and in wet canyons; calyx greenish white and brown-pilose; corolla white; fruit white at maturity. Flowers have been obtained between April and June, fruits in the same months and persisting until October.

TIPIFICATION: The type is *Parks 20237* (BISH HOLOTYPE; ISOTYPES at SUVA, UC, US), obtained in June, 1927, near Namosi, Province of Namosi, Viti Levu.

DISTRIBUTION: Endemic to Fiji and now known only from north-central to south-central Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 6327*; slopes of Mt. Tomanivi, *Smith 5102*. SERUA: Inland from Namboutini, *DA 13991*; inland from Ngaloa, *DA 16566*. NAMOSI: Track to Mt. Voma, *DA 1804*.

11. *Cyrtandra ventricosa* Gillett in Contr. U. S. Nat. Herb. 37: 128. 1967; J. W. Parham, Pl. Fiji Isl. ed. 2. 344. 1972.

Subligneous herb or shrub 1–2 m. high, infrequent in dense forest at elevations of 100–850 m.; flowers borne on stems and also associated with leaves; corolla cream white to greenish white. Flowers have been obtained between November and May, fruits in December and January.

TIPIFICATION: The type is *Smith 368* (BISH HOLOTYPE; many ISOTYPES), collected Nov. 11, 1933, on the southern slope of the Valanga Range, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and thus far known from eastern Vanua Levu, Taveuni, and Yathata, the last an island of the northern Lau Group but the closest of the Group to Taveuni.

LOCAL NAME: *Merikula*.

AVAILABLE COLLECTIONS: VANUA LEVU: THAKAUNDROVE: Vatunivuaomonde Mt., Savusavu Bay region, *Degener & Ordenez 13968*. TAVEUNI: Above Nggathavula Estate, *DA 16930*. YATHATA: Navakathuru, *DA 16301*.

12. *Cyrtandra acutangula* Seem. in *Bonplandia* 9: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; A. Gray in *Proc. Amer. Acad. Arts* 6: 41, nom. nud. 1862; Seem. *Fl. Vit.* 182. 1866; Horne, *A Year in Fiji*, 260. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 229. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 251. 1892; J. W. Parham, *Pl. Fiji Isl.* 247. 1964, ed. 2. 340. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 129. 1967.

Cyrtandra utriculosa C. B. Clarke in *DC. Monogr. Phan.* 5: 230. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 256. 1892; J. W. Parham, *Pl. Fiji Isl.* 252. 1964.

Shrub 2–3 m. high, found sparingly and locally in dense forest at elevations of about 200–1,000 m. Flowers have been collected in March, fruits in March, August, and September.

TYPIFICATION AND NOMENCLATURE: *Cyrtandra acutangula* (mentioned several times before it was described by Seemann in 1866) was based on *Seemann 276* (κ HOLOTYPE; ISOTYPE at GH), collected between Aug. 22 and Sept. 2, 1860, in mountains near Namosi, Namosi Province, Viti Levu. The type of *C. utriculosa* is *Horne 911* (κ HOLOTYPE; ISOTYPE at GH), obtained in August, 1878, along Vienungga Creek, Namosi Province, Viti Levu. I believe that Gillett correctly combined these two names in recognizing a single highly distinctive species.

DISTRIBUTION: Endemic to Fiji and thus far known only from Namosi Province, in south-central Viti Levu. (The two Parks collections here cited, without locality, may also have come from the vicinity of Namosi, where he spent some time.)

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Mt. Naitarandamu, *Gillespie 3120*; slopes of Korombasambasanga Range, *DA 2159*. VITI LEVU without further locality, *Parks 20954, 20478*.

13. *Cyrtandra trichophylla* A. C. Sm. in *J. Arnold Arb.* 34: 44. 1953; J. W. Parham, *Pl. Fiji Isl.* 251. 1964, ed. 2. 344. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 130. 1967.

An often slender tree or shrub 1.5–6 m. high, sometimes locally frequent in dense forest, often along creeks, at elevations of 100–1,160 m.; calyx green, with brown indument; corolla, stamens, and fruit white, the last up to 4 × 2.5 cm. Flowers and fruits have been obtained between June and October.

TYPIFICATION: The type is *Smith 5698* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Aug. 18, 1947, on the ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, Ra Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from north-central to south-central and southeastern Viti Levu.

LOCAL NAMES AND USE: *Mbulambula ti masoko*, *mandiri tambua*; bark of the roots and stems, together with the leaves, are mashed in water and used as an internal medicine.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills east of Nandala Creek, south of Nandarivatu, *Smith 6246*. SERUA: Natukatambua, upper Navua River, *DA 15534*. NAMOSI: Slopes and summit of Mt. Naitarandamu, *Gillespie 3243, 3244, 3303, 3378*; hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8544*; vicinity of Namosi, *Parks 20269, Gillespie 2595, 2690, Weiner 15A*; summit of Mt. Vakarongasiu, *Gillespie 3289*. NAITASIRE: Wainisavulevu–Numbulolo divide, Wainimala Valley, *St. John 18324*; Naisonggo, *DA 15310*; Waimanu River region, *DA 15441, 15801*; Central road, *Tohill 564*; vicinity of Tamavua, *Gillespie 2116, 2455*. REWA: Mt. Korombamba, *Parks 20138, Gillespie 2257*. FIJI without further locality, *Horne 547*.

14. *Cyrtandra muskarimba* A. C. Sm. in *Bishop Mus. Bull.* 141: 132. *fig. 67*. 1936; J. W. Parham, *Pl. Fiji Isl.* 251. 1964, ed. 2. 342. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 131. 1967.

Shrub 2–3 m. high, with succulent branches, infrequent in dense forest at elevations of 300–870 m.; corolla white. Flowers have been obtained in June and November, fruits only in June.

TYPIFICATION: The type is *Smith 673* (BISH HOLOTYPE; many ISOTYPES), collected Nov. 29, 1933, on the southwestern slope of Mt. Mbatini, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and possibly to eastern Vanua Levu, although occurrences in south-central Viti Levu are indicated below.

LOCAL NAME: *Muskarimba*.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Mbuyombuyo, near Namboutini, *Tabulewa 15577*; inland from Namboutini, *Damanu 70*. VANUA LEVU: THAKAUNDROVE: Track to Mt. Nasorolevu, *DA 17151, 17161*; eastern slope of Mt. Ndikeya, *Smith 1914*.

In deference to the opinion of Gillett (1967), who cited as *Cyrtandra muskarimba* the first two specimens listed above (from Serua Province, Viti Levu), I also indicate the present species as occurring on both of the large islands. However, the Serua specimens occur within the range of *C. trichophylla*, and differences between the two species are difficult to analyze on the basis of incomplete herbarium material. The woody nature of the stem of *C. trichophylla* (emphasized by Gillett, 1967, p. 131) seems essentially duplicated by that of the type collection of *C. muskarimba*. It may be suspected that further study, preferably of fresh material, will indicate that *C. trichophylla* is limited to Viti Levu, *C. muskarimba* to Vanua Levu.

15. *Cyrtandra victoriae* Gillespie in Bishop Mus. Bull. 74: 25. fig. 34. 1930; A. C. Sm. in J. Arnold Arb. 34: 37. 1953; J. W. Parham, Pl. Fiji Isl. 253. fig. 88, B. 1964, ed. 2. 344. fig. 96, B. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 132. 1967; Burt & Bokhari in Notes Roy. Bot. Gard. Edinburgh 32: 400. fig. 1, A, B. 1973.

Shrub or branching tree 1.5–5 m. high, sometimes locally frequent in dense forest at elevations of 250–1,300 m. (mostly at the higher elevations); bracts greenish white; calyx white with pale brown indument; corolla white with pale yellowish or pale brown indument; filaments white; fruit green (probably becoming white). Flowers have been observed between July and November, fruits somewhat later and even as late as May.

TYPIFICATION: The type is *Gillespie 4088* (BISH HOLOTYPE; ISOTYPES at BISH, UC), collected Nov. 29, 1927, near the summit of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and now known from northwestern, north-central, and south-central Viti Levu.

LOCAL NAME: *Ndure levu*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near summit of Mt. Evans Range, *Greenwood 320*; slopes and summit of Mt. Ndelaioo, on escarpment west of Nandarivatu, *Smith 5081*; slopes and summit of Mt. Nanggaranambuluta, east of Nandarivatu, *Tothill 643, Gillespie 4349*; slopes of Mt. Tomanivi, *Smith 5915, 5916, 5917, DA 12741 (Melville et al. 7133), 14669, O. & I. Degener 32057*. NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8801*; near summit of Mt. Vakarongasiu, *Gillespie 3263*. RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, *Smith 5697, 5722*.

16. *Cyrtandra chippendalei* Horne, A Year in Fiji, 260, nom. nud. 1881; Horne ex C. B. Clarke in DC. Monogr. Phan. 5: 230. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 252. 1892; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 340, excl. syn. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 133, excl. syn. 1967; Burt & Bokhari in Notes Roy. Bot. Gard. Edinburgh 32: 400. 1973.

Cyrtandra milnei sensu Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 182. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 255. 1892; non Seem. ex A. Gray.

Shrub or suffrutescent herb 1–2.5 m. high, occurring from low elevation (less than 100 m. on Yathata) to about 900 m. in usually dense forest. The calyx is bright green, the corolla pale green, and the fruit green turning to white and up to 3 × 1.8 cm. or more. Flowers have been obtained between April and August, while fruits sometimes persist until January.

TYPIFICATION: The species is typified by *Horne 577* (K HOLOTYPE; ISOTYPE at GH), collected in May, 1878, at an elevation of about 300 m. inland from Waiwai, Savusavu Bay, Thakaundrove Province, Vanua Levu. At Horne's request, named for the then owner of Waiwai Plantation.

DISTRIBUTION: Endemic to Fiji and now known from Vanua Levu, Taveuni, and Yathata.

LOCAL NAME: *Muskarimba*.

AVAILABLE COLLECTIONS: VANUA LEVU: THAKAUNDRIVE: Mt. Uluingala, Natewa Peninsula, *Smith 1986*. TAVEUNI: Hills east of Somosomo, west of old crater occupied by small swamp and lake, *Smith 8377*, *DA 14393*; western slope between Somosomo and Wairiki, *Smith 885*; above Nggathavula Estate, *DA 16924*. TAVEUNI without further locality, *Seemann 281*. YATHATA: Navakathuru, *DA 16302*.

Gillett (1967) combined *Cyrtandra chippendalei* and *C. tomentosa*, which in the present treatment is maintained as distinct (the following species). The union of these two taxa has seemed unwarranted to me, in view of the many diverging characters (cf. key to species) bearing on the petiole length, leaf shape, and comparative sizes of the peduncles, bracts, pedicels, calyces, and fruits. Furthermore, the first of the two species appears limited to Vanua Levu, Taveuni, and the nearby Lauan island of Yathata, while the second occurs only on Viti Levu. The evidence from sclereid patterns (cf. Burt & Bokhari, 1973) is very strongly against the reduction of *C. tomentosa* to *C. chippendalei*.

17. *Cyrtandra tomentosa* A. C. Sm. in *Sargentia* 1: 116. 1942, in *J. Arnold Arb.* 34: 38. 1953; J. W. Parham, *Pl. Fiji Isl.* 251. 1964; Burt & Bokhari in *Notes Roy. Bot. Gard. Edinburgh* 32: 400. 1973.

Shrub 2-4 m. high, occasional in dense forest at elevations of 150-1,100 m. As far as noted, the fruit is green, but no color notes have been given on the flowers. Flowers have been obtained in March, fruits in March, September, and October.

TYPIFICATION: The type is *Degener 14889* (A HOLOTYPE; ISOTYPES at BISH, K, NY), collected March 26, 1941, in the vicinity of Nandrau, Nandronga & Navosa Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from north-central, central, and southeastern Viti Levu.

LOCAL NAMES: *Mbeta, makamakandora*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills east of Nandala Creek, south of Nandarivatu, *Smith 6237*. NAMOSI: Mt. Naitarandamu, *Gillespie 3351*; hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8549*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8720*. REWA: Mt. Korombamba, *Parks 20129*.

18. *Cyrtandra spathacea* A. C. Sm. in *Bishop Mus. Bull.* 141: 133. *fig. 69*. 1936; J. W. Parham, *Pl. Fiji Isl.* 251. 1964, ed. 2. 342. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 135. 1967.

Slender tree about 4 m. high, rare in dense forest at an elevation of 500-750 m.; the corolla is cream white, the fruit white. The type material bore flowers and fruits in October.

TYPIFICATION: The type is *Smith 258* (BISH HOLOTYPE; many ISOTYPES), collected Oct. 25, 1933, on the slopes of Mt. Mbuke Levu, Kandavu.

DISTRIBUTION: Endemic to Fiji and known from only two collections, from Kandavu and northwestern Viti Levu respectively.

AVAILABLE COLLECTION: VITI LEVU: MBA: Mountains inland from Lautoka, *Greenwood 51*.

In the present study I have not reexamined *Greenwood 51* (κ), cited by Gillett, who could scarcely have mistaken this remarkably distinct species, well marked by its strictly spathaceous calyx. The occurrence of taxa on both Viti Levu and Kandavu is not particularly unusual, but in this instance the rarity of the species provokes speculation. Gillett (1967) notes the occurrence of species of this general relationship in the Society Islands and Hawaii.

19. *Cyrtandra kandavuensis* A. C. Sm. in Bishop Mus. Bull. **141**: 132. fig. 68. 1936; J. W. Parham, Pl. Fiji Isl. 250. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 136. 1967.

Spreading tree or shrub 2–4 m. high, found in dense forest at an elevation of 500–838 m.; corolla cream white to pale yellow; fruit white. Flowers and fruits were obtained in October.

TIPIFICATION: The species is typified by *Smith 282* (BISH HOLOTYPE; many ISOTYPES), collected Oct. 25, 1933, on the summit of Mt. Mbuke Levu, Kandavu.

DISTRIBUTION: Endemic to Fiji and, as far as now known, to the island of Kandavu.

AVAILABLE COLLECTIONS: KANDAVU: Slopes and summit of Mt. Mbuke Levu, *Smith 214, 288*; Lutumatavoro, *DA 14922*.

20. *Cyrtandra natewaensis* Gillett in Taxon **22**: 701. 1973.

Cyrtandra attenuata Gillett in Contr. U. S. Nat. Herb. **37**: 137. 1967; J. W. Parham, Pl. Fiji Isl. ed. 2. 340. 1972; non Elmer (1908).

Shrub or small tree 3–4 m. high, infrequent in dense forest at elevations of 400–820 m.; calyx greenish white; corolla white or cream white. Flowers were obtained in June and July; fruits remain to be collected.

TIPIFICATION: The type of *Cyrtandra attenuata* Gillett, for which *C. natewaensis* was a new name, is *Smith 2006* (BISH HOLOTYPE; many ISOTYPES), obtained June 15, 1934, on Mt. Uluingala, Natewa Peninsula, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from eastern Vanua Levu and Taveuni.

AVAILABLE COLLECTIONS: TAVEUNI: Trail above Somosomo leading to the "crater lake," *Smith 8366*, *DA 14368*.

21. *Cyrtandra involucrata* Seem. in Bonplandia **9**: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; A. Gray in Proc. Amer. Acad. Arts **6**: 41, nom. nud. 1862; Seem. Fl. Vit. 183. 1866; Horne, A Year in Fiji, 260. 1881; C. B. Clarke in DC. Monogr. Phan. **5**: 269. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 254. 1892; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 138. 1967.

Cyrtandra monticola Gillespie in Bishop Mus. Bull. **74**: 23. fig. 30. 1930; non K. Schum. (1905) nec Lauterb. (1910).

Cyrtandra gillespieana A. C. Sm. in Bishop Mus. Bull. **141**: 134. 1936; J. W. Parham, Pl. Fiji Isl. 249. 1964.

Shrub or slender tree 1–5 m. high, sometimes frequent in dense forest from low elevations (perhaps about 100 m.) to 1,150 m.; calyx and corolla white or cream-colored with pale brown indument; style and fruit white. Flowers and fruits have been obtained essentially throughout the year.

TIPIFICATION: *Cyrtandra involucrata* (mentioned casually several times before Seemann described it in 1866) was based on *Seemann 279* (κ HOLOTYPE; ISOTYPES at BM, GH), collected between Aug. 22 and Sept. 2, 1860, in "woods of Namosi" (probably near Namosi Village), Namosi Province, Viti Levu. The type of *C. monticola* Gillespie (for which *C. gillespieana* was a new name) is *Gillespie 3122* (BISH HOLOTYPE; ISOTYPES

at BISH, UC), obtained Sept. 27, 1927, near the summit of Mt. Naitarandamu, Namosi Province, Viti Levu. Gillespie's figure shows well the connate-perfoliate inflorescence bracts characteristic of the species.

DISTRIBUTION: Endemic to Fiji and frequent on Viti Levu, apparently rare on Ovalau and Vanua Levu. *Cyrtandra involuocrata* shows the distribution on Viti Levu common to many forest species—north-central to south-central, with small populations in isolated western ranges. The specimens from Ovalau and Vanua Levu, cited by Gillett, have not been examined in connection with the present review, but the species is well marked if inflorescence bracts are available.

LOCAL NAME: *Tangitangi*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1228*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4136*; Mt. Koromba, *DA 14735*; vicinity of Nandarivatu, *Gillespie 3866*; hills east of Nandala Creek, south of Nandarivatu, *Smith 6221*; western and southern slopes of Mt. Tomanivi, *Smith 5318*. NANDRONGA & NAVOSA: Southern slopes of Nausori Highlands, in drainage of Namosi Creek above Tumbenasolo, *Smith 4717*. SERUA: Upper Navua River, *DA 15508, 15510, 15513, 15515, 15519*; Mbuyombuyou, near Namboutini, *Tabualewa 15596*; inland from Namboutini, *DA 13988*; hills north of Ngaloa, in drainage of Wainingere Creek, *Smith 9426*. NAMOSI: Near Saliandrau, Wainikoroliva River, *DA 15002*; Waisevu, track to Namosi, *DA 11634*; near Namosi Village, *Gillespie 2691*. OVALAU: Without further locality, *U. S. Expl. Exped.* VANUA LEVU: MBUA: Without further locality, *H. B. R. Parham 17*. FUI without further locality, *Horne 827*.

In connection with the occurrence of the present species on Vanua Levu, cf. my comment on its possible confusion with *C. harveyi* (species no. 35 in the present treatment).

22. *Cyrtandra anthropophagorum* Seem. in *Bonplandia* 9: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; Seem. ex A. Gray in *Proc. Amer. Acad. Arts* 6: 41. 1862; Seem. *Fl. Vit.* 182. 1866; C. B. Clarke in *DC. Monogr. Phan.* 5: 281. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 251. 1892; J. W. Parham, *Pl. Fiji Isl.* 247. 1964, ed. 2. 340. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 141. 1967.

Cyrtandra buttii Horne ex C. B. Clarke in *DC. Monogr. Phan.* 5: 279. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 252, as *C. buttii*. 1892; J. W. Parham, *Pl. Fiji Isl.* 247. 1964.

Cyrtandra anthropophagorum var. *obscura* C. B. Clarke in *DC. Monogr. Phan.* 5: 282. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 251. 1892.

Cyrtandra pritchardii sensu Gibbs in *J. Linn. Soc. Bot.* 39: 159. 1909; non Seem.

An often freely branched shrub or small tree 1–4 m. high, locally abundant from near sea level to about 1,150 m. in dense forest and in the thickets of crests and ridges; the inflorescence bracts are pale green, the calyx is dull white to pale green, the corolla is white, the gynoecium is greenish white, and the fruits are white to dull or translucent white, up to 25 mm. long. Flowers and fruits have been obtained in essentially every month.

TYPIFICATION AND NOMENCLATURE: Gray based his description of *Cyrtandra anthropophagorum* on two collections, *Seemann 278*, from Viti Levu, and *U. S. Expl. Exped.* (GH, US 9953), the latter collected on Ovalau in June, 1840; Gillett (1967) indicated the former as lectotype without comment. A suitable citation is: *Seemann 278* (GH LECTOTYPE; ISOLECTOTYPE at K), collected on Viti Levu without further locality in July, 1860; during that month Seemann was visiting various localities in southeastern Viti Levu and Ovalau. Clarke cited two Horne collections as representing *C. buttii*; of these Gillett (1967) cited no. 818 as the "type." A suitable citation is: *Horne 818* (K LECTOTYPE; ISOLECTOTYPE at GH), collected in June, 1878, in mountains near Namosi, Namosi Province, Viti Levu. The second Horne collection was his no. 756 (err. cit. Gillett as 956) (GH, K), obtained in August, 1878, near Namboumbutho Creek, Naitasiri Province, Viti Levu. At Horne's request, the name commemorates a Mr. Butt, then

manager of the Bank of New Zealand in Fiji. The type of *C. anthropophagorum* var. *obscura* is Graeffe 42, p. p. (BM HOLOTYPE), said to have come from Viti Levu (but conceivably part of Graeffe s. n. (κ) from Ovalau, cited below). The Graeffe BM specimen was not seen in connection with the present review, but the name is here mentioned because nothing in Clarke's description seems to exclude it from the species; Clarke appended the comment: "Species forsan distincta; sed fragmentum obvium mancum."

DISTRIBUTION: Endemic to Fiji and its most abundant species of *Cyrtandra*, about 90 collections being available from central, south-central, and southeastern Viti Levu and Ovalau. The species seems to be lacking from north-central Viti Levu and the outlying western forested areas. The last specimen mentioned below, cited by Gillett, has not been examined in connection with the present study; representation of *C. anthropophagorum* in northeastern Vanua Levu is unexpected, but of course quite possible.

LOCAL NAMES: *Makamakandora, kavika ni veikau.*

REPRESENTATIVE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Between Naloka and Koronayalevu, DA 1417, p. p. (DF 141). SERUA: Track to Mt. Tuvutau, DA 14495; track to Mt. Tikituru, DA 14474; north of Korovou, St. John 18926; hills north of Ngaloa, in drainage of Waininggere Creek, Smith 9164. NAMOSI: Mt. Naitarandamu, Gillespie 3084; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, Smith 8719; hills east of Wainikoroiuva River, near Namuamua, Smith 8909; vicinity of Namosi, Parks 20262; Mt. Voma, DA 1765; track to Mt. Vakarongasiu, DA 16105. NAITASIRI: Vatavula, Gibbs 537; Central road, Tothill 640; near Nasinu, Gillespie 3450. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, Smith 7110; Waimaro River, near Copper Mine, DA 13639. REWA: Mt. Korombamba, DA 17610. OVALAU: Summit of Mt. Ndelaiovalau and adjacent ridge, Smith 7380; Mt. Tana Lailai, Graeffe, Dec. 1864 (κ); Ovalau without further locality, Milne 249. VANUA LEVU: MATHUATA: Wainikoro River, Greenwood 687.

Cyrtandra anthropophagorum, as noted by Gillett (1967), is separable from *C. involucrata* with difficulty if the bracts subtending the pedicels are lacking. However, the former of these two species appears to have somewhat paler indument, the trichomes being a trifle the longer; these characters are scarcely dependable, and separation of the two depends essentially upon the inflorescence bracts.

23. *Cyrtandra jugalis* A. C. Sm. in J. Arnold Arb. 34: 49. 1953; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 140. 1967.

Cyrtandra involucrata sensu Gibbs in J. Linn. Soc. Bot. 39: 159. 1909; non Seem.

Shrub or slender, freely branching tree 2–5 m. high sometimes locally frequent in dense forest at elevations between 700 and 1,130 m. The corolla, stamens, and gynoecium are white or cream-white, and the fruits are white or pink-tinged, up to 1.5 × 1 cm. and with brownish seeds. Flowers and fruits have been obtained between March and November.

TYPIFICATION: The type is Smith 4994 (A HOLOTYPE; ISOTYPES at BISH, K, US), collected in flower June 30, 1947, on the ridge between Mt. Nanggaranambuluta and Mt. Namama. east of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and to Viti Levu, occurring primarily in the north-central part of the island but also in central and south-central areas.

LOCAL NAMES: *Mindra, mbetambeta.*

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, Gibbs 640, 696 bis; slopes and summit of Mt. Nanggaranambuluta, east of Nandarivatu, Smith 4878, DA 15259, Stauffer & Koroiveibau 5831; vicinity of Nambuisa Village, Gillespie 4134; western and southern slopes of Mt. Tomanivi, Smith 5319, DA 12750 (Melville et al. 7142). NANDRONGA & NAVOSA: Vicinity of Nandrau, Degener 14904; northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, Smith 5569. SERUA: Mt. Tuvutau, DA 15531. NAMOSI: Slopes of Mt. Nandombe, DA 14564. RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, Smith 5695, 5696, 5709, 5715.

24. *Cyrtandra reticulata* Gillett in Contr. U. S. Nat. Herb. 37: 139. 1967; J. W. Parham, Pl. Fiji Isl. ed. 2. 342. 1972.

Shrub or slender tree 2-3 m. high; found in dense or open forest at elevations of about 100-700 m.; corolla pale yellow to cream-colored or white; gynoecium white. Flowers and fruits have been collected between October and January.

TYPIIFICATION: The type is *Smith 6343* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Oct. 27, 1947, on the southern slopes of Mt. Numbuiloa, east of Lambasa, Mathuata Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and apparently to Vanua Levu.

AVAILABLE COLLECTIONS: VANUA LEVU: MATHUATA: Northwestern slope of Mt. Numbuiloa, east of Lambasa, *Smith 6529*. THAKAUNDROVE: Eastern drainage of Yanawai River, *Degener & Ordenez 14088*; inland from Wailevu, Savausavu Bay, *DA 14279*; track to Mt. Nasorolevu, *DA 17149*; Navonu Creek, Natewa Peninsula, *DA 15049*.

25. *Cyrtandra esothrix* A. C. Sm. in J. Arnold Arb. 34: 45. 1953; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 142. 1967.

Shrub or slender, often freely branched tree 2-6 m. high, found at elevations of (300-) 450-1,150 m. in dense forest; calyx white to pale green; corolla white; fruits narrowly ovoid, white, sometimes pink-tinged. Flowers and fruits have been observed between July and October.

TYPIIFICATION: The type is *Smith 6134* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Sept. 18, 1947, on the northern portion of the Rairaimatuku Plateau between Mt. Tomanivi and Nasonggo, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and believed limited to north-central and central Viti Levu.

LOCAL NAME AND USE: *Makamakandora*; the bark is used medicinally to cause constipation after sickness (*St. John 18185*, upper Naitasiri).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Summit ridge of Mt. Tomanivi, *Gillespie 4081*; western and southern slopes of Mt. Tomanivi, *Smith 5098, 5267, DA 12733 (Melville et al. 7123), 13049*. NAMOSI: Mt. Naitarandamu, *Gillespie 3113*; Wayauyau Creek near Saliandrau, Wainikoroiluva River, *DA 15013*. NAITASIRI: Wainamo Creek, near Matawailevu, Wainimala Valley, *St. John 18185*.

Cyrtandra esothrix is difficult to distinguish from some specimens of *C. pritchardii* (species no. 29 in the present treatment) unless good calyces are available. As remarked by Gillett (1967, p. 143), the specimens from Tailevu Province and Ovalau that he identified as *C. esothrix* have leaf blades essentially glabrous beneath. I believe that these specimens are better referred to *C. pritchardii*. As here circumscribed, the two species are essentially allopatric, *C. esothrix* occurring at higher elevations in north-central and central Viti Levu, *C. pritchardii* at lower elevations in southern and eastern Viti Levu and Ovalau.

26. *Cyrtandra hornei* C. B. Clarke in DC. Monogr. Phan. 5: 281. 1883; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 144. 1967.

Cyrtandra glabrata sensu Gibbs in J. Linn. Soc. Bot. 39: 159. 1909; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; non C. B. Clarke.

Cyrtandra greenwoodiana A. C. Sm. in J. Arnold Arb. 34: 46. 1953; J. W. Parham, Pl. Fiji Isl. 249. 1964.

Often slender tree or shrub 1-6 m. high, found in dense forest or crest thickets at 300-1,100 m. (usually at the higher elevations); calyx pale green; corolla and fruit white. Flowers and fruits occur in months scattered throughout the year.

TYPIIFICATION AND NOMENCLATURE: For *Cyrtandra hornei*, Clarke cited three Horne Fijian collections, all deposited at K and without further data. Of them Gillett (1967) indicated *Horne 449* (K) as the LECTOTYPE; the other numbers are 570 (K) and

1134a (K). The type of *C. greenwoodiana* is *Smith 4412* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected May 14, 1947, on Mt. Nairosa, eastern flank of Mt. Evans Range, Mba Province, Viti Levu. There seems no doubt that Gillett's reduction of the latter name is correct.

DISTRIBUTION: Endemic to Fiji and thus far known only from northwestern, north-central, and central Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Vovono Creek, Vunda Tikina, *DA 14716*; Mt. Evans Range, *Greenwood 871a, 1260, DA 14169*; northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, *Smith 4304*; Ambatha, Saione Waterfall, Nawaka Tikina, *DA 14134*; vicinity of Nandarivatu, *Gibbs 572, Tohill 645, 647, Gillespie 3385, 4038*; Mt. Nanggaranambuluta, east of Nandarivatu, *Greenwood 871, Gillespie 3684, Smith 4768, Webster & Hildreth 14211*; Nandala, south of Nandarivatu, *Degener 14512, 14833*; Nauwangga, south of Nandarivatu, *Degener 14622*. NANDRONGA & NAVOSA: Between Naloka and Koronayalevu, *DA 1417*, p. p. (*DF 141*). NAMOSI: Mt. Voma, *Gillespie 2890.1*.

27. *Cyrtandra taviunensis* Gillespie in Bishop Mus. Bull. **74**: 24. fig. 33. 1930; J. W. Parham, Pl. Fiji Isl. 251. fig. 88, A. 1964, ed. 2. 342. fig. 96, A. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 145, as *C. tavinunensis*, sphalm. 1967.

Shrub or tree, usually slender, 1.2–5 m. high, occurring in dense forest at an elevation of 700–850 m.; corolla pale cream-colored or pale green on both surfaces; fruit bright red at maturity. Flowers and fruits have been obtained in March, August, and October.

TYPEIFICATION: The type is *Gillespie 4782* (BISH HOLOTYPE; ISOTYPES at BISH, K, NY, UC, US), collected March 5, 1928, in a deep, moist ravine inland from Somosomo, Taveuni.

DISTRIBUTION: Endemic to Fiji and thus far known only from Taveuni.

AVAILABLE COLLECTIONS: TAVEUNI: Track to lake above Somosomo, *DA 15895, 17108*; summit and adjacent slopes of Mt. Manuka, east of Wairiki, *Smith 8234*.

As noted by Gillett (1967), *Cyrtandra taviunensis* and *C. montana* (the next species in this treatment) are very distinct species by virtue of their elongate, filiform inflorescences with obvious, narrow bracts paired along slender peduncles (and mostly not subtending flowers), as well as by their orange to bright red fruits. Neither the inflorescence type nor the fruit color suggests other Fijian or Polynesian species of the genus.

28. *Cyrtandra montana* Gillespie in Bishop Mus. Bull. **74**: 22. fig. 29. 1930; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 342. 1972; Gillett in Contr. U. S. Nat. Herb. **37**: 146. 1967.

Cyrtandra bracteolosa A. C. Sm. in J. Arnold Arb. **34**: 43. 1953; J. W. Parham, Pl. Fiji Isl. 247. 1964.

Shrub or slender tree 2–5 m. high, infrequent in dense forest at elevations of 450–1,100 m.; corolla white; fruit orange to red at maturity. Flowers have been obtained only in September, fruits between September and January.

TYPEIFICATION: *Cyrtandra montana* was based on *Gillespie 3144* (BISH HOLOTYPE; ISOTYPES at BISH, UC), collected Sept. 28, 1927, on Mt. Naitarandamu, Namosi Province, Viti Levu; *C. bracteolosa* on *Smith 6232* (A HOLOTYPE; ISOTYPES at BISH, K, US), obtained Sept. 25, 1947, in hills east of Nandala Creek, south of Nandarivatu, Mba Province, Viti Levu. Gillett (1967) was entirely correct in combining these taxa.

DISTRIBUTION: Endemic to Fiji and known only from north-central, central, and south-central Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8833*; hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8504*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8732*; track to Mt. Vakarongasiu, *DA 16148, 17605*.

29. *Cyrtandra pritchardii* Seem. in *Bonplandia* 9: 257, nom. nud. 1861, in op. cit. 9: 364. (Dec.) 1861, Viti, 438. 1862; A. Gray in *Proc. Amer. Acad. Arts* 6: 41. 1862; Seem. *Fl. Vit.* 181. t. 39. 1866; Horne, *A Year in Fiji*, 260. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 280, as *C. pritchardi*. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 256. 1892; J. W. Parham, *Pl. Fiji Isl.* 251. fig. 87. 1964, ed. 2. 342. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 147. 1967.

Cyrtandra coriacea C. B. Clarke in *DC. Monogr. Phan.* 5: 280. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 252. 1892; J. W. Parham, *Pl. Fiji Isl.* 248. 1964.

Cyrtandra gracilipes Gillespie in *Bishop Mus. Bull.* 74: 21. fig. 27. 1930; J. W. Parham, *Pl. Fiji Isl.* 249. 1964.

Shrub or slender tree 2-5 m. high, often freely branched, sometimes locally frequent in dense or comparatively dry forest at elevations of about 50-900 m.; the flowers, often borne on branches and main stems, having the calyx greenish white and often very early caducous and the corolla white; fruits white; ellipsoid to fusiform, up to 20 × 12 mm. Flowers and fruits do not appear seasonal.

TYPIFICATION AND NOMENCLATURE: The type of *Cyrtandra pritchardii* is *Seemann* 283 (K HOLOTYPE; ISOTYPES at BM, GH), collected in 1860 on Ovalau, on "Mr. Pritchard's Estate" (cf. this *Flora*, vol. 1, p. 45); that of *C. coriacea* is *Horne* 698 (K HOLOTYPE), obtained in June, 1878, near Na Vesi (north of Namuka Harbour), Rewa Province, Viti Levu; and that of *C. gracilipes* is *Gillespie* 2306 (BISH HOLOTYPE; ISOTYPES at BISH, UC), collected Aug. 17, 1927, on the southeastern slopes of Mt. Korombamba, Rewa Province, Viti Levu. I believe that Gillett (1967) was quite correct in combining these names.

DISTRIBUTION: Endemic to Fiji and now known from southern and eastern Viti Levu and Ovalau. The difficulties of distinguishing between some of the Viti Levu collections of the present species and of upland *Cyrtandra esothrix* (species no. 25 in the present treatment) have been mentioned under the latter.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Near summit of Mt. Tikituru, *DA* 14485; hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith* 9304; hills between Waininggere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith* 9546. NAITASIRI: Hills between Savu and Nathokaika, *DA* 914; vicinity of Tamavua, *H. B. R. Parham* 280; Tholo-i-suva, *Parks* 20068, *DA* 982, 983; Naitasiri without further locality, *DA* 15415. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith* 7067, 7134, 7179; near Wailotua cave, *DA* 9412; King's Road, *DA* 843. REWA: Slopes and summit of Mt. Korombamba, *Gillespie* 2221, 2393, *Meebold* 16726, *DA* 1158, 1267, 16518, *Webster & Hildreth* 14088. OVALAU: Hills east of Lovoni Valley, *Smith* 7261, 7679; mountains south of Levuka, *Gillespie* 4538; Ovalau without further locality, *U. S. Expl. Exped.*

30. *Cyrtandra denhamii* Seem. *Fl. Vit.* 182, as *C. denhami*. 1866; Gillett in *Contr. U. S. Nat. Herb.* 37: 148. 1967.

Cyrtandra denhami Seem. ex Horne, *A Year in Fiji*, 260. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 268. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 252. 1892; J. W. Parham, *Pl. Fiji Isl.* 249. 1964, ed. 2. 341. 1972.

Shrub or tree to 5 m. high, apparently rare and local in dense forest at elevations of 300-450 m.; the calyx, corolla, and fruit are white. Flowers and fruits were obtained in June (but for probable dates of type collection, cf. below).

TYPIFICATION: The type is *Milne* 236 (K HOLOTYPE), collected in the "mountains" of Ngau, without further data. Milne visited Ngau, on H. M. S. *Herald* commanded by Capt. Denham, sometime between Sept. 4 and Nov. 24, 1854 (cf. this *Flora*, vol. 1, pp. 42-43).

DISTRIBUTION: Endemic to Fiji and apparently to the island of Ngau in Loma-i-Viti; the only other known collection may have come from essentially the type locality.

AVAILABLE COLLECTION: NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith* 7755.

31. *Cyrtandra tempestii* Horne ex C. B. Clarke in DC. Monogr. Phan. 5: 273, as *C. tempesti*. 1883; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 344. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 149. 1967.

Cyrtandra tempesti Horne, A Year in Fiji, 260, nom. nud. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 256. 1892.

Compact shrub or slender tree 3–4 m. high, infrequent in dense forest at an elevation of perhaps about 300 m. to 900 m.; calyx white with blackish indument; corolla and fruit white. Flowers have been obtained in August and September, fruits in August and December.

TYPEFICTION: The type is *Horne 1136* (K HOLOTYPE; ISOTYPE at GH), collected in September, 1878, "near the sea" (but more probably at a higher elevation) at Salialailai, Taveuni. At Horne's request the species was named for Mr. Tempest, then proprietor of Salialailai plantation in southeastern Taveuni.

DISTRIBUTION: Endemic to Fiji and apparently to the island of Taveuni.

AVAILABLE COLLECTIONS: TAVEUNI: Hills east of Somosomo, west of old crater occupied by small swamp and lake, *Smith 8388*; track to Mt. Uluingalau, *DA 14083*.

Cyrtandra tempestii and the preceding species, *C. denhamii*, both rare and highly localized species, are characterized by their many-flowered inflorescences and comparatively large calyces cleft nearly to base. Although they are readily separable, they may have been derived from a single waif introduction from farther west, and both also have Polynesian relatives.

32. *Cyrtandra ciliata* Seem. in Bonplandia 9: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; A. Gray in Proc. Amer. Acad. Arts 6: 41, nom. nud. 1862; Seem. Fl. Vit. 182. t. 41. 1866; Horne, A Year in Fiji, 260. 1881; C. B. Clarke in DC. Monogr. Phan. 5: 268. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 252. 1892; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 340. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 150. 1967.

Slender, often simple-stemmed shrub, or slender tree 1–4 m. high, found in dense forest at an elevation of 300–900 m.; inflorescences borne on stems; calyx white or the proximal portion greenish; corolla white or pale yellow; stamens, gynoeceium, and fruit white. Flowers have been observed between February and August, fruits between June and February.

TYPEFICTION: The type is *Seemann 282* (K HOLOTYPE; ISOTYPE at GH), collected in June, 1860, on Taveuni. Seemann's field label bears the inscription "Vuna," which generally refers to the southern part of Taveuni, but he often used it as synonymous with the entire island.

DISTRIBUTION: Eastern Vanua Levu and Taveuni, with a single collection known from the island of Koro in Loma-i-Viti.

LOCAL NAME: *Muskarimba*.

AVAILABLE COLLECTIONS: KORO: Eastern slope of main ridge, *Smith 965*. VANUA LEVU: THAKAUNDROVE: Mt. Mariko, *Smith 435*; eastern buttress of Mt. Ndikeya, *Smith 1863*; Nanggilokalou Creek, eastern slope of Mt. Ndikeya (inland from Korotasere), *DA 16042*; Mt. Uluingala, Natewa Peninsula, *Smith 1979*. TAVEUNI: Western slope between Somosomo and Wairiki, *Smith 765*; summit and adjacent slopes of Mt. Manuka, east of Wairiki, *Smith 8207*; above Nggathavula Estate, *DA 16923*; Taveuni without further locality, *Gillespie 4724*.

33. *Cyrtandra xanthantha* A. C. Sm. in J. Arnold Arb. 34: 48. 1953; J. W. Parham, Pl. Fiji Isl. 253. 1964, ed. 2. 344. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 151. 1967.

Shrub 3–4 m. high, occurring in dense forest, mostly along streams, at elevations of 550–925 m.; calyx white; corolla pale yellow, the lobes greenish when first opening. Flowers and fruits were obtained between September and December.

TYPIIFICATION: The type is *Smith 6277* (A HOLOTYPE; ISOTYPES at BISH, K, US), obtained Sept. 29, 1947, on slopes of the escarpment north of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from north-central and northwestern Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 376*; Savundamatau Creek, west of Nandarivatu, *Webster & Hildreth 14241*; vicinity of Nandarivatu, *Tothill 652*, *Gillespie 3970, 3979, 4150*.

34. *Cyrtandra aloisiana* A. C. Sm. in *Sargentia* 1: 116. 1942; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 340. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 153. 1967.

Shrub 1–1.5 m. high, occurring in dense forest from near sea level to an elevation of about 550 m.; corolla yellowish or pale lemon-colored; fruit white. Flowers have been noted between April and November, fruits between June and November.

TYPIIFICATION: The type is *Degener 15105* (A HOLOTYPE; ISOTYPES at BISH, K, NY, UC, US), collected April 29, 1941, on wet, forested slopes near the ocean near Thulanuku, vicinity of Ngaloa, Serua Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from southern Viti Levu.

LOCAL NAMES AND USES: *Makamakandora*, *soro ni mbengga*; the stems are said to be used medicinally, and a decoction of the leaves is used for headache or stomachache.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Uluvatu, vicinity of Mbalo, near Vatukarasa, *Tabualewa 15619*; north of Komave, *St. John 18952*. NAMOSI: Track to Mt. Vakarongasiu, *DA 16145*.

35. *Cyrtandra harveyi* Seem. *Fl. Vit.* 182. 1866; Horne, *A Year in Fiji*, 260. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 281. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 253. 1892; A. C. Sm. in *J. Arnold Arb.* 34: 48. 1953; J. W. Parham, Pl. Fiji Isl. 249. 1964, ed. 2. 341. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 154. 1967.

Cyrtandra gorriei Horne, *A Year in Fiji*, 260, nom. nud. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 273. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 253. 1892; J. W. Parham, Pl. Fiji Isl. 249. 1964.

Shrub or small tree 1–4 m. high, often slender, found in dense forest from approximately 100 m. to an elevation of 870 m.; inflorescence usually axillary and associated with leaves, occasionally borne on stems below leaves; calyx lobes greenish white; corolla white to cream-white or pale yellow; gynoeceum white; fruit white and borne along branches below leaves. Flowers have been obtained between November and January, fruits in the same months and also in May.

TYPIIFICATION AND NOMENCLATURE: *Cyrtandra harveyi* was based on *Harvey s. n.* (K HOLOTYPE; ISOTYPES at BM, GH), collected in November, 1855, at (presumably in forest above) Nandi Bay, Mbua Province, Vanua Levu; *C. gorriei* on *Horne 546* (K HOLOTYPE), obtained in May, 1878, in mountains near Koro ni Satha, the precise village not located on modern maps but presumably near Natewa, Tunuloa Tikina, Natewa Peninsula, Thakaundrove Province, Vanua Levu. At Horne's request the species was named in honor of John Gorrie, then Chief Judge of Fiji.

DISTRIBUTION: Endemic to Fiji and apparently to Vanua Levu.

LOCAL NAME: *Merikula*.

AVAILABLE COLLECTIONS: VANUA LEVU: MBUA: Mbua Bay, *U. S. Expl. Exped. MATHUATA*: Divide between Wainunu and Ndreketi River basins, *Smith 1847*; southern base of Mathuata Range, north of Natua, *Smith 6761*. THAKAUNDRIVE: Track to Mt. Nasorolevu, *DA 17160*; southern slope of Valanga Range, *Smith 367*; hills east of Mbalanga, Savusavu Bay region, *Degener & Ordenez 13899*; Mt. Vatunivua-monde, Savusavu Bay region, *Degener & Ordenez 13969*. FIJI without further locality, *Horne 112*.

In my 1953 notes on *Cyrtandra harveyi* I mentioned two specimens from Viti Levu. One of these, *Tabualewa 15596*, is to be placed in *C. involucrata*, as which it is cited in the present treatment (species no. 21); the other, *B. E. V. Parham 17*, has not been reviewed, but it may be noted that Gillett (1967) cited a no. 17 collected by H. B. R. Parham in Mbua, Vanua Levu, as *C. involucrata*. When sterile, the two species mentioned can readily be confused, although the inflorescences are entirely different; it is possible that the H. B. R. Parham specimen from Mbua does represent *C. harveyi* and that my mention of B. E. V. Parham in 1953 was incorrect. Another reference to *C. harveyi* in my 1953 notes was to *Degener & Ordenez 14088*, which is now referred to *C. reticulata* Gillett, q. v. (species no. 24 in the present treatment).

As pointed out by Gillett (1967), *Cyrtandra harveyi* and *C. coleoides* (the following species) stand apart from other Fijian *Cyrtandrae* in being sometimes gynodioecious, by having the gynoecium borne on a short gynophore and with the style exerted, and by having the filaments elongated, so that the anthers are exerted above the corolla tube. In foliage and indument the two species are scarcely separable from several other Fijian species of the genus.

36. *Cyrtandra coleoides* Seem. in *Bonplandia* 9: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862; A. Gray in *Proc. Amer. Acad. Arts* 6: 41, nom. nud. 1862; Seem. *Fl. Vit.* 181. t. 40. 1866; Horne, *A Year in Fiji*, 260, as *C. coloides*, sphalm. 1881; C. B. Clarke in *DC. Monogr. Phan.* 5: 270. 1883; Drake, *Ill. Fl. Ins. Mar. Pac.* 252. 1892; J. W. Parham, *Pl. Fiji Isl.* 248. fig. 86. 1964, ed. 2. 340. 1972; Gillett in *Contr. U. S. Nat. Herb.* 37: 155. 1967.

Cyrtandra alba Gillespie in *Bishop Mus. Bull.* 74: 20. fig. 25. 1930; J. W. Parham, *Pl. Fiji Isl.* 247. 1964.

Small tree or shrub 2–4 m. high, often slender or freely branched, found in dense forest between about 150 and 1,150 m.; inflorescences borne on older, woody stems; calyx, corolla, and gynoecium white at anthesis, the corolla lobes often greenish; fruit white or orange-tinged, up to 30 × 15 mm. Flowers and fruits have been obtained between July and November.

TYPIFICATION AND NOMENCLATURE: The type of *Cyrtandra coleoides* is *Seemann 280* (K HOLOTYPE; ISOTYPES at BM, GH), collected Aug. 24, 1860, at the foot of Mt. Voma, Namosi Province, Viti Levu; that of *C. alba* is *Gillespie 2671* (BISH HOLOTYPE; ISOTYPE at UC), obtained Sept. 6, 1927, on the upper slopes of Mt. Voma, Namosi Province, Viti Levu. Gillett's combination of these names is certainly correct. A second sheet of *Seemann* (K), unnumbered but marked "bis", is probably part of the type collection; it bears the interesting note: "New genus of Cyrtandraceae, having a peculiarly shaped corolla and only two fertile stamens without any vestige of sterile ones."

DISTRIBUTION: Endemic to Fiji and now known from north-central, central, and southeastern Viti Levu and Ovalau.

LOCAL NAMES AND USE: *Mendiri tambua*, *ndiritambua*, *makamakandora*. In upper Naitasiri an unspecified part of the plant is said to be used medicinally to cause constipation.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills between Nggaliwana and Nandala Creeks, south of Nauwanga, *Smith 5813*; western and southern slopes of Mt. Tomanivi, *Smith 5259*. NADRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5628*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8879*; slopes of Mt. Voma, trail from Namosi, *Gillespie 2924.1*. NAITASIRI: Wainamo Creek, Wainimala Valley, *St. John 18227*; Suva Ditch trail, *Bryan 378*. OVALAU: Nasonggo, Lovoni Valley, *DA 13288*. FIJI without further locality, *Horne 64, 713, s. n.*

37. *Cyrtandra prattii* Gillespie in Bishop Mus. Bull. 74: 24, fig. 32. 1930; J. W. Parham, Pl. Fiji Isl. 251. 1964, ed. 2. 342. 1972; Gillett in Contr. U. S. Nat. Herb. 37: 156. 1967.

Shrub about 3 m. high, rare in dense forest at elevations of 850–1,250 m.; corolla yellow to pale yellow; fruit white. Flowers and fruits have been collected in August and November.

TIPIFICATION: The type is *Gillespie 4091* (BISH HOLOTYPE; ISOTYPES at BISH, UC), collected Nov. 28, 1927, near the summit of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known definitely only from north-central and central Viti Levu at high elevations.

LOCAL NAME AND USE: In upper Naitasiri the name *andalunga* has been noted; oil from the leaves is said to be used for massaging sore leg muscles.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Rarandawai, Wainamo–Wainisavulevu divide, Wainimala Valley, *St. John 18260*. FIJI without further locality, *Parks 20242*.

This extraordinary species, by virtue of its elongated inflorescences composed of a woody axis and many lateral, solitary flowers, is unique among Fijian species of *Cyrtandra*.

5. *EPISCIA* Mart. Nov. Gen. Sp. Pl. 3: 39. 1829; H. E. Moore in *Baileya* 2: 69. 1954, Afr. Violets, *Glox.* 181. 1957; Backer & Bakh. f. *Fl. Java* 2: 532. 1965.

Pilose herbs with long stolons, the stems short, stout; leaves opposite or verticillate, the blades pinnate-nerved; flowers axillary, solitary or in fascicles of 2–4, the peduncle long, pubescent; calyx deeply 5-lobed, the lobes linear to oblong; corolla salverform to tubular-campanulate, much larger than calyx, variable in color, the tube straight or curved, abruptly broadened on posterior side, the limb with 5 subequal lobes, sometimes fringed; fertile stamens 4 (or 5), inserted near base of corolla tube, glabrous, included, the filaments united in pairs at base, the staminode 1, small (or rarely antheriferous); disk small, composed of a single dorsal gland; ovary superior or essentially so, pilose, the style glabrous, becoming elongated, the stigma shortly bilobed; fruit a 2-valved capsule, the seeds ellipsoid, smooth, brown.

LECTOTYPE SPECIES: *Episcia reptans* Mart. (vide Leeuwenberg in *Acta Bot. Neerl.* 8: 309. 1958).

DISTRIBUTION: Southern Mexico and the West Indies to Brazil, with about ten species. One taxon is cultivated in Fiji.

USEFUL TREATMENT OF GENUS: MOORE, H. E., JR. The cultivated *Episcias*. *Baileya* 2: 69–75. 1954.

1. *Episcia cupreata* (Hook.) Hanst. in *Linnaea* 34: 340. 1865; Yuncker in Bishop Mus. Bull. 178: 108. 1943; H. E. Moore in *Baileya* 2: 75. 1954, Afr. Violets, *Glox.* 185. *pl. II, C; fig. 26, A.* 1957; J. W. Parham, Pl. Fiji Isl. 253, as *Episcea c.* 1964, ed. 2. 344. 1972; Backer & Bakh. f. *Fl. Java* 2: 532. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 98. 1970; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 58. 1985.

Chimenes cupreata Hook. in *Bot. Mag.* 73: t. 4312. 1847.

Episcia cupreata is commonly grown as a pot plant in Fijian cultivation, often in hanging baskets; spreading herb; leaves short-petiolate, the blades broadly elliptic, up to about 13 × 8 cm., variable in color from coppery or reddish green to clear green, often variegated; corolla tube red on upper surface, yellow with red spots on lower surface and within, the limb orange-red, the 3 lower lobes the longest. Flowers have been noted in March.

TIPIFICATION: The type is *Purdie 470* (K HOLOTYPE), from Sona, presumably along the Magdalena River, Colombia. Purdie also sent seeds to Kew, where the plant

flowered in April, 1847; the holotype may be a mixture of wild and cultivated material (L. E. Skog, in litt.).

DISTRIBUTION: Colombia and Venezuela; now worldwide in cultivation.

LOCAL NAME AND USE: *Episcia*; an attractive ornamental.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRE: Toninaiwau, Tholo-i-suva, DA 16744.

The specific epithet here applied to this taxon may be questioned, as cultivated plants of *Episcia* are unlikely to be true species; there are a hundred or more cultivars in the genus (L. E. Skog, in litt.). However, Moore (1954) discusses the five species that provide most of the basic stock.

FAMILY 177. ACANTHACEAE

ACANTHACEAE Juss. Gen. Pl. 102, as *Acanthi*. 1789.

Herbs or shrubs, sometimes climbing, rarely trees, estipulate, often with silicified cystoliths on vegetative parts; leaves opposite (infrequently alternate), simple, usually decussate and entire, petiolate (rarely sessile), sometimes spiny; inflorescences axillary or terminal, cymose or racemose or flowers sometimes solitary; flowers ♂, bracteate and often also bracteolate (the bracts and bracteoles sometimes showy), hypogynous, usually zygomorphic; calyx usually deeply (4 or)5(-20)-lobed, the lobes imbricate or valvate (sometimes suppressed); corolla sympetalous, usually 5-lobed, sometimes essentially actinomorphic, more frequently zygomorphic or bilabiate (upper lip sometimes suppressed), the lobes imbricate or convolute in bud; stamens attached to corolla tube, alternate with lobes, usually exserted, usually 4 or 2 and paired (upper members sometimes represented by staminodes), the anthers usually 2-locular, dehiscent by longitudinal slits, the locules parallel or superposed, sometimes widely separated on a modified connective, sometimes with one reduced or suppressed; ovary superior, sessile on a nectariferous disk, usually 2-locular and with axile placentation (sometimes unilocular and with intruded parietal placentation), the ovules commonly 2 per locule, collateral or superposed, rarely as many as 28 per locule, anatropous to amphitropous or campylotropous, each with a modified funicle, this a hook-shaped jaculator or sometimes cushion-shaped, the style terminal, the stigma sometimes hypocrateriform, more often 2-lobed (upper lobe sometimes reduced or suppressed); fruit a loculicidal, 2-locular, explosively dehiscent capsule (rarely a drupe), the seeds usually compressed, subtended at base by conspicuous hooks (retinacula or jaculators) derived from hardened funicles (these lacking in some genera), the testa thin, often becoming mucilaginous, the embryo large, straight or curved, the endosperm usually lacking.

DISTRIBUTION: Pantropical, sometimes extending into temperate areas, with about 250 genera and 2,600 species. Thirteen genera occur in Fiji, but only two (*Graptophyllum* and *Pseuderanthemum*) have indigenous representatives. The family includes many beautiful species of horticultural value.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. *Acanthaceae*. Fl. Java 2: 544-593. 1965. LONG, R. W. The genera of *Acanthaceae* in the southeastern United States. J. Arnold Arb. 51: 257-309. 1970. HEINE, H. *Acanthaceae*. In: Aubréville, A., & J.-F. Leroy (eds.). Fl. Nouv.-Calé. et Dépend. 7: 1-68. 1976. BARKER, R. M. A taxonomic revision of Australian *Acanthaceae*. J. Adelaide Bot. Gard. 9: 1-292. 1986.

I am greatly indebted to D. C. Wasshausen (us) for valuable comments pertaining to the interpretations of species occurring in Fiji, but conclusions here expressed are the responsibility of the present writer. For checking certain type material at LINN and BM I also express my appreciation to C. E. Jarvis (BM).

The literature on *Acanthaceae* is vast and, in many instances, conflicting in its interpretations of generic limits to such an extent that only a specialist on the family can legitimately express opinions. Many of the basic papers have been listed and

discussed by Long (1970) and Barker (1986); these include numerous influential treatments by C. E. B. Bremekamp and E. C. Leonard that it is scarcely feasible to discuss in such a limited regional treatment as the present one.

KEY TO GENERA

- Stamens 4, all of them with well-developed anthers (these either 1- or 2-loculed) (in *Asystasia* the posterior pair rarely reduced to filiform staminodes; in *Barleria* the posterior pair sometimes sterile).
 Anthers 2-loculed.
 Corolla lobes contorted or convolute in bud.
- Calyx small, truncate or shallowly 12-20-lobed; filaments free from each other, not connate or connected by basal membranes; ovary locules 2-ovulate, the funicles pulvinate; capsule abruptly beaked from a broadened, subglobose base; retinacula lacking; cystoliths lacking; cultivated and naturalized species. 1. *Thunbergia*
- Calyx deeply 4- or 5-partite; filaments connate or connected by basal membranes in pairs; ovary locules with 3-20 (rarely 2) ovules; seeds 6-numerous (rarely as few as 4); valves of capsule usually with 3 or more retinacula.
 Corolla distinctly bilabiate; inflorescences spicate; capsule fusiform, not stipitate, seminiferous throughout, the seeds 6-20; our representative a cultivated and naturalized sprawling herb. 2. *Hemigraphis*
- Corolla limb actinomorphic or nearly so; capsule oblong to clavate, the base contracted into a solid stipe, the seeds 6-numerous (very rarely 2).
 Inflorescences usually densely flowered terminal spikes or spiciform racemes; bracts large and closely imbricate; corolla not projecting beyond bracts; our representative a naturalized weed. 3. *Blechum*
- Inflorescences terminal or axillary, cymose or cymose-paniculate, rarely racemose (or flowers axillary); bracts usually small and narrow; corolla projecting well beyond bracts; our representative a naturalized weed with bright red corollas. 4. *Ruellia*
- Corolla lobes imbricate in bud; ovary locules with (1 or) 2 ovules.
 Calyx deeply 5-partite, the segments subequal; inflorescences terminal, spiciform-racemose, sometimes unilateral, the bracts and bracteoles small; cultivated or naturalized. 5. *Asystasia*
- Calyx deeply 4-partite, the inner segments the narrower; inflorescences fasciculate, spicate, or cymose, the bracts obvious; cultivated and naturalized. 6. *Barleria*
- Anthers 1-loculed; calyx deeply 4-partite, the segments unequal; corolla tube geniculate bent forward, the limb flat, orange to salmon-pink; stamens very short, included in corolla tube; leaves spuriously 4-verticillate; cultivated only. 7. *Crossandra*
- Stamens with only 2 well-developed anthers, these 2-loculed, accompanied by staminodes or not; staminodes if present anantherous or rarely with poorly developed anthers.
 Calyx deeply 4-partite, the inner segments the narrower; fertile stamens often 4; corolla lobes imbricate in bud; ovary locules with (1 or) 2 ovules. 6. *Barleria*
- Calyx deeply 5-partite.
 Corolla lobes contorted in bud.
 Stamens deeply inserted in corolla tube, the filaments long, exerted; ovary locules with 3 or 4 ovules; capsule narrowly cylindrical, usually with 6-8 seeds; cultivated and naturalized. 8. *Sanchezia*
- Stamens borne near apex of corolla tube, the filaments short, usually included; ovary locules with 2 ovules; capsule clavate, the seeds 4 or fewer; cultivated only. 9. *Eranthemum*
- Corolla lobes imbricate in bud; ovary locules with 2 ovules.
 Anther locules essentially parallel, attached at the same or slightly unequal level.
 Corolla tube infundibuliform, broadened distally, curved, the limb sometimes bilabiate.
 Inflorescences terminal, spiciform-racemose, sometimes unilateral; fertile stamens usually 4, inserted in widened part of corolla tube, the posterior pair rarely reduced to filiform staminodes. 5. *Asystasia*
- Inflorescences terminal or axillary narrow panicles or small cymes; fertile stamens 2, inserted in corolla throat; staminodes sometimes present and basally adnate to anterior stamens, sometimes lacking; indigenous and cultivated plants. 10. *Graptophyllum*
- Corolla tube slender, cylindrical, only slightly broadened distally, the limb inconspicuously bilabiate or not, the lobes subequal.
 Inflorescences terminal or axillary, paniculate, racemose, or cymose; stamens inserted near apex of corolla tube, usually slightly exerted; indigenous and cultivated plants. 11. *Pseuderanthemum*
- Inflorescences terminal, racemose, simple; stamens inserted near middle of corolla tube; cultivated only, with bright red flowers. 12. *Odontonema*
- Anther locules often separated and unequal, usually superposed, often oblique; staminodes lacking; cultivated and naturalized. 13. *Justicia*

1. *Thunbergia* Retz. in *Physiogr. Sölsk. Handl.* 1 (3): 163. 1780; Backer & Bakh. f. *Fl. Java* 2: 551. 1965; R. Long in *J. Arnold Arb.* 51: 273. 1970; Heine in *Fl. Nouv.-Caléd. et Dépend.* 7: 64. 1976; R. Barker in *J. Adelaide Bot. Gard.* 9: 40. 1986. *Nom. cons.*

Herbs or shrubs, without cystoliths, erect or sinistrorsely twining, the stems articulated; leaves opposite, petiolate, the blades often cordate to hastate or sagittate at base; inflorescences racemose, rarely cymose, or flowers solitary in leaf axils, the bracts and bracteoles often large, the bracteoles enclosing calyx and corolla tube and often persistent; calyx small, short-cupuliform, truncate or 10–20-lobed, the lobes narrow; corolla large, hypocrateriform or salverform, the tube slender, straight or curved, the limb spreading, oblique, 5-lobed, the lobes contorted in bud; stamens 4, usually didynamous, attached near base of corolla tube, the filaments free, thickened proximally, the anther locules 2, parallel, equal or nearly so, often with basal spurs; disk annular or pulvinate; ovary locules 2-ovulate, the funicles pulvinate, the style curved distally, the stigma entire or 2-lobed, usually broad and often inrolled, the lobes sometimes unequal; capsule woody, with a broadened, subglobose base, abruptly beaked, usually subtended by persistent bracteoles, loculicidally dehiscent, the seeds 2–4, subglobose, with an excavation on inner surface, the retinacula lacking.

TYPE SPECIES: *Thunbergia capensis* Retz.

DISTRIBUTION: Paleotropical, with about 200 species, some of which are widespread in cultivation and are often naturalized elsewhere. Five species have been recorded from Fiji, all introduced.

KEY TO SPECIES

- Erect shrub; petioles 2–5 mm. long; leaf blades 1.5–9 × 0.5–5 cm.; flowers axillary, solitary; pedicels 1.2–2 cm. long; bracteoles subtending calyx caducous before or during anthesis, 1.5–2 cm. long; calyx 3–6 mm. long, with 10 or more lobes 1–4 mm. long; corolla tube 4–5 cm. long, white, yellowish within at throat, the limb 3.5–5 cm. in diameter, rich blue to dark purple. 1. *T. erecta*
- Plants with sinistrorsely twining stems.
- Calyx 1.5–5 mm. long, with 10–16 well-developed, linear-subulate lobes; flowers axillary.
- Petioles unwinged, 0.5–7 cm. long; corolla white, the tube 2–2.5 cm. long, the limb 4–5.5 cm. across; leaf blades ovate, 3–8 × 1.5–4 cm., sinuate-dentate, broadly obtuse to truncate at base. 2. *T. fragrans*
- Petioles winged nearly to base; corolla usually orange or yellow with a dark purple tube, the tube 1.5–2 cm. long, the limb 3–4 cm. across; leaf blades ovate, 3.5–15 × 2.5–11 cm., sagittate or hastate at base. 3. *T. alata*
- Calyx truncate or with short, broad, obtuse lobes; upper flowers borne in terminal, pendulous racemes; corolla limb blue-violet to white, 6–8 cm. across.
- Petioles 4–13 cm. long; leaf blades 7–18 × 6.5–19 cm., usually about as broad as long, cordate and 5–7-nerved at base, shallowly to deeply palmatilobed; pedicels 4.5–16 cm. long; basal bracteoles of calyx pale green, 2.5–3.5 cm. long, caducous after anthesis; corolla tube 3–3.5 cm. long. 4. *T. grandiflora*
- Petioles 1–6.5 cm. long; leaf blades 7.5–18 × 2.5–6 cm., 2–4-times as long as broad, cuneate to subcordate and 3–5-nerved at base, entire or slightly crenate-dentate; pedicels 1.7–3 cm. long; basal bracteoles of calyx green with violet blotches, 4–5 cm. long, long-persistent; corolla tube 3.2–4.8 cm. long. 5. *T. laurifolia*

1. *Thunbergia erecta* (Benth.) T. Anders. in *J. Proc. Linn. Soc. Bot.* 7: 18. 1863; Christophersen in *Bishop Mus. Bull.* 128: 197. 1935; Yuncker in *op. cit.* 178: 109. 1943, in *op. cit.* 184: 63. 1945; Backer & Bakh. f. *Fl. Java* 2: 551. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 39. 1970; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 339. 1972; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 116. 1972; Heine in *Fl. Nouv.-Caléd. et Dépend.* 7: 66. 1976; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 11. 1985.

Meyenia erecta Benth. in *Hook. Niger Fl.* 476. 1849.

Shrub 1–2 m. high, cultivated and sparingly naturalized along trails between sea level and about 400 m.; corolla tube white without, yellowish within at throat, the lobes rich blue to violet or dark purple. Flowers have been noted in April, July, and December, but fruits have not been collected in Fiji.

TYPIFICATION: The type is *Theodor Vogel* (HOLOTYPE presumably at K), collected on the "Cape Coast," tropical western Africa.

DISTRIBUTION: Indigenous in tropical western Africa, now widely cultivated and sometimes naturalized elsewhere. The species (as *Meyenia erecta*) was listed in Thurston's 1886 *Catalogue* and may have been first introduced into Fiji by him.

USE: An attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: RA: Near Nasukamai, *Gillespie 4398*. NAITASIRI: Plant Introduction and Quarantine Station, Nanduruloulou, *DA 12143*. TAILEVU: Ndakuivuna, cultivated in village, *Smith 7081*. VANUA LEVU: MATHUATA: Seangangga Plateau north of Natua, toward Mathuata Range, *Smith 6826*.

2. *Thunbergia fragrans* Roxb. Pl. Coromandel 1: 47. pl. 67. 1796; Greenwood in Proc. Linn. Soc. 154: 102. 1943, in J. Arnold Arb. 25: 401. 1944; Yuncker in Bishop Mus. Bull. 220: 242. 1959; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 339. 1972; Backer & Bakh. f. Fl. Java 2: 552. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 39. 1970; R. Long in J. Arnold Arb. 51: 274. 1970.

Herbaceous scrambling or climbing vine, occasionally cultivated, also naturalized in thickets, along roadsides, and in coconut plantations near sea level; corolla white. Flowers have been observed in scattered months, fruits only in July.

TYPIFICATION: The type, presumably collected by Roxburgh, was noted as "common on banks of water-courses about Samulcotah," India.

DISTRIBUTION: Southeastern Asia and Malesia, cultivated and sometimes naturalized elsewhere.

USE: A garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 735*. NAITASIRI: Nanduruloulou, *DA 12151*. VANUA LEVU: MATHUATA: Banks of lower Lambasa River, *Smith 6627*. THAKAUNDROVE: Wairuku, *DA 14304*; along Hibiscus Highway leading from Savusavu, *Bierhorst F159*. TAVEUNI: Waiyevo, *DA 5706*. LAKEMBA: Near Levuka Village, *Garnock-Jones 973*.

Apparently *Thunbergia fragrans* was first recorded from Fiji by Greenwood (1943), whose cited specimen, *Greenwood 735* (collected in 1927) is the earliest available; at that time the species was fairly common, cultivated and naturalized, in northwestern Viti Levu.

3. *Thunbergia alata* Bojer ex Sims in Bot. Mag. 52: t. 2591. 1825; Rechanger in Denkschr. Akad. Wiss. Wien 85: 366. 1910; Christophersen in Bishop Mus. Bull. 128: 197. 1935; Yuncker in op. cit. 178: 109. 1943; Greenwood in Proc. Linn. Soc. 154: 102. 1943, in J. Arnold Arb. 30: 80. 1949; Yuncker in Bishop Mus. Bull. 220: 242. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 131. fig. 65. 1959, Pl. Fiji Isl. 246. 1964, ed. 2. 339. 1972; Backer & Bakh. f. Fl. Java 2: 552. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 39. 1970; R. Long in J. Arnold Arb. 51: 274. fig. 1. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 116. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 66. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 11. 1985; R. Barker in J. Adelaide Bot. Gard. 9: 47. 1986.

Sprawling or scrambling herbaceous vine, often locally frequent from near sea level to about 900 m. as a naturalized weed in thickets, cultivated areas, pastures, villages, and plantations, and along roadsides; corolla rich orange to pale or bright yellow, the tube rich purple within (or occasionally similar in color to rest of corolla). Flowers and fruits occur throughout the year.

TYPIFICATION: The original description was based on plants grown in England from seed sent by Bojer from Mauritius, although the plant was said to be a native of Zanzibar and Pomba, East Africa.

DISTRIBUTION: Tropical East Africa and perhaps Indian Ocean islands, now widely cultivated and naturalized. *Thunbergia alata* was listed in Thurston's 1886 *Catalogue* and may have been introduced by him (or earlier) as an ornamental. About 25 Fijian collections are at hand.

LOCAL NAME AND USE: *Black-eyed Susan*; sometimes grown as an ornamental, although more often treated as a weed.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 205*; Saweni beach, *DA 10302*; vicinity of Nandarivatu, *Smith 5015*. NANDRONGA & NAVOSA: Navula, Singatoka Valley road, *DA 11325*. RA: Without further locality, *DA 10950*. NAITASIRE: Vunindawa, *DA 11036*; Navuso, *DA 11050*. TAILEVU: Korovou, *DA 10937*; Raralevu, *DA 10600*. REWA: Suva, *Bryan 200*. OVALAU: Lovoni Village, *Smith 7477*. KORO: East coast, *Smith 1099*. VANUA LEVU: MATHUATA: Ndreketi Plantations, *DA 14365*; Lambasa, *Greenwood 205A*. TAVEUNI: Vicinity of Waivevo, *Smith 8119*; Waimanggere Plantation, *DA 8931*.

4. ***Thunbergia grandiflora*** [Roxb. Hort. Beng. 45, nom. nud. 1814] (Roxb. ex Rottler) Roxb. in Bot. Cab. 4: t. 324. (Jan.) 1820, in Edgew. in Bot. Reg. 6: t. 495. (post Mar.) 1820, Fl. Ind. ed. 2. 3: 34. 1832; A. C. Sm. in Sargentia 1: 117. 1942; Greenwood in J. Arnold Arb. 36: 399. 1955; J. W. Parham, Pl. Fiji Isl. 247. 1964, ed. 2. 339. 1972; Backer & Bakh. f. Fl. Java 2: 552. 1965; R. Long in J. Arnold Arb. 51: 274. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 67. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 11. 1985; R. Barker in J. Adelaide Bot. Gard. 9: 49. 1986.

Flemingia grandiflora Roxb. ex Rottler in Ges. Naturf. Freunde Berlin Neue Schriften 4: 202. 1803.

A vine, often sprawling or creeping, cultivated in gardens and villages or sparingly naturalized from near sea level to about 200 m.; corolla tube white (sometimes with a pale yellow tinge), the limb pale violet to bluish purple. Flowers have been noted in May, June, July, and December, but fruits have not been obtained in Fiji.

TYPIFICATION: The species was based on material collected near Calcutta, India, presumably by Roxburgh; a number of specimens at K could qualify as the LECTOTYPE, apparently not yet selected (Barker, 1986). It is possible that *Flemingia grandiflora* is illegitimate, in which case the parenthetical authorship would be unnecessary (Barker, 1986).

DISTRIBUTION: Indigenous in India, but now widely cultivated and sometimes naturalized elsewhere. Thurston listed *Thunbergia grandiflora* in his 1886 *Catalogue*; the species may have been introduced into cultivation by him. My 1942 note overlooked that earlier introduction.

LOCAL NAMES AND USE: Although they have not been recorded in Fiji, the usual names are *large-flowered thunbergia* and *Bengal trumpet*. The species is one of the most striking of the genus as an ornamental.

AVAILABLE COLLECTIONS: MAMANUTHAS: YANUTHA: J. Fogg (kodachrome only). VITI LEVU: RA: Vicinity of Rewasa, near Vaileka, *Degener 15493*. REWA: Suva Botanical Gardens, *DA 12112*. VANUA LEVU: THAKAUNDOVE: Nanukuloa Estate, *DA 17192*.

5. *Thunbergia laurifolia* Lindl. in Gard. Chron. 1856: 260. 1856; Backer & Bakh. f. Fl. Java 2: 553. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 339. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 67. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 11. 1985; R. Barker in J. Adelaide Bot. Gard. 9: 50. 1986.

Sprawling vine, apparently naturalized along roadsides in a single locality at 800–850 m.; corolla limb pale blue to pale violet, with a paler center. Flowers were noted in July.

TIPIFICATION: Lindley (1856) indicated that his specimen had been cultivated by J. Veitch & Son, but apparently Hooker (in Bot. Mag. 83: t. 4985. 1857) disagreed as to the source; this and the apparent lack of a holotype are discussed by Barker (1986).

DISTRIBUTION: Apparently indigenous in Burma and Malaysia, cultivated elsewhere. Nothing is known of its introduction into Fiji, but from the locality it could have been an escape from a European garden, and it may even have been introduced by Thurston, who doubtless brought various plants to Nandarivatu.

USE: A garden ornamental, but perhaps not grown as such in Fiji.

AVAILABLE COLLECTION: VITI LEVU: MBA: Nandarivatu, DA 10402.

2. *Hemigraphis* Nees in DC. Prodr. 11: 722. 1847; Backer & Bakh. f. Fl. Java 2: 559. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 30. 1976; R. Barker in J. Adelaide Bot. Gard. 9: 114. 1986.

Erect, ascending, or creeping herbs, the leaves petiolate, the pairs connected by a transverse ridge, the blades entire or dentate; inflorescences terminal and axillary, spike, the bracts imbricate, each subtending a flower; calyx 5-lobed nearly to base or to half its length, the segments subequal; corolla tube straight, slender, shortly widened distally, the lobes 5, contorted in bud, subequal; stamens 4, didynamous, included, inserted at base of corolla throat, the 2 anterior ones the longer, the filaments basally connected by membranes, the anthers medifixed, 2-locular, the locules parallel; ovary locules with 4–10 ovules, the stigma with unequal subulate lobes; capsule fusiform, seminiferous throughout, the retinacula conspicuous, the seeds 6–20, ovate or orbicular, flat, pilose.

LECTOTYPE SPECIES: *Hemigraphis latebrosa* (Heyne ex Roth) Nees (*Ruellia latebrosa* Heyne ex Roth); cf. Bremekamp in Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 41: 74. 1944. This lectotypification was presumably overlooked by ING (1979) but is noted by Heine (1976) and Barker (1986).

DISTRIBUTION: Southeastern Asia and Malesia, with species in northern Australia and New Caledonia, with about 70 species. At least one species is widely cultivated and sometimes naturalized elsewhere.

1. *Hemigraphis alternata* (Burm. f.) T. Anders. in J. Proc. Linn. Soc. Bot. 7: 114. 1863; Backer & Bakh. f. Fl. Java 2: 561. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 38. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 30. 1976.

Ruellia alternata Burm. f. Fl. Ind. 135. 1768.

Ruellia colorata Bl. Bijdr. Fl. Ned. Ind. 795. 1826.

Hemigraphis colorata Hall. f. in Nova Acta Acad. Leop.-Carol. 70: 199. pl. 9, fig. 1. 1897; Yunker in Bishop Mus. Bull. 178: 109. 1943; Greenwood in J. Arnold Arb. 25: 401. 1944; Yunker in Bishop Mus. Bull. 184: 63. 1945; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 338. 1972.

Sprawling herb, with ascending branches to 20 cm., cultivated in settlements and villages and sparingly naturalized along trails from near sea level to perhaps 200 m. elevation; stems, leaves, and bracts rich purple; petioles 2–5.5 cm. long; leaf blades ovate to oblong, 4–10 × 2.5–6 cm., crenate-serrate; spikes pedunculate, 2–10 cm. long;

corolla about 1.5 cm. long, white with faint purple markings within; stamens white, purple-tinged. Flowers and fruits are commonly found between May and July.

TYPIFICATION AND NOMENCLATURE: Burman noted that his plant was from Java (where it was doubtless cultivated); he cited illustrations of Rumphius and Rheede. Blume merely indicated that *Ruellia colorata* came from gardens in Java. The similarity of the two taxa was overlooked in much of the older literature.

DISTRIBUTION: Indigenous in the eastern half of Malesia, but now widely cultivated elsewhere and sometimes naturalized. It was presumably well established in Fiji by the time it was first recorded there by Greenwood (1944).

LOCAL NAME AND USES: *Cemetery plant*; it is a pleasing ornamental and is commonly grown to cover steep banks.

AVAILABLE COLLECTIONS: MAMANUTHAS: YANUTHA: *J. Fogg* (kodachrome only). VITI LEVU: MBA: Lautoka, *Greenwood 983A*. NAITASIRI: Principal Agricultural Station, Koronivia, *DA 12121*. REWA: Suva, *St. John 18920*, *Wilder*, November, 1928. OVALAU: Lovoni Village, *Smith 7672*. VANUA LEVU: THAKAUNDOVE: Along trail from Mbiagunu to Vemsi over Drayton Peak, *Bierhorst F127*.

3. BLECHUM P. Br. Hist. Jam. 261. 1756; R. Long in J. Arnold Arb. 51: 284. 1970.

Perennial herb; leaves petiolate, the blades entire to dentate; inflorescences usually terminal spikes or spiciform racemes, densely flowered, the bracts closely imbricate, broad, suborbicular or elongate; calyx deeply 5-partite, the segments linear-subulate, usually subequal; corolla infundibuliform, not projecting beyond bracts, the tube elongate, slender, the limb short, the lobes 5, subequal, contorted in bud; stamens 4, didynamous, included, adnate about middle of corolla tube, the anthers with parallel locules; ovary locules with few-6 ovules, the style filiform, the stigma subulate, obscurely lobed; capsule usually broadly oblong, with a short, narrow base, the seeds suborbicular, compressed, with mucilaginous hairs, the retinacula acute, the septum breaking away from capsular wall.

TYPE SPECIES: *Blechum brownei* Juss. (*Ruellia blechum* L.) = *B. pyramidatum* (Lam.) Urb.

DISTRIBUTION: Neotropical, with about ten species, one of which is a common adventive elsewhere.

1. *Blechum pyramidatum* (Lam.) Urb. in Repert. Sp. Nov. 15: 323. 1918; Greenwood in J. Arnold Arb. 30: 80. 1949; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 337. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 147. 1972.

Ruellia blechum L. Syst. Nat. ed. 10. 1120 (May-June) 1759, Pl. Jam. Pugillus, 16. (Dec.) 1759.

Barleria pyramidata Lam. Encycl. Méth. Bot. 1: 380. 1785; J. W. Parham in Dept. Agr. Fiji Bull. 35: 132. fig. 66. 1959.

Blechum brownei Juss. in Ann. Mus. Nat. Hist. (Paris) 9: 270. 1807; Greenwood in Proc. Linn. Soc. 154: 94, as *B. brownii*. 1943; R. Long in J. Arnold Arb. 51: 284. 1970.

Subligneous herb 0.3-1 m. high, naturalized and sometimes locally frequent in settlements, gardens, pastures, and waste places, and along roadsides; petioles slender, 5-20 mm. long; leaf blades elliptic-lanceolate, usually 3-8 × 1-3 cm., long-attenuate at base, inconspicuously crenate; inflorescence a dense, conspicuously bracteate, 4-sided spike; flowers small, the corolla white to pale blue; capsule about 3 mm. long. Flowers and fruits seem most common between July and December.

TYPIFICATION: *Ruellia blechum* is based on "Plum. Ic. t. 42, fig. 3; Sloan. Jam. t. 109, fig. 1." Voucher material of the latter is in Herb. Sloane, vol. 3: 56 (BM); there is also a specimen without data at LINN numbered 804.1. Perhaps all these items may be considered syntypes (C. E. Jarvis, in litt.). *Barleria pyramidata* was based on the Plumier illustration; *Blechum brownei* was a new name for *Ruellia blechum*.

DISTRIBUTION: Tropical America, now widespread as an adventive. The species was first noted to occur in Fiji by Greenwood (1943), who observed it in Suva in 1929. Presumably it was first established as an ornamental, although now it is considered a weed. Perhaps its date of introduction goes back to the latter part of the nineteenth century and the Lomaloma Botanical Gardens (cf. this *Flora*, vol. 1, p. 49).

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Plant Introduction and Quarantine Station, Nanduloulou, DA 9574, 11750; Navuso, DA 9345, 9376; Principal Agricultural Station, Koronivia, DA 4009; Tamavua, DA 11073. TAILEVU: Korovou, DA 10935, 11428. REWA: Suva, Greenwood 758, Meebold 16923. TAVEUNI: Mt. Vernon Estate, DA 8946. VANUA MBALAVU: Lomaloma Botanical Gardens, DA 10204; Lomaloma Village, Garnock-Jones 1108.

4. **RUELLIA** L. Sp. Pl. 634. 1753; Backer & Bakh. f. Fl. Java 2: 557 (sensu angust.). 1965; R. Long in J. Arnold Arb. 51: 285. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 62. 1976; R. Barker in J. Adelaide Bot. Gard. 9: 75 (sensu angust.). 1986.

Stephanophysum Pohl, Pl. Bras. Icon. Descr. 2: 83. 1830 or 1831; Backer & Bakh. f. Fl. Java 2: 558. 1956; R. Barker in J. Adelaide Bot. Gard. 9: 79. 1986.

Perennial herbs or shrubs; leaves petiolate or sessile, connected by transverse ridges, the blades usually entire and undulate; inflorescences terminal or axillary, sometimes long-pedunculate, cymose or cymose-paniculate, or flowers axillary and solitary or fasciculate, sometimes small and cleistogamous, the bracts narrow, the bracteoles small or lacking; calyx deeply 5-partite, the segments linear or narrow, acute, subequal; corolla infundibuliform or hypocrateriform, sometimes saccate or curved, the tube short to long, narrow proximally, straight or oblique, the limb spreading, the lobes 5, convolute in bud; stamens 4 (rarely 5), didynamous, attached below corolla throat, usually included, the filaments united in pairs at base by a membrane, the anthers parallel, 2-loculate, oblong-sagittate, dorsifixed, a staminode small or none; disk annular or inconspicuous; ovary locules each with (2 or) 3-20 ovules, the style slender, usually slightly recurved at apex, the stigma subulate or 2-lobed (posterior lobe sometimes short or obsolete); capsule linear-oblong or clavate, narrow, the base contracted into a solid stipe, the seeds 4-numerous, suborbicular, plano-compressed, with mucilaginous hairs, the retinacula elongate, acicular, hooked.

LECTOTYPE SPECIES: The lectotype species of *Ruellia* is *R. tuberosa* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2, 3: 241. 1913); that of *Stephanophysum* is *S. longifolium* Pohl; vide Bremekamp in Verh. Kon. Ned. Akad. Wetensch., Afd. Natuurk., Tweede Sect. 45: 13. 1948; = *R. graecizans* Backer.

DISTRIBUTION: Pantropical and subtropical, rarely extending into temperate areas, with about 250 species. One widespread weed is frequent in Fiji.

1. **Ruellia graecizans** Backer in Brittonia 3: 85. 1938; J. W. Parham, Pl. Fiji Isl. ed. 2. 339. 1972.

Stephanophysum longifolium Pohl, Pl. Bras. Icon. Descr. 2: 85. t. 156. 1830 or 1831; Backer & Bakh. f. Fl. Java 2: 558. 1965; R. Barker in J. Adelaide Bot. Gard. 9: 80. 1986; non *Ruellia longifolia* A. Rich. (1782).

Ruellia amoena Nees ex Backer in Ann. Jard. Bot. Buitenzorg 2: Suppl. 3: 412. 1909; Greenwood in Proc. Linn. Soc. 154: 102. 1943; non Sessé & Moc. (1889).

Coarse herb 0.5-1.5 m. high, sometimes locally frequent as a naturalized weed from near sea level to about 400 m. on hillsides, along trails and roadsides, and in coconut plantations; petioles 1-3.5 cm. long; leaf blades ovate-lanceolate, usually 4-15 × 2-6 cm.; calyx 0.5-1 cm. long; corolla bright red, 3-4 cm. long; filaments white; style pale red; capsule green to brown. Flowers and fruits seem to occur throughout the year.

TYPIFICATION AND NOMENCLATURE: Pohl indicated his material as from two Brazilian localities; probable syntypes are Pohl 3027 and 6038 (w) (Barker, 1986). In 1909

Backer provided no description or type citation for *Ruellia amoena*, merely indicating it as from Brazil; in 1938 he stated that the name was taken from a Nees manuscript in Herb. Beyrich. *Ruellia graecizans* was proposed as a new name for *Stephanophysum longifolium* Pohl. That there has been much confusion caused by use of the binomial *Ruellia longifolia* by different authors is shown not only by Backer (1938), but also by Ghafoor and Heine (in Willdenowia 16: 121–123. 1986). *Ruellia graecizans*, however, remains the correct binomial in *Ruellia* for the ornamental tropical American plant with broad leaves and bright red flowers.

DISTRIBUTION: Tropical America, now widely naturalized elsewhere. The earliest Fijian collection noted, *Graeffe 117*, was presumably collected in the 1860's. Although the species is now considered a weed, it was probably introduced as an ornamental and may have been so established on Vanua Mbalavu, then a port of entry to Fiji. Its persistence at the site of the old Lomaloma Botanical Gardens suggests that it attracted the attention of early planters who established those Gardens (cf. this *Flora*, vol. 1, p. 49).

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Near Thuvu beach, *DA 10273, 11418*: Singatoka, *Greenwood 10* (October, 1919). SERUA: Shore of Taunovo Bay, *Vaughan 3160*; near Navua River at Namata rapids, *Gillespie 2945*. NAITASIRE: Kalambo, *Tothill 655, DA 11240*; Waimanu road, near Suva, *H. B. R. Parham 4*. REWA: Lami, *Meebold 16924*. OVALAU: Near Lovoni Village, *Smith 7503*; mountains near Levuka, *Gillespie 4535*; Levuka, *Parks 20489*. KORO: Northern slope, *Smith 1044*. VANUA LEVU: THAKAUNDOVE: West of Valeti, *Bierhorst 104A*. TAVEUNI: Vicinity of Waiyevo, *Gillespie 4713*; Tavuki, *DA 8935*. VATU VARA: In lowland coconut grove, *Bryan 597*. EXPLORING ISLANDS: *Graeffe 117* (HBG). VANUA MBALAVU: Lomaloma Botanical Gardens, *DA 10202*. FIJI without further locality, *DA 2287, 13688*.

5. ASYSTASIA Bl. Bijdr. Fl. Ned. Ind. 796. 1826; Backer & Bakh. f. Fl. Java 2: 576. 1965; R. Long in J. Arnold Arb. 51: 298. 1970; R. Barker in J. Adelaide Bot. Gard. 9: 132. 1986.

Perennial herbs or low shrubs, sometimes scrambling or with climbing branches, the stems thickened above nodes; leaves petiolate, connected by transverse ridges; inflorescences terminal, spiciform-racemose, sometimes unilateral, the bracts and bracteoles small, the flowers single or paired; calyx deeply 5-partite, the segments linear to lanceolate, subequal; corolla infundibuliform, narrow at base, broadened in distal half, the lobes 5, spreading, imbricate in bud, ovate-ovovate; stamens 4 (or the posterior pair rarely reduced to filiform staminodes), inserted in widened part of corolla tube, didynamous, included (or 2 slightly exerted), the filaments connate in pairs, the anther locules parallel, attached at same or slightly unequal level, the connective obtuse; disk cupuliform or annular; ovary locules each with 2 ovules, the style subulate, the stigma thickened, bilobed; capsule clavate, contracted and solid at base, the seeds 4 or fewer, ovate-orbicular, compressed, tuberculate-rugose, the retinacula elongate, subulate.

TYPE SPECIES: The type species indicated by ING (1979) is *Asystasia intrusa* (Forssk.) Bl. (*Ruellia intrusa* Forssk.); however, Barker (1986) has interestingly discussed the probability that this choice should be superseded because it is unlikely that Blume's Javan material represents that species. Typification of the genus is therefore still to be decided.

DISTRIBUTION: Paleotropical, with 40–50 species; one species is cultivated and sometimes naturalized in Fiji.

1. *Asystasia gangetica* (L.) T. Anders. in Thw. Enum. Pl. Zeyl. 235. 1860; Yuncker in Bishop Mus. Bull. **178**: 109. 1943; Greenwood in Proc. Linn. Soc. **154**: 102. 1943, in J. Arnold Arb. **30**: 80. 1949, in op. cit. **36**: 399. 1955; Yuncker in Bishop Mus. Bull. **220**: 243. 1959; J. W. Parham in Dept. Agr. Fiji Bull. **35**: 132. 1959, Pl. Fiji Isl. 244. 1964, ed. 2. 337. 1972; Backer & Bakh. f. Fl. Java **2**: 576. 1965; R. Long in J. Arnold Arb. **51**: 299. 1970; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 37. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 68. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **9**. 1985; R. Barker in J. Adelaide Bot. Gard. **9**: 134. fig. 19, E. 1986.

Justicia gangetica L. Cent. II. Pl. 3. 1756, Amoen. Acad. **4**: 299. 1759.

Scrambling subligneous herb or shrub, sometimes with ascending climbing branches to 1 m. high, cultivated or naturalized near settlements near sea level; petiole 0.2–3 cm. long; leaf blades ovate, 1.5–7.5 × 0.5–5 cm.; calyx 5–10 mm. long; corolla 2.5–3.5 cm. long, usually white ventrally and pale pink dorsally (light violet to white or yellowish in color forms); capsule 3.5–4 cm. long. Flowers have been noted between May and July, fruits in October.

TIPIFICATION: The type material is from India without further data (LINN 28.26, 28.27, SYNTYPES) (Barker, 1986).

DISTRIBUTION: Indigenous in the Old World tropics, introduced into northern Australia and Pacific areas as well as tropical America.

USES: The seeds of this plant are sought after and eaten by domestic fowls in Fiji (Greenwood, 1955); it may have been introduced into cultivation for that purpose. Greenwood (1949) indicates that it was first noticed in Fiji in Levuka, Ovalau, in 1927.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 738, 738A*. NANDRONGA & NAVOSA: Agricultural Station, Singatoka, *DA 10830, 11546*. NAITASIRI: Near Nausori, *Greenwood 1115*. REWA: Waimanu road, Suva, *H. B. R. Parham 55*; Suva Botanical Gardens, *DA 12111*.

6. *BARLERIA* L. Sp. Pl. 636. 1753; Backer & Bakh. f. Fl. Java **2**: 571. 1965; Heine in Fl. Nouv.-Caléd. et Dépend **7**: 10. 1976; R. Barker in J. Adelaide Bot. Gard. **9**: 125. 1986.

Erect herbs or low shrubs; leaves opposite, petiolate, sometimes with axillary spines, the blades entire; inflorescences fasciculate, spicate, or cymose, the flowers in the axils of leaves or subtended by bracts; calyx bracteolate, deeply 4-partite, the inner segments the narrower; corolla tube long, broadened distally, the lobes 5, imbricate in bud; stamens 4 (rarely only 2 fertile), inserted at base of corolla tube, the 2 anterior ones fertile, exerted, with parallel locules, the posterior one included, smaller, sometimes sterile; disk cupuliform; ovary locules with 1 or 2 ovules, the style elongate, glabrous, the stigma entire or slightly bifid; capsule ovate-oblong, compressed, the seeds 2–4, compressed, with mucilaginous hairs, the retinacula conspicuous.

LECTOTYPE SPECIES: *Barleria cristata* (vide M. L. Green, Prop. Brit. Bot. 169. 1929).

DISTRIBUTION: Mostly tropical Africa and Asia, but also in tropical America, with about 80 species, several of which are widely cultivated. Two species are cultivated in Fiji, one of them occasionally becoming naturalized.

KEY TO SPECIES

Flowerless leaf axils with 2 subulate spines; flowers in spikes 3.5–9 cm. long; calyx 1–1.5 cm. long, the segments subequal in length, entire, short-aristate; corolla yellow, 2–4 cm. long; ovary locules with 1 ovule; petioles 1–7 mm. long; leaf blades linear-lanceolate, 3.5–13 × 0.5–2 cm. 1. *B. lupulina*

Flowerless leaf axils without spines; flowers 1–3 in leaf axils; calyx 1.5–2.5 cm. long, the segments very unequal, dentate, with spiny margins and apex; corolla blue or violet to white, 5–7.5 cm. long; ovary locules with 2 ovules; petioles 4–18 mm. long; leaf blades elliptic to ovate or obovate, 3–12 × 1–4.5 cm.

2. *B. cristata*

1. *Barleria lupulina* Lindl. in Bot. Reg. **18**: t. 1483. 1832; Backer & Bakh. f. Fl. Java **2**: 572. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 337. 1972; R. Barker in J. Adelaide Bot. Gard. **9**: 127. 1986.

Barleria lupulina is seen in Fiji only in cultivation from near sea level to about 250 m.; it is a shrub 2-3 m. high, with spiny branches; bracts green, brown-tipped or purplish in upper half; corolla pale yellow. Flowers have been obtained in March.

TYPIFICATION: Based on material cultivated at the Horticultural Society garden in England from material sent from Mauritius by C. Telfair. There is no herbarium voucher at CGE, but the original illustration may be taken as the type (Barker, 1986).

DISTRIBUTION: Indigenous in Mauritius, but widely cultivated (as a houseplant in cooler areas) and perhaps rarely naturalized.

USE: An attractive ornamental, sometimes used as a hedge.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Toninaiwau, Tholo-i-suva, DA 16756. REWA: Lami, in private garden, DA 16462.

2. *Barleria cristata* L. Sp. Pl. 636. 1753; Backer & Bakh. f. Fl. Java **2**: 572. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 37. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 337. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 10. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **9**. 1985.

Shrub 1-2.5 m. high, cultivated in villages and gardens and sparingly naturalized along roadsides from near sea level to about 100 m.; corolla variable in color, rich blue or purple to pale pink or pure white; filaments and style usually pale blue. Flowers have been obtained between January and June, but fruits have not been noted in Fiji.

TYPIFICATION: Linnaeus's only statement of the provenance of his material was: "*Habitat in India.*" Specimens at LINN that may be taken as SYNTYPES are 805.10, 805.11, and possibly 805.12 (C. E. Jarvis, in litt.).

DISTRIBUTION: Indigenous in India (and adjacent areas?), now widely cultivated and sometimes naturalized. It is probable that one of the species of *Barleria* was introduced into Fiji by Thurston, as the genus was listed by him (with a different epithet) in his 1886 *Catalogue*.

LOCAL NAME AND USE: *Tombithi*; an attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Plant Introduction and Quarantine Station, Nanduroulou, DA 7422. REWA: Lami, in private garden, DA 16457, 16466; Suva Botanical Gardens, DA 12288. OVALAU: Lovoni Village, Smith 7491. VANUA LEVU: THAKAUNDROVE: Along Hibiscus highway leading from Savusavu, Bierhorst F158.

7. *CROSSANDRA* Salisb. Parad. Lond. **1**: t. 12. 1805; Backer & Bakh. f. Fl. Java **2**: 554. 1965.

Erect, small shrubs, the leaves spuriously 4-verticillate; inflorescences terminal, spicate, the bracts opposite, imbricate, the bracteoles shorter and narrower; calyx membranaceous, deeply 4-partite, the segments imbricate, unequal; corolla tube terete, slender, geniculate bent forward, shortly widened distally, dorsally split, the limb flat, the lobes 5, imbricate; stamens 4, very short, included in corolla tube, the anthers 1-loculed; ovary locules with 2 ovules, the style shortly 2-lobed; capsule oblong, tetragonous, the seeds 4 or fewer, orbicular, flat, with fimbriate scales.

TYPE SPECIES: *Crossandra undulaefolia* Salisb.

DISTRIBUTION: Tropical Asia, Africa, and Madagascar, with about 50 species, one of which is cultivated in Fiji.

1. **Crossandra infundibuliformis** (L.) Nees in Wall. Pl. Asiat. Rar. 3: 98. 1832; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 337. 1972; Backer & Bakh. f. Fl. Java 2: 554. 1965; R. Long in J. Arnold Arb. 51: 265. 1970; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 9. 1985.

Justicia infundibuliformis L. Syst. Nat. ed. 10. 850. 1759.

Shrub 0.5–1 m. high, cultivated near sea level; leaf blades ovate-oblong, dark green, glossy, long-decurrent on petiole, 6–13 × 1.5–5 cm.; spikes long-pedunculate, acutely tetragonous and with closely imbricate bracts, bearing 4–6 flowers at a time; corolla tube pale, about 2 cm. long, the limb 2.5–4 cm. across, bright orange to scarlet, the throat yellow.

TYPIFICATION: No specimen or illustration was cited by Linnaeus in 1759, but a specimen in the Linnaean Herbarium, 28.6 (LINN), may be taken as the LECTOTYPE (Wasshausen, in litt.).

DISTRIBUTION: Indigenous in India and Ceylon, cultivated in other tropical areas. Although no Fijian herbarium specimens have been noted, the species is said to be moderately common in cultivation (Parham, 1964, 1972); it is presumably a comparatively recent introduction in Fiji.

USE: A garden ornamental.

8. **SANCHEZIA** Ruiz & Pavón, Fl. Per. Chil. Prodr. 5. t. 32. 1794; Backer & Bakh. f. Fl. Java 2: 556. 1965.

Erect shrubs, with quadrangular stems and thickened nodes; leaves opposite, connected by transverse ridges, with linear cystoliths, the blades crenate to serrate; inflorescences terminal, spicate, the spikes sometimes branched, the flowers fasciculate or solitary in axils of bracts; calyx deeply 5-partite, the segments oblong or lanceolate; corolla tube elongate, narrow, broadened above base, the lobes 5, contorted in bud, short, rounded, subequal, becoming recurved; fertile stamens 2, inserted deeply on corolla tube, the filaments exerted, long-pilose, the locules 2, parallel; staminodes 2, filiform; ovary locules with 3 or 4 ovules, the style with the anterior arm longer than the posterior one; capsule narrowly cylindrical, the seeds usually 6–8.

TYPE SPECIES: *Sanchezia oblonga* Ruiz & Pavón (Fl. Per. Chil. 7. t. 8, fig. b. 1798).

DISTRIBUTION: Neotropical, with about 30 species, several of which are cultivated elsewhere. One species is cultivated and naturalized in Fiji.

1. **Sanchezia nobilis** Hook. f. in Bot. Mag. 92: t. 5594. 1866; Backer & Bakh. f. Fl. Java 2: 556. 1965; R. Long in J. Arnold Arb. 51: 265. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 339. 1972.

Robust shrub 1–3 m. high, cultivated in gardens and also abundantly (but locally) naturalized along streams in dense forest at elevations from near sea level to about 200 m.; petioles stout, 1–4 cm. long, winged nearly to base; leaf blades oblong, 10–45 × 5–15 cm., long-decurrent on petiole; bracts red to orange, greenish near base, ovate, 2.5–5.5 cm. long; corolla rich yellow to orange, 4.5–5.5 cm. long; stamens and style rich yellow. Flowers have been noted between February and July; fruits have not been observed in Fiji.

TYPIFICATION: The illustrated plant was grown in the Royal Exotic Nurseries, Chelsea, from a source at first indicated as Peru but later said to have been collected in Ecuador by Pearce.

DISTRIBUTION: Tropical South America, now often cultivated elsewhere and sometimes naturalized. The species was listed by Thurston in his 1886 *Catalogue* and may have been introduced into Fiji by him.

USE: A striking ornamental, naturalizing in deep forest in a few localities, profusely so in the first cited below.

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakui-vuna, *Smith 7131*. REWA: Suva, *DA 17229*; Suva Botanical Gardens, *DA 12103*. VANUA LEVU: THAKAUNDROVE: Along Hibiscus highway leading from Savusavu, *Bierhorst F186*.

9. *ERANTHEMUM* L. Sp. Pl. 9. 1753; Backer & Bakh. f. Fl. Java 2: 559. 1965.

Erect herbs or shrubs, the nodes thickened; leaves opposite, with linear cystoliths, the petioles connected by a transverse ridge; inflorescences terminal and axillary, densely spiciform-racemose, the bracts conspicuous; calyx 5-parted, exceeding the bracteoles in length, the segments equal, narrow, acute; corolla tube elongate, slender, not much widened distally, the lobes 5, contorted in bud; fertile stamens 2, borne near apex of corolla tube, exerted or not, the locules 2, parallel; staminodes 2, short, each connected with a stamen by a membrane; ovary glandular-pilose distally, the locules 2-ovulate, the stigma 2-lobed (posterior lobe minute); capsule clavate, the retinacula well developed, the seeds 4 or fewer, with copious mucilaginous hairs.

TYPE SPECIES: *Eranthemum capense* L., the only original species.

DISTRIBUTION: Paleotropical, with about 30 species, some of which are cultivated, as is one species in Fiji.

1. *Eranthemum nervosum* (Vahl) R. Br. ex Roemer & Schultes, Syst. Veg. 1: 174. 1817; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 96. 1948; Backer & Bakh. f. Fl. Java 2: 559. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 337. 1972.

Justicia nervosa Vahl, Enum. Pl. 1: 164. 1804.

Shrub 0.6–2 m. high, cultivated at elevations from near sea level to about 250 m.; petioles 1–8 cm. long; leaf blades elliptic to ovate, 8–25 × 4–10 cm.; inflorescences rigid, 2–10 cm. long, the bracts whitish with conspicuous green veins, 10–25 mm. long; corolla blue, 2–3 cm. long, the limb 2–2.5 cm. across, the filaments exerted.

TIPIFICATION: The type is a Rottler specimen from India, presumably at c.

DISTRIBUTION: Southeastern Asia, widely cultivated in other tropical areas. It may have been introduced into Fiji by Thurston and listed in his 1886 *Catalogue* as *Eranthemum sp.*; the Suva specimen cited below comes from his former "Thornbury" garden.

USE: An attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Toninaiwau, Tholo-i-suva, *DA 16739*. REWA: Suva, in private garden, *DA 16087*; reported by Parham (1948) to be grown in the Suva Botanical Gardens, but no voucher available).

10. *GRAPTOPHYLLUM* Nees in Wall. Pl. Asiat. Rar. 3: 76, 102. 1832; Backer & Bakh. f. Fl. Java 2: 578. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 15. 1976; R. Barker in J. Adelaide Bot. Gard. 9: 156. 1986.

Erect shrubs or small trees; leaves opposite, subsessile or petiolate, the blades with minute cystoliths; inflorescences terminal or axillary narrow panicles or cymes, the bracts and bracteoles small; calyx deeply 5-partite, the segments narrow, acute; corolla tube infundibuliform, widened distally, the limb bilabiate, sometimes inconspicuously so, oblique, the lobes 5, imbricate in bud, the upper lip 2-lobed, the lower lip usually larger, 3-lobed; stamens inserted in corolla throat, the 2 anterior ones fertile, the locules parallel, subequal, the 2 posterior stamens usually reduced to short staminodes often basally adnate to anterior filaments, sometimes lacking; disk annular; ovary locules with 2 ovules, the stigma slightly 2-lobed; capsule woody, clavate, stipitiform at base, the seeds 4 or often reduced to 2, orbicular, the retinacula prominent.

TYPE SPECIES: *Graptophyllum hortense* Nees, nom. illeg. (*Justicia picta* L.) = *G. pictum* (L.) Griffith.

DISTRIBUTION: Paleotropical, with about 15 species. Four species are recorded from Fiji, three of them indigenous.

KEY TO SPECIES

Inflorescences terminal, 3–12 cm. long, many-flowered; corolla 3–4 cm. long, rich purple to crimson-purple or mauve or reddish brown; leaf blades 6–20 × 3–13 cm., variously variegated with purple, green, red, and white, sometimes with pale margins or pale costa; cultivated only. 1. *G. pictum*

Inflorescences axillary, few-flowered or flowers solitary; corolla 0.7–3.5 cm. long, usually rich pink to white, infrequently purplish red or maroon; leaf blades 2.5–11 × 0.8–5 cm., green, occasionally bronze beneath but not variegated; indigenous.

Petioles 3–20 mm. long, slender; leaf blades chartaceous or papyraceous, obtuse to attenuate at base and decurrent on petiole, often slightly repand-undulate at margin.

Corolla 2.5–3.5 cm. long, rich pink, infrequently red to purplish or maroon; pedicels usually 5–10 mm. long; leaf blades 3–11 × 1.5–5 cm. 2. *G. insularum*

Corolla 0.7–1 cm. long, white to pale pink; pedicels to 8 mm. long; leaf blades 2.5–8 × 0.8–2.7 cm. 3. *G. repandum*

Petioles 0.5–2 mm. long; leaf blades chartaceous to subcoriaceous, subamplexicaul, cordate at base, entire and slightly revolute at margin; corolla 2.5–3 cm. long. 4. *G. sessilifolium*

1. ***Graptophyllum pictum*** (L.) Griffith, Notul. Pl. Asiat. 4: 139. 1854; Rechanger in Denkschr. Akad. Wiss. Wien 85: 366. 1910; Yuncker in Bishop Mus. Bull. 178: 109. 1943, in op. cit. 220: 243. 1959; Backer & Bakh. f. Fl. Java 2: 579. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 38. 1970; R. Long in J. Arnold Arb. 51: 265. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 338. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 16. pl. 3. 1976.

Justicia picta L. Sp. Pl. ed. 2. 21. 1762.

Graptophyllum hortense Nees in Wall. Pl. Asiat. Râr. 3: 102, nom. illeg. 1832.

Graptophyllum pictum var. *pictum*; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 19. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 9. 1985.

Graptophyllum aff. *pictum* R. Barker in J. Adelaide Bot. Gard. 9: 165. 1986.

Shrub 1–3 m. high, widely cultivated in villages and gardens at low elevations; petiole 0.3–1 cm. long; leaf blades oblong to lanceolate, 6–20 × 3–13 cm., rich purple and pale-blotched toward center, or green with white edges and purplish costa, or dull green and red with pale costa, or chocolate-colored with white blotches; inflorescences terminal, 3–12 cm. long, the bracts and bracteoles 2–4 mm. long; corolla rich purple, reddish brown, crimson-purple, or mauve, 3–4 cm. long. Flowers have been noted sporadically throughout the year, but fruits have not been collected in Fiji.

TYPIFICATION: Barker (1986) cites as the type: "*Anon. s. n.*, s. dat. Asia Herb. Linn. 28.5 (LINN)." Perhaps this extant specimen together with the Rumphius and Rheede illustrations cited by Linnaeus should be taken as syntypes.

DISTRIBUTION: Southeastern Asia and into Malesia, possibly to northern Australia, now widely cultivated elsewhere. It is quite possible that the species eastward in the Pacific was an aboriginal introduction. Several varieties have been recognized on the basis of leaf color, variegation or the lack of it, etc.; if these are accepted, the collections from the Fijian Region appear to represent var. *pictum*, with conspicuous leaf-variegation. The species was listed by Thurston in his 1886 *Catalogue*.

LOCAL NAME AND USE: *Caricature plant*; a garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Natuathoko, on Singatoka River, Kleinschmidt 198 (HBG), Aug. 1877. REWA: Along streets, DA 12225, 12226, 12227, 12228; Suva, in private garden, DA 16216, 16218, 16228. OVALAU: Lovoni Village, Smith 7486. VANUA LEVU: MATHUATA: Ndreketi Plantations, DA 16961.

2. *Graptophyllum insularum* (A. Gray) A. C. Sm. in *Sargentia* 1: 118. 1942; Yuncker in Bishop Mus. Bull. 220: 243. 1959; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 337. 1972. FIGURE 10A.

Graptophyllum hortense sensu Seem. in *Bonplandia* 9: 258, p. p. 1861; non Nees.

Eranthemum insularum A. Gray in Proc. Amer. Acad. Arts 5: 349. 1862, in *Bonplandia* 10: 37. 1862; Seem. Viti, 440. 1862, Fl. Vit. 186. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 257. 1892; Hemsl. in J. Linn. Soc. Bot. 30: 187. 1894.

Graptophyllum siphonostena F. v. Muell. Fragm. Phyt. Austral. 6: 87, nom. nud. 1867; Hemsl. in J. Linn. Bot. Soc. 30: 187, nom. nud. 1894; Stapf in Hemsl. in op. cit. 30: 214. 1894; Lindau in Engl. & Prantl, Nat. Pflanzenfam. IV. 3b: 327. 1895; Burkill in J. Linn. Soc. Bot. 35: 49. 1901; Gibbs in op. cit. 39: 159. 1909.

Shrub or slender tree, often freely branched, occurring from near sea level to an elevation of about 1,200 m. in dense, dry, or open forest and in the forest of crests and ridges, often locally frequent; petioles 3–20 mm. long; leaf blades chartaceous, occasionally bronze beneath, ovate or oblong to lanceolate, 3–11 × 1.5–5 cm., obtuse to attenuate at base and decurrent on petiole; calyx lobes 2–5 mm. long; corolla 2.5–3.5 cm. long, rich pink to purplish red, red, or maroon; filaments rich or pale pink or nearly white; style rich pink; fruit becoming dark brown to black, 2–3 cm. long. Flowers and fruits occur throughout the year.

TYPIFICATION: Gray cited an Exploring Expedition specimen from Fiji and also Harvey specimens from Vava'u and Lifuka, Tonga; since his treatment was primarily devoted to Exploring Expedition material, a suggested citation is: *U. S. Expl. Exped.* (US 62243 LECTOTYPE; ISOLECTOTYPE at GH). In describing *Graptophyllum siphonostena*, Stapf cited three collections: (1) *Lister*, in 1889, from 'Eua, Tonga; (2) *Harvey*, in August and October, 1855, from Vava'u and Lifuka, Tonga; (3) *Seemann*, in 1854, from Ovalau, Fiji [the date was actually July, 1860, and the locality was Moturiki; the specimen is a mere scrap (κ) presumably separated out of *Seemann 351*, *Pseuderanthemum laxiflorum*]. Of the first two collections cited by Stapf, the second (presumably combining two different specimens) is slightly the better, and a suggested citation for *G. siphonostena* is: *Harvey* (κ LECTOTYPE), collected in August and October, 1855, on Vava'u and Lifuka, Tonga. This, of course, is the same Harvey material cited by Gray in 1862. My (1942) indication of *Seemann 351*, p. p., as the type collection of *G. siphonostena* should be superseded.

DISTRIBUTION: Fiji and Tonga; about 65 Fijian collections are now available.

LOCAL NAMES AND USE: Possibly none of the following recorded names are very credible, each of them reported only once or twice: *mendra suthu na mbeka*, *mendra suthu na kaka*, *menamenawai*, *ndakaindravindravi*, *mbolovati*, *nggainggai*, *ndrimbindrimbi*, *nasa*, *sausau*, *vono ni matasawa*. In upper Naitasiri a leaf decoction has been reported to be used for kidney ailments.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Nangua, *St. John 18107*. VITI LEVU: M̄BA: North of Natalau, near Lautoka, *Degener 14999*; summit of Mt. Koroyanitu, Mt. Evans Range, *Smith 4179*; Vatia Point, *DA 13570*; near summit of Mt. Mangondro, *DA 14800*; vicinity of Nandarivatu, *Gibbs 876*; summit and slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Gillespie 4352*, *Smith 4753*; western and southern slopes of Mt. Tomanivi, *Smith 5307*, *DA 12754* (*Melville et al. 7146*). NANDRONGA & NAVOSA: Nausori Highlands, *DA 12665* (*Melville et al. 7040*); northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5574*. SERUA: Hills between Wainigere and Waiese Creeks, between Ngaloa and Wainiyambia, *Smith 9632*. NAMOSI: Near summit of Mt. Naitarandamu, *Gillespie 3086*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8723*; Mt. Voma, *Gillespie 2897*. NAITASIRI: Matanatavo, head of Wainisavulevu Creek, Wainimala Valley, *St. John 18310*; Vatavulu, Nambauthara Hill, *Gibbs 535*. REWA: Summit of Mt. Korombamba, *Vaughan 3450*. KANDAVU: Namalata isthmus region, *Smith 44*. OVALAU: Slopes of Mt. Korotolotolu, west of Thawathi, *Smith 8012*; hills near Levuka, *Gillespie 4420*. MOTURIKI: *Seemann 351*, p. p. VANUA LEVU: M̄BA: Lower Wainunu

River Valley, *Smith 1837*. MATHUATA: Mt. Ndelaikoro, *DA 11490*; vicinity of Lambasa, *Greenwood 527*; southern slopes of Mt. Numbuloa, east of Lambasa, *Smith 6386*. THAKAUNDOVE-MATHUATA boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith 562*. MATUKU: *Bryan 268*. KAMBARA: *Tohill 654*. FULANGA: On limestone formation, *Smith 1120*. ONGEA NDRIKI: In forest near rocky beach, *Bryan 384*.

3. *Graptophyllum repandum* (A. Gray) A. C. Sm. comb. nov. FIGURE 10B & C.

Chaetacanthus repandus A. Gray in Proc. Amer. Acad. Arts 5: 349, excl. syn. 1862; Seem. Fl. Vit. 185. 1866.

Calophanes repandus Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 257. 1892; Gillespie in Bishop Mus. Bull. 91: 27. fig. 30. 1932.

Dyschoriste repanda A. C. Sm. in Sargentia 1: 117. 1942, in J. Arnold Arb. 36: 287. 1955; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 337. 1972.

Shrub or small tree 0.5–2 m. high, occurring from near sea level to 1,130 m. elevation in often dense forest in rocky places; petioles slender, 3–15 mm. long; leaf blades elliptic to lanceolate, 2.5–8 × 0.8–2.7 cm., irregularly repand-undulate; flowers solitary or in few-flowered axillary cymes; pedicels to 8 mm. long; bracts lanceolate, about 1.5 mm. long; calyx 3–4 mm. long, the lobes linear-lanceolate; corolla white to pale pink, slightly curved, 7–10 mm. long; capsule 10–13 mm. long. Flowers and fruits seem to occur throughout the year, the flowers most often between July and January.

TYPIFICATION: The type is *U. S. Expl. Exped.* (GH LECTOTYPE), collected in 1840 on Ovalau. In this case no US specimen of the collection has been found. Several Graeffe and Horne specimens at K were annotated by C. B. Clarke in 1904 as a new species of *Eranthemum* which was never published.

DISTRIBUTION: Apparently endemic to Fiji and thus far known from the two largest islands and Ovalau.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *DA 14168*; near Nandarivatu, *Tohill 207*; near summit of Mt. Nanggaranambuluta, east of Nandarivatu, *Gillespie 3783*. NANDRONGA & NAVOSA: Koroniyalewa, ridge above Naloka, *DA 2485*; Ruwalevu, Singatoka River Valley, *Webster & Hildreth 14370*; above Volinangerua, Mbemana District, *H. B. R. Parham 171*; Viro, near Saru, *Tabulewa 15616*. NAITASIRI: Tholo-i-suva, *DA 7585*. VITI LEVU without further locality, *Graeffe 248*. OVALAU: Slopes of Mt. Korotulutolu, west of Thawathi, *Smith 8007*; Lovoni Valley, *Horne 238*; hillsides above Levuka, *Gillespie 4443*; Ovalau without detailed locality, *MacGillivray s. n.*, *Graeffe 1589, s. n.*, *Horne 61, 263a*. VANUA LEVU: THAKAUNDOVE: Southern slope of Valanga Range, *Smith 388*; between Mbalanga and Urata, Savusavu Bay region, *Degener & Ordenez 13861*.

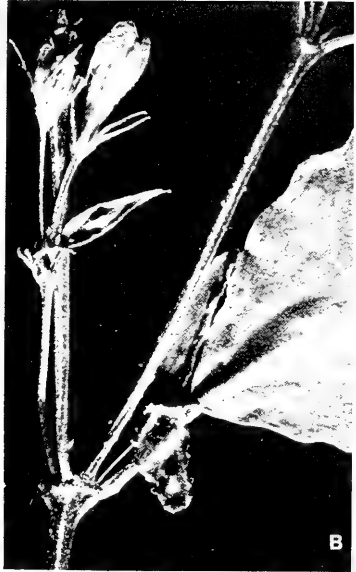
My 1942 reference of *Chaetacanthus repandus* to *Dyschoriste* was erroneous; that genus has the corolla lobes contorted in aestivation and four stamens; apparently it does not occur in the Pacific east of Malesia (contrary to my statement in *J. Arnold Arb.* 36: 287. 1955; van Balgooy in *Blumea Suppl.* 6: 157. 1971). On the other hand, no characters exclude the species from *Graptophyllum*, with which *C. repandus* agrees in corolla shape and aestivation; Heine (1976) has described three New Caledonian species of *Graptophyllum* which also lack staminodes.

4. *Graptophyllum sessilifolium* A. C. Sm. in *J. Arnold Arb.* 33: 117. 1952; J. W.

Parham, *Pl. Fiji Isl.* 245. 1964, ed. 2. 338. 1972.

Shrub 1–2 m. high, apparently rare, in steep, open forest at an elevation of 350–500 m., glabrous throughout except calyx lobes minutely puberulent within; leaves subsessile; petioles 0.5–2 mm. long; leaf blades subamplexicaul, chartaceous or subcoriaceous, drying olivaceous-green, oblong or narrowly ovate-oblong, (3.5–) 6–9 × 2–4 cm., slightly cordate at base, rounded or obtuse at apex; inflorescences cymose, axillary, several-flowered, to 5 cm. long; bracts lanceolate-deltoid, 1.5–2 mm. long; bracteoles similar or slightly smaller; pedicels 7–12 mm. long; calyx lobes lanceolate, 1.7–2 mm.

FIGURE 10. A, *Graptophyllum insularum*; flower and young leaf, × 2. B & C, *Graptophyllum repandum*; B, inflorescence and basal portion of leaf, × 4; C, fruit with attached seeds, × 4. D, *Pseuderanthemum laxiflorum*; inflorescences and foliage, × 1. A from *Smith 4753*, B from *Degener & Ordenez 13861*, C from *DA 14168*, D from *Smith 8874*.



long; corolla rich pink, 25–30 mm. long, curved, the tube about 13 mm. long, gradually widened to throat, the lobes 8–9 mm. long; capsule about 2 cm. long, the seeds conspicuously rugulose. Flowers and fruits were observed in November.

TYPEIFICATION: The type is *Smith 6566* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Nov. 10, 1947, on the southern slopes of Mt. Numbuiloa, east of Lambasa, Mathuata Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the type collection.

In comparison to *Graptophyllum sessilifolium*, *G. insularum* has distinctly petiole leaves, thinner and more obviously nerved leaf blades, obtuse to acute at base; its young vegetative parts, inflorescence branches, and pedicels are closely puberulent, and its inflorescences are comparatively contracted and fewer-flowered. The small flowers and repand-undulate leaf blades margins of *G. repandum* readily set that species apart.

11. PSEUDERANTHEMUM Radlk. in Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad.

Wiss. München 13: 282. 1883; Backer & Bakh. f. Fl. Java 2: 577. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 40. 1976; Fosberg & Sachet in Bailey 22: 178. 1985; R. Barker in J. Adelaide Bot. Gard. 9: 141. 1986.

Herbs or small to medium-sized shrubs or small trees, rarely lianas, with cystoliths; leaves petiolate, those of each pair connected by transverse ridges; inflorescences terminal or axillary, paniculate, racemose, or cymose, the bracts and bracteoles small, sometimes linear; stigmas 1–3 in axils of bracts; calyx deeply 5-partite; corolla tube slender, cylindrical, straight, only slightly broadened distally, the limb not or only slightly bilabiate, the lobes 5, imbricate in bud, becoming horizontally expanded; fertile stamens 2, inserted near apex of corolla tube, usually slightly exserted, the anther locules 2, attached at slightly different levels, parallel, subequal, without appendages; staminodes 2 or lacking, short-filiform or minute; disk annular; ovary locules 2-ovulate, the style long, the stigma small, equally 2-lobed; capsule clavate, basally contracted into a stipe, the retinacula well developed, the seeds 4 or fewer, orbicular, compressed.

LECTOTYPE SPECIES: *Pseuderanthemum alatum* (Nees) Radlk. (*Eranthemum alatum* Nees); vide Leonard in Contr. U. S. Nat. Herb. 31: 292. 1953. This lectotypification, accepted by ING, is questioned by Barker (1986).

DISTRIBUTION: Pantropical, mostly Indo-Pacific, perhaps with about 80 species. Three species are present in Fiji, one indigenous (but also sometimes locally cultivated), the other two in cultivation only.

KEY TO SPECIES

Flowers in axillary cymes, comparatively large, the corolla tube 18–30 mm. long, the lobes 10–20 (–27) mm. long; petioles 2–10 mm. long; leaf blades elliptic to lanceolate or narrowly ovate, 3.5–12 × (1–) 1.5–4.5 cm., usually 2.5–4-times longer than broad, attenuate at base, obtuse or obtusely attenuate at apex, green or reddish or dark purple but not variegated.

Axillary cymes 3-many-flowered, borne on peduncles 10–30 mm. long, the bracts at each node obvious, often subfoliaceous, 5–17 mm. long; corolla tube white or pink to pale blue, the lobes pale blue to purple or magenta or mottled, the corolla rarely white or faintly blue-tinged throughout; leaf blades green, occasionally purplish or brownish beneath; indigenous but sometimes also locally cultivated.

1. *P. laxiflorum*

Axillary cymes 3(or 1)-flowered, borne on peduncles 2–10 mm. long, the bracts at the nodes inconspicuous, lanceolate, 2–4 mm. long; corolla basically white, the tube sometimes pale purple or pink distally, the lobes sometimes pink- or red- or purple-mottled or -spotted; leaf blades reddish to dark purple; cultivated only. 2. *P. bicolor*

Flowers in panicles or racemes, terminal or in upper leaf axils, comparatively small, the corolla tube 10–25 mm. long, the lobes 10–15 mm. long; petioles 5–20 mm. long; leaf blades elliptic to ovate, (4–) 8–20 × (3–) 4–10 cm., usually 2–3-times longer than broad, subacute to obtuse or rounded at base, acute to short-mucronate at apex, suffused with purple or variously variegated, green- and yellow-mottled, or green with yellow veins, the costa sometimes purple; cultivated only. 3. *P. carruthersii*

1. *Pseuderanthemum laxiflorum* (A. Gray) Hubbard in *Rhodora* **18**: 159. 1916; Guillaumin in *J. Arnold Arb.* **13**: 26. 1932; J. W. Parham, *Pl. Fiji Isl.* 245. *fig. 85*. 1964, ed. 2. 338. 1972; Fosberg & Sachet in *Smithsonian Contr. Bot.* **45**: 27. 1980. **FIGURE 10D.**

Graptophyllum hortense sensu Seem. in *Bonplandia* **9**: 258, p. p. 1861; non Nees.

Eranthemum laxiflorum A. Gray in *Proc. Amer. Acad. Arts* **5**: 349. (Jan.) 1862, in *Bonplandia* **10**: 37. (Feb.) 1862; Seem. *Vit.* 440. 1862, *Fl. Vit.* **185**. t. 42. 1866; Drake, *Ill. Fl. Ins. Pac.* 258. 1892; Gibbs in *J. Linn. Soc. Bot.* **39**: 159. 1909; Reching in *Denkschr. Akad. Wiss. Wien* **85**: 366. 1910.

Shrub, sometimes subsucculent, or slender tree 1–5 m. high, often locally frequent at elevations from near sea level to 1,150 m. in dense forest and on its edges, often along rocky stream beds, and occasionally brought into village cultivation; petioles 2–10 mm. long; leaf blades elliptic to lanceolate, 3.5–12 × (1–) 1.5–4.5 cm., occasionally purplish or brownish beneath; corolla tube 20–30 mm. long, white or pink to pale blue, the lobes 12–20 (–27) mm. long, pale blue to purple or magenta or mottled, the corolla rarely white throughout and faintly blue-tinged. Flowers usually occur profusely throughout the year, but fruits have been noted only in February, April, and September.

TYPIFICATION: The type is *U. S. Expl. Exped.* (US 62242 HOLOTYPE), collected at "Sandalwood Bay, etc.," i. e. Mbua Bay, Mbua Province, Vanua Levu. Gray's "etc." may imply that material was merely seen (but not collected) elsewhere; no isotypes have been seen.

DISTRIBUTION: Indigenous and presumably endemic in Fiji, but conceivably also indigenous in such adjacent archipelagoes as the New Hebrides and Samoa, where more probably it may have been introduced as an ornamental, as seems to have been the case in Micronesia (Fosberg and Sachet, 1980). About 55 Fijian collections from five islands have been examined.

LOCAL NAMES AND USE: *Ndrivindrivi, asi, asi, uthuuthurakalavo*; the species is locally recognized as an attractive ornamental and is found cultivated in villages.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4454*; near Korovou, east of Tavua, *Degener 14941*; vicinity of Nandarivatu, *Parks 20652*; along trail to Nandrau, *Gibbs 744*; western and southern slopes of Mt. Tomanivi, *Smith 5255*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5437*; vicinity of Mbelo, near Vatukarasa, *Degener 15297*. SERUA: Mt. Tuvutau, *DA 15532*; Nathengathenga Creek, upper Navua River, *DA 14859*; Thulanuku, vicinity of Ngaloa, *Degener 15125*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8874*; Mt. Voma, *DA 1985*; hills near Navua River, *Greenwood 1045*. NAITASIRE: Nanggali, Waindina River, *DA 11063*; Kalambo, *Tohill 653*; vicinity of Nasinu, *Gillespie 3563*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndukuivuna, *Smith 7180*; King's Road, *DA 827*. REWA: Mt. Korombamba, *Vaughan 3193*; Suva Botanical Gardens, *DA 12113*. OVALAU: Lovoni Village, cultivated, *Smith 7493*; hills east of Lovoni Valley, *Smith 7315*. MOTURIKI: *Seemann 351*, p. p. VANUA LEVU: MBUA: Lower Wainunu River Valley, *Smith 1835*. MATHUATA: Mt. Ndrandramea, *DA 12890*; Mt. Ndelaikoro, *DA 11493*. THAKAUNDROVE: Ndrawa, track to Mbakimbaki, *DA 14325*. TAVEUNI: Vicinity of Wairiki, *Gillespie 4746*.

2. *Pseuderanthemum bicolor* (Schrank) Radlk. in *Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München* **13**: 286. 1883; Backer & Bakh. *f. Fl. Java* **2**: 577. 1965; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 338. 1972.

Eranthemum bicolor Schrank, *Pl. Rar. Hort. Acad. Monac.* **1**: t. 8. 1817.

Shrub 1–2 m. high, cultivated from near sea level to about 200 m.; petioles 2–10 mm. long; leaf blades lanceolate to narrowly ovate, 4–11 × 1.5–4 cm., usually about 3-times longer than broad, attenuate at base, obtuse or obtusely attenuate at apex, reddish to dark purple in color on both surfaces; corolla tube 18–25 mm. long, white at base, pale purple or pink distally, the lobes 10–15 mm. long, pale purple- or pink-mottled within proximally. Flowers have been noted between January and April, but fruits have not been obtained in Fiji.

TYPIFICATION: Schrank described his species from greenhouse-grown specimens; the country of origin was stated as being unknown.

DISTRIBUTION: Presumably Malesia, but now cultivated in other Pacific areas and probably elsewhere. Fosberg and Sachet (in Smithsonian Contr. Bot. **45**: 27. 1980, where they take *Pseuderanthemum laxiflorum* to be the widely planted ornamental species in Micronesia) note that *P. bicolor* is a wild Philippine species. The date of introduction into Fijian gardens is speculative, but one of the specimens cited below (*DA 16220*) is from Thurston's old garden "Thornbury"; he may have made the introduction toward the end of the nineteenth century.

USE: An attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Ndakuivuna, cultivated in village, *Smith 7079*. REWA: Lami, in private garden, *DA 16452*; Suva, in private garden, *DA 16220*; Suva Botanical Gardens, *DA 12289*.

3. *Pseuderanthemum carruthersii* (Seem.) Guillaumin in Ann. Mus. Col. Marseille VI. 5-6: 48. 1948; Fosberg in Phytologia **5**: 290. 1955; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 59. 1976.

Eranthemum carruthersii Seem. Fl. Vit. 185. 1866.

Eranthemum reticulatum Bull in Gard. Chron. n. s. 3: 619. 1875; Hook. f. in Bot. Mag. **122**: t. 7480. 1896.

Eranthemum atropurpureum Bull in Gard. Chron. n. s. 3: 619. 1875.

Pseuderanthemum reticulatum Radlk. in Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München **13**: 286. 1883; Backer & Bakh. f. Fl. Java **2**: 577. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 39. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 339. 1972.

Pseuderanthemum atropurpureum Radlk. in Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München **13**: 286. 1883; L. H. Bailey in Gentes Herb. **1**: 130. 1923, Man. Cult. Pl. 702. 1924, in Gentes Herb. **4**: 351. 1940; Yuncker in Bishop Mus. Bull. **178**: 110. 1943; R. Long in J. Arnold Arb. **51**: 265. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 338. 1972.

Pseuderanthemum carruthersii var. *carruthersii*; Fosberg in Phytologia **5**: 290. 1955; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 59. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **10**. 1985.

Pseuderanthemum carruthersii var. *atropurpureum* Fosberg in Phytologia **5**: 290. 1955; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 61. 1976; Fosberg & Sachet in Smithsonian Contr. Bot. **45**: 26. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **10**. 1985.

Pseuderanthemum carruthersii var. *reticulatum* Fosberg in Smithsonian Contr. Bot. **45**: 26. 1980.

Shrub 1-3 m. high, cultivated from near sea level to about 250 m.; petioles 5-20 mm. long; leaf blades elliptic to ovate or oblong, (4-) 8-20 × (3-) 4-10 cm., usually 2-3-times longer than broad, dark green to purple or more often variously variegated, purplish- or yellow-blotched or green- and yellow-mottled; inflorescences and calyx sometimes rich purple; corolla tube usually rich purple, the lobes rich pink with paler mottling or white, the throat purple-spotted; filaments and style often purple-tinged. Flowers have been noted between January and June, but fruits have not been obtained in Fiji.

TYPIFICATION AND NOMENCLATURE: As representing his new species, Seemann (1866) cited: "Aneitum and Eromanga, New Hebrides (M'Gillivray!)." On the Eromanga specimen of this (BM, with a type specimen label) is the inscription: "I take this as *the Eranth. Carruthersii* Seem. because the description is taken *mainly* from this. C. B. Clarke, 31 Dec. 1904. Observe the *short* corolla-tube." [The corolla tube on this specimen is about 1 cm. long.] I believe it correct to accept this MacGillivray specimen as the LECTOTYPE (BM). At BM there are also two sheets of *MacGillivray 30* from Aneityum, with the inscription: "Eranth. *reticulatum* Hook. f. in hb. Kew—Observe the long corolla-tube. C. B. Clarke, 31 Dec. 1904. Bot. Mag. 7480 I take as the gardener's state of this." [The corolla tube on this specimen is 1.8-2.5 cm. long.] *Eranthemum reticulatum* was described from a specimen cultivated at Kew; in taking up this epithet at a varietal level, Fosberg (1980) noted the pronouncedly ovate leaves with a yellow zone along the midrib and veins; however, the foliage within this widely

cultivated complex is so variable that the value of *Eranthemum reticulatum* at any level is questionable. No actual specimen of *E. atropurpureum* having been located, Heine (1976) chose Bull's original illustration of 1875 (Retail List of New and Beautiful and Rare Plants **110**: 6. fig.) as the LECTOTYPE.

The various attempts to recognize infraspecific taxa within *Pseuderanthemum carruthersii* appear very questionable; Fosberg (1955, 1980) seems to depend upon leaf color and pattern, Heine (1976) upon leaf shape and apex. Actually, corolla tube length might be as reasonable a character as any, but the complex of cultivars (see Heine, 1976, for many other specific epithets) seems to defy separation into taxonomic units.

DISTRIBUTION: Probably indigenous in Melanesia (perhaps in New Caledonia and the New Hebrides), now widely cultivated. Like *Pseuderanthemum bicolor*, this species could have been introduced into Fiji by Thurston late in the nineteenth century, since *DA 16211* and *16214* were obtained at his "Thornbury" garden.

USE: An attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, *DA 16771*. REWA: Suva, in private garden, *DA 16211, 16214*; Suva, in hotel garden, *DA 16480*. OVALAU: Lovoni, cultivated in village, *Smith 7487*.

12. ODONTONEMA Nees in *Linnaea* **16**: 300. 1842; Backer & Bakh. f. *Fl. Java* **2**: 579. 1965. Nom. cons.

Herbs or shrubs; leaves with linear cystoliths; inflorescences terminal, racemose, simple, the flowers fasciculate in axils of small bracts; calyx 5-partite, the segments narrow, acute; corolla tube slightly incurved, narrow, cylindrical, only slightly broadened distally, the limb comparatively small, the lobes 5, imbricate in bud; fertile stamens 2, inserted near middle of corolla tube, the anther locules 2, parallel, obtuse at base and apex; staminodes 2, short, each on the base of a filament, sometimes lacking; ovary locules 2-ovulate, the style filiform, included; capsule clavate, the seeds 2-4, flat, glabrous, the retinacula well developed.

TYPE SPECIES: As now permitted by ICBN, Art. 10.3, the type of *Odontonema* is a specimen rather than a species: a garden specimen without date or collector at GZU [= *O. rubrum* (Vahl) Kuntze (*Justicia rubra* Vahl)], typ. cons. The complex discussions exploring this situation, by several authors, are found in *Taxon* **29**: 334-337. 1980, in op. cit. **30**: 453-454, 461. 1981, in op. cit. **31**: 757-759. 1982, in op. cit. **33**: 297. 1984.

DISTRIBUTION: Neotropical and subtropical, with about 40 species, some of which are widely cultivated; one species is so grown in Fiji.

1. Odontonema tubiforme (Bertol.) Kuntze, *Rev. Gen. Pl.* **2**: 494. 1891.

Justicia tubaeformis Bertol. in *Novi Comment. Acad. Sci. Inst. Bononiensis* **4**: 405. 1840.

Thysacanthus strictus Nees in *DC. Prodr.* **11**: 324. 1847.

Odontonema strictum Kuntze, *Rev. Gen. Pl.* **2**: 494. 1891; Sykes in *New Zealand Dept. Sci. Indust. Res.*

Bull. **200**: 38. 1970; R. Long in *J. Arnold Arb.* **51**: 265. 1970; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 338. 1972; Heine in *Fl. Nouv.-Caléd. et. Dépend.* **7**: 68. 1976; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* **10**. 1985.

Shrub 1-2 m. high, cultivated from near sea level to about 250 m. elevation; petioles short, 0.5-2 cm. long; leaf blades ovate, attenuate, 7-22 × 4-11 cm.; inflorescences spicate, narrow, compact, many-flowered, 10-40 cm. long, sometimes with 2 or 3 lateral spikes arising from base; pedicels 2-7 mm. long; calyx bright red, composed of 5 small, ovate, acute lobes 1-2 mm. long; corolla bright red, the tube 20-30 mm. long, gradually slightly swollen distally, the lobes 2-5 mm. long; stamens included. Flowers were noted in February and March.

TYPEIFICATION AND NOMENCLATURE: *Justicia tubaeformis* is based on *J. Velasquez* (HOLOTYPE probably at BOLO), collected in Esquintla, Guatemala, without further data; *Thyracanthus strictus* on *Armstrong* (K HOLOTYPE), from Honduras. I am indebted to D. Wasshausen for pointing out the specific identity of these taxa.

DISTRIBUTION: Central America, now widely cultivated. The species is apparently a fairly recent introduction into Fiji, but it is now quite common in Suva gardens.

USE: A very attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16718. REWA: Lami, in private garden, DA 16472.

13. JUSTICIA L. Sp. Pl. 15. 1753; R. Long in J. Arnold Arb. 51: 302. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 36. 1976; V. Graham in Kew Bull. 43: 581. 1988.

Beloperone Nees in Wall. Pl. Asiat. Rar. 3: 76, 102. 1832; Backer & Bakh. f. Fl. Java 2: 587. 1965.

Jacobinia Nees ex Moric. Pl. Nouv. Amér. 156. 1847. Nom. cons. sed non vs. *Justicia*.

Perennial (rarely annual) herbs or shrubs, sometimes sprawling, rarely small trees, usually with conspicuous cystoliths; leaves petiolate, the blades entire; inflorescences terminal or axillary, spicate, simple or compound, the flowers rarely solitary or fasciculate, the bracts and bracteoles very diverse; calyx usually subequally 5-partite nearly to base (1 segment rarely reduced or absent), the segments subulate or linear; corolla white to yellow, red, or purple, variously mottled or spotted, the tube usually short and narrow, straight or incurved, slightly broadened distally, the limb bilabiate, the upper lip usually shallowly 2-lobed, the lower lip 3-lobed, the lobes imbricate in bud; fertile stamens 2, usually slightly exserted, inserted in corolla throat, the anther locules often separated and unequal, usually superposed, often oblique, the lower one usually with a sterile appendage; staminodes lacking; disk cupuliform; ovary locules 2-ovulate, the style filiform, the stigma entire, capitate, or minutely 2-dentate; capsule ovate, oblong, or clavate, contracted proximally into a short, solid stalk, the seeds 4 (rarely 2 or 3), suborbicular to discoid, the testa smooth or variously ornamented, the retinacula arcuate, acute.

LECTOTYPE SPECIES: *Justicia adhatoda* L. (vide Britton, Fl. Bermuda, 354. 1918), one of the eleven species first included in the genus by Linnaeus (ING, 1979). In discussing the desirability of utilizing *Justicia* in a broad sense, Stearn (1971) found no reason to reject Britton's lectotypification, but many other students (e. g. Long, 1970, Heine, 1976, and Graham, 1988) have designated *J. hyssopifolia* as the lectotype species, following Hitchcock and Green, Prop. Brit. Bot. 116. 1929. Graham (1988, p. 581), in fact, implies that all of Britton's generic lectotypifications can be superseded under ICBN, Art. 8. However, there are many instances when Britton (often with A. Brown) did not use a mechanical method of selection, and a wholesale refutation of his lectotypifications seems unwarranted. Both mentioned species are now considered to fall into *Justicia* by practically all modern Acanthaceae specialists, but sectional names (as outlined by Graham, 1988) would be affected by a change in the lectotypification.

The type species of *Beloperone* is *B. amherstiae* Nees; that of *Jacobinia* is *J. lepida* Nees. ex Moric.; although the latter genus is conserved, no nomen rejiciendum is listed (ICBN, 1988). These two genera, with a host of others, are now absorbed into *Justicia* as that genus is understood by specialists on the family. The genus is altogether beyond the scope of any but a specialist.

DISTRIBUTION: Pantropical and subtropical, with 600 or more species. Three or four cultivated and naturalized species are recorded from Fiji.

USEFUL TREATMENTS OF GENUS: STEARN, W. T. *Justicia*. J. Arnold Arb. 52: 636-644. 1971. GRAHAM, V. A. W. Delimitation and infrageneric classification of *Justicia* (Acanthaceae). Kew Bull. 43: 551-624. 1988.

KEY TO SPECIES

- Inflorescences simple spikes, usually with 1 flower maturing at a time; bracts usually pink to red, sometimes yellow-green; corolla about 3 cm. long, white or pink- or purple-spotted; petioles to 2 cm. long; leaf blades to 8.5 × 4 cm., sprawling subliguous herb or shrub. 1. *J. brandegeana*
- Inflorescences with many flowers maturing simultaneously; shrubs or coarse herbs or small trees.
Leaves large, the petioles 3–8 cm. long, the blades 15–25 × 6–14 cm.; inflorescences compound but composed of spicate units, the bracts not translucent nor with green veins; corolla yellow, 50–60 mm. long. 2. *J. umbrosa*
- Leaves smaller, the petioles 0.5–2 cm. long, the blades 4–12 × 2–4 cm.; inflorescences simple spikes, the bracts yellowish white, translucent, with green veins; corolla white with rose-colored to purple markings, 10–15 mm. long. 3. *J. betonica*

1. *Justicia brandegeana* Washh. & L. B. Sm. in Reitz, Fl. Illustr. Catarin. Acont. 102, as *J. brandegeana*. 1969; V. Graham in Kew Bull. 43: 608. 1988.

Beloperone guttata Brandegee in Univ. Calif. Publ. Bot. 4: 278. 1912; Yuncker in Bishop Mus. Bull. 220: 244. 1959; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 337. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 37. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 68. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 9. 1985; non *Justicia guttata* Wall. (1830).

Justicia brandegeana Washh. & L. B. Sm. ex R. Long in J. Arnold Arb. 51: 304. 1970; Stearn in op. cit. 52: 640. 1971.

Sprawling, subliguous herb or shrub with ascending branches 0.3–1.5 m. high, cultivated only or sparingly naturalized along streets near sea level; petioles to 2 cm. long; leaf blades ovate, 3–8 × 1.5–4 cm.; inflorescences simple spikes 3–10 cm. long, usually with 1 flower maturing at a time, the bracts broadly ovate, 15–20 × 10–15 mm., longer than calyx, dull pink or brick-red or orange-pink, sometimes yellow-green; calyx 5-partite, the segments equal, lanceolate, about 5 × 1 mm.; corolla about 3 cm. long, white with dull pink spots within or the lip purple-spotted. Flowers have been collected in March, June, and December.

TIPIFICATION: The type of *Beloperone guttata*, for which *Justicia brandegeana* is a new name, is *Purpus 5263* (UC 155270 HOLOTYPE; ISOTYPE at BM), collected along Rio de las Gallinas, near Rascon, San Luis Potosí, Mexico. Although Wasshausen and Smith deliberately spelled their new epithet *brandegeana*, ICBN Art. 73.10 (in conjunction with Rec. 73C.1(c)) seems unequivocally to mandate the spelling *brandegeana*. An interesting discussion of this trivial matter may be found in *Acanthus Newsletter*, no. 3. 1988.

DISTRIBUTION: Mexico, but now widely cultivated and sometimes naturalized. No date of introduction into Fiji can be suggested, but the limited distribution implies the date as the present century.

LOCAL NAMES AND USE: *Shrimp plant*; *Honolulu salvia*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16451, 16792; Suva, along street, DA 16784; Suva, Medical Department compound, DA 12085; Suva Botanical Gardens, DA 17224.

2. *Justicia umbrosa* Benth. Pl. Hartw. 79. 1841; V. Graham in Kew Bull. 43: 616. 1988.

Jacobinia umbrosa Blake in Contr. Gray Herb. n. s. 52: 103. 1917; J. W. Parham, Pl. Fiji Isl. ed. 2. 338. 1972.

Shrub or coarse herb or small tree to 2 m. high, naturalized in forested areas along streams and river banks at elevations of about 50–400 m.; petioles 3–8 cm. long; leaf blades broadly elliptic-ovate, 15–25 × 6–14 cm.; inflorescences consisting of spicate units, 10–20 cm. long overall, the bracts longer than calyx; calyx 5-partite, the segments equal; corolla 50–60 mm. long, yellow. Flowers have been noted between June and October, but fruits have not been seen in Fiji.

TIPIFICATION: The type is *Hartweg 552* (K HOLOTYPE; ISOTYPE at BM), collected near Chiupaché, Quezaltenango, Guatemala.

DISTRIBUTION: Central America, now cultivated elsewhere and sometimes naturalized.

LOCAL NAMES AND USE: *Afomba*, *lion's tail*; presumably introduced as an ornamental and perhaps cultivated in villages, although most of the Fijian collections seem to be from plants naturalized in wet, forested areas. From material at hand the introduction was presumably not earlier than the present century.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Near Tangangge, *DA 16993*. SERUA: Nukusere, *DA 5903*. NAMOSI: Vicinity of Namosi, on river bank, *Parks 20165*. TAILEVU: Waitotua, *DA L.11420*. FIJI without further locality, *Gillespie 2519*, "on river bank."

It is quite probable that *Justicia carnea* Lindl. (syn.: *Jacobinia carnea* Nicholson, *Cyrtanthera magnifica* Nees, *Jacobinia magnifica* Lindau) occurs in cultivation in Fiji, as it does in several other Pacific archipelagoes. Superficially it is suggestive of *J. umbrosa* but has pink or purple flowers. *Gillespie 2806* (foliage only, the leaf blades up to 35 × 22 cm.), without locality, bears a note: "flowers purplish," which seems to exclude it from *J. umbrosa*.

3. *Justicia betonica* L. Sp. Pl. 15. 1753; J. W. Parham, Pl. Fiji Isl. 245. 1964, ed. 2. 338. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 40. 1976; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 10. 1985; V. Graham in Kew Bull. 43: 586. 1988.

Shrub 1-3 m. high, cultivated only near sea level; petioles 0.5-2 cm. long; leaf blades ovate to lanceolate, 4-12 × 2-4 cm.; inflorescences simple spikes 3-15 cm. long with 1 flower per node, the bracts exceeding calyx, ovate, 10-15 × 4-10 mm., yellowish white, translucent, with green veins; calyx 5-partite, with equal segments; corolla 10-15 mm. long, white proximally, the limb violet to rose-colored with purple markings.

TYPIFICATION: Of the three references originally given by Linnaeus, the first may be taken as providing the type: Herb. Hermann. 3: fol. 2 (BM LECTOTYPE); cf. V. Graham, 1988.

DISTRIBUTION: Indigenous in the Indian subcontinent and eastern tropical Africa, widely cultivated elsewhere.

LOCAL NAME AND USE: *White shrimp plant*; a garden ornamental moderately common, at least in Suva gardens (Parham, 1964, 1972), although no Fijian herbarium specimens have been seen. It is probably an introduction of the current century. Recent collections have been seen from Samoa and the Societies.

FAMILY 178. PEDALIACEAE

PEDALIACEAE R. Br. Prodr. Fl. Nov. Holl. 519, as *Pedalinæ*. 1810.

Annual or perennial herbs, rarely shrubs, with short-stalked, capitate, mucilaginous hairs on young herbaceous parts, stipulate; leaves opposite (upper ones sometimes alternate), simple, sometimes palmately compound; inflorescences axillary, the flowers solitary or in simple dichasia, often with glands (metamorphosed flowers) at base of stalks, ♂, usually zygomorphic; calyx (4 or)5-lobed, usually deeply partite; corolla sympetalous, the tube campanulate to hypocrateriform or tubular, often ventricose and oblique, the limb subbilabiate or nearly regular, the lobes 5, imbricate; stamens borne near base of corolla tube alternate with lobes, usually 4, paired, with 1 staminode, rarely 2, with 2 staminodes, the locules parallel or divergent, dehiscing by longitudinal slits; disk usually present, annular or adaxially expanded; ovary superior (rarely inferior), bilocular (sometimes also with incomplete false septa), with axile placentation, the ovules 1-many in each locule, anatropous, the style slender, terminal, the stigma 2-lobed; fruit a loculicidal capsule, drupe, or nut, the endocarp sometimes with hooks or prickles, the seeds with straight embryo.

DISTRIBUTION: Paleotropical, rarely extending into temperate areas, with about 12 genera and 50-80 species. A single species is sometimes cultivated and occasionally naturalized in Fiji.

1. *SESAMUM* L. Sp. Pl. 634. 1753; Backer & Bakh. f. Fl. Java 2: 543. 1965; Theobald & Grupe in Rev. Handb. Fl. Ceylon 3: 324. 1981.

Erect or prostrate herbs, the indument of white mucilaginous hairs and of longer, articulate hairs, the stem obtusely quadrangular; leaves usually opposite below and alternate above, petiolate, simple or variously lobed to compound; flowers axillary, solitary or few in fascicles, short-pedicellate; calyx small, persistent, 5-merous, deeply divided; corolla 5-merous, the tube campanulate-ventricose, oblique, bilabiate, the lower lip the longer; stamens 4, didynamous, included, the anthers free; ovules numerous, superposed; fruit a capsule, ovate to oblong, obtusely tetragonous, loculicidally 2-valved, the seeds numerous.

LECTOTYPE SPECIES: *Sesamum indicum* L. (vide M. L. Green, Prop. Brit. Bot. 169. 1929; Bruce in Kew Bull. 1953: 425. 1953) = *S. orientale* L.

DISTRIBUTION: Paleotropical, with about 30 species.

1. *Sesamum orientale* L. Sp. Pl. 634. 1753; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Backer & Bakh. f. Fl. Java 2: 544. 1965; Burkill, Dict. Econ. Prod. Malay Penins. ed. 2. 2029. 1966.

Sesamum indicum L. Sp. Pl. 634. 1753; J. W. Parham, Pl. Fiji Isl. 211. 1964, ed. 2. 296. 1972; Purseglove, Trop. Crops, Dicot. 430. fig. 69. 1968; Theobald & Grupe in Rev. Handb. Fl. Ceylon 3: 325. fig. 1, A, B. 1981.

Coarse, erect, annual herb to 1.5 m. high, cultivated and occasionally naturalized, becoming a weed in canefields, and in moist, cultivated areas near sea level; lower leaves simple or palmately compound, with petioles to 5 cm. long and blades to 15 × 10 cm., the upper leaves with petioles 1–2 cm. long and blades to 13 × 3 cm.; calyx 6–8 mm. long; corolla pale blue to white, 2.5–4 cm. long, often yellow- or purple-blotched within; capsule 15–30 × 5–10 mm., the seeds pale yellow to black, about 2 mm. long. Our collections bore flowers and fruits in February and March.

LECTOTYPIFICATION AND NOMENCLATURE: The type of *Sesamum orientale* is a specimen from *Hortus Cliffortianus* (BM LECTOTYPE) (vide Bruce in Fl. Trop. E. Afr. Pedal. 19. 1953); for *S. indicum*, Linnaeus gave two prior references. Although it has long been agreed that Linnaeus's two original species of *Sesamum*, *S. orientale* and *S. indicum*, were based on two forms of a single species, the two epithets seem to have been first combined by Roxburgh, Fl. Ind. ed. 2. 100. 1832 (cf. Seegeler in Taxon 38: 656–659. 1989) under the binomial *S. orientale*. This usage was earlier than the same selection made by Graham, Cat. Pl. Bombay, 126. 1839 (Backer & Bakh. f., 1965). Some authors have argued that the Linnaean taxa were first combined by de Candolle in 1825 (Pl. Rar. Jard. Genève, 18) utilizing the binomial *S. indicum*, but that his opinion was strictly provisional was indicated by de Candolle's statement: "Je conserve donc encore les espèces des auteurs."

DISTRIBUTION: The species is apparently indigenous in Africa and is of ancient cultivation; it was taken at an early date to India, China, and Persia, where secondary centers of diversity and many cultivars have developed.

LOCAL NAME AND USES: *Sesame*; the seeds produce an oil of high quality and are also used as scatter-cover in baking. Although it appears not to be of economic consequence in Fiji, it was introduced in 1958 for trial at Koronivia; it had presumably become established as a weed early in the present century. Many other uses are discussed by Burkill (1966) and Purseglove (1968).

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Lautoka, *Greenwood 262*; Korovutu, Nandi, *DA 10697*. NAITASIRI: Principal Agricultural Station, Koronivia, *DA 11737*. VANUA LEVU: THAKAUNDROVE: Vicinity of Savusavu, *Bierhorst F209*.

FAMILY 179. BIGNONIACEAE

BIGNONIACEAE Juss. Gen. Pl. 137, as *Bignoniae*. 1789.

Trees, shrubs, or woody vines (rarely herbaceous vines or herbs), estipulate; leaves opposite or rarely whorled, rarely alternate, simple or more often pinnately or palmately compound (the terminal leaflet occasionally modified into a tendril); inflorescences terminal or axillary or cauliflorous, cymose to racemose or flowers solitary; flowers mostly large and showy, ♂, hypogynous, bracteate and bracteolate; calyx (often closed in bud) usually 5-dentate or -lobed, often cupuliform, sometimes bilabiate, the lobes sometimes suppressed or calyprate; corolla sympetalous, sometimes strongly zygomorphic, often bilabiate, usually campanulate or hypocrateriform, the lobes 5, imbricate (rarely valvate); stamens attached to corolla tube, alternate with lobes, usually 4 (the fifth staminodial or lacking), rarely only 2 fertile and 3 staminodial, rarely 5 fully developed, the anthers often connivent in pairs, 2-locular, the locules usually one above the other, dehiscent by longitudinal slits; disk annular or cupular; ovary superior, 2-locular, with 2 axile placentae in each locule, sometimes unilocular with 2 or 4 intruded parietal placentae, rarely 4-locular, the ovules numerous, anatropous or hemitropous, the style terminal, slender, the stigma 2-lobed; fruit a bivalved, septicidal or loculicidal capsule, sometimes septifragal, rarely fleshy and indehiscent, the seeds usually flat, often winged, the embryo straight, the endosperm usually lacking.

DISTRIBUTION: Pantropical but mostly American, sometimes extending into temperate areas, with about 120 genera and 800 species. Many ornamental trees and vines are included in the family. In Fiji nine genera have been recorded, but none have indigenous species there.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Bignoniaceae. Fl. Java 2: 534-542. 1965. HEINE, H. Bignoniaceae. In: Aubréville, A., & J.-F. Leroy (eds.). Fl. Nouv.-Caléd. et Dépend. 7: 69-93. 1976. STEENIS, C. G. G. J. VAN. Bignoniaceae. Fl. Males. I. 8: 114-186. 1977. THEOBALD, W. L. Bignoniaceae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 2: 387-396. 1981.

KEY TO GENERA

- Climbing shrubs or lianas, the leaves usually 3- or 2-foliolate (then the petiole prolonged into a tendril); fruit capsular.
- Corolla hypocrateriform to campanulate, in our species pinkish purple. 1. *Arrabidaea*
 Corolla tube narrowly cylindrical, in our species bright orange. 2. *Pyrostegia*
 Trees or erect shrubs.
- Leaves simple (rarely 3- or 5-foliolate but not in our species); flowers solitary or 2 (or 3)-fasciculate, borne on old wood; corolla with an anterior, broad, deeply intruded, transverse fold; fruit a large, subglobose, indehiscent pepo or calabash. 3. *Crescentia*
 Leaves compound (rarely simple in *Tecoma*), the inflorescences terminal.
- Inflorescences pendulous, flaccid, eventually 1-2 m. in length; calyx closed in bud, then irregularly splitting; corolla 10-14 cm. long, reddish purple within; fruit large, oblong, up to 50 cm. long, terete or somewhat compressed, hard-walled, indehiscent, the placenta filling the entire cavity, the seeds not winged; leaves imparipinnate. 4. *Kigelia*
 Inflorescences not pendulous or flaccid; fruit capsular.
- Leaves palmately 3-7-foliolate; calyx truncate or irregularly lobed; corolla campanulate or hypocrateriform; capsule linear, compressed contrary to septum, loculicidally dehiscent, the seeds winged at both ends. 5. *Tabebuia*
 Leaves pinnately compound (rarely digitately trifoliolate or simple).
- Calyx entirely closed in bud, spathaceously splitting on anterior side, the flowers large and showy; corolla conspicuously zygomorphic, obliquely campanulate, the lobes very broad, crispate; capsule oblong-lanceolate, loculicidally 2-valved, the valves navicular, woody, often remaining attached to one another at base and apex; seeds membranous-circumalate.
6. *Spathodea*
 Calyx campanulate or cupuliform, 3-5-lobed; capsule linear to ovate or orbicular, the valves thin.
 Leaves bipinnate, the leaflets numerous; corolla tube narrowly campanulate, curved, the limb subbilabiate; capsule ovate to orbicular, the seeds membranous-circumalate.
7. *Jacaranda*

Leaves simply pinnate (rarely digitately trifoliolate or simple); capsule linear.

Leaflet blades entire; corolla campanulate to tubular-ventricose, geniculate, the limb bilabiate; ovary with the septum thickened; capsule terete to quadrangular in section, the valves thin, the septum subterete, spongy, notched, the seeds embedded in notches of septum, trigonous, membranous-winged at each end. 8. *Stereospermum*

Leaflet (or leaf) blades incised or serrate; corolla campanulate-infundibuliform, the tube widened above base, the lobes subequal; capsule compressed contrary to septum, the valves flat, coriaceous, the seeds hyaline-circumalate. 9. *Tecoma*

1. **ARRABIDAEA** DC. in *Biblioth. Universelle Genève* II. 17: 126. 1838; Backer & Bakh. f. *Fl. Java* 2: 535. 1965.

Climbing shrubs, the leaf axils often with stipuloid leaflets (pseudostipules); leaves opposite, the proximal ones often simple, the distal ones 3- or 2-foliolate (then the petiole prolonged into a simple tendril), the leaflets petiolulate, the blades entire; inflorescences terminal or subaxillary panicles; calyx campanulate to tubular, truncate or short-dentate; corolla hypocrateriform to campanulate, the lobes 5, subequal, broad, imbricate in bud; stamens 4, included, the staminode small; fruit a linear capsule compressed parallel to septum, septifragal, the valves flat, coriaceous, the seeds membranous-winged.

TYPE SPECIES: *Arrabidaea rego* (Vell.) DC. (*Bignonia rego* Vell.).

DISTRIBUTION: Tropical America, with about 70 species, several of which are widely cultivated.

1. **Arrabidaea magnifica** (Bull) Sprague ex van Steenis in *Rec. Trav. Bot. Néerl.* 24: 830, 831. 1927; Backer & Bakh. f. *Fl. Java* 2: 536. 1965.

Bignonia magnifica Bull in *Gard. Chron.* n. s. 12: 72: fig. 9. 1879.

A vigorous woody vine, sparingly cultivated near sea level; pseudostipules suborbicular, 2-3 cm. broad; distal leaves 2-foliolate, the leaflet blades obovate, 6-12 × 3-6 cm.; unbranched tendrils present; pedicels 1-2 cm. long; calyx 8-12 mm. long, dilated distally; corolla narrowly campanulate, pinkish purple to reddish violet, 5-8 cm. long, the segments suborbicular. Flowers were collected in February.

TYPIFICATION: The species was described from a cultivated plant introduced from Colombia.

DISTRIBUTION: Colombia, now cultivated elsewhere in tropical areas.

USE: A striking ornamental.

AVAILABLE COLLECTION: FIJI without further locality (but very probably obtained in Suva, Rewa Province, Viti Levu, in a private garden), *G. P. Wilder*, Feb. 20, 1935 (BISH).

2. **PYROSTEGIA** Presl in *Abh. Königl. Böhm. Ges. Wiss. V.* 3: 523. 1845, repr. *Bot. Bemerk.* 93. 1846; Backer & Bakh. f. *Fl. Java* 2: 536. 1965.

Lianas; leaves opposite, 3-foliolate or 2-foliolate (then the petiole prolonged into a simple or 3-parted tendril), the leaflets petiolate, the blades entire; inflorescences cymose-paniculate; calyx campanulate-cupuliform, truncate or short-dentate; corolla tube narrowly cylindrical, gradually broadened and laterally compressed distally, the lobes 5, valvate or narrowly imbricate; stamens 4, exserted, the staminode small; fruit a capsule, linear, acute, compressed parallel to septum, septifragally dehiscent, the valves coriaceous, the seeds elliptic, membranous-winged.

TYPE SPECIES: *Pyrostegia ignea* (Vell.) Presl (*Bignonia ignea* Vell.) = *P. venusta* (Ker-Gawler) Miers.

DISTRIBUTION: Tropical America, with about five species, one of which is widely cultivated.

1. *Pyrostegia venusta* (Ker-Gawler) Miers in Proc. Roy. Hort. Soc. London n. s. 3: 188. 1863; Backer & Bakh. f. Fl. Java 2: 537. 1965; Heine in Fl. Nouv.-Caléd. et Dépend 7: 92. 1976; van Steenis in Fl. Males. I. 8: 184. 1977; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 24. 1985.

Bignonia venusta Ker-Gawler in Bot. Reg. 3: t. 249. 1818.

Bignonia ignea Vell. Fl. Flum. 244. 1829, Icon. 6: t. 15. 1831.

Pyrostegia ignea Presl in Abh. Königl. Böhm. Ges. Wiss. V. 3: 523. 1845, repr. Bot. Bemerk. 93. 1846; J. W. Parham, Pl. Fiji Isl. ed. 2. 295. 1972.

Climbing vine, found only near sea level in cultivation; petioles 2.5–6 cm. long; leaflet blades ovate, 4–8 × 2–4.5 cm.; cymes 1–8-flowered, combined into a compact, leafy panicle; pedicels 1–2 cm. long; calyx 5–8 mm. long; corolla bright orange, the tube 5–7.5 cm. long, the lobes at length recurved, 1–1.5 cm. long; anthers protruding at anthesis; capsule 25–30 cm. long. Flowers are seen between about July and September.

TYPEIFICATION: *Bignonia venusta* was based on a cultivated plant originally sent from the neighborhood of Rio de Janeiro, Brazil. For *B. ignea* Vellozo gave no locality, but Presl indicated that the source was also Rio de Janeiro.

DISTRIBUTION: Brazil, now widely cultivated in tropical areas. In Fiji it is presumably a comparatively recent introduction but is now freely grown, for instance in Suva gardens and at the airport at Nandi.

LOCAL NAMES AND USE: As elsewhere, this striking ornamental is known as *flame flower* and *orange trumpet vine*.

AVAILABLE COLLECTION: VITI LEVU: NANDRONGA & NAVOSA: Korolevu, DA 10896.

3. *CRESCENTIA* L. Sp. Pl. 626. 1753; Backer & Bakh. f. Fl. Java 2: 542. 1965; Gentry in Fl. Neotrop. 25: 82. 1980.

Small to medium-sized trees, glabrous; leaves seemingly alternately fasciculate in defoliated leaf axils, simple (or 3- or 5-foliolate but not in our species); inflorescences borne on old wood, the flowers solitary or 2(or 3)-fasciculate; calyx coriaceous, closed in bud, subsequently deeply 2(or 3)-partite; corolla carnosae, much broadened above base, with an anterior, broad, deeply intruded, transverse fold, the limb oblique, the lobes 5, recurved, broad, acute, crispate; stamens 4, subexserted, inserted at base of widened part of corolla tube, the staminode minute or filiform; ovary ovoid-elliptic, unilocular, the ovules multiseriate on 4 parietal placentae; fruit a pendulous, subglobose, large, hard-walled, indehiscent pepo or calabash, the placentae filling the entire fruit cavity, the seeds immersed in the placentae, compressed, wingless.

TYPE SPECIES: *Crescentia cujete* L.

DISTRIBUTION: Tropical America, with about six species, some of which are elsewhere cultivated.

1. *Crescentia cujete* L. Sp. Pl. 626. 1753; J. W. Parham in J. Dept. Agr. Fiji 19: 97. fig. 10. 1948, in op. cit. 29: 32. 1959, Pl. Fiji Isl. 210. 1964, ed. 2. 295. 1972; Backer & Bakh. f. Fl. Java 2: 542. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 91. 1976; van Steenis in Fl. Males. I. 8: 182. 1977; Gentry in Fl. Neotrop. 25: 90. fig. 15, A-E. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 23. 1985.

Tree to 12 m. high, cultivated in gardens and locally naturalized in coconut plantations at elevations up to about 100 m.; petioles lacking; leaf blades obovate, very variable in size, 4–26 × 1–7.5 cm.; each lobe of bilabiate calyx 1.8–2.6 × 1.3–4 cm.; corolla 4–7.5 cm. long, 3–4.5 cm. broad, brownish green, yellowish, or dull white with pinkish or purplish lines; fruit green to brownish when mature, to 30 × 20 cm., the seeds to 8 × 6 mm. Flowers are seen mostly between August and November, fruits being long-persistent.

TYPIFICATION: Many references were originally listed by Linnaeus; Gentry (1980) takes as the type a specimen without data, Herb. Linn. 779.1 (LINN HOLOTYPE).

DISTRIBUTION: Tropical America, now widely cultivated and naturalized.

LOCAL NAMES AND USES: *Calabash tree*, *gourd tree*. The fruit is a large calabash but is not recorded as being used as such in Fiji, where the species is grown sparingly as an ornamental curiosity.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Singatoka, *Greenwood 777* (coll. H. Phillips). REWA: Suva Botanical Gardens, *MacDaniels 1128*. VANUA LEVU: THAKAUNDRÖVE: Tambia Village, in coconut plantation, *DA 17180*.

4. *KIGELIA* DC. in *Biblioth. Universelle Genève II*. 17: 135. 1838, *Prodr.* 9: 247. 1845; Backer & Bakh. f. *Fl. Java* 2: 542. 1965.

Trees; leaves opposite or in whorls of 3, imparipinnate; inflorescences terminal, large, pendulous; calyx closed in bud, then irregularly splitting; corolla hypocrateriform, narrow at base, bilabiate, the lower lip 3-lobed, the segments imbricate in bud, ovate, copiously plicate; stamens 4, borne on corolla tube above narrow part, the staminode large; fruit pendulous, large, oblong, terete or somewhat compressed, hard-walled, indehiscent, the placentae filling the entire cavity, the seeds obovoid, wingless.

TYPE SPECIES: *Kigelia pinnata* (Jacq.) DC. (*Crescentia pinnata* Jacq.) = *K. africana* (Lam.) Benth.

DISTRIBUTION: Africa, usually considered as comprising a single species.

1. *Kigelia africana* (Lam.) Benth. in Hook. *Niger Fl.* 463. 1849; Heine in Hutchinson & Dalziel, *Fl. W. Trop. Afr.* ed. 2. 2: 385. 1963, in *Fl. Nouv.-Caléd. et Dépend.* 7: 92. 1976; van Steenis in *Fl. Males.* 1. 8: 183. 1977; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 23. 1985.

Bignonia africana Lam. *Encycl. Méth. Bot.* 1: 424. 1785.

Crescentia pinnata Jacq. *Collect.* 3: 203. t. 18. 1791.

Kigelia pinnata DC. *Prodr.* 9: 247. 1845; B. E. V. Parham in *Agr. J. Dept. Agr. Fiji* 10: 115. 1939; J. W. Parham, *Pl. Fiji Isl.* 211. 1964, ed. 2. 295. 1972.

Tree 10 m. or more high, sparingly cultivated near sea level; leaflets 7-13, the blades ovate to oblong, obtuse, 8-20 × 4-7 cm.; inflorescences dependent, 1-2 m. long, the flowers night-blooming, with an unpleasant odor, the pedicels 8-18 cm. long; calyx subcoriaceous, greenish, 3-5 cm. long; corolla yellowish externally, veined, reddish purple within, 10-14 cm. long; fruit to 50 × 15 cm. Flowers have been noted in January.

TYPIFICATION AND NOMENCLATURE: Several taxa, some based on cultivated plants, have been described in the genus; Heine (1963) and van Steenis (1977) conclude that all should be combined in a single species.

DISTRIBUTION: Tropical West Africa, cultivated elsewhere.

LOCAL NAME AND USE: *Sausage tree*; sparingly cultivated as an ornamental curiosity.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva Botanical Gardens, *DA 12297*.

5. *TABEBUIA* Gomes ex DC. in *Biblioth. Universelle Genève II*. 17: 130. 1838; Backer & Bakh. f. *Fl. Java* 2: 539. 1965.

Trees or erect shrubs; leaves opposite, palmately 3-7-foliolate; inflorescences cymose, racemiform, or paniculiform, borne on defoliated or leafy branches; calyx truncate or irregularly lobed; corolla campanulate or hypocrateriform, the tube long, the lobes 5; stamens 4, didynamous, included, the staminode small; capsule linear, compressed contrary to septum, loculicidally dehiscent, the seeds oblong, winged at both ends.

LECTOTYPE SPECIES: *Tabebuia uliginosa* (Gomes) DC. (*Bignonia uliginosa* Gomes); vide Sandwith in Taxon 4: 44. 1955.

DISTRIBUTION: Tropical and subtropical America, with about 100 species.

Two species of *Tabebuia* are (or recently have been) in cultivation in Fiji, but the correct names for these remain to be ascertained. The names used below are to be considered provisional, pending current study of the genus by A. H. Gentry. These names have been in recent use for the two species, but one or both will probably be replaced as a result of new studies.

KEY TO SPECIES

Corolla pink or pinkish purple to nearly white; leaflets (3-) 5, the blades entire. 1. *T. pentaphylla*
Corolla yellow; leaflets 5, the blades serrate-margined. 2. *T. serratifolia*

1. ***Tabebuia pentaphylla*** (L.) Hemsl. Biol. Centr.-Amer. Bot. 2: 495. 1882; J. W. Parham in Agr. J. Dept. Agr. Fiji 29: 33. 1959, Pl. Fiji Isl. 211. 1964, ed. 2. 296. 1972.

Bignonia pentaphylla L. Sp. Pl. ed. 2. 870. 1763.

Tree 6-18 m. high, found near sea level in cultivation; petioles 10-15 cm. long, stout, the leaflet blades (3-) 5, ovate, entire, coriaceous, 10-18 × 4-10 cm.; calyx 1.5-2 cm. long; corolla pink or pinkish purple to nearly white, 5-7.5 cm. long; capsule 12-28 cm. long. Flowers have been noted between January and March.

TYPIFICATION: Several references were given by Linnaeus (1763); de Candolle (Prodr. 9: 217, as *Tecoma pentaphylla*. 1845) cited several West Indian collections but also noted "(excl. syn.)", perhaps implying that a firm lectotypification remains necessary in order to clarify the appropriate name of the taxon.

DISTRIBUTION: Tropical America, now widely cultivated elsewhere. According to Parham (1964, 1972) the species was introduced into Fiji in 1945; it is moderately common in Suva and vicinity.

LOCAL NAME AND USE: *Mayflower tree*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Agricultural Station, Singatoka, DA 9666. NAITASIRI: Kalambo, DA 16413. REWA: Suva Botanical Gardens, DA 12293.

2. ***Tabebuia serratifolia*** (Vahl) G. Nichols. Ill. Dict. Gard. 4: 1. 1887; Rolfe in Kew Bull. 1893: 267. 1893; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 97. 1948.

Bignonia serratifolia Vahl, Eclog. Amer. 2: 46. 1798.

Small tree, cultivated near sea level; leaflets 5, with serrate-margined blades; corolla yellow.

TYPIFICATION: The type is a collection of *John Ryan* (HOLOTYPE probably at c) from Trinidad.

DISTRIBUTION: Tropical America, now elsewhere cultivated. According to Parham (1948) the species was introduced from Trinidad in 1945 and was growing in the Suva Botanical Gardens; however, I find no voucher for that collection nor any other Fijian material, nor is the species listed subsequently by Parham.

USE: Ornamental; it may be hoped that this attractive tree persists in cultivation in Fiji.

6. **SPATHODEA** Beauv. Fl. Oware 1: 46. 1805; Backer & Bakh. f. Fl. Java 2: 540. 1965; Theobald in Rev. Handb. Fl. Ceylon 2: 393. 1981.

Trees, sometimes with leafy pseudostipules; leaves opposite, infrequently in whorls of 3, simply pinnate; inflorescences terminal, dense, racemose-subcorymbiform, the

peduncles not much exceeding the leaves in length, the flowers large, showy; calyx entirely closed in bud, spathaceously splitting on anterior side, recurved; corolla conspicuously zygomorphic, obliquely campanulate, the basal portion of tube short, cylindrical, enclosed within calyx, the upper portion abruptly broadened, ventricose-campanulate, the lobes 5, very broad, crispate, subequal, erect; stamens 4, inserted near base of swollen portion of corolla tube, not exerted, the anthers large, divergent, the staminode small; ovary ovoid, 2-locular, the style slender, the stigma 2-lobed; capsule oblong-lanceolate, compressed contrary to septum, loculicidally 2-valved, the valves perpendicular to septum, navicular, woody, often remaining attached to one another at base and apex, the seeds numerous, membranous-circumalate.

LECTOTYPE SPECIES: *Spathodea campanulata* Beauv. (vide Seemann in J. Bot. 1: 225. 1863).

DISTRIBUTION: Tropical Africa, with two species.

1. *Spathodea campanulata* Beauv. Fl. Oware 1: 47. t. 27, 28. 1805; Yuncker in Bishop Mus. Bull. 178: 108. 1943; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 97. 1948, in op. cit. 29: 33. 1959; Yuncker in Bishop Mus. Bull. 220: 242. 1959; J. W. Parham, Pl. Fiji Isl. 211. 1964, ed. 2. 295. 1972; Backer & Bakh. f. Fl. Java 2: 540. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 50. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 92. 1976; van Steenis in Fl. Males. I. 8: 185. 1977; Theobald in Rev. Handb. Fl. Ceylon 2: 393. fig. 1, C. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 24. 1985.

Tree 15–20 m. high, cultivated and naturalized near sea level; leaflets 9–19, the petiolules 1–3 mm. long, the blades ovate to obovate, 7–13 × 3–5.5 cm.; pedicels 2–4 cm. long; calyx 4–7 cm. long; corolla red or bright orange, 10–14 cm. long, the lobes with undulate, yellow edges; filaments yellow, 4–6 cm. long, the anthers about 8 mm. long; capsule 15–22 cm. long and 3.5–5 cm. broad, the seeds (including hyaline wings) 2–2.5 cm. in diameter. The flowering season extends from about June to October.

TYPE SPECIFICATION: Specimens collected by Palisot de Beauvois north of Chama on the Gulf of Guinea, Africa, have been destroyed, but the description and illustrations may serve as the type (Merrill in Proc. Amer. Philos. Soc. 76: 899–920. 1936).

DISTRIBUTION: Central tropical Africa, now widely cultivated elsewhere.

LOCAL NAMES AND USE: *African tulip tree, fountain tree*. The species was introduced into Fiji in the 1930's as a striking ornamental; it has now become commonly naturalized but is very susceptible to wind damage.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Suva, along street, DA 12237; Suva, Department of Agriculture compound, DA 16976.

7. *JACARANDA* Juss. Gen. Pl. 138. 1789; Backer & Bakh. f. Fl. Java 2: 538. 1965.

Trees; leaves opposite, bipinnate, the leaflets numerous, the blades serrate; inflorescences axillary or in defoliated leaf axils, paniculate; calyx shortly 5-dentate; corolla tube narrowly campanulate, curved, sometimes constricted above base, the limb subbilabiate, the lower lip the larger, 3-lobed; stamens 4, didynamous, included, the staminode long; capsule ovate to orbicular, compressed contrary to septum, loculicidally dehiscent, the seeds flat, circumalate, the wing membranous.

TYPE SPECIES: *Jacaranda caerulea* (L.) Jaume St.-Hil. (Expos. Fam. Nat. 1: 317. 1805) (*Bignonia caerulea* L.).

DISTRIBUTION: Tropical America, with about 50 species. One species is known to be cultivated in Fiji.

1. *Jacaranda mimosifolia* D. Don in Bot. Reg. 8: t. 631. (June 1) 1822, in Edinburgh Philos. J. 9: 266. 1823; Sandwith in Kew Bull. 1953: 456. 1954; J. W. Parham in Agr. J. Dept. Agr. Fiji 29: 33, as *J. mimosaeifolia*. 1959; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 91. 1976; van Steenis in Fl. Males. I. 8: 183. 1977.

Jacaranda ovalifolia R. Br. in Bot. Mag. 49: t. 2327. (June 1) 1822.

Jacaranda rhombifolia sensu J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 97. 1948; non G. F. W. Meyer.

Jacaranda acutifolia sensu J. W. Parham, Pl. Fiji Isl. 211. 1964, ed. 2. 295. 1972; Backer & Bakh. f. Fl. Java 2: 539. 1965; non Humb. & Bonpl.

Tree to 15 m. high, sparingly cultivated near sea level; leaves 15–40 cm. long, the pinnae on each side of midrib 10–23, the leaflets numerous, the blades oblong, 5–10 × 2–3.5 mm.; panicles lax, to 30 cm. long, the flowers abundant; calyx to 2.5 mm. long, the lobes less than 1 mm. long; corolla 3–4 cm. long, blue-lavender to purple, paler in throat; capsule suborbicular, 4.5–6 cm. broad.

TIPIFICATION AND NOMENCLATURE: *Jacaranda mimosifolia* and *J. ovalifolia* were described and figured from material derived from the same source, the botanic garden of the Comte and Comtesse de Vandes, at Bayswater (Sandwith, 1954, who also points out the extraordinary fact that both names were published on the same day, and that a choice between them is mandated by Don's (1823) reduction of *J. ovalifolia* to synonymy). The origin of the tree cultivated at Bayswater was suggested as "Brazil," but Sandwith (1954) points out that the species is indigenous in northwestern Argentina; he also effectively discusses the distinctions between this commonly cultivated *Jacaranda* and *J. acutifolia* Humb. & Bonpl., the type locality of which is northern Peru.

DISTRIBUTION: Originally from northwestern Argentina, now commonly cultivated throughout warm and tropical regions of both hemispheres. No Fijian material is available, but the species is known to be cultivated in the Suva Botanical Gardens, and it is seen sparingly elsewhere in Suva.

USE: A handsome ornamental, flowering in Fiji between September and November (Parham, 1948).

8. STEREOSPERMUM Cham. in Linnaea 7: 720. 1832; Backer & Bakh. f. Fl. Java 2: 540. 1965; van Steenis in Fl. Males. I. 8: 145. 1977; Theobald in Rev. Handb. Fl. Ceylon 2: 394. 1981.

Trees; leaves opposite or sometimes in whorls of 3, simply pinnate; inflorescences terminal or in defoliated leaf axils, lax, thryoid-paniculiform; calyx campanulate, 3–5-lobed; corolla campanulate to tubular-ventricose, geniculate, the limb bilabiate, the lobes 5, with crispate margins, the upper 2 partially connate, the lower 3 distinct; stamens 4, didynamous, included, inserted near base of corolla tube, the anther locules divergent, the staminode small; ovary linear-oblong, 2-locular, the septum thickened, the style slender, the stigma 2-lobed; fruit a linear capsule, terete to quadrangular in section, loculicidally 2-valved, the valves thin, perpendicular to septum, this subterete, spongy, notched, the seeds embedded in notches of septum, trigonous, membranous-winged at each end.

TYPE SPECIES: *Stereospermum kunthianum* Cham.

DISTRIBUTION: Southeastern Asia to tropical Africa and Malesia, with about 20 species. One species is (or has recently been) in cultivation in Fiji.

1. *Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabberley in *Taxon* 27: 553. 1979.

Bignonia colais Buch.-Ham. ex Dillwyn, *Rev. Hort. Malabar* 28. 1839; Mabberley in *Taxon* 26: 533. 1977.

Dipterosperma personatum Hassk. in *Flora* 25 (2): Beibl. 28. 1842.

Stereospermum personatum Chatterjee in *Bull. Soc. Bot. Bengal* 2: 70. 1948; Santisuk in *Kew Bull.* 28: 178. 1973; van Steenis in *Fl. Males. I.* 8: 148. fig. 17. 1977; Theobald in *Rev. Handb. Fl. Ceylon* 2: 395. 1981.

Stereospermum chelonoides sensu auct.; J. W. Parham, *Pl. Fiji Isl. ed.* 2. 295. 1972; non DC. (1838) (*Bignonia chelonoides* L. f., 1782).

Tree (to 30 m. high where indigenous), sparsely cultivated near sea level; leaves 20–50 cm. long, the leaflets 5–11, the petiolules slender, 5–15 mm. long, the blades elliptic-oblong, 5–15 × 2.5–6 cm.; inflorescences to 40 cm. long, the flowers fragrant; calyx 6–8 mm. long, yellowish purple; corolla about 3 cm. long overall, yellowish, ochre-buff-tinged, lined with reddish purple; capsule 8–50 × 0.5–1 cm., the seeds about 2 cm. long including wings.

TYPEFICTION AND NOMENCLATURE: The type of *Bignonia colais* is Rheede, *Hort. Ind. Malabar* 6: t. 26. 1686 (Mabberley, 1979); that of *Dipterosperma personatum* was from a plant cultivated at Bogor (Santisuk, 1973). Distinctions between this taxon and *Stereospermum chelonoides* (L. f.) DC. were discussed by Santisuk (1973), who, following Chatterjee (1948), did not utilize the earliest binomial available for the species.

DISTRIBUTION: Southeastern Asia, from southern China, India, and Ceylon south-eastward; cultivated in Malesia and elsewhere.

LOCAL NAME AND USES: *Padri*. The wood is used for furniture within the indigenous range, and medicinal uses are ascribed to the species in Malaya. It was presumably brought into Fiji fairly recently as a potential timber tree.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Nasinu Agricultural Station, DA 1549.

9. *TECOMA* Juss. *Gen. Pl.* 139. 1789; Backer & Bakh. f. *Fl. Java* 2: 539. 1965; van Steenis in *Fl. Males. I.* 8: 134. 1977.

Stenolobium D. Don in *Edinburgh Philos. J.* 9: 264. 1823; Seem. in *J. Bot.* 1: 87. 1863.

Erect or scrambling shrubs or small trees; leaves opposite, imparipinnate, digitately trifoliate, or simple, the leaf or leaflet blades incised or serrate; inflorescences terminal, racemose or thyrsoid-paniculiform; calyx cupuliform or campanulate, the lobes 5, deltoid; corolla campanulate-infundibuliform, straight or slightly curved, the tube widened above base, the lobes subequal, imbricate in bud; stamens 4, didynamous, inserted at narrow part of corolla tube, included or exerted, the anther locules divergent, the staminode small; ovary narrowly cylindrical, compressed, the ovules 2–4-seriate in each locule; capsule linear, compressed contrary to septum, the valves flat, coriaceous, the seeds hyaline-circumalate.

LECTOTYPE SPECIES: *Tecoma stans* (L.) H. B. K. (*Bignonia stans* L.); vide Rehder in *Mitt. Deutsch. Dendrol. Ges.* 1913: 262. 1913. The type species of *Stenolobium* is *S. castanifolium* D. Don. The two genera are now generally recognized as synonymous.

DISTRIBUTION: Tropical and subtropical America, from the southern U. S. to Argentina (and with one species in southern Africa), with about 15 species, one of which is widespread in cultivation.

1. *Tecoma stans* (L.) H. B. K. Nova Gen. et Sp. 3: 144. 1819; Hook. in Bot. Mag. **59**: t. 3191. 1832; Yuncker in Bishop Mus. Bull. **178**: 108. 1943; J. W. Parham in Agr. J. Dept. Agr. Fiji **19**: 97. 1948, in op. cit. **29**: 33. 1959, Pl. Fiji Isl. 211. 1964; Backer & Bakh. f. Fl. Java **2**: 539. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 51. 1970; Heine in Fl. Nouv.-Caléd. et Dépend. **7**: 93. 1976; van Steenis in Fl. Males. I. **8**: 135, 186. 1977; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 24. 1985.

Bignonia stans L. Sp. Pl. ed. 2. 871. 1763.

Stenolobium stans Seem. in J. Bot. **1**: 88. 1863; Yuncker in Bishop Mus. Bull. **220**: 241. 1959; J. W. Parham, Pl. Fiji Isl. ed. 2. 295. 1972.

Shrub or small tree 1–10 m. high, cultivated near sea level; leaves 10–20 cm. long, the leaflets 5–13 (rarely 3 or 1), the petiolules very short, the blades ovate-lanceolate, 4–12 × 1–3 cm., dentate; inflorescences erect, the flowers slightly fragrant; calyx about 5 mm. long; corolla bright yellow, 3.5–5 cm. long; capsule narrow, 10–20 × 0.4–0.8 cm. Flowers and fruits are usually seen in Fiji between April and July.

TIPIFICATION: Several prior references were cited by Linnaeus; the type locality is presumably the West Indies.

DISTRIBUTION: Tropical America, now widely cultivated.

LOCAL NAMES AND USE: *Yellow bells*, *yellow elder*; a garden ornamental, but not frequent in Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Department of Agriculture compound, Suva, DA 11916, 12083. VANUA LEVU: THAKAUNDOVE: Namale, near Savusavu, DA 16858.

PLANTAGINALES

FAMILY 180. PLANTAGINACEAE

PLANTAGINACEAE Juss. Gen. Pl. 89, as *Plantagines*. 1789.

Annual or perennial herbs or occasionally small shrubs, estipular; leaves usually radical (rarely cauline or opposite), simple, often sheathing at base, the blade phylloidal, essentially parallel-veined, apparently actually representing an expanded petiole (or leaves sometimes much reduced); inflorescences pedunculate, scapose, capitate or spicate, bracteate, without bracteoles, the flowers usually actinomorphic and ♂, small, protogynous, anemophilous, sometimes cleistogamous, often inconspicuous, usually 4-merous as to calyx, corolla, and androecium; calyx lobed or cleft; corolla sympetalous, scarious, the lobes imbricate; stamens usually as many as and alternate with corolla lobes, the filaments attached to corolla tube, the anthers long-exserted, versatile, 2-locular, dehiscent by longitudinal slits; ovary superior (stigmas protruding from bud), basically 2-locular (but sometimes with intrusive partitions and appearing 4-locular), in *Plantago* with 1–40 ovules per locule (in other genera the ovary unilocular with a single basal ovule), the ovules anatropous to hemitropous; fruit capsular, membranous, circumscissile (in *Plantago*, but in other genera an achene or nut), the cotyledons usually straight, the endosperm fleshy, well developed.

DISTRIBUTION: An essentially cosmopolitan family of three genera and about 265 species, all but four of which belong to the genus *Plantago*. A number of species are noxious weeds of lawns, but many are fascinating endemics.

1. *PLANTAGO* L. Sp. Pl. 112. 1753; Seem. Fl. Vit. 193. 1866; Pilger in Pflanzenr. **102** (IV. 269): 39. 1937; Backer & Bakh. f. Fl. Java **2**: 446. 1965.

Characters of the family; flowers in spikes or heads, mostly or all ♂, the stamens 4, the ovules 1 or more in each ovary locule; fruit dehiscent by a transverse circular slit.

LECTOTYPE SPECIES: *Plantago major* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 245. 1913).

DISTRIBUTION: Widely distributed, with all the species of the family except four. One naturalized weed is found in Fiji.

1. ***Plantago major*** L. Sp. Pl. 112. 1753; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 193. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 266. 1892; Reinecke in Bot. Jahrb. 25: 682. 1898; Christophersen in Bishop Mus. Bull. 128: 198. 1935; Pilger in Pflanzenz. 102 (IV. 269): 41. 1937; Yuncker in Bishop Mus. Bull. 178: 110. 1943; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 104. 1948; Greenwood in J. Arnold Arb. 30: 80. 1949; Yuncker in Bishop Mus. Bull. 220: 244. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 120. 1959, Pl. Fiji Isl. 230. 1964, ed. 2. 319. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 169. 1970; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 109. 1985.

Perennial herb with a copious rosette of leaves and ascending inflorescences 15–70 cm. high, naturalized as a weed in lawns and open places and along roadsides from near sea level to about 800 m.; root thick; inflorescences arising in the axils of the rosette of large, erect leaves, the blades of these broadly ovate, 3–25 cm. long and up to 15 cm. broad, with 5–9 longitudinal veins; inflorescence peduncle (3–) 15–60 cm. long. Flowers and fruits are noted throughout the year.

TYPIFICATION: Linnaeus originally listed a number of prior references.

DISTRIBUTION: Indigenous in the Old World but now nearly cosmopolitan.

LOCAL NAME: *Plantain*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, Greenwood 804, Tothill 662, DA 2102. TAILEVU: Viwa Island, Seemann 362. REWA: Suva, along streets, DA 9820, 9866. MBENGGGA: Ndakuni, DA 2070, 2072. KANDAVU: Mburelevu: DA 9641.

Pilger (1937) and other specialists divide *Plantago major* into numerous varieties or other taxa, the details of which, sound as they may be, only a specialist in the group can appreciate. The species may have been in Fiji since the earliest European settlers, or conceivably it was an inadvertent aboriginal introduction.

ORDER LAMIALES

KEY TO FAMILIES OCCURRING IN FIJI

- Leaves alternate (infrequently opposite), usually entire; plants not aromatic; stems and branchlets not quadrangular; inflorescences basically cymose (often coiled, dorsiventral cincinni); flowers actinomorphic or nearly so, usually 5-merous; corolla not bilabiate, usually with a flat limb; stamens usually as many as corolla lobes; ovary 2-locular but usually with 4 (2–10) segments or lobes or compartments, each 1-ovulate; style terminal or gynobasic, entire or lobed (or styles 2); fruit of 4 nutlets or a 1–4-seeded nut or drupe, often enclosed by the persistent and accrescent calyx. 181. BORAGINACEAE
- Leaves mostly opposite (or whorled), entire or cleft or toothed or compound; plants sometimes with aromatic compounds; stems and branchlets often quadrangular; inflorescences various (but not coiled cincinni); flowers mostly zygomorphic, 4- or 5-merous; corolla usually somewhat irregular, sometimes bilabiate; stamens often fewer than corolla lobes (but sometimes as many), often 4 and didynamous, seldom 2, infrequently 5; ovary initially 2-locular but soon divided into 4 (or more) 1-ovulate chambers (or essentially distinct segments) by intruded partitions.
- Plants seldom aromatic; flowers usually 5-merous; style terminal, rarely sunk among the lobes of the ovary, this shallowly (rarely deeply) lobed distally or not at all lobed; fruit variously drupaceous (with 2 or 4 pyrenes), capsular, or achenial, sometimes composed of 1-seeded, separating nutlets or mericarps. 182. VERBENACEAE
- Plants commonly aromatic; flowers (4- or) 5-merous; style commonly gynobasic, uniting the otherwise essentially distinct ovary lobes (or ovary infrequently partially (1/3 or more) 4-lobed, the style then arising from among the lobes); fruit composed of (1–) 4 1-seeded nutlets (the nutlets rarely drupaceous). 183. LAMIACEAE

In accord with Cronquist (1981), the order Lamiales is here taken to include the Boraginaceae, Verbenaceae, and Lamiaceae, families that occur in our area. However, many phylogenists prefer to limit the order Lamiales to the two latter families (and very closely related or segregated groups). The Boraginaceae (with segregated or very closely allied groups) are placed in a separate order Boraginales by Dahlgren (1980), Ehrendorfer (1983), and Takhtajan (1986, 1987). It is probable that future phylogenists will agree with the latter opinion and will remove Boraginaceae from a coherent order Lamiales, treating the two resultant orders as taxa independently derived from a common ancestry with the orders Solanales and Scrophulariales. The problem is well discussed by Cantino (Affinities of the Lamiales: a cladistic approach. *Syst. Bot.* 7: 237-248. 1982).

FAMILY 181. BORAGINACEAE

BORAGINACEAE Juss. Gen. Pl. 128, as *Borragineae*. 1789.

Herbs, shrubs, or trees, infrequently lianas, stipulate, often with firm, unicellular hairs with a basal cystolith; leaves alternate (infrequently opposite), simple, the blades usually entire, sometimes crenate or serrate; inflorescences terminal, axillary, or leaf-opposed, basically cymose (often a coiled, dorsiventral cincinnus), the flowers infrequently solitary and axillary; flowers usually ♂, sometimes functionally unisexual, sympetalous, actinomorphic or nearly so, (4 or)5(-8)-merous; calyx tubular or campanulate, dentate or deeply divided (sometimes to base), the lobes imbricate or rarely valvate; corolla hypocrateriform, rotate, campanulate, or sometimes tubular, the limb usually flat, the lobes imbricate or convolute, rarely valvate, the tube sometimes with small scales (fornices) projecting inward from throat; stamens as many as corolla lobes and alternate with them, borne on corolla tube, included or exerted, the anthers 2-locular, basifixed or dorsifixed, dehiscing by longitudinal introrse slits; nectary disk often present, hypogynous, annular; ovary superior, 2-locular but usually with 4 (2-10) segments or lobes or compartments, each with a single ovule, sometimes entire, the ovules usually erect and axile, anatropous, the style terminal or gynobasic, entire or lobed (or styles 2), the stigma usually dry and papillate, often claviform, sometimes discoid or sessile; fruit of 4 nutlets or a 1-4-seeded nut or drupe, often enclosed in the persistent and accrescent calyx, the cotyledons straight or curved, the endosperm well developed or scanty or none.

DISTRIBUTION: Pantropical and temperate (best developed in western North America and Eurasia), with about 113 genera and 2,400 species. Six genera have been recorded in Fiji, but only *Cordia* and *Argusia* have indigenous species.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Boraginaceae. *Fl. Java* 2: 457-464. 1965. HEINE, H. Boraginaceae. *In: Aubréville, A., & J.-F. Leroy (eds.). Fl. Nouv.-Caléd. et Dépend.* 7: 95-118. 1976.

Takhtajan (1987) recognizes seven families in his order Boraginales (which in 1980 he had placed as a suborder of Polemoniales); of the genera occurring in Fiji, *Cordia* would fall into the family Cordiaceae, the remaining genera into the Boraginaceae (subfamilies Heliotropioideae and Boraginoideae). In the present treatment the more traditional broad use of the family Boraginaceae is adopted.

KEY TO GENERA

Style twice forked, the 4 ultimate branches each bearing a stigma; cotyledons plicate; endosperm absent (Cordioideae). 1. *Cordia*
 Style simple or simply forked or divided, the stigmas 1 or 2; cotyledons not plicate.

Style arising from fruit and seated terminally in its pericarp, falling away with it, simple or essentially none; stigma single, partially sterile, conical or fragmentary or rarely peltate, receptive only in a delimited circumferential band at base or indefinitely stigmatic laterally but sterile at apex, the sterile portion frequently somewhat bilobed; endosperm usually present but often scanty (*Heliotropioideae*).

Fruit at maturity without a clearly differentiated, well-developed mesocarp, dry, the bony endocarp covered only by a thin layer of epicarp; herbs and suffrutescent plants. 2. *Heliotropium*

Fruit at maturity with an evident, well-developed, vesicular mesocarp forming permanent, firm, corky tissue about the endocarp; our species a shrub or tree. 3. *Argusia*

Style not borne directly on fruit, seated independently at middle of floral receptacle or on a central upward projection of receptacle (gynobase) and arising between lobes of the dry fruit (nutlets) and free from them; style simple; stigma simple or rarely 2-lobed; endosperm absent; mostly herbs (*Boraginoideae*).

Corolla lacking fornicies; anther appendages produced above locules and forming a long, spirally twisted, conspicuous beak; ovary 4-locular, undivided or slightly 4-lobed at anthesis, the lobes not then separated; nutlets adnate to the pyramidal gynobase. 4. *Trichodesma*

Corolla with fornicies; anthers lacking spirally twisted appendages; ovary even in bud divided into 4 separated lobes.

Calyx usually divided to base; fornicies usually subquadrate; style shorter than calyx; nutlets attached to a convex or pyramidal gynobase, glochidiate. 5. *Cynoglossum*

Calyx campanulate or tubular, 5-parted or -dentate; fornicies linear or subulate; style filiform, shortly exerted; nutlets free, with amplexant basal appendages. 6. *Symphytum*

1. *Cordia* L. Sp. Pl. 190. 1753; Seem. Fl. Vit. 168. 1866; I. M. Johnston in J. Arnold Arb. 16: 3. 1935, in op. cit. 32: 2. 1951; Backer & Bakh. f. Fl. Java 2: 458. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 97. 1976.

Trees or shrubs; leaves petiolate, the blades entire to repand-serrate; inflorescences terminal or axillary, often corymbiform cymes, ebracteate; flowers sometimes functionally unisexual (plants then dioecious); calyx tubular or campanulate-turbinate, closed in bud, irregularly 2-10-lobed, accrescent under fruit; corolla campanulate to hypocrateriform, usually 5-merous, sometimes salverform or subrotate to infundibuliform, the tube short to long, cylindric or expanding, the lobes ascending to recurved; stamens as many as corolla lobes, borne at or near apex of corolla tube, exerted or included, the filaments usually well developed; ovary entire, 4-locular, the ovules (1-4); style terminal on ovary, dichotomous, simple at base, dividing into 2 forked branches, the stigmas 4, clavate to spatulate or capitate; fruit a drupe with watery or glutinous mesocarp or a nut without fleshy mesocarp, the endocarp bony, 1-4-seeded, the seeds without endosperm, the cotyledons plicate.

LECTOTYPE SPECIES: *Cordia sebestena* L. (vide Hitchcock, Prop. Brit. Bot. 133. 1929), one of Linnaeus's three original species. Johnston (1951) points out that sect. *Myxa* is the largest and most widely represented section of the genus, whereas sect. *Sebestena* is a small group of mainly West Indian species; he considered it possible that sect. *Myxa* might in the future be disassociated from the genus *Cordia* and suggested, in effect, that *C. myxa* (one of the original species) be recognized as the lectotype species. This suggestion appears not to have been acted upon. As a matter of fact, it may be noted that Takhtajan (1987) accepts *Sebestena* as a genus and lists *Cordia* in the sense of *C. myxa*.

DISTRIBUTION: Pantropical and subtropical, with its center of diversity in America, with 250-300 species. Five species are known to occur in Fiji, three only in cultivation and two indigenous (although one of these may conceivably have been an aboriginal introduction).

KEY TO SPECIES

- Corolla orange or scarlet, 3–5 cm. long and in apical diameter; fruit completely and tightly enclosed by the enlarged, coriaceous calyx tube.
- Leaf blades essentially glabrous, smooth; calyx glabrous; corolla pale or bright orange; indigenous and abundant near sea beaches. 1. *C. subcordata*
- Leaf blades with scattered, appressed, stiff hairs on upper surface, rough; calyx strigose and densely brown-puberulent; corolla orange or scarlet; cultivated only. 2. *C. sebastena*
- Corolla white, not more than 1.5 cm. long.
- Leaf blades serrate-margined, with obvious, subulate teeth; young parts, petioles, and inflorescence branches with a russet-ferruginous indument; calyx with 10 pilose angles; drupe drying with conspicuous lobes and angles, the calyx in fruit patelliform, about 10 mm. in diameter; indigenous (or possibly aboriginally introduced). 3. *C. aspera*
- Leaf blades entire or essentially so; young parts, petioles, and inflorescence branches closely pilose, subglabrescent; cultivated only.
- Fruit cylindrical, about 5 mm. long, enveloped by the persistent corolla and calyx tube; leaf blades lanceolate to elliptic, 2–3-times longer than broad. 4. *C. alliodora*
- Fruit subglobose, 20–25 mm. in diameter, the corolla soon deciduous, the calyx in fruit accrescent, patelliform; leaf blades broadly ovate, about as broad as long. 5. *C. myxa*

1. *Cordia subcordata* Lam. Tabl. Encycl. Méth. Bot. 1:421. 1792; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 168. t. 34. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 240. 1892; Reching in Denkschr. Akad. Wiss. Wien 85: 337. 1910; Guillaumin in J. Arnold Arb. 13: 126. 1932; Christophersen in Bishop Mus. Bull. 128: 191. 1935; Yuncker in op. cit. 178: 100. 1943, in op. cit. 184: 59. 1945; I. M. Johnston in J. Arnold Arb. 32: 3. 1951; Yuncker in Bishop Mus. Bull. 220: 229. 1959; J. W. Parham, Pl. Fiji Isl. 211. fig. 75. 1964, ed. 2. 296. fig. 89. 1972; Backer & Bakh. f. Fl. Java 2: 458. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 52. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 124, 132. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 104. pl. 23. 1976.

FIGURE 11A.

Spreading tree or shrub 2–15 m. high, abundant near sea level in beach thickets, on edges of forest along rocky shores, and on inner edges of mangrove swamps; petioles 2–8 cm. long; leaf blades ovate to elliptic, rigid, 8–20 (–25) × 5–15 cm., entire, obtuse or rounded at base and apex but usually mucronulate, scattered-short-appressed-pilose above, sparsely tomentose beneath at least along costa, soon glabrate on both surfaces; inflorescences cymose, 6–20-flowered, 2–5 cm. long (without flowers), the peduncle 0.5–2 cm. long, the pedicels 2–10 mm. long; calyx coriaceous, glabrous, cylindrical, 10–20 mm. long, accrescent after anthesis; corolla pale or bright orange, infundibular, 3.5–5 cm. long and in apical diameter, the lobes 5–7, rounded, spreading; filaments attached about middle of corolla tube; style 20–30 mm. long; fruit an ovoid to subglobose nut 15–30 mm. in diameter, green, becoming brown, completely and tightly enveloped by calyx tube, the mesocarp spongy or corky when fresh, the endocarp hard, angled, the locules 4 (1 or 2 often without seeds). Flowers and fruits occur in most months.

TYPIFICATION: The type is *Commerson s. n.* (P-JU HOLOTYPE), collected on Praslin Island, in the Seychelles.

DISTRIBUTION: Southeastern Asia, Malesia, coastal tropical East Africa, Indian Ocean islands, and Queensland throughout Micronesia and most Pacific archipelagoes. About 35 Fijian collections have been examined, but the species is even more abundant than this implies.

LOCAL NAME AND USES: The name *nawanawa* is firmly attached to this species. The seeds are edible but without much taste; parts of the plant are said to serve as an internal remedy for rheumatic pains. The wood is now very popular for carving statues for sale to tourists.

REPRESENTATIVE COLLECTIONS: YASAWAS: NANUYA LILAI ISLAND: *DA 11834*. VITI LEVU: M̄BA: Lautoka, *Greenwood 339*. NANDRONGA & NAVOSA: Kofotongo, *DA 8000*. SERUA: Namboutini, *DA 13752 (DF 255)*. RA: Ellington, *Parks 20851*. TAILEVU: Near Nggeleku, *DA 13593*. REWA: Nukulau Island, *Barclay 3430*. MBENGGGA: Rukua, *DA 6069*. KANDAVU: Western end of island, near Cape Washington, *Smith 312*. OVALAU: Vicinity of Levuka, *Gillespie 4497*. WAKAYA: *Tothill 627*, p. p. KORO: *Tothill 628*, p. p. NGAU: Shore of Herald Bay, vicinity of Sawaieke, *Smith 7906*. VANUA LEVU: THAKAUNDROVE: Ndromoninuku, *DA 16817*. TAVEUNI: Navakawau, *Weiner 71-7-20b*. MOALA: *Bryan 300*. MATUKU: *Bryan 279*. VANUA MBALAVU: Near Sawana Village, *Garnock-Jones 1056*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 935*. FULANGA: On limestone, *Smith 1170*. F11 without further locality, *U. S. Expl. Exped., Seemann 337*.

2. *Cordia sebestena* L. Sp. Pl. 190. 1753; I. M. Johnston in J. Arnold Arb. 16: 9. 1935; Fosberg in *Phytologia* 15: 501. 1968.

Tree or shrub 1–7 m. high, occasionally cultivated near sea level; petioles 1–4 cm. long; leaf blades ovate to elliptic, 9–16 × 5–14 cm., obtuse to subcordate at base, with scattered appressed stiff hairs above; calyx strigose and densely brown-puberulent, 12–15 mm. long, expanding to 3–4 cm. long and enclosing fruit; corolla orange or scarlet, hypocrateriform, 3–4 cm. long and in apical diameter, the tube twice as long as the calyx; fruit ovoid, white, 1–2.5 cm. long or larger, tightly invested by calyx tube. The cited specimen was fruiting in November.

TYPIFICATION: Several earlier references were cited by Linnaeus, but I have not noted a lectotypification.

DISTRIBUTION: West Indies and probably also along the coasts of Venezuela, Colombia, and Central America, frequently cultivated elsewhere in tropical areas.

USES: No local name has been recorded in Fiji. In its indigenous range, the seeds of *Cordia sebestena* are considered edible and many parts of the plant are used medicinally.

AVAILABLE COLLECTION: VANUA LEVU: THAKAUNDROVE: Vunalangi, *DA 8948*.

In noting that *Cordia sebestena* is commonly cultivated on Guam, Fosberg (1968) remarks: "It strongly resembles *C. subcordata* Lam., of which it seems to be the Caribbean vicariant. It differs in the firmer, more ovate, more nearly cordate, rougher leaves, narrower, strongly striate calyx, and deeper scarlet flowers. It flowers more abundantly and more continuously."

3. *Cordia aspera* Forst. f. Fl. Ins. Austr. Prodr. 18. 1786; A. Gray in Proc. Amer. Acad. Arts 5: 341. 1862; Seem. Fl. Vit. 169. t. 35. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 239. 1892; Reinecke in Bot. Jahrb. 25: 671. 1898; Rechanger in Denkschr. Akad. Wiss. Wien 85: 337. 1910; Yuncker in Bishop Mus. Bull. 220: 229. 1959; J. W. Parham, Pl. Fiji Isl. 211. 1964, ed. 2. 296. 1972; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 98. pl. 21. 1976.

Cordia dichotoma sensu Spreng. Pl. Min. Cogn. Pugill. 19. 1813; non Forst. f.

Cordia sprengelii DC. Prodr. 9: 473. 1845; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862.

Tree 6–7 m. high, occurring near sea level (but not represented in recent collections); young parts and petioles with a russet-ferruginous indument; petioles 1–3 (–5) cm. long; leaf blades membranous, ovate, 10–18 (–22) × 5–11 (–16) cm., rounded or obtuse at base, acuminate at apex, serrate with obvious, subulate teeth; inflorescences terminal, glomerulate-cirrhate, finely and rigidly pubescent, 3–7 cm. long; flowers sessile, the calyx about 4.5 mm. long, with 10 pilose angles and 5 small teeth; corolla white, the tube 4–6 mm. long, the lobes 2–4 mm. long; filaments free for about 2.5 mm., the anthers about 0.6 mm. long; drupe 10–12 × 6–8 mm., with 1 or 2 locules at maturity, drying with conspicuous lobes and angles, the calyx in fruit patelliform, about 10 mm. in diameter.

TYPIFICATION: The type was obtained on Tongatapu, Tonga, by the Forsters during Cook's second voyage. No material of this collection was located at BM, and I

suggest: *J. R. & G. Forster* (LECTOTYPE). Although *Cordia sprengelii* was noted by de Candolle as from New Caledonia, the name is based on Sprengel's misinterpretation of *C. dichotoma* Forst. f. and may be taken as a direct synonym of *C. aspera*. Heine's (1976) remarks on this situation are clarifying.

DISTRIBUTION: Malesia (Philippines, Moluccas, and New Guinea) to Queensland and eastward to Tonga and Samoa. Although Parham (1964, 1972) indicates the species to be common in Fiji, no modern specimens support this statement. Material has been seen from the Solomons, Tonga, and Samoa; conceivably the species may persist in the Fijian Region by virtue of being semi-cultivated for its use in the preparation of tapa; it is even possible that *Cordia aspera* was an aboriginal introduction into the Fijian Region.

LOCAL NAME AND USE: *Tou*; sap from the fruit is used for gluing together strips of masi (tapa).

AVAILABLE COLLECTIONS: TAVEUNI: *Seemann* 336 (June, 1860). FIJI (?) without further locality: *U. S. Expl. Exped.* ("Fiji, Tonga, or Samoa").

4. *Cordia alliodora* (Ruiz & Pavón) Cham. ex DC. Prodr. 9: 472. 1845; I. M. Johnston in Contr. Gray Herb. 92: 13. 1930, in *J. Arnold Arb.* 16: 8. 1935, in op. cit. 30: 115. 1949; J. W. Parham, Pl. Fiji Isl. ed. 2. 296. 1972.

Cerdana alliodora Ruiz & Pavón, Fl. Per. Chil. 2: 47. t. 184. 1799.

Tree to 12 m. high (to 20 m. where indigenous), cultivated at low elevation; [where indigenous the plant is a myrmecophyte, usually with conspicuous gall-like swellings just below the inflorescences;] petioles 1-3 cm. long; leaf blades oblong or lanceolate to elliptic, 10-20 × 3-8 cm., stellate-pilose or glabrate on both surfaces; inflorescences loosely branched, 10-30 cm. across; calyx cylindric, 4-6 mm. long, densely stellate-tomentose, with 10 prominent ribs; corolla white, drying brown, marcescent, the lobes 5-7 mm. long; fruit cylindric, about 5 mm. long, enveloped by the persistent corolla and calyx tube.

TYPIFICATION: The original material of Ruiz and Pavón came from Peru, "versus Pozuzo et Muña."

DISTRIBUTION: Mexico and the West Indies along the Andes south to Amazonian Bolivia and southwestern Brazil, apparently sparsely cultivated elsewhere.

USE: The species was apparently cultivated experimentally as a possible timber tree in Department of Forestry plots; our material, although sterile, appears identical with many specimens so identified by Johnston.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Kalambo, Tholo-i-suva, Block 65, DA 16426.

5. *Cordia myxa* L. Sp. Pl. 190. 1753; Hutchinson in Kew Bull. 1918: 219. fig. 1. 1918; Post, Fl. Syria. ed. 2. 219. 1933; I. M. Johnston in *J. Arnold Arb.* 32: 10. 1951.

Cordia dichotoma sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 296. 1972; non Forst. f.

Tree 4-8 m. high, commonly cultivated in the dry zones of Viti Levu at low elevations; petioles becoming stout (to 3 mm. in diameter), 2-5 cm. long; leaf blades subcoriaceous, broadly ovate, 5-15 cm. long and broad, truncate to subcordate at base, obtuse to rounded at apex, short-pilose or subglabrate beneath; inflorescences loosely flowered; calyx cylindric, 5-6 mm. long, the lobes small; corolla white, to 10 mm. long, the lobes projecting from calyx and spreading or recurved; stamens with exserted anthers; drupes subglobose, 20-25 mm. in diameter, wrinkled in drying, the calyx accrescent, coriaceous and patelliform under fruit and 15-18 mm. in diameter, sinuate-margined, persistently pilose within. The single available collection was in flower and fruit in September.

TYPEIFICATION: Hutchinson (1918) discussed the several references listed by Linnaeus and suggested as the type a specimen in the Linnaean Herbarium (LINN LECTOTYPE) from a plant grown in the garden at Uppsala.

DISTRIBUTION: Asia Minor and possibly Egypt (Hutchinson, 1918), widely cultivated elsewhere. It is closely related to *Cordia obliqua* Willd., of India, Ceylon, and adjacent areas. "Since it is reported as always associated with Man it may be only a cultivated race, possibly even of Indian origin" (Johnston, 1951). In the Pacific *C. myxa* has been cultivated on Guam (Fosberg et al. in *Micronesia* 15: 229. 1979) as well as in Fiji.

LOCAL NAMES AND USES: *Sebastian plum*; names used in Asia Minor (Post, 1933) are *sebesten* and *Assyrian plum*. In Fiji the fruits are used for Indian chutneys, and the bark and fruit are also reported to be used medicinally. In Asia Minor and elsewhere the fruit is used in making birdlime and the bark is considered a tonic.

AVAILABLE COLLECTION: VITI LEVU: MBA: Vunda Point, DA 15267.

The relationship of *Cordia myxa* with *C. dichotoma* Forst. f., of southeastern Asia (from northern India, southern China, and Formosa) through Malesia to northeastern Australia and New Caledonia, was discussed by Johnston (1951). [In mentioning *C. dichotoma*, Seemann (Fl. Vit. 168. 1866) did not know it from Fiji; he mentioned its occurrence in New Caledonia and Australia.] *Cordia myxa* is readily differentiated from *C. dichotoma* by its broad, thick, rounded leaf blades, its coarser flowers, and its much larger fruits.

2. **HELIOTROPIUM** L. Sp. Pl. 130. 1753; I. M. Johnston in J. Arnold Arb. 32: 110. 1951; Backer & Bakh. f. Fl. Java 2: 461. 1965; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 113. 1976; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 359. 1986.

Herbs and low shrubs; leaves alternate (rarely opposite), sessile or petiolate, the blades entire or denticulate; inflorescences unilateral, spiciform, terminal cymes, simple or forked, bracteate or not; flowers ♂, small; calyx with 5 lanceolate or linear lobes, these sometimes unequal; corolla tubular, hypocrateriform, or infundibuliform, the lobes short, spreading, folded and induplicate in bud; stamens inserted on corolla tube, included (or tips of anthers protruding), the filaments very short; ovary completely or incompletely 4-locular, the style terminal or absent, the stigma depressed, conical or discoid, receptive only in a band about base, usually with a cylindrical or conical sterile appendage; fruit dry or drupaceous, at maturity breaking into 4 1-seeded nutlets or these coherent in pairs.

LECTOTYPE SPECIES: *Heliotropium europaeum* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 73. 1913), one of the five original species.

DISTRIBUTION: Pantropical and temperate, often in dry areas, with about 250 species. A single species is infrequently cultivated and sometimes naturalized in Fiji.

1. **Heliotropium amplexicaule** Vahl, Symb. Bot. 3: 21. 1794; J. W. Parham, Pl. Fiji Isl. ed. 2. 346. 1972; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 359. fig. 50. F. 1986.

Perennial herb to 30 cm. high, sparingly cultivated and occasionally naturalized near sea level; stems with long, spreading or recurved hairs and often with short glandular hairs; leaves subsessile, narrowly ovate-oblong, up to 8 × 1.2 cm., narrowed and often clasping at base, pilose on both surfaces; inflorescences longer than leaves, bracteate, the flowers sessile; calyx about 3 mm. long; corolla about 6 mm. long, the tube yellow, the lobes blue; fruit subglobose, the exocarp succulent, the nutlets cohering in 2-seeded pairs.

TYPIFICATION: The type (HOLOTYPE presumably at C) was said to have been collected in Brazil by Thouin.

DISTRIBUTION: South America, introduced elsewhere as a garden plant and sometimes becoming naturalized. In Queensland it can be a serious pest, suspected of poisoning sheep (Stanley, 1986).

LOCAL NAME AND USE: *Blue heliotrope*; occasionally cultivated as an ornamental; presumably a fairly recent introduction in Fiji.

AVAILABLE COLLECTION: VANUA LEVU: THAKAUNDROVE: Namale, south of Savusavu, DA L.16780.

3. *ARGUSIA* Boehmer in Ludwig, Defin. Gen. Pl. ed. 3. 507. 1760; Heine in Fl. Nouv.-Caléd. et Dépend. 7: 108. 1976; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 357. 1986.

Messerschmidia L. ex Hebenstreit in Novi Comment. Acad. Sci. Imp. Petrop. 8: 315. 1763; I. M. Johnston in J. Arnold Arb. 16: 161. 1935, in op. cit. 32: 118. 1951; Backer & Bakh. f. Fl. Java 2: 461. 1965. *Tournefortia* sensu Seem. Fl. Vit. 169. 1866; non L.

Trees, shrubs, or herbs; leaves alternate, large to small, the petiole lacking or inconspicuous, the blades usually narrowed at base; inflorescences dichotomously branched, ebracteate, bearing flowers in unilateral cymes often combined into panicles or corymbs, the flowers sessile or pedicellate; calyx deeply lobed; corolla white, the tube cylindrical or campanulate, the limb spreading, the lobes conduplicate in bud; stamens with very short filaments, the anthers mucronulate at apex; stigma fragmentary, about as long as thick, receptive only in a ring at base, the sterile portion thick and somewhat lobed; fruit dry when mature, the mesocarp vesicular, corky, the endocarp dividing into 2 parts, each with 2 seminiferous cavities, the fertile cavities in each half of endocarp separated by a deep groove or by a sterile cavity.

TYPE SPECIES: *Tournefortia sibirica* L. = *Argusia sibirica* (L.) Dandy (vide Dandy in Regnum Veg. 51: 28, 121. 1967, in Bot. J. Linn. Soc. 65: 256. 1972). *Messerschmidia* is a superfluous name, also based on *Tournefortia sibirica* L. In his 1935 treatment, Johnston discussed in detail the complicated nomenclatural history and variant spellings of *Messerschmidia* and its three species, proposing new combinations for two of them, but apparently he was unaware of Boehmer's legitimate publication of the generic name *Argusia*. The combination *Argusia sibirica* was proposed only in 1972 by Dandy.

DISTRIBUTION: *Argusia* comprises three species of halophytic plants: *A. sibirica* (L.) Dandy, found on saline sands in southeastern Europe and eastward across Asia to China, Korea, and Japan; *A. argentea* (L. f.) Heine, widespread from coastal eastern Asia and the east coast of Africa to the Pacific islands; and *A. gnaphalodes* (L.) Heine, of the West Indies.

1. *Argusia argentea* (L. f.) Heine in Fl. Nouv.-Caléd. et Dépend. 7: 109. pl. 24. 1976; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 357. 1986.

FIGURES 11B-D, 12.

Tournefortia argentea L. f. Suppl. Pl. 133. 1782; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 170. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 240. 1892; Reinecke in Bot. Jahrb. 25: 671. 1898; Guillaumin in J. Arnold Arb. 13: 23. 1932; Christophersen in Bishop Mus. Bull. 128: 191. 1935.

Messerschmidia argentea I. M. Johnston in J. Arnold Arb. 16: 164. 1935; Yuncker in Bishop Mus. Bull. 178: 100. 1943, in op. cit. 184: 59. 1945; I. M. Johnston in J. Arnold Arb. 32: 121. 1951; Yuncker in Bishop Mus. Bull. 220: 229. 1959; J. W. Parham, Pl. Fiji Isl. 254. 1964, ed. 2. 346. 1972; Backer & Bakh. f. Fl. Java 2: 461. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 52. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 83, 124. 1972.

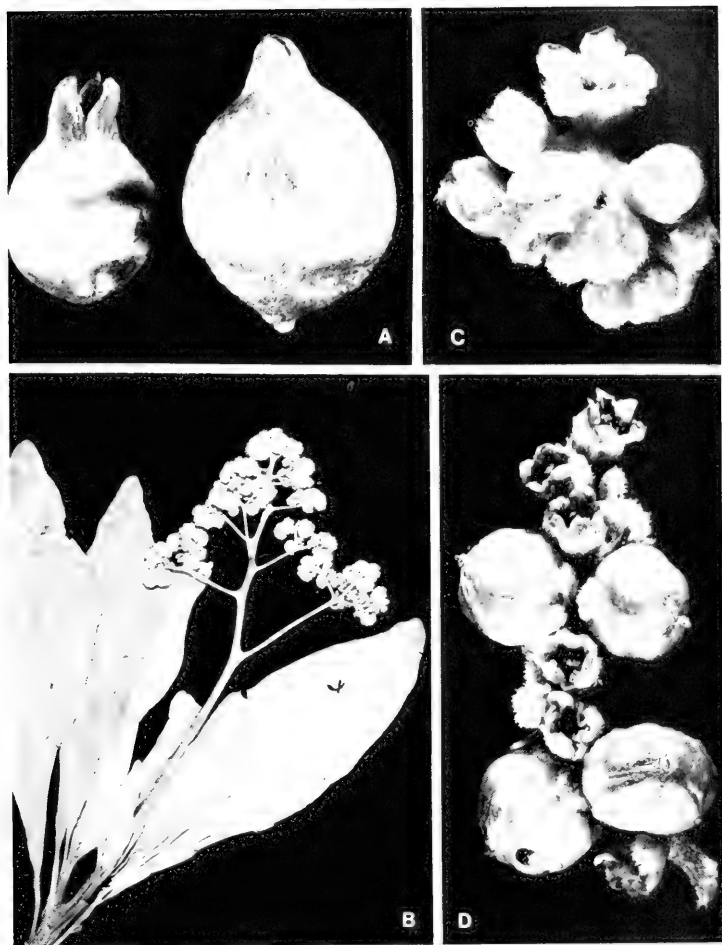


FIGURE 11. A, *Cordia subcordata*: young and essentially mature fruits, $\times 2$. B-D, *Argusia argentea*: B, distal portion of branchlet, with foliage and an inflorescence, $\times 1/3$; C, cluster of flower buds and one open flower, $\times 4$; D, portion of mature infructescence, $\times 4$. A from *DA 16817*, B from *Smith 1261*, C from *Smith 178*, D from *Smith 1094*.

Spreading or compact shrub or tree 1-12 m. high, frequent in beach thickets; young parts, leaves, and inflorescences densely pilose with grayish white or silvery hairs; leaves congested toward apices of branchlets, the petioles often stout, to 2.5 cm. long,



FIGURE 12. *Argusia argentea* in a beach thicket on Kambara (Smith 1261).

winged to base, the blades elliptic to obovate or oblanceolate, 8–28 × 3–13 cm., long-decurrent on petiole, obtuse to rounded at apex; inflorescences terminal, freely branching, to 25 cm. long and broad, the flowers sessile, congested; calyx 1.5–2 mm. long; corolla white, about 4 mm. long, the tube short, the limb spreading, glabrous, the lobes ovate to suborbicular; anthers exserted, pale yellow, 1–1.5 mm. long; ovary glabrous; fruit turning from green to blackish, depressed-globose, 5–8 mm. in diameter. Flowers and fruits occur throughout the year.

TYPIFICATION: The type is *Koenig* (LINN HOLOTYPE), from Ceylon (vide Johnston, 1935; Heine, 1976).

DISTRIBUTION: Ryukyu Islands, Formosa, Hainan, coastal Vietnam, etc. through Malasia and Indian Ocean islands to the east coast of Africa, northern Australia, and to the easternmost islands of the southern Pacific. About 25 Fijian collections from twelve islands have been examined, but the species is much more frequent in beach thickets than this would suggest.

LOCAL NAMES AND USES: No widely recognized Fijian name seems to be applied to this strikingly distinct species, which has been recorded as *evu*, *vevindu*, *ndrendre*, *tokatoka mbembe*, *roro ni mbembe*, *mbamba*, *samuna kirakira*, *kau ni yalewa*, and *velvet leaf*. An extract from the roots, together with other plants, is taken internally for rheumatism; and parts of the plant are reputed to be used for weakness following childbirth.

REPRESENTATIVE COLLECTIONS: YASAWAS: YASAWA: *Weiner 239*. VITI LEVU: NANDRONGA & NAVOSA: Thuvu, west of Singatoka, *Greenwood 276*. SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9607*. NAITASIRE: "Tholo-i-suva" (locality erroneous or plant conceivably cultivated), *DA 11819*. REWA: Nukulau Island, *Tothill 630*. VITI LEVU without further locality, *Seemann 335*, p. p. MBENGGGA: Rukua, *DA 6071*. KANDAVU: Namalata isthmus region, *Smith 178*. ONO (northwest of Kandavu): *DA 14947*. KORO: East coast, *Smith 1094*. NAIRAI: *Tothill 627*, p. p. VANUA LEVU: THAKAUNDROVE: Namale, *DA 16863*; Maravu, near Salt Lake, *Degener & Ordonez 14190*. TAVEUNI: Somosomo, *Seemann 335*, p. p. TOTOYA: *Bryan 356*. VANUA MBALAVU: Near Sawana Village, *Garnock-Jones 1073*. KAMBARA: On limestone, *Smith 1261*.

4. *TRICHODESMA* R. Br. Prodr. Fl. Nov. Holl. 496. 1810; Brand in Pflanzenz. 78 (IV. 252); 19. 1921; Backer & Bakh. f. Fl. Java 2:462. 1965; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 358. 1986. Nom. cons.

Herbs or shrubs, usually hispid; leaves alternate or opposite; flowers solitary or in many-flowered, usually bracteate cincinni; calyx deeply divided, slightly accrescent in fruit, the lobes imbricate, ovate or lanceolate, attenuate or cuspidate at apex, often winged, cordate, or sagittate at base; corolla subrotate, hypocrateriform, or infundibular, lacking fornicies, the tube short, the lobes ovate; stamens borne on corolla tube, the filaments short or essentially none, the anthers large, oblong or linear-lanceolate, coherent into a cone, the connectives produced above locules and forming a long, spirally twisted, conspicuous beak exserted from corolla tube; ovary 4-locular, conical-ovoid or slightly 4-lobed at anthesis, the style subulate, the stigma small, globose; nutlets 4, adnate to the pyramidal receptacle, ovoid, subglobose, or triquetrous, smooth or rugose or hirsute, the seeds oblong or suborbicular.

TYPE SPECIES: *Trichodesma zeylanicum* (Burm. f.) R. Br. (*Borago zeylanica* Burm. f.), typ. cons. Although some authors have considered the generic name feminine (and apparently either feminine or neuter may be used for Greek compounds ending in *-desma*), it seems advisable to use the gender as the epithet of the conserved type species is listed in ICBN.

DISTRIBUTION: Tropical and subtropical areas of Africa, Asia, and Australia, with about 35 species, one of which is a naturalized weed in Fiji.

1. *Trichodesma zeylanicum* (Burm. f.) R. Br. Prodr. Fl. Nov. Holl. 496, as *T. zeylanica*. 1810; Brand in Pflanzentr. 78 (IV. 252): 40. fig. 1, A, 4, D, E. 1921; J. W. Parham in Dept. Agr. Fiji Bull. 35: 122. 1959; Backer & Bakh. f. Fl. Java 2: 462. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 346. 1972; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 358, as *T. zeylanica*. 1986.

Borago zeylanica Burm. f. Fl. Ind. 41. t. 14, fig. 2. 1768.

Annual herb 30–60 cm. high or more, sparingly naturalized in vegetable gardens and cultivated fields near sea level; leaves short-petiolate or sessile, the blades oblong or lanceolate to linear, usually up to 9×3 cm.; pedicels hispid; calyx 10–12 mm. long, deeply divided into oblong-lanceolate lobes; corolla pale blue, slightly longer than calyx; anthers villose, awned; nutlets ovoid, about 5 mm. long, triquetrous on inner surfaces, rugulose, tuberculate. Our collections were in flower and fruit in July and September.

TIPIFICATION: The type of *Borago zeylanica* is a specimen from Ceylon, presumably collected by J. Burman.

DISTRIBUTION: From eastern tropical Africa to India, Ceylon, western Malesia, and Australia, apparently introduced and naturalizing elsewhere. It was first noted in Fiji in 1958.

LOCAL NAME: *Camel bush*. The species is potentially a serious weed; it is suspected of poisoning stock in Queensland.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near Vitongo Creek, inland from Lautoka, DA 11468. VANUA LEVU: THAKAUNDOVE: Nakoroutari, south of Lambasa, DA L.12360.

5. *CYNOGLOSSUM* L. Sp. Pl. 134. 1753; Brand in Pflanzentr. 78 (IV. 252): 114. 1921; I. M. Johnston in Contr. Gray Herb. 78: 107. 1927; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 358. 1986.

Biennial or perennial herbs, rarely annual, the basal leaves long-petiolate, the cauline leaves alternate; inflorescences elongating, usually ebracteate; calyx usually divided to base, accrescent in fruit; corolla cylindric or infundibular, the tube short and broad, the limb spreading, the lobes broadly ovate, the fornications usually subquadrate; stamens borne on corolla tube, included, the filaments short, the anthers ovate or oblong, enclosed in corolla tube; ovary divided into 4 completely separated 1-ovuled lobes, the style usually shorter than calyx, the stigma capitate; fruit composed of ovoid, glochidiate nutlets attached to a convex or pyramidal gynobase, the exterior surface of these plane or slightly convex, saccate-rounded beneath the scar.

LECTOTYPE SPECIES: *Cynoglossum officinale* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 75. 1913), one of the six original species.

DISTRIBUTION: Temperate and subtropical areas of both hemispheres, with about 50 species. One species is naturalized in Fiji.

1. *Cynoglossum amabile* Stapf & J. R. Drummond in Kew Bull. 1906: 202. 1906; Brand in Pflanzentr. 78 (IV. 252): 135. 1921; A. C. Sm. in J. Arnold Arb. 33: 116. 1952; Greenwood in op. cit. 36: 399. 1955; J. W. Parham, Pl. Fiji Isl. 254. 1964, ed. 2. 346. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 219: 79. 1977.

Erect herb to about 50 cm. high, naturalized along trails in dense forest; leaves short-petiolate, the petioles winged, the blades lanceolate, up to 20×3 cm., gray-tomentose on both sides; calyx about 4 mm. long; corolla bright blue, campanulate-infundibuliform, about 6 mm. long; nutlets transversely ovoid, about 4 mm. long. Flowers were noted in June.

TYPIFICATION: Five collections from Yunnan, China, were cited by Stapf and Drummond, who also indicated that a specimen was grown at Kew.

DISTRIBUTION: Tibet and interior southern China, cultivated and sometimes naturalized elsewhere, as in New Zealand (Sykes, 1977, who reports the species from the Kermadec Islands). The sole collection known from Fiji was obtained at an elevation of 1,000–1,100 m. and had probably escaped from a European garden in Nandarivatu, although the species was not observed in that settlement.

LOCAL NAME AND USE: *Chinese forget-me-not*; an ornamental in semitropical areas, but not so noted in Fiji.

AVAILABLE COLLECTION: VITI LEVU: MBA: Western slope of Mt. Nanggaranambuluta, east of Nandari-vatu, *Smith 4809*.

6. *SYMPHYTUM* L. Sp. Pl. 136. 1753; Bucknall in J. Linn. Soc. Bot. **41**: 496. 1913; Riedl in Rechinger f. Fl. Iran. **48**: 239. 1967.

Perennial herbs, sometimes tall, with hispid indument; inflorescences terminal, racemose, scorpioid; calyx campanulate or tubular, 5-parted or -dentate, slightly accrescent after anthesis; corolla campanulate, infundibular, or subcylindric, 5-dentate, 3–4-times longer than calyx, with short, distinct, linear or subulate, connivent fornicies, these usually included; stamens included, the anthers oblong; ovary divided into 4 separated 1-ovuled lobes, the style filiform, shortly exserted, the stigma minutely capitate; fruit composed of 4 free nutlets, these ovate, somewhat curved, with amplexant basal appendages.

LECTOTYPE SPECIES: *Symphytum officinale* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. **3**: 92. 1913), one of the three original species.

DISTRIBUTION: Mediterranean area to the Caucasian region and Iran, with about 25 species, one of which has been introduced into Fiji for trial as a fodder plant.

1. *Symphytum asperum* Lepechin in Nova Acta Acad. Sci. Imp. Petrop. Hist. Acad. **14**: 422. 1805; Bucknall in J. Linn. Soc. Bot. **41**: 510. 1913; Riedl in Rechinger f. Fl. Iran. **48**: 240. 1967.

Symphytum asperum Sims in Bot. Mag. **24**: t. 929. 1806; J. W. Parham, Pl. Fiji Isl. ed. 2. 346. 1972. *Symphytum* sp. ? Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 52. 1970.

Coarse herb 40–50 cm. high (to 1.8 m. where indigenous), sparingly cultivated near sea level; lower leaves petiolate, the upper leaves sessile, the blades ovate to elliptic or lanceolate, 10–30 × 4–12 cm., hispid or tuberculate-setose; calyx 3–7 mm. long, setose; corolla white or rose-colored, fading pale blue, 9–14 mm. long, the fornicies lanceolate; nutlets constricted above base, about 4 × 2.5 mm. The cited Fijian specimen was flowering in October.

TYPIFICATION: The type of *Symphytum asperum* was collected by Lepechin in the Caucasus area. *Symphytum asperum* was also from the Caucasus, introduced into England in 1801 and cultivated at the Botanic Garden at Brompton. Sims referred to Donn, Hortus Cantabrig. ed. 3. 38. 1804, where the name occurs as a nomen nudum.

DISTRIBUTION: Eastern Europe, the Caucasus area, and Iran, introduced elsewhere. The species was brought into Fiji for trial in 1965 and again in 1969 (Parham, 1972). The sterile cultivated plant mentioned from Niue by Sykes (1970) almost certainly belongs to the same species.

LOCAL NAME AND USE: *Russian comfrey*; a fodder plant (which may not persist in Fiji). Burkill (Dict. Econ. Prod. Malay Penins. ed. 2. 2150. 1966) notes that it has failed to grow in Malaya.

AVAILABLE COLLECTION: VITI LEVU: SERUA: Ranandi Beach, Ndeumba, DA 17201.

FAMILY 182. VERBENACEAE

By ALBERT C. SMITH and STEVEN P. DARWIN (Tulane University)

VERBENACEAE Jaime St.-Hil. Expos. Fam. Nat. 1: 245. 1805.

Herbs, shrubs, trees, or lianas, estipulate, the branchlets often quadrangular and sometimes armed with thorns; leaves opposite, occasionally whorled, rarely alternate, sessile or petiolate, simple or palmately (rarely pinnately) compound; inflorescences axillary or terminal, racemose (often a spike or head) or cymose, sometimes subtended by an involucre of colored bracts; flowers ♂ (or rarely some of them unisexual), sessile or pedicellate, usually zygomorphic and 5-merous; calyx gamosepalous, 4- or 5(-8)-toothed or -lobed, hypogynous, sometimes irregular or subentire, persistent; corolla sympetalous, often with a slender tube and spreading limb, less often campanulate, usually somewhat irregular, sometimes bilabiate, the lobes 4 or 5 (-8), imbricate; stamens usually 4 and didynamous, seldom only 2, infrequently 5, the missing ones sometimes represented by staminodes, the filaments borne on corolla tube, alternate with corolla lobes, the anthers 2-locular, dehiscent by longitudinal, introrse slits; disk often inconspicuously annular around base of ovary, sometimes lacking; ovary superior, initially 2-locular but soon divided into 4 (or more) 1-ovulate chambers by intruded partitions, sometimes shallowly 4-lobed laterally and distally, the apex entire or somewhat depressed, the placentation axile (in the family sensu str.), the ovules anatropous to hemitropous, basal or lateral, rarely pendulous, the style terminal or rarely sunk among the lobes of the ovary, the stigma often 2-lobed; fruit drupaceous (with 2 or 4 pyrenes) or with 1-seeded, separating nutlets, or a 2- or 4-valved capsule, rarely a schizocarp, the seeds with a straight embryo and lacking endosperm (in the family sensu str.).

DISTRIBUTION: Pantropical but also extending into temperate areas, with about 100 genera and 3,000 species (in the family sensu lat.). The Verbenaceae are diverse in gynoecial structure, and there are many variations on the basic gynoecial pattern described above. At least five peripheral groups (collectively with about 24 genera) are often segregated as families. Among genera occurring in Fiji, the only one to fall outside the Verbenaceae as narrowly construed is *Congea* (referable to Symphoremaceae if separated).

The family includes many ornamentals and a number of medicinally and otherwise useful plants of economic value. Fifteen genera have been recorded from Fiji, but only six of them have species indigenous in the archipelago.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Verbenaceae. Fl. Java 2: 594-614. 1965. MOLDENKE, H. N., & A. L. MOLDENKE. Verbenaceae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 4: 196-487. 1983.

A basic treatment of the Verbenaceae is that of J. I. Briquet (in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 132-182. 1895, and supplements), but for purposes of a local flora the use of infrafamilial categories would not be helpful. In the present treatment the sequence of and key to genera are in general adapted from H. & A. Moldenke (1983).

KEY TO GENERA

- Ovary imperfectly 2-loculed, each locule with 2 ovules, the placentation appearing free-central; fruit usually 1-seeded; cymes of inflorescence subtended by 3 or 4 prominent, tomentose, involucre bracts; cultivated. 1. *Congea*
- Ovary usually 4-loculed (sometimes with more or fewer locules by division or abortion), each locule with 1 ovule, the placentation axile; inflorescences without involucre bracts.
- Inflorescences indeterminate, spicate, capitulate, or racemose, often paniculate.
- Flowers sessile or subsessile, in spikes or heads.
- Inflorescences elongate (at least in fruit), spicate; fruit dry; calyx 5-toothed or -lobed.
- Flowers erect or spreading, not embedded in inflorescence axis; fruit separating into 4 nutlets; fertile stamens 4; adventive. 2. *Verbena*
- Flowers erect, appressed against and often embedded in excavations of inflorescence axis; fruit separating into 2 cocci; fertile stamens 2; naturalized. 3. *Stachytarpheta*
- Inflorescences condensed, capitate to subcapitate; fruit drupaceous; fertile stamens 4; calyx truncate to sinuate; cultivated and naturalized. 4. *Lantana*
- Flowers usually pedicellate, in racemes or panicles.
- Fruit usually prominently winged by expanded lobes of accrescent calyx, eventually separating into 2 2-loculed pyrenes; epicalyx present at interior base of calyx lobes; unarmed woody vines (our species); cultivated. 5. *Petrea*
- Fruit not winged by calyx; epicalyx absent; trees or shrubs, sometimes scrambling, the branchlets (our species) frequently armed with spines; cultivated and naturalized.
- Calyx flask-shaped when mature and completely enclosing fruit; fruit separating into 4 2-loculed pyrenes; stigma subcapitate to 4-lobed; flowers often showy. 6. *Duranta*
- Calyx shorter than fruit; fruit separating into 2 2-loculed pyrenes; stigma mostly 2-lobed; flowers small. 7. *Citharexylum*
- Inflorescences determinate, cymose, the cymes frequently in terminal panicles, rarely solitary in leaf axils or reduced to a single flower; fruit drupaceous, the pyrenes (2-) 4, united or variously separating at maturity.
- Trees to 50 m. high; leaf blades large (in ours to 95 × 50 cm.), silvery-stellate-pubescent beneath; calyx and corolla 5-7-lobed; cultivated and adventive. 8. *Tectona*
- Herbs, shrubs, lianas, or trees to 27 m. high; leaf blades usually much smaller, not silvery beneath; calyx and corolla usually 4- or 5-lobed.
- Leaves (in our species) digitately compound with (2-) 3-5 (-7) leaflets, rarely also with simple leaves (*Vitex*); corolla densely villose in throat; indigenous.
- Corolla usually 5-lobed; calyx 5-ribbed; our species with upper leaf blade surfaces glabrescent; shrubs or trees to 10 m. high. 9. *Vitex*
- Corolla usually 4-lobed; calyx not ribbed; our species with upper leaf blade surfaces scattered-puberulent with pustular-based trichomes; trees to 20 m. high. 10. *Viticipremna*
- Leaves simple.
- Mature calyx ampilate from base, or appressed to fruit over whole length, or inflated, or merely subtending fruit, the limb not broadly expanded and saucer-shaped, but sometimes colored.
- Corolla 4 (or occasionally 5)-lobed, mostly regular or the lobes unequal in size; indigenous.
- Immature calyx cupular, variously lobed from inception, not ruptured by expanding corolla; corolla densely villose in throat, the tube (in our species) to 5.5 mm. long; pyrenes of fruit united at maturity; trees or shrubs. 11. *Premna*
- Immature calyx completely enclosing corolla in bud, eventually rupturing and irregularly 2-5-lobed; corolla glabrous to minutely puberulent or glandular in throat, the tube (in our species) 3-60 mm. long; pyrenes of fruit separating at maturity, or often only 1 pyrene developing; usually high-climbing lianas. 12. *Faradaya*
- Corolla (4 or) 5-lobed, regular to strongly irregular, glabrous to puberulent but not villose in throat.
- Trees (ours to 27 m. high) or shrubs; pyrenes united at maturity, frequently forming a 2- or 3-loculed fruit; style unequally 2-lobed at apex; corolla blue or yellow to reddish or brownish; indigenous and cultivated. 13. *Gmelina*
- Shrubs, lianas, or perennial herbs; pyrenes usually 4, separating at maturity; style equally 2-lobed at apex; corolla white (indigenous species) to often highly colored (cultivated species). 14. *Clerodendrum*
- Mature calyx short-tubular at base and partially enclosing fruit, the limb much enlarged, spreading, entire, saucer-shaped, often brightly colored; corolla 5-lobed; cultivated.
15. *Holmskioldia*

1. *CONGEA* Roxb. Pl. Coromandel 3: 90. 1820; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 181. 1895; Backer & Bakh. f. Fl. Java 2: 612. 1965; Munir in Gard. Bull. Singapore 21: 277. 1966; Moldenke in Phytologia 45: 47. 1980; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 192. 1983.

Large climbing shrubs, the branchlets usually tomentose with mixed simple and stellate hairs; leaves simple, entire; inflorescences terminal or axillary, paniculate, the cymes capitate, pedunculate, 3-9-flowered, the involucre bracts 3 or 4, free or united at base, violet- to white-tomentose, elliptic to oblong or spatulate; flowers sessile to pedicellate; calyx tubular to infundibuliform, 5-toothed; corolla bilabiate, oblique, the tube glabrous except villose in throat, the upper lip erect, 2-lobed, the lower lip 3-lobed; stamens 4, exserted, didynamous, epipetalous, inserted at corolla throat, the anthers suborbicular; ovary obovoid, glabrous, glandular at apex, imperfectly 2-loculed with 2 ovules in each cell, the style filiform, as long as stamens or longer; fruit drupaceous, obovoid, nearly dry, 1-seeded.

TYPE SPECIES: *Congea tomentosa* Roxb., the only original species. Munir (1966) notes that the type of this species is from Chittagong, not Coromandel.

DISTRIBUTION: Southeastern Asia (from Assam, Bangladesh, and southwestern China) into Malesia (Sumatra), with ten species (Munir, 1966). A number of these species are widely cultivated in tropical regions; one is recorded from Fiji.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A revision of *Congea* (Verbenaceae). Gard. Bull. Singapore 21: 259-314. 1966.

1. *Congea pedicellata* Munir in Gard. Bull. Singapore 21: 300. fig. 8. 1966; Moldenke in Phytologia 45: 61. 1980. FIGURE 13.

Congea velutina sensu J. W. Parham, Pl. Fiji Isl. 213. 1964, ed. 2. 299. 1972; non Wight.

Climbing shrub, in Fiji occasionally cultivated from near sea level to about 250 m.; branchlets terete, cinereo-pubescent; petioles 5-12 mm. long, the leaf blades chartaceous, elliptic, usually rounded or broadly obtuse but sometimes subcordate at base, acute to acuminate at apex, scabridulous above, gray-pubescent beneath, up to 15.5 × 7 cm., the lateral nerves 4-6 per side; inflorescences axillary or terminal panicles, gray-pubescent, the cymes 7-flowered, with peduncles 1-3 cm. long, the involucre bracts 3 or sub-4 (one often retuse or laterally lobed), free to base, elliptic-obovate, to 3.7 × 1.7 cm., densely white-tomentose above, less obviously so beneath, sometimes pink-tinged; flowers mostly pedicellate but sometimes the pedicel less than 1 mm. long or essentially lacking; calyx campanulate, to 8 mm. long, cinereo-pubescent without, appressed-pubescent within, the tube 6-6.5 mm. long, the lobes 5, nearly 1/3 as long as calyx tube, 1.5-2 mm. long, acute, crispate at margin; corolla bilabiate, the tube shorter than calyx, cylindrical, glabrous but villose in throat, the lobes rounded at apex; stamens 4, exserted, the anthers suborbicular; ovary obovoid, glabrous, glandular at apex, about 1.5 mm. long, the style long-exserted, the stigma faintly bilobed. Our specimens were in flower between May and August.

TIPIFICATION: As the type Munir designated *Pierre s. n.* (B HOLOTYPE; ISOTYPES at A, B, SING), from Dong nai, in the Cochinchina region of Vietnam.

DISTRIBUTION: Laos and Vietnam, apparently here first recorded as in cultivation elsewhere.

LOCAL NAMES AND USE: *White congea*, *pink congea*; presumably introduced during the past half-century as an ornamental, with slight variations in the color of involucre bracts.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Plant Introduction and Quarantine Station, Nanduruloulou, DA 12144; Cocoa Station, Nanduruloulou, DA 12145; Tholo-i-suva, DA 16949. The species has also been observed in Suva, Rewa Province.

The cited collections agree well with Munir's (1966) description and illustration, especially in the three involucrel bracts which are essentially free to base, the corolla tube shorter than the sericeo-pubescent calyx, the cinereous pubescence of inflorescence axes, and the usually rounded or obtuse leaf bases. Although most flowers of our collections are essentially sessile, some are short-pedicellate (pedicels about 1 mm. long), agreeing with flowers illustrated by Munir.

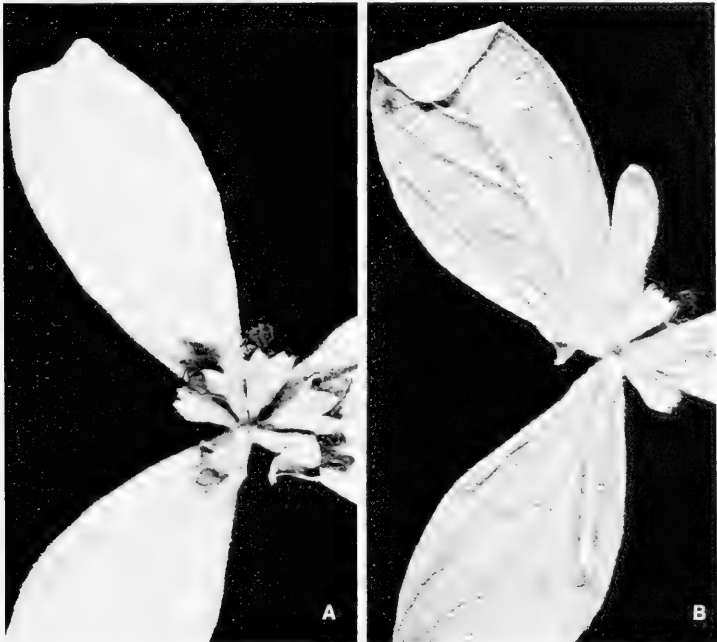


FIGURE 13. *Congea pedicellata*, from DA 16949; A, upper surface of inflorescence cyme, $\times 2$; B, lower surface of inflorescence cyme, $\times 2$.

2. VERBENA L. Sp. Pl. 18. 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam IV. 3A: 146. 1895; Moldenke in Fl. Madagasc. Fam. 174. 4. 1956, in Phytologia 8: 95, 108. 1961; Backer & Bakh. f. Fl. Java 2: 596. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 43. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 198. 1983; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 367. 1986.

Herbs, sometimes subligneous toward base, the stems usually more or less tetragonal, glabrous or pubescent; leaves opposite or rarely whorled, the blades usually dentate or variously lobed, incised, or pinnatifid; inflorescences spicate, the spikes terminal, usually densely flowered, often arranged in flat-topped, pseudoumbellate, or fasciculate-capitate groups, rarely also axillary, often elongating after anthesis; flowers usually small, solitary in axils of usually narrow bracteoles; calyx usually tubular,

5-angled and -ribbed, unequally 5-toothed, often connivent or contorted apically in fruit; corolla hypocrateriform or infundibular, the tube cylindric, straight or curved, often slightly amplate or subinflated distally, usually villose at level of stamen insertion within and barbate in mouth, the limb flat, spreading or oblique, weakly 2-lipped, the lobes 5, usually elongate, somewhat unequal; stamens 4, didynamous, inserted in upper half of corolla tube, included, the anthers ovate, dehiscing longitudinally; ovary 2-carpellate, entire or 4-lobed, 4-locular, the ovules solitary in each locule, attached laterally at or near base, erect, the style terminal, usually equalling stamens, somewhat dilated, briefly bifid at apex; fruit mostly enclosed by mature calyx, the pericarp hard and dry, readily separating into 4 1-seeded, linear or linear-oblong (rarely elliptical), crustaceous nutlets.

LECTOTYPE SPECIES: *Verbena officinalis* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 94. 1913), one of the 14 original species.

DISTRIBUTION: About 250 species in tropical and temperate America, with two or three species indigenous in the Mediterranean region and the Near East, introduced elsewhere in the Old World. Two species occur in Fiji and are considered weeds, although one of them was presumably at one time cultivated.

P. F. Yeo (A re-definition of *Verbena brasiliensis*. Kew Bull. 45: 101-120. 1990) has recently discussed three species of *Verbena* that occur in various parts of the Pacific, two of them often being confused. These two are now known from Fiji, but *V. litoralis* H. B. K. has not yet been discovered in the archipelago; it is readily distinguished by its looser inflorescences and its leaves that are cuneate (not auriculate-clasping) at base.

KEY TO SPECIES

Inflorescence spikes 5-15 (-45) mm. long; leaf blades clasping at base; corolla 5-6.5 mm. long, the tube mostly twice as long as calyx; stamens inserted near middle of corolla tube. . . . 1. *V. bonariensis*
 Inflorescence spikes 15-45 mm. long, rarely longer; leaf blades clasping or not at base; corolla to 4.5 mm. long, the tube exerted beyond calyx for less than 1/3 its length; stamens inserted near corolla throat.

2. *V. brasiliensis*

1. ***Verbena bonariensis*** L. Sp. Pl. 20. 1753; Moldenke in Phytologia 8: 246, p. p. 1962; J. W. Parham, Pl. Fiji Isl. 216, p. p. 1964, ed. 2. 302, p. p. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 215. 1970; Moldenke in Phytologia Mem. 2: 333. 1980; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 201, saltem p. p. 1983; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 136, saltem p. p. 1985; Chaw et al. in J. Taiwan Mus. 39: 124. fig. 1. 1986; Yeo in Kew Bull. 45: 105. fig. 2. 1990.

As seen in Fiji, *Verbena bonariensis* is sometimes grown in gardens as an ornamental but is more often considered a weed in settlements and waste places from near sea level to about 850 m.; coarse, erect, perennial or annual herb to 2.5 m. high, often suffrutescent, the stems sharply tetragonal, somewhat scabrous-pubescent, hispidulous, or subvillose, especially on angles; leaves decussate, sessile, the blades lanceolate to oblong-lanceolate, (3-) 4.5-13 × 1-3 cm., cordate to subauriculate and clasping at base, acute at apex, sharply and unequally serrate to incised-serrate at margin, entire toward base, rugose-hirtellous above, spreading-pubescent beneath, or hirsute-scabrous on both surfaces, the venation prominent; inflorescences terminal, the spikes 4-12, sessile or subsessile, 5-15 (-45) mm. long, the bracteoles lanceolate, 2-4 mm. long, acuminate, pubescent to hirtellous and ciliate; calyx about 3 mm. long, hispidulous on angles, the lobes acute with short, subulate apices; corolla variable in color from blue to violet or red, the tube about twice as long as calyx, pubescent without, the limb small, nearly regular; stamens didynamous, inserted near middle of corolla tube; fruit splitting into 4 cylindric cocci to 2 mm. long, 2.5-3.5 times as long as broad, mostly striate to somewhat raised-reticulate at apex, muricate-scabrous, the commissural faces scarcely reaching the tip. Flowers have been noted in Fiji in January and August, fruits simultaneously or slightly later.

TYPIFICATION: Linnaeus cited several prior references. Yeo (1990, p. 109), with considerable discussion, lectotypifies the species by Herb. Linn. 35.11 (LINN LECTOTYPE); the same specimen had been stated by Moldenke (1962) and H. & A. Moldenke (1983) as the "type."

DISTRIBUTION: Paraguay, Uruguay, Argentina, Brazil, and Chile, now widely cultivated and naturalized. The earliest Fijian collection we have seen is dated 1932, but doubtless the species was in cultivation prior to that.

LOCAL NAMES AND USE: *Verbena, sekara, vunikuta*; a popular ornamental common in gardens throughout Fiji (Parham, 1964, 1972), but for the most part considered to be a weed. Possibly the same names refer to the following species, although that is not thought of as an ornamental in Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, DA 2465. REWA: Suva, Meebold, Aug., 1932, *Vakaloloma & Lambel*, in 1977 (CHR 307758) [we have not seen this specimen, which is cited by Yeo, 1990].

2. *Verbena brasiliensis* Vell. Fl. Flum. 16. t. 40. 1829; Yeo in Kew Bull. 45: 111. fig. 1. 1990.

Verbena bonariensis sensu Greenwood in Proc. Linn. Soc. 154:94. 1943; J. W. Parham, Pl. Fiji Isl. 216, p. 1964, ed. 2. 302, p. p. 1972; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 368, saltem p. p. 1986; non L.

In Fiji *Verbena brasiliensis* is noted as a weed in waste places and in the open from near sea level to about 850 m.; perennial or annual herb to nearly 3 m. high, the stems tetragonal, sparsely to densely hispid; leaves decussate, the blades rhombic-lanceolate to lanceolate, (1.4-) 5-8 (-12) × 1.2-2 (-3.2) cm., slightly tapering to cuneate at base, clasping or not, acute at apex, equally to somewhat unequally serrate at margin, entire toward base, hispid above and beneath or sometimes subvelutinous beneath; inflorescences terminal, the spikes 1.5-4.5 cm. long or rarely to 10 cm. long, the bracteoles lanceolate, 2-4 mm. long, hispid-ciliate; calyx 2.5-3.5 mm. long; corolla pubescent without, the tube to 3.25 mm. long, exerted beyond calyx less than 1/3 its length; stamens inserted in upper third of corolla tube; fruit splitting into 4 cocci, these less than 2 mm. long, 2-3.25 times as long as broad. Flowers and fruits have been collected in February, April, and December.

TYPIFICATION: The Vellozo types are at present missing, and Yeo (1990, p. 115) relies on the Vellozo illustration, without stating that he is making a lectotypification.

DISTRIBUTION: Galapagos Islands, Peru, Colombia, Bolivia, Brazil, Paraguay, Uruguay, Argentina, and Chile, adventive and widespread in the Old World. The species was first noted in Fiji by Greenwood in April, 1925 (no. 714).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Tothill 206, O. & I. Degener 32359*. REWA: Suva, *Greenwood 714*.

3. *Stachytarpheta* Vahl, Enum. Pl. 1: 205. 1804; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 154. 1895; Moldenke in Fl. Madagasc. Fam. 174. 20. 1956; Backer & Bakh. f. Fl. Java 2: 597. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 73. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 246. 1983; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 366. 1986. Nom. cons.

Annual or perennial herbs or low shrubs; leaves opposite or alternate, the blades dentate, often rugose; inflorescences terminal, spicate, the spikes mostly elongate and many-flowered, the flowers opening a few at a time from the inflorescence base upward, sessile or often semi-immersed in excavations of the inflorescence axis, each flower subtended by a persistent, appressed or spreading bract; calyx narrowly tubular, 5-lobed or -dentate, persistent around fruit; corolla white, blue, purple, or red, hypocrateriform, the tube cylindrical, straight or curved, the limb spreading, 5-lobed,

the lobes broad, equal or somewhat unequal, obtuse or retuse at apex; perfect stamens 2, inserted above middle of corolla tube, included, the anthers unappendaged, the thecae divergent and dehiscent in one continuous line; staminodia 2, small; ovary 2-locular, the ovules solitary in each locule, attached laterally near locule base, the style elongate, filiform, the stigma terminal, capitate or subcapitate; fruit a schizocarp, included within the calyx, splitting at maturity into 2 long, hard, truncate, 1-seeded cocci, the seeds erect, linear.

TYPE SPECIES: *Stachytarpheta jamaicensis* (L.) Vahl (*Verbena jamaicensis* L.), typ. cons.

DISTRIBUTION: Tropical and subtropical America, with about 100 species; a few species are naturalized in tropical Asia, Africa, and Oceania, some being aggressive weeds. Two species occur in Fiji.

KEY TO SPECIES

- Spikes (excluding bracts) 4-6 mm. broad at middle; bracts 5-8 mm. long, spreading, pilose; corolla 8-12 mm. long (including lobes), red, less often pink, violet, or purple; lower surfaces of leaf blades conspicuously pilose. 1. *S. mutabilis*
 Spikes 2-3 mm. broad at middle; bracts usually not more than 6 mm. long, erect, minutely appressed-puberulent to glabrous; corolla to 8 mm. long, blue to purplish or sometimes white; lower surfaces of leaf blades glabrous to minutely scabridulous on nerves and costa. 2. *S. urticaefolia*

1. *Stachytarpheta mutabilis* (Jacq.) Vahl, Enum. Pl. 1: 208. 1804; Lam in Bull. Jard. Bot. Buitenzorg III. 3: 6. 1921; Moldenke in Sargentia 1: 114. 1942; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Moldenke in Fl. Madagasc. Fam. 174. 25. 1956; J. W. Parham in Dept. Agr. Fiji Bull. 35: 136. 1959, Pl. Fiji Isl. 216. 1964, ed. 2. 302. 1972; Backer & Bakh. f. Fl. Java 2: 598. 1965; Moldenke in Phytologia Mem. 2: 333. 1980; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 366. 1986.

FIGURE 14A & B.

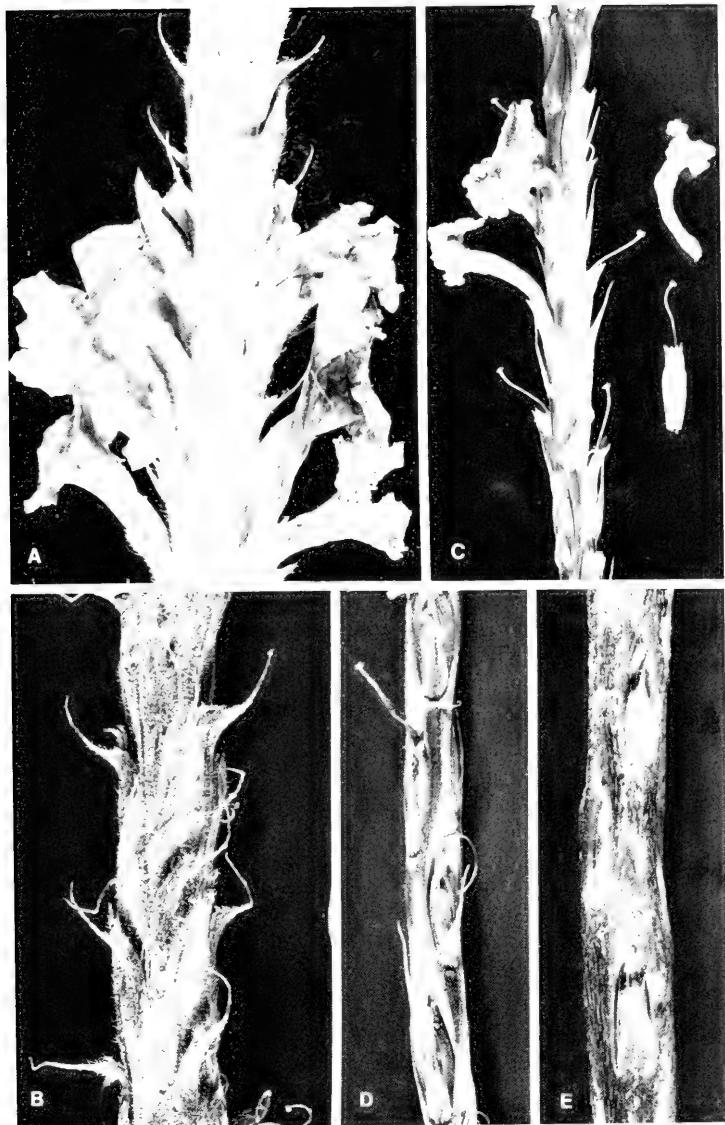
Verbena mutabilis Jacq. Collect. 2: 334. 1789.

Stachytarpheta mutabilis var. *mutabilis*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 248. 1983.

In Fiji *Stachytarpheta mutabilis* is naturalized, probably as an escape from cultivation, in open places from near sea level to about 900 m.; suffrutescent herb or straggling shrub 0.5-1.5 m. high, the branchlets tetragonal, tomentose-villose; leaves decussate, the blades chartaceous, ovate to elliptic-oblong to oblong-lanceolate to subcordate-ovate, 5-12 cm. long, cuneate at base and decurrent on petiole, acute to acuminate at apex, crenate or serrate at margin, sparsely pubescent above, densely so beneath; spikes elongate, 10-60 cm. long, to 6 mm. broad, the rachis densely strigose-pubescent or hirtellous, shallowly excavate opposite flowers, the bracts rigid, spreading, lanceolate to oblong-lanceolate, 5-8 mm. long, subulate-acuminate to cuspidate at apex; calyx 8-12 mm. long, at length immersed in furrows of rachis, unequally 4-toothed; corolla showy, reddish to magenta or pink, less often violet or purple, the tube twice as long as calyx, the limb (6-) 8-12 mm. broad, unequally 4-lobed; cocci shorter than calyx, cylindrical, glabrous. Flowers and fruits occur throughout the year.

TYPIFICATION: The type is *Jacquin s. n.* (W HOLOTYPE), from a cultivated plant in Hortus Schönbrunnensis (H. & A. Moldenke, 1983).

FIGURE 14. A & B, *Stachytarpheta mutabilis*; A, flowering portion of spike, $\times 3$; B, lower portion of spike, showing persistent indument, bracts, and fruit-containing depressions much narrower than rachis, $\times 4$. C & D, *Stachytarpheta urticaefolia*; C, flowering portion of spike and a separated calyx and corolla, $\times 3$; D, lower portion of spike, showing fruit-containing depressions nearly as broad as rachis, $\times 4$. E, *Stachytarpheta jamaicensis*; lower portion of spike, showing fruit-containing depressions much narrower than rachis, $\times 4$. A & B from Gillespie 4418, C from Smith 7946, D from Bryan 201, E from Whistler 7007 (Upolu, Samoa).



DISTRIBUTION: Tropical America from Mexico and the West Indies to central Brazil, widely cultivated and naturalized elsewhere. Presumably it was brought into Fiji early in the present century.

LOCAL NAME AND USE: *Pink rat tail*; although none of our specimens are indicated as coming from cultivated plants, the species is (or was) presumably thought worthy of cultivation.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 455*; Nandi and vicinity, *Degener 15327, DA 9800, 9801, 9802*; vicinity of Nandarivatu, *Gillespie 4418*. NAITASIRE: Sawani, *DA 1067*; weed control plot, Nanduruloulou, *DA 9901, 9902*. REWA: Department of Agriculture compound, Suva, *DA 9105, 9149*. OVALAU: Levuka, *Tothill 674*.

2. *Stachytarpheta urticaefolia* (Salisb.) Sims in Bot. Mag. **43**: t. 1848. 1816; Moldenke in Sargentia **1**: 114. 1942; Greenwood in J. Arnold Arb. **25**: 401. 1944; Yuncker in Bishop Mus. Bull. **184**: 60. 1945, in op. cit. **220**: 230. 1959; J. W. Parham in Dept. Agr. Fiji Bull. **35**: 137. fig. 69. 1959, Pl. Fiji Isl. 216. 1964, ed. 2. 302. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 215. 1970; St. John & A. C. Sm. in Pacific Sci. **25**: 341, as *S. urticifolia*. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 80. 1972; Moldenke in Phytologia Mem. **2**: 333. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 135. 1985. FIGURE 14C & D.

Cymburus urticaefolius Salisb. Parad. Lond. pl. 53. 1806.

Stachytarpheta dichotoma sensu Gibbs in J. Linn. Soc. Bot. **39**: 160. 1909; non Vahl.

Stachytarpheta indica sensu Rechinger in Denkschr. Akad. Wiss. Wien **85**: 340. 1910; Simmonds in Agr. J. Dept. Agr. Fiji **4**: 31. 1931; Guillaumin in J. Arnold Arb. **13**: 26. 1932; Yuncker in Bishop Mus. Bull. **178**: 101. 1943; non Vahl.

Stachytarpheta jamaicensis sensu Greenwood in Proc. Linn. Soc. **154**: 102. 1943; non Vahl.

Stachytarpheta urticaefolia f. *urticaefolia*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon **4**: 257. 1983.

In Fiji *Stachytarpheta urticaefolia* is seen as an abundantly naturalized weed at elevations from near sea level to about 850 m. in clearings, coconut plantations, and pastures, along trails and roadsides, and on reed-covered slopes; coarse herb or subshrub 0.5–3 m. high, the branchlets slender, glabrous or the young parts obscurely pilosulous; leaves decussate, the blades membranous, bullate-rugose when fresh, ovate to broadly elliptic, 4–12 × 2–7.5 cm., cuneate and decurrent on petiole at base, acute at apex, antrorsely serrate at margin, essentially glabrous above and beneath; spikes terminal or sometimes in upper leaf axils, 14–40 cm. long, the peduncle to 3 cm. long, obscurely pilosulous to glabrous, the rachis not deeply excavate, about as wide as furrows, the bracts erect, lanceolate, 4–7 mm. long, aristate at apex; calyx usually 5–7 mm. long, closely appressed to rachis, 5-toothed; corolla usually dark purple-blue, to 8 mm. long; stamens and style white. Flowers and fruits occur throughout the year.

TYPIFICATION: Although Salisbury's plate is often considered the type, it was apparently based on an Isaac Swainson collection (BM HOLOTYPE) from cultivated material in or before 1806 (H. & A. Moldenke, 1983). Salisbury cited a Sloane collection from Barbados, but that may have represented *Stachytarpheta jamaicensis* and presumably is not a satisfactory type.

DISTRIBUTION: Tropical America, but long established in western Malesia and thence to other paleotropical areas. The oldest Fijian collection we have noted is *Gibbs 812*, collected in 1907, but of course the species may have been present in Fiji before the beginning of the present century. About 65 Fijian collections are available.

LOCAL NAMES AND USE: *Turulakaka, tumbutumbu, serakawa, lavenia, blue rat tail*; the plant, when macerated and mixed with oil, is reputed to be used externally for asthmlike conditions.

REPRESENTATIVE COLLECTIONS: VITI LEVU: Mba: Lautoka, *Greenwood 420*; Nandi, *DA 9684*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4317*; Nandarivatu, *Gibbs 812*. NANDRONGA & NAVOSA: Keiyasi, Singatoka River, *DA 10178*; Nggalimare (Ruwailevu Tikina), *H. B. R. Parham 132*. SERUA: Tokotoko road, Navua, *DA 10538*. RA: Penang, *Greenwood 13A*. NAITASIRI: Nanduruloulou, *DA 10816* (white-flowered form); Koronivia, *DA 3941*. TAILEVU: Londoni, *DA 9966*; Wainimbokasi, *DA 10582*. REWA: Veisari, *DA 10999*; Suva, *Bryan 201*. MBENGGGA: Malambi, *Weiner 208*. KANDAVU: Namalata isthmus region, *Smith 11*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7734* (white-flowered form). NGAU: Shore of Herald Bay, vicinity of Sawaieke, *Smith 7946*. VANUA LEVU: MBUA: Without further locality, *DA 5018*. MATHUATA: Lambasa, *DA 10466*. THAKAUNDOVE: Maravu, near Salt Lake, *Degener & Ordóñez 14212*. TAVEUNI: Vicinity of Waiyevo, *Gillespie 4651.3*. VANUA MBALAVU: Near Lomaloma, *Garnock-Jones 992*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 772*.

In addition to the present species, *Stachytarpheta jamaicensis* (L.) Vahl has nearly the same Pacific range as a weed. However, in preparing the present review we have seen no Fijian specimens referable to *S. jamaicensis*, in which the fruiting inflorescence rachis is deeply excavate and conspicuously wider than the furrows (FIGURE 14E); in *S. urticaefolia* the shallow furrows are about as wide as the slender rachis (FIGURE 14D). Both species are found in Samoa and Tonga; where both occur, hybrids are frequent (H. & A. Moldenke, 1983, p. 257, = *S. × intercedens* Danser). In Fijian specimens of *S. urticaefolia* the corollas are noted as rich or deep blue to purple, but rarely as pure white (e. g. in two of the above-cited collections); the white-flowered form may be distinguished as *S. urticaefolia* f. *albiflora* Moldenke (in *Phytologia* 4: 182. 1953; H. & A. Moldenke, 1983, p. 261).

4. LANTANA L. Sp. Pl. 626. 1753; Briquet in Engl. & Prantl, *Nat. Pflanzenfam.* IV. 3A: 150. 1895; Moldenke in *Fl. Madagasc. Fam.* 174. 10. 1956; Backer & Bakh. f. *Fl. Java* 2: 596. 1965; Moldenke in *Ann. Missouri Bot. Gard.* 60: 47. 1973; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 212. 1983; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* 2: 365. 1986.

Erect, scandent, or prostrate shrubs, usually more or less scabrous and hirsute, the stems sometimes armed with thorns or prickles; leaves decussate, opposite or ternate, the blades usually dentate or serrate, often rugose, often fragrant; inflorescences usually axillary, pedunculate, dense cylindrical spikes or contracted heads; flowers sessile in axils of oblong, lanceolate, or ovate bracts; calyx small, membranous, truncate or sinuate-dentate; corolla hypocrateriform, red to yellow to purple, blue, or white, the tube narrow-cylindric or somewhat ampliate above, sometimes curved, the limb spreading, regular or obscurely 2-lipped, 4- or 5-lobed, the lobes broadly obtuse or retuse at apex; stamens 4, didynamous, inserted at or above middle of corolla tube, included, the anthers ovate, with parallel thecae; ovary 2-loculed, the ovules solitary in each locule, basally or subbasally attached, erect, the style usually short, the stigma thick, oblique or sublateral; fruit drupeaceous, more or less fleshy when mature, rarely dry, the endocarp hard, splitting into 2 pyrenes.

TYPE SPECIES: Of Linnaeus's seven original species, Britton (*Fl. Bermuda*, 314. 1918) selected *L. camara* L. as lectotype; M. L. Green (*Prop. Brit. Bot.* 168. 1929) selected *L. trifolia* L. The latter choice is accepted by H. & A. Moldenke (1983).

DISTRIBUTION: *Lantana* is a complex genus of about 160 species, mostly native to tropical and subtropical America, but also with a few taxa indigenous in tropical Asia and Africa. Several species are cultivated, and a few are aggressive weeds. In Fiji the genus is apparently represented by two species, which are distinguished in the following key. *Lantana tiliaefolia* Cham. was attributed to Fiji by Moldenke (in *Phytologia Mem.* 2: 333. 1980), but we have seen no Fijian specimens of that Brazilian species. *Lantana crocea* Jacq. (= *L. urticaefolia* Mill.) was reported in Fiji by Turbet (in *Agr. J.*

Dept. Agr. Fiji 4: 25. 1931), Simmonds (in op. cit. 4: 31. 1931), and Greenwood (in Proc. Linn. Soc. 154: 102. 1943), specifically as a cause of cattle poisoning, the identification having been based on F. M. Bailey's description of *L. crocea* in Queensland; we suspect that the Fijian records are actually referable to *L. camara*, which is also known to be poisonous to cattle.

KEY TO SPECIES

- Outer bracteoles of inflorescence not much larger than inner ones, narrowly lanceolate, usually only 1-2 mm. broad, not conspicuously involucrate; shrubs to 3 (-4.5) m. high, often armed with prickles or spines; corolla opening yellow, becoming pinkish, orange, or reddish with age; leaf blades to 12 × 6 cm., the petioles 7-30 mm. long. 1. *L. camara*
- Outer bracteoles of inflorescence much larger than inner ones, broadly ovate, often more than 5 mm. broad, conspicuously involucrate; suffrutescent herbs or sprawling shrubs usually not more than 1 m. high; corolla pinkish to purple, never yellow or orange; leaf blades to 3.5 × 1.6 cm., the petioles to 6 mm. long. 2. *L. montevidensis*

1. *Lantana camara* L. Sp. Pl. 627. 1753; Reinecke in Bot. Jahrb. 25: 672. 1898; Rechinger in Denkschr. Akad. Wiss. Wien 85: 338. 1910; Christophersen in Bishop Mus. Bull. 128: 191. 1935; Parham, Mune, & O'Connor in Agr. J. Dept. Agr. Fiji 27: 28. fig. 1, pl. 1-4. 1956; Mune & Parham in Dept. Agr. Fiji Bull. 31: 40. fig. 11, pl. VII-X. 1957; J. W. Parham in op. cit. 35: 133. fig. 67, 68. 1959; Backer & Bakh. f. Fl. Java 2: 597. 1965; Mune & Parham in Dept. Agr. Fiji Bull. 48: 42. fig. 11. 1967; Moldenke in Ann. Missouri Bot. Gard. 60: 57. 1973, in Phytologia Mem. 2: 333. 1980; Sinha & Sharma in Repert. Sp. Nov. 95: 621. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 134. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 365. 1986.

Lantana camara in Fiji is an abundantly naturalized pernicious weed from near sea level to about 900 m. in thickets, plantations, and canefields, on the edges of forest, and along roadsides; shrub 1-3 (-4.5) m. high, the stems and branches usually armed with short, recurved prickles, minutely puberulent to densely spreading-hirsute; leaves decussate, the petioles 7-12 mm. long, the blades chartaceous, ovate to oblong-ovate, 2-12 × 2-6 cm., abruptly rounded and cuneate at base, acute to short-acuminate (rarely obtuse) at apex, crenate-serrate at margin, reticulate-rugose and scabrous above, usually sparsely pilosulous or strigillose beneath, sometimes glabrescent; inflorescences axillary, capitate, hemispherical, to 3 cm. broad, many-flowered, the peduncle slender, 2-9 cm. long, the bracteoles oblong to lanceolate, 4-9 × 1-1.5 mm. (rarely larger), acute to subulate at apex; calyx inconspicuous, about 3 mm. long; corolla hypocrateriform, usually opening yellow and turning pinkish, sometimes orange to red or scarlet with age, the tube to 10 mm. long, slightly curved, puberulent, the limb 5-8 mm. broad; drupes fleshy, purple or black, about 3 mm. in diameter.

TYPIFICATION: Linnaeus gave several older references; the type is cited as Herb. Linn. 783/4 (LINN HOLOTYPE), probably collected from cultivated material in the University Garden at Uppsala, by H. & A. Moldenke (1983, p. 220, referring to var. *camara*).

DISTRIBUTION: A highly variable species probably native to the West Indies, but now naturalized in many tropical and subtropical regions. In Fiji it is a declared noxious weed, well established by 1921 (Mune & Parham, 1967, who discuss methods of control). About 50 Fijian collections are at hand.

LOCAL NAMES: *Kaumboitha*, *mbonambulmakau*, *mbona ra mbulumakau*, *tokalau*, *waiwai*, *lantana*. The plant is poisonous to livestock and the fruit is said to be toxic, causing illness if eaten.

A review of *Lantana camara* and its introduction, dispersal, and ecological impact in the Pacific is provided by Thaman (in *Micronesica* **10**: 17-39, 1974). The variant that appears most common in the Pacific is *L. camara* var. *aculeata* (Thaman in op. cit. 18), although many collections may be referred to var. *mista*, in our opinion a dubiously separable taxon. Nevertheless, we have tentatively assigned available Fijian collections to these two varieties. The questionable value of infraspecific taxa in *L. camara* is emphasized by the fact that Moldenke (in *Phytologia* **45**: 296, 1980) proposed the alteration of 14 infraspecific taxa to the category of form.

KEY TO VARIETIES

Branchlets usually not conspicuously hispid-hirsute with stiff, widespreading hairs. . . . 1a. var. *aculeata*
Branchlets usually conspicuously hispid-hirsute with widespreading hairs. 1b. var. *mista*

1a. *Lantana camara* var. *aculeata* (L.) Moldenke in *Torreya* **34**: 9, 1934, in *Sargentia* **1**: 114, 1942; Yuncker in *Bishop Mus. Bull.* **220**: 230, 1959; J. W. Parham, *Pl. Fiji Isl.* **215**, 1964, ed. 2, 301, 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 213, 1970; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* **85**: 54, 1972; Moldenke in *Ann. Missouri Bot. Gard.* **60**: 58, 1973, in *Phytologia Mem.* **2**: 333, 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* **3**: 225, 1983.

Lantana aculeata L. Sp. Pl. 627, 1753; Lam in *Bull. Jard. Bot. Buitenzorg III.* **3**: 4, 1921; Greenwood in *Proc. Linn. Soc.* **154**: 102, 1943, in *J. Arnold Arb.* **25**: 401, 1944.

TYPIFICATION: Linnaeus indicated several prior references for *Lantana aculeata*, the type of which is Herb. Linn. 768/6 (LINN HOLOTYPE), from a plant cultivated in the University of Uppsala Botanical Garden (H. & A. Moldenke, 1983).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 575A*; Nandala, south of Nandarivatu, *Degener 15026*. SERUA: Navua, *DA 11446*. RA: Yanggara, *DA 10736*. NAITASIRE: Tholoisuva, *DA 11248*; Nanduruloulou, *DA 3697*. TAILEVU: Matavatathou, *DA 9948*. REWA: Lami quarry, *Parks 20884*; Suva, herbarium garden, *DA 10786*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7501*. VANUA LEVU: MATHUATA: Vicinity of Lambasa, *Greenwood 575*. THAKAUNDROVE: Nalembalemba, *Savusavu, DA 10784*. TAVEUNI: Vatuwiri, *DA 8921*.

1b. *Lantana camara* var. *mista* (L.) L. H. Bailey, *Cycl. Amer. Hort.* **884**, 1900; Moldenke in *Ann. Missouri Bot. Gard.* **60**: 58, 1973; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* **4**: 229, 1983.

Lantana mista L. Syst. Nat. ed. 12, 417, 1767.

Lantana camara f. *mista* Moldenke in *Phytologia* **45**: 296, 1980, in *Phytologia Mem.* **2**: 333, 1980.

TYPIFICATION: The type of *Lantana mista* is a specimen (OXF HOLOTYPE) from a plant cultivated in the garden of L. Sherard at Eltham, England, about 1726 (H. & A. Moldenke, 1983).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Slopes of the escarpment north of Nandarivatu, *Smith 6026*. REWA: Lami, *Krauss 413*. VANUA LEVU: THAKAUNDROVE: Hills south of Nakula Valley, *Smith 341*.

2. *Lantana montevidensis* (Spreng.) Briquet in *Ann. Conserv. & Jard. Bot. Genève* **7-8**: 301, 1904; R. J. Henderson in *Contr. Queensland Herb.* **3**: 1, *fig. 1*, 2, 1969; J. W. Parham, *Pl. Fiji Isl.* ed. 2, 301, 1972; Moldenke in *Phytologia Mem.* **2**: 356, 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* **4**: 215, 1983; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* **2**: 365, 1986.

Lippia montevidensis Spreng. Syst. Veg. **2**: 751, 1825.

Lantana sellowiana Link & Otto, *Icon. Pl. Select. Berol.* **107**, *t. 50*, 1826; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* **135**, 1985.

In Fiji *Lantana montevidensis* has been noted as cultivated only, occurring near sea level; suffrutescent herb or low, lax, scrambling, or sometimes climbing shrub with weak stems, often trailing or vinelike and mat-forming, often rooting at nodes, unarmed, more or less strigose or hirsute; leaves decussate, opposite or ternate, the petioles usually about 4 mm. long, the blades variable in size and shape, resinous-punctate on both surfaces, ovate to subrhomboid-oblong to lanceolate, mostly (0.6–) 1.2–3.5 × (0.3–) 0.8–1.6 cm., cuneate to attenuate at base, subacute to obtuse at apex, coarsely toothed at margin, generally rugose and scabrous above, strigose on nerves or more densely pubescent beneath; inflorescences initially capitate and hemispheric, 2.5 cm. or more broad, elongating and oblong in fruit, slender-pedunculate, the bracteoles ciliate, resinous-punctate, the outer ones broadly ovate to ovate-oblong, acuminate; flowers sessile, the calyx about 2 mm. long, obscurely 4- or 5-dentate, subvillose-pubescent; corolla infundibular, slightly irregular, pinkish to rose or purple, the tube slender, about twice as long as subtending bracteoles, 8–12 mm. long, subvillose-pubescent, the limb spreading, 5–8 mm. broad, 4- or 5-lobed; drupes dark violet, globose, about 4 mm. long and broad, fleshy, half enclosed by calyx, the endocarp woody, 2-loculed, splitting septically into 2 pyrenes, the seeds dorsally incrassate. Flowers in Fiji have been noted between January and April.

TIPIFICATION: It is probable that both *Lippia montevidensis* and *Lantana sellowiana* were based on the same specimen collected about 1822 in Montevideo, Uruguay, and said to be in the M. Orro herbarium (H. & A. Moldenke, 1983).

DISTRIBUTION: Indigenous from southern Brazil to Argentina, now widely cultivated, reported to be escaped and naturalized in tropical and subtropical areas; Fijian material is from cultivated plants only. The species may have been introduced into Fiji no more than 50 years ago.

USE: An attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Victoria Parade, Suva, DA 12301; beach road, Suva Point, DA 16477. VANUA LEVU: THAKAUNDROVE: Namale, DA 16893.

5. *PETREA* L. Sp. Pl. 626. 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 158, as *Petraea*. 1895; Backer & Bakh. f. Fl. Java 2: 599. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 81. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 270. 1983.

Trees, shrubs, or woody vines; leaves opposite or whorled, the blades net-veined; inflorescences axillary or terminal, racemiform, mostly elongate and many-flowered, the bracteoles small, numerous, caducous; flowers alternate on inflorescence rachis, often distant; calyx 5-lobed, mostly actinomorphic, the tube cylindrical to campanulate, the lobes mostly equal, blue or violet or white, usually longer than tube, bearing on ventral surface toward base a calycine crest (epicalyx) in the form of a sinuate coronet, or this comprising 5 teeth alternating with calyx lobes; fruiting calyx incrassate, stiff, reticulate-veined, serving as wings for fruit dispersal; corolla hypocrateriform, usually slightly zygomorphic, the tube cylindrical, urceolate, or infundibular, usually ampliate distally, the limb 5-lobed, the lobes of varying size in the same flower; stamens 4, didynamous, inserted near middle of corolla tube, included, the anthers oblong to ovate, dorsifixed near base, each theca opening introrsely by a longitudinal slit, the connective usually enlarged; ovary 2-locular, subglobose to oblong, borne on a more or less conspicuous disk, the ovules solitary in each locule, the style terminal, the stigma capitate, mostly oblique, usually bilobed; fruit drupaceous, leathery or fleshy, the endocarp hard and forming 2 (or by abortion 1) pyrenes, each pyrene 1-seeded.

TYPE SPECIES: *Petrea volubilis* L, the only original species.

DISTRIBUTION: Tropical and subtropical America, with about 30 species, one of which (*Petrea volubilis*) has become naturalized in some parts of the Old World; many species are in cultivation, one in Fiji.

1. *Petrea volubilis* L. Sp. Pl. 626. 1753; Lam in Bull. Jard. Bot. Buitenzorg III. 3: 8, as *Petraea* v. 1921; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 301. 1972; Backer & Bakh. f. Fl. Java 2: 599. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 86. 1973; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 135, as *Petraea volubilis* Auct. 1985.

Petrea volubilis var. *volubilis*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 274. 1983.

Woody vine or subshrub to 13 m. high, in Fiji cultivated near sea level, the branchlets slender, prominently lenticellate, pubescent or puberulent with mostly appressed hairs; petioles 4–13 mm. long, the leaf blades firmly chartaceous, scabrous on both surfaces, elliptic, 3–21 × 1.4–10.5 cm., usually acute to obtusely narrowed at base and acute to short-acuminate at apex, the margin mostly entire; racemes abundant, axillary, erect to pendent, often clustered near tips of branchlets, 8–29 cm. long, loosely many-flowered, the pedicels about 8 mm. long at anthesis and to 15 mm. long in fruit, the torus expanded; calyx tube about 3 mm. long, densely pubescent, the lobes membranous, oblong, 13–18 × 4–6 mm. at anthesis, to 22 × 7 mm. in fruit, blue or lavender, rounded at apex, glabrous on both surfaces, the lobes of the calycine crest about 1 mm. long, acute; corolla violet, the tube 6–8 mm. long, ampliate, distally puberulent without, puberulent within and densely villose among stamens, the anterior lobe broadly elliptic, 5–6.5 × 4–4.5 mm., densely puberulent, the other lobes slightly smaller; stamens inserted 4–5 mm. above base of corolla tube; ovary glabrous.

TIPIFICATION: Linnaeus's sole reference was based on a plant cultivated in the George Clifford garden at Hartecamp, The Netherlands, between 1735 and 1737 (BM HOLOTYPE) (H. & A. Moldenke, 1983).

DISTRIBUTION: Of American origin but now widely cultivated. Although no Fijian herbarium specimens have come to our attention, the species, mentioned in Thurston's 1886 *Catalogue* and perhaps introduced by him, is commonly grown as an ornamental at least in Suva and vicinity.

LOCAL NAME AND USE: *Petrea*; an attractive ornamental.

The species is sometimes confused with *Petrea arborea* H. B. K., which is a shrub or small tree with sessile or subsessile leaf blades (petioles to 3 mm. long) and generally shorter calyx lobes (to 12.5 × 3.5 mm. at anthesis, expanding to 18 × 8 mm. in fruit).

6. *DURANTA* L. Sp. Pl. 637. 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 159. 1895; Caro in Revista Argent. Agron. 23: 3. 1956; Backer & Bakh. f. Fl. Java 2: 599. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 87. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 277. 1983; Sanders in Sida 10: 309. 1984; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 368. 1986.

Shrubs, the branchlets often spinose, glabrous or pubescent; leaves decussate or whorled, the blades entire or dentate; inflorescences usually terminal, racemiform, elongate, the flowers often showy, pedicellate, solitary, borne in axils of small bracteoles; calyx tubular or subcampanulate, 5-costate and -toothed or truncate; corolla hypocrateriform, mostly blue or purple, occasionally white, the tube cylindrical, straight or distally curved and spreading, regular or oblique, mostly pubescent in throat, 5-lobed, the lobes rounded, usually unequal; stamens 4, didynamous, included, the anthers sagittate, dorsifixed, erect, the thecae parallel; ovary more or less completely 8-loculed (from 4 2-celled carpels), the ovules solitary in each locule, the style terminal, shorter than or equalling the shorter pair of stamens, oblique, subcapitate, briefly and unequally 4-lobed; fruiting calyx accrescent, flask-shaped, the fruit drupaceous, usually completely included within the mature calyx, the exocarp fleshy, the endocarp hard and forming 4 pyrenes, each 2-celled and 2-seeded.

LECTOTYPE SPECIES: *Duranta erecta* L. (vide M. L. Green, Prop. Brit. Bot. 169. 1929). Caro (1956) further discusses this selection.

DISTRIBUTION: Florida and Texas to Argentina and Brazil, with about 17 species (Sanders, 1984), one of which is cultivated and naturalized in Fiji.

1. *Duranta erecta* L. Sp. Pl. 637. 1753; Caro in Revista Argent. Agron. 23: 6. fig. 1. 1956; Backer & Bakh. f. Fl. Java 2: 599. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 299. 1972; Bromley in Kew Bull. 39: 803. 1984.

Duranta repens L. Sp. Pl. 637. 1753; Greenwood in J. Arnold Arb. 25: 401. 1944; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 105. 1948; Yuncker in Bishop Mus. Bull. 220: 231. 1959; J. W. Parham, Pl. Fiji Isl. 213. 1964, ed. 2. 299. 1972; Moldenke in Ann. Missouri Bot. Gard. 60: 90. 1973, in Phytologia Mem. 2: 333. 1980; Sanders in Sida 10: 311. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 134. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 369. fig. 51, J. 1986.

Duranta plumieri Jacq. Enum. Syst. Pl. Carib. 26, nom. illeg. 1760, Select. Stirp. Amer. 186. t. 176, f. 76. 1763; Reching in Denkschr. Akad. Wiss. Wien 85: 341. 1910; Lam in Bull. Jard. Bot. Buitenzorg III. 3: 9. 1921.

Duranta plumieri var. *alba* Mast. in Gard. Chron. III. 3: 44. fig. 9. 1888.

Duranta repens var. *alba* L. H. Bailey in L. H. & E. Z. Bailey, Hortus, 225. 1930; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 282. 1983; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 134. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 369. 1986.

Duranta erecta var. *alba* Caro in Revista Argent. Agron. 23: 11. 1956.

Duranta repens var. *repens*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 278. 1983.

In Fiji *Duranta erecta* is cultivated from near sea level to about 850 m. and is an occasional plantation weed; polymorphic shrub or small tree to 7 m. high, the branchlets slender, arching, drooping, or trailing, unarmed or spiny, sometimes scandent, pubescent to glabrate; petioles slender, 1-8 (-15) mm. long, the leaf blades ovate-elliptic or ovate to obovate, 1.5-6 × 0.5-4 cm., cuneate at base, obtuse to acute to acuminate or apiculate at apex, entire or coarsely serrate above middle or sometimes dentate throughout, usually thin-textured, glabrate on both surfaces; inflorescences terminal and axillary, loosely many-flowered, erect or recurved, 5-30 cm. long, the bracteoles minute or occasionally subfoliaceous; flowers pedicellate (pedicels 1-5 mm. long), fragrant; calyx tubular, 3-4.5 mm. long at anthesis, angled, appressed-strigillose to canescent, the teeth minute, apically subulate; corolla pale blue to violet, purple, or white, surpassing calyx by 2-5 mm., densely puberulent distally without, the limb 7-14 mm. broad, puberulent on both surfaces; fruiting calyx yellowish, glabrous, glossy, prolonged into a curved beak; fruit yellow or orange-yellow, globose, 7-11 mm. in diameter, enclosed by calyx. Flowers and fruits have been noted between January and July.

TYPIFICATION AND NOMENCLATURE: Linnaeus's only reference under *Duranta erecta* was "Plum. gen. 30," doubtless to Plumier's 1703 work. Caro (1956) lectotyped the name by a Plumier illustration that postdates the Linnaean protologue: Plumier, Pl. Amer. t. 79. 1756; a "possible" type suggested by Sanders (1984) is Herb. Linn. 806.2. As to *D. repens*, Caro (1956) remarked "species dubia est," but Sanders (1984) suggested as the "probable type" Herb. Linn. 806.1.

The two names, published simultaneously by Linnaeus, were discussed by Caro (1956) and Bromley (1984); apparently they were first united by Hiern, who used the name *Duranta erecta*, in 1877, earlier than Kuntze in 1891, who used *D. repens* for the united species; Sanders (1984) considered Kuntze to have been the first author to combine *D. repens* and *D. erecta*. The choice between the names, which seems to have puzzled many authors, has been well clarified by Caro and Bromley.

The type of *Duranta plumieri* var. *alba* is Woodrow material probably sent to Masters from India in 1888 or earlier.

DISTRIBUTION: Subtropical and tropical America; introduced and firmly naturalized in parts of tropical Africa, Asia, Australia, and Oceania. Numerous varietal and horticultural names have been proposed, the most obvious of which is perhaps var. *alba* (Mast.) Caro.

LOCAL NAMES AND USES: A garden ornamental, introduced in the 1880's (listed in Thurston's 1886 *Catalogue*), locally known as *durantia* or *golden dewdrop* and sometimes used in hedges. The berries are reputed to be poisonous.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, cultivated in European gardens, *Smith 5024* (white-flowered form). NAITASIRE: Koronivia, *DA 6037*. REWA: Suva Botanical Gardens, *DA 12345*; Suva, in private garden, *DA 16097*. VANUA LEVU: MATHUATA: Nandakeke, Ndreketi, *DA 16959*. VANUA MBALAVU: Yanuyanu Island (Mrs. E. Hennings, as a plantation weed), *DA L.13847, L.14390*. FIJI without further locality, *Gillespie 2068, DA 3452*.

7. CITHAREXYLUM L. Sp. Pl. 625. 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 159. 1895; Moldenke in Ann. Missouri Bot. Gard. 60: 92. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 282. 1983.

Trees or shrubs (rarely climbing), the branchlets sometimes spiny; leaves decussate, whorled, or rarely alternate, petiolate or sessile, the blades usually bearing a pair of glands at base, entire or dentate; inflorescences axillary and terminal, racemiform to spicate, mostly simple, elongate, and many-flowered, rarely reduced; flowers small, each subtended by an inconspicuous bracteole; calyx tubular to cyathiform, regular to somewhat zygomorphic, 5-toothed or -lobed to truncate; corolla infundibular to hypocrateriform, yellow or white to blue or violet, the tube narrow, regular, the limb spreading, (4 or)5(or 6)-lobed, pubescent in throat; stamens 4, mostly didynamous, usually with a staminode (or stamens 5 or even 6), the anthers ovate to sagittate, the parallel thecae dehiscing lengthwise, surpassed by the thickened connective; style terminal, included, the stigma briefly bifid; ovary perfectly or imperfectly 4-locular (from 2 carpels), the ovules solitary in each locule, laterally attached; fruit drupaceous, the endocarp forming 2 pyrenes, each with 2 cells and 2 seeds, the fruiting calyx often enlarged and indurate, shorter than fruit.

TYPE SPECIES: *Citharexylum spinosum* L., the only original species.

DISTRIBUTION: Southern U. S. to Argentina and Uruguay, with perhaps 100 species, many of which are widely cultivated and sometimes naturalized, as is one species in Fiji.

1. *Citharexylum spinosum* L. Sp. Pl. 625. 1753; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in op. cit. 29: 32. 1959; Moldenke in Phytologia 7: 33. 1959; J. W. Parham, Pl. Fiji Isl. 211. 1964, ed. 2. 297. 1972; Moldenke in Phytologia Mem. 2: 348. 1980; Sivarajan & Manilal in J. Econ. Tax. Bot. 3: 813. 1982; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 286. 1983.

Cultivated and naturalized near sea level in Fiji; shrubs or trees to 16 m. high, the trunk rarely more than 30 cm. in diameter; branchlets glabrous, the leaf scars often prominent as corky sterigmata to 4 mm. long; petioles slender, 7-25 mm. long, the leaf blades chartaceous to membranous, elliptic or elliptic-oblong to subovate, 3.5-19 × 1.3-11.3 cm., acute to attenuate at base, obtuse to acute or acuminate (rarely emarginate) at apex, entire (rarely dentate) at margin, glabrous on both sides or sometimes barbellate in axils of secondary nerves beneath, the venation prominulous on both surfaces; inflorescences terminal or sometimes axillary, simple or compound, with 1-5 pairs of basal bracts, 2.5-30 cm. long at anthesis, the peduncle short, the pedicels slender, 0.5-4 mm. long, glabrous, each subtended by a linear bracteole; flowers fragrant, the calyx cyathiform, 3-4 mm. long, 5-dentate, ciliate; corolla white to cream-colored to reddish, the tube 4-6 mm. long, glabrous without, the limb 5-lobed, the lobes suborbicular-lingulate, 2-3 mm. long, rounded; fruiting calyx indurate, cupuliform, 3-4 × 5-6 mm., orange when fresh, glabrous; fruit red- to brown-black at maturity, glossy. Flowers have been noted between March and November, fruits only in April.

TIPIFICATION: The type is *James Reed s. n.* (BM HOLOTYPE in Sloane Herbarium), collected on Barbados before 1700 (H. & A. Moldenke, 1983).

DISTRIBUTION: Widely distributed in the West Indies and northern South America, cultivated and sometimes naturalized elsewhere. Another species, *Citharexylum fruticosum* L., is also frequent in cultivation, differing from *C. spinosum* in the firmer leaf blades with more conspicuous venation. Dioecism has been reported in various species of *Citharexylum* (*C. fruticosum* and *C. montevidense*) by Tomlinson and Fawcett (in J. Arnold Arb. 53: 386–389. 1972) and Tomlinson (in op. cit. 54: 120. 1973), but we have not been able to confirm the same for *C. spinosum*, which has probably been in Fiji since early in the present century.

LOCAL NAME AND USE: *Fiddlewood* (corruption of the West Indian name *bois fidèle*); a garden ornamental readily naturalizing.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Koronivia, DA 7557. REWA: Suva Botanical Gardens, Wilder 1234; Suva and vicinity, H. B. R. Parham 67, 319, DA, Jan. 26, 1940, 12265, 12613. FIJI without further locality, Howard 32.

8. **TECTONA** L. f. Suppl. Pl. 20, as *Tektona*, 151. 1782; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 167. 1895; Backer & Bakh. f. Fl. Java 2: 601. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 123. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 303. 1983. Nom. et orth. cons.

Tall forest trees; leaves decussate or whorled, petiolate or subsessile, the blades mostly large, entire or denticulate, rarely lobed; inflorescences cymose, numerous, many-flowered, borne in massive terminal panicles and sometimes also in smaller axillary cymes; flowers small, actinomorphic; calyx campanulate, briefly 5–7-lobed, persistent and in fruit greatly enlarged, often inflated and enveloping fruit; corolla hypocrateriform, white or blue, the limb 5–7-lobed, the lobes subequal, overlapping in bud; stamens 5 or 6, inserted on corolla tube, exserted, the anthers ovate to elliptic-oblong, dorsifixed, dehiscing by longitudinal slits; ovary elongate, 4-loculed (from 2 carpels), the ovules solitary in each locule, the style terminal, capillary, the stigma briefly bifid, its lobes subequal; fruit drupaceous, rounded or weakly 4-lobed, enclosed within calyx, the exocarp thin, subcarinose, the endocarp bony, with a small central cavity between locules.

TYPE SPECIES: *Tectona grandis* L. f., the only original species.

DISTRIBUTION: Southeastern Asia (from India and Burma) and into Malesia, with three or four species, one of which is occasionally cultivated and rarely naturalized in Fiji.

1. **Tectona grandis** L. f. Suppl. Pl. 151. 1782; Lam in Bull. Jard. Bot. Buitenzorg III 3: 28. 1921; Surridge in Agr. J. Dept. Agr. Fiji 9 (4): 23. 1938; Yuncker in Bishop Mus. Bull. 178: 101. 1943, in op. cit. 184: 60. 1945; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in op. cit. 29: 33. 1959; Backer & Bakh. f. Fl. Java 2: 601. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 215. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 128. 1972; Moldenke in Ann. Missouri Bot. Gard. 60: 123. fig. 12. 1973, in Phytologia Mem. 2: 333. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 136. 1985.

Tectona grandis var. *glabrifolia* Moldenke in Phytologia 2: 321. 1947, in op. cit. 5: 140. 1955; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 302. 1972.

Tectona grandis var. *grandis*; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 302. 1972; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 304. 1983.

In Fiji *Tectona grandis* is cultivated at low elevations or is locally established along roads and trails; tree to 50 m. high (where indigenous), the branchlets stout, with large quadrangular pith, densely tomentose, the nodes distinctly annulate; leaves drooping, deciduous, the blades firmly chartaceous, broadly elliptic, 11–95 × 6–50 cm., abruptly

acute to long-acuminate at base and decurrent on petiole, acute to short-acuminate at apex, densely squamose and rugose or bullate above, pubescent to glabrescent and often silvery beneath; inflorescences mostly 40 × 35 cm. or larger, densely furfuraceous throughout, composed of distant, opposite, many-flowered cymes, each pair of these subtended by large foliaceous bracts, with smaller linear-lanceolate bracteoles to 15 × 4 mm. subtending the pedicels; calyx 3–4.5 mm. long, densely furfuraceous-tomentellous, the teeth ovate or ovate-oblong, 1.5–2.5 mm. long, often reflexed, obtuse; corolla white or somewhat rose-colored, glabrous on both surfaces, the tube 1.5–3 mm. long, the lobes 2.5–3 mm. long, rounded at apex, erect or reflexed; filaments of stamens white, glabrous, the anthers yellow; ovary conical or ovoid, densely pubescent, the style white, somewhat pilose; fruit subglobose to tetragonally flattened, to 1.5 cm. long and broad, pale green to brown, the fruiting calyx to 2.5 mm. long and broad, chartaceous. Flowers have been observed between January and April, fruits slightly later.

TYPIIFICATION AND NOMENCLATURE: The type is *König s. n.*, from "prope Madras & aliis locis in hortis" (H. & A. Moldenke, 1983). The type of *Tectona grandis* var. *glabrifolia* is *Gillespie 4544* (NY HOLOTYPE; ISOTYPES AT BISH, K), collected Jan. 31, 1928, on Ovalau, in hills south of Levuka on the trail across the island. The variety is said to differ from the typical variety in having the puberulence of the lower leaf surfaces closely appressed and obscure. However, under reasonable magnification this indument is far from obscure, totally covering the surface. It may be noted that Lam (1921) indicates the leaf blades of *T. grandis* to be stellate-tomentose to subglabrate on the lower surfaces; certainly a close but dense indument is to be expected throughout the natural range of the species as well as in plants far from its indigenous range.

DISTRIBUTION: India, Burma, Thailand, and Laos; introduced into Malesia several hundred years ago and now widespread in tropical areas in cultivation or naturalized. It was introduced into Fiji in the late nineteenth century, being listed in Thurston's 1886 *Catalogue*.

LOCAL NAME AND USE: *Teak* is a valuable timber tree; however, it does not do well in Fiji and is not currently being exploited.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Nuku Village, DA 7004; near Lelean Memorial School, Ndavuilevu, DA 16406.

The original distribution and growth requirements of *Tectona grandis* are reviewed by A. Kaosa-ard (in Nat. Hist. Bull. Siam Soc. 29: 55–74. 1989). The literature on *teak* is large; two useful bibliographies are: Mathur, K. B. L. *Teak Bibliography*. 1–320. 1973 (Manager of Publications. Delhi), and Krishna Murthy, A. V. R. G. *Bibliography on Teak: Tectona grandis* Linn. f. i–xvi, 1–402, xvii–xxviii. 1974–1975 (Jugal Kishore & Co., Dehra Dun).

9. VITEX L. Sp. Pl. 638 ('938'). 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 170. 1895; Moldenke in Phytologia 5: 142. 1955, in Fl. Madagasc. Fam. 174. 70. 1956; Backer & Bakh. f. Fl. Java 2: 604. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 130. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 348. 1983; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 370. 1986; Munir in J. Adelaide Bot. Gard. 10: 33. 1987.

Shrubs or trees, glabrous or pubescent, the branchlets terete or obscurely tetragonal; leaves decussate or whorled, 3–7-foliolate (or leaflets 2 or 1), the leaflets petiolulate or sessile, the blades entire or dentate or rarely lobed; inflorescences cymose, compound and often much branched, terminal or axillary, usually pedunculate, the bracts small, narrow; flowers small, more or less zygomorphic; calyx campanulate to infundibular, variously toothed to truncate, accrescent, persistent; corolla white or yellow-

ish to blue or violet, hypocrateriform, bilabiate, the upper lip 2-lobed, the lower lip 3-lobed with the middle lobe larger and longer than the others, the tube usually villose within, often pubescent without; stamens 4, didynamous, exerted, inserted near middle of corolla tube, the filaments usually villose toward base, the anthers dorsifixed, oblong to elliptic, the thecae parallel or divergent; ovary 4-loculed (or imperfectly 2-loculed), the ovules solitary in each locule, the style filiform, terminal, glabrous, briefly 2-lobed at apex; fruit drupaceous, the hard endocarp separating into 4 1-seeded pyrenes.

LECTOTYPE SPECIES: *Vitex agnus-castus* L. (vide Britton & Wilson, Sci. Surv. Porto Rico 6: 149. 1925), one of the four original species.

DISTRIBUTION: Widely distributed in tropical and subtropical regions, especially in Asia, Africa, and Australia, with at least one species extending to southern Europe, and with about 270 species. One indigenous species occurs in Fiji.

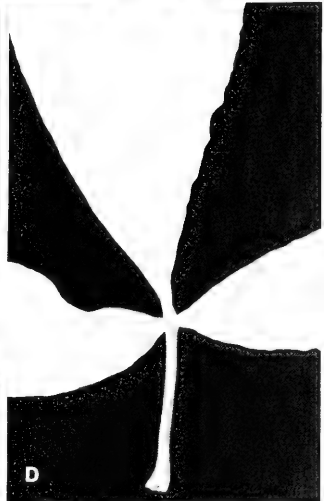
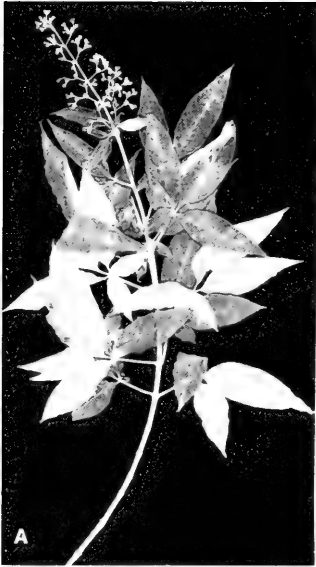
USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Vitex* L. (Verbenaceae) in Australia. J. Adelaide Bot. Gard. 10: 31-79. 1987.

The genus is closely related to *Viticipremna* Lam in the digitately compound leaves, persistent and accrescent calyx, short cylindrical corolla tube, didynamous stamens, style with a short bifid stigma, and 4-celled fruit; but *Vitex* can be distinguished by its 5-lobed corolla and 5-toothed calyx. *Vitex* is also close to *Premna*, but in that genus the corollas are 4-lobed and the leaves are always simple.

1. *Vitex trifolia* L. Sp. Pl. 638 ('938'), as *V. trifoliis*. 1753; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 190. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 260. 1892; Reinecke in Bot. Jahrb. 25: 671. 1898; Rechanger in Denkschr. Akad. Wiss. Wien 85: 338. 1910; Guillaumin in J. Arnold Arb. 13: 28, p. p. 1932; Moldenke in Phytologia 6: 165. 1958; Backer & Bakh. f. Fl. Java 2: 605. 1965; Moldenke, Fifth Summary Verb. 344. 1971, in Phytologia Mem. 2: 333. 1980; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 371. 1986; Munir in J. Adelaide Bot. Gard. 10: 65. 1987.

Small tree or shrub, sometimes decumbent and low, the branchlets somewhat quadrangular, minutely gray-tomentulose; leaves highly variable, 2-, 3-, 4-, or 5-foliolate (occasionally simple, but then also with accompanying compound leaves), petiolate, the leaflets ovate-lanceolate, obovate-spathulate, or oblong-elliptic, sessile or (in var. *trifolia*) the central leaflet(s) petiolulate, the blades often pubescent on both surfaces, becoming nearly glabrous above; inflorescences terminal, gray-tomentulose, the cymes opposite, pedunculate, forming short panicles, the floral leaves becoming reduced to small bracts; flowers sessile to short-pedicellate; calyx cupular, obscurely 2-lipped, 5-toothed to subtruncate, 5-ribbed, grayish-puberulent and white-glandular without, glabrous within, 2-4 mm. long, 1.5-3 mm. broad; corolla 2-lipped, hypocrateriform, pubescent and glandular without, villose within the tube, this nearly twice as long as calyx, the lower lobe about twice as long as tube; stamens inserted on corolla tube, exerted, the filaments 3-6 mm. long, villose toward base; ovary globose, gland-dotted toward apex, glabrous toward base, 2-loculed with 2 ovules in each locule, the style glabrous, exerted, filiform, 5-8 mm. long, briefly bifid at apex; fruit globose, glandular, to 6 mm. in diameter, the fruiting calyx cupular, 4-6 mm. long and broad.

FIGURE 15. A & B, *Vitex trifolia* var. *trifolia*; A, distal portion of branchlet, with foliage and an inflorescence, $\times 1/3$; B, lower surface of leaf, showing upper part of petiole and bases of three leaflets, the terminal one distinctly petiolulate, $\times 2$. C & D, *Vitex trifolia* var. *subtrisecta*; C, distal portion of branchlet, with foliage and inflorescences, $\times 1/3$; D, lower surface of leaf, showing petiole and bases of three leaflets, these sessile and gradually tapering to base, $\times 2$. A from DA 9755, B from DA 16862, C & D from DA 10673.



DISTRIBUTION: Southeastern Asia (from Afghanistan and southern China) to southern Africa and Indian Ocean islands and eastward through Malesia and northern Australia to Polynesia. We consider the species to be represented in Fiji by two varieties. In addition to *Vitex trifolia*, *V. rotundifolia* L. f. (*V. trifolia* var. *simplicifolia* Cham.) has also been reported from Fiji (Moldenke in *Phytologia* Mem. 2: 333. 1980; Munir, 1987, p. 52) and elsewhere in the Pacific; it is the only indigenous species of *Vitex* in Hawaii. However, all Fijian collections so annotated that we have examined for the present study are readily assignable to *V. trifolia* var. *subtrisecta*, in which the leaves are often 1-foliolate, but in which the habit is not prostrate. A collection from Aneityum, New Hebrides (*Kajewski* 690), cited by Guillaumin (1932) as *V. trifolia*, does seem to represent *V. rotundifolia*.

KEY TO VARIETIES

- Leaves 3-5-foliolate, the leaflets (at least the terminal one) distinctly petiolulate, with blades oblong-elliptic to ovate-lanceolate, usually rounded or truncate to an abruptly attenuate base, acute to subacuminate at apex, subglabrous above. 1a. var. *trifolia*
 Leaves mostly 3-foliolate, sometimes also 1- or 2-foliolate, the leaflets sessile, with blades elliptic to oblanceolate, gradually tapering to a narrowly cuneate base, obtuse to subacuminate at apex, usually persistently puberulent on upper surface. 1b. var. *subtrisecta*

1a. *Vitex trifolia* var. *trifolia*; J. W. Parham, Pl. Fiji Isl. 217. 1964; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 87. 1972; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 378. 1983; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 371. 1986; Munir in J. Adelaide Bot. Gard. 10: 66. fig. 8. 1987.

FIGURES 15A & B, 16B.

Vitex bicolor Willd. Enum. Pl. Horti Berol. 660. 1809.

Vitex negundo sensu Benth. in London J. Bot. 2: 227. 1843; non L.

Vitex negundo var. *bicolor* Lam, Verb. Malayan Arch. 191. 1919; Christophersen in Bishop Mus. Bull. 128: 192. 1935; Yuncker in op. cit. 178: 102. 1943.

Vitex trifolia var. *bicolor* Moldenke, Known Geogr. Distr. Verb. 79. 1942, in *Sargentia* 1: 115. 1942; Yuncker in Bishop Mus. Bull. 184: 60. 1945; Moldenke in *Phytologia* 6: 174. 1958; J. W. Parham in Dept. Agr. Fiji Bull. 35: 136. 1959; Yuncker in Bishop Mus. Bull. 220: 232. 1959; Moldenke in *Phytologia* 8: 84. 1961; J. W. Parham, Pl. Fiji Isl. 217. 1964, ed. 2. 302. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 216. 1970; Moldenke, Fifth Summary Verb. 344. 1971; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 87. 1972; Moldenke in *Phytologia* Mem. 2: 333. 1980, in *Phytologia* 51: 345. 1982; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 386. 1983; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 371. 1986.

In Fiji, *Vitex trifolia* var. *trifolia* occurs near sea level, rarely inland to an elevation as high as 250 m., in beach thickets and thickets along rivers, on the edges of mangrove swamps, and along roadsides near the sea, rarely encroaching into forested areas; shrub or often freely branching tree 1.5-10 m. high; corolla, filaments, and style blue to purple; mature fruit blue. Flowers and fruits are to be seen throughout the year.

TYPIFICATION: Linnaeus cited several prior references, but the type of *Vitex trifolia* is considered to be a specimen from India, the collector not known, Herb. Linn. 811/7 (LINN HOLOTYPE) (H. & A. Moldenke, 1983; Munir, 1987). For *V. bicolor*, Willdenow cited "*Habitat in Indiae orientali*"; Munir (1987) cites Herb. Willdenow 11709 (B HOLOTYPE), a cultivated specimen from the Botanical Garden at Berlin.

DISTRIBUTION: Essentially the range of the species. About 45 Fijian collections from 15 islands are available, but the variety is doubtless to be found on any Fijian island that supports a well-developed beach thicket.

LOCAL NAMES AND USES: *Ndrala*, *ndralakaka*, *ndralakuru*, *mamakara*, *molokaka*, *mulokaka*, *mbulokaka*, *volokaka*, *vulokaka*; the leaves are squeezed in the nose or

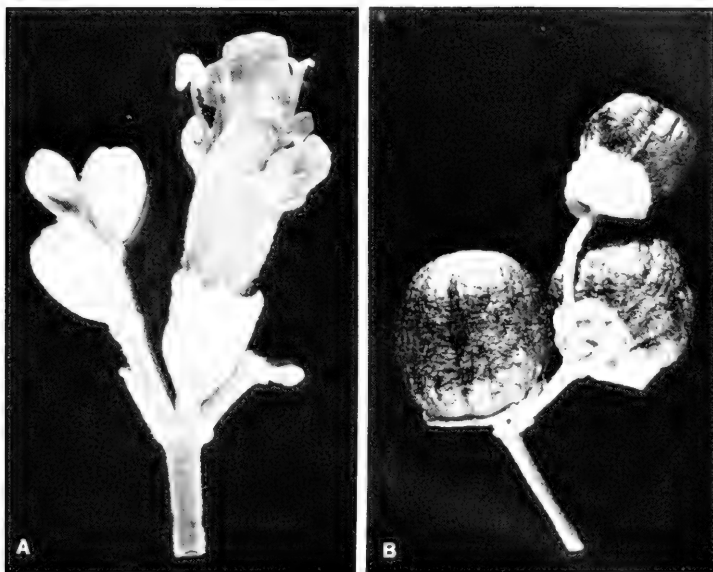


FIGURE 16. A, *Vitex trifolia* var. *subtrisetata*; inflorescence cymule with a mature flower, $\times 6$. B, *Vitex trifolia* var. *trifolia*; mature fruits, $\times 6$. A from Smith 6078, B from Smith 1200.

made into a concoction taken internally for headaches, and an unspecified part of the plant is reputed to be a component of a remedy for bone fractures.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood* 146; Tavua, *DA* 9467. NANDRONGA & NAVOSA: Naveisamasama, *DA* 9755. SERUA: Namboutini, *DF* 971. RA: Ellington, *Parks* 20857. NAITASIRE: Nawanggambena, *DA* 1048. TAILEVU: Wainimbokasi, *DA* 862. REWA: Suva Point, *Toihill* 660. MBENGGGA: Rukua beach, *DA* 6052. KANDAVU: Western end of island, near Cape Washington, *Smith* 314; Namara, *DA* 13855 (*DF* 277). OVALAU: Coast north of Levuka, *Gillespie* 4503. MAKONDRONGA: *Degener & Ordenez* 13815. KORO: West coast, *Smith* 1075. NAIRAI: *Milne* 167. VANUA LEVU: MATHUATA: Nanduri, *DA* 13511; banks of lower Lambasa River, *Smith* 6622. THAKAUNDROVE: Namale, *DA* 16862. TAVEUNI: Vicinity of Waiyevo, *Gillespie* 4687. MOALA: *Milne* 122. MATUKU: *Moseley s. n.* VANUA MBALAVU: Near Ndakuilomaloma, *Garnock-Jones* 1131. THITHIA: *Bryan* 556. LAKEMBA: *Seemann* 354. FULANGA: On limestone, *Smith* 1200.

1b. *Vitex trifolia* var. *subtrisetata* (Kuntze) Moldenke in *Phytologia* 8: 88. 1961, Fifth Summary Verb. 344. 1971, in *Phytologia Mem.* 2: 333. 1980, in *Phytologia* 52: 188. 1982; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 385. 1983; Munir in *J. Adelaide Bot. Gard.* 10: 71. *fig. 9*. 1987. FIGURES 15C & D, 16A.

Vitex agnus-castus var. *subtrisetata* Kuntze, *Rev. Gen. Pl.* 2: 510, 511. 1891.

Vitex rotundifolia var. *heterophylla* Makino, *Ill. Fl. Nipp.* 186. 1940.

Vitex trifolia var. *heterophylla* Moldenke in *Phytologia* 3: 178. 1949, in *op. cit.* 6: 180. 1958; J. W. Parham, *Pl. Fiji Isl.* 217. 1964, ed. 2. 302. 1972.

Vitex trifolia var. *simplicifolia* sensu Moldenke, Fifth Summary Verb. 344. 1971, in *Phytologia* 52: 184, *saltem p. p.* 1971; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 302. 1972; non Cham. (= *V. rotundifolia* L. f.).

Vitex trifolia var. *subtrisecta* is noted in Fiji at elevations from near sea level to about 900 m. in thickets and on open hillsides; it is less frequently coastal in occurrence than var. *trifolia* but sometimes it does occur in beach thickets as well as in lowland cultivated areas; shrub or small tree 1–6 m. high; corolla, filaments, and style pale blue to purple; mature fruit blue. No marked flowering or fruiting seasons have been noted.

TIPIFICATION AND NOMENCLATURE: The type of *Vitex agnus-castus* var. *subtrisecta* is Kuntze 5817 (NY HOLOTYPE), from Willisgebirge, Java, collected Aug. 28, 1875 (for discussion cf. Moldenke in *Phytologia* 6: 172, 190. 1958); that of *V. rotundifolia* var. *heterophylla* is a Japanese specimen seen by neither Moldenke (1982) nor Munir (1987), both of whom agree that it is a synonym of *V. trifolia* var. *subtrisecta*.

DISTRIBUTION: Widespread in Malesia and the Pacific. In Fiji it occurs at substantially higher elevations than var. *trifolia*, although occasionally it is also found near the sea. About 25 Fijian collections from four islands have been examined.

LOCAL NAMES AND USE: *Ndrala*, *ndralakaka*, *ndralayalewa*, *mulokaka*, *vulokaka*. In the Yasawas the leaves are reported to be part of an internal remedy for stomach pains.

REPRESENTATIVE COLLECTIONS: YASAWAS: NAVITI: Kese Village, *Weiner* 252. VITI LEVU: MBA: Lautoka, *DA* 2345; coast near Nandi, *Tothill* 673; northern slopes of Mt. Namendre, east of Mt. Koromba, *Smith* 4559; between Waikumbukumbu and Nandarivatu, *Gillespie* 4380; slopes of escarpment north of Nandarivatu, *Smith* 6078; Nandarivatu, *Parks* 20800. NANDRONGA & NAVOSA: Volivoli, *DA* 10673; Thuvu, *Webster & Hildreth* 14315. RA: Yanggara, *DA* 10748. NAITASIRI: Waindina River Valley, *Weiner* 268. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith* 7088. REWA: Matai beach, Suva, *DA* 1498. WAKAYA: *DA* 11568. VANUA LEVU: MATHUATA: Mt. Uluimbau, south of Lambasa, *Smith* 6610. FIJI without further locality, *U. S. Expl. Exped.* (US 74077).

10. VITICIPREMNA Lam, Verb. Malayan Arch. 162. 1919, in Bull. Jard. Bot. Buitenzorg III. 3: 47. 1921; Munir in J. Adelaide Bot. Gard. 7: 181. 1985.

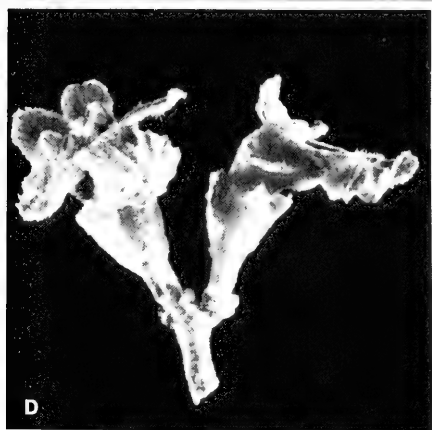
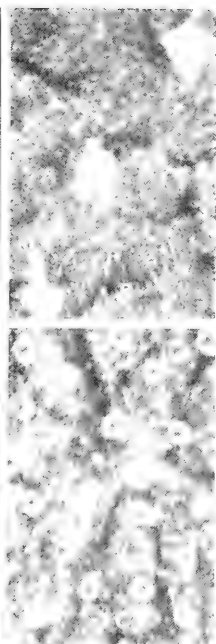
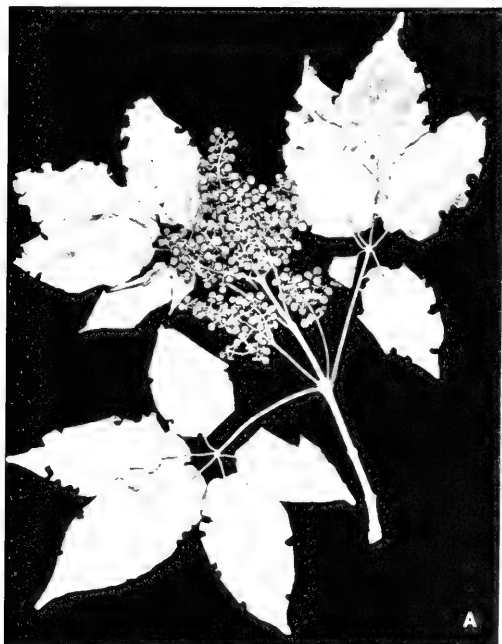
Tall shrubs or trees, the branchlets somewhat quadrangular to terete; leaves decussate, digitately compound, petiolate, the leaflets 3–6 (–7), usually petiolulate, the blades reticulate-veined; inflorescences terminal, cymose and often much branched, pedunculate or branched from base; flowers zygomorphic; calyx cupular to tubular or infundibular, truncate to briefly 4-dentate, accrescent, persistent; corolla tubular, more or less bilabiate, 4-lobed, the upper lip usually entire, the lower lip 3-lobed with the median lobe often the largest, the tube villose within; stamens 4, didynamous, inserted on corolla tube, the filaments glabrous, the anthers dorsifixed, oblong to elliptic, the 2 thecae longitudinally dehiscent; ovary 4-loculed (from 2 carpels), the ovules solitary in each locule and attached at or above the middle of the axile placenta, the style filiform, briefly 2-lobed at apex; fruit globose, drupaceous with a hard, undivided, 4-loculed pyrene.

LECTOTYPE SPECIES: *Viticipremna philippinensis* (Turcz.) Lam (*Premna philippinensis* Turcz.) (vide Munir in J. Adelaide Bot. Gard. 7: 181. 1985).

DISTRIBUTION: Malesia (Philippines, Moluccas, New Guinea, Admiralty and Bismarck Islands) and northern Queensland, with an outlying endemic in Fiji, with five species.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Viticipremna* H. J. Lam (Verbenaceae). J. Adelaide Bot. Gard. 7: 181–200. 1985.

FIGURE 17. *Viticipremna vitilevuensis*; A, distal portion of branchlet, with foliage and an infructescence, $\times 1/3$; B, portion of upper surface of leaflet blade, showing pustular-based trichomes, $\times 70$; C, portion of lower surface of leaflet blade, showing glands, $\times 70$; D, flowers, the left one with 5 corolla lobes and stamens, the right one with 4 corolla lobes and stamens, $\times 6$; E, mature fruits, $\times 6$. A from *DA* 15636, B & C from *Gillespie* 4164.1, D from *O. & I. Degener* 32113, E from *Smith* 4307.



1. *Viticipremna vitilevuensis* Munir in J. Adelaide Bot. Gard. 7: 189. fig. 3. 1985.

FIGURE 17.

Vitex quinata sensu Moldenke in Sargentina 1: 115. 1942; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 302. 1972; non F. Williams.

Vitex quinata var. *puberula* Moldenke in Phytologia 3: 489, p. p. 1951, in op. cit. 6: 103, quoad spec. vit. 1957, in op. cit. 17: 31, quoad spec. vit. 1968, in Phytologia Mem. 2: 333. 1980, in Phytologia 49: 458, quoad spec. vit. 1981; non sensu typi.

Vitex turczaninowii f. *puberula* Moldenke in Phytologia 51: 163, p. p. 1982.

Tree to 20 m. high, found at elevations of 100–900 m. in dense forest and on its edges, in woods along streams, and occasionally in open valleys; branchlets puberulent and covered with minute yellowish glands; leaves 3–5-foliolate, the petioles puberulent and glandular to glabrescent, (3–) 4–10 cm. long, the petiolules puberulent, glandular, 0.5–2.5 cm. long, the leaflet blades narrowly to broadly elliptic to elliptic-lanceolate, (5–) 7–13 (–16) × (2.5–) 4–7 (–8.5) cm., chartaceous, cuneate at base, acuminate at apex, entire at margin, glabrous above except for scattered, white, pustular-based trichomes, glabrous but glandular beneath, the secondary nerves 6–10 on each side of costa; inflorescences puberulent and glandular, 11–30 × 10–15 cm., the peduncles of lateral cymes 2–8 cm. long, the bracts minute, linear; flowers fragrant, the pedicels 1–2 mm. long; calyx cupular to broadly infundibular, truncate to minutely 4-dentate, pubescent and glandular without, distally glabrous within, 1.5–2.5 × 1.5–2.5 mm.; corolla white (and purple-tinged within at throat) or pale purple, pubescent and glandular without, villose in throat with hairs extending onto surface of anterior lobes, the tube subcylindric, scarcely longer than calyx, 2–3 mm. long, 1.5–2.5 mm. in diameter, the lobes broadly elliptic to suborbicular, the anterior lobe the largest, 2–4 × 2.5–3.5 mm.; stamens included, more or less didynamous, inserted about at middle of corolla tube, the filaments villose toward base, the longer pair 1–1.5 mm. long, the anthers elliptic-oblong, about 0.5 mm. long; ovary globose, glabrous, distally glandular, 1–1.5 mm. in diameter, the style included, glabrous, 2.5–3 mm. long; fruit green, becoming purplish black, globose to obovoid, glabrous, 4–6 × 3–5 mm. Flowers have been noted between September and January, fruits between December and May.

TIPIFICATION: The type is *Smith 8881* (L HOLOTYPE; many ISOTYPES), collected Oct. 8, 1953, in hills bordering Wainavindrau Creek, vicinity of Wainimakutu, Namosi Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from Viti Levu, in some parts of which it may be locally frequent.

LOCAL NAMES AND USE: *Mbosawa*, *mbothawa*, *yarokasawa*, *ndrautolu*; locally considered a useful timber tree.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 344, 344A*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4307*; Mt. Nukulevu, *DA 14833*; vicinity of Nandarivatu, *Gillespie 4164.1, Smith 6295*; Nauwanga, south of Nandarivatu, *Degener 14481*; Navai, south of Nandarivatu, *O. & I. Degener 32113*. NANDRONGA & NAVOSA: Nausori Highlands, *DA 15636*; Singatoka (doubtless inland from), *DA 3207*. SERUA: Hills east of Navua River, near Nukusere, *Smith 9119*. NAMOSI: Wainisarava Creek, Wainikoroiuva River, *DA 14585*; vicinity of Namuamua, *Gillespie 2953*. RA: Vicinity of Nasukamai, *Gillespie 4691.8*. NAITASIRI: Wainimala River, *DA 2472*; Nanduna, *DA 5842*.

11. PREMNA L. Mant. Pl. Alt. 154. 1771; Seem. Fl. Vit. 186. 1866; Briquet in Engl. & Prantl. Nat. Pflanzenfam. IV. 3A: 170. 1895; Backer & Bakh. f. Fl. Java 2: 602. 1965; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 308. 1983; Munir in J. Adelaide Bot. Gard. 7: 3. 1984; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 373. 1986. Nom. cons.

Trees, shrubs, or subshrubs, the branchlets obscurely tetragonal; leaves decussate, simple, petiolate or sessile; inflorescences cymose, compound and often much branched, terminal, pedunculate, the bracts small, narrow; flowers small, more or less zygomorphic; calyx tubular or somewhat campanulate, variously toothed to truncate, often somewhat 2-lipped, persistent but not accrescent; corolla more or less 2-lipped, the upper lip usually entire, rarely 2-lobed, the lower lip 3-lobed, the tube usually densely villose in upper half; stamens 4, didynamous, inserted near middle of corolla tube, the filaments short to long, glabrous, the anthers dorsifixed, oblong to elliptic, the thecae parallel or divergent; ovary 4-locular (from 2 carpels), the ovules solitary in each locule, the style filiform, with 2 short lobes; fruit a small, globose drupe with a hard, 4-celled, undivided endocarp.

TYPE SPECIES: *Premna serratifolia* L., typ. cons.

DISTRIBUTION: Paleotropical and subtropical, with about 200 species. We here recognize two species indigenous in Fiji, one a widespread coastal species and the other an inland endemic herewith described.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Premna* L. (Verbenaceae) in Australia. *J. Adelaide Bot. Gard.* 7: 1-43. 1984.

KEY TO SPECIES

- Mature corolla (including lobes) 2.5-4 mm. long, the tube to 2.5 mm. long, the longest lobe to 1.5 mm. long; style to 2.8 mm. long, briefly exerted, usually not exceeding reflexed corolla lobes or stamens; filaments of stamens 1.2-2.4 mm. long, briefly exerted, usually not exceeding corolla lobes; ovary glabrous or sparsely puberulent but not glandular. 1. *P. serratifolia*
- Mature corolla (including lobes) (4-) 5-8.5 mm. long, the tube 3.5-5.5 mm. long, the longest lobe (1-) 2-3 mm. long; style (6-) 7-9 mm. long, well exerted beyond corolla lobes and usually longer than stamens; filaments of stamens 3.4-5.2 mm. long, exerted well beyond corolla; ovary densely or rarely sparsely invested with pale, discoid glands about 0.05 mm. in diameter over distal half, or the glands more generally distributed on ovary, usually persisting in fruit. 2. *P. protrusa*

1. *Premna serratifolia* L. Mant. Pl. Alt. 253. 1771; Munir in *J. Adelaide Bot. Gard.* 7: 13. fig. 2, 3. 1984. FIGURES 18A & B, 19A, 20A.

Cornutia corymbosa Burm. f. *Fl. Ind.* 132. t. 41, fig. 1. 1768.

Premna integrifolia L. Mant. Pl. Alt. 252, nom. illeg. 1771; Benth. in *London J. Bot.* 2: 227. 1843; Guillaumin in *J. Arnold Arb.* 13: 28. 1932.

Premna corymbosa Rottler & Willd. in *Ges. Naturf. Freunde Berlin Neue Schriften* 4: 187. 1803; non (Burm. f.) Merr. (1917); Yuncker in *Bishop Mus. Bull.* 178: 101. 1943.

Premna obtusifolia R. Br. *Prodr. Fl. Nov. Holl.* 512. 1810; Fosberg in *Taxon* 2: 89. 1953; Yuncker in *Bishop Mus. Bull.* 220: 231. 1959; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 214. 1970; Moldenke, *Fifth Summary Verb.* 343. 1971, in *Phytologia Mem.* 2: 333. 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 334. 1983.

Premna gaudichaudii Schauer in *DC. Prodr.* 11: 631. 1847; J. W. Parham, *Pl. Fiji Isl.* 216. 1964, ed. 2. 301. 1972; Moldenke, *Fifth Summary Verb.* 343. 1971.

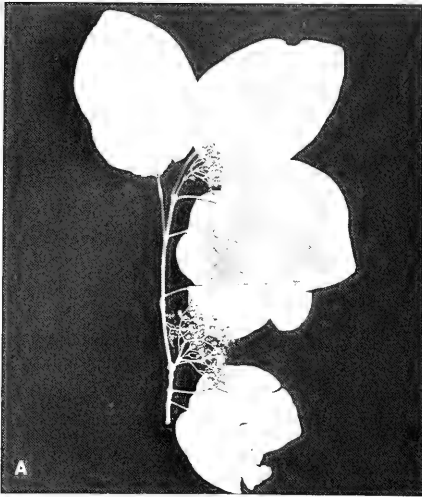
Premna taitensis sensu Seem. in *Bonplandia* 9: 258, as *P. tahitensis*, p. p. 1861, Viti, 440, as *P. tahitensis*, p. p. 1862, Fl. Vit. 186. fig. 43, p. p. 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* 260, as *P. tahitensis*, p. p. 1892; Reinecke in *Bot. Jahrb.* 25: 672. 1898; Rechinger in *Denkschr. Akad. Wiss. Wien* 85: 338. 1910; Christophersen in *Bishop Mus. Bull.* 128: 192. 1935; Yuncker in *op. cit.* 178: 102. 1943, in *op. cit.* 184: 60. 1945; St. John & A. C. Sm. in *Pacific Sci.* 25: 341. 1971; non Schauer.

Premna taitensis var. *rimatarensis* F. Br. in *Bishop Mus. Bull.* 130: 248, as *P. tahitensis* var. *r.* 1935; Moldenke in *Sargentina* 1: 114. 1942; Yuncker in *Bishop Mus. Bull.* 220: 231. 1959; J. W. Parham, *Pl. Fiji Isl.* 216. 1964, ed. 2. 301. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 214. 1970; Moldenke, *Fifth Summary Verb.* 343. 1971, in *Phytologia Mem.* 2: 333. 1980.

Premna taitensis var. *rapensis* F. Br. in *Bishop Mus. Bull.* 130: 248, as *P. tahitensis* var. *r.* 1935; Moldenke, *Fifth Summary Verb.* 343. 1971, in *Phytologia Mem.* 2: 333. 1980.

Premna taitensis var. *taitemensis* sensu B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 14. 1972; non sensu Schauer.

Premna obtusifolia var. *gaudichaudii* Moldenke in *Phytologia* 27: 69. 1973, in *Phytologia Mem.* 2: 333. 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 340. 1983.



In Fiji *Premna serratifolia* is seen at elevations from near sea level and slightly above, only infrequently higher than 200 m., as a common component of beach vegetation; it is abundant in beach thickets, dry lowland forest and woods, along rocky shores, on the edges of mangrove swamps, and in coconut plantations; low shrub or small tree to 10 m. high, the branchlets compressed, 1.5–3 mm. broad toward apex, glabrous to densely puberulent with hairs to 0.2 mm. long; leaves opposite, the petioles slender, 0.5–6 (–8) cm. long, 1–2.5 mm. broad, puberulent to subglabrous, the blades elliptic to oblong-ovate or suborbicular, 2–8 (–15) × 1–6 (–9) cm., cordate to rounded or obtuse at base, rounded, obtuse, emarginate, or rarely acute at apex, usually short-mucronate, entire to rarely serrate at margin, chartaceous, glabrous above, glabrous or occasionally pilose on costa and nerves or in nerve axils beneath, the costa prominulous above, raised beneath, the secondary nerves (2 or) 3–5 per side, prominulous on both surfaces, the tertiary nerves and veinlets usually prominulous on both surfaces; inflorescences terminal or sometimes also axillary, cymose, many-flowered, sparsely to densely puberulent, 3–9 × 3–8 cm., the peduncles to 2 cm. long, the pedicels to 1 mm. long, the bracts paired at each node, subulate to narrowly lanceolate, to 5 mm. long, persistent; calyx cupular, irregularly 4- or 5-lobed, 1.5–2 mm. long at anthesis, not conspicuously enlarging in fruit, sometimes glandular on lobes, the lobes acute to obtuse to rounded, glabrous to minutely puberulent on both surfaces; corolla short-hypocrateriform to subrotate, somewhat bilabiate, with 4 or occasionally 5 lobes, glabrous to puberulent without, densely villose in throat within, the tube to 2.5 mm. long, the longest lobes 1–1.5 mm. long, usually rounded at apex; stamens 4 or rarely 5, attached near middle of corolla tube, didynamous, the filaments glabrous, 1.2–2.4 mm. long, briefly exerted beyond corolla throat, usually not surpassing lobes, the anthers 0.4–0.5 × 0.4–0.6 mm., the thecae opening by short, vertical slits; ovary subglobose to obovoid, about 1 mm. long, minutely puberulent to glabrous, not glandular, the style glabrous, briefly 2-lobed at apex, 1.8–2.8 mm. long, hardly exerted beyond corolla throat; fruit drupaceous, subglobose, glabrous, 2–4 mm. in diameter, possibly becoming rugose-tuberculate with age. Flowers and fruits do not appear seasonal.

TYPIFICATION AND NOMENCLATURE: The complex synonymy of this widespread species has been summarized in detail by Munir (1984); here we merely list and discuss the synonyms that are essential to an understanding of the correct name and those synonyms that have been used in the literature dealing with the Fijian Region. Munir points out that the two simultaneously published Linnaean names, *Premna integrifolia* and *P. serratifolia*, while certainly taxonomic synonyms, are actually based on different types. *Premna integrifolia* is illegitimate because it was directly based on *Cornutia corymbosa* Burm. f., typified by a Hermann specimen from Ceylon, now in the herbarium of the Institut de France, Paris. *Premna serratifolia*, on the other hand, is typified by a different Hermann specimen (LINN HOLOTYPE), also from Ceylon, but with serrate leaf blade margins; *P. serratifolia* is therefore a legitimate name and is the earliest available for the species. The type of *P. corymbosa* Rottler & Willd. is a Rottler specimen from southern India (B-W HOLOTYPE) and is not based on *Cornutia corymbosa*, as some authors have mistakenly assumed. The type of *P. obtusifolia* R. Br. is *Brown s. n.* (BM SYNTYPES) from Prince of Wales Island, Queensland, Australia; that of *P. gaudichaudii* Schauer is *Gaudichaud s. n.* (G-DC HOLOTYPE), from the Marianas Islands. *Premna taitensis* var. *rimatarensis* F. Br. and *P. taitensis* var. *rapensis* F. Br. are based on collections having the same number, *Stokes 41*, but are from different

FIGURE 18. A & B, *Premna serratifolia*; A, distal portion of branchlet, with foliage, an inflorescence, and an infructescence, × 1/4; B, calyx and detached corolla with stamens, the style within the corolla tube and equalling it in length, × 10. C & D, *Premna protrusa*; C, distal portion of branchlet, with an inflorescence, × 1/4; D, flower (one anther fallen), × 10. A from *Smith 26*, B from *Smith 9486*, C & D from *Smith 38*.

localities, the former from Rimatara, Anapoto, Austral Islands (BISH 3707 HOLOTYPE), the latter from Rapa (BISH 3706 HOLOTYPE). These last two taxa are not referable to *P. taitensis*; var. *rimatarensis* is quite representative of the ordinary form of *P. serratifolia*, while var. *rapensis* is merely a small-leaved variant; the leaf form and calyces of both fall well within the extremes figured by Munir (1984, fig. 3). After examining an extensive suite of specimens from Melanesia, Micronesia, and Polynesia, we are in agreement with Munir (1984, pp. 17-20) that the species is a widespread and polymorphic taxon that defies attempts to divide it further.

DISTRIBUTION: *Premna serratifolia* is a lowland species, often of the strand or coastal thickets, occurring from eastern Africa to Ceylon, southeastern Asia, the Ryukyu Islands, Taiwan, Malesia, and tropical Australia eastward throughout the southern Pacific to the Tuamotu Archipelago. From Fiji approximately 50 collections have been examined from 13 islands, including several of the Lau Group, where the following species, *P. protrusa*, has not been found. Specimens of *P. serratifolia* from island groups east of Fiji, including collections previously assigned to *P. taitensis* vars. *rimatarensis* and *rapensis*, fall well within Munir's (1984) concept of the species except that the very mature fruits are often prominently rugose-tuberculate; the most (but perhaps not fully) mature fruits we have seen in Fijian collections are smooth or costate, as described for *P. serratifolia* in Australia. Rugose fruits also characterize the upland Fijian species *P. protrusa* (described below) and *P. taitensis* Schauer, which, in both its typical and pubescent-leaved phase (var. *marchionica* F. Br.) may further be distinguished from *P. serratifolia* in having pronouncedly acuminate leaf blade apices, although leaf blade shape in *P. serratifolia* is highly variable (Munir, 1984, fig. 3).

LOCAL NAMES AND USES: *Yaro, waro, yaro ndina, yaro loa, waro ndamu, araro, tavotavo, rauvula, ngurunguru*; juice of the pounded leaves is said to furnish medicine for stomach ills and is also inhaled to cure headaches, while the bark has been used as part of a remedy for bone fractures.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Below Yalombi and Natawa, *DA 13671*. VITI LEVU: MBA: Shores of Mba River near its mouth, *Smith 4734*. NANDRONGA & NAVOSA: Thuvu, west of Singatoka, *Webster & Hildreth 14309*. SERUA: Vicinity of Ngaloa, *Smith 9486*. RA: Rakiraki, *DA 7935*. NAITASIRI: Waindina River Basin, *MacDaniels 1060*. REWA: Vicinity of Lami, *Gillespie 4580*; Suva Bay, *Bryan 193*. MBENGGGA: Malambi, *Weiner 203*. KANDAVU: Nangingia Island (west of Kandavu), *DA 14958*; western end of island, near Cape Washington, *Smith 317*; Namalata isthmus region, *Smith 26*. OVALAU: Vicinity of Thawathi, *Smith 8093*. VANUA LEVU: MATHUATA: Banks of lower Lambasa River, *Smith 6623*. THAKAUNDOVE: Mbutha Bay, *DA 13419*. MOALA: North coast, *Smith 1388*. YATHATA: In coconut plantation, *DA 13626*. VANUA MBALAVU: Near Lomaloma, *Garnock-Jones 1099*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 764*. KAMBARA: On limestone, *Smith 1295*. FULANGA: On limestone, *Smith 1107*. ONGEA NDRIKI: Islet off northwestern coast, *Bryan 401*. FIJI without further locality, *Seemann 356*.

A predominantly inland relative of *Premna serratifolia* in eastern Polynesia is *P. taitensis* Schauer, with a pubescent-leaved phase var. *marchionica* F. Br. We believe *P. taitensis* to occur only in the Society and Marquesas Islands, but to separate it from *P. serratifolia* is often difficult. There are no obvious floral differences, but in general the leaf blades of *P. taitensis* are sharply acute to acuminate and the mature fruits are rugulose (but rugulose fruits are sometimes noted in *P. serratifolia*, and the value of that character may be questioned). Indument of the lower surfaces of leaf blades, in this general alliance, is highly variable, and the value of var. *marchionica* is doubtful.

On the other hand, inland material of this relationship from Fiji (described below as *Premna protrusa*) has usually long-acuminate leaf blades and much larger flowers with exerted stamens and styles. Probably this Fijian taxon developed in connection with a different pollinator. We consider it very distinct from *P. serratifolia* and certainly a much better marked species than *P. taitensis*. In our observation only *P. serratifolia* represents *Premna* in the island groups between Fiji and the Society Islands.

2. *Premna protrusa* A. C. Sm. & S. Darwin, sp. nov.¹

FIGURES 18C & D, 19B-D, 20B-D.

Premna taitensis sensu Seem. in Bonplandia 9: 258, as *P. taitensis*, p. p. 1861, Viti, 440, as *P. taitensis*. 1862, Fl. Vit. 186. t. 43, p. p. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 260, as *P. taitensis*, p. p. 1892; Gibbs in J. Linn. Soc. Bot. 39: 160. 1909; Turrill in op. cit. 43: 35. 1915; Moldenke, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980; non Schauer.

Premna odorata var. *vitiensis* Yamamoto in J. Soc. Trop. Agric. 6: 554. 1934; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 301. 1972; Moldenke, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980.

Premna taitensis var. *marchionica* sensu Moldenke in Sargentia 1: 114. 1942; J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 301. 1972; Moldenke, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980; non F. Br.

Premna pyramidata var. *vitiensis* Moldenke in Phytologia 8: 163. 1962, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980.

Premna taitensis var. *vitiensis* Moldenke in Phytologia 8: 393. 1962, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980.

Premna taitensis var. *taitensis* sensu J. W. Parham, Pl. Fiji Isl. 216. 1964, ed. 2. 301. 1972; non Schauer.

A compact shrub or more frequently a tree with a spreading crown, 2-12 m. in height and often with a trunk up to 60 cm. in diameter, found from near sea level to an elevation of about 900 m. in open, dense, or secondary forest, in patches of forest in open country, in thickets, rarely in open areas, and infrequently along rocky coasts. The pedicels and calyces are sometimes purplish and often pubescent; the corollas are white or cream-colored to yellowish, with the tube sometimes greenish; the stamens have white or greenish filaments and purple- or pink-tinged anthers; the style is white; and the fruits are blue to deep purple or black. Flowers and fruits have been collected in every month of the year.

¹*Premna protrusa* A. C. Sm. & S. Darwin, sp. nov.

Frutex vel persaepe arbor usque ad 12 m. alta, ramulis compressis vel subquadrangularibus apicem versus 2.5-3.5 mm. diametro subglabris vel pilis ad 0.3 mm. longis dense adpresso-puberulis; foliis oppositis, petiolis gracilibus (1-2 mm. diametro) 2.5-12 cm. longis dense tomentulosus vel subglabris, laminis tenui-vel firmo-chartaceis, ovatis vel ovato-oblongis vel lanceolatis, 7-20 × 3-15 cm., basi cordatis vel rotundatis vel obtusis et saepe obliquis, apice longo-acuminatis raro tantum acutis non mucronatis, margine integris vel raro serratis, supra glabris, subtus glabris vel costa et nervis puberulis vel dense tomentulosus vel aliquantum lamina copiose pubescentibus, costa supra prominula subtus elevata, nervis secundariis utrinsecus 4-7 utrinque prominulis, nervis tertiariis et nervaturis utrinque vulgo prominulis et confertim reticulatis; inflorescentiis terminalibus cymosis 3-15 × 5-17 cm. copiose aut sparsim pubescentibus multifloris, pedunculis ad 6 cm. longis et 3.5 mm. diametro, pedicellis ad 3 mm. longis, bracteis ad nodos binatis subulatis vel anguste lanceolatis 3-12 mm. longis persistentibus; calyce cupulato vel campanulato sub anthesi 1.6-2.7 mm. longo irregulatum 4- vel 5-lobato utrinque puberulo et interdum glanduloso sub fructu persistenti haud accrescenti; corolla hypocrateriformi vel infundibulari (4-) 5-8.5 mm. longa subbilabiata extus glabra vel puberula intus fauce copiose villosa, lobis 4 vel 5 plerumque 2-3 mm. longis et apice rotundatis; staminibus 4 et didynamis vel 5, corollae tubi medio insertis, filamentis gracilibus 3.4-5.2 mm. longis a corolla exertis, antheris 0.5-0.7 mm. longis, thecis divergentibus rimis verticalibus dehiscentibus; ovario subgloboso vel obovoideo plerumque glandulis pallidis discoideis ad 0.05 mm. diametro supra medium induto; stylo glabro filiformi (6-) 7-9 mm. longo apice breviter 2-lobato quam staminibus plerumque longiore et bene exserto; fructu subgloboso vel obovoideo drupaceo 2.5-4 mm. lato distaliter glanduloso vel demum glabro, endocarpio rigido interdum laevi vel plerumque conspicue tuberculato. HOLOTYPE: FIJI: VITI LEVU: SERUA: Smith 8984 (BISH).

TYPIFICATION AND NOMENCLATURE: The type of *Premna protrusa* is herewith indicated as *Smith 8984* (BISH HOLOTYPE; many ISOTYPES), collected Oct. 20, 1953, in hills between the Navua River and Wainiyavu Creek, near Namuamua, Serua Province, Viti Levu. This collection is indicated because there are ten duplicates, the flowers are ample and entirely characteristic, and the leaf blades are approximately average for the specific concept, being long-acuminate at apex and glabrous beneath except for obvious indument on the lower part of the costa of the lower leaf surface and in the axils of the proximal secondaries.

The occurrence of a species of *Premna* in Fiji distinct from *P. serratifolia* (under one name or another) was recognized by Seemann and many subsequent botanists. This species is quite obviously not *P. taitensis* Schauer, and we here propose it as new. Seemann's (1866) *t. 43* excellently portrays *P. protrusa*; Fitch's drawing was based on *Seemann 355* with the exception of the detached branchlet (lower left), which was based on *Seemann 356* and which represents *P. serratifolia*. Seemann (1866, p. 187) was well aware that there were two phases of the inland Fijian species, one essentially glabrous and one with a considerable degree of indument; it is not obvious how he could have taken the very different flowers of his no. 355 (and other cited inland Fijian specimens) as representing *P. taitensis*.

The taxon has been named three times in the recent past at the rank of variety, each time in a different species and by coincidence with the same varietal epithet *vitiensis*. The earliest such trinomial, *Premna odorata* var. *vitiensis* Yamamoto (1934) was very inadequately published, being mentioned in a note appended to a description of *P. odorata* Blanco: . . . "with a variety (var. *vitiensis*) with obliquely cordate leaves in the Fiji Islands." Because of the date (prior to 1 Jan. 1953), this trinomial may charitably be considered as valid. Although no specimen was cited, indirect evidence suggests that Yamamoto's varietal epithet was based on an unpublished trinomial of Asa Gray, which in turn was based on a collection of the U. S. Exploring Expedition from Fiji without further locality (US 73537 HOLOTYPE [or at least "source of the name"]; ISOTYPE at NY). We refrain from basing a new combination at the specific level on Yamamoto's trinomial for obvious reasons: (1) doubt may remain as to its validity, (2) the identity of the type is derived from inferential information, and (3) the indicated type has the leaf blades heavily pubescent beneath and falls into our "pubescent-leaved phase," discussed below, which some future authors may be disposed to separate at some level from the bulk of the material we wish to refer to the taxon.

Premna pyramidata var. *vitiensis* Moldenke is typified by *Gillespie 3400* (UC HOLOTYPE; ISOTYPE at BISH), collected Oct. 20, 1927, in the vicinity of Nasinu, Naitasiri Province, Viti Levu. The type of *P. taitensis* var. *vitiensis* Moldenke is *Smith 7029* (HOLOTYPE said to be in Moldenke Herbarium; many ISOTYPES), collected April 15, 1953, in hills east of the Wainimbuka River, vicinity of Ndakuivuna, Tailevu Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and now known from approximately 100 specimens from ten of the islands, but to be expected on most of the high islands.

LOCAL NAMES AND USES: *Yaro, aro, araro, warowaro, tavu, tavotavo, rauvula, mbombo, nithi*; trunks of the trees are used as posts or pit-props; the macerated leaves provide an oil dressing said to be used on boils.

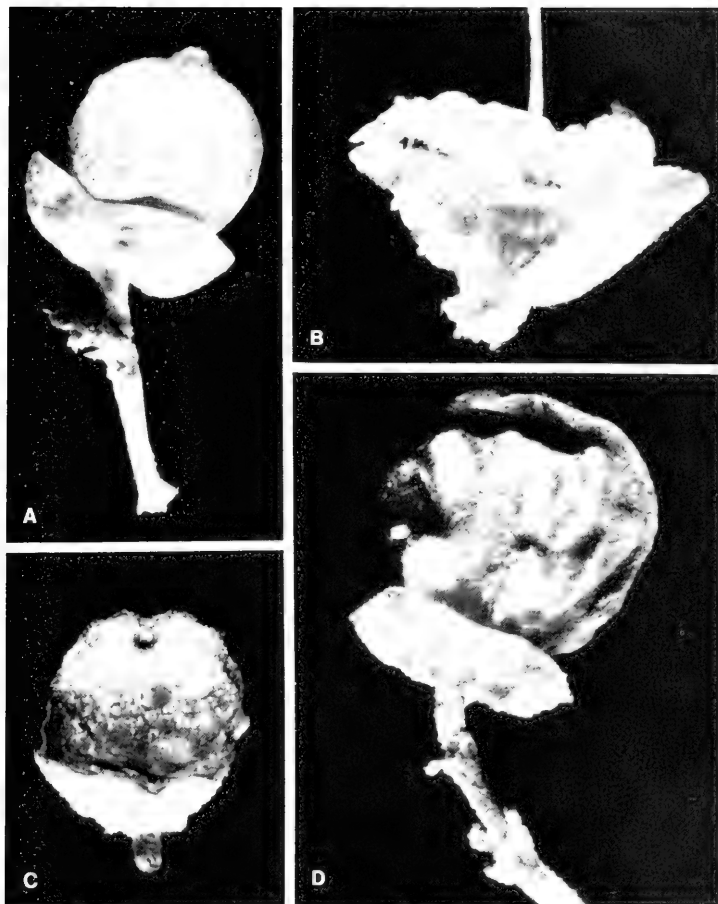


FIGURE 19. A, *Premna serratifolia*; essentially mature fruit, with calyx, $\times 30$. B–D, *Premna protrusa*: B, ovary, showing the distal one-third densely covered with glands, the lower part of style, and the calyx spread open, $\times 30$; C, young fruit, showing glands, with calyx, $\times 30$; D, mature fruit, with calyx, $\times 30$. A from DA 14958, B from Smith 38, C from Gillespie 4669, D from Smith 7029.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Yalombi, DA 13669; Makawa Gulch, west side of Mbatinaremba, St. John 18136. VITI LEVU: MBA: Mountains near Lautoka, Greenwood 910; north of Lomolomo, Degener & Ordonez 13641; slopes of escarpment north of Nandarivatu, Smith 6073; vicinity of Nandarivatu, Degener 14546. NANDRONGA & NAVOSA: Inland from Mbelo, near Vatukarasa, O. & I Degener 32195. SERUA: Hills north of Ngaloa, in drainage of Waininggere Creek, Smith 9173. NAMOSI

Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8766*; Nakavu, on Navua River, *Parks 20366*. NAITASIRE: Waindina River Basin, *MacDaniels 1035*; Nasinu, *DA 11237*. TAILEVU: Waito, *Valentine 31*. VITI LEVU without further locality, *Seemann 355*. KANDAVU: Namalata isthmus region, *Smith 38*. OVALAU: Near Levuka, *Degener & Ordonez 13793*; without further locality, *Milne 252*. KORO: Eastern slope of main ridge, *Smith 940*. NAIRAI: *Milne 171*. VANUA LEVU: MATHUATA: Mt. Numbuloa, east of Lambasa, *DA 14636*. THAKAUNDROVE: Hills south of Nakula Valley, *Smith 342*. TAVEUNI: Vicinity of Waiyevo, *Gillespie 4669*. MOALA: *Milne 120*. MATUKU: *Moseley s. n.*, *Bryan 230*. FIJI without further locality, *U. S. Expl. Exped.* (us 73538).

The pubescent-leaved phase is represented by about ten collections including the putative type specimen of *Premna odorata* var. *vitiensis*, mentioned above. Some representative collections of this phase are:

VITI LEVU: MBA: Vatia Point, *DA 15275*. VANUA LEVU: MBUA: Near bank of Koromba Creek, *DA 15121*. MATHUATA: Near Korovuli, *DA 12881*; Seangangga Plateau, in drainage of Korovuli River, vicinity of Natua, *Smith 6637, 6898*.

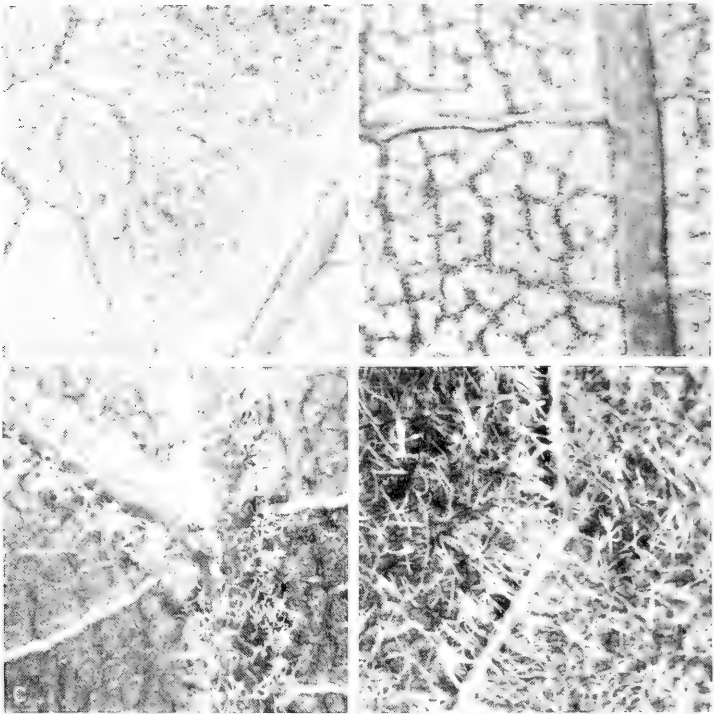


FIGURE 20. Lower leaf blade surfaces of *Premna*, all $\times 20$. A, *Premna serratifolia*. B–D, *Premna prostrata*; B, completely glabrous, except for occasional scattered hairs borne laterally on costa; C, with indumentum on costa and principal nerves, especially in axils toward leaf blade base; D, pubescent phase, the surface copiously pilose. A from *Smith 9486*, B from *Degener 14546*, C from *Smith 342*, D from *Smith 6637*.

The new species is clearly distinct from *Premna serratifolia* L. in having its corollas (both tube and lobes) much larger, in having its style and stamens much longer and very obviously well exerted beyond the corolla lobes, and in having its ovary invested with pale, discoid glands at least in the distal half, the glands usually persisting in fruit. *Premna taitensis* Schauer is not represented in the Fijian Region but apparently is restricted to the Society and Marquesas Islands; it is quite distinct from *P. protrusa* in having the short corollas, styles, and filaments characteristic of *P. serratifolia*, and like that widespread species it lacks glands on the ovary.

It may be noted that both *Premna protrusa* and *P. taitensis* have phases with the leaf blades densely pubescent beneath; in the Fijian species there is a complete gradient from essentially glabrous leaves to pubescent ones, and we believe that to recognize varieties or forms on the basis of the degree of foliar indument would merely increase the confusion that already exists in current identifications of Pacific *Premnae*. Many specimens of *P. serratifolia* also show a degree of indument on the lower leaf blade surfaces.

12. FARADAYA F. v. Muell. *Fragm. Phyt. Austral.* 5: 21. 1865; *Seem. in J. Bot.* 3: 258. 1865, *Fl. Vit.* 188. 1866; Briquet in *Engl. & Prantl, Nat. Pflanzenfam.* IV. 3A: 178. 1895; Moldenke in *Phytologia* 51: 384. 1982; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 402. 1983; Munir in *J. Adelaide Bot. Gard.* 10: 166. 1987.

Clerodendron sect. *Tetrathyranthus* A. Gray in *Proc. Amer. Acad. Arts* 6: 50. 1862.

Trees, shrubs, or climbing vines, glabrous or often puberulent-pubescent; leaves opposite or whorled, usually glabrous and petiolate, the blades chartaceous to coriaceous, often with small basal glands beneath; inflorescences cymose, usually many-flowered and forming terminal, corymbose panicles (sometimes lateral on older branches); flowers usually large and conspicuous, the calyx mostly coriaceous, campanulate or cupular, closed when young but rupturing at anthesis and splitting into 2-5 lobes; corolla usually showy, zygomorphic or (as in our species) nearly regular, narrowly hypocrateriform to infundibular, the limb 4 (or rarely 5)-lobed, the lobes conspicuously imbricate in bud, at length spreading to reflexed, the outermost lobe usually larger than the others; stamens 4 (rarely 5), distinctly didynamous or not, variously inserted in corolla tube, often long-exserted, the filaments often pubescent, especially toward base, the anthers ovate-oblong, the thecae parallel; ovary 4-locular (from 2 carpels), briefly to deeply 4-lobed, the style terminal, filiform, usually glabrous, exerted, briefly and equally 2-lobed at apex; fruit drupaceous, in our species separating into 4 1-seeded mericarps (or by abortion not all mericarps developing), each mericarp narrowly to broadly ellipsoid, often oblique, sometimes conspicuously sulcate on ventral side, glabrous, (3.5-) 4.5-5.5 × 1.8-2.5 cm.

TYPE SPECIES: *Faradaya splendens* F. v. Muell., the only original species. Gray based his sect. *Tetrathyranthus* on *Clerodendron ovalifolium* (*Faradaya ovalifolia* (A. Gray) Seem.), also including in the section *C. amicorum* Seem. (*Faradaya amicorum* (Seem.) Seem.).

DISTRIBUTION: Eastern Malesia and northeastern Australia eastward to Tonga and Samoa, with about 20 species. *Faradaya* is represented in Fiji by five indigenous species (four of them endemic). The species are often deceptively similar in foliage and fruit, but floral characters seem very dependable, although fully mature corollas (with the limb completely expanded) are in some cases needed for positive identification. The corolla tube lengthens perceptibly between the bud stage and full maturity, and therefore immature flowers often do not accurately suggest the shape and length of the

mature corolla tube. Other useful characters, as noted in the following key, refer to the position and branching of the inflorescence and to the indument. Fruiting material in this genus is often difficult to place with certainty.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Faradaya* F. Muell. (Verbenaceae) in Australia. *J. Adelaide Bot. Gard.* **10**: 165-177. 1987.

KEY TO SPECIES

Inflorescences lateral on older branches, subsessile, condensed, never subtended by fully developed leaves, the pedicels 8-30 (-40) mm. long; corolla infundibular, the tube 4-6 mm. broad toward base, gradually expanding upward, (22-) 26-35 mm. long, the lobes subglabrous on both surfaces. 1. *F. vitiensis*

Inflorescences terminal on leafy branchlets or sometimes appearing axillary to distal leaves, never lateral, the pedicels 3-20 mm. long; corolla infundibular or hypocrateriform.

Calyx densely yellowish-puberulent within and without; corolla infundibular, the tube 6-8 mm. broad toward base, expanding toward apex, 12-18 mm. long, densely puberulent without, especially toward apex, the lobes densely puberulent, to 8 × 8 mm.; style to 42 mm. long.

2. *F. ampliflora*

Calyx glabrous to sparsely brown-puberulent; corolla infundibular to hypocrateriform, the tube usually more than 20 mm. long, glabrous to sparsely puberulent without, the lobes often larger than 8 × 8 mm.

Corolla narrowly infundibular, the tube (4-) 5-8 mm. broad toward base, gradually expanding upward, 18-25 (-35) mm. long. 3. *F. lehuntei*

Corolla narrowly hypocrateriform, the tube 3-4 (-6) mm. broad toward base, hardly expanding upward.

Inflorescences conspicuously puberulent, the bracts to 12 × 4 mm., the pedicels 3-10 mm. long; calyx 7-10 (-15) mm. long; corolla tube 40-55 mm. long, the lobes to 10 mm. long and broad, puberulent on both surfaces. 4. *F. ovalifolia*

Inflorescences glabrous, the bracts often enlarged and leaflike, the pedicels 10-20 mm. long; calyx 12-18 mm. long; corolla tube 40-60 mm. long, the lobes to 15 mm. long and nearly as broad, glabrous on both surfaces. 5. *F. glabra*

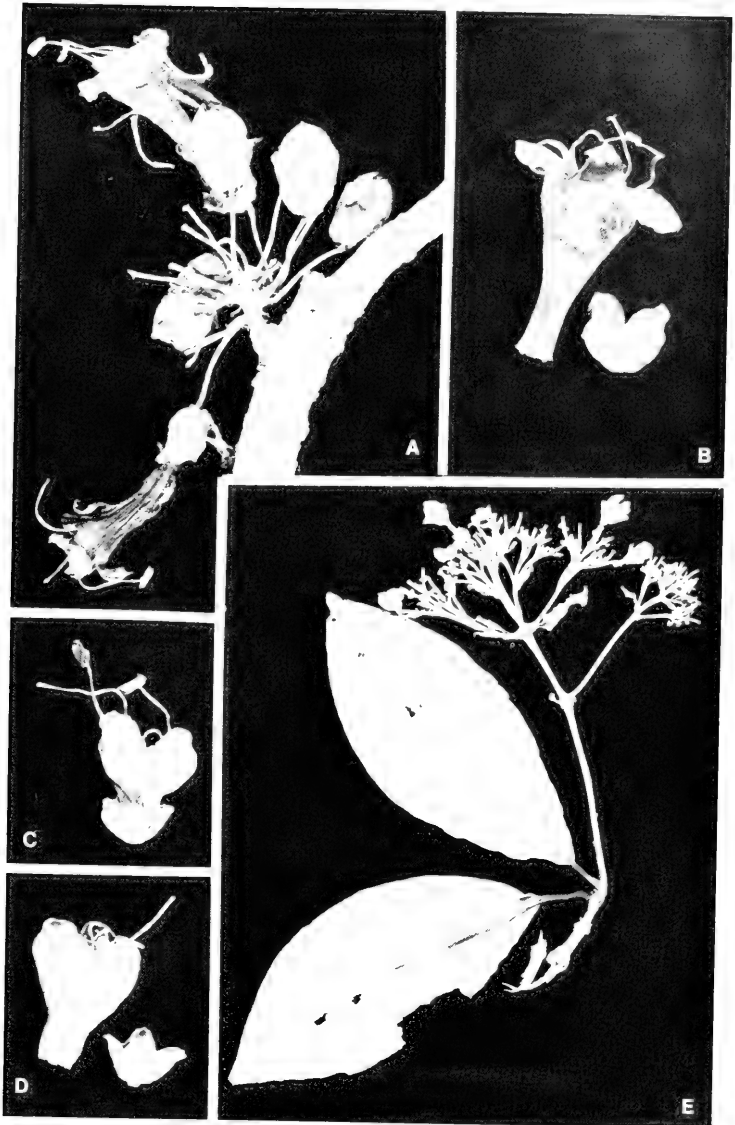
1. *Faradaya vitiensis* Seem. in *J. Bot.* **3**: 258, nom. nud. 1865, *Fl. Vit.* **190. t. 44.** 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* **260.** 1892; Moldenke, *Fifth Summary Verb.* **343.** 1971; J. W. Parham, *Pl. Fiji Isl.* ed. **2.** **299.** 1972; Moldenke in *Phytologia Mem.* **2**: **333.** 1980, in *Phytologia* **52**: **44.** 1982. FIGURE 21A & B.

Faradaya amicorum sensu J. W. Parham, *Pl. Fiji Isl.* **213.** 1964, ed. **2.** **299.** 1972; Moldenke, *Fifth Summary Verb.* **343.** 1971, in *Phytologia Mem.* **2**: **333.** 1980; non Seem.

Faradaya neo-ebudica var. *puberulenta* sensu J. W. Parham, *Pl. Fiji Isl.* **214. fig. 76.** 1964; non Moldenke.

Liana, usually high-climbing, bearing inflorescences on stems (occasionally noted as a "small tree" but probably in error), found from near sea level to about 1,150 m. in dense or thin forest; branchlets compressed to subquadrangular, 2-4 mm. in diameter toward apex; petioles 18-40 mm. long, 2-4 mm. in diameter, the leaf blades elliptic to obovate, 12-24 × (4.5-) 6-15 cm., subcoriaceous, acute at base, briefly acuminate at apex, glabrous on both surfaces, the lateral nerves 6-8 on each side of costa, prominent on both surfaces; inflorescences lateral on older branchlets, subsessile and not subtended by leaves, glabrous to minutely puberulent, to 9 × 12 cm. and with as many as 60 flowers, the bracts minute, the pedicels 8-30 (-40 in fruit) mm. long; calyx pale green (often whitish distally), cupular to somewhat tubular, at length 2-4-lobed, (10-) 14-18 mm. long at anthesis, the limb 10-16 mm. broad, glabrous on both surfaces; corolla white or cream-white, infundibular, gradually expanded from base, the tube (22-) 26-35 mm. long, 4-6 mm. broad toward base, glabrous without, the limb 18-35 mm. broad, the lobes oblong-ovate, 10-16 × 4-12 mm., subglabrous on both surfaces; stamens exerted 10-15 mm. beyond corolla throat, the filaments white, glandular-puberulent, the anthers 3-4 mm. long; style white, exerted, 40-45 (-50) mm. long,

FIGURE 21. A & B, *Faradaya vitiensis*; A, inflorescence, × 1; B, calyx and mature corolla, × 1. C-E, *Faradaya ampliflora*; C, maturing flower, with two protruding stamens and style, × 1; D, calyx and mature corolla, the anthers mostly empty of pollen, the style protruding, × 1; E, distal portion of branchlet, with foliage and an inflorescence, × 1/2. A from *Bryan 612*, B from *Smith 9091*, C & D from *Smith 5505*, E from *DA 13546*.



longer or shorter than stamens, glandular-puberulent, briefly 2-lobed at apex; mericarps orange or red, at length deep red. Flowers and fruits have been noted in scattered months but chiefly between September and January.

TYPIFICATION: The type is *Storck s. n.* (K HOLOTYPE; ISOTYPE at BM), collected on Viti Levu without further locality.

DISTRIBUTION: Endemic to Fiji and thus far known from Viti Levu, Ovalau, and Vanua Levu.

LOCAL NAMES: *Wa vatu, wa korovundi.*

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Koro Levu, vicinity of Nandarivatu, *Gillespie 3738*; hills between Nggaliwana and Tumbendreketi Creeks, east of sawmill at Navai, *Smith 5859*; slopes of Mt. Tomanivi, *DA 14295*. NANDRONGA & NAVOSA: Nausori Highlands, 3 miles east of Nausori, *Webster & Hildreth 14301*. SERUA: Near summit of Mt. Tikituru, *DA 14480*; hills between Navua River and Wainiyavu Creek, near Namuamua, *Smith 9004*; hills east of Navua River, near Nukusere, *Smith 9091*; hills north of Ngaloa, in drainage of Waininggere Creek, *Smith 9199*; vicinity of Ngaloa, *Degener & Ordenez 13619*. NAMOSI: Summit of Mt. Naitarandamu, *Gillespie 3290*; vicinity of Namosi Village, *Gillespie 2596*. NAITASIRI: Central road, *Tothill 497*; vicinity of Nasinu, *Gillespie 3640*. OVALAU: Without further locality, *Bryan 612*. VANUA LEVU: MBUA: Lower Wainunu River Valley, *Smith 1717*. MATHUATA: Mt. Ndelaikoro, *DA 12821*.

2. *Faradaya ampliflora* A. C. Sm. & S. Darwin, sp. nov.¹ FIGURE 21C-E.

Liana, occurring in dense forest between approximately 700 and 1,100 m.; the species is characterized by its densely puberulent inflorescences, calyces, and corollas, the corolla being comparatively short but flaring abruptly from the broad base of its tube.

TYPIFICATION: The type is designated as *Smith 5505* (BISH HOLOTYPE; ISOTYPES at A, K, US), collected Aug. 4, 1947, on the northern part of the Rairaimatuku Plateau between Nandrau and Nanga, Nandronga & Navosa Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from north-central Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *DA 13546*; hills between Nggaliwana and Nandala Creeks, south of Nauwangga, *Smith 5822*.

Moldenke (in *Phytologia* 56: 315. 1984) unaccountably cited the two Smith collections as *Gmelina vitiensis*, although his description of that species (p. 314) is evidently taken from Seemann's original description and illustration of *Vitex vitiensis*; in the present treatment *Gmelina vitiensis* (q. v.) is noted as a frequent endemic tree, bearing little resemblance to species of *Faradaya*.

¹*Faradaya ampliflora* A. C. Sm. & S. Darwin, sp. nov.

Liana, ramulis compressis vel subteretibus apicem versus 2.5-4 mm. diametro; foliis interdum suboppositis, petiolis 12-25 mm. longis comparate validis 2-3 mm. latis, laminis ovatis vel ellipticis 9-15 × 4.5-9.5 cm. basi obtusis aliquando obliquis apice acutis vel acuminatis supra glabris subtus glabris vel basim versus puberulis, nervis lateralibus utroque 6-8 untrinsecus prominulis, venulis reticulatis; inflorescentiis terminalibus corymbosis ad 11 × 15 cm. dense puberulis, bracteis ad 10 × 4 mm. lanceolatis vel anguste ellipticis, pedicellis ad 8 mm. longis; calyce alabastro glabro minute 4-dentato demum rumpenti irregulatum 4- vel 5-lobato cyathiformi ad 10 mm. longo, limbo ad 15 mm. lato utrinque copiose luteo-puberulo; corolla infundibuliformi 18-25 mm. longa extus praesertim apicem versus copiose puberula intus parce puberula, tubo 12-18 mm. longo basim versus 6-8 mm. lato, lobis ovatis 6-8 × 6-8 mm. apice rotundatis; staminibus corollae tubi prope medium affixis exsertis, filamentis 16-20 mm. longis glabris vel basim versus inconspicue glandulosis, antheris dorsifixis ad 4.5 mm. longis; ovario ovoideo sub anthesi ad 2 mm. longo subglabro apice 4-lobato, stylo terminali ad 42 mm. longo apice breviter 2-lobato; fructu deest. HOLOTYPE: FIJI: VITI LEVU: NANDRONGA & NAVOSA: *Smith 5505* (BISH).

3. *Faradaya lehuntei* (Horne ex Baker) A. C. Sm. in *Allertonia* 1: 412. 1978; Moldenke in *Phytologia Mem.* 2: 333. 1980, in *Phytologia* 51: 399. 1982, in op. cit. 52: 20. 1982. FIGURE 22A.

Clerodendron le huntei Horne, *A Year in Fiji*, 259, nom. nud. 1881.

Clerodendrum lehuntei Horne ex Baker in *J. Linn. Soc. Bot.* 20: 369, as *Clerodendron l.* 1883; J. W. Parham, *Pl. Fiji Isl.* 213. 1964, ed. 2. 298. 1972; Moldenke, *Fifth Summary Verb.* 343, as *C. lehuntii*. 1971.

Clerodendrum amicorum sensu Gibbs in *J. Linn. Soc. Bot.* 39: 160, p. p. 1909.

Faradaya neo-ebudica Guillaumin in *J. Arnold Arb.* 13: 28. 1932; Moldenke, *Fifth Summary Verb.* 341, 343. 1971, in *Phytologia Mem.* 2: 333. 1980.

Faradaya vitiensis var. *puberulenta* Moldenke in *Phytologia* 3: 60. 1949.

Faradaya neo-ebudica var. *puberulenta* Moldenke in *Phytologia* 4: 52. 1952; J. W. Parham, *Pl. Fiji Isl.* 213, excl. fig. 76. 1964; Moldenke, *Fifth Summary Verb.* 343. 1971, in *Phytologia Mem.* 2: 333. 1980.

Faradaya neo-ebudica var. *neo-ebudica*: J. W. Parham, *Pl. Fiji Isl.* 213. 1964, ed. 2. 299. 1972.

Faradaya lehuntei is seen in Fiji as a high-climbing liana or a scandent shrub at elevations of 100–970 m. in dense forest or in the dense thickets of crests and ridges; branchlets terete to compressed, about 3 mm. in diameter toward apex, brown-puberulent to glabrous; petioles slender to stout, 10–40 mm. long, 1.5–2 mm. in diameter, the leaf blades broadly ovate to suborbicular or obovate, (6–) 8–17 (–25) × (2–) 5–12 (–19) cm., acute to obtuse at base, bluntly acuminate to rounded at apex, thin-coriaceous, glabrous on both surfaces, the secondary nerves 4–7 per side, prominulous on both surfaces; inflorescences terminal, sparsely puberulent, 5–15 × 8–12 cm. at anthesis, the bracts usually narrow and about 10 mm. long but sometimes foliaceous and much larger, the pedicels 5–15 mm. long, the flowers fragrant; calyx cupular, irregularly 2–4-lobed (usually 4-toothed in bud), 6–12 mm. long, the limb 10–13 mm. broad, glabrous throughout or sparsely puberulent on lobes, the tube sometimes glandular; corolla white, narrowly infundibular, the tube glabrous to sparsely puberulent without, 18–25 (–35) mm. long, (4–) 5–8 mm. broad toward base, the limb to 24 mm. broad, the lobes sparsely puberulent on both surfaces, 7–10 × 5–8 mm.; stamens attached near middle of corolla tube, briefly exserted, the filaments white, the anthers about 3 mm. long; ovary somewhat 4-lobed, the style white, exserted but usually shorter than stamens, somewhat glandular-puberulent, 2-lobed at apex; mericarps green, becoming orange at maturity. Flowers and fruits were mostly obtained between March and October.

TYPEFICTION AND NOMENCLATURE: The type is *Horne 1002* (K HOLOTYPE), collected in August, 1878, near Waindrandra, east of Nandrau, Nandronga & Navosa Province (or possibly Naitasiri Province), Viti Levu. The type of *Faradaya neo-ebudica* is *Kajewski 813* (A HOLOTYPE; ISOTYPES at BISH, K, US), collected Feb. 23, 1929 (label data), at Anelgauhau Bay, Aneityum, New Hebrides. *Faradaya vitiensis* var. *puberulenta* (the epithet later transferred to *F. neo-ebudica*) is based on *Smith 5799* (NY HOLOTYPE; ISOTYPES at BISH, K, US), obtained Aug. 21, 1947, on the northern portion of the Rairaimatuku Plateau between Mt. Tomanivi and Nasonggo, Naitasiri Province, Viti Levu.

DISTRIBUTION: New Hebrides, Fiji, and Tonga, but frequent only in Fiji, where it is now known from seven islands.

LOCAL NAMES: *Wa vatu*, *wa korovundi*, *ngakawa*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Koromba, *Horne*, Aug., 1878; west of Nandarivatu, *Webster & Hildreth 14267*; vicinity of Nandarivatu, *Gibbs 576*, *DA 8518*; Mt. Tomanivi, *DA 12735* (*Melville et al.* 7125). NAMOSI: Slopes of Mt. Voma, *Gillespie 2670*. NAITASIRI: Tamavua Ridge, *Vaughan 3179*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7032*. REWA: Vicinity of Suva (doubtless inland from), *Horne s. n.*, *Tohill 658A*. VITI LEVU without further locality, *Parks 20386*. KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith 81*. OVALAU: Summit of Mt.

Ndelaiovalau and adjacent ridge, *Smith 7388*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7764*. VANUA LEVU: MBUA: Southern portion of Seatovo Range, *Smith 1570*. MATHUATA: Wainunu-Ndreketi divide, *Smith 1845*. TAVEUNI: Hills east of Somosomo, west of old crater occupied by small swamp and lake, *Smith 8385*. MOALA: Summit ridge, *Bryan 341*.

4. *Faradaya ovalifolia* (A. Gray) Seem. in *J. Bot.* 3: 258. 1865, *Fl. Vit.* 189. 1866; Gillespie in *Bishop Mus. Bull.* 83: 29. *fig. 37*. 1931; Moldenke, *Fifth Summary Verb.* 343. 1971; A. C. Sm. in *Allertonia* 1: 413. 1978; Moldenke in *Phytologia Mem.* 2: 333. 1980, in *Phytologia* 52: 24. 1982. FIGURE 22B & C.

Clerodendron ovalifolium A. Gray in *Proc. Amer. Acad. Arts & Sci.* 6: 50. 1862; Drake, *Ill. Fl. Ins. Mar. Pac.* 261. 1892.

Clerodendron arthurgordonii Horne, *A Year in Fiji*, 259, nom. nud. 1881.

Clerodendron gordonii Baker in *J. Linn. Soc. Bot.* 20: 370, as *Clerodendron gordonii*. 1883; J. W. Parham, *Pl. Fiji Isl.* 213. 1964, ed. 2. 298. 1972; Moldenke, *Fifth Summary Verb.* 343. 1971.

Clerodendron amicorum sensu Gibbs in *J. Linn. Soc. Bot.* 39: 160, p. p. 1909; non Seem.

Faradaya ovalifolia var. *ovalifolia*; J. W. Parham, *Pl. Fiji Isl.* 213. 1964, ed. 2. 299. 1972.

High-climbing liana or scrambling shrub, occurring at elevations from near sea level to about 1,150 m. in dense or open forest; branchlets subterete, 3–4 mm. in diameter toward apex, puberulent to glabrescent; petioles 12–30 mm. long, usually stout, 2–3 mm. in diameter, the leaf blades narrowly elliptic to obovate, (5–) 9–22 × 5–11 cm., stiff-chartaceous, glabrous on both surfaces, acute to obtuse at base, bluntly acuminate at apex, the lateral nerves 5–8 per side, prominulous on both surfaces, the veinlets reticulate; inflorescences terminal, puberulent, 20 (or more)-flowered, to 15 cm. long, the bracts elliptic-lanceolate, 5–12 × 2–4 mm., the pedicels 3–10 mm. long at anthesis, the flowers sometimes fragrant; calyx cupular to cyathiform, 7–10 (–15) mm. long, irregularly 3- or 4-lobed, the limb 8–18 mm. broad, glabrous or very sparsely puberulent on both surfaces, the lobes acute to obtuse and apiculate at apex; corolla white, narrowly hypocrateriform, the tube 40–55 mm. long, to 3 mm. broad toward base, hardly expanded toward apex, glabrous without, minutely puberulent within, the lobes 7–10 × 6–10 mm., rounded at apex, puberulent on both surfaces; stamens exserted, the filaments white, to 40 mm. long, inserted 10–20 mm. below corolla throat, glandular-puberulent toward base, the anthers 2–3 mm. long; ovary 4-lobed, glabrous, the style white, exserted, 5–10 mm. longer than corolla throat, briefly 2-lobed at apex; mericarps red to yellow, becoming black at maturity. Flowers and fruits have been collected throughout the year.

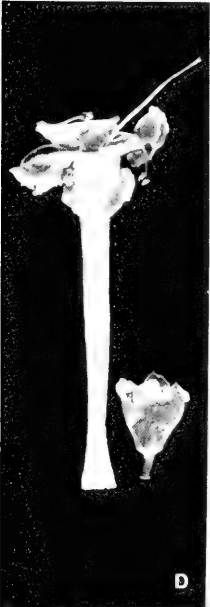
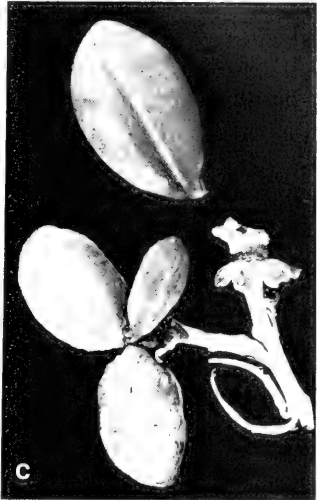
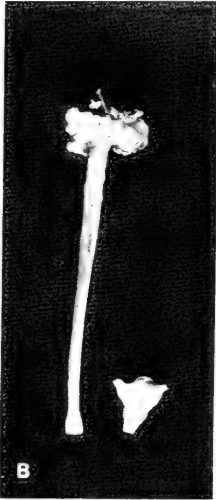
TIPIFYICATION AND NOMENCLATURE: The type of Gray's species is *U. S. Expl. Exped.* (US 75176 HOLOTYPE; ISOTYPE at GH; photo of ISOTYPE at BISH), collected in 1840 in Fiji without further locality. *Clerodendrum gordonii* is typified by *Horne s. n.* (K HOLOTYPE), indicated merely as "not uncommon in many parts of Viti Levu." These names were referred to the same taxon by Smith in 1978, but also included was *Faradaya ovalifolia* var. *glabra*, which we now refer to the following species in the present treatment.

DISTRIBUTION: Endemic to Fiji and now known from approximately 60 collections from four islands.

LOCAL NAMES: *Wa korovundi, wa vundi, wa masi, karavau.*

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Nairova, eastern flank of Mt. Evans Range, *Smith 4077*; upper slopes of Mt. Koromba, *Smith 4636*; Mt. Nukulevu, *DA 14823*; vicinity of Nandarivatu, *Gibbs 559, 872, Gillespie 3166*; western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 4752*; Mt. Tomanivi, *DA 12737 (Melville et al. 7129)*. NAMOSI: Vicinity of Namosi, *Gillespie 2616*; vicinity of Namuamua, *Gillespie 2979*; Wainandoi River, *DA 10806*. RA: Mataimeravula, vicinity of

FIGURE 22. A, *Faradaya lehuntei*; mature flower, one anther fallen, × 1. B & C, *Faradaya ovalifolia*; B, calyx and mature corolla, × 1; C, fruits, one mericarp detached, × 1. D & E, *Faradaya glabra*; D, calyx and mature corolla, × 1; E, distal portion of branchlet, with foliage and mature inflorescences (many corollas fallen), × 1/2. A from *Smith 1570*, B from *MacDaniels 1052*, C from *Smith 7523*, D from *Gillespie 3513*, E from *DA 18156*.



Rewasa, near Vaileka, *Degener 15333*. NAITASIRI: Matanavo, head of Wainisavulevu Creek, *St. John 18308*; Waindina River Basin, *MacDaniels 1052*; vicinity of Tamavua, *Gillespie 2182*. REWA: West of Suva Harbor, *Parks 20036*. OVALAU: Hills west of Lovoni Valley, on ridge south of Mt. Korolevu, *Smith 7523*; valley above Levuka reservoir, *Gillespie 4530*. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA 11497*; mountains near Lambasa, *Greenwood 462A*. MATUKU: *Bryan 284*.

Although *Faradaya ovalifolia* and *F. lehuntei* are readily distinguished by their strikingly different corollas, they are separated with difficulty if corollas are absent. In general, *F. ovalifolia* has proportionately narrower leaf blades, but to identify fruiting or sterile material of these two taxa is unsatisfactory.

5. *Faradaya glabra* (Moldenke) A. C. Sm. & S. Darwin, comb. et stat. nov.

FIGURE 22D & E.

Faradaya ovalifolia var. *glabra* Moldenke in *Phytologia* 4: 53. 1952; J. W. Parham, Pl. Fiji Isl. 213. 1964, ed. 2. 299. 1972; Moldenke, Fifth Summary Verb. 343. 1971, in *Phytologia Mem.* 2: 333. 1980, in *Phytologia* 52: 26. 1982.

Faradaya neo-ebudica var. *degeneri* Moldenke in *Phytologia* 4: 53. 1952; J. W. Parham, Pl. Fiji Isl. 213. 1964, ed. 2. 299. 1972; Moldenke, Fifth Summary Verb. 343. 1971, in *Phytologia Mem.* 2: 333. 1980.

Faradaya lehuntei var. *degeneri* Moldenke in *Phytologia* 52: 21. 1982, in op. cit. 52: 125. 1982.

High-climbing liana, infrequent in dense forest at elevations from near sea level to 1,090 m.; branchlets compressed to subterete, 4–5 mm. in diameter toward apex, glabrous; petioles 10–25 mm. long, 1.5–3 mm. in diameter, the leaf blades narrowly elliptic to oblong-elliptic, 8–18 × 4–6.5 cm., glabrous on both surfaces, obtuse at base, bluntly acute at apex, the lateral nerves 5–7 per side, prominulous on both surfaces; inflorescences terminal, glabrous, to 18 × 24 cm., the bracts often enlarged and foliaceous, the inflorescence branches then appearing axillary, the pedicels slender, 10–20 mm. long; calyx cupular to campanulate, irregularly 2–4-lobed, 12–18 mm. long, the limb 10–20 mm. broad, glabrous without and within; corolla narrowly hypocrateriform, the tube 40–60 mm. long, 3–4 (–6) mm. broad toward base, hardly expanded toward apex, glabrous within and without, the limb to 35 mm. broad, the lobes oblong-obovate, 10–15 × 8–13 mm., glabrous on both surfaces; stamens exserted, the filaments glabrous, 10–15 mm. longer than corolla tube, the anthers about 3 mm. long; style slender, glabrous, exserted, 50–85 mm. long, briefly 2-lobed at apex; mature fruit not seen; immature fruit yellow to orange. Flowers have been observed between October and December, immature fruits only in December.

TIPIFICATION AND NOMENCLATURE: The type of *Faradaya ovalifolia* var. *glabra* is *Gillespie 3513* (NY HOLOTYPE; ISOTYPES at BISH, K, US), collected Oct. 24, 1927, in the vicinity of Nasinu, Naitasiri Province, Viti Levu; that of *F. neo-ebudica* var. *degeneri* (later transferred to *F. lehuntei*) is *Degener & Ordenez 13762* (NY HOLOTYPE; ISOTYPES at A, NY), obtained Dec. 15, 1940, near the Suva Pumping Station, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from Viti Levu, where it is known from four collections made in the southeastern part of the island at fairly low elevations (near sea level to 400 m.) and a single collection from the isolated Mt. Evans Range at a much higher elevation (1,090 m.).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 966*. REWA: Veisari, *DA 10993*; Mt. Korombamba, *DA 18156*.

The present taxon, which certainly merits specific rank, is very readily distinguished from its only close congener, *Faradaya ovalifolia*, by its completely glabrous habit, large calyx, and sometimes even longer corolla with larger lobes. The two types cited above, from proximate localities, seem identical, but in that of *F. neo-ebudica* var. *degeneri* the flowers are less mature, the corolla limb not fully expanded and the tube in this condition shorter.

13. *Gmelina* L. Sp. Pl. 626. 1753; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 173. 1895; A. C. Sm. in J. Arnold Arb. 36: 287. 1955; Backer & Bakh. f. Fl. Java 2: 606. 1965; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 388. 1983; Moldenke in Phytologia 55: 308. 1984; Munir in J. Adelaide Bot. Gard. 7: 92. 1984; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 373. 1986.

Trees or shrubs, the branchlets subcylindric, glabrous or pubescent; leaves decussate, petiolate or sessile, simple, the blades mostly entire, often with a few sunken nectariferous glands near or at base; inflorescences terminal, cymose, compound, much branched; calyx campanulate to somewhat tubular, 4- or 5-toothed to sinuate or truncate, usually with large glands on the exterior, persistent; corolla zygomorphic, obliquely campanulate to infundibular, the upper lip 2-lobed, the lower lip 3-lobed, the tube narrow at base, much dilated upward; stamens 4, distinctly didynamous, included or slightly exerted, inserted in lower part of corolla tube, the filaments often glanduliferous, decurved, the anthers dorsifixed, oblong, the thecae longitudinally dehiscent; ovary 4-locular (from 2 carpels), the ovules solitary in each locule, the style filiform, slightly exerted, the 2 stigmatic lobes unequal; fruit a succulent drupe, the endocarp hard, undivided, (2-)4-celled, the seeds without endosperm.

TYPE SPECIES: *Gmelina asiatica* L., the only original species.

DISTRIBUTION: Africa and southeastern Asia (from Pakistan and southern China) through Malasia to Micronesia, Australia, New Caledonia, and the Solomon Islands, with a disjunct endemic in Fiji, and with about 35 species. A second species is cultivated in Fiji.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Gmelina* L. (Verbenaceae) in Australia. J. Adelaide Bot. Gard. 7: 91-116. 1984.

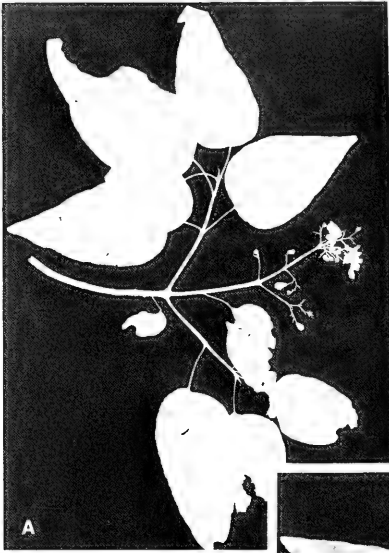
KEY TO SPECIES

- Inflorescences and young parts yellowish-tomentose; petioles 5-15 cm. long; leaf blades long-acuminate at apex, the lower surfaces persistently tomentellous with stellate hairs; corolla 25-40 mm. long; fruit 20-25 mm. long; cultivated. 1. *G. arborea*
 Inflorescences and young parts brown-puberulent to glabrous; petioles 1.5-4 cm. long; leaf blades bluntly acute at apex, the lower surfaces densely and minutely granular-squamellate; corolla to 18 mm. long; fruit about 10 mm. long; indigenous. 2. *G. vitiensis*

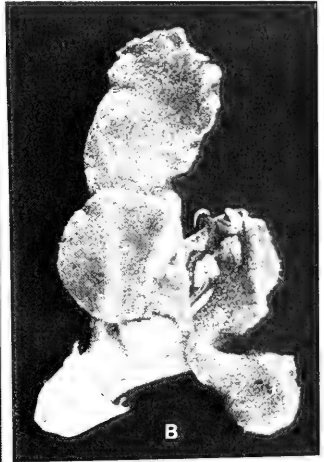
1. *Gmelina arborea* Roxb. ex Sm. in Rees, Cycl. 16. 1810; Roxb. Hort. Beng. 46. 1814, Pl. Coromandel 3: 41. pl. 246. 1815, Fl. Ind. ed. 2. 3: 84. 1832; Bakh. in Bull. Jard. Bot. Buitenzorg III. 3: 68. 1921; J. W. Parham in Agr. J. Dept. Agr. Fiji 29: 32. 1959, Pl. Fiji Isl. 213. 1964, ed. 2. 299. 1972; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 390. 1983; Moldenke in Phytologia 55: 337. 1984.

Large, rapidly growing tree, the branchlets yellowish-tomentose; leaves petiolate, the petioles 5-15 cm. long, puberulent to glabrous, the leaf blades broadly ovate, 10-25 × 7.5-18 cm., cordate or truncate at base, long-acuminate at apex, entire at margin (but sometimes toothed or lobed on young plants), tomentose or at length glabrous above, densely and persistently tomentellous beneath with stellate hairs, glanduliferous just above petiole, the lateral nerves 5-10 per side; inflorescences fulvous-tomentose throughout, the bracts linear to linear-lanceolate; calyx broadly campanulate, about 5 mm. long, 5-toothed; corolla showy, yellow to reddish or brownish, 25-40 mm. long, the tube densely pubescent without; stamens 4, exerted, one pair sometimes sterile; drupes ovoid to obovoid-pyriform, 20-25 mm. long, orange-yellow when mature, aromatic, the endocarp usually 2-celled and 2-seeded (or by abortion 1-seeded), or sometimes 3-celled and 3-seeded.

TYPIFICATION: The type is a plant from India; "Sent from the coast of Coromandel by the Rev. Dr. Rottler, with the above name of Dr. Roxburgh." (Smith, 1810).



A



B



C



D

DISTRIBUTION: Southeastern Asia (from Pakistan and southern China) and into Malasia, now widely introduced and cultivated elsewhere. Although no Fijian specimens are available, the species has been recorded as growing in the Suva Botanical Gardens (Parham, 1959) and is said to be moderately common elsewhere in Fiji, doubtless having been introduced as a potential timber tree.

LOCAL NAME AND USE: The name used in Fiji is *yemane*; the species in various parts of the world is used for lumber and paper-pulp, and it is also grown for ornament and as a shade tree.

2. *Gmelina vitiensis* (Seem.) A. C. Sm. in *Allertonia* 1: 414. 1978; Moldenke in *Phytologia Mem.* 2: 333. 1980, in *Phytologia* 56: 313, excl. spec. cit. 1984; Munir in *J. Adelaide Bot. Gard.* 7: 110, pro syn. 1984. FIGURE 23.

Gmelina vitiensis Seem. Viti, 440, nom. nud. 1862; Moldenke, *Known Geogr. Distr. Verb.* 69, nom. nud. 1942, *Alphabet. List Verb.* 56, nom. nud. 1942; A. C. Sm. in *J. Arnold Arb.* 36: 287, nom. nud. 1955; J. W. Parham, *Pl. Fiji Isl.* 214, fig. 77, nom. illeg. 1964, ed. 2. 300, fig. 90, nom. illeg. 1972; Moldenke, *Fifth Summary Verb.* 343, nom. nud. 1971.

Vitex vitiensis Seem. *Fl. Vit.* 190, t. 45. 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* 260. 1892; Munir in *J. Adelaide Bot. Gard.* 7: 110, pro syn. 1984.

Tree to 27 m. high, occurring in dense forest at elevations of 90–900 m., the trunk to 75 cm. in diameter, the branchlets slender, 2–3 mm. in diameter, brown-puberulent to glabrate; leaves petiolate, the petioles slender, 1.5–4 cm. long, adaxially puberulent, the blades ovate to lanceolate, 7–15 × (2.5–) 4–10 cm., bluntly acute at apex, truncate to broadly rounded and often somewhat oblique at base, entire at margin, glabrous above, minutely and densely granular-squamellate beneath and occasionally invested with open, circular to elongate glands (nectaries?) to 0.5 mm. long toward base, the lateral nerves 7–10 on each side of costa, spreading; inflorescences paniculate, up to about 60-flowered (but many flowers early caducous), 5–12 × 3–10 cm., the peduncle to 4 cm. long, sometimes essentially lacking, scattered-puberulent to glabrous; bracts lacking; pedicels 1–3 mm. long; calyx cupular to campanulate, 2.5–4 mm. long, subglabrous to densely granular-squamellate without, occasionally also with circular glands to 0.3 mm. in diameter scattered over tube, the limb 5-toothed, the teeth broad, obtuse, 0.5–1 mm. long; corolla blue, infundibular, to 18 mm. long, the tube 5–8 mm. long, about 2.5 mm. broad at middle, densely brown-pubescent without, glabrous within, the limb unequally 5-lobed, pubescent, the lobes oblong-obovate, the largest (lowermost) lobe 5–8 × 3–6 mm., the other lobes 4–5 × 3–6 mm.; stamens 4, didynamous, briefly exserted, the filaments distally glabrous, glandular and puberulent toward base, the anthers up to 1 mm. long, affixed near apex, the thecae divergent, pendent; style exserted, distally spreading-pubescent, very unequally and acutely 2-lobed at apex; fruit drupaceous, purple or mauve, shiny, thinly fleshy, globose to broadly ovoid, up to 10 × 13 mm., subtended by the persistent calyx, this 7–8 mm. in diameter and frequently irregularly ruptured into 2–4 lobes, the endocarp thick, bony. Flowers and fruits have been obtained in most months of the year.

TIPIFICATION: The type is *Milne 224* (K HOLOTYPE, 2 sheets), collected in October, 1855, on “high ground” on the island of Ngau.

DISTRIBUTION: Endemic to Fiji and now known from four of the high islands (Viti Levu, Kandavu, Ngau, and Vanua Levu), represented by 23 known collections, all of which are here cited.

LOCAL NAME AND USE: The name *rosawa* seems well established for this species, which is known as a timber tree supplying good furniture wood.

FIGURE 23. *Gmelina vitiensis*; A, distal portion of branchlet, with foliage and an inflorescence, × 1/4; B, flower, one anther concealed, × 4; C, mature fruit, the distal surface with an obscure styler scar (s), the proximal surface with a persistent calyx, × 4; D, distal portion of branchlet, with foliage and an infructescence, × 1/2. A & B from *DF 366*, C & D from *DA 17354*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mbukuya, *DA 17378*. NANDRONGA & NAVOSA: Nausori Highlands, *DF 1104 (Damanu NH-43)*, *DA 17354*, *17381*. SERUA: Yarawa, *Berry 121*; Namboutini, *DF 514 (Damanu 148)*; Korovou Hill, *Bola KV-1*, *DF 514 (Damanu 148)*; Ngaloa, *Nasoqiri 18*. NAMOSI: 4 km. from highway (Queen's Road?), *DA 20170*. NAITASIRI: Tholo-i-suva, *DF 140 (Drova 5)*. TAILEVU: West ridge above Waisei Village, *Berry K168*. KANDAVU: Naikorokoro, *DA 12444 (DF 89, Bola 6)*. VANUA LEVU: MATHUATA: Ridge above Nasingasinga, *Berry 44*; Ndreketi, *Mead 2010*; Sasa logging area, *Howard 181*; Seanggangga area, *DA 11780*; Sarava, Lambasa, *DF 366 (Damanu 55)*, p. p. THAKAUNDROVE: Niuvundi, *DA 17380*; Namberai Creek, *DA 17379*; Mbutha Bay, *Berry 28*. FIJI without further locality, *DA L.14207*.

Munir (1984) was certainly incorrect in assuming that *Gmelina vitiensis* may have been a cultivated plant and in reducing it to *G. dalrympleana* (F. v. Muell.) Lam, of Australia and New Guinea, for several reasons. It is highly improbable (or even impossible) for a tree to have been cultivated and to have come to maturity in 1855 on the seldom visited island of Ngau. Munir (1984, p. 113) states: "Since the publication of Seemann's *Flora Vitiensis* (1865-73), *Gmelina* has never been reported wild from any part of the Fijian Islands." On the contrary, the species occurs in dense and undisturbed forest and is well known to Fijian foresters. *Gmelina vitiensis* differs from *G. dalrympleana* in the usual absence of glands at the bases of leaf blades, the pale, minutely squamellate puberulence on the lower surfaces of leaf blades and on calyx exteriors (these parts glabrous in *G. dalrympleana*), the smaller inflorescences (to 12 cm. versus 12-30 cm. long), the shorter calyces (2.5-4 mm. versus 4-5 (-6) mm. long), the shorter corollas (to 18 mm. versus 15-23 (-30) mm. long), and the smaller anthers (up to 1 mm. versus 2-2.5 mm. long), among other characters.

However, it is strange that, after its initial collection on Ngau by Milne in 1855, *Gmelina vitiensis* seems to have eluded collectors until May 20, 1927, when J. P. Mead (no. 2010) obtained it on Vanua Levu. After 1927 it was unremarked until a decade or two later, when its abundance became evident to foresters in Fiji; many collections of it were made during the timber resources survey under the guidance of M. J. Berry and W. J. Howard in 1966-1969 (cf. this *Flora*, vol. 1, p. 82).

Gmelina vitiensis was first listed as a nomen nudum by Seemann in 1862, and, as Moldenke (1984, p. 314) points out, all subsequent uses of this binomial were nomina nuda [or illegitimate according to the provisions of ICBN, Art. 33.2] until Smith's publication in 1978. The species was actually first described, as *Vitex vitiensis*, by Seemann in 1866.

14. CLERODENDRUM L. Sp. Pl. 637. 1753; Moldenke in Fl. Madagasc. Fam. 174. 146. 1956; Backer & Bakh. f. Fl. Java 2: 607. 1965; Moldenke in Ann. Missouri Bot. Gard. 60: 137. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 407. 1983; Moldenke in Phytologia 57: 157. 1985; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 369. 1986; Munir in J. Adelaide Bot. Gard. 11: 104. 1989.

Clerodendron: Seem. Fl. Vit. 187. 1866; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 174. 1895; et auct. mult.

Trees, shrubs, vines, or herbaceous perennials, glabrous or variously pubescent; leaves opposite or whorled, the blades entire or variously dentate, serrate, or lobed; inflorescences cymose, mostly loosely flowered but sometimes dense and subcapitate, usually paniculate in upper leaf axils, the flowers somewhat to conspicuously zygomorphic, often showy; calyx often colored, campanulate or rarely tubular, truncate to lobed or divided, subtending or enclosing fruit; corolla white or variously colored, hypocrateriform, the tube narrow, straight or curved, the limb spreading or reflexed at anthesis, 5-lobed, the lobes usually subequal; stamens 4 (or 5), didynamous, inserted in corolla tube, usually long-exserted, the anthers ovate to oblong, the thecae parallel and opening longitudinally; style terminal, elongate, briefly 2-lobed at apex; ovary imper-

fectly 4-loculed, the ovules solitary in each locule; fruit drupaceous, globose to obovoid, often 4-sulcate and 4-lobed, the endocarp hard, smooth or variously rugose, separating at maturity into 4 pyrenes or these sometimes cohering in pairs; seeds without endosperm.

TYPE SPECIES: *Clerodendrum infortunatum* L. (as *C. infortunata*), the only original species.

DISTRIBUTION: Pantropical and subtropical, with about 400 species, a few of which extend into temperate areas. The genus, the largest in the family, is especially abundant in Asia and Africa but is poorly represented in the New World. Many species are highly ornamental and are in cultivation. In Fiji *Clerodendrum* is represented by one indigenous and six cultivated (and occasionally naturalized) taxa.

USEFUL TREATMENT OF GENUS: MUNIR, A. A. A taxonomic revision of the genus *Clerodendrum* L. (Verbenaceae) in Australia. *J. Adelaide Bot. Gard.* 11: 101-173. 1989.

Although *Clerodendrum* was Linnaeus's original spelling, the spelling *Clerodendron* was used by many (perhaps most) authors, probably following Adanson in 1763, until recent decades. In our synonymies the distinction is not always made as to which spelling was used by a particular author.

The infrageneric taxonomy of *Clerodendrum* is far from settled, and we have not, for the present study, attempted a natural sequence of species, the following key being based on the most readily observable characters. Moldenke (1985, pp. 334-365) provides a historical summary of generic taxonomy. A study of phenetic relationships in *Clerodendrum* has recently been presented by E. Stenzel et al. (in *Pl. Syst. Evol.* 159: 257-271. 1988).

KEY TO SPECIES

- Indigenous shrubs or small trees or lianas, usually of coastal habitats; calyx subtruncate and minutely denticulate, eventually indurate and striate-venose; corolla white to purplish, the tube to 3.5 cm. long.
1. *C. inerme*
- Cultivated (occasionally naturalized) shrubs, subshrubs, or vines; calyx conspicuously lobed or divided, not striate; corolla tube to 2.5 cm. long.
Leaf blades prominently 3-7-lobed, remotely denticulate to crenate or entire at margin, the lower surface squamose with peltate scales; nodes of branchlets pubescent with a broad band of hairs; calyx 3-5 mm. long, deeply divided; corolla orange-red to scarlet or rarely white. 2. *C. paniculatum*
- Leaf blades entire, serrate, or denticulate, sometimes sinuate or shallowly lobed, the lower surface glabrous or pubescent, often punctate but never squamose; nodes of branchlets glabrous or pubescent but without a broad band of hairs.
Calyx to 5 mm. long, shallowly 5-lobed, the lobes rounded at apex; corolla strongly zygomorphic, the lobes blue to blue-violet, longer than corolla tube; filaments of stamens blue; leaf blades serrate (at least toward apex); petioles to 7 mm. long. 3. *C. ugandense*
- Calyx usually more than 5 mm. long, deeply lobed or divided, the lobes sharply acute to acuminate; corolla red to pink or white; leaf blades entire or irregularly denticulate or sometimes shallowly lobed; petioles 5-25 mm. long or longer.
Base of leaf blade deeply cordate to subtruncate or obtuse, the lower surface usually conspicuously pubescent; petioles to 23 cm. long.
Branchlets medullose or hollow, sulcate when dry; inflorescences loosely paniculate, to 45 × 25 cm.; calyx 3-5 (-9) mm. long; corolla red to vermilion. 4. *C. buchananii*
- Branchlets not sulcate when dry; inflorescences subsessile, compact, to 6 × 9 cm.; calyx 10-15 mm. long; corolla white to pink or rose-colored, usually "doubled" with petaloid staminodia.
5. *C. chinense*
- Base of leaf blade long-attenuate to subacute or rounded, the lower surface glabrous or puberulent on venation; petioles to 25 (-35) mm. long.
Climbing shrubs or vines, the branchlets 4-angled but soon becoming terete; leaf blades rounded to subacute at base, short-acuminate at apex; corolla deep red to scarlet or crimson distally.
6. *C. thomsonae*
- Shrubs or subshrubs, the branchlets usually strongly and sharply 4-angled; leaf blades usually long-attenuate at base, long-acuminate to caudate at apex; corolla white to pinkish or greenish. 7. *C. wallichii*

1. *Clerodendrum inerme* (L.) Gaertn. Fruct. Sem. Pl. 1: 271. t. 57, fig. 1. 1788; Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 188. 1866; Drake, Fl. Ins. Mar. Pac. 261. 1892; Reinecke in Bot. Jahrb. 25: 672. 1898; Rechinger in Denkschr. Akad. Wiss. Wien 85: 340. 1910; Bakh. in Bull. Jard. Bot. Buitenzorg III. 3: 77. 1921; Guillaumin in J. Arnold Arb. 13: 29. 1932; Christophersen in Bishop Mus. Bull. 128: 192. 1935; Yuncker in op. cit. 178: 102. 1943, in op. cit. 184: 60. 1945; Moldenke in Fl. Madagasc. Fam. 174. 244. 1956; Yuncker in Bishop Mus. Bull. 220: 233. 1959; J. W. Parham, Pl. Fiji Isl. 213. 1964, ed. 2. 298. 1972; Backer & Bakh. f. Fl. Java 2: 668. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 212. 1970; Moldenke, Fifth Summary Verb. 343. 1971; St. John & A. C. Sm. in Pacific Sci. 25: 341. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 14. 1972; Moldenke in Phytologia Mem. 2: 333. 1980, in Phytologia 61: 30. 1986; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 369. 1986; Munir in J. Adelaide Bot. Gard. 11: 109. fig. 1. 1989. FIGURE 24A-C.

Volkameria inermis L. Sp. Pl. 637. 1753.

Clerodendrum neriifolium Wall. ex Walp. Rep. Bot. Syst. 4: 110. 1845.

Clerodendron inerme var. *oceanicum* A. Gray in Proc. Amer. Acad. Arts 6: 50. 1862.

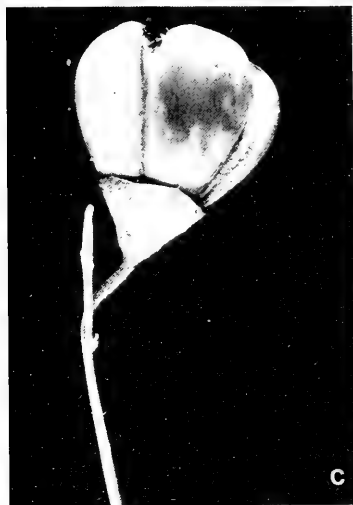
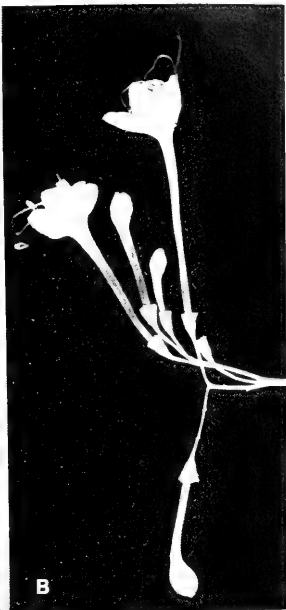
Clerodendron inerme var. *neriifolium* Kurz, For. Fl. Brit. Burma 2: 266. 1877; Engl. in Bot. Jahrb. 7: 477, as var. *neriifolia*. 1886.

Clerodendrum inerme f. *inermis*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 447. 1983.

In Fiji *Clerodendrum inerme* occurs near sea level or at low elevations as a common component of beach thickets, also occurring on rocky shores and sea cliffs, on the inner edges of mangrove swamps, in dry, forested ravines, and along roadsides; erect, spreading, or sometimes scandent shrub or small tree to 5 m. high or a liana, the branchlets slender, minutely puberulent to glabrous; leaves opposite or rarely whorled, aromatic, the petioles slender, 4-20 mm. long, the blades thin-chartaceous when dry, elliptic to narrowly lanceolate, to 13 × 7 cm., acute at base, short-acuminate or cuspidate to a blunt tip at apex, entire at margin, glabrate above, puberulent and punctate to glabrous beneath; inflorescences axillary or supra-axillary, the cymes mostly 3-7-flowered, the peduncles slender, subglabrate, to 4 cm. long, the bracteoles small, few, the flowers fragrant; calyx campanulate, subtruncate and minutely denticulate, 4-6 mm. long; corolla white to purplish, hypocrateriform, the tube to 3.5 cm. long, somewhat expanded distally, glabrous, the lobes ovate, bluntly acute at apex, to 8 mm. long, the limb spreading, to 15 mm. broad; stamens exerted to 20 mm. beyond corolla, the filaments pink, red, or purple, the anthers yellow, 2-3 mm. long; style purple to rich pink distally, paler proximally, exerted to 20 mm.; fruit drupaceous, obovoid, to 15 × 15 mm., 4-sulcate or eventually separating into 4 1-seeded segments, yellow-green to dark brown, becoming black at maturity, subtended by the cupular, indurate, striate-venose calyx. Flowers and fruits are to be seen throughout the year.

TYPIFICATION AND NOMENCLATURE: The type of *Volkameria inermis* is a specimen from India, Herb. Linn. 809/3 (LINN HOLOTYPE). That of *Clerodendrum neriifolium* is from Tavoy, Tenasserim, Burma (K-W HOLOTYPE) (Munir, 1989). *Clerodendron inerme* var. *oceanicum* is based on *U. S. Expl. Exped.* (US 75175 HOLOTYPE), cited by Gray as "Samoan, Tonga, and Feejee Islands"; the locality of neither the holotype nor various isotypes can be certain. H. & A. Moldenke (1983) and Munir (1989) provide fuller synonymies; only those names (and basionyms) mentioned in the literature of the Fijian Region are included above. Moldenke (1986) records a variety and a form of *C. inerme* in addition to the widespread typical form, but neither of them has been recorded from Fiji.

FIGURE 24. A-C, *Clerodendrum inerme*; A, distal portion of branchlet, with foliage and inflorescences, × 1/2; B, inflorescence, × 1; C, dehiscent fruit, × 2. D, *Clerodendrum wallichii*; flower, two anthers fallen, × 1. A from Smith 1433, B from Smith 1187, C from Degener & Ordonez 14154, D from Smith 7485.



DISTRIBUTION: A widely distributed and polymorphic species from tropical and subtropical Asia (from India, Ceylon, and southern China) into Malesia, Australia, and throughout the southern Pacific; introduced elsewhere to check beach erosion. About 60 collections from 13 Fijian islands have been examined, but the species may be anticipated on most islands of the group.

LOCAL NAMES AND USE: *Vere, verevere, aria, ariya, thula ni masei, matiavi*; a concoction from the leaves (sometimes mixed with other elements) is used internally for coughs, headaches, and internal pains.

REPRESENTATIVE COLLECTIONS: MAMANUTHAS: MALOLO GROUP: Nggalito Island, *O. & I. Degener 32209A*. VITI LEVU: MBA: Lautoka, *Greenwood 310*; Korovou, east of Tavua, *Degener 14958*. SERUA: Vicinity of Ngaloa, *Smith 9506*; Taunovo River, *DA 11592*. NAMOSI: Wainandoi River, *Mead 1968*. TAILVU: Near Londoni, *DA 14418*. REWA: Namboro, *DA 5935*; roadside between Lami and Suva, *Gillespie 2068*. KANDAVU: Western end of island, near Cape Washington, *Smith 318*. ONO (northeast of Kandavu): *DA 14949*. OVALAU: Seaside cliffs north of Levuka, *Gillespie 4492*. KORO: East coast, *Smith 1091*. VANUA LEVU: MBUA: Nasau, *H. B. R. Parham 88*. MATHUATA: Banks of Nggawa River, above Lambasa, *Smith 6611*. THAKAUNDOVE: Maravu, near Salt Lake, *Degener & Ordenez 14154*. RAMBLI: Horne, April, 1878. MOALA: *Bryan 338*. VANUA MBALAVU: Southern limestone section, *Smith 1433*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 937*. FULANGA: On limestone, *Smith 1187*. ONGEA LEVU: *Bryan 432*. FIJI without further locality, *Seemann 353*.

2. ***Clerodendrum paniculatum*** L. Mant. Pl. 90, as *C. paniculata*. 1767; Bakh. in Bull. Jard. Bot. Buitenzorg III. 3: 92. 1921; Backer & Bakh. f. Fl. Java 2: 609. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 298. 1972; Moldenke in Ann. Missouri Bot. Gard. 60: 73. fig. 15. 1973; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 412. 1983; Moldenke in Phytologia 63: 51. 1987.

In Fiji a cultivated shrub 1–2 m. high found from near sea level to about 250 m.; branchlets medullose to hollow, bluntly quadrangular, the nodes with a broad band of hairs; leaves opposite, the petioles to 20 cm. long, the blades thin-chartaceous to membranaceous, broadly ovate, 4–15 (–40) × 7–20 (–38) cm., prominently 7-lobed or the uppermost ones entire, cordate at base, the lobes acute to short-acuminate and remotely denticulate to crenate or entire at margin, minutely strigillose to glabrous above, squamose with peltate scales beneath; inflorescences axillary or terminal, the panicles large, many-flowered, to 45 cm. long and broad, the pedicels reddish, filiform, 4–15 mm. long, the flowers slightly fragrant; calyx red or orange-red, campanulate, 3–5 mm. long, deeply divided; corolla hypocrateriform, orange-red to scarlet or rarely white, puberulent, the tube slender, to 2 cm. long, the limb spreading, to 1 cm. broad; stamens and style exerted 2.5–3.5 cm. beyond corolla throat; fruit drupeous, greenish blue to black at maturity. Flowers were noted in Fiji in March.

TYPIFICATION: The type is a specimen from India, Herb. Linn. 810/5 (LINN HOLOTYPE) (H. & A. Moldenke, 1983).

DISTRIBUTION: India, China, and Taiwan south to the Andaman and Nicobar Islands and into Malesia, cultivated elsewhere. In Fiji it is a moderately common ornamental and is showing signs of becoming naturalized in some areas (Parham, 1972).

LOCAL NAME AND USE: An ornamental shrub locally known as *pagoda flower*.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, *DA 16743*.

3. ***Clerodendrum ugandense*** Prain in Bot. Mag. 135: t. 8235. 1909; B. Thomas in Bot. Jahrb. 68: 88. 1936; Backer & Bakh. f. Fl. Java 2: 608. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 298. 1972; Moldenke in Phytologia Mem. 2: 351. 1980.

In Fiji *Clerodendrum ugandense* is occasionally cultivated near sea level; shrub to 4 m. high, the branchlets slender, distally 4-angled, usually glabrous; leaves whorled or

sometimes also opposite, the petioles to 7 mm. long, slender, or essentially none, the blades elliptic to oblanceolate, 4–16 × 1.5–8 cm., cuneate at base, acute to acuminate at apex, serrate at margin at least toward apex, glabrous above, subglabrous and punctate beneath; inflorescences terminal, paniculate, diffuse, to 20 × 15 cm., often leafy-bracteate at lower nodes; flowers showy, unscented; calyx campanulate, to 5 mm. long, shallowly 5-lobed, the lobes rounded; corolla strongly zygomorphic, 5-lobed, the lobes blue to blue-violet, to 15 mm. long, longer than corolla tube; stamens exerted, to 30 mm. long, the filaments blue, pilose proximally; fruit black, fleshy, conspicuously 4-lobed, about 1 cm. in diameter. Flowers have been noted in Fiji between January and June.

TYPIFICATION: The type is from a plant cultivated at Kew from seeds sent in 1906 by M. T. Dawe, collected in Voi, British East Africa (K HOLOTYPE) at an elevation of 2,000 ft.

DISTRIBUTION: Tropical eastern Africa, now widely cultivated. Presumably it was a fairly recent introduction into Fiji.

USE: An attractive garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16435; Suva, Department of Agriculture compound, DA 12086; Suva, in private garden, DA 16098.

The type locality, Voi, is in Kenya, not Uganda as indicated in Prain's protologue. A member of sect. *Cyclonema* (which may eventually be recognized as a genus), *Clerodendrum ugandense* is probably a cultivar of *C. myricoides* (Hochst.) Vatke, but horticulturists usually maintain it as a distinct species (B. Verdcourt, in litt. to G. Staples, 1990).

4. *Clerodendrum buchananii* (Roxb.) Walp. Rep. Bot. Syst. 4: 108, as *Clerodendron buchananii*. 1845; Moldenke in Phytologia 58: 283. 1985.

Volkameria buchananii Roxb. Hort. Beng. 46, nom. nud. 1814, Fl. Ind. ed. 2. 3: 60. 1832.

TYPIFICATION: The type is *Buchanan s. n.* (K HOLOTYPE), collected at Lockipore (Roxburgh, 1832) or Chittagong (Roxburgh, 1814), India, in 1797 (Moldenke, 1985). However, a type has not been located by G. Staples (pers. comm.), although there is a Roxburgh drawing in the Kew Library.

DISTRIBUTION: A widespread species from India to Malesia, recognized as including a number of infraspecific taxa. In Fiji it is represented only by the following variety.

4a. *Clerodendrum buchananii* var. *fallax* (Lindl.) Bakh. in Bull. Jard. Bot. Buitenzorg III. 3: 92. 1921; Moldenke in Fl. Madagasc. Fam. 174. 177. 1956; Yuncker in Bishop Mus. Bull. 220: 233. 1959; J. W. Parham, Pl. Fiji Isl. 212. 1964, ed. 2. 298. 1972.

Clerodendrum speciosissimum van Geert ex Morren in Hort. Belge 3: 322, pl. 68. 1836; Paxt. Mag. Bot. 3: 217, 271. 1837; Moldenke in Sargentia I: 115. 1942; Yuncker in Bishop Mus. Bull. 184: 60. 1945; Backer & Bakh. f. Fl. Java 2: 610. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 213. 1970; Moldenke, Fifth Summary Verb. 343. 1971, in Phytologia Mem. 2: 333. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 133. 1985.

Clerodendrum fallax Lindl. in Bot. Reg. 30: 19. t. 14. 1844; Reching in Denkschr. Akad. Wiss. Wien 85: 339. 1910; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Yuncker in Bishop Mus. Bull. 178: 102. 1943.

Clerodendrum blumeanum Schauer var. *typicum* sensu Christophersen in Bishop Mus. Bull. 128: 193. 1935.

Clerodendrum speciosissimum f. *speciosissimum*; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 444. 1983.

In Fiji *Clerodendrum buchananii* var. *fallax* is frequently cultivated near sea level and is also naturalized, sometimes locally commonly, on the edges of cultivated areas, in clearings, and in coconut plantations; shrub or subshrub to 4 m. high, often spreading by runners, the branchlets medullose or hollow and sulcate when dry,

densely short-pubescent; leaves opposite, the petioles to 21 cm. long, densely pubescent, the blades broadly ovate to ovate-rotund, 7-20 (-35) × 6-17 (-26) cm., deeply cordate at base, abruptly acute to short-acuminate at apex, entire to irregularly repand-denticulate at margin, usually pubescent above and copiously so beneath; inflorescences terminal, paniculate, loosely many-flowered, to 45 × 25 cm., often conspicuously bracteate, the branches bright red, the flowers showy; calyx campanulate, bright red, 3-5 (-9) mm. long, 5-lobed, the lobes 1-3 mm. long, acute; corolla hypocrateriform, red to vermilion, the tube slender, to 2.5 cm. long, the limb spreading to 3 cm., the lobes obovate, to 15 × 10 mm.; stamens and style bright red, exerted about 3 cm. beyond corolla throat; fruit bright red or scarlet, turning purplish or black when mature, deeply 4-lobed, to 7 × 10 mm. Flowers and fruits have been noted between February and October.

TIPIFICATION AND NOMENCLATURE: If this taxon is recognized as a species distinct from *Clerodendrum buchananii*, the correct name is *C. speciosissimum*; if it is considered a variety it is correctly known as var. *fallax*. Many horticulturists and some taxonomists still prefer to treat it as a species; actually, however, it is probably no more than a cultivar of *C. buchananii*. We here follow much current practice and retain it as a botanical variety.

Clerodendrum speciosissimum was based on a cultivated plant received from van Geert, gardener at Ghent, who received it from "des Indes." H. & A. Moldenke (1983) cite the type as a Morren collection taken from material given him by Baron Taffin from the van Geert garden at Ghent, Belgium, in August, 1835 (BR HOLOTYPE). However, we are informed by G. Staples that no type was found at BR, and the taxon may have been described from a living specimen. *Clerodendrum fallax* was described from a cultivated plant from the rich collection of Syon, originally from Java (Lindley, 1844); however, inquiries have not disclosed a specimen that could be a possible type (G. Staples, pers. comm.).

DISTRIBUTION: Malesia; widely cultivated elsewhere and sometimes naturalized. In Fiji it is known from several islands and doubtless is to be anticipated on others. It has been known in Fiji for more than a century, having been listed in Thurston's 1886 *Catalogue* and perhaps introduced by him.

LOCAL NAME AND USE: A striking ornamental known locally as *red clerodendrum*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA OF NANDRONGA & NAVOSA: Natova ("between Lautoka and Singatoka"), *Greenwood 11*. REWA: Suva Botanical Gardens, *DA 12342*; Vunikawai, *DA 6064*. KANDAVU: Namalata isthmus region, *Smith 188*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7474*. VANUA LEVU: THAKAUNDROVE: Ndromoninuku, *DA 16825*. TAVEUNI: Wairiki, *Gillespie 4712*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 933*. ONEATA: On edge of cultivated clearing, *Bryan 484*.

5. *Clerodendrum chinense* (Osbeck) Mabblerley, The Plant-Book, rev. ed. [707]. 1989.

Cryptanthus chinensis Osbeck, *Dagb. Ostind. Resa*, 215. 1757.

Volkmannia japonica Jacq. *Hort. Schoenbr.* 3: 48. t. 388. 1798; non *Clerodendrum japonicum* (Thunb.) Sweet (1827).

Volkameria fragrans Vent. *Jard. Malm.* 2: t. 70. 1804.

Clerodendrum fragrans Hort. ex Vent. *Jard. Malm.* 2: sub. t. 70, pro syn. 1804.

Clerodendrum fragrans var. *multiplex* Sweet, *Hort. Brit.* 322. 1827.

Clerodendrum fragrans var. *pleniflorum* Schauer in DC. *Prodr.* 11: 666, nom. illeg. 1847; Moldenke in *Sargentia* 1: 115. 1942; J. W. Parham in *Dept. Agr. Fiji Bull.* 35: 135. 1959, *Pl. Fiji Isl.* 212. 1964; Backer & Bakh. f. *Fl. Java* 2: 610. 1965.

Clerodendrum philippinum Schauer in DC. *Prodr.* 11: 667. 1847; Howard & Powell in *Taxon* 17: 54. 1968; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 212. 1970; Moldenke, *Fifth Summary Verb.* 343. 1971; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 298. 1972; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 68. 1972; Moldenke in *Ann. Missouri Bot. Gard.* 60: 141. 1973.

Clerodendrum philippinum f. *multiplex* Moldenke in *Phytologia* 41: 10. 1978, in *Phytologia Mem.* 2: 333. 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* 4: 469. 1983.

In Fiji *Clerodendrum chinense* is sparingly cultivated from near sea level to an elevation of about 900 m.; it is more commonly seen naturalized in thickets, fields, and coconut plantations, and along roadsides; subshrub to 2 m. high, the branchlets puberulent, bluntly 4-angled to terete; leaves opposite or subopposite, the petioles to 15 (-23) cm. long, the blades broadly ovate, 6-20 (-29) \times 5-15 (-28) cm., membranaceous, cordate to subtruncate or broadly obtuse at base, cuspidate to acuminate at apex, coarsely and irregularly dentate or sinuate or shallowly lobed at margin, more or less strigillose on both surfaces, more densely so on nerves beneath; inflorescences terminal, subsessile to short-pedunculate, to 6 \times 9 cm., many-flowered, the flowers fragrant, the bracts foliaceous; calyx campanulate, 1-1.5 cm. long, purple to red or rich pink, 5-cleft, the lobes sharply acuminate; corolla hypocrateriform, white to pink or rose-colored, to 3 cm. in diameter, often "doubled" by modification of stamens. Flowers do not appear to be seasonal.

TIPIFICATION AND NOMENCLATURE: Howard and Powell (1968) presented a detailed discussion of *Clerodendrum fragrans* vs. *C. philippinum*, considering the latter the earliest available name for this often cultivated taxon. However, very recently (1989) Mabberley has accepted the earlier Osbeck epithet (1757) as applying to this plant. The type of *Cryptanthus chinensis* is *Osbeck s. n.* (S LECTOTYPE; photo at FHO), collected in China, near Whampoa, Sept. 11, 1751 (Mabberley, 1989). *Cuming 1096* (GH LECTOTYPE), from the Philippine Islands, was the only collection of *Clerodendrum philippinum* cited by Schauer (1847), represented by material in two herbaria in Berlin; these being destroyed, Howard and Powell chose a duplicate at GH as lectotype. For further information about this complex synonymy, the reader is referred to their work.

DISTRIBUTION: The origin of the present taxon may be lost in prehistory, due to its long cultivation; however, it probably originated in southern tropical Asia, perhaps in southern China; it is now widespread in cultivation and as an escape. It may have been introduced into Fiji in the earlier part of the present century.

LOCAL NAME AND USE: *Clerodendrum*; a garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Smith 5017*. SERUA: Waimate, *DA 10126*. NAITASIRE: King's Road, near 9 mile post, *DA 7428*. REWA: Suva, *DA 11071*. VANUA LEVU: THAKAUDROVE: Valethi, *DA 10763*. FIJI without further locality, *DA 3985*.

6. *Clerodendrum thomsonae* Balf. f. in *Edinburgh New Philos. J. n. s.* **15**: 233 (repr. p. 2). *pl.* 2. 1862; B. Thomas in *Bot. Jahrb.* **68**: 60. 1936; Yuncker in *Bishop Mus. Bull.* **178**: 102, as *C. thompsonae*. 1943; Moldenke in *Fl. Madagasc. Fam.* **174**. 212. 1956; J. W. Parham, *Pl. Fiji Isl.* **213**. 1964, ed. 2. 298. 1972; Backer & Bakh. f. *Fl. Java* **2**: 611. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 213. 1970; Moldenke, *Fifth Summary Verb.* **343**. 1971, in *Ann. Missouri Bot. Gard.* **60**: 142. 1973, in *Phytologia Mem.* **2**: 333. 1980; H. & A. Moldenke in *Rev. Handb. Fl. Ceylon* **4**: 433. 1983; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* **134**. 1985.

In Fiji moderately common in cultivation from near sea level to an elevation of about 250 m.; climbing shrub or vine, the branchlets slender, distally 4-angled, terete proximally, puberulent, the leaf scars often prominent and borne on short sterigmata; leaves opposite, the petioles slender, 8-25 (-35) mm. long, minutely puberulent, the blades elliptic to elliptic-ovate, 5-10 (-14.5) \times 2.5-5 (-7) cm., rounded to subacute at base, short-acuminate at apex, entire at margin, glabrate on both surfaces or puberulent on venation; inflorescences terminal or in axils of distal leaves, cymose, to 12 \times 15 cm., the peduncles slender, 2.5-6.5 cm. long, the pedicels slender, 7-16 mm. long; calyx pale yellow-green, becoming white or pinkish, to 2 cm. long, deeply 4-lobed, obviously veined, the lobes sharply acute; corolla hypocrateriform, deep red to scarlet or crimson distally, the tube slender, greenish red, 1.5-2.5 cm. long, the limb spreading or reflexed,

to 2 cm. broad; stamens and style long-exserted, pale green; fruit glossy black with a brilliant red aril uniting the 4 pyrenes. Flowers have been collected between February and July, fruits in February.

TIPIFICATION: The type is a specimen collected in December, 1861 (E HOLOTYPE), from a living plant at the Edinburgh Botanical Garden, originally sent by the Rev. W. C. Thomson from Old Calabar, southern Nigeria, in 1861, and named in honor of his wife (H. & A. Moldenke, 1983).

DISTRIBUTION: Tropical Africa from Senegambia to Zaire, now widely cultivated. It was probably introduced into Fiji no more than half a century ago.

LOCAL NAME AND USE: *Bleeding heart*; a moderately common garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Plant Introduction and Quarantine Station, Nanduruloulou, DA 12140. Toninaiwau, Tholo-i-suva, DA 16715. REWA: Lami, in private garden, DA 16439. OVALAU: Lovoni Village, Smith 7475.

7. *Clerodendrum wallichii* Merr. in J. Arnold Arb. 33: 220. 1952; Backer & Bakh. f. Fl. Java 2: 611. 1965; Moldenke, Fifth Summary Verb. 343. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 96. 1972; Moldenke in Phytologia Mem. 2: 333. 1980; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 440. 1983. FIGURE 24D.

Clerodendrum nutans Wall. ex D. Don, Prodr. Fl. Nepal. 103. 1825; Hook. in Bot. Mag. 58: t. 3049. 1831; Yuncker in Bishop Mus. Bull. 184: 61. 1945; J. W. Parham, Pl. Fiji Isl. ed. 2. 298. 1972; non Wall. ex Jack (1820).

In Fiji known only from cultivated plants growing from near sea level to an elevation of a few hundred meters; shrub or subshrub to 3 m. high, the branchlets slender, flexuose, usually strongly 4-angled, glabrate; leaves opposite or sometimes whorled, the petioles 5–15 mm. long, the blades lanceolate to oblong or oblanceolate, 7.5–28 × 1.5–5 cm., usually long-attenuate at base, long-acuminate to caudate at apex, entire to undulate at margin, glabrate on both surfaces, somewhat punctate beneath; inflorescences terminal, dispersed, paniculate, to 50 × 20 cm., the pedicels very slender, the bracts usually foliaceous toward base of inflorescence; calyx campanulate, wide-spreading, to 15 mm. long and 25 mm. broad, dark red to purplish or brown, deeply 4- or 5-lobed, the lobes narrowly acute at apex; corolla hypocrateriform, the tube greenish, usually not much longer than calyx, the lobes white or pinkish, spreading or reflexed, about as long as corolla tube; filaments white or tinted pink or blue, long-exserted, arching; style white, shorter than filaments; fruit black at maturity, enclosed within the accrescent calyx. Flowers have been obtained between March and June.

TIPIFICATION: The type of *Clerodendrum nutans* Wall. ex D. Don, for which *C. wallichii* is a new name, is *Wallich 1793* (K HOLOTYPE), from "Sylhet bengaliae orientalis," Bangladesh.

DISTRIBUTION: Himalayan India, Pakistan, Bhutan, and Sikkim to Burma and Indo-China, south to the Nicobar Islands and north to southern China, widely cultivated and sometimes naturalized elsewhere (H. & A. Moldenke, 1983). It was presumably introduced into Fiji during the first part of the present century.

LOCAL NAME AND USE: A garden ornamental; the name *vutu* was noted on Ovalau.

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Ndakuivuna, Smith 7084. REWA: Suva, Wilder 1231, DA 11796. OVALAU: Lovoni Village, Smith 7485. FIJI without further locality, Gillespie 2816.

15. *HOLMSKIOLDIA* Retz. Obs. Bot. 6: 31. 1791; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 176. 1895; Moldenke in Fl. Madagasc. Fam. 174. 252. 1956; Backer & Bakh. f. Fl. Java 2: 611. 1965; Moldenke in Phytologia 48: 313. 1981; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 476. 1983.

Glabrous to pubescent erect or clambering shrubs or trees; leaves opposite, simple, petiolate, the blades entire to dentate; inflorescences cymose, axillary and short-pedunculate or crowded in axils of terminal leaves, the bracts usually small; calyx membranous, broadly expanded above a short, urceolate base, often colored, accrescent in age, entire to broadly 5-lobed; corolla zygomorphic, the tube curved, somewhat expanded toward apex, the limb oblique, spreading, unequally 5-lobed; stamens 4, didynamous, inserted at or below middle of corolla tube, exserted, the anthers ovate, the thecae parallel; ovary 4-loculed (from 2 carpels), obtuse and entire or obscurely 4-lobed, the ovules solitary in each locule, subpendulous, the style exserted, briefly 2-lobed at apex; fruiting calyx much enlarged, widespreading, often 2 cm. or more broad, often brightly colored, almost enclosing fruit; fruit drupaceous, obovoid, truncate to briefly 4-lobed at apex, the endocarp hard, separating into 1-4 1-seeded pyrenes.

TYPE SPECIES: *Holmskioldia sanguinea* Retz., the only original species.

DISTRIBUTION: Africa, Indian Ocean islands, and southeastern Asia into western Malesia, with about eleven species, cultivated elsewhere. Two species are known to be cultivated in Fiji.

KEY TO SPECIES

- Branchlets acutely 4-angled; petioles to 3 cm. long; leaf blades 3-12 × 1.5-8.5 cm., long-acuminate to caudate at apex, entire to crenate-serrate at margin, the secondary nerves 4 or 5 per side; corolla red, orange, or yellow, the stamens and style exserted about 5 mm. beyond corolla throat. 1. *H. sanguinea*
 Branchlets obtusely 4-angled to subterete; petioles to 1 cm. long; leaf blades to 4 × 3 cm., acute at apex, coarsely crenate-dentate or scalloped at margin, the secondary nerves 3 or 4 per side; corolla purple, violet, or blue, the stamens and style exserted about 15 mm. beyond corolla throat. 2. *H. tettensis*

1. *Holmskioldia sanguinea* Retz. Obs. Bot. 6: 31. 1791; Lam in Bull. Jard. Bot. Buitenzorg III. 3: 96. 1921; J. W. Parham, Pl. Fiji Isl. 215. 1964, ed. 2. 301. 1972; Backer & Bakh. f. Fl. Java 2: 612. 1965; Moldenke in Phytologia 48: 333. 1981; H. & A. Moldenke in Rev. Handb. Fl. Ceylon 4: 477. 1983; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 134. 1985.

In Fiji known only in cultivation at elevations from near sea level to about 250 m.; straggling shrub or small tree to 10 m. high, rarely scandent, the branchlets elongate, pubescent, sometimes procumbent, acutely 4-angled; petioles slender, to 3 cm. long, short-pubescent; leaf blades membranaceous to thin-chartaceous, ovate, 3-12 × 1.5-8.5 cm., subcordate to truncate or rounded at base and often briefly decurrent on petiole, usually long-acuminate to caudate at apex, entire to somewhat crenate-serrate at margin, glabrate above, usually short-pubescent on venation beneath and conspicuously glandular-punctate or squamellate, the secondary nerves 4 or 5 per side; inflorescences abbreviated, paniculate, axillary, to 5 cm. long, the cymules 3-flowered or reduced to a solitary central flower and 2 sterile branchlets, the pedicels 2-10 mm. long, the bracteoles minute; calyx shallowly cupular to rotate, usually 10-20 mm. broad, orange, red, or yellow, membranaceous to chartaceous, reticulate-venose, minutely denticulate to entire; corolla red to orange or yellow, 1.5-2.5 cm. long, the tube about 1.5 cm. long, minutely pilosulous without, the lobes unequal, the lower one about twice as long as the others, declinate; stamens declinate, slightly longer than corolla tube; ovary glabrous to minutely puberulent, the style about 2 cm. long; fruit subglobose, brown, often verrucose. Flowers have been noted between May and August.

TYPIIFICATION: The type is probably a specimen labelled "*Holmskioldia*" (LD presumed HOLOTYPE in Koenig Herbarium), although there is nothing to connect it with Koenig or with Retzius's description (C. E. C. Fischer in Kew Bull. 1932: 64. 1932).

DISTRIBUTION: Subtropical Himalayan region of Pakistan and India, now widely cultivated and sometimes naturalized elsewhere (H. & A. Moldenke, 1983).

LOCAL NAMES AND USE: *Parasol flower*, *Japanese parasol flower*, *cup-and-saucer plant*; a garden ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Cocoa Station, Nanduruloulou, DA 12153; Toninai-wau, Tholo-i-suva, DA 16946.

2. *Holmskioldia tettensis* (Kl.) Vatke in Linnaea 43: 536. 1882; J. W. Parham, Pl. Fiji Isl. ed. 2. 301. 1972; Moldenke in Phytologia 48: 354. 1981.

Cyclonema tettense Kl. in Peters, Naturwiss. Reise Mossambique, Bot. 261. 1861.
Holmskioldia speciosa Hutchinson & Corbish in Kew Bull. 1920: 332. fig. 1. 1920.

In Fiji occasionally cultivated near sea level; erect shrub or slender tree, the branchlets slender, pubescent; petioles 7–10 mm. long, densely pubescent; leaf blades chartaceous, broadly ovate to obovate or oblong or deltoid, 2–4 × 1.5–3 cm., cuneate to rounded at base, acute at apex, irregularly and coarsely crenate-dentate or scalloped at margin, velutinous to sparsely short-pubescent with evanescent hairs above, conspicuously glandular and short-pubescent beneath especially on venation, the secondary nerves 3 or 4 per side; inflorescences axillary at tips of branchlets, pubescent, bracteate, the bracts caducous, the pedicels to 2 cm. long, densely pubescent; calyx cyathiform to broadly cupular, pink or purplish, obtusely 5-dentate, urceolate at base, the limb 15–20 mm. broad; corolla purple to violet or blue, 2–2.5 cm. long, the tube usually shorter than calyx, glandular-puberulent without, the limb spreading; stamens long-exserted, the filaments purple or violet; ovary pubescent at least toward apex, the style long-exserted; fruit broadest toward apex, truncate, 4-horned. The only available collection was flowering in March.

TYPIIFICATION: The type was collected by Peters (B HOLOTYPE, destroyed) "auf Ebenen in der Umgebung von Tette," Mozambique. The type of *Holmskioldia speciosa* is *Pole-Evans 16879*, Nov. 29, 1917, collected in Transvaal, South Africa (HOLOTYPE presumably at K or PRE).

DISTRIBUTION: Southern Africa, now cultivated elsewhere. Presumably it was introduced into Fiji during the past half-century.

LOCAL NAME AND USE: *Parasol flower*; an uncommon garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Lami, in private garden, DA 16455.

FAMILY 183. LAMIACEAE

By ALBERT C. SMITH and STEVEN P. DARWIN (Tulane University)

LAMIACEAE Lindl. Nat. Syst. Bot. ed. 2. 275. 1836.

Labiatae Juss. Gen. Pl. 110. 1789. Nom. alt.

Annual or perennial herbs, shrubs, or rarely small trees or climbers, commonly with short-stalked epidermal glands containing ethereal oils, unarmed, estipulate, the young stems commonly quadrangular; leaves opposite, sometimes whorled, very

rarely alternate, simple or infrequently pinnately compound; inflorescences various, mostly axillary to leaves or bracts and cymose and collectively often forming a thyrses or a spurious raceme or panicle or head, sometimes 1-flowered; flowers ♂ or sometimes unisexual (plants then gynodioecious), mostly zygomorphic, usually bracteolate; calyx hypogynous, often tubular and 4- or 5-dentate or -lobed, sometimes campanulate or hypocrateriform, sometimes bilabiate, usually conspicuously ribbed and persistent in fruit and often accrescent, sometimes circumscissile or splitting longitudinally; corolla sympetalous, usually strongly irregular and with 5 imbricate lobes, mostly bilabiate and personate, occasionally nearly regular and 4-lobed (one lobe wider than others); stamens 4 and didynamous or 2 (then with or without a pair of staminodes), the filaments attached to corolla tube and alternate with corolla lobes, the anthers 2-lobed (one theca sometimes reduced or suppressed), dorsifixed, dehiscing by longitudinal slits, the connective sometimes broadened and separating the locules; disk commonly present at base of ovary, regular or irregular; ovary superior, sometimes borne on a gynophore, usually composed (by intrusion of ovary walls in 2 initial locules) of 4 essentially distinct segments united only by the gynobasic style, less commonly partially (1/3 or more to base) 4-lobed, the style then arising from among the lobes but not gynobasic, the placentation axile, the ovules 4 (1 in each ovary lobe or segment), basal-axile, erect, anatropous to hemitropous, the style usually apically cleft into 2 dry stigmas or stigmatic lobes (one of these often reduced or suppressed); fruit composed of (1-) 4 1-seeded nutlets, the pericarp hard, smooth or sculptured, the nutlets rarely drupaceous, the seeds small, the embryo straight, the endosperm scanty or lacking.

DISTRIBUTION: Cosmopolitan, most abundant in Mediterranean and eastern Asian regions, with about 200 genera and 3,200 species. Eleven genera have been recorded from Fiji, but only two (*Plectranthus* and *Leucas*) have indigenous species there. Many members of the family are of horticultural value, and others have culinary or other economic uses due to the presence of volatile oils.

USEFUL TREATMENTS OF FAMILY: BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. *Lamiaceae*. *Fl. Java* 2: 614-640. 1965. KENG, H. *Flora Malesianae Precursores XLVIII. A revision of Malesian Labiatae*. *Gard. Bull. Singapore* 24: 13-180. 1969. KENG, H. *Labiatae*. *Fl. Males. I* 8: 301-394. 1978. CRAMER, L. H. *Lamiaceae (Labiatae)*. In: Dassanayake, M. D., & F. R. Fosberg (eds.). *Rev. Handb. Fl. Ceylon* 3: 108-194. 1981.

The Lamiaceae and Verbenaceae are closely related and without entirely satisfactory boundaries. In general the evolutionary trends initiated in the Verbenaceae culminate in the Lamiaceae. In the latter family a truly gynobasic style predominates, and the plants are commonly aromatic, with volatile oils, but a definite boundary is elusive and somewhat conventional.

Basic treatments of the Lamiaceae are those of G. Bentham (*Labiatarum Genera et Species*, 1-783. 1832-1836; in *DC. Prodr.* 12: 27-603. 1848; in *Benth. & Hook. f. Gen. Pl.* 2: 1160-1223. 1876) and J. I. Briquet (in *Engl. & Prantl, Nat. Pflanzenfam. IV.* 3A: 183-375. 1895-1897, and supplements), although Briquet's delimitation of subfamilies has been criticized by Erdtman (in *Svensk Bot. Tidskr.* 39: 279-285. 1945) and more recently by Cantino and Sanders (in *Syst. Bot.* 11: 163-185. 1986). The following key to genera is modelled after those presented by Keng (1969, 1978); a complete review of subfamilial, tribal, and subtribal nomenclature of Lamiaceae is provided by Sanders and Cantino (in *Taxon* 33: 64-72. 1984).

In addition to the taxa discussed below, *Leonurus sibiricus* L. may be anticipated as a garden weed in Fiji; it is native in temperate Asia but is now widespread in warm and tropical areas (for a discussion of ecotypical forms cf. Keng, 1978, p. 336). In Pacific archipelagoes *L. sibiricus* has been recorded from New Caledonia, Tonga, Niue, Samoa, Cook Islands, Society and Austral Islands, and Hawaii.

KEY TO GENERA

- Corolla seemingly 1-lipped, the upper lip deeply divided and with the other lobes forming a 5-lobed, spreading limb; stamens 4, erect, exerted; adventive. 1. *Teucrium*
- Corolla nearly regular and 4-lobed or distinctly bilabiate but not seemingly 1-lipped.
- Perfect stamens 4, or if rarely 2 then the anther connectives not transversely elongate and both thecae of anthers usually fertile.
- Calyx lobes or teeth usually 5, if rarely more numerous than the upper calyx lip broad and decurrent on tube.
- Lower lip of corolla shorter than or equalling upper lip, the median lobe recurved and sometimes saccate at base; stamens declinate and resting on lower corolla lip; calyx subequally 5-toothed and (in our species) conspicuously white-pilose between the teeth; flowers sessile on scorpioid inflorescence branches, secund and erect; naturalized. 2. *Hyptis*
- Lower lip of corolla usually longer than upper lip and calyx teeth often very unequal, or if corolla lobes subequal then the stamens ascending and erect; calyx (in our species) not conspicuously white-pilose between the teeth; flowers sessile or pedicellate but not secund and erect.
- Stamens declinate, lying on or enclosed by lower lip of corolla; calyx distinctly bilabiate, the upper lip broad and decurrent on tube.
- Corolla tube often sharply curved, the lower lip longer than upper lip, deeply concave to navicular, constricted at base; verticils of inflorescence 6-many-flowered; filaments of stamens free or united at base.
- Lateral teeth of calyx deltoid or obsolete, (in our species) truncate to rounded at apex, the lower teeth united, (in our species) forming a strap-shaped limb forked at apex; cultivated and naturalized. 3. *Solenostemon*
- Lateral teeth of calyx well formed, acuminate, the lower teeth not united; indigenous, cultivated, and naturalized. 4. *Plectranthus*
- Corolla tube straight, the lower lip usually flat, sometimes concave but not navicular; verticils of inflorescence 4-6(-10)-flowered; filaments of stamens free at base; cultivated and naturalized.
- Stigma capitate-clavate, only briefly lobed; filaments of stamens unappendaged at base, glabrous, exerted (in our species) 20 mm. or more beyond corolla; corolla (in our species) 10-20 mm. long, the tube much exceeding calyx. 5. *Orthosiphon*
- Stigma subequally 2-branched, the branches subulate or flattened; filaments of stamens appendaged at base, glabrous or pubescent, equalling corolla tube or briefly exerted; corolla (in our species) to 9 mm. long, the tube as long as or shorter than calyx. 6. *Ocimum*
- Stamens ascending under upper lip of corolla, or if corolla regular then the filaments erect or spreading; calyx regular, the teeth equal or subequal.
- Corolla distinctly bilabiate, the upper lip entire or emarginate; anther thecae parallel or the 2 posterior stamens each with only 1 fertile theca, the filaments pubescent; stems sharply 4-angled; cultivated and naturalized. 7. *Anisomeles*
- Corolla regular or only slightly irregular, usually 4-lobed, the lobes subequal; anther thecae divaricate or confluent.
- Stems subterete and usually swollen above nodes; stamens subequal, the filaments bearded; leaves (in our species) long-petiolate, the petioles 1-3.5 (-6.5) cm. long, the blades 5-12 (-16) cm. long; cultivated and naturalized. 8. *Pogostemon*
- Stems acutely 4-angled, not swollen above nodes; stamens equal, the filaments glabrous; leaves sessile or petiolate, the blades 1-9 cm. long; cultivated only. 9. *Mentha*
- Calyx lobes or teeth 8-10, equal or unequal but the upper lobe not decurrent on calyx tube; corolla bilabiate, the upper lip hooded, erect, shorter than lower lip; stamens ascending; indigenous and naturalized. 10. *Leucas*
- Perfect stamens 2, the anther connectives transversely elongate, filiform, versatile, the anterior end bearing a single fertile theca, the posterior end with a sterile theca or none at all; corolla bilabiate, the upper lip erect; cultivated and naturalized. 11. *Salvia*

1. *TEUCRIUM* L. Sp. Pl. 562. 1753; Seem. Fl. Vit. 193. 1866; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1221. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 210. 1895; Epling in Repert. Sp. Nov. Beih. 85: 1. 1935; McClint. & Epling in Brittonia 5: 491. 1946; Backer & Bakh. f. Fl. Java 2: 617. 1965; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 105. 1969; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 314. 1973; H. Keng in Fl. Males. I. 8: 317. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 193. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 384. 1986.

Annual or perennial herbs or shrubs, the branchlets usually pubescent, often with glandular hairs; leaves petiolate or sessile, the blades entire or variously lobed or parted; flowers sessile or pedicellate, 2 per verticil and these arranged in elongate racemes, or the verticils 6-18-flowered and forming terminal or axillary panicles; calyx campanulate to tubular, 10-nerved, the limb 5-toothed, the upper 3 teeth often somewhat longer than the lower teeth; corolla exserted, the tube shorter than or about as long as calyx, the upper lip deeply divided and seemingly absent, the lower lip prominent, spreading, the lateral lobes short, the lowest lobe entire or bifid, oblong to ovate; stamens 4, didynamous, exserted, erect, the anthers 2-celled, reniform; style exserted, unequally 2-branched at apex, the disk symmetrical; nutlets obovoid, flattened, subtriquetrous, rugose to reticulate or smooth, pubescent or glabrous.

LECTOTYPE SPECIES: *Teucrium fruticosum* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 101. 1913).

DISTRIBUTION: Cosmopolitan, with about 100 species, with a center of diversity in the Mediterranean region; a single adventive species has been recorded in Fiji.

1. *Teucrium vesicarium* Mill. Gard. Dict. ed. 8. 1768; Epling in Repert. Sp. Nov. Beih. 85: 3. 1935; McClint. & Epling in Brittonia 5: 492. 1946; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 106. fig. 13. 1969; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 316. fig. 63. 1973.

Teucrium inflatum Sw. Nov. Gen. & Sp. Prodr. 88. 1788; Seem. in Bonplandia 9: 258. 1861. Viti, 440. 1862. Fl. Vit. 193. 1866, op. cit. 432. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 266. 1892; Yuncker in Bishop Mus. Bull. 178: 103. 1943, in op. cit. 220: 234. 1959; J. W. Parham, Pl. Fiji Isl. 255. 1964, ed. 2. 348. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 105. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 66. 1985.

In Fiji this widespread adventive has been sparingly collected near sea level, but possibly it is no longer present in the archipelago; perennial herb to 1 m. high, the branchlets pubescent with curled hairs or hirsute with spreading and often glandular hairs; leaves petiolate, the petioles slender, 10-40 mm. long, the blades ovate to oblong-ovate, membranaceous, 4-12 × 2-6 cm., rounded to subtruncate or shallowly cordate at base, acute to acuminate at apex, crenate-serrate (sometimes coarsely so) at margin, hirtellous to glabrate above, soft-pubescent with curled hairs, or sometimes also with longer, straight hairs on nerves, or glabrous beneath; verticils arranged in dense terminal spikes seldom more than 20 cm. long, the flowers sessile or with pedicels to 1 mm. long, the bracts inconspicuous, lanceolate to linear, shorter than calyces; calyx weakly bilabiate, 4-8 mm. long, densely pubescent, the tube inflated and subsaccate at maturity, the upper lip 2-toothed, the lower lip 3-toothed, the teeth deltoid; corolla 9-13 mm. long, the tube 4-6 mm. long, pubescent; stamens exserted, the filaments pubescent toward base, the anthers about 0.5 mm. long; nutlets glabrous, rugose-reticulate, 2-2.5 mm. long.

TIPIFICATION AND NOMENCLATURE: *Teucrium vesicarium* is based on a collection by Houstoun (BM HOLOTYPE) (Epling, 1935), presumably from the West Indies and possibly from Jamaica. *Teucrium inflatum* was based on *Teucrium* (P. Br. Hist. Jam. 257. 1756, "India Occidental, Jamaica"). In the Pacific this adventive has usually passed under Swartz's name.

DISTRIBUTION: A complex and variable species throughout tropical America, and widespread as a weed. It has not been collected in Fiji since the time of Horne's visit, although there are fairly recent collections from nearby archipelagoes (MacKee, 1985).

AVAILABLE COLLECTIONS: TAVEUNI: *Seemann 360*. FIJI without further locality, *Harvey*, Nov., 1855 (BM) (also at K but there noted as from Tonga), *Horne 62*, 75.

2. *HYPTIS* Jacq. *Collect.* 1: 101, 103. 1787; Benth. in Benth. & Hook. f. *Gen. Pl.* 2: 1178. 1876; Briquet in Engl. & Prantl, *Nat. Pflanzenfam.* IV. 3A: 333. 1897; Epling in *Repert. Sp. Nov.* 34: 73. 1933; Backer & Bakh. f. *Fl. Java* 2: 633. 1965; H. Keng in *Gard. Bull. Singapore* 24: 90. 1969; Nowicke & Epling in *Ann. Missouri Bot. Gard.* 56: 84. 1969; Standley & L. O. Williams in *Fieldiana Bot.* 24 (9): 246. 1973; H. Keng in *Fl. Males. I.* 8: 368. 1978; L. Cramer in *Rev. Handb. Fl. Ceylon* 3: 154. 1981; Stanley in Stanley & Ross, *Fl. S.-E. Queensland* 2: 385. 1986. *Nom. cons.*

Herbs or subshrubs, often aromatic; leaves petiolate, the blades serrate, gland-dotted; inflorescences spicate to capitate or occasionally few-flowered cymose racemes, the bracts subulate to setaceous; calyx tubular to campanulate, straight or oblique, 10-nerved, the teeth 5, subequal, erect, acute to awned; corolla bilabiate, 5-lobed, the tube about as long as calyx, the upper lip 2-lobed, erect or spreading, the lower lip 3-lobed, the median lobe abruptly deflexed, sometimes saccate at base; stamens 4, declinate, slightly exerted; disk entire; style briefly bifid at apex; nutlets oblong to ovoid, smooth to punctate-rugose.

TYPE SPECIES: *Hyptis capitata* Jacq., *typ. cons.*

DISTRIBUTION: Tropical America (especially Brazil), with about 350 species, a few of them naturalized in warmer areas of the Old World; one species is a serious weed in Fiji.

USEFUL TREATMENT OF GENUS: EPLING, C. Synopsis of the genus *Hyptis* in North America. *Repert. Sp. Nov.* 34: 73-130. 1933.

1. *Hyptis pectinata* (L.) Poit. in *Ann. Mus. Hist. Nat. (Paris)* 7: 474. t. 30. 1806; Epling in *Repert. Sp. Nov.* 34: 97. 1933; B. E. V. Parham in *Agr. J. Dept. Agr. Fiji* 13: 53. 1942; Greenwood in *J. Arnold Arb.* 30: 80. 1949; Mune & Parham in *Agr. J. Dept. Agr. Fiji* 25: 80. *fig.* 1954, in *Dept. Agr. Fiji Bull.* 31: 46. *fig. 12.* 1957; J. W. Parham in *op. cit.* 35: 138. *fig. 70.* 1959, *Pl. Fiji Isl.* 254. 1964, ed. 2. 347. 1972; Backer & Bakh. f. *Fl. Java* 2: 634. 1965; Mune & Parham in *Dept. Agr. Fiji Bull.* 48: 60. *fig. 16.* 1967; Nowicke & Epling in *Ann. Missouri Bot. Gard.* 56: 86. 1969; Standley & L. O. Williams in *Fieldiana Bot.* 24 (9): 255. 1973; H. Keng in *Fl. Males. I.* 8: 371. 1978; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 63. 1985.

Nepeta pectinata L. *Syst. Nat.* ed. 10. 1097. 1759.

In Fiji *Hyptis pectinata* is seen from near sea level to about 200 m. as a vigorous and aggressive weed of agricultural, pastoral, and plantation lands, found in cultivated areas, wasteland, canefields, and coconut plantations, along roads, and on open hillsides; perennial, aromatic herb or subshrub to 4 m. high, the branchlets pubescent to subglabrous; petioles 0.5-3 (-5) cm. long; leaf blades ovate to subdeltoid or elliptic, 2-5 (-8) × 1-3 (-4.5) cm., truncate to obtuse or rounded at base, acute to acuminate at apex, serrate to crenate at margin, pubescent on both surfaces, densely so beneath; inflorescence cymes 6-15-flowered, each with 2 or 3 scorpioid branches, the peduncles 1-2 mm. long, the bracteoles linear, 3-4 mm. long; flowers sessile, secund and incurved; calyx tubular, to 2.5 mm. long at maturity, pubescent, 10-ribbed, the teeth setaceous, to 2 mm. long, a copious tuft of white hairs present between the teeth; corolla white to pale blue or pink-tinged, 3-3.5 mm. long, the tube about 2 mm. long, pubescent, the lobes to 1 mm. long; nutlets oblong, to 2 mm. long, smooth, black. Flowers and fruits are found throughout the year.

TYPIFICATION: Linnaeus based *Nepeta pectinata* on P. Br. Hist. Jam. "259, n. 2."

DISTRIBUTION: Widespread but not abundant in tropical America, introduced and naturalized in many other parts of the world. In Fiji it may have become naturalized early in the present century and by the 1930's had become such an agricultural pest as to be declared a noxious weed; methods for its control are detailed by Mune and Parham (1967). About 35 Fijian collections from seven islands are at hand; the species is most prevalent in eastern Viti Levu.

LOCAL NAMES AND USE: *Tamoli ni vavalangi*, *timothi ni vavalangi*, *wavuwavu*, *ndamoli*, *ben tulsia* (Hindi), *mint weed*, *wild mint*, *purple top*; juice from the leaves is reputed to be squeezed into cuts associated with diabetes.

REPRESENTATIVE COLLECTIONS: VITI LEVU: NAMOSI: Hills between Navua River and Suva, *Greenwood 1015*. RA: Mborotu Valley, *DA 9512*; Pasture Seed and Production Farm, Ndombulevu, *DA 10944*. NAITASIRI: Vunindawa, *DA 11035*; Waindina River, *Weiner 256*; Principal Agricultural Station, Koronivia, *DA 3940*; Tamavua, *Simmonds 51* (Sept., 1932). TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7227*; Naingani Island, *DA 3363*; Wainimbokasi, *DA 10581*. REWA: Lami, *Meebold 16788*; Suva, *St. John 18915*. OVALAU: Wainiloka, *DA 5686*. KORO: *Tohill 575*. VANUA LEVU: MATHUATA: Raranimbumbulu, *DA 10508*. TAVEUNI: Waiyevo, *DA 5724*. VANUA MBALAVU: Near Lomaloma, *Garnock-Jones 1013*. LAKEMBA: Tumbou Valley, *Garnock-Jones 836*.

3. SOLENOSTEMON Thonning in Schumacher, Beskr. Guin. Pl. 271. 1827; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1175. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 359. 1897; Hutchinson & Dalziel, Fl. W. Trop. Afr. 2: 289. 1931; J. K. Morton in J. Linn. Soc. Bot. 58: 251. 1962; Codd in Mitt. Bot. Staatssamml. München 10: 249. 1971; S. T. Blake in Contr. Queensland Herb. 9: 6. 1971; Codd in Bothalia 11: 437. 1975.

Coleus sect. *Solenostemon* Benth. Lab. Gen. Sp. 52. 1832, in DC. Prodr. 12: 72. 1848.

Annual or perennial herbs or subshrubs, sometimes succulent; leaves long-petiolate, the blades ovate, crenate; verticils of flowers sessile or pedunculate, dense or lax, arranged in long racemes or panicles, the bracts much smaller than leaves, deciduous; calyx bilabiate, the upper lip usually broadly ovate and decurrent on calyx tube, the lateral lobes short, truncate to deltoid or obsolete, the lower lip ovate to oblong, entire or emarginate or strap-shaped and forked at apex, formed from union of 2 lowermost lobes over the greater part of their length; corolla usually colored, gradually expanding from base, sharply curved, the lower lip longer than upper lip, navicular; stamens 4, free or briefly united at base, attached at mouth of corolla tube, didynamous, declinate and usually enclosed by lower corolla lip; disk glandular; style declinate, briefly bifid at apex; nutlets lenticular to ovoid, smooth.

TYPE SPECIES: *Solenostemon ocymoides* Schumacher. The generic name is often referred to the authorship of Schumacher and the name of the type species to Schumacher & Thonning, but we follow ING (1979) in referring the authorship of the genus to Thonning and that of the type species to Schumacher. Presumably this follows the complicated method of assignment outlined in Stafleu and Cowan, Tax. Lit. ed. 2. 5: 399 [item 11,360]. 1985.

DISTRIBUTION: As defined by Morton (1962), *Solenostemon* is common in tropical Africa, Asia, and Malesia. Codd (1975) suggests that more than 60 names (mostly published in *Coleus*) may be referable to *Solenostemon*, but species limits are difficult to determine and the number of species eventually recognized may be considerably fewer. In Fiji the genus is represented by one widely cultivated and naturalized species.

1. *Solenostemon scutellarioides* (L.) Codd in *Bothalia* 11: 439. 1975.

Ocymum scutellarioides L. Sp. Pl. ed. 2. 834. 1763; Sims in Bot. Mag. 35: t. 1446. 1812.

Plectranthus scutellarioides R. Br. Prodr. Fl. Nov. Holl. 506. 1810; H. Keng in Fl. Males. I. 8: 389. 1978; S. T. Blake in Austral. Pl. 10: 326. 1980.

Plectranthus scutellarioides Bl. Bijdr. Fl. Ned. Ind. 837, nom. illeg. 1826; non R. Br.

Coleus scutellarioides Benth. in Wall. Pl. Asiat. Rar. 2: 15. 1830, Lab. Gen. Sp. 53. 1832, in DC. Prodr. 12: 73. 1848; Reinecke in Bot. Jahrb. 25: 673. 1898; Guillaumin in J. Arnold Arb. 13: 29. 1932; Christophersen in Bishop Mus. Bull. 154: 40. 1938; Backer & Bakh. f. Fl. Java 2: 637. 1965; H. Keng in Gard. Bull. Singapore 24: 51. fig. 9. 1969; J. W. Parham, Pl. Fiji Isl. ed. 2. 346. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 48, 99. 1972; St. John in Phytologia 36: 373. 1977; L. Cramer in Kew Bull. 32: 555. 1978, in Rev. Handb. Fl. Ceylon 3: 140. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 62. 1985.

Coleus blumei Benth. Lab. Gen. Sp. 56. 1832; Hook. in Bot. Mag. 79: t. 4754. 1853; Yuncker in Bishop Mus. Bull. 178: 104. 1943, in op. cit. 184: 61. 1945, in op. cit. 220: 235. 1959; Purseglove, Trop. Crops, Dicot. 634. 1968; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 83. 1969; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 103. 1970; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 243. 1973.

Plectranthus blumei Launert in Mitt. Bot. Staatssamml. München 7: 301. 1968.

In Fiji *Solenostemon scutellarioides* is widely cultivated in villages and European gardens from near sea level to about 850 m. elevation and is also sparingly naturalized; aromatic, perennial, erect or ascending herb to 1.5 m. high, the branchlets finely pubescent to glabrous; leaves petiolate, the petioles 1–5 (–8) cm. long, the blades highly variable in size and shape, usually brightly colored or blotched, generally ovate-deltoid to broadly ovate, (1–) 4–12 (–17) × (1–) 3–7 (–10) cm., truncate to rounded or cuneate and attenuate at base, acute to acuminate at apex, crenate to lacinate at margin, scabrid to subglabrous above, hirtellous on nerves and often over lamina beneath, gland-dotted; flowers in verticils or in irregularly branched and sessile cymes, these disposed in simple or branched, terminal racemes or panicles 5–10 (–35) cm. long, the inflorescence rachis finely tomentose, the bracts ovate, to 5 × 4 mm., long-acuminate, deciduous, the pedicels 3–4 mm. long; calyx obliquely campanulate, pubescent and gland-dotted, 10-nerved, to 7 mm. long in fruit, the upper lip erect, ovate, 2–4 × 2–3 mm., rounded to acute at apex, the lateral teeth broadly oblong, truncate to rounded, 0.5–1.5 mm. long, the lowermost teeth connate to form a strap-shaped lobe to 4 mm. long in fruit, divided at apex; corolla blue to purple or mauve, infundibular, 8–13 (–18) mm. long, the tube paler, usually about 5 mm. long, puberulent, abruptly decurved, the upper lip about 1.5 mm. long, erect, the lower lip deeply concave, to 6 mm. long; filaments of stamens usually united 1–2 mm. at base, enclosed with style by lower lip of corolla; nutlets lenticular to broadly ovoid or subglobose, 0.75–1.2 mm. long, brown, glossy. Flowers and fruits are found throughout the year.

TIPIFICATION AND NOMENCLATURE: The type of *Ocymum scutellarioides* was described from Amboina; that of *Plectranthus scutellarioides* Bl. (non R. Br.) was a garden plant from Java collected by Blume. When Bentham (1832) wished to transfer Blume's concept into *Coleus*, he found it necessary to coin the name *C. blumei*, which is based on Blume's name, although that was illegitimate because of the prior combination of Brown (1810). Although the binomial *C. blumei* is still used by many horticulturists and some taxonomists, the two taxa are scarcely separable (e. g. Keng, 1969, who comments on the variability and recognizes five varieties).

DISTRIBUTION: Continental southeastern Asia (from India, southern China, and Taiwan) southward to Malesia and Australia, now pantropical by cultivation. It is difficult to ascertain how far eastward the species is indigenous, but in Fiji it probably was introduced only during the present century.

LOCAL NAMES AND USE: *Lata, lau lata, coleus*; a garden ornamental, the well-known *coleus* includes many cultivars differing principally in the color and pattern of leaf variegation.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Gillespie*, Nov. 23, 1927. NAITASIRE: Toninai-wau, Tholo-i-suva, *DA 16738*. REWA: Lami, in private garden, *DA 16437*; Suva Botanical Gardens, *DA 12104*. VANUA MBALAVU: *Bryan 586*. FIJI without further locality, in Fijian village, *Gillespie 3732*.

4. *PLECTRANTHUS* L'Hér. Stirp. Nov. 84 verso. 1788; Seem. Fl. Vit. 192. 1866; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1175. 1876; Briquet in Engl. & Prant, Nat. Pflanzenfam. IV. 3A: 352. 1897; J. K. Morton in J. Linn. Soc. Bot. 58: 242. 1962; Backer & Bakh. f. Fl. Java 2: 635. 1965; S. T. Blake in Contr. Queensland Herb. 9: 9. 1971; Codd in *Bothalia* 11: 374. 1975; H. Keng in Fl. Males. I. 8: 382. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 126. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 391. 1986. Nom. cons.

Coleus Lour. Fl. Cochinch. 358, 372. 1790; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1176. 1876; Briquet in Engl. & Prant, Nat. Pflanzenfam. IV. 3A: 359. 1897; Backer & Bakh. f. Fl. Java 2: 636. 1965; H. Keng in Gard. Bull. Singapore 24: 48. 1969; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 83. 1969; S. T. Blake in Contr. Queensland Herb. 9: 6. 1971; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 243. 1973; L. Cramer in Kew Bull. 32: 553. 1978, in Rev. Handb. Fl. Ceylon 3: 136. 1981.

Annual or perennial herbs or shrubs, the stems and leaves often succulent or semisucculent; inflorescences paniculate, racemose, or spicate, the flowers in 6-many-flowered verticils; calyx tubular to campanulate, the tube straight to declinate, gibbous in age, often villose within, the limb subequally 5-toothed or 2-lipped, the upper tooth the largest; corolla bilabiate, the tube decurved or straight, sometimes with a spur on upper side, the upper lip usually 4-lobed, shorter than lower lobe, recurved, the lower lip entire or notched, concave; stamens 4 (rarely 2), attached at mouth of corolla tube, free or united at base, didynamous, declinate along lower lip of corolla, the anthers with 1 theca; style declinate, the stigma briefly 2-lobed.

TYPE SPECIES AND NOMENCLATURE: The type species of *Plectranthus* is *P. fruticosus* L'Hér., type cons.; that of *Coleus* is *C. amboinicus* Lour. In uniting *Coleus* with *Plectranthus* we follow the opinion of most recent authors who have been intimately concerned with this large and taxonomically complex group of the Lamiaceae. The two genera were maintained by Bentham (1876) on the basis of united filaments in *Coleus* versus free filaments in *Plectranthus*. Some additional characters, such as calyx limb shape, disposition of inflorescence bracts, and shape of nutlets, have been employed by Blake (1971) and Cramer (1978) to separate the genera. However, many other taxonomists have agreed with Morton's (1962) conclusion that *Coleus* and *Plectranthus* cannot be satisfactorily distinguished on the basis of the stamen character, and no other alternative features have been identified as entirely reliable (for a review see Launert in Mitt. Bot. Staatssamml. München 7: 295-307. 1968; Codd in op. cit. 10: 245-252. 1971; Willemse in *Blumea* 25: 507-511. 1979). Interestingly, Merrill (in *Addisonia* 20: 12. 1937), describing the varying degree of stamen fusion in *Coleus amboinicus*, remarked: "Thus within the limits of this one species the generic differences between *Coleus* and *Plectranthus* break down."

DISTRIBUTION: Paleotropical, from southern Africa to India and eastward to Malesia, Australia, and the insular Pacific, with about 300 species. In Fiji one species is indigenous and a second is cultivated and sometimes naturalized.

USEFUL TREATMENTS OF GENUS: BLAKE, S. T. A revision of *Plectranthus* (Labiatae) in Australasia. Contr. Queensland Herb. 9: 1-120. 1971. CODD, L. E. *Plectranthus* (Labiatae) and allied genera in southern Africa. *Bothalia* 11: 371-442. 1975. CRAMER, L. H. A revision of *Coleus* (Labiatae) in Sri Lanka (Ceylon). Kew Bull. 32: 551-561. 1978.

KEY TO SPECIES

- Branchlets and inflorescences usually scattered-pubescent with appressed, antrorse, or rarely retrorse hairs; leaf blades thin-textured, with 3-6 pairs of coarse teeth along margin; flowers 6-10 in each verticil of inflorescence; corolla 2.5-4 mm. long, the lobes about 1 mm. long; stamens with filaments free at base; indigenous. 1. *P. forsteri*
- Branchlets and inflorescences densely spreading-hirsute; leaf blades fleshy, with more than 10 pairs of teeth along margin; flowers 10-20 (or more) in each verticil of inflorescence; corolla 8-12 mm. long, the lobes to 6 mm. long; stamens with filaments usually united toward base; cultivated and naturalized.

2. *P. amboinicus*

1. *Plectranthus forsteri* Benth. Lab. Gen. Sp. 38. 1832, in London J. Bot. 2: 227. 1843; A. Gray in Bonplandia 10: 37. 1862; Seem. Viti, 440. 1862, Fl. Vit. 192. t. 47. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 262. 1892; Gibbs in J. Linn. Soc. Bot. 39: 160. 1909; Guillaumin in J. Arnold Arb. 13: 29. 1932; Greenwood in Proc. Linn. Soc. 154: 103. 1943; J. W. Parham, Pl. Fiji Isl. 255. fig. 89. 1964, ed. 2. 347. 1972; S. T. Blake in Contr. Queensland Herb. 9: 45. fig. 2, Q, 4, C, 17, D, 22. 1971, in Austral Pl. 10: 322. 1980.

FIGURE 25.

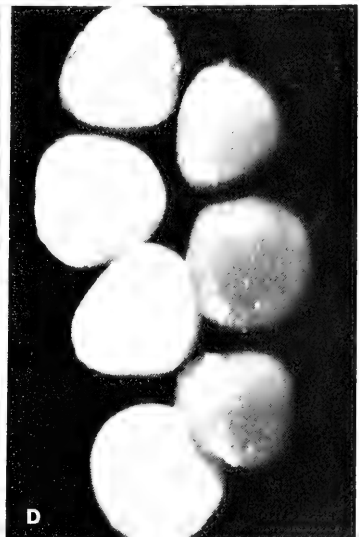
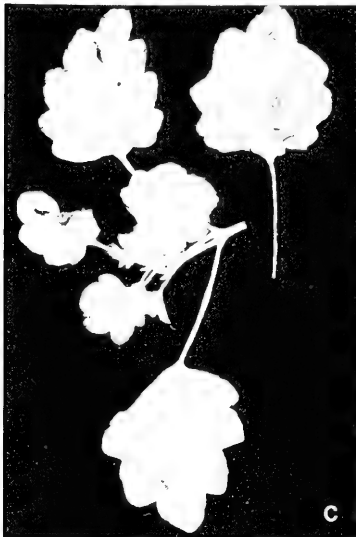
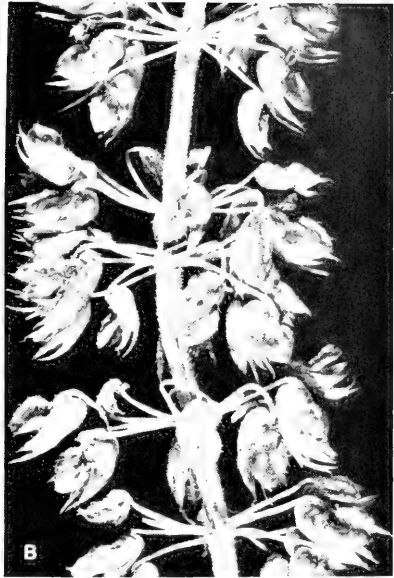
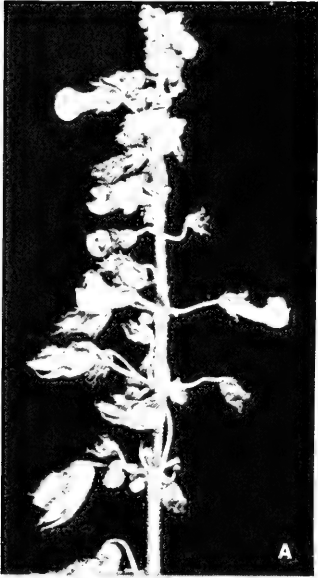
Ocymum pusillum Forst. f. Fl. Ins. Austr. Prodr. 91, nom. nud. 1786.*Coleus atropurpureus* sensu Seem. in Bonplandia 9: 258. 1861; non Benth.

Indigenous at elevations from near sea level to 1,050 m. in rocky places in forest, sometimes locally frequent in mountainous areas, and occasionally cultivated in villages; perennial herb, sometimes sprawling and subligneous, or subshrub to 1 m. high, the branchlets ascending to straggling, pubescent with short, appressed hairs as well as scattered, longer, antrorse (or rarely retrorse) hairs; leaves petiolate, the petioles slender, to 3 cm. long, the blades thin-textured, ovate to broadly ovate to deltoid, 1.5-3.5 × 1-3 cm., cuneate to truncate or subcordate at base, more or less obtuse at apex, coarsely crenate to crenate-serrate or repand at margin with 3-6 pairs of teeth, pubescent to glabrescent above and beneath with gland-tipped hairs, densely glandular beneath; verticils 6-10-flowered, arranged in solitary, pedunculate racemes 7-25 cm. long, the axis reddish, the bracts 1.2-1.8 mm. long, deciduous, the pedicels to 5 mm. long; calyx to 2.5 mm. long at anthesis, to 4.5 mm. long in fruit, short-pubescent and glandular without, the tube decurved, the upper lip orbicular to broadly ovate, the lateral lobes ovate to obliquely triangular, the lower lip shorter than tube, the lobes narrowly triangular; corolla white or pale blue, 2.5-4 mm. long, the lobes about 1 mm. long, pubescent without; stamens exserted, the filaments free, pale blue, nearly white; style exserted, about as long as stamens; nutlets subglobose to compressed, glossy dark brown, 0.7-1 mm. in diameter. Flowers have been collected in most months, fruits usually between October and March.

TYPIFICATION: The type of *Plectranthus forsteri* is *J. R. & G. Forster* (BM LECTOTYPE and ISOLECTOTYPE), collected on Tanna, New Hebrides, in August, 1774, during Cook's second voyage.

DISTRIBUTION: New Caledonia, Loyalty Islands, New Hebrides, Fiji, and Tonga. Several authors have also included Samoa in the range of this species, but W. A. Whistler (pers. comm.) states that it does not occur there. The *U. S. Expl. Exped.* specimen cited by Blake (1971) was presumably mislabelled, and the specimen cited by Reinecke (in Bot. Jahrb. 25: 672. 1898) actually represents *Stachytarpheta*. In Fiji the species occurs on at least five islands and may be anticipated on others. All specimens we have seen are here listed, and also a few cited by Blake (1971) which we have not seen.

FIGURE 25. *Plectranthus forsteri*; A, apical portion of inflorescence, showing flowers, × 4; B, midportion of inflorescence, showing fruiting calyces, × 4; C, distal portion of branchlet, showing lower leaf surfaces, with a detached leaf showing upper surface, × 1; D, nutlets, × 30. A & B from *Smith 9073*, C from *St. John 18109*, D from *Gillespie 2809a*.



LOCAL NAMES AND USES: *Lata, latha, mbambasanga, ndranumi, sende*. In earlier times the leaves were used as a cure for "bad eyes" and headaches and were also recommended for coughs and colds (Seemann, 1866). The species is sometimes brought into village cultivation as an ornamental.

AVAILABLE COLLECTIONS: YASAWAS: WAYA: Nangua, *St. John 18109*. VITI LEVU: MBA: Near Lautoka, *Greenwood 100* [cited by Blake; not seen by us]; Mt. Evans Range, *Greenwood 131* [cited by Blake; not seen by us], 238; Mt. Mbatilamu, *DA 14129*; Lomolomo Levu, *DA 14043*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4238*; Nandendeleva, Mt. Evans Range, *DA 14840*; vicinity of Nandarivatu, *Gibbs 650*; Nandala, south of Nandarivatu, *O. & I. Degener 32023*. NAMOSI: Hills east of Wainikoroiuva River, near Namuamua, *Smith 9073*; Mt. Voma, *DA 11643, 13983*. REWA: Nukulau Island, *Barclays s. n.* VITI LEVU without further locality, *Graeffe 1486* [err. cited by Blake as 1456]. OVALAU: Lovoni Valley, *Veitch*, Aug. 1865 [cited by Blake; not seen by us]; Levuka, *Carsons* [cited by Blake; not seen by us]. TAVEUNI: Somosomo, *Seemann 359*. MOALA: *Milne 115*. FIJI without further locality: *Hinds s. n.* [probably from Nukulau Island], *Harvey s. n.*, *Gillespie 2809a*.

2. *Plectranthus amboinicus* (Lour.) Spreng. Syst. Veg. 2: 690. 1825; Launert in Mitt. Bot. Staatssamml. München 7: 298. pl. 3. 1968; Codd in Bothalia 11: 388. fig. 10. 1975; H. Keng in Fl. Males. I. 8: 387. 1978; Willemsen in Blumea 25: 509. 1979.

Coleus amboinicus Lour. Fl. Cochinch. 372. 1790; Merr. in Addisonia 20: 11. pl. 646. 1937; Christophersen in Bishop Mus. Bull. 154: 39. 1938; Greenwood in Proc. Linn. Soc. 154: 103. 1943; Yuncker in Bishop Mus. Bull. 220: 235. 1959; Backer & Bakh. f. Fl. Java 2: 637. 1965; Pursglove, Trop. Crops, Dicot. 634. 1968; H. Keng in Gard. Bull. Singapore 24: 50. fig. 9a, a. 1969; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 102. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; J. W. Parham, Pl. Fiji Isl. ed. 2. 346. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 51, 63, 82. 1972; L. Cramer in Kew Bull. 32: 555. 1978, in Rev. Handb. Fl. Ceylon 3: 138. 1981.

Coleus aromaticus Benth. in Wall. Pl. Asiat. Rar. 2: 15. 1830; Reehinger in Denkschr. Akad. Wiss. Wien 85: 341. 1910; J. W. Parham, Pl. Fiji Isl. 254. 1964.

Salvia officinalis sensu J. W. Parham in Dept. Agr. Fiji Bull. 35: 140. 1959, Pl. Fiji Isl. 255. 1964; non L.

In Fiji *Plectranthus amboinicus* is seen from near sea level to about 250 m., sometimes cultivated but also naturalized in rocky and sandy areas in woods and thickets; sprawling and somewhat succulent herb to 1 m. high, sometimes subliguous and prostrate at base, the branchlets ascending, densely spreading-hirsute; leaves petiolate, the petioles 1–4.5 cm. long, densely pubescent, the blades fleshy, broadly ovate to suborbicular, rhombic, or reniform, 4–10 × 3–9 cm., rounded to truncate and then often long-attenuate at base, obtuse to rounded at apex, coarsely crenate to dentate at margin or entire toward base, densely appressed-pubescent above and beneath; verticils 10–20 (or more)-flowered, subglobose, arranged in terminal, spicate, densely pubescent inflorescences 10–20 cm. long, the bracts 3–4 mm. long, the pedicels slender, hirsute, to 5 mm. long; calyx campanulate, 1.5–4 mm. long, hirsute and glandular, the upper lip erect, broadly ovate-oblong, the other teeth narrow, acute; corolla pale blue or mauve to pink, 8–12 mm. long, the tube declinate, 3–4 mm. long, expanding distally, pubescent without, the upper lip to 4.5 × 3 mm., erect, puberulent, the lower lip to 5–6 × 4 mm., concave; filaments of stamens mostly fused into a tube around style; nutlets smooth, pale brown, about 0.7 × 0.5 mm. Flowers have been noted between March and September, but no fruiting specimens are at hand.

TYPIFICATION AND NOMENCLATURE: According to Launert (1968), Loureiro's specimen at BM is virtually unidentifiable, consisting of a stem fragment and an almost pulverized inflorescence, and the Rumphius (Herb. Amb. 5: 294. t. 102, fig. 2. 1747) mention cited by Loureiro is "not conclusive at all." A representative specimen of Loureiro's *Coleus amboinicus* is *A. F. G. Kerr s. n.* (BM), from Bai Hu Súa, Siam, May 25, 1924; however, Launert refrains from suggesting this as a neotype. Cramer (1981) indicated the Rumphius illustration as the lectotype. *Coleus aromaticus* is typified by *Buchanan-Hamilton* (K-W HOLOTYPE), from Patna, India (Codd, 1975). Recent students agree that these two taxa are conspecific.

DISTRIBUTION: *Plectranthus amboinicus* has often been considered of unknown origin; it is widely cultivated in the Indo-Malesian region and is now almost pantropical in cultivation and naturalization. Launert (1968) suggests that, since the species is known from "natural habitats" in southern tropical Africa, that region may have been its place of origin, from which it may have been distributed by seafaring Portuguese to the East. The earliest Fiji collection we have noted (*Greenwood 734*) was obtained in September, 1927, but the species was probably cultivated in Fiji much earlier than that date.

LOCAL NAMES AND USES: *Rhaivoki, sage*; commonly cultivated but also considered a weed; it is used as a spice, as flavoring in cooking meat, etc.

AVAILABLE COLLECTIONS: YASAWAS: WAYA: Woods along Wailevu Creek, *St. John 18080*. VITILEVU: MBA: Lautoka, *Greenwood 734*. NAITASIRI: Toninaiwau, Tholo-i-suva, *DA 16757*. VANUA LEVU: THAKAUNDROVE: Namale, *DA 16890*; Mbutha Bay, *DA 11524*. TAVEUNI: Not collected but noted naturalized along roads [note with *DA 16890*].

5. **ORTHOSIPHON** Benth. in Bot. Reg. **15**: sub. *t.* 1300. 1830, in Benth. & Hook. f. Gen. Pl. **2**: 1174. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. **3A**: 372. 1897; Sleesen in Reinwardtia **5**: 37. 1959; Backer & Bakh. f. Fl. Java **2**: 640. 1965; H. Keng in Fl. Males. I. **8**: 379. 1978; L. Cramer in Rev. Handb. Fl. Ceylon **3**: 123. 1981.

Herbs or subshrubs with woody rootstocks, the branchlets glabrous or pubescent; leaf blades serrate to crenulate or subentire, dotted-glandular beneath; inflorescences racemose, terminal, the verticils 4-6-flowered, distant; calyx tubular to campanulate, deflexed and accrescent in fruit, 10-ribbed, bilabiate, the upper lip broad, membranaceous, often recurved, the margins decurrent on calyx tube, the lower lip 4-lobed or -toothed, the lateral teeth oblong, aristate, the lower teeth subulate; corolla longer than calyx, bilabiate, the tube slender, straight, the upper lip 3- or 4-lobed, the lower lip entire, concave; stamens didynamous, declinate, included to long-exserted, the filaments not appendaged at base, glabrous, the anther thecae confluent; disk 4-lobed, usually produced anteriorly; style minutely capitate to clavate and briefly emarginate at apex; nutlets ovoid, smooth or tuberculate, the scar basal and small.

LECTOTYPE SPECIES: Apparently not yet designated (ING, 1979).

DISTRIBUTION: Africa and Indian Ocean islands to southeastern Asia, Malesia, and Australia, with 35-40 species, one of which is cultivated and naturalized in Fiji.

USEFUL TREATMENT OF GENUS: SLEESEN, ELLEN VAN DER. Revision of Malaysian Orthosiphon (Lab.). Reinwardtia **5**: 37-43. 1959.

1. **Orthosiphon aristatus** (Bl.) Miq. Fl. Ned. Ind. **2**: 943. 1858; Sleesen in Reinwardtia **5**: 38. 1959; Backer & Bakh. f. Fl. Java **2**: 640. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 104. 1970; J. W. Parham, Pl. Fiji Isl. ed. **2**. 347. 1972; H. Keng in Fl. Males. I. **8**: 380. *fig. 31*. 1978; L. Cramer in Rev. Handb. Fl. Ceylon **3**: 125. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **64**. 1985.

Ocimum aristatum Bl. Bijdr. Fl. Ned. Ind. **833**. 1826.

Cultivated in villages and gardens at elevations up to about 200 m., and sometimes naturalized along roadsides; slender perennial herb to 2 m. high, the branchlets 4-angled, sparsely puberulent to glabrescent, sometimes purplish; leaves petiolate, the petioles 1-2 (-4.5) cm. long, puberulent, the blades lanceolate to ovate or rhombic, 2-9 × 1-5 cm., chartaceous to membranaceous, cuneate at base, acute to acuminate at apex, coarsely serrate at margin (especially above middle of blade), glabrous to puberulent on both surfaces; racemes 10-15 (-20) cm. long, the verticils lax, distant, the bracts sessile, ovate, 1-2 mm. long, ciliolate, the pedicels to 4 mm. long; calyx curved-campanulate, the tube to 3 mm. long at anthesis, 10-nerved, scabridulous on

nerves, the upper lip ovate, to 3×2.5 mm., the lower lip longer, the median lobes acuminate-aristate; corolla white or pale blue, 10–16 (–20) mm. long, the tube 10–15 mm. long, straight, strigose-tomentose without, the upper lip shallowly 4-lobed, recurved, the lower lip as long as upper lip, concave; stamens glabrous, coiled in bud, projecting 2 cm. or more beyond corolla throat, the filaments white, purplish distally, the anthers purple; style 5–6 cm. long, glabrous, clavate and briefly 2-lobed at apex, white, purplish distally; nutlets ovoid-oblong, to 2 mm. long, glabrous, rugose. Flowers and fruits have been obtained between March and July.

TYPIFICATION AND NOMENCLATURE: *Ocimum aristatum* is typified by *Blume s. n.* (L HOLOTYPE), collected in fields around Batavia, Java. A conceivably older specific epithet is provided by *Trichostema spiralis* Lour. Fl. Cochinch. 371. 1790, the basionym of *Orthosiphon spiralis* (Lour.) Merr. in Lingnaam Agric. Rev. 2: 137. 1925. However, Loureiro's scanty description, mentioning "folia integerrima tomentosa," does not seem to indicate the present species, and there is no Loureiro specimen of *Orthosiphon* at BM (Sleesen, 1959).

DISTRIBUTION: India through southeastern Asia and the Nicobars and throughout Malesia to Australia, widely cultivated elsewhere and sometimes naturalized, as in Fiji, where it was introduced probably during the present century.

LOCAL NAMES AND USES: *Kumi ni pusi*, *cat's whiskers*; a garden ornamental. Medicinal uses in Malesia are discussed at length by Sleesen, 1959, pp. 40–41.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Principal Agricultural Station, Koronivia, DA 12126. TAILEVU: Ndakuivuna, Smith 7233. REWA: Lami, in private garden, DA 16469. VANUA LEVU: MBUA: Near Nasawana Village, DA 16956.

6. *OCIMUM* L. Sp. Pl. 597. 1753; Seem. Fl. Vit. 191. 1866; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1171. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 369. 1897; Backer & Bakh. f. Fl. Java 2: 638. 1965; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 102. 1969; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 268. 1973; H. Keng in Fl. Males. I. 8: 376. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 111. 1981.

Annual or perennial herbs or shrubs, the branchlets glabrous or pubescent; leaves usually long-petiolate, the blades subentire to serrate; inflorescences terminal, racemiform or paniculate, the flowers 4–10 in distant verticils, pedicellate, the bracteoles small or absent; calyx campanulate, bilabiate, frequently deflexed in fruit, the upper lip rounded, entire, its margins decurrent on tube, the lower lip 4-toothed, the teeth unequal, aristate, ascending-incurved and often closing mouth of tube; corolla bilabiate, the upper 4 lobes subequal, connate, the lower lobe rounded, spreading, flat or concave; stamens 4, equalling corolla tube or exserted, the filaments distinct, the lower pair glabrous or pubescent, often with an appendage near base, the anthers with 2 functional thecae; style exserted, equally or unequally bifid at apex, the lobes flat; nutlets obovate to subglobose, united toward base, smooth or verrucose.

LECTOTYPE SPECIES. *Ocimum basilicum* L. (vide Britton & Millspaugh, Bahama Fl. 380. 1920).

DISTRIBUTION: Pantropical and subtropical, with 50–60 species, mostly of the Old World. Two species occur in Fiji, both weedy but at least one of them sometimes cultivated. A third species, *Ocimum gratissimum* L., is also a widespread weed in the Pacific and may be anticipated in Fiji; it is readily identified by the lower calyx lip being shorter than the upper lip and eventually curving upward to close the calyx mouth, by the glabrous interior of the calyx tube, and by the subglobose nutlets that do not swell in water, among other characters. Specimens of *O. gratissimum* with especially heavy

indument (the inflorescence in particular being densely villose-hirsute) have been referred to var. *suave* (Willd.) Hook. f.

KEY TO SPECIES

- Calyx to 9 mm. long in fruit (at anthesis 2-3 mm. long), conspicuously hirsute within, at least toward base of tube; nutlets 1.5-2.5 mm. long; corolla to 9 mm. long. 1. *O. basilicum*
 Calyx to 5 mm. long in fruit (at anthesis about 2.5 mm. long), glabrous within except occasionally puberulent near base of upper calyx lobe; nutlets 0.8-1.2 mm. long; corolla to 4 mm. long. 2. *O. tenuiflorum*

1. ***Ocimum basilicum*** L. Sp. Pl. 597. 1753; Engl. in Bot. Jahrb. 7: 476. 1886; Drake, Ill. Fl. Ins. Mar. Pac. 261. 1892; Christophersen in Bishop Mus. Bull. 154: 40. 1938; Yuncker in op. cit. 178: 104. 1943; Greenwood in Proc. Linn. Soc. 154: 103. 1943; Yuncker in Bishop Mus. Bull. 220: 236. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 140. 1959, Pl. Fiji Isl. 255. 1964, ed. 2. 347. 1972; Backer & Bakh. f. Fl. Java 2: 639. 1965; Purselglove, Trop. Crops, Dicot. 636. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 104. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 342. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 50, 61, 109. 1972; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 269. 1973; H. Keng in Fl. Males. 1. 8: 377. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 115. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 64. 1985.

Ocimum gratissimum sensu Seem. in Bonplandia 9: 258. 1861, Viti, 440. 1862, Fl. Vit. 191. 1866, op. cit. 432. 1873; J. W. Parham, Pl. Fiji Isl. ed. 2. 347. 1972; non L.

In Fiji *Ocimum basilicum* is cultivated in villages and gardens up to an elevation of about 250 m., and it is also a naturalized weed of roadsides and waste places; aromatic annual herb or subshrub to 1 m. high, the branchlets glabrous to hispid; leaves petiolate, the petioles slender, to 2 cm. long, the blades elliptic to ovate or oblong, 2-5 x 1-2 cm., cuneate to attenuate at base, acute at apex, entire or obscurely dentate at margin, glabrous to scattered-pubescent on both surfaces; inflorescence rachis and bracts rich purple, the verticils many-flowered, distant, arranged in racemose inflorescences 10-15 (or more) cm. long, the pedicels short, the bracteoles 2-6 mm. long; calyx greenish, purple-tinged, 2-3 mm. long at anthesis, enlarging to 9 mm. long in fruit, conspicuously hirsute within at least toward base, the upper lip suborbicular, the lateral teeth ovate, the lowermost teeth subulate, equalling or exceeding the upper lip, eventually turning upward and closing calyx mouth; corolla white, to 9 mm. long, glabrous to hispid; filaments of stamens exerted, white, the upper pair each with a small, basal, toothlike projection; style purplish; nutlets dark brown to blackish, ellipsoid, 1.5-2.5 mm. long, pitted, swelling in water. Flowers are probably not seasonal, but most of the dated available collections were in flower and fruit between May and July.

TYPIFICATION: Several references were cited by Linnaeus; the type is a specimen from western Asia, Herb. Linn. 749.5 (LINN HOLOTYPE) (Cramer, 1981).

DISTRIBUTION: Paleotropical, now widely distributed; it was well established in many Pacific archipelagoes in the nineteenth century and may even have been an aboriginal introduction.

LOCAL NAMES AND USES: *Tomole*, *tulsi* (Hindi), *basil*; an ornamental, also grown as a potherb, the leaves being used for flavoring soups, sauces, and other foods. The species yields basil oil, used in the perfume industry and for scenting soaps.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Namulomulo and along road from Nandi, DA 9746, 9753, 10290. NATASIRI: Plant Industry and Quarantine Station, Nanduruloulou, DA 12141; Toninaiwau, Tholoi-suva, DA 16951. OVALAU: Lovoni Village, Smith 7482. WAKAYA: Milne 380. VANUA LEVU: MATHUATA: Lambasa, Greenwood 480. MATUKU: Moseley, July, 1874. LAKEMBA: Harvey, Nov., 1855. Seemann 358.

2. *Ocimum tenuiflorum* L. Sp. Pl. 597. 1753; Benth. Lab. Gen. Sp. 11. 1832, in DC. Prodr. 12: 39. 1848; H. Keng in Fl. Males. I. 8: 378. *fig. 30*. 1978; Press & Sivar. in Bull. Brit. Mus. Nat. Hist. (Bot.) 19: 113. *fig. 1*. 1989.

Ocimum sanctum L. Mant. Pl. 85. 1767; Benth. Lab. Gen. Sp. 11. 1832, in DC. Prodr. 12: 38. 1848; Guillaumin in J. Arnold Arb. 13: 29. 1932; Christophersen in Bishop Mus. Bull. 154: 40. 1938; Greenwood in Proc. Linn. Soc. 154: 102. 1943; Yuncker in Bishop Mus. Bull. 178: 104. 1943, in op. cit. 184: 61. 1945; J. W. Parham, Pl. Fiji Isl. 255. 1964, ed. 2. 347. 1972; Backer & Bakh. f. Fl. Java 2: 639. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 104. 1970; L. Cramer in Rev. Handb. Fl. Ceylon 3: 116. 1981.

In Fiji *Ocimum tenuiflorum* is found near sea level or at low elevations as a weed in cleared areas and in coconut plantations; erect, much-branched herb or subshrub to 1 m. high, with a pungent odor, the branchlets soft-pubescent; leaves petiolate, the petioles to 2.5 cm. long, the blades elliptic to elliptic-oblong, 3-6 × 1-2.5 cm., cuneate to attenuate at base, obtuse to acute at apex, entire to remotely serrate at margin, pubescent on both surfaces but especially on nerves beneath; verticils of flowers arranged in slender racemes or panicles 8-10 cm. long, the bracteoles ovate, acuminate, ciliate, 2-3 mm. long, the pedicels to 4.5 mm. long; calyx about 2.5 mm. long at anthesis, in fruit to 5 mm. long, glabrous within, the upper lip suborbicular, reflexed, short-apiculate, the lower lip longer than upper lip, the teeth 4, lanceolate; corolla pale pink or pale lavender, to 4 mm. long; filaments of stamens exerted, slender, the upper pair each with a small, bearded, basal appendage; nutlets purple-green to brown, broadly ellipsoid, 0.8-1.2 mm. long, smooth to minutely pitted, swelling in water. Our few specimens were in flower and fruit between July and September.

TYPIFICATION AND NOMENCLATURE: For *Ocimum tenuiflorum* Linnaeus gave the locality: "Habitat in Malabar." There are two specimens in the Linnaean Herbarium; as lectotype Press and Sivarajan (1989) indicate Herb. Linn. 749.13 (LINN LECTOTYPE), the source of the specimen not known. *Ocimum sanctum* was published with the phrase "Habitat in India," with the letters "HU" (Hortus Uppsaliensis) at the end of the description; Press and Sivarajan (1989, *fig. 2*) have traced three syntype specimens, deeming the most suitable to be Herb. Linn. 749.7 (LINN LECTOTYPE). Bentham (1832, 1848) suggested that the two Linnaean concepts might be conspecific, although he maintained them as distinct species.

DISTRIBUTION: Probably indigenous in tropical Asia, but now pantropical in distribution. In Fiji it is noted by collectors as a weed, but possibly it was originally introduced as a cultivated plant; the earliest Fijian collection we have noted is *Greenwood 64*, obtained in September, 1920.

LOCAL NAMES AND USE: *Tamoli, ndomele*; on Taveuni the leaves are said to be part of an internal remedy for filariasis.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Thuvu, west of Singatoka, *Greenwood 64*. TAVEUNI: Korovou Village, *Weiner 71-7-94*; Nggeleni Village, *Weiner 71-7-94a*; Mt. Vernon Estate, *DA 11520*. ONEATA: *Bryan 485*. FIJI without further locality, *Gillespie 2809*.

7. ANISOMELES R. Br. Prodr. Fl. Nov. Holl. 503.1810; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1207. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 268. 1896; Backer & Bakh. f. Fl. Java 2: 624. 1965; H. Keng in Gard. Bull. Singapore 24: 33. 1969, in Fl. Males. I. 8: 328. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 176. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 383. 1986.

Perennial herbs or subshrubs, the stems and branchlets villose to lanate; leaves petiolate, the blades serrate-crenate to dentate; inflorescences terminal, spicate to paniculate, or the verticils axillary; calyx ovoid to campanulate to tubular, slightly enlarged in fruit, the tube straight, 10-nerved, the limb 5-lobed, the lobes subequal; corolla tube about as long as calyx, pilose-annulate within, the limb bilabiate, the

upper lip entire, erect, the lower lip 3-lobed, spreading, the median lobe the largest, emarginate to bifid; stamens 4, didynamous, exerted, the filaments pubescent at middle, the anthers of upper pair of stamens sterile, those of lower pair with 1 fertile cell; disk equal-sided; style subequally bifid at apex; nutlets smooth, ovoid or oblong, bluntly angled and with a prominent scar on ventral face.

LECTOTYPE SPECIES: Brown (1810) included three species in *Anisomeles*; no lectotypification was designated by ING (1979), but Subramanyam and A. N. Henry listed *A. moschata* R. Br. as the lectotype species in 1969 (in Taxon 18: 595). The name *Epimeredi* Adanson (Fam. Pl. 2: 192. 1763) was considered an earlier generic name for the same concept by Rothmaler, with the lectotype species *E. malabaricus* (L.) Rothm. (based on *Nepeta malabarica* L.), in Repert. Sp. Nov. 53: 12. 1944, where seven new combinations were proposed. In view of this, Subramanyam and Henry (1969) proposed the conservation of *Anisomeles*, but the Committee for Spermatophyta (in Taxon 20: 388. 1971) concluded that the need for conservation was unproven, as the two genera may not be taxonomically or nomenclaturally the same.

DISTRIBUTION: Tropical and subtropical Asia to Malesia and Australia, with about seven species; one naturalized species occurs in Fiji.

1. *Anisomeles indica* (L.) Kuntze, Rev. Gen. Pl. 2: 512. 1891; Backer & Bakh. f. Fl. Java 2: 624. 1965; H. Keng in Gard. Bull. Singapore 24: 34. fig. 5. 1969, in Fl. Males. I. 8: 329. fig. 8. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 176. 1981.

Nepeta indica L. Sp. Pl. 571. 1753.

Anisomeles ovata R. Br. in Ait. f. Hort. Kew. ed. 2. 3: 364. 1811; Greenwood in Proc. Linn. Soc. 154: 94. 1943.

Epimeredi indicus Rothm. in Repert. Sp. Nov. 58: 12. 1944; J. W. Parham in Dept. Agr. Fiji Bull. 35: 140. 1959, Pl. Fiji Isl. 254. 1964, ed. 2. 346. 1972.

In Fiji *Anisomeles indica* is sparingly naturalized in waste places and coconut plantations and along roadsides near sea level, presumably as an escape from occasional cultivation; perennial herb or subshrub to 2 m. high, the branchlets acutely 4-angled, sparingly to densely pubescent with retrorse hairs; petioles 1-7.5 cm. long; leaf blades ovate, 3-10 × 3-8 cm., cordate, cuneate, or truncate at base, acute at apex, crenate-serrate at margin, usually villose-pilose on both surfaces; spikes terminal, 8-38 cm. long, the verticils many-flowered, rarely few- or 1-flowered, the floral leaves linear-oblong to subulate, 7-8 × 1 cm., the bracts linear, to 6 mm. long; flowers short-pedicellate, the calyx long-campanulate, 5-10 mm. long, hirsute, the lobes nearly as long as tube, ovate-lanceolate, acute to acuminate; corolla purple or blue, occasionally white, to 18 mm. long, the tube linear, to 7 mm. long, the upper lip to 6 mm. long, pilose dorsally, the lower lip longer, the median lobe deflexed, broadly orbicular; filaments of stamens pubescent; disk more or less 4-lobed; style glabrous; nutlets pale yellow-brown, ovoid to ellipsoid, to 2.5 mm. long, subtrigonal, glabrous. Flowers and fruits have been noted between April and November.

TIPIFICATION AND NOMENCLATURE: For *Nepeta indica* Linnaeus cited several prior references; the type is a specimen from "India," Herb. Linn. 726.28 (LINN HOLOTYPE) (Cramer, 1981). *Anisomeles ovata* was based on a later interpretation of *N. indica* (L. Sp. Pl. ed. 2. 799. 1763), but recent authors (e. g. Keng, 1969, 1978; Cramer, 1981) consider it a direct synonym of *A. indica*.

DISTRIBUTION: Southeastern Asia (from India, China, and Japan) southeastward throughout Malesia; presumably cultivated elsewhere and sometimes naturalized, in the Pacific at least in Fiji and Samoa. The earliest Fijian record we have noted is Greenwood 583, collected in May, 1923. Its Fijian distribution is very local and apparently is not expanding (Parham, 1959).

LOCAL NAME AND USES: *Gumma* (Hindi); the plant is reputed to have medicinal uses for coughs, asthma, etc., and the leaves are sometimes smoked.

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Korothirithiri, DA 2735; Tailevu without further locality, DA 7560. OVALAU: Levuka, Greenwood 583, DA 11838. VANUA LEVU: THAKAUNDROVE: Plantations near Savusavu, DA 8835, 11525, 11528, 14785. FIJI without further locality, DA 3919.

8. *POGOSTEMON* Desf. in Mém. Mus. Hist. Nat. (Paris) 2: 154. 1815; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1179. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 328. 1897; Merr. Fl. Manila, 410. 1912; Backer & Bakh. f. Fl. Java 2: 632. 1965; H. Keng in Gard. Bull. Singapore 24: 151. 1969, in Fl. Males. I. 8: 351. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 171. 1981.

Annual or perennial herbs or subshrubs, often strongly scented, usually pubescent; leaves opposite or whorled, sessile or petiolate, the blades entire or serrate; flowers small or minute, the verticils arranged in spicate, racemose, or paniculate inflorescences, the bracts small, densely pubescent; calyx tubular to campanulate, (4- or)5-toothed, the limb subequal, the throat glabrous; corolla tubular, exserted or included, the limb spreading, subequally 4-lobed or the upper 3 lobes united to form a 3-lobed lip, the lower lip spreading; stamens 4, exserted, the filaments straight or declinate, bearded, the anthers 2-celled, the locules confluent; disk subentire; style subequally 2-lobed at apex; nutlets ovoid to ellipsoid or oblong, smooth to granulate.

TYPE SPECIES: *Pogostemon plectranthoides* Desf. The genus *Pogostemon* Desf. was proposed for conservation against *Alopecuro-veronica* L. by Bakhuizen, Keng, and van Steenis (in Taxon 19: 820. 1970), but the Committee for Spermatophyta (in Taxon 23: 820. 1974) held that conservation was unnecessary, believing *Alopecuro-veronica* not to have been validly published.

DISTRIBUTION: India to southern China and Japan and southeastward into Malesia and Australia, with about 60 species (if *Dysophylla* Bl. is included). One species is naturalized in Fiji, presumably as an escape from cultivation.

1. *Pogostemon cablin* (Blanco) Benth. in DC. Prodr. 12: 156. 1848; Merr. Fl. Manila, 411. 1912; A. C. Sm. in Sargentia 1: 115. 1942; J. W. Parham, Pl. Fiji Isl. 255. 1964, ed. 2. 348. 1972; Backer & Bakh. f. Fl. Java 2: 633. 1965; Purseglove, Trop. Crops, Dicot. 636. 1968; H. Keng in Gard. Bull. Singapore 24: 154. 1969; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 99. 1972; H. Keng in Fl. Males. I. 8: 353. 1978.

Mentha cablin Blanco, Fl. Filip. 473. 1837.

Pogostemon nepetoides Stapf in Kew Bull. 1908: 116. 1908; Yuncker in Bishop Mus. Bull. 178: 104. 1943.

In Fiji *Pogostemon cablin* has been noted only as an infrequent weed in clearings at elevations up to 400 m., but it may also be anticipated in cultivation; erect, aromatic herb to 1 m. high, the branchlets tomentose; leaves petiolate, the petioles 1-3.5 (-6.5) cm. long, tomentose, the blades membranaceous to thin-chartaceous, ovate, 5-12 (-16) × 3.5-8 (-12) cm., cuneate, rounded, or truncate and sometimes oblique at base, acute at apex, doubly incised-dentate or -crenate at margin but entire toward base, appressed-pubescent on both surfaces; verticils of flowers arranged in spicate racemes or panicles (2-) 15-30 (-40) cm. long, often congested toward apices of inflorescence branches, the bracts imbricate, lanceolate to ovate, acute, to 8 mm. long; calyx tubular, 4-5 mm. long, to 6 mm. long in fruit, pubescent without, equally 5-toothed; corolla 6-8 mm. long; filaments of stamens soft-pubescent; style 2-branched at apex; nutlets ellipsoid, to 1 mm. long, about 0.5 mm. broad, subtriquetrous, smooth, black.

TYPIIFICATION AND NOMENCLATURE: *Mentha cablin* was presumably based on a Blanco specimen from the Philippines, but we have not noted that any author claims to have seen one; a few Blanco specimens are said to be still extant at MA (Stafleu & Cowan, Tax. Lit. ed. 2. 1: 229. 1976). *Pogostemon nepetoides* was also based on a collection from the Philippines, Micholitz (K HOLOTYPE), without precise locality. The two taxa are not considered separable by recent specialists.

DISTRIBUTION: Ceylon, continental southeastern Asia, and Malesia, naturalized elsewhere, presumably as an escape from cultivation. In our area it occurs in Fiji, Samoa, and Tonga. The specimen from Niue cited by Yuncker (1943) may possibly be referable to *Plectranthus amboinicus* (i. e. *Coleus amboinicus*; cf. Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 102. 1970). The earliest record in Fiji is Degener & Ordóñez 14108, obtained in 1940, but the species may have been in cultivation earlier than that.

LOCAL NAMES AND USES: *Tukilamlam*; *patchouli* (the usual name, but not recorded in Fiji). The leaves are used to scent coconut oil. In Samoa (B. E. V. Parham, 1972) the species is used as a potherb or condiment, and presumably it had been introduced into Fiji for similar purposes. Elsewhere an essential oil is extracted from dry shoots; it is one of the best fixatives for heavy perfumes and is used in soaps, hair tonics, and tobacco; it gives the characteristic odor to cashmere shawls and carpets (Purseglove, 1968).

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Vatukarasa, Degener 15326. VANUA LEVU: THAKAUNDOVE: Near summit of Mt. Vatunivuaomonde, Savusavu Bay region, Degener & Ordóñez 14018.

9. *MENTHA* L. Sp. Pl. 576. 1753; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1182. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 317. 1896; Backer & Bakf. f. Fl. Java 2: 631. 1965; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 266. 1973; H. Keng in Fl. Males. I. 8: 343. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 169. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 382. 1986; Webb et al. Fl. New Zealand 4: 777. 1988.

Perennial herbs, often strongly scented, erect or prostrate, with creeping rootstocks; leaf blades often gland-dotted; inflorescences dense, terminal, cylindrical spikes or panicles, the flowers arranged in verticils, the bracts usually small; calyx tubular to campanulate, 10-nerved, the throat glabrous or villose, the limb 5-toothed, actinomorphic to somewhat bilabiate; corolla infundibular, the limb 4-lobed, somewhat irregular, the uppermost lobe larger than the others, entire to emarginate; stamens 4, sometimes didynamous, erect, included or exserted, the filaments glabrous; disk entire, symmetrical; style exserted, 2-lobed at apex; nutlets ovoid, smooth to reticulate.

LECTOTYPE SPECIES: *Mentha spicata* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 148. 1913).

DISTRIBUTION: Principally in North Temperate regions of the Old World, but also extending southward to Africa, with 30 or more species. Two taxa are known to be cultivated in Fiji.

KEY TO SPECIES

Leaves usually distinctly petiolate (sometimes subsessile on shoots growing in water), peppermint- or lemon-scented. 1. *M. × piperita*
 Leaves sessile or subsessile, spearmint-scented. 2. *M. spicata*

1. *Mentha* × *piperita* L. Sp. Pl. 576. 1753; Purseglove, Trop. Crops, Dicot. 636. 1968; H. Keng in Fl. Males. I. 8: 344. 1978; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 64. 1985; Webb et al. Fl. New Zealand 4: 779. fig. 77, B. 1988.

Mentha arvensis sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 347. 1972; non L.

Frequently cultivated in gardens in Fiji at low elevation; rhizomatous perennial herb, the stems glabrous to sparsely pubescent, often purplish; leaves variable, petiolate, the blades 1-6 × 1-3.5 cm., lanceolate-elliptic to oblong-ovate, ovate, or suborbicular, somewhat rugose, cuneate to rounded or cordate at base, sharply acute to apiculate at apex, serrate at margin, pubescent to glabrous; inflorescences spicate to subcapitate, the terminal verticils congested, the basal ones more distant, mostly glabrous except on calyces; calyx 3-4 mm. long, tubular, purple and dotted with oil glands, the teeth subequal, ciliate, narrowly acuminate, much shorter than calyx tube at anthesis; corolla 5-6 mm. long, glabrous, the tube exserted; stamens small, included; nutlets mostly absent (plants sterile).

TYPIFICATION: Tucker, Harley, and Fairbrothers (in Taxon 29: 235. 1980) indicate that *Mentha piperita* was based solely on Ray's Syn. Meth. Stirp. Brit. t. 10, fig. 2. 1724, based on a Sherardian specimen (OXF) (illustrated in Taxon 29: 246. fig. 6). The taxon is considered a hybrid of *M. aquatica* L. × *M. spicata* L.

DISTRIBUTION: The hybrid *Mentha* × *piperita* is indigenous in Europe and is now widespread in cultivation. It was probably an early European introduction into Fiji, now commonly seen in gardens but seldom collected.

LOCAL NAMES AND USES: *Mint*, *peppermint*; the leaves are aromatic and are used for flavoring. Peppermint oil, obtained by steam distillation, is used in confectionery and liqueurs, and in pharmaceutical and dental preparations (Purseglove, 1968).

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16767.

2. *Mentha spicata* L. Sp. Pl. 576. 1753; Purseglove, Trop. Crops, Dicot. 636. 1968; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 64. 1985; Webb et al. Fl. New Zealand 4: 781. fig. 77, D. 1988.

Mentha viridis L. Sp. Pl. ed. 2. 804, nom. illeg. 1763; J. W. Parham, Pl. Fiji Isl. 255. 1964.

In Fiji *Mentha spicata* is occasionally cultivated at low elevations for household use, but no herbarium specimens seem to be available; rhizomatous perennial herb, the stems glabrous to gray-villose, often reddish; leaves short-petiolate to sessile, the blades 2.5-9 × 0.7-3 cm., lanceolate to elliptic to ovate or oblong, plane to rugose, cuneate to cordate at base, obtuse to briefly acuminate at apex, scattered-puberulent on nerves beneath or densely pubescent above and persistently gray-villose beneath; inflorescences spicate, the central spike 4-12 cm. long, usually sparsely pubescent or sometimes gray-villose, the flowers pedicellate; calyx 1.5-2.2 (-3.5) mm. long, purplish, sparsely gland-dotted, the teeth lanceolate to linear-subulate, ciliate, acuminate, somewhat shorter than or equalling calyx tube; corolla 3-5 mm. long, the lobes gland-dotted without; stamens included or exserted, the anthers 0.35-0.4 mm. long; style long-exserted; nutlets 0.5-0.7 mm. long, broadly ovoid, minutely reticulate or granular or the plant sometimes sterile.

TYPIFICATION: *Mentha spicata* L. (1753) included three varieties, of which the first, var. *viridis*, was chosen as the lectotype of the species by Tucker, Harley, and Fairbrothers (in Taxon 29: 234. 1980). A specimen (BM) from the Clifford Herbarium is taken as the LECTOTYPE of *M. spicata* and its type variety *viridis* and is illustrated in Taxon 29: 242. fig. 2.

DISTRIBUTION: *Mentha spicata* is perhaps an allopolyploid derived from *M. longifolia* and *M. suaveolens*. A number of infraspecific taxa are recognized; Webb et al.

(1988) record two subspecies in New Zealand: subsp. *spicata* with glabrous to sparsely pubescent stems and leaves, and subsp. *tomentosa* (Briquet) Harley with leaf blades persistently gray-villose beneath and densely pubescent above. The indigenous range of the former subspecies is unknown; that of the latter is the Mediterranean region and Asia Minor.

LOCAL NAMES AND USE: *Mint, spearmint*; spearmint oil is used in the preparation of sauces and jellies and to flavor food, as well as commercially in chewing gum, etc.

10. *LEUCAS* R. Br. Prodr. Fl. Nov. Holl. 504. 1810; Benth. Lab. Gen. Sp. 602. 1834; Seem. Fl. Vit. 192. 1866; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1213. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 250. 1896; Backer & Bakh. f. Fl. Java 2: 622. 1965; H. Keng in Gard. Bull. Singapore 24: 100. 1969, in Fl. Males. I. 8: 337. 1978; Sebald in Stuttgarter Beitr. Naturk. Ser. A. 341: 6. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. 47: 24. 1981; L. Cramer in Rev. Handb. Fl. Ceylon 3: 181. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 387. 1986.

Perennial herbs or shrubs, the stems and leaves often villose; leaves petiolate, the blades dentate; flowers arranged in dense, many-flowered, axillary, distant verticils, these sometimes forming terminal, capitate clusters; calyx 8-10-nerved, often striate, the mouth symmetrical or oblique, the limb 8-10-toothed, the teeth subequal or frequently unequal with the posterior one largest; corolla tube slender, annulate or not within, the limb bilabiate, the upper lip short, erect, hooded, entire or rarely emarginate, densely hirsute without, the lower lip longer, spreading, 3-lobed, the median lobe largest; stamens 4, didynamous, the upper pair shorter, all ascending under upper lip of corolla, the filaments glabrous, the anthers 2-celled, connivent; disk symmetrical, entire or lobed; style 2-lobed at apex, the posterior lobe very short; nutlets ovoid, triquetrous, obtuse.

TYPE SPECIES: *Leucas flaccida* R. Br. (= *L. decemdentata* (Willd.) Sm.).

DISTRIBUTION: Pantropical, but chiefly in Africa and Asia, with about 60 species.

Three species are recorded from Fiji, one indigenous and two adventive.

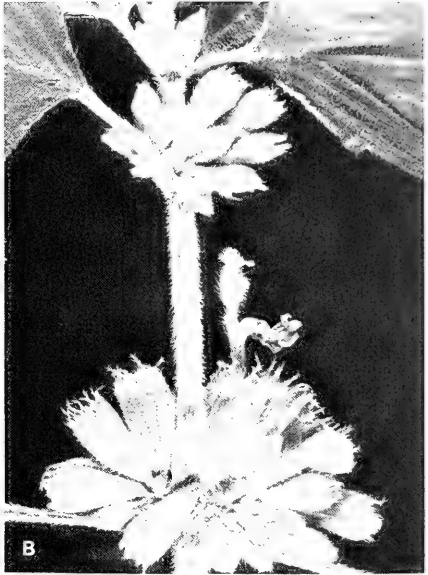
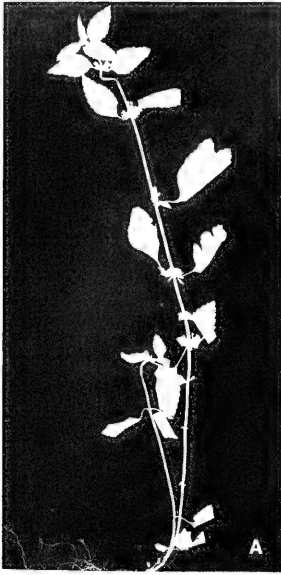
USEFUL TREATMENTS OF GENUS: SEBALD, O. Die Gattung *Leucas* R. Brown (Labiatae) in Afrika und auf der Arabischen Halbinsel. Stuttgarter Beitr. Naturk. Ser. A. 341: 1-200. 1980. FOSBERG, F. R., & M.-H. SACHET. *Leucas* R. Brown (Lamiaceae) in the Pacific Islands. Smithsonian Contr. Bot. 47: 24-26. 1981.

KEY TO SPECIES

- Floral verticils terminal, globose, to 5 cm. broad, the foliar bracts involucrate, imbricate, elliptic to linear-lanceolate, awned; calyx about 2 cm. long, the mouth pubescent with hairs about as long as teeth; leaf blades ovate to ovate-lanceolate; adventive. 1. *L. cephalotes*
- Floral verticils axillary or occasionally terminal, not more than 3 cm. broad, the foliar bracts not involucrate or awned; calyx usually not more than 1 cm. long, the mouth not long-pubescent.
- Calyx symmetrical, the teeth subequal, triangular to lanceolate at base, subulate at apex but not spinescent; leaf blades lanceolate to ovate or ovate-deltoid, usually about twice as long as broad; indigenous. 2. *L. decemdentata*
- Calyx conspicuously oblique, the upper tooth large and broad, the others small and spinescent; leaf blades linear-lanceolate or rarely lanceolate, frequently less than 1 cm. broad, usually more than 4-times as long as broad; adventive. 3. *L. lavandulifolia*

1. *Leucas cephalotes* (Roth) Spreng. Syst. Veg. 2: 743. 1825; Wight, Icon. Pl. Ind. Orient. 2: 2. pl. 337. 1840; T. Cooke, Fl. Pres. Bombay 2: 466. 1906; Greenwood in Proc. Linn. Soc. 154: 103. 1943; J. W. Parham, Pl. Fiji Isl. 254. 1964, ed. 2. 347. 1972.

Phlomis cephalotes Roth, Nov. Pl. Sp. 262. 1821.



In Fiji *Leucas cephalotes* has been reported to be rather common locally in wet places and at times on cultivated land near sea level; stout annual herb to 1 m. high, the branchlets scaberulous with spreading hairs; leaves petiolate, the petioles to 15 mm. long, the blades membranaceous, 5–10 × 2–4 cm., ovate to ovate-lanceolate, subacute at apex, crenate-serrate at margin, more or less pubescent on both surfaces; flowering verticils often large, to 5 cm. broad, terminal, globose, surrounded by imbricate, membranaceous bracts, these elliptic- to linear-lanceolate, 8–15 × 2–5 mm., awned at apex, ciliate at margin; calyx tubular, about 2 cm. long, the tube slightly curved, membranaceous, usually soft-pubescent, the mouth oblique, long-pubescent, the teeth short-subulate, subequal, 1–2 mm. long, scabrid; corolla 20–30 mm. long, the tube to 20 mm. long, the upper lip to 5 mm. long, villose, the lower lip about twice as long as upper lip, the median lobe spreading, subtruncate; nutlets 2–3 mm. long, obovoid-oblong, rounded at apex, smooth, brown. Flowers were noted in January and July.

TYPIFICATION: The type of *Phlomis cephalotes* was a collection made in India by Heyne, probably in Roth's herbarium at B that was in large part destroyed.

DISTRIBUTION: Afghanistan to eastern India and Bangladesh, found elsewhere as a naturalized or possibly cultivated plant. In Fiji it is known from only two collections made in 1924 on Vanua Levu, apparently adventive but conceivably naturalized from a cultivated introduction. No other Pacific material has been noted by us.

AVAILABLE COLLECTIONS: VANUA LEVU: MATHUATA: Lambasa, *Greenwood 658, 658A*.

2. *Leucas decemdentata* (Willd.) Sm. in Rees, *Cycl.* **20**: 1812; Seem. in *Bonplandia* **9**: 258. 1861, Viti, 440. 1862, Fl. Vit. 192. 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* **263**. 1892; Reinecke in *Bot. Jahrb.* **25**: 673. 1898; Reehinger in *Denkschr. Akad. Wiss. Wien* **85**: 341. 1910; Greenwood in *Proc. Linn. Soc.* **154**: 103. 1943; J. W. Parham, *Pl. Fiji Isl.* **254**. 1964; Fosberg & Sacht in *Smithsonian Contr. Bot.* **47**: 25. 1981.

FIGURE 26A & B.

Stachys decemdentata Forst. f. *Fl. Ins. Austr. Prodr.* **91**, nom. nud. 1786.

Phlomis decemdentata Willd. *Sp. Pl.* **3**: 124. 1800.

Leucas flaccida R. Br. *Prodr. Fl. Nov. Holl.* **505**. 1810; Christophersen in *Bishop Mus. Bull.* **154**: 39. 1938; Yuncker in op. cit. **178**: 103. 1943, in op. cit. **184**: 61. 1945, in op. cit. **220**: 234. 1959; H. Keng in *Gard. Bull. Singapore* **24**: 107. *fig. 17, i*. 1969; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 103. 1970; St. John & A. C. Sm. in *Pacific Sci.* **25**: 342. 1971; J. W. Parham, *Pl. Fiji Isl.* ed. 2. **347**. 1972; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* **85**: 93. 1972; H. Keng in *Fl. Males. I.* **8**: 340. 1978; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* **63**. 1985.

In Fiji *Leucas decemdentata* is found in dense or dry forest among rocks at elevations from near sea level to about 600 m.; annual herb to 1.5 m. high, sometimes sprawling, the branchlets slender, appressed- to long-villose with retrorse hairs; petioles to 1 (–3) cm. long; leaf blades thin- to thick-membranaceous, lanceolate to broadly ovate or ovate-deltoid, 1.5–7 × 1–4 cm., cuneate to rounded or truncate at base, obtuse to acute at apex, crenate-serrate to coarsely serrate at margin or usually entire toward base, densely appressed-tomentose to -puberulent on both surfaces; flowers 2–10 (–12) in distant, axillary verticils, the bracteoles sericeous, filiform, to 4 mm. long; calyx tubular to campanulate, 4–9 mm. long at anthesis, somewhat longer in fruit, sparsely to densely pubescent without, minutely sericeous on distal half within, 10-toothed, the teeth lanceolate to triangular toward base, subulate toward apex, to 1.5 mm. long; corolla white, 8–16 mm. long, the tube short- to long-exserted, glabrous to sparsely villose without, usually annulate within, the upper lip densely villose to long-pilose dorsally, the lower lip about as long as to slightly longer than the upper one, orbicular-spathulate; filaments of stamens white, the anthers reddish; nutlets obovoid, about 1.5 × 0.5 mm., smooth. Flowers and fruits are probably not seasonal, having been noted in scattered months.

FIGURE 26. A & B, *Leucas decemdentata*; A, plant with flowers and young fruits, × 1/4; B, distal nodes of branchlet, with inflorescences, × 4. C & D, *Leucas lavandulifolia*; C, plant with flowers and fruits, × 1/4; D, node, with inflorescences, × 4. A from *DA 11642*, B from *Smith 389*, C from *DA 11738*, D from *DA 10588*.

TYPIIFICATION AND NOMENCLATURE: *Leucas decemdentata* is based entirely upon *Phlomis decemdentata* Willd., from which Smith's (1812) description was quoted. Willdenow took his specific epithet from G. Forster's nomen nudum of 1786, indicating the plant as "Native of the Society Islands." A Forster specimen in the type cover at K bears the numbers 62 and 226, although Forster (1786) had listed his nomen nudum under the number 526. The "S" following Forster's nomen seems to ascribe the name to Solander, but no such specimen from the Society Islands was located at BM. However, Fosberg and Sachet (1981) cite Tahitian specimens of *Banks & Solander* from the first Cook expedition as being at P and US; these would seem to be ISOTYPES. *Leucas flaccida* R. Br. is based on a specimen (BM HOLOTYPE) in the Banks Herbarium said to have come from the coast of N. Holland near Endeavour River and Bay of Inlets. It would indeed seem possible, as suggested by Fosberg and Sachet (1981) that this BM specimen is the holotype of both species and is actually from the Societies rather than from Australia.

DISTRIBUTION: Continental southern and southeastern Asia (from India to southern China and the Ryukyu Islands) throughout Malesia to northeastern Australia and into the Pacific to the Society and Austral Islands. Keng (1978), in view of the several other binomials reduced by him to *Leucas flaccida* and his concept of it as extremely polymorphic, seems unduly cautious in excluding *L. decemdentata* (sensu typi) from it. In our observation, Pacific material provides a precise match for many specimens cited by Keng, and we agree with Fosberg and Sachet (1981) that it provides the earliest available name.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 106, DA 14170*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4437*. NAMOSI: Mt. Voma, *DA 11642*. TAILEVU: Namara, *Seemann 357*. VITI LEVU without further locality, *Milne 8, Graeffe 1485*. WAKAYA: *Milne 372*. NAIRAI: *Milne 155*. NGAU: Shore of Herald Bay, vicinity of Sawaieke, *Smith 7930*. VANUA LEVU: THAKAUNDROVE: Southern slope of Valanga Range, *Smith 389*. MOALA: *Milne 110*. FLI without further locality, *Horne 398*.

3. *Leucas lavandulifolia* Sm. in Rees, *Cycl.* **20**. 1812; Greenwood in *J. Arnold Arb.* **25**: 402. 1944; J. W. Parham, *Pl. Fiji Isl.* **254**. 1964, ed. 2. 347. 1972; Backer & Bakh. f. *Fl. Java* **2**: 623. 1965; H. Keng in *Gard. Bull. Singapore* **24**: 103. *fig. 17, h*. 1969; Chandrabose & Srinivasanin in *Bull. Bot. Surv. India* **17**: 164, as *L. lavandulifolia*. 1975; H. Keng in *Fl. Males. I.* **8**: 338. *fig. 13, 14*. 1978; Sebald in *Stuttgartarter Beitr. Naturk. Ser. A.* **341**: 188. *fig. 10, H, 11, E, 14, M, 43, 98*. 1980; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* **63**. 1985; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* **2**: 387. *fig. 55, A*. 1986.

FIGURE 26C & D.

Leonurus indicus L. Sp. Pl. ed. 2. 817. 1763.

Phlomis linifolia Roth, Nov. Pl. Sp. 260. 1821.

Leucas linifolia Spreng. Syst. Veg. **2**: 743. 1825; Fosberg & Sachet in *Smithsonian Contr. Bot.* **47**: 25. 1981.

In Fiji *Leucas lavandulifolia* occurs near sea level as an occasional weed of cultivated areas, in dryland ricefields, and along roadsides; erect, fetid, annual herb to 1 m. high, the branchlets pubescent with spreading to retrorse hairs and often subglaucous; leaf blades usually subsessile, linear-lanceolate or rarely lanceolate, 4-9 × about 0.5 (-2.5) cm., attenuate at base, acuminate to acute at apex, remotely and sparingly serrate to subentire at margin; flowers short-pedicellate, 3-30 in terminal and axillary, always leafy-bracted verticils, these often congested toward tips of branchlets, the bracteoles linear, to 10 mm. long, puberulent; calyx turbinate to cupular, 6-8 mm. long, in fruit to 9 mm. long, glabrescent to puberulent without, the mouth conspicuously oblique, the teeth 7-10, the uppermost one large and broad, the others minute

and spinescent; corolla white or tinged with pale blue, about 10 mm. long, the tube annulate within near middle, the upper lip oblong, copiously pilose, the lower lip patent, the middle lobe large, obovate; anthers red-brown; nutlets oblong, about 2.5×1 mm., rounded at apex, the inner surface angular, the outer surface rounded, dark brown or paler toward base. Flowers and fruits have been observed between March and October.

TYPIFICATION AND NOMENCLATURE: *Leucas lavandulifolia* Sm. (1812) was a new name based on *Leonurus indicus* L. and has the same type, a Burman specimen from India (LINN HOLOTYPE). The type of *Phlomis linifolia* was a Heyne specimen (B HOLOTYPE, presumably destroyed) from India. Fosberg and Sachet (1981) considered *Leucas lavandulifolia* illegitimate because *Leonurus indicus* was listed as a synonym. However, as they admit, and as pointed out by Sebald (1980), the epithet *indica* had already been used in *Leucas* (as *Leucas indica* (L.) R. Br. Prodr. Fl. Nov. Holl. 504. 1810, based on *Phlomis indica* L.). If it should be questioned whether or not Brown's (1810) combination was legitimately made [although it was accepted by *Index Kewensis*], the same combination was certainly legitimately made in 1812 by Smith himself (in Rees, Cycl. 20). *Leucas lavandulifolia* was thus legitimately published as a new name for *Leonurus indicus* L. (since the epithet *indica* was not available in *Leucas*), and *Phlomis linifolia* is merely the basionym of a later synonym.

DISTRIBUTION: Continental Asia (India to China) and southeastward throughout Malesia; a widespread weed elsewhere, into the Mascarenes and southern Africa. In the Pacific we have noted material from Queensland, the Solomons, Palau, and Fiji. The earliest Fijian collection we have seen is *Greenwood 916*, collected in May, 1942.

LOCAL NAME: *Guma* (Hindi).

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Nandi, *DA 9636*. NANDRONGA & NAVOSA: Thuvu, west of Singatoka, *Greenwood 916*; Thuvu sandhills, *DA 17325*; road to golf course, *DA 16026*. NAITASIRI: Koronivia, *DA 3989*, p. p.; Principal Agricultural Station, Koronivia, *DA 11738*. TAILEVU: Visama, *DA 10588*. REWA: Tonga Island (in Rewa River), *DA 2929*. FIJI without further locality, *DA 3904*.

11. *SALVIA* L. Sp. Pl. 23. 1753; Benth. in Benth. & Hook. f. Gen. Pl. 2: 1194. 1876; Briquet in Engl. & Prantl, Nat. Pflanzenfam. IV. 3A: 270. 1896; Backer & Bakh. f. Fl. Java 2: 625. 1965; Nowicke & Epling in Ann. Missouri Bot. Gard. 56: 72. 1969; H. Keng in Gard. Bull. Singapore 24: 160. 1969; Standley & L. O. Williams in Fieldiana Bot. 24 (9): 273. 1973; Hedge in Notes Roy. Bot. Gard. Edinburgh 33: 18. 1974; T. C. Huang & J. T. Wu in Taiwania 20: 213. 1975; H. Keng in Fl. Males. I. 8: 356. 1978; L. Cramer in Rev. Handb. Fl. Ceylon 3: 164. 1981; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 388. 1986.

Annual or perennial herbs or shrubs, usually aromatic; leaves simple or pinnate, petiolate or sessile; flowers small to large and showy, the verticils 2-many-flowered, arranged in spikes, racemes, or panicles, terminal or axillary, the inflorescence bracts small or large, sometimes brilliantly colored; calyx bilabiate, ovoid-campanulate to tubular or infundibular, usually with an indument of gland-tipped hairs, 8-13-nerved, the upper lip entire or 3-lobed, the median lobe often short or obsolete, the lower lip 2-lobed, longer than upper lip, spreading; corolla usually exerted beyond calyx, bilabiate, the tube straight or curved, glabrous and sometimes annulate within, the upper lip erect, hooded, 2-lobed to entire, the lower lip spreading, 3-lobed, the median lobe the largest; fertile stamens 2, mostly enclosed by upper lip of corolla, rarely exerted, the filaments short, the anther cells usually widely separated by transversely elongate connectives, both thecae fertile or usually the posterior one sterile or completely absent; style included to exerted, unequally 2-branched at apex; nutlets ovoid, subtriquetrous, smooth, mucilaginous on wetting or not.

LECTOTYPE SPECIES: *Salvia officinalis* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 129. 1913), one of 27 species originally included in the genus.

DISTRIBUTION: Temperate and warmer regions of both hemispheres, with 550 or more species. The genus includes many species of horticultural value. Four species are recorded from Fiji in cultivation, some of them occasionally naturalized. A fifth species, *Salvia occidentalis* Sw., native to the West Indies, is a weed throughout the Pacific and should be expected in Fiji, although we have not as yet seen any herbarium material of it from that archipelago. *Salvia occidentalis* is readily distinguishable by its slender-racemose inflorescences to 20 cm. long, the floral verticils distant and to 10 mm. broad, the broadly ovate inflorescence bracts to 4 mm. long, the densely stipitate-glandular calyces about 2 mm. long at anthesis, and the corolla tubes usually only about 2.5 mm. long.

KEY TO SPECIES

Branchlets and lower surfaces of leaf blades usually densely white-tomentose or -lanate; calyx conspicuously lanate with white to blue or purplish hairs; leaf blades oblong-lanceolate, rounded at base, serrulate at margin; corolla white to dark blue, about 20 mm. long. 1. *S. leucantha*

Branchlets and lower surfaces of leaf blades glabrous to variously pubescent, but not densely white-tomentose or -lanate; calyx less densely pubescent; leaf blades linear-lanceolate to ovate or ovate-deltoid; corolla 15-50 mm. long.

Leaf blades oblong-lanceolate to linear, attenuate at base, sharply serrate at margin; verticils 8-20-flowered, the flowers sessile to subsessile (pedicels to 1 mm. long); calyx 5-7 mm. long, not conspicuously striate, dotted with dark glands; corolla (including lobes) to 15 mm. long, pale blue.

2. *S. uliginosa*

Leaf blades ovate to ovate-deltoid, rounded to truncate or cordate (and then usually abruptly attenuate) at base, shallowly crenate to serrate at margin; verticils 2-10(-14)-flowered, the pedicels to 8 mm. long; calyx 7-22 mm. long, conspicuously striate or ribbed, without dark glands; corolla 20-50 mm. long, red or in some forms pink, purple, or white.

Calyx to 22 mm. long, usually red (or in some forms greenish or purplish), pubescent with usually reddish, loosely spreading hairs; corolla to 50 mm. long, the lower lip usually shorter than upper lip; leaf blades sharply acuminate at apex, rounded or broadly obtuse at base. 3. *S. splendens*

Calyx 7-10 mm. long, greenish or dull purple, pubescent with spreading to retrorse hairs on nerves; corolla to 30 mm. long, the lower lip usually longer than upper lip; leaf blades obtuse to acute at apex, truncate to cordate at base. 4. *S. coccinea*

1. *Salvia leucantha* Cav. Icon. Descr. Pl. 1: 16. t. 24. 1791; Epling in Repert. Sp. Nov. Beih. 110: 336. 1939; J. W. Parham, Pl. Fiji Isl. ed. 2. 348. 1972; Hedge in Notes Roy. Bot. Gard. Edinburgh 33: 114. 1974; L. Cramer in Rev. Handb. Fl. Ceylon 3: 167. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 65. 1985.

Cultivated in European gardens in Fiji near sea level; perennial herb or shrub to 1.5 m. high, the branchlets tomentose to white-lanate; leaves petiolate, the petioles to 2 cm. long, the blades oblong-lanceolate, 4-11 × 1-2 cm., rounded at base, acute to acuminate at apex, serrulate at margin, sparsely appressed-pubescent above, densely white-lanate beneath; verticils 6-10(-14)-flowered, arranged in terminal racemes or rather dense spikes to 30 cm. long, the bracts lanceolate, to 10 × 3 mm., villose beneath, the pedicels 1-3 mm. long; calyx green to dark blue, tubular-campanulate, usually deflexed from pedicel, (5-) 8-12 mm. long, bilabiate, densely lanate without; corolla white to dark blue, about 20 mm. long, slightly curved, pubescent, the tube about 13 mm. long, the lower lip equal to or shorter than upper lip; style bearded distally in 2 opposite rows, the branches very unequal. Our only collection was in flower in March.

TYPIFICATION: *Salvia leucantha* was seen by Cavanilles flowering in the Royal Gardens in Madrid; Ramamoorthy (in Taxon 32: 637. 1983) found four sheets of the species at MA, two with dates later than 1791; he selected one of the others with complete label information and abundant material, annotated as "*Salvia leucantha* Icon. Tab. 24" (MA LECTOTYPE).

DISTRIBUTION: Indigenous in Mexico and spreading northward, now widely cultivated throughout the world. A single Fijian collection, obtained in 1969, gives no real indication of the date of its introduction.

USE: A garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Lami, in private garden, DA 16800.

2. *Salvia uliginosa* Benth. Lab. Gen. Sp. 251. 1833; Epling in Repert. Sp. Nov. Beih. **85**: 53. 1935, in op. cit. **110**: 69. 1938; Backer & Bakh. f. Fl. Java **2**: 626. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 348. 1972.

Sparingly cultivated in Fiji near sea level; fetid herb to 1.5 m. high, erect or decumbent and spreading by subterranean stolons, the branchlets scattered-pubescent, 4-angled and narrowly furrowed; leaves petiolate, the petioles 5–28 mm. long, the blades oblong-lanceolate to linear, 3–10 × 0.5–2.5 cm., attenuate at base, acute to acuminate at apex, sharply serrate at margin, subglabrous above, appressed-puberulent on nerves beneath; verticils 8–20-flowered, arranged in terminal spikelike inflorescences, sessile or the lowermost verticils short-pedunculate, the flowers sessile or subsessile, the bracts usually absent; calyx tubular-campanulate, bilabiate, 5–7 mm. long, the tube about 3 mm. long, thinly appressed-pubescent and gland-dotted without, the lobes broadly rounded to obtuse, mucronate; corolla pale blue, to 15 mm. long, puberulent, the tube about 8 mm. long, the upper lip 4–5 mm. long, the lower lip spreading, 3-lobed, about 8 mm. long; stamens covered by upper lip of corolla; style bearded toward apex, the branches unequal; nutlets about 2 mm. long, black or distally blotched. Our only available collection was flowering in March.

TYPIFICATION: The species was based on *Sellow 466* (B HOLOTYPE, presumably destroyed), obtained near Montevideo, Uruguay.

DISTRIBUTION: Brazil (Minas Gerais) to Uruguay, now cultivated elsewhere. It was probably introduced into Fiji during the present century.

USE: A garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva Botanical Gardens, DA 12344.

3. *Salvia splendens* [Sellow ex Nees in Wied-Neuw. Reise Bras. **2**: 335, nom. nud. 1821] Sellow ex Schultes, Mant. Syst. Veg. **1**: 185. 1822; Epling in Repert. Sp. Nov. Beih. **85**: 94. 1935; A. C. Sm. in J. Arnold Arb. **33**: 116. 1952; J. W. Parham, Pl. Fiji Isl. 255. 1964; Backer & Bakh. f. Fl. Java **2**: 628. 1965; Standley & L. O. Williams in Fieldiana Bot. **24** (9): 298. 1973; Hedge in Notes Roy. Bot. Gard. Edinburgh **33**: 115. 1974; H. Keng in Fl. Males. **1**: 8: 360. 1978; L. Cramer in Rev. Handb. Fl. Ceylon **3**: 168. 1981; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **65**. 1985.

Salvia splendens var. *splendens*: J. W. Parham, Pl. Fiji Isl. ed. 2. 348. 1972.

Salvia splendens var. *atropurpurea* Hort.; J. W. Parham, Pl. Fiji Isl. ed. 2. 348. 1972.

In Fiji *Salvia splendens* is frequently cultivated near sea level (and perhaps in villages at higher elevation) and is occasionally naturalized up to about 800 m.; annual or perennial herb or subshrub to 2 m. high, the branchlets pubescent to subglabrous; leaves petiolate, the petioles to 4 (–6) cm. long, the blades ovate, to 10 × 6.5 cm., rounded or broadly obtuse at base, sharply acuminate at apex, serrulate to crenate at margin, glabrous or rarely puberulent on both surfaces; verticils 2–6-flowered, arranged in racemes to 20 cm. long, the bracts ovate-lanceolate, acuminate, colored, longer than calyces, deciduous, the pedicels to 5 mm. long, reddish-pubescent; calyx tubular-campanulate, to 22 mm. long, pubescent with reddish hairs, the lobes ovate-oblong, sharply acute; corolla infundibular, pubescent without, to 50 mm. long, the tube to 35 mm. long, laterally compressed, narrowed toward base, the upper lip 10–15 mm. long, 2-lobed, the lower lip shorter than upper lip; stamens often exerted beyond corolla lobes, the filaments about 50 mm. long, glabrous; style branches usually unequal. Flowers have been obtained between March and August.

TYPIFICATION: Although Schultes's 1822 citation was "Nees ab Esenb. in Princ. Neuwied Reis. App.," that 1821 mention was as a nomen nudum; Epling (1935) indicates that Schultes's description was based on a specimen collected by Sellow in Rio de Janeiro Province, Brazil, which was available at B, although it has probably been destroyed; the availability of isotypes is not known.

DISTRIBUTION: Indigenous in southern Brazil and now widely cultivated and sometimes naturalized, with many cultivars. The earliest Fijian collection noted by us is *Smith 5398* (July 31, 1947), from a naturalized specimen, suggesting that the plant was in cultivation in Fiji considerably earlier.

LOCAL NAMES AND USE: A garden ornamental known in Fiji as *red salvia* or *purple salvia*.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5398*. NAITASIRI: Principal Agricultural Station, Koronivia, *DA 12114, 12115* (dark-flowered form). REWA: Lami, in private garden, *DA 16789* (white-flowered form), *16790, 16798*.

The flowers, both calyx and corolla, of *Salvia splendens* are typically red, but garden forms with dark purple flowers or with pure white corollas are also noted for the cited collections. The dark-flowered plants are usually referred to *S. splendens* var. *atropurpurea* Hort., which Epling (in *Repert. Sp. Nov. Beih.* **110**: 293, 1939) suggests may be the same as *S. ianthina* Otto & Dietr.

4. *Salvia coccinea* B. Juss. ex Murr. in *Commentat. Soc. Regiae Sci. Gott.* **1**: 86. *pl. 1.* 1778; Gibbs in *J. Linn. Soc. Bot.* **39**: 161. 1909; Epling in *Repert. Sp. Nov. Beih.* **85**: 124. 1936, in op. cit. **110**: 133. 1938; Yuncker in *Bishop Mus. Bull.* **178**: 103. 1943; Greenwood in *J. Arnold Arb.* **30**: 80. 1949; Yuncker in *Bishop Mus. Bull.* **220**: 235. 1959; J. W. Parham in *Dept. Agr. Fiji Bull.* **35**: 138. 1959, *Pl. Fiji Isl.* 255. 1964, ed. 2. 348. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 105. 1970; Standley & L. O. Williams in *Fieldiana Bot.* **24**(9): 280. 1973; Hedge in *Notes Roy. Bot. Gard. Edinburgh* **33**: 114. 1974; T. C. Huang & J. T. Wu in *Taiwania* **20**: 216. *pl. 2.* 1975; H. Keng in *Fl. Males I.* **8**: 359. 1978; L. Cramer in *Rev. Handb. Fl. Ceylon* **3**: 169. 1981; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 65. 1985; Stanley in *Stanley & Ross, Fl. S.-E. Queensland* **2**: 390. *fig. 54, C.* 1986.

Salvia coccinea is cultivated and naturalized as a minor weed of waste places in Fiji at elevations from near sea level to about 850 m.; perennial subligneous herb to 1.5 m. high, the branchlets shaggy-hirsute to hispid, usually eglandular; leaves petiolate, the petioles slender, 0.5-2 (-6) cm. long, the blades ovate-deltoid, 2.5-4 (-6) × 1.5-3 (-5) cm., truncate to cordate and then abruptly attenuate at base, acute to obtuse at apex, shallowly crenate to serrate at margin, glabrous to scaberulous above, more densely pubescent and often glandular-pubescent beneath especially on nerves; verticils 2-10(-14)-flowered, arranged in terminal racemes, the bracts ovate-lanceolate, to 1 cm. long, often long-ciliate on margin, deciduous; pedicels slender, to 8 mm. long; calyx dull purple and green, tubular, erect or deflexed from end of pedicel, 7-8 mm. long at anthesis, to 10 mm. long in fruit, striate, pubescent, the upper lip entire, obtuse, the lower lip 2-toothed, the teeth triangular to ovate, acute; corolla red, 20-25 (-30) mm. long, pubescent without, the tube straight, exserted, the upper lip short, erect, the lower lip 3-lobed, longer than upper lip; stamens inserted in corolla throat, the filaments pink, to 4 mm. long, the connectives many times longer; nutlets narrowly ovoid, about 3 mm. long, brown, smooth. Flowers have been observed in months scattered throughout the year.

TYPIFICATION: The species was based on a garden specimen, "Patria ejus Aethiopia fertur." According to Epling (1938) no specimen has been retained, and he implies that the plate is to be taken as the type. Authorship of the name is usually attributed to B. Juss. ex Murr. (1778), but Hedge (1974) gives the original place of publication as Etlinger, De Salvia, 23. 1777, a work that we have been unable to examine in connection with the present study.

DISTRIBUTION: Throughout tropical America, probably native in Brazil (Epling, 1938) or Mexico (Cramer, 1981), now widespread in cultivation and freely naturalizing. The earliest Fijian specimen we have noted is *Gibbs 761*, collected in 1907, "from seed collected by Mr. A. Joske in Nandrau Valley, flowered in his garden at Nandari-vatu." It may be assumed that the species was cultivated and naturalized in Fiji at the start of the present century or earlier.

LOCAL NAMES AND USE: *Red salvia*, *wild salvia*; a garden ornamental. As naturalized, the species is reported to cause abortion in cattle if grazed (Parham, 1959).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandari-vatu, *Gibbs 761*. NANDRONGA & NAVOSA: Near Thuvu, west of Singatoka, *DA 11418*. REWA: Lami, in private garden, *DA 16450*. KANDAVU: Track between Taulaulia and Ndurungeli, *DA 2938*. VANUA LEVU: THAKAUNDOVE: Namale, *DA 16894*.

SUBCLASS ASTERIDAE

KEY TO ORDERS OCCURRING IN FIJI

- Inflorescences various but not capitate (at least in our representatives); calyx present, lobed; anthers connivent or connate to form a tube into which pollen is shed, the style then growing through anther tube and pushing out pollen, with pollen-collecting hairs or a cupular, fringed indusium below the stigma or stigmas; ovary 1-several-locular, the ovules 1-many per locule; fruit a capsule, less frequently a drupe, nut, or berry. CAMPANULALES (FAMILIES 184, 185)
- Inflorescences capitate, the heads subtended by one or more series of bracts (phyllaries), often with additional bracts (pales or chaff) interspersed among florets on receptacle; calyx absent or represented by 1-numerous hairs, bristles, or scales (pappus) in one or more series; anthers connate (or connivent) into a tube around style, which grows through the tube and pushes out pollen, the style usually 2-branched, the branches usually with receptive papillae on inner surfaces and pollen-collecting hairs on outside; ovary 1-locular, with a single basal ovule; fruit an achene. ASTERALES (FAMILY 186)

ORDER CAMPANULALES

KEY TO FAMILIES OCCURRING IN FIJI

- Style with well-developed collecting hairs below the (usually 2-5) stigmas; plants often with milky latex; our representatives adventive herbs (possibly first introduced as ornamentals). 184. CAMPANULACEAE
- Styles with a cupular indusium below the small stigma, without collecting hairs, the indusium with a distal fringe of short hairs; plants without latex; our representatives indigenous shrubs or small trees. 185. GOODENIACEAE

FAMILY 184. CAMPANULACEAE

CAMPANULACEAE Juss. Gen. Pl. 163. 1789.

Herbaceous plants, sometimes secondarily woody and forming shrubs or small trees, often with milky latex, estipulate, the indument when present mostly of unicellular hairs; leaves alternate (rarely opposite or verticillate), simple, the blades entire to dentate or incised; inflorescences basically dichasial or monochasial cymes; racemiform or thyriform (flowers sometimes axillary and solitary); flowers ♂, protandrous, rarely unisexual, actinomorphic or zygomorphic, usually (3-)(5-)(10)-merous, epigynous (in our taxa); calyx lobes (3-) 5 (-10), imbricate or valvate, often persistent in

fruit; corolla sympetalous, with valvate lobes, in Campanuloideae actinomorphic or nearly so and campanulate, in Lobelioideae zygomorphic and tubular, resupinate, the morphologically upper lip 3-lobed, the lower lip 2-lobed or -cleft, sometimes deeply so and corolla then appearing unilabiate, or sometimes the 5 lobes subequal; stamens as many as corolla lobes and alternate with them, the filaments inserted on an annular, epigynous disk or near base of corolla, distinct at base, in Lobelioideae often connate above, the anthers 2-locular, dehiscing by longitudinal, introrse slits, connivent (Campanuloideae) or connate (Lobelioideae) to form a tube into which pollen is shed; ovary mostly inferior (infrequently semi-inferior or superior), (1 or 2-5(-10)-locular, the ovules numerous on axile (rarely parietal) placentae, anatropous, the style slender, with a fringe of collecting hairs below the appressed (usually 2-5) stigmas, growing upward through anther tube and pushing out pollen, the stigmas then spreading apart; fruit a capsule, often poricidal or dehiscing by apical valves or longitudinal slits, infrequently baccate, the seeds numerous, small, the embryo straight, the endocarp usually oily.

DISTRIBUTION: Cosmopolitan, mostly temperate and subtropical, with about 70 genera and 2,000 or more species. The family includes many ornamental plants. Of the two major subfamilies, only the Lobelioideae are recorded in Fiji (but no taxa are indigenous there). A separate family Lobeliaceae is often recognized. Current phylogenists and compilers of Floras seem evenly divided as to the appropriate rank of the group, whether family or subfamily.

USEFUL TREATMENTS OF FAMILY: MOELIONO, B., & P. TUYN (with collaboration of C. G. G. J. VAN STEENIS). Campanulaceae. Fl. Males. I. 6: 107-141. 1960. BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Lobeliaceae. Fl. Java 2: 449-452. 1965. CRAMER, L. H. Lobeliaceae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 4: 166-177. 1983.

The following key to the two genera known to occur in Fiji is in large part taken from McVaugh (in Bull. Torrey Bot. Club 67: 781. 1940).

KEY TO GENERA

Corolla white, salverform, the tube narrowly cylindrical, 50-140 mm. long, the lobes subequal; pedicels each with a pair of filiform bracteoles 2-4 mm. in length at or near base; ovary inferior or very nearly so, the apex enclosed by the free rim of the hypanthium; seeds conspicuously foveolate-reticulate.

1. *Hippobroma*

Corolla blue or purplish, sometimes pale, strongly bilabiate, three of the lobes much broader than the other two; flowers, including hypanthium, 25 mm. long or less; pedicels ebracteolate; ovary inferior or semi-superior; seeds smooth, lustrous. 2. *Lobelia*

1. *HIPPOBROMA* G. Don. Gen. Hist. Dichlam. Pl. 3: 698, 717. 1834; McVaugh in Bull. Torrey Bot. Club 67: 782. 1940; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 5. 1980.

Laurentia sensu Wimmer in Pflanzenz. 107 (IV. 276b): 386, p. p. minore. 1953; Moel. & Tuyn in Fl. Males. I. 6: 139, quoad sp. incl. 1960; Backer & Bakh. f. Fl. Java 2: 452, p. p. 1965; Badré in Fl. Masc. Fam. 111. 1, quoad sp. incl. 1976; L. Cramer in Rev. Handb. Fl. Ceylon 4: 176, quoad sp. incl. 1983; non Adanson.

Coarse herbs, the stems with acrid, milky, poisonous latex, erect or decumbent; leaves cauline, spreading or ascending, the blades elliptic to oblanceolate, coarsely repand-dentate; inflorescences axillary, the flowers solitary, short-pedicellate, the pedicels with a pair of filiform bracteoles 2-4 mm. long at or near base; hypanthium turbinate, becoming ellipsoid or ellipsoid-campanulate in fruit, the calyx lobes narrowly linear; corolla salverform, the tube narrowly cylindrical, entire, the lobes subequal, spreading; stamens with filaments subequal to corolla tube and adnate to it, free from one another from base to just below apex of corolla tube, connate distally, the anthers forming a slightly exserted tube with an oblique orifice, three longer than the others, all white-bearded at tip; capsule pendent when mature, 3/4 or more inferior, closely invested by free rim of hypanthium, dehiscing loculicidally by 2 apical valves, the seeds ellipsoid to cylindrical, minutely and regularly foveolate-reticulate.

TYPE SPECIES: *Hippobroma longiflora* (L.) G. Don (*Lobelia longiflora* L.).

DISTRIBUTION: West Indies, with a single species now pantropically adventive.

USEFUL TREATMENT OF GENUS: McVAUGH, R. A revision of "Laurentia" and allied genera in North America. *Bull. Torrey Bot. Club* 67: 778-798. 1940.

McVaugh (1940) considers *Hippobroma* to comprise a single species and to be most closely related to the Hawaiian genus *Brighamia* A. Gray. "The species is clearly marked, distinct from all other known species by the following combination of characters: Corolla white, salverform, the tube very long in proportion to its diameter, the lobes subequal; pedicels bracteolate; free rim of the calyx surpassing the ovary, which is nearly wholly inferior; seeds foveolate-reticulate." "When subjected to critical examination, the characters that separate *Laurentia* and *Isotoma* from *Lobelia* are seen to break down entirely." McVaugh proposes to unite the first two (somewhat localized groups of these three genera) with *Lobelia*, the principal character that has been used to separate the three genera, the presence or absence of a dorsal slit or cleft in the corolla tube, being of no real value as an indicator of generic differences.

1. ***Hippobroma longiflora*** (L.) G. Don, *Gen. Hist. Dichlam. Pl.* 3: 717. 1834; McVaugh in *Bull. Torrey Bot. Club* 67: 783. 1940; Yuncker in *Bishop Mus. Bull.* 220: 261. 1959; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 5. 1980. FIGURE 27A.

Lobelia longiflora L. Sp. Pl. 930. 1753.

Isotoma longiflora Presl, *Prodr. Monogr. Lobel.* 42. 1836; Greenwood in *Proc. Linn. Soc.* 154: 94. 1943;

J. W. Parham in *Agr. J. Dept. Agr. Fiji* 19: 103. 1948; Greenwood in *J. Arnold Arb.* 30: 78. 1949; J. W. Parham in *Dept. Agr. Fiji Bull.* 35: 121. *fig. 60.* 1959; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 27. 1985.

Laurentia longiflora Peterm. *Pflanzenreich*, 444. *t. 118, fig. 665.* 1845; Wimmer in *Field Mus. Nat. Hist. Bot. Ser.* 13 (6): 474. 1937, in *Pflanzenr.* 107 (IV. 276b): 405. *fig. 11, i* (on p. 14). 1953; Moel. & Tuyn in *Fl. Males.* 1. 6: 140. 1960; J. W. Parham, *Pl. Fiji Isl.* 231. 1964, ed. 2. 320. 1972; Backer & Bakh. *f. Fl. Java* 2: 452. 1965; Badré in *Fl. Masc. Fam.* 111. 2. *pl. 1.* 1976; L. Cramer in *Rev. Handb. Fl. Ceylon* 4: 177. 1983.

Laurentia longiflora var. *longiflora*; Wimmer in *Pflanzenr.* 107 (IV. 276b): 406. 1953.

Simple or few-branched succulent herb 0.3-1.2 m. high, with acrid latex, naturalized near sea level in rocky, grassy areas, pastures, coconut plantations, and along roadsides; leaves sessile or with short, winged petioles, the blades 10-24 × 2.5-6 cm.; calyx lobes narrowly linear, 10-22 mm. long, about 1 mm. broad; corolla tube white or pale green, straight, 5-14 cm. long, 1-2.5 mm. in diameter, the limb white, the lobes to 25 × 10 mm.; filaments white, the anther tube 5-6 mm. long, the anthers sometimes green-tinged; stigma capitate, at maturity slightly exserted from anther tube; capsule thin-walled, cylindrical to ellipsoid, up to 15 × 10 mm., the seeds pale brown. Flowers and fruits have been obtained in most months.

TYPEFICTION: Although Linnaeus apparently had no specimen in 1753 and perhaps based his description merely upon Sloane's plate and description (*Voy. Jam. Nat. Hist.* 1: 158. *t. 101, fig. 2.* 1707), there is an extant specimen in the Sloane Herbarium (BM LECTOTYPE) (McVaugh, 1940).

DISTRIBUTION: Indigenous in the West Indies, now widespread throughout the tropics as an adventive. It may have been originally introduced in some areas as an ornamental; it has been noted in the Suva Botanical Gardens (Parham, 1948). The earliest Fijian specimen available is *Greenwood 582*, obtained in Levuka, Ovalau, in May, 1923. The species is believed to be poisonous to stock.

LOCAL NAME: *Star of Bethlehem.*

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9629*. NAITASIRI: Wanivau, *DA 456*; Nanduruloulou, *DA 7436, 11052, 11747*; near Nasinu, *Greenwood 582A*. TALEVU: Mamotha Estate, *DA 2614*; Tonia, *DA 9999*. REWA: Suva, *H. B. R. Parham 299, St. John 18175, 18917*. OVALAU: Levuka, *Greenwood 582*. VANUA LEVU: THAKAUNDRIVE: Waimbalambala Estate, Savusavu, *DA 11831*; west of Valethi, *Bierhorst F92*; Nangingi, *DA 10777*. FIJI without further locality, *DA 3999*.



FIGURE 27. A, *Hippobroma longiflora*; distal portion of stem, with flowers and fruits, $\times 1/3$. B, *Lobelia zeylanica*; branchlet with a flower and developing fruit, $\times 2$. A from DA 10777, B from Smith 4760.

2. LOBELIA L. Sp. Pl. 929. 1753; Wimmer in Pflanzenr. 107(IV. 276b): 408. 1953; Moel. & Tuyn in Fl. Males. I. 6: 121. 1960; Backer & Bakh. f. Fl. Java 2: 450. 1965; Badré in Fl. Masc. Fam. 111. 2. 1976; L. Cramer in Rev. Handb. Fl. Ceylon 4: 166. 1983; Ross in Stanley & Ross, Fl. S.-E. Queensland 2: 477. 1986.

Annual or perennial herbs, erect, ascending, or creeping, rarely woody and even arborescent, often laticiferous; leaves alternate or rosulate; inflorescences racemiform or paniculiform, or flowers axillary and solitary, usually bracteate; flowers 5-merous, the pedicels ebracteolate; calyx lobes well developed, subequal; corolla zygomorphic, bilabiate, blue or purplish or sometimes pale, with a dorsal cleft to base or nearly so, the limb with 2 usually diverging upper lobes, the 3 other lobes forming a trifold lip; filaments free or adnate to corolla tube, linear, often broadened at base, the anthers basifixed, slightly exserted; disk absent; ovary 2-locular, inferior or semi-superior, the style with collecting hairs below the stigmas, lengthening during anthesis, the stigmas 2; fruit a berry or an apically 2-valved capsule, the calyx lobes persistent, the seeds smooth, lustrous.

TYPE SPECIES: Linnaeus originally included 25 species in *Lobelia*, but there seems to be disagreement as to lectotypification; Britton and Brown (Ill. Fl. N. U. S. ed. 2. 3: 299. 1913) indicated *L. dortmanna* L. as the type species, M. L. Green (Prop. Brit. Bot. 184. 1929) *L. cardinalis* L.

DISTRIBUTION: Pantropical or subtropical or in temperate areas, mostly American, with about 300 species. One naturalized species occurs in Fiji.

1. *Lobelia zeylanica* L. Sp. Pl. 932. 1753; Merr. & Perry in J. Arnold Arb. 22: 386. 1941; A. C. Sm. in Sargentia 1: 140. 1942; Greenwood in Proc. Linn. Soc. 154: 94. 1943, in J. Arnold Arb. 30: 78. 1949; Moel. & Tuyn in Fl. Males. I. 6: 128. 1960; J. W. Parham, Pl. Fiji Isl. 231. 1964, ed. 2. 321. 1972; Backer & Bakh. f. Fl. Java 2: 450. 1965; L. Cramer in Rev. Handb. Fl. Ceylon 4: 170. 1983. FIGURE 27B.

Lobelia succulenta Bl. Bijdr. Fl. Ned. Ind. 728. 1826; Wimmer in Pflanzn. 107 (IV. 276b): 576. 1953.
Lobelia purpurascens sensu J. W. Parham in Dept. Agr. Fiji Bull. 35: 120. 1959, Pl. Fiji Isl. 231. 1964; non R. Br.

Prostrate herb found in Fiji from near sea level to about 1,000 m., often abundantly naturalized along trails in dense forest and also in dry forest, wet clearings, cocoa plantations, pastures, marshes, and swamps, and along roadsides, the stems rooting at lower nodes, then ascending to 20 cm. high; petiole 1–20 mm. long; leaf blades ovate, 1–4 (–6) × 1–3.5 cm., tinged with purple beneath, subentire to repand-dentate, puberulent to glabrous on both surfaces; flowers axillary, the pedicels 1–3.5 cm. long; calyx tube 2–4 mm. long, the lobes lanceolate to deltoid, 3–5 mm. long; corolla 4–9 mm. long, pale blue or lavender, dorsally slit to base, the tube nearly white; filaments 3–5 mm. long, the anthers 0.8–1.5 mm. long, with apical hair tufts; capsule ovoid, 3–6 mm. long, yellowish brown. Plants are seen in flower and fruit throughout the year.

TYPE: *Lobelia zeylanica* is based on a plant collected by Osbeck (ISOTYPES at s, SBT) near Canton, China. This interpretation is well discussed by Merrill and Perry (1941) and by Moeliono and Tuyn (1960, p. 129). Blume noted that *L. succulenta* is found in fields around Buitenzorg, Java (possible ISOTYPE at NY; cf. Merrill and Perry, 1941).

DISTRIBUTION: Southeastern Asia (from Ceylon, the Himalayas, southern China, and Formosa) throughout Malesia. Specimens have not been noted from between New Guinea and Fiji. The species has probably been present in Fiji since early in the present century, conceivably having been introduced as an ornamental, although it is now usually considered a weed and is reputed to be poisonous to stock. About 30 Fijian collections from four islands are at hand.

LOCAL NAME: *Vononiwai* (noted only once).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Greenwood 811*; western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 4760*; Mt. Tomanivi, *O. & I. Degener 32059*. SERUA: Hills between Wainingere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith 9402*; near Waiyanitu, Navua River, *DA 8630*. NAMOSI: Valley of Wainambua Creek, south of Mt. Naitarandamu, *Smith 8805*. RA: Without further locality, *DA 10951*. NAITASIRI: Sawani–Serea road, *DA 12323*; Nanduruloulou, *DA 9424*; Koronivia, *DA 6018*; near Nasinu, *Greenwood 811A*, *Gillespie 3407*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7003*; vicinity of Korovou, *DA 11432*. REWA: Waingganaki, west of Suva, *DA 7563*. VANUA LEVU: THAKAUNDROVE: Mbalanga, Savusavu Bay, *Degener & Ordonez 13911*. RAMBI: *DA 3676*. MATUKU: *DA 7739*.

FAMILY 185. GOODENIACEAE

GOODENIACEAE R. Br. Prodr. Fl. Nov. Holl. 573, as *Goodenoviae*. 1810.

Perennial herbs or shrubs or small trees, estipulate, without latex; leaves simple, alternate (rarely opposite or radical); inflorescences cymose, racemose, spicate, or capitate, the flowers sometimes solitary and axillary; flowers ♂, zygomorphic, protandrous; calyx tubular, small, (3–)5-lobed; corolla sympetalous, 5-lobed, bilabiate or unilabiate (upper lip bifid to base), the lobes valvate, often induplicate; stamens 5, alternate with corolla lobes, free from corolla or shortly adnate to its base, the

filaments free, the anthers connivent or connate or free, forming a tube into which pollen is shed, 2-locular, dehiscing by longitudinal, introrse slits; intrastaminal nectary glands sometimes present; ovary inferior to semi-inferior (rarely essentially superior), (1 or)2(-4)-locular, the ovules 1-many per locule, erect or ascending, anatropous, the placentation axile or basal-axile, the style simple or divided, growing through the anther tube and collecting pollen in bud, with a cupular indusium below the small stigma, the indusium with a distal fringe of short hairs; fruit a capsule, less frequently a drupe or nut, the seeds small, flat, with a straight embryo, the endosperm copious, oily.

DISTRIBUTION: Primarily Australian but extending into paleotropical and neotropical and subtropical areas, with about 16 genera and more than 300 species. Only the genus *Scaevola* occurs in Fiji.

1. *SCAEOVOLA* L. Mant. Pl. Alt. 145. 1771; Seem. Fl. Vit. 145. 1866; Krause in Pflanzenr. 54 (IV. 277): 117. 1912; Leenhouts in Fl. Males. I. 5: 339. 1957; Backer & Bakh. f. Fl. Java 2: 453. 1965; Brizicky in J. Arnold Arb. 47: 296. 1966; Guillaumet in Fl. Masc. Fam. 110. 1. 1976; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 6. 1980; Ross in Stanley & Ross, Fl. S.-E. Queensland 2: 488. 1986. Nom. cons.

Shrubs or small trees (or herbs); leaves spirally arranged or opposite, the blades fleshy, entire to dentate; inflorescences axillary or terminal, simple to few- or many-flowered compound dichasia (sometimes reduced to a single flower), the flowers subsessile, bracteolate; calyx limb often short, usually inconspicuously and unequally 5-lobed to subentire; corolla tube adaxially open to base, densely lanate within, the lobes spreading, with membranous margins; intrastaminal nectary glands (1 or 2) usually present; stamens free, with slender filaments, the anthers basifixed, with a small, ovate, terminal appendage; ovary (1- or)2-locular, the ovules usually solitary in each locule, the style simple, the stigma simple or 2-lobed; fruit a blue-black or white 1- or 2-seeded drupe, the exocarp often succulent, the endocarp woody or bony, sometimes surrounded by softer, corky tissue, irregularly verrucose to subreticulate on surface, the seeds obovate, plano-convex.

TYPE SPECIES: *Scaevola lobelia* Murray (in L. Syst. Veg. ed. 13. 178. 1774), nom. illeg. (*Lobelia plumieri* L.) = *S. plumieri* (L.) Vahl.

DISTRIBUTION: Mostly Australian, with 80-100 species, but with two widely distributed species and several other scattered, local, often narrowly endemic species of sect. *Scaevola*. Two species are indigenous in Fiji.

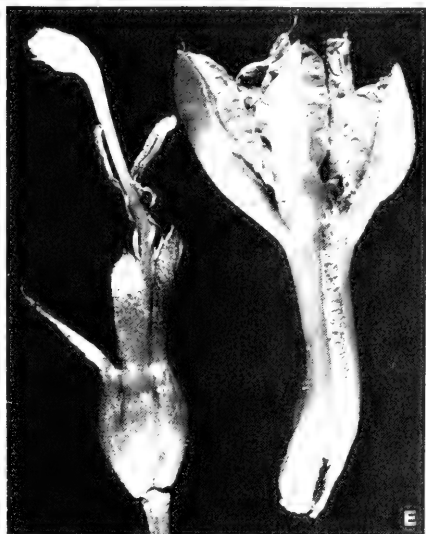
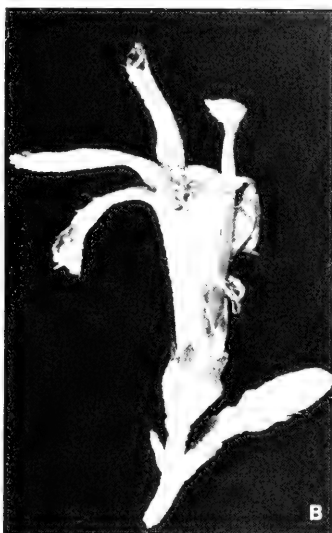
KEY TO SPECIES

Shrub or tree to 8 m. high occurring in various habitats from near sea level (but seldom in beach vegetation) to 1,200 m.; leaf blades lanceolate- to oblanceolate-oblong, 4-5-times longer than broad; inflorescences 3-12 cm. long, axillary or forming large, many-flowered terminal panicles, the peduncles (2-) 4-6 cm. long; fruit black or deep purple, drying to 5-7 mm. in diameter and not obviously costate.

1. *S. floribunda*

Shrub 0.5-5 m. high, abundant along beaches and rocky shores near sea level; leaf blades obovate to spatulate, 2-3-times longer than broad; inflorescences 2-5 cm. long, axillary, comparatively few-flowered, the peduncles (0.5-) 1-2 cm. long; fruit white, drying to 7-13 mm. in diameter and obviously bluntly costate. 2. *S. sericea*

FIGURE 28. A-C, *Scaevola floribunda*: A, distal portion of branchlet, with foliage and an inflorescence, $\times 1/3$; B, mature flower, showing calyx, corolla, style, stigma, and old stamens, $\times 4$; C, portion of infructescence, with a persisting flower, $\times 2$. D & E, *Scaevola sericea*: D, mature fruit (dried), $\times 2$; E, mature flower, showing calyx, style, stigma, old stamens, and detached corolla, $\times 4$. A from *Smith 555*, B & C from *Smith 111*, D from *Bryan 288*, E from *Smith 9510*.



1. *Scaevola floribunda* A. Gray in Proc. Amer. Acad. Arts 5: 152. 1861; Seem. in Bonplandia 9: 257. 1861, in op. cit. 10: 296. 1862, Viti, 438. 1862, Fl. Vit. 146. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 216. 1890; Gibbs in J. Linn. Soc. Bot. 39: 155. 1909; Krause in Pflanzenz. 54 (IV. 277): 129. 1912; Turrill in J. Linn. Soc. Bot. 43: 29. 1915; Yuncker in Bishop Mus. Bull. 220: 262. 1959; J. W. Parham, Pl. Fiji Isl. 231. 1964, ed. 2. 321. 1972. FIGURE 28A-C.

Shrub or tree 1-8 m. high, occurring at elevations from near sea level (but seldom in beach vegetation) to 1,200 m. in dense or open forest and thickets, often on crests and ridges, among reeds, and in open places; indument fugacious on vegetative parts, short-white-sericeous on inflorescences; petioles 5-20 mm. long, narrowly (infrequently conspicuously) winged to base; leaf blades lanceolate- or oblanceolate-oblong, usually (6-) 10-15 × 2-4.5 cm., attenuate at base and long-decurrent on petiole, obtuse and mucronulate at apex, repand-dentate at margin (teeth 1 or 2 per centimeter) or essentially entire; inflorescences in axils of distal leaves or terminal, 3-12 cm. long, usually many-flowered, the peduncle (2-) 4-6 cm. long; calyx 3-4 mm. long at anthesis including deltoid, obtuse lobes 1-2 mm. long; corolla 12-15 mm. long, the tube purplish green without, purple within, the lobes white to yellowish, erose-margined; style and stigmas purple at maturity; fruit black or deep purple, drying to 5-7 mm. in diameter.

TYPIFICATION: The type is *U. S. Expl. Exped.* (US 76182 HOLOTYPE; ISOTYPE AT K), collected in 1840 in Fiji without further locality. Gray also cited a Harvey collection, but since his paper deals primarily with Exploring Expedition material, lectotypification does not appear required.

DISTRIBUTION: Endemic to Fiji, although sometimes mentioned as occurring in Tonga apparently on the basis of a mislabelled isotype. About 75 collections from six islands have been examined, but certainly the species may be expected to occur on other high islands.

LOCAL NAMES: Many apparently unrelated names have been recorded for this endemic: *totoirembimbi*, *ndurumbi*, *kirakira*, *turulevu*, *laungaingai*, *vevendu*, *ndo-konivoli*, and *vevenduvanua*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, *Smith 4410*; upper slopes of Mt. Koromba, *Smith 4641*; Nandarivatu, *Gibbs 875*, in *Thurn 263*; Nandala, south of Nandarivatu, *O. & I. Degener 32013*. NANDRONGA & NAVOSA: Nausori Highlands, *DA 13789 (DF 341)*. SERUA: Mt. Tututau, *DA 14500*; hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith 9319*. NAMOSI: Summit of Mt. Naitarandamu, *Gillespie 3238*; hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8555*. NAITASIRI: Tamavua-Sawani road, *Setchell & Parks 15057*; Prince's Road, Nasinu River, *Vaughan 3285*; Tholo-i-suva, *DA 11883*. REWA: Naikorokoro Creek, *Meebold 21946*; Mt. Korombamba, *H. B. R. Parham 5*. VITI LEVU without further locality, *Seemann 274*. KANDAVU: Summit of Mt. Mbuke Levu, *DA 14929*; hills above Namalata and Ngaloa Bays, *Smith 111*. OVALAU: Port Kinnaird, *Storck 896*. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA 12791*; summit ridge of Mt. Numbuiloa, east of Lambasa, *Smith 6501*. MATHUATA-THAKAUNDROVE boundary: Crest of Korotini Range between Navitho Pass and Mt. Ndelaikoro, *Smith 555*. TAVEUNI: Summit and adjacent slopes of Mt. Manuka, east of Wiriki, *Smith 8222*. MOALA: Ndelaimoala, *Smith 1355*. FIJI without further locality, *Harvey*, Nov., 1855.

2. *Scaevola sericea* [Forst. f. Fl. Ins. Austr. Prodr. 98, nom. nud. 1786] Vahl, Symb. Bot. 2: 37. 1791; A. Gray in Proc. Amer. Acad. Arts 5: 151. 1861; Seem. Fl. Vit. 145. 1866; Fosberg & Sachet in Taxon 5: 7. 1956; Leenhouts in Fl. Males. I. 5: 339. fig. 3, 4, 5, g. 1957; Fosberg in Taxon 10: 226. 1961; J. W. Parham, Pl. Fiji Isl. 232. 1964; Jeffrey in Kew Bull. 34: 543. 1980. FIGURES 28D & E, 29.

Lobelia taccada Gaertn. Fruct. Sem. Pl. 1: 119. t. 25. fig. 5. 1788.

Scaevola koenigii Vahl, Symb. Bot. 3: 36. 1794; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, in J. Bot. 2: 72. 1864, Fl. Vit. 145. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 217. 1892; Reinecke in Bot. Jahrb. 25: 692. 1898; Rechingen in Denkschr. Akad. Wiss. Wien 85: 382. 1910.

Scaevola taccada Roxb. Hort. Beng. 15. 1814; St. John in Taxon 9: 205 [interpreting the binomial as a new combination based on *Lobelia taccada* Gaertn.]. 1960.

Scaevola taccada Roxb. Fl. Ind. 2: 146, nom. illeg. 1824; Fosberg in Taxon 11: 181. 1962; Backer & Bakh. f. Fl. Java 2: 453. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 99. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 343. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 130. 1972; Guillaumet in Fl. Masc. Fam. 110. 1. pl. (1-6). 1976; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 7. 1980; Cronquist, Integr. Syst. Class. Fl. Pl. fig. 6-30. 1981; non Roxb. (1814).

Scaevola lobelia sensu A. Gray in Proc. Amer. Acad. Arts 5: 151. 1861; non Murr. (1774).

Scaevola frutescens Krause in Pflanzenz. 54 (IV. 277): 125. fig. 25, nom. illeg. 1912; Guillaumin in J. Arnold Arb. 13: 11. 1932; Christophersen in Bishop Mus. Bull. 128: 208. 1935; Yuncker in op. cit. 178: 115. 1943, in op. cit. 184: 66. 1945.

Scaevola frutescens var. *sericea* Merr. in Philipp. J. Sci. Bot. 7: 354. 1912; Yuncker in Bishop Mus. Bull. 220: 263. 1959.

Scaevola frutescens var. *frutescens*; Yuncker in Bishop Mus. Bull. 220: 262. 1959.

Scaevola taccada var. *sericea* St. John in Taxon 9: 205. 1960; J. W. Parham, Pl. Fiji Isl. ed. 2. 321. 1972.

Scaevola taccada var. *taccada*; St. John & A. C. Sm. in Pacific Sci. 25: 343. 1971.

Freely branching, spreading shrub 0.5-5 m. high, abundant along beaches and rocky shores near sea level, often forming dense thickets; indument highly variable, the vegetative parts and inflorescences soft-white-sericeous to glabrous (but with hair tufts in leaf axils); petioles essentially lacking or to 15 mm. long and winged to base; leaf blades obovate to spatulate, highly variable in size, (6-) 8-26 cm. long, (3-) 4-12 cm. broad, narrowed toward the cuneate-decurrent base, subentire or sinuate to distally crenate at margins (crenations 1 or 2 per centimeter), obtuse to rounded at apex; inflorescences axillary, few-flowered, 2-5 cm. long, the peduncle (0.5-) 1-2 cm. long; calyx 5-12 mm. long at anthesis including acute lobes (1-) 3-6 mm. long; corolla 12-22 mm. long, the tube white to greenish or purplish, 10-15 mm. long, the limb white or pale green without and purple-lined or brown-bordered, 5-10 mm. long, the lobes with membranaceous, sometimes fimbriate or erose margins; style pale green; fruit white, globose to ovoid, 10-18 mm. in diameter when fresh, drying to 7-13 mm. in diameter and bluntly costate.

TYPIFICATION AND NOMENCLATURE: The correct name of the Indo-Pacific strand *Scaevola* is currently controversial, many modern floras adopting the name *S. sericea* Vahl, others the name *S. taccada* (Gaertn.) Roxb. The most pertinent discussions of this controversy are perhaps those of Fosberg and Sachet in Taxon 5: 7-10. 1956, St. John in op. cit. 9: 200-208. 1960, Fosberg in op. cit. 10: 225-226. 1961, in op. cit. 11: 181. 1962, and Jeffrey in Kew Bull. 34: 537-545. 1980. The details of these discussions cannot here be stated in full, and even a summary can be confusing. However, the remarks of Jeffrey (1980) seem to justify his conclusion that the name *S. sericea* should be adopted.

The oldest post-Linnaean name for the widespread Indo-Pacific white-fruited *Scaevola* is *Lobelia taccada* Gaertn. Jeffrey (1980, p. 541) indicates that the choice of *Bela-Modagam* Rheede (Hort. Malabar. 4: 121. t. 59. 1683) by St. John (1960, p. 202) as the lectotype of *L. taccada* "must be rejected, as having been based on a misinterpretation of the protologue, since it could not have been the source of the validating description and illustrations, and since there is no certainty that it was employed by Gaertner even in part as such a source." Of the elements listed by Gaertner in his protologue of *L. taccada*, his description and illustrations were from a fruit (or fruits) conserved in the collection at Leiden and originating from Ceylon; this fruit would have been the indisputable choice of a lectotype for Gaertner's name had it been still extant, but the material appears to have been lost and thus can hardly be chosen as a lectotype. [However, it is not clear to me why St. John's lectotypification cannot be superseded by naming Gaertner's original illustration as the lectotype (ICBN, Arts. 7.5, 8.1 (b), 9.1).] Any of the other elements included by Gaertner is discordant with the



FIGURE 29. *Scavola sericea*, with foliage, flowers, and fruits, in a beach thicket on Koro (Smith 1061), \times about 2/3.

protologue, inasmuch as the latter contains details which could not have been drawn from it. The real reason to reject the name *S. taccada* (Gaertn.) Roxb. (1824) is its illegitimacy because of *S. taccada* Roxb. (1814), as discussed below.

The type of *Scaevola sericea* is *J. R. & G. Forster* (C HOLOTYPE), collected on Niue (Savage Island) during Cook's second voyage. In his 1791 publication Vahl made no reference to G. Forster's nomen nudum of 1786, although obviously a portion of the same Forster collection was the sole basis of his binomial.

Scaevola koenigii is based on *Koenig* (C HOLOTYPE), collected in India. Although the taxon is obviously conspecific with that typified by the Forsters' Niue plant, Vahl must have considered that the two localities are so far separated that conspecificity of the specimens was unlikely; differences in indument are also apparent.

Scaevola taccada Roxb. (1814) is discussed in considerable detail by Jeffrey (1980, p. 542); it is one of the few names in Roxburgh's 1814 work to be considered validly published, typified (Fosberg and Sacht, 1956, p. 9) by the same Rheede element discussed above (*Bela-Modagam*); the epithet *taccada* was taken from the vernacular name used in Ceylon. Roxburgh's 1814 usage cannot be taken as a transfer of *Lobelia taccada* Gaertn. to *Scaevola*; it would seem to be a validly published new species not based upon *L. taccada*. However, in the edition of *Flora Indica* of 1824, *S. taccada* was definitely based on *L. taccada*; *S. taccada* (Gaertn.) Roxb. (1824) is therefore illegitimate, being a later homonym of *S. taccada* Roxb. (1814).

Scaevola frutescens is to be considered a superfluous name based on the same type as *S. sericea* Vahl, which was cited in the synonymy (Jeffrey, 1980, p. 544).

The preceding discussion by no means exhausts the subject of the synonymy of *Scaevola sericea*. Only those names that are basic to the problem and those that have been applied to the species in the Fijian Region have been listed.

DISTRIBUTION: Widespread in the Indo-Pacific, usually restricted to open sandy beaches or rocky coasts on most islands and continental shores from East Africa northward to Ceylon, India, and southern Japan, and eastward through Malesia to tropical Australia and into eastern Polynesia and Hawaii. About 30 Fijian collections are at hand, but the species may be anticipated on most islands with suitable habitats.

The species is highly variable, especially in the existence of essentially glabrous and velutinous vegetative parts. The usefulness of infraspecific taxa remains to be demonstrated by critical analyses of the entire population. The typical form, with pilosulous or puberulent leaves, young stems, and inflorescences, is less frequent in Fiji than a form with glabrous stems and leaves (but with tufts of white hairs on leaf bases and on peduncles and pedicels); the two forms sometimes are intermingled, and there is as yet no assurance that seeds always produce forms entirely resembling their parents (Sykes, 1970).

LOCAL NAMES AND USES: Recorded vernacular names in Fiji are *vivendu*, *vevendu*, *kirakira*, *ndrendre*, *kativari*, *vasa ni waitui*, and *masi ni wai*. The root is said to be used for unspecified medicinal purposes, and the leaves are used internally for pneumonia.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 219*. NANDRONGA & NAVOSA: Korotongo, *O. & I. Degener 32124*. SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9510*; Navua, *Parks 20405*. REWA: Suva Point, *Tothill 340*; Nukulau Island, *Barclay 3424*. MBENGGGA: Raviravi, *DA 6047*. KANDAVU: Nangingia (Denham Island, west of Kandavu), *DA 14964*; Namalata Isthmus region, *Smith 176*. OVALAU: Nathula Point, *Weiner 175*. MOTURIKI: *Seemann 275*. KORO: East coast, *Smith 1061*. NGAU: Shore of Herald Bay, vicinity of Sawaeke, *Smith 7934*. VANUA LEVU: MATHUATA: Nanduri, *Tothill 450*. THAKAUNDROVE: Namale, *DA 16864*. MATUKU: *Bryan 288*. VANUA MBALAVU: Lomaloma, *DA 13620*. LAKEMBA: Near Tumbou Jetty, *Garnock-Jones 760*. KAMBARA: On limestone beach, *Smith 1259*.

ORDER ASTERALES

As in nearly all recent schemes of the classification of flowering plants, the order Asterales is here construed as containing the sole family Asteraceae (cf. Hutchinson, 1973; Dahlgren, 1980; Takhtajan, 1980, 1987; Cronquist, 1981; Thorne, 1983).

FAMILY 186. ASTERACEAE

BY ALBERT C. SMITH and GERALD D. CARR (University of Hawaii)

ASTERACEAE Dumort. Comment. Bot. 55, as *Astereae*. 1822.

Compositae Giseke, Prael. Ord. Nat. Pl. 538. 1792. Nom. alt.

Annual or perennial herbs, or less often shrubs, or rarely (in our taxa) vines or small trees, estipulate; leaves diverse in arrangement and detail; individual flowers epigynous, actinomorphic or zygomorphic, ♂, unisexual, or neuter, gamopetalous with either strap-shaped (ligulate) or tubular, commonly 5-merous corollas, compactly clustered in heads (capitula) often simulating a single flower, the heads variously disposed, subtended or partially enveloped by one or more series of bracts (phyllaries), often with additional bracts (pales or chaff) interspersed among florets on the receptacle; calyx absent or represented by 1-numerous hairs, bristles, or scales (pappus) in one or more series; stamens epipetalous, equalling the number of corolla lobes and alternate with them, the anthers usually elongate and appendaged apically and basally, usually connate around style, introrsely dehiscent; style usually 2-branched, the branches usually with receptive papillae on inner surfaces and pollen-collecting hairs on outside; ovary inferior, bicarpellate, unilocular with a single basal ovule, developing into an achene (cypsel); endosperm absent; embryo straight.

DISTRIBUTION: Cosmopolitan but especially well developed in temperate and subtropical regions, encompassing about 1,100 genera and perhaps 20,000 species. In Fiji we recognize the occurrence of 58 species in 44 genera; only nine species are considered indigenous (three of these presumably being endemic).

USEFUL TREATMENTS OF FAMILY: Of the enormous volume of literature on the Asteraceae, comparatively few papers are here listed. These are primarily floristic works with elements in common with Fiji, or they are treatments that give an overview of classification within the family. Other references are noted under generic treatments. CRONQUIST, A. Phylogeny and taxonomy of the Compositae. Amer. Midl. Nat. 53: 478-511. 1955. SOLBRIG, O. T. The tribes of Compositae in the southeastern United States. J. Arnold Arb. 44: 436-461. 1963. BACKER, C. A., & R. C. BAKHUIZEN VAN DEN BRINK, JR. Asteraceae. Fl. Java 2: 362-437. 1965. KOSTER, J. T. The Compositae of New Guinea I. Nova Guinea Bot. 24: 497-614. 1966; II. Blumea 18: 137-145. 1970; III. op. cit. 20: 193-226. 1972; IV. op. cit. 22: 207-217. 1975; V. op. cit. 23: 163-175. 1976; VI. op. cit. 25: 249-282. 1979; VII. op. cit. 26: 233-243. 1980. CARLQUIST, S. Tribal interrelationships and phylogeny of the Asteraceae. Aliso 8: 465-492. 1976. HEYWOOD, V. H., J. B. HARBORNE, & B. L. TURNER (eds.). The Biology and Chemistry of the Compositae 1: i-xiv, 1-619; 2: i-xiv. 621-1189. 1977. FOSBERG, F. R., & M.-H. SACHET. Compositae (in Flora of Micronesia). Smithsonian Contr. Bot. 46: 12-70. 1980. GRIERSON, A. J. C. Compositae. In: Dassanayake, M. D., & F. R. Fosberg (eds.). Rev. Handb. Fl. Ceylon 1: 111-278. 1980. ROBINSON, H. A revision of the tribal and subtribal limits of the Heliantheae (Asteraceae). Smithsonian Contr. Bot. 51: 1-102. 1981. THORNE, R. F. Proposed new realignments in the angiosperms. Nordic J. Bot. 3: 85-117. 1983. McVAUGH, R. Compositae. In: Anderson, W. R. (ed.). Flora Novo-Galiciana 12: 1-1161. 1984. LANE, M. A., & B. L. TURNER (eds.). The generic concept in the Compositae: a symposium. Taxon 34: 5-88. 1985. KING, R. M., & H. Robinson. The Genera of the Eupatorieae (Asteraceae). i-ix. 1-581. (Monogr. in Syst. Bot. 22). 1987.

The Asteraceae are one of the two largest families of flowering plants. Although the familial boundaries are seldom disputed, there has been much debate over the recognition of subfamilies and the recognition and disposition of tribes and genera. The tribal arrangement of the present treatment follows the scheme of Thorne (1983), while the alignment of genera within tribes follows Heywood et al. (1977), where such information is provided or can be inferred.

Of the above-listed treatments, those of Backer and Bakhuizen van den Brink (1965), Koster (1966-1980), Fosberg and Sachet (1980), and Grierson (1980) provide discussions of many (or most) of the genera and species of Asteraceae found in Fiji and are cited in the appropriate synonymies when pertinent. McVaugh's (1984) scholarly treatment of the family in western Mexico includes discussions of many taxa which are now pantropical in their adventive distributions. The other contributions listed above are more general but will interest readers who are concerned with broader aspects of Asteraceae systematics and who may feel that synanthology has completely slipped beyond the grasp of anyone but a specialist.

The Asteraceae are phyletically rather isolated from other Asteridae, and this has led to much speculation as to the most primitive tribe within the family and the nearest relatives outside the family. Jansen and coworkers have recently provided strong molecular evidence that subtribe Barnadesiinae of tribe Mutisieae is the most primitive element in the Asteraceae (Jansen, R. K. in Proc. Nat. Acad. Sci. **84**: 5818-5822. 1987; Jansen, R. K., J. D. Palmer, & H. J. Michaels in Comp. Newsl. **15**: 2-11. 1988; Jansen, R. K. & J. D. Palmer in Amer. J. Bot. **75**: 753-766. 1988). Although the nearest relative outside the family has still not been concretely identified, Jansen and Palmer (1988) indicate that, of the families examined in their studies, Rubiaceae is the best candidate.

Biologically, the Asteraceae are of interest because of the large number of natural and artificial interspecific and intergeneric hybrids that are known. Indeed, this has been one of the families in which biosystematic studies have been most rewarding, and in several instances this approach has produced detailed knowledge about interspecific and intergeneric relationships. The relative paucity of barriers to hybridization is presumably in part related to the youth of the family and its continuing rapid evolutionary development. This, in turn, has contributed to the notorious systematic complexity of the family and has produced many groups that defy practical taxonomic treatment.

The economic importance of the family is considerable but is not commensurate with its size. A few food and oil crops and the insecticide pyrethrum contribute to the family's value to man. A large number of ornamentals are grown, notably in the genera *Aster*, *Coreopsis*, *Cosmos*, *Dahlia*, *Gerbera*, *Helianthus*, *Senecio*, and *Tagetes*. A negative impact on man's economy is produced by the many very successful, often noxious weeds found in the family, e.g. in such genera as *Ambrosia*, *Centaurea*, *Cirsium*, *Taraxacum*, and *Xanthium*.

KEY TO TRIBES OCCURRING IN FIJI

- Heads ligulate (the florets all ♂, the corolla of each comprising a ligule with 5 apical teeth) or, if heads apparently radiate, then the corollas of the disk florets bilabiate. 1. MUTISIEAE
 Plants without milky latex; corollas of disk florets bilabiate. 1. MUTISIEAE
 Plants with milky latex; corollas all ligulate. 3. LACTUCEAE
 Heads radiate (central florets ♀ or functionally ♂, each with a tubular, 4- or 5-lobed, usually actinomorphic corolla; peripheral florets ♀ or neuter, each with a strap-shaped, generally 3-toothed corolla), disciform (peripheral florets ♀, the corolla of each a slender tube lacking a ligule), or discoid (having only ♀ florets, each with a tubular, more or less actinomorphic (3 or)4- or 5-lobed corolla).
 Florets all ♀; heads homogamous, discoid; phyllaries 2-several-seriate, mostly more or less imbricated and distinct (reduced to 2 scarcely imbricated pairs in *Mikania*); receptacle naked; corollas never yellow.
 Leaves alternate; style branches slender, tapering uniformly to acute tips, minutely hispidulous; anther bases sagittate. 2. VERNONIEAE
 Leaves opposite, at least on lower part of plant; style branches obtuse to clavate, minutely papillate, not hairy; anther bases obtuse. 6. EUPATORIEAE

Florets not all ♂ (exceptions noted), the peripheral ones commonly ♀; heads heterogamous (disciform or radiate) or rarely homogamous and discoid with uniseriate, more or less connivent phyllaries (senecioid genera *Crassocephalum* and *Emilia*) or discoid and/or unisexual with a chaffy receptacle or the capitulescence an aggregation of 1-flowered heads (helianthoid genera *Bidens*, *Eleutheranthera*, *Lagasea*, and *Xanthium*); corollas variously colored, commonly yellow.

Leaves opposite, at least below; and/or all or most of the disk flowers each associated with an often persistent receptacular palea or seta (chaff); and/or heads unisexual.

Receptacle chaffy; and/or heads unisexual. 4. HELIANTHEAE
Receptacle naked; heads all bisexual. 5. TAGETEAE

Leaves alternate; receptacles naked or merely minutely hairy; heads always bisexual.
Anther bases sagittate, finely caudate. 8. INULEAE

Anther bases obtuse to minutely sagittate, not caudate.
Phyllaries herbaceous, uniseriate, connivent, sometimes with a few external bracteoles; pappus of capillary hairs. 10. SENECIONEAE

Phyllaries herbaceous or scarious-margined to membranous, in 2-several series, distinct; pappus of bristles or scales, or absent.

Rays present (reduced or absent in *Conyza*); phyllaries herbaceous to chartaceous, sometimes subscarious at margin; style branches of ♂ flowers each with a narrowly triangular to subulate terminal appendage covered with collecting hairs; pappus (in our taxa) bristly or absent. 7. ASTEREEAE

Rays absent (present in *Chrysanthemum*); phyllaries (at least the inner ones) scarious- or often hyaline-margined; style branches of ♀ flowers obtuse or truncate, the apex sometimes penicillate; pappus a minute corona or absent. 9. ANTHEMIDEAE

KEYS TO GENERA

TRIBE 1. MUTISIEAE

One genus only in Fiji; perennial ornamental herbs with basally tufted leaves; ray flowers showy; disk flowers bilabiate. 1. *Gerbera*

TRIBE 2. VERNONIEAE

Anthers 3; pappus of 3 thick, cartilaginous, white scales coalesced into a cuplike crown. 2. *Strachium*
Anthers 5; pappus of 5 or more bristles or thin flat scales, never coalesced into a crown.

Involucre mostly 6-11 mm. high; pappus bristles about 5-8; heads sessile, in clusters of (1 or) 2-many, the clusters paniculately or spicately disposed.

Heads numerous in glomerules, each cluster subtended by usually 2 or 3 broad, conspicuous bracts, the glomerules paniculately disposed; pappus consisting of 5 delicate aristae. 3. *Elephantopus*

Heads few (mostly 2-5) in glomerules, each cluster subtended by a narrow bract, the glomerules spicately disposed; pappus consisting of 5-8 stiffly awned scales, two of which are twice folded. 4. *Pseudelephantopus*

Involucre mostly less than 5.5 mm. high; pappus bristles more than 15; heads pedunculate, or if sessile then aggregated in corymbiform clusters. 5. *Vernonia*

TRIBE 3. LACTUCEAE

Plants caulescent; heads numerous on leafy or at least somewhat branched stems; achene truncate or terminated in a beak usually less than 5 mm. long, the main body not barbed around the base of the beak.

Pappus dimorphic, consisting of fine narrow bristles and capillary down; heads large (with 30 or more florets), commonly woolly in bud and often coarsely glandular. 6. *Sonchus*

Pappus monomorphic, consisting of uniformly fine setae; heads small (with 20 or fewer florets), neither woolly nor coarsely glandular.

Achenes with a beak up to about 5 mm. long; stems stout, generally leafy and in the capitulescence conspicuously bracteate; involucre about 8-12 mm. high. 7. *Lactuca*

Achenes beakless; stems slender, with few or no leaves and only minute bracts; involucre about 4-5 mm. high. 8. *Youngia*

Plants acaulescent; heads solitary on leafless unbranched scapes; achene terminated in a beak about 6-10 mm. long, the main body antorsely barbed around the base of the beak. 9. *Taraxacum*

TRIBE 4. HELIANTHEAE

Heads 1-flowered, aggregated into specialized bracteate capitulescences closely resembling single heads; each head subtended by a calyxlike, gamophyllous, mostly 4-lobed involucre; ray flowers absent; pappus minute or absent. 16. *Lagasea*

Heads few-many-flowered, variously disposed; involucre variable; ray flowers often present; pappus absent or more often present.

Involucre comprising usually 5 clavate, spreading, coarsely glandular outer phyllaries and a series of inner phyllaries in number equalling and enfolding the ray achenes; pappus absent. 10. *Sigesbeckia*

Involucre not as above; pappus present or sometimes absent.

Leaves alternate, at least above, or basal.

Flowering heads bisexual.

Coarse herbs or subshrubs, commonly 1–3 m. tall, the stems leafy; leaves entire to coarsely lacinate; heads large and showy, 2–several cm. broad.

Receptacle convex; pappus scales (at least some of them) generally awned or acuminate.

Peduncles not fistulose, solid or at least thick-walled; pappus of 2 deciduous scalelike awns.

17. *Helianthus*

Peduncles fistulose and thin-walled from a short distance below the head, hollow; pappus a persistent crown of unequally awned scales. 18. *Tithonia*

Receptacle markedly conical; pappus a short crown of awnless, generally obtuse scales.

19. *Rudbeckia*

Slender herbs, less than 0.5 m. tall, the stems with few or no leaves; leaves (mostly basal) finely pinnatisect, the segments linear, often subuliform; heads small, less than 1.5 cm. broad; pappus of two retrorsely barbed awns. 24. *Glossogyne*

Flowering heads unisexual, the ♂ heads many-flowered, hemispherical, distal on the branches, the ♀ heads 2-flowered, ovoid, burrlike, covered by hooked spines, proximal on the branches.

27. *Xanthium*

Leaves opposite.

Rays more or less sessile and persistent on the ray achenes; heads solitary; involucre 3–many-seriate, the phyllaries mostly with a dark distal band or discoloration; paleae conduplicate, enclosing the achenes; achenes with 1 or 2 awns or naked. 11. *Zinnia*

Rays with a distinct basal tube (rays often absent in *Eleutheranthera*), not persistent; involucre mostly 2-seriate, the phyllaries generally lacking a dark distal band.

Pappus absent or consisting of a few awns, setae, or scales, these never numerous or plumose; inner phyllaries herbaceous, stramineous, or membranous.

Phyllaries herbaceous, greenish throughout (the inner ones stramineous in *Eleutheranthera* and *Synedrella*); pappus when present of awns (not retrorsely barbed), scales, or setae.

Receptacle flat to convex; involucre 2(or 3)-seriate; pappus variable or absent.

Inner phyllaries herbaceous; pappus minute or scalelike or with 1 or 2 ephemeral awns less than 1.5 mm. long.

Receptacular paleae broadly oblanceolate, sometimes apiculate, concave, embracing the achenes, firm, persistent. 12. *Wollastonia*

Receptacular paleae bristlelike, delicate, often deciduous. 13. *Eclipta*

Inner phyllaries stramineous; pappus absent or of usually 2 rigid awns.

Pappus absent. 14. *Eleutheranthera*

Pappus of usually 2 rigid, persistent awns. 15. *Synedrella*

Receptacle very high, narrowly conical; involucre (in our taxon) uniseriate; pappus of 2(–4) very delicate unequal setae less than 1 mm. long. 25. *Acmella*

Phyllaries, at least the inner series, membranous or with scarios margins and brown-orange longitudinal striae; pappus of 2(–4) long, retrorsely barbed awns or essentially absent.

Pappus of 2(–4) long, retrorsely barbed awns.

Summit of achenes more or less truncate, the awns more or less erect. 20. *Bidens*

Summit of achenes drawn out into a long rostrum, the awns widely divergent.

22. *Cosmos*

Pappus absent or comprising 2 minute teeth.

Achenes elliptic-oblong, greatly compressed, usually less than 2.5-times longer than broad; roots not tuberous; stems less than 1 m. high; inner phyllaries usually less than 10 mm. long. 21. *Coreopsis*

Achenes linear to linear-oblanceolate, moderately compressed, usually more than 3.5-times longer than broad; roots tuberous; stems commonly 1–1.5 m. high; inner phyllaries 12–21 mm. long. 23. *Dahlia*

Pappus of numerous plumose setae; inner phyllaries membranous. 26. *Tridax*

TRIBE 5. TAGETEAE

One genus only in Fiji; herbaceous annuals with gland-dotted leaves; phyllaries glandular, uniseriate, coalescent; receptacle naked. 28. *Tagetes*

TRIBE 6. EUPATORIEAE

Flowers 10–125 per head; phyllaries 10–40, 2- or 3-seriate, subequal, lacking a smaller additional bract at the base of each head.

Pappus of 3 (or 4) viscid-tipped knobs; phyllaries 2-seriate, basally connate; achenes usually 3-angled, without distinct ribs. 29. *Adenostemma*

Pappus of about 5 broadly based aristate scales; phyllaries 2- or 3-seriate, distinct; achenes prismatic, 4- or 5-ribbed. 30. *Ageratum*

Flowers 4 per head; phyllaries 4, uniseriate, subequal, often with a smaller additional bract at the base of each head. 31. *Mikania*

TRIBE 7. ASTEREAE

- Pappus absent or vestigial, at most consisting of 1-3 delicate hairlike bristles less than 0.5 mm. long.
 Flowering heads very small, globose, disciform (corollas of marginal ♀ flowers tubular), in loose paniculiform clusters, the receptacle hemispherical or depressed-globose; leaves not rosulate or subrosulate. 32. *Dichrocephala*
 Flowering heads small to moderately large, campanulate, radiate (corollas of marginal flowers ligulate), solitary, terminal on scapiform peduncles, the receptacle slightly convex; leaves rosulate or subrosulate. 33. *Keysseria*
 Pappus of numerous, well-developed setae commonly 2-4 mm. long.
 Ray and disk flowers yellow. 34. *Solidago*
 Ray flowers white or pink to blue.
 Inner phyllaries with a chartaceous base and an evident green tip; heads radiate, the ray ligules far exceeding the involucre and mostly 1.5-3 mm. broad (except in *A. subulatus*, where the ligules are very short and narrow, as in some species of the two following genera). 35. *Aster*
 Inner phyllaries usually green or sometimes chartaceous, but not as above; heads radiate or discoid, the ray ligules vestigial or well developed but less than 1 mm. broad.
 Heads radiate, the corollas of marginal ♀ flowers with ligules far surpassing the style branches and far exceeding the tube in length. 36. *Erigeron*
 Heads basically disciform, the corollas of marginal ♀ flowers eligulate or with ligules scarcely surpassing the style branches and less than half the length of the tube. 37. *Conyza*

TRIBE 8. INULEAE

- One genus in Fiji; our species half-shrubby, often 1-3 m. high, with elliptic-oblongate to obovate, serrate leaves up to 30 cm. or more in length, the stems and often young leaves silky-haired to thinly tomentose.
 38. *Blumea*

TRIBE 9. ANTHEMIDEAE

- Heads radiate, generally large and showy. 39. *Chrysanthemum*
 Heads eradiate (in our taxa disciform), generally small, not showy.
 Erect herbs or shrubs; heads numerous in paniculiform clusters. 40. *Artemisia*
 Low-growing prostrate herbs; heads solitary, more or less sessile in leaf axils. 41. *Centipeda*

TRIBE 10. SENECTIONEAE

- Capitula heterogamous, disciform, the peripheral flowers ♀. 42. *Erechtites*
 Capitula homogamous, discoid, the flowers all ♂.
 Involucre calyculate (with several very small bracts at the base); achenes 8-10-ribbed.
 43. *Crassocephalum*
 Involucre not calyculate; achenes 5-ribbed. 44. *Emilia*

1. *GERBERA* L. Opera Var. 247. 1758; Backer & Bakh. f. Fl. Java 2: 432. 1965. Nom. et orth. cons.

Perennial herbs with basal tufts of petiolate leaves; flowering heads heterogamous, solitary, apparently radiate, large and showy, borne on scapes, the phyllaries in 2 or more rows, the receptacle naked; rays conspicuous, in 1 or 2 series, mostly ♀, the inner series, if present, generally shorter and sometimes bilabiate; disk flowers bilabiate, ♀, the style branches rather short and broad, rounded or truncate at tips; achenes often beaked, the pappus consisting of bristles in 2 or more series.

TYPE SPECIES: *Gerbera linnaei* Cass. (*Arnica gerbera* L.), typ. cons.

DISTRIBUTION: Africa, Madagascar, Asia, and Malesia, with 50-70 species. One species is occasionally cultivated in Fiji.

1. *Gerbera jamesonii* Bolus ex Hook. f. in Gard. Chron. III. 5: 772. t. 122, as *G. jamesoni*. 1889, in Bot. Mag. 115: t. 7087, as *G. jamesoni*. 1889; Backer & Bakh. f. Fl. Java 2: 432. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972; Grierson in Rev. Handb. Fl. Ceylon 1: 267. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 37. 1985.

As occasionally cultivated near sea level in Fiji, *Gerbera jamesonii* has pinnatilobate leaves to 50 cm. long and 4-10 cm. broad; scapes pale-pilose, 30-50 cm. long, the flowering heads 6-10 cm. in diameter, the rays light pink to orange. Flowers and fruits were noted in September.

TYPIFICATION: The type is from a plant cultivated at Kew, originally from a number of different localities in Africa.

DISTRIBUTION: Southern Africa, now widely cultivated.

LOCAL NAMES AND USE: This attractive ornamental is known in Fiji only as *gerbera*, but elsewhere the names *Transvaal daisy* and *Baberton daisy* are used.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, Department of Agriculture grounds, DA 12185.

2. *STRUCHIUM* P. Br. Hist. Jam. 312. 1756; Backer & Bakh. f. Fl. Java 2: 369. 1965; Koster in Nova Guinea Bot. 24: 500. 1966; Grierson in Rev. Handb. Fl. Ceylon 1: 119. 1980.

Erect herbs with sessile or petiolate alternate leaves; flowering heads homogamous, discoid, small, sessile, clustered in leaf axils, the phyllaries 3- or 4-seriate, the receptacle naked; flowers tubular, 3- or 4-lobed, ♂, the anther bases sagittate with acuminate lobes, the style branches subulate; achenes oblong, 3- or 4-angled, the pappus a short, tubular, cartilaginous crown of 3 coalescent scales.

TYPE SPECIES: *Struchium herbaceum* Jaume St.-Hil. (*Ethulia struchium* Sw.).

DISTRIBUTION: Tropical America, with one species that has now become widespread in tropical areas.

1. *Struchium sparganophorum* (L.) Kuntze, Rev. Gen. Pl. 1: 366. 1891; Greenwood in J. Arnold Arb. 30: 78. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 120. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 326. 1972; Backer & Bakh. f. Fl. Java 2: 370. 1965; Koster in Nova Guinea Bot. 24: 500. 1966; Grierson in Rev. Handb. Fl. Ceylon 1: 120. 1980.

Ethulia sparganophora L. Sp. Pl. ed. 2. 1171. 1763.

Sparganophorus vaillantii Crantz, Inst. Rei Herb. 1: 261. 1766.

A coarse succulent herb 30–60 cm. high, seen in Fiji as a naturalized weed at elevations up to about 150 m. on rocky shores of rivers, along roadsides, and in pastures, usually in damp places; flowers white, sometimes, like the styles, tinged with pale to deep blue. Flowers and fruits occur throughout the year.

TYPIFICATION: As *Ethulia sparganophora*, Linnaeus listed a reference to P. Browne's Hist. Jam. but also mentioned Vaillant. Grierson (1980) notes the type as being in the Vaillant Herbarium at P.

DISTRIBUTION: Tropical America and the West Indies, now adventive in tropical Africa, Indian Ocean islands, southeastern Asia, Malesia, and into the Pacific.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Near Nasinu, Greenwood 1107, DA 7504. TAILEVU: Gatward's farm, Korovou, DA 10447, 14039. OVALAU: Valley of Mbureta and Lovoni Rivers, Smith 7394. VANUA LEVU: MBUA: Namulomulo, DA 5766. THAKAUNDRIVE: Naweni Plantation, DA 11531; along Hibiscus Highway leading from Savusavu, Bierhorst F189.

The occurrence of this weed in Fiji was first noted by Greenwood in June, 1945 (Greenwood 1107); it is now fairly widespread but is not common. From the southern Pacific we have seen material only from Fiji and Samoa.

3. *ELEPHANTOPUS* L. Sp. Pl. 814. 1753; Philipson in J. Bot. 76: 301. 1938; Backer & Bakh. f. Fl. Java 2: 374. 1965; Koster in Nova Guinea Bot. 24: 501. 1966; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 36. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 135. 1980; McVaugh, Fl. Novo-Galic. 12: 319. 1984.

Erect, rigid, perennial herbs with subsessile to sessile, oblanceolate, often rosulate, alternate (sometimes mostly basal) leaves; flowering heads homogamous, discoid, small, few (usually 4)-flowered, sessile, densely clustered in terminal glomerules surrounded by broad bracts (forming a secondary head), the phyllaries biseriate, the receptacle naked; flowers tubular, 5-lobed, more deeply cleft on one side, ♂, the anther bases sagittate, the style branches filiform, hairy; achenes 10-ribbed, pubescent, the pappus of 5 or 6 (in our species) to numerous basally dilated uniseriate setae.

LECTOTYPE SPECIES: *Elephantopus scaber* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 353. 1913), one of the two species originally included by Linnaeus.

DISTRIBUTION: A genus of about a dozen species (but perhaps as many as 30), mostly indigenous in tropical America, some of them now widespread as adventives. As here delimited, the genus is represented in Fiji by a widespread, pernicious weed.

1. *Elephantopus mollis* H. B. K. Nova Gen. et Sp. 4: 26. 1820; Philipson in J. Bot. 76: 303. 1938; B. E. V. Parham in Agr. J. Dept. Agr. Fiji 13: 53. 1942; Greenwood in Proc. Linn. Soc. 154: 99. 1943, in J. Arnold Arb. 25: 400. 1944, in op. cit. 30: 78. 1949; Mune & Parham in Agr. J. Dept. Agr. Fiji 25: 21. 1954, in Dept. Agr. Fiji Bull. 31: 34. fig. 9; pl. VI. 1957; J. W. Parham in op. cit. 35: 108. fig. 53. 1959; Yuncker in Bishop Mus. Bull. 220: 265. 1959; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972; Koster in Nova Guinea Bot. 24: 502. 1966; Mune & Parham in Dept. Agr. Fiji Bull. 48: 46. fig. 12. 1967; St. John & A. C. Sm. in Pacific Sci. 25: 343. 1971; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 36. 1980; McVaugh, Fl. Novo-Galic. 12: 320. fig. 51. 1984.

Elephantopus tomentosus sensu J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in Dept. Agr. Fiji Bull. 35: 108, pro syn. 1959; non L.

Elephantopus scaber sensu J. W. Parham in Dept. Agr. Fiji Bull. 35: 108, pro syn. 1959; non L.

Coarse herb 0.3–1 m. high from near sea level to about 1,100 m., abundantly naturalized in cultivated and waste lands, clearings, pastures, and plantations, along roads and trails, and on forest edges; flowers white or pinkish. Flowering and fruiting plants are evident throughout the year.

TYPIFICATION: The type is a Humboldt & Bonpland collection from Venezuela, originally mentioned as being from the vicinity of Cumaná and Caracas.

DISTRIBUTION: Tropical America, now widespread as an adventive throughout tropical areas. About 40 Fijian collections are available, but thus far the species seems limited to Viti Levu, Ovalau, Vanua Levu, and Kandavu. We have seen no material from the last two islands, mentioned by Mune and Parham (1967).

LOCAL NAMES: *Tobacco weed, false tobacco, elephant's foot, tavako ni veikau, jangli tambaku* (Hindi).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, Greenwood 1224; Nandi, Krauss 454; summit of Mt. Nanggaranambuluta, east of Nandarivatu, Smith 4879. NANDRONGA & NAVOSA: Upper Singatoka Valley road, DA 10158; Vunisala, Singatoka, Greenwood 746. SERUA: Nakaulevu, Navua, DA 10535. NAMOSI: Wainandoi River, DA 10797. RA: Mborotu Valley, DA 9510; Pasture Seed and Production Farm, Ndombuilevu, DA 10947. NAITASIRI: Nanduruloulou, DA 454; Koronivia, DA 3943; Nasinu, DA 9358; Tamavua, DA 11094. TAILLEVU: Verata, DA 7667. REWA: Naikorokoro Creek, Meebold 21934; vicinity of Suva, Simmonds 73. OVALAU: Valley of Mbureta and Lovoni Rivers, Smith 7677; Wainiloka, DA 5687.

A declared noxious weed in Fiji, *Elephantopus mollis* is believed to have arrived there about 1921 (Greenwood, 1943); the earliest collection we have noted is *Greenwood 746* (November, 1928). Notes on control of this serious weed are provided by Mune and Parham (1967).

4. *PSEUDELEPHANTOPUS* Rohr in Skr. Naturhist.-Selsk. 2 (1): 214, as *Pseudo-Elephantopus*. 1792; Backer & Bakh. f. Fl. Java 2: 375. 1965; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 49, as *Pseudo-Elephantopus*. 1980; McVaugh, Fl. Novo-Galic. 12: 778. 1984. Orth. cons.

Freely branching annual to weakly perennial herbs with obovate to linear alternate (sometimes basal) leaves; flowering heads homogamous, discoid, small, 4-flowered, sessile, mostly in glomerules of 2–5, each glomerule with a narrow bract, the clusters of

heads disposed in a panicle of strongly ascending spikes, the phyllaries biseriate, the receptacle naked; flowers as in *Elephantopus*; achenes 10-ribbed, the pappus of 5 very unequal scales with more or less connate triangular-ovate bases bearing erect bristles in addition to the central awn (2 adjacent scales long and straight, the 2 flanking these twice folded with erect tips slightly exceeding the straight scales, the fifth scale rudimentary or up to about half the length of the others).

TYPE SPECIES: *Pseudelephantopus spicatus* (B. Juss. ex Aubl.) C. F. Baker (*Elephantopus spicatus* B. Juss. ex Aubl.).

DISTRIBUTION: Tropical America, with two or three species, one of which has become a common tropical weed.

The conserved orthography of the generic name is *Pseudelephantopus*, first indicated in ICBN in the Berlin (1988) edition. This spelling was probably first used by Pfeiffer (Nomencl. Bot. 2: 852. 1874); informative discussions are provided by Nicolson (in Taxon 30: 492. 1981) and the Committee for Spermatophyta (in op. cit. 33: 706. 1984).

1. ***Pseudelephantopus spicatus*** (B. Juss. ex Aubl.) C. F. Baker in Trans. Acad. Sci. St.

Louis 12: 45, 54, 56. 1902; Gleason in N. Amer. Fl. 33: 109. 1922; Backer & Bakh. f. Fl. Java 2: 375. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 67. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 10. 1972; McVaugh, Fl. Novo-Galic. 12: 779. fig. 131. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 38. 1985.

Elephantopus spicatus B. Juss. ex Aubl. Hist. Pl. Guiane Fr. 808. 1775; J. W. Parham in Dept. Agr. Fiji Bull. 35: 110. 1959, in Agr. J. Dept. Agr. Fiji 29: 35. 1959, Pl. Fiji Isl. 234. 1964; Mune & Parham in Dept. Agr. Fiji Bull. 48: 50. fig. 13. 1967.

Pseudo-Elephantopus spicatus Rohr in Skr. Naturhist.-Selsk. 2 (1): 216. 1792; Fosberg & Sachtet in Smithsonian Contr. Bot. 46: 49. 1980.

Distreptus spicatus Cass. in F. Cuvier, Dict. Sci. Nat. 13: 366. 1819; Greenwood in J. Arnold Arb. 30: 78. 1949.

Pseudo-elephantopus spicatus quoad J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 141, 143. 1972.

As seen in Fiji, this aggressive species is a coarse herb 0.2–1 m. high, occurring near sea level as a vigorous weed in pastoral, plantation, and agricultural lands, along roadsides, and on the sea coast; flowers white, sometimes with a bluish tinge. Flowers and fruits have been obtained in May, July, and October.

TYPIFICATION: The type of *Elephantopus spicatus* is an Aublet collection from French Guiana.

DISTRIBUTION: Tropical America, now widely adventive elsewhere.

LOCAL NAME: *Yasawa tobacco weed*.

AVAILABLE COLLECTIONS: YASAWAS: NAVITE: Mua-i-ra, DA 11767. WAYA: Yalombi, DA 11764, 13279. VITI LEVU: MBA: Lautoka, Greenwood 1132; near Ndrasa turn-off, DA 14362.

The species was first recorded from Fiji by Greenwood (1949), and his no. 1132, from Lautoka (July 2, 1945) may be the earliest known collection in the archipelago. Mune and Parham (1967) indicate that it is a declared noxious weed in Samoa and suggest that it may have been first introduced into Fiji by American troops into the Yasawa Group during the second World War. However, a first entry through Lautoka seems more likely. It is presumably now a declared noxious weed in Fiji as well as in Samoa (Parham, 1972), but thus far it seems restricted to the Yasawas and north-western Viti Levu. Notes on control of the species are given by Mune and Parham (1967).

5. *VERNONIA* Schreber, Gen. Pl. 2: 541. 1791; Backer & Bakh. f. Fl. Java 2: 371. 1965; Koster in Nova Guinea Bot. 24: 503. 1966; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 57. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 120. 1980; McVaugh, Fl. Novo-Galic. 12: 1013. 1984. Nom. cons.

Monosis DC. in Guillemin, Arch. Bot. 2: 515. 1833, in Wight, Contr. Bot. India, 5. 1834; Seem. Fl. Vit. 139. 1866.

Annual or perennial herbs, shrubs, or trees with alternate, often glandular, simple leaves; flowering heads homogamous, discoid, small to large, pedunculate to sessile, mostly numerous in open paniculiform to more congested corymbiform capitulescences, the phyllaries in few-several series, the receptacle naked; flowers tubular, 5-lobed, ♂, the anther bases sagittate, the style branches elongate, subulate; achenes oblong, terete or angular, often glandular, the pappus filiform or scalelike, biseriate (rarely uniseriate), the outer series often reduced.

TYPE SPECIES: The type species of *Vernonia* is *V. noveboracensis* (L.) Willd. (*Serratula noveboracensis* L.), typ. cons.; that of *Monosis* is *M. wightiana* DC. ex Wight.

DISTRIBUTION: Widespread in the tropics of both hemispheres, with several hundred species, of which a few extend into temperate areas. Two species occur in Fiji, one presumably adventive and one indigenous (and endemic).

KEY TO SPECIES

- Erect herbs to 1.5 m. high, the leaf blades usually 2-5 × 0.5-3 cm.; heads pedunculate, paniculately disposed; pappus biseriate, the outer series much reduced and scalelike, the inner series of fine, delicate, white setae; adventive. 1. *V. cinerea*
 Woody shrubs 1-3 m. high, the leaf blades usually 5-13 × 2-7 cm.; heads mostly sessile, corymbosely disposed; pappus uniseriate, of very narrow but durable, flattened, stramineous aristae; indigenous (and endemic). 2. *V. insularum*

1. *Vernonia cinerea* (L.) Less. in Linnaea 4: 291. 1829; Gibbs in J. Linn. Soc. Bot. 39: 154. 1909; Reching in Denkschr. Akad. Wiss. Wien 85: 382. 1910; Guillaumin in J. Arnold Arb. 13: 10. 1932; Christophersen in Bishop Mus. Bull. 128: 208. 1935; Greenwood in Proc. Linn. Soc. 154: 99. 1943; Yuncker in Bishop Mus. Bull. 178: 115. 1943, in op. cit. 184: 66. 1945; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 103. 1948, in Dept. Agr. Fiji Bull. 35: 108. 1959; Yuncker in Bishop Mus. Bull. 220: 265. 1959; J. W. Parham, Pl. Fiji Isl. 235. 1964; Backer & Bakh. f. Fl. Java 2: 373. 1965; Koster in Nova Guinea Bot. 24: 509. 1966; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 69. 1970; Grierson in Rev. Handb. Fl. Ceylon 1: 133. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 57. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 41. 1985.

FIGURE 30, D.

Conyza cinerea L. Sp. Pl. 862. 1753.

Vernonia parviflora Reinw. ex Bl. Bijdr. Fl. Ned. Ind. 893. 1826.

Vernonia cinerea var. *parviflora* DC. Prodr. 5: 24. 1836; Koster in Blumea 1: 412. 1935, in Nova Guinea Bot. 24: 511. 1966; J. W. Parham, Pl. Fiji Isl. ed. 2. 327. 1972; St. John in Phytologia 36: 389. 1977.

As seen in Fiji *Vernonia cinerea* is an herb to 1.5 m. high, often locally abundant as a naturalized weed in open places, villages, cultivated fields, and pastures, along roads, and on open slopes, at elevations from near sea level to about 850 m. The corollas and styles are pale blue to purple distally, and the pappus is white. Flowers and fruits are to be seen throughout the year.

TYPIFICATION: Linnaeus gave several prior references for *Conyza cinerea*, and Grierson (1980) notes as LECTOTYPE a Hermann (BM) specimen. *Vernonia parviflora* was based on material growing near Buitenzorg, Java.

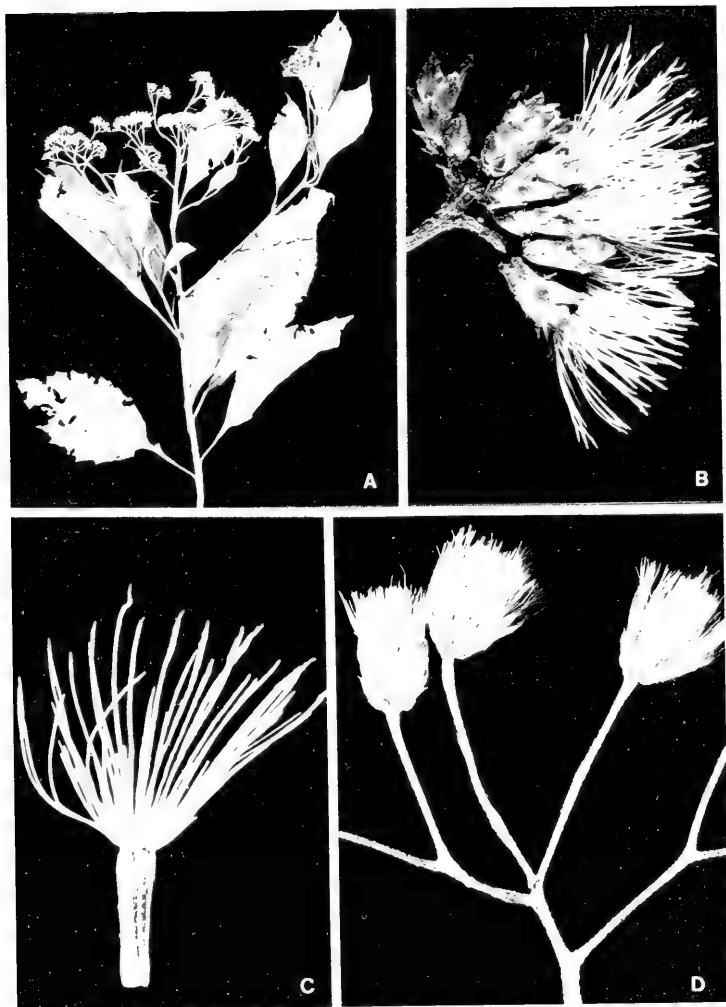


FIGURE 30. A-C, *Vernonia insularum*; A, distal portion of stem, with foliage and capitulescences, $\times 1.4$; B, portion of capitulescence, $\times 4$; C, achene and pappus, $\times 8$. D, *Vernonia cinerea*; portion of capitulescence, $\times 4$. A from Smith 470. B & C from Smith 1960. D from Smith 7004.

DISTRIBUTION: Presumably indigenous in southeastern Asia and Malesia, now adventive in most southern Pacific archipelagoes and elsewhere in the tropics, including Australia, New Zealand, Africa, and America. More than 50 Fijian collections are now at hand.

LOCAL NAMES: *Ironweed*, *vutikaumondro*, *tho vuka*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 170*; Nandi, *DA 9793*; Korovuto, *DA 10689*; Nandarivatu, *Gibbs 873*. NANDRONGA & NAVOSA: Singatoka, *DA 11314*. SERUA: Ngaloa, *Smith 9443*; Nakaulevu, Navua, *DA 11450*. NAMOSI: Namosi, *Parks 20168*. RA: Yanggara, *DA 11868*; Penang, *Greenwood 170A*; Ndombuilevu, *DA 9515*. NAITASIRI: Nanduruloulou, *DA 9572*; Koronivia, *DA 7454*; Nasinu, *DA 11082*. TAILEVU: Ndakuivuna, *Smith 7004*; Matavatathou, *DA 9943*. REWA: Suva, *H. B. R. Parham 46*. OVALAU: Lovoni Village, *Smith 7481*. VANUA LEVU: MATHUATA: Banks of lower Lambasa River, *Smith 6617*; Lambasa, *Harwood 104*. THAKAUNDROVE: Savusavu, *Krauss 1022*. TAVEUNI: Waiyevo, *DA 5719*. NGAMEA: *Harwood 175*. VANUA MBALAVU: Near Ndakuilomaloma, *Garnock-Jones 1140*. LAKEMBA: Near Tumbou, *Garnock-Jones 897*. FIJI without further locality, *Yeoward 46*.

There have been various attempts to divide *Vernonia cinerea* into varieties, as by Koster (1966), who recognized five varieties in Malesian and Pacific areas. However, most recent students (e. g. Grierson, 1980; Fosberg and Sachet, 1980) seem to feel that infraspecific taxa in *V. cinerea* merge into one another, a viewpoint here reflected. If varieties are to be accepted, most Pacific material may be referred to var. *parviflora* (Bl.) DC., the only variety considered by Koster (1966) to extend much farther eastward than New Guinea. It is difficult to assign a firm eastward limit to the indigenous occurrence of the species, but perhaps it is adventive east of New Guinea. The earliest Fijian collection seems to be *Yeoward 46*, sent to Kew in November, 1894.

2. *Vernonia insularum* (A. Gray) Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 202. 1890; J. W. Parham, Pl. Fiji Isl. ed. 2. 327. 1972. FIGURE 30, A-C.

Monosis insularum A. Gray in Proc. Amer. Acad. Arts 5: 114. 1861; Seem. Viti, 438. 1862, Fl. Vit. 139. 1866.

Strobocalyx insularum Sch.-Bip. in Jahresber. Pollichia 18-19: 170. 1861; Seem. Fl. Vit. 139, pro syn. 1866.

Shrub 1-3 m. high, usually compact, occurring at elevations of 400-900 m. in dry or dense forest, in open places, or in crest thickets; phyllaries purplish; corollas white or tinged with blue; filaments purple, the anthers rich blue; pappus stramineous. Flowers and fruits have been obtained between June and November.

TYPIFICATION: The type is *U. S. Expl. Exped.* (US 42465 HOLOTYPE), collected in 1840 in Fiji without further locality.

DISTRIBUTION: Presumably endemic to Fiji, and known with certainty only from Vanua Levu. In his original publication Gray listed the locality as "Tonga and Feejee Islands," but only Fiji is mentioned on the holotype. Gray's mention of Tonga, presumably from the label of another Exploring Expedition collection (which are not always accurately labelled), may be incorrect; at least no more recent Tongan material or literature references of the species from Tonga have been noted.

AVAILABLE COLLECTIONS: VANUA LEVU: MATHUATA: Mountains near Lambasa, *Greenwood 545*; mountains of interior Vanua Levu at about 2,000 ft., *Greenwood 545A*; summit ridge of Mt. Numbuiloa, east of Lambasa, *Smith 6510*; Mt. Ndelaikoro, *DA 11492*. MATHUATA-THAKAUNDROVE boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith 566*. THAKAUNDROVE: Mt. Mariko, *Smith 470*; Natewa Peninsula, hills south of Natewa, *Smith 1960*. FIJI without further locality, *Horne 569*, 611.

6. *SONCHUS* L. Sp. Pl. 793. 1753; Seem. Fl. Vit. 144. 1866; Backer & Bakh. f. Fl. Java 2: 434. 1965; Koster in Blumea 23: 164. 1976; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 50. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 272. 1980; McVaugh, Fl. Novo-Galic. 12: 858. 1984.

Annual or perennial erect herbs or shrubs with hollow stems, milky latex, and alternate, sessile, simple to pinnately divided, often semiamplexicaul and auriculate leaves; flowering heads homogamous, ligulate, large or fairly large, many-flowered, pedunculate, disposed in cymose corymbiform or paniculiform capitulescences, the phyllaries membranous-margined, in several imbricated series, the receptacle naked; flowers ligulate, ♂, the anther bases sagittate, caudate-acuminate, the style branches thin, subobtusate; achenes obovate to narrowly oblong, ribbed, the pappus dimorphic, of fine narrow bristles and downy capillary hairs, weakly coherent at base.

LECTOTYPE SPECIES: *Sonchus oleraceus* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 316. 1913), one of the eight species included in the genus by Linnaeus in 1753.

DISTRIBUTION: Eurasia and Africa, perhaps with as many as 50 species, several of which have become widely naturalized. Two weedy species occur in Fiji.

KEY TO SPECIES

- Perennial with deep vertical rootstock, spreading by horizontal creeping root branches; involucre 14–22 mm. high in fruit; heads 3–5 cm. broad in flower. 1. *S. arvensis*
Annual with short taproot; involucre 9–14 mm. high in fruit; heads 1.5–2.5 cm. broad in flower. 2. *S. oleraceus*

1. *Sonchus arvensis* L. Sp. Pl. 793. 1753; Backer & Bakh. f. Fl. Java 2: 435. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 39. 1985.

Coarse, freely branched herb 0.3–2 m. high, perennial, with abundant milky latex, found as a naturalized weed in open places, along roadsides, and sometimes in openings along streams in dense forest from near sea level to 400 m.; flowers dull red in center, yellow at margin, the styles yellow. Flowers and fruits have been noted between August and December.

TYPIFICATION: Several prior references were cited by Linnaeus.

DISTRIBUTION: Eurasia, now naturalized elsewhere, but not as widespread in the Pacific or in Fiji as the following species.

LOCAL NAME: Although none of the Fijian specimens have been associated with local names, the species is often known as *perennial sow thistle* elsewhere.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8684*. NAITASIRI: Central Agricultural Station, Navuso, *DA 2534*; Nasinu, *DA 9379, 9647, 11109*.

Sonchus arvensis, known only from Viti Levu in Fiji, apparently arrived in the archipelago no earlier than the 1920's or 1930's.

2. *Sonchus oleraceus* L. Sp. Pl. 794. 1753; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862; Yuncker in Bishop Mus. Bull. 178: 119. 1943, in op. cit. 220: 270. 1959; Backer & Bakh. f. Fl. Java 2: 435. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 68. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972; Koster in Blumea 23: 164. 1976; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 219: 96. 1977; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 50. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 273. 1980; McVaugh, Fl. Novo-Galic. 12: 858. *fig. 93* (lower). 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 39. 1985.

Sonchus asper sensu Seem. Fl. Vit. 145. 1866, op. cit. 430. 1873; Drake, Ill. Fl. Ins. Mar. Pac. 215. 1890; Greenwood in Proc. Linn. Soc. 154: 100. 1943; Yuncker in Bishop Mus. Bull. 220: 270. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 114. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 326. 1972; non Hill (*S. oleraceus* var. *asper* L.).

Annual herb 0.2–1.2 m. high, naturalized as a weed in clearings and cultivated areas and along forest trails from near sea level to about 900 m.; flowers yellow; pappus white. Flowers and fruits probably occur throughout the year, but have mostly been noted between October and February.

TIPIFICATION: Grierson (1980) notes the LECTOTYPE as Herb. Linn. 949/6 (LINN).

DISTRIBUTION: Eurasia and northern Africa, but now widespread as a weed.

LOCAL NAMES: *Sow thistle*, *thandavu*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains inland from Lautoka, *Greenwood 179*; Nandarivatu, *Gillespie 4166*. NANDRONGA & NAVOSA: Lawangga, *DA 9773*. NAMOSI: Mt. Voma, *DA 11694*. TAILEVU: Namara, *Seemann 266*. REWA: Suva, *Simmonds s. n.* KANDAVU: Western end of island, near Cape Washington, *Smith 302*. MATUKU: *Milne 116*. LAKEMBA: Near Tumbou, *Garnock-Jones 902*.

The common *sow thistle* was apparently introduced into Fiji early in the nineteenth century; it was widespread at the time of the collections of Milne (1855) and Seemann (1860).

7. *LACTUCA* L. Sp. Pl. 795. 1753; Backer & Bakh. f. Fl. Java 2: 436. 1965; Koster in *Blumea* 23: 167. 1976; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46:44. 1980; McVaugh, *Fl. Novo-Galic.* 12: 548. 1984.

Erect annual and perennial herbs with hollow stems, milky latex, and alternate (often basal) entire to pinnatifid leaves; flowering heads homogamous, ligulate, fairly small, few-many-flowered, subsessile to pedunculate, subtended by amplexicaul bracts (or bracts small or absent), the capitulescences paniculiform to corymbiform, the phyllaries in 2-several series, membranous or herbaceous with scarious margins, often glabrous, the receptacle naked; flowers ligulate, 5-toothed at apex, ♂, the anther bases sagittate with acute or shortly acuminate auricles, the style branches semicylindric; achenes oval to linear, compressed, strongly nerved or winged on margins, more faintly 1-few-nerved on each face, beaked, the pappus of many-seriate hairs on the dilated summit of the beak.

LECTOTYPE SPECIES: *Lactuca sativa* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 317. 1913), one of the six species originally included in the genus by Linnaeus.

DISTRIBUTION: Northern Hemisphere and Africa, with 50–100 or more species, widely introduced elsewhere. The common garden species is grown in Fiji.

1. *Lactuca sativa* L. Sp. Pl. 795. 1753; Yuncker in Bishop Mus. Bull. 178: 119. 1943; J. W. Parham, Pl. Fiji Isl. 236. 1964, ed. 2. 325. 1972; Backer & Bakh. f. Fl. Java 2: 436. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 66. 1970; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 45. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 37. 1985.

Erect herb to 1 m. high at maturity, the basal leaves large, often compacted into a head; flowers yellow, usually about 15 per head.

TIPIFICATION: Linnaeus originally listed several prior references, including one to *Hortus Cliffortianus*.

DISTRIBUTION: Presumably indigenous in Europe, now worldwide in cultivation. Although it is cultivated for the local market in Fiji, no collector seems to have prepared a token specimen.

LOCAL NAME AND USE: The edible garden *lettuce*.

8. *YOUNGIA* Cass. in Ann. Sci. Nat. **23**: 88. 1831; Backer & Bakh. f. Fl. Java **2**: 437. 1965; Koster in Blumea **23**: 166. 1976; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 67. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 268. 1980.

Annual or perennial erect herbs with milky latex and alternate (often mostly basal), coarsely dentate to lyrate-pinnatifid leaves; flowering heads homogamous, ligulate, small to medium in size, 8–20-flowered, the phyllaries glabrous, biseriate, those of the outer series much the shorter, the receptacle naked; flowers ligulate, apically 4- or 5-dentate, ♂, the anther bases caudate-acuminate, the style branches obtuse; achenes fusiform, ribbed, the pappus 1- or 2-seriate, composed of fine setae.

LECTOTYPE SPECIES: No type species was designated for *Youngia* by ING (1979). Cassini originally included two species, *Y. lyrata* and *Y. integrifolia*; the first of these was indicated as the type (i. e. lectotype) species by Grierson (1980).

DISTRIBUTION: Temperate and tropical Asia to Malesia and Australia, perhaps with 25–50 species. Babcock and Stebbins (1937) recognized 26 species. While the common Pacific weed is sometimes referred to *Youngia lyrata*, we here follow most recent treatments in utilizing the broader concept of *Y. japonica*.

USEFUL TREATMENT OF GENUS: BABCOCK, E. B., & G. L. STEBBINS. The genus *Youngia*. Carnegie Inst. Wash. Publ. **484**: 1–108. pl. 1–5; fig. 1–31. 1937.

1. *Youngia japonica* (L.) DC. Prodr. **7**: 194. 1838; Babcock & Stebbins in Carnegie Inst. Wash. Publ. **484**: 94. fig. 28. 1937; A. C. Sm. in Sargentia **1**: 141. 1942; J. W. Parham, Pl. Fiji Isl. **236**. 1964, ed. 2. 327. 1972; Backer & Bakh. f. Fl. Java **2**: 437. 1965; Koster in Blumea **23**: 106. 1976; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 67. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 268. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **41**. 1985.

Prenanthes japonica L. Mant. Pl. 107. 1767.

Youngia lyrata Cass. in Ann. Sci. Nat. **23**: 88. 1831; Yuncker in Bishop Mus. Bull. **220**: 271. 1959; J. W. Parham, Pl. Fiji Isl. ed. 2. 327. 1972.

Crepis japonica Benth. Fl. Hongkong. **194**. 1861; Greenwood in Proc. Linn. Soc. **154**: 94. 1943; J. W. Parham in Dept. Agr. Fiji Bull. **35**: 113. 1959.

As noted in Fiji, *Youngia japonica* is an herb 10–50 cm. high (occasionally more vigorous and to 1 m. high) found from near sea level to about 1,100 m. as a weed in gardens and villages, on cleared land, and along roadsides and forest trails; flowers and styles bright yellow. Flowers and fruits have been noted in most months.

TYPIFICATION: The type of *Prenanthes japonica* is *Kleynhoff*, from Japan (LINN 952/6 HOLOTYPE) (Grierson, 1980); that of *Youngia lyrata* is *Bouton* (P HOLOTYPE), from Mauritius (Grierson, 1980).

DISTRIBUTION: Japan, Korea, western China, and northwestern India to Malesia, widely adventive elsewhere.

LOCAL NAME: *Mosita ni Viti* (Naitasiri).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Greenwood 801, DA 10410*; Mt. Nanggarambuluta, east of Nandarivatu, *Vaughan 3237*; western slopes of Mt. Nanggarambuluta, *Smith 4794*. NAMOSI: Wainimakutu, Valley of Wainavindrau Creek, *Smith 8814*. NAITASIRI: Mountain west of Mata-wailevu, Wainimala Valley, *St. John 18305*; Plant Introduction and Quarantine Station, Nanduruloulou, *DA 9576*; Vunimbua Arboretum, Nanduruloulou, *DA 5624*; vicinity of Nasinu, *DA 11105*. TAILEVU: Nambua, Namara, *DA 10066*. REWA: Department of Agriculture grounds, Suva, *DA 11475*; Edinburgh Drive, Suva, *DA 12607*. FIJI without further locality: *Yeoward 14, Gillespie 4038*.

The earliest Fijian collection of *Youngia japonica* that we have noted is *Yeoward 14*, which the collector sent to Kew in 1894. Surprisingly, this weed has thus far been obtained in Fiji only on Viti Levu.

9. *TARAXACUM* Wiggers, Prim. Fl. Holsat. 56. 1780; Backer & Bakh. f. Fl. Java 2: 434. 1965; Grierson in Rev. Handb. Fl. Ceylon 1: 271. 1980; McVaugh, Fl. Novo-Galic. 12: 925. 1984. Nom. cons.

Biennial or perennial acaulescent scapose herbs with milky latex and subentire to runcinate-pinnatifid basal leaves; flowering heads homogamous, large, many-flowered, solitary on hollow naked scapes, the phyllaries several-seriate, those of the inner series long and subequal, the outer ones shorter, the receptacle naked; flowers ligulate, 5-dentate at apex, ♂, the anther bases sagittate, shortly setaceous, acuminate, the style branches thin, more or less obtuse; achenes oblong to fusiform, 4- or 5-angled or -ribbed, the upper portion antrorsely barbed below the extension of a long rostrum, the pappus uniseriate, composed of fine, minutely barbellate setae at summit of rostrum.

TYPE SPECIES: *Taraxacum officinale* Wiggers (*Leontodon taraxacum* L.), typ. cons.

DISTRIBUTION: Cold or temperate regions of the Northern Hemisphere, with a multitude of named species (microspecies?) which are partly or wholly parthenogenetic. Several (or perhaps many) species have become weeds with wide distributions.

Many botanists have attributed *Primitiae Florae Holsaticae* to G. H. Weber, but Stafleu and Cowan (Tax. Lit. ed. 2. 7: 129, 275. 1988) amply justify attribution of the work and of names proposed in it to F. H. Wiggers. As to *Taraxacum*, both for the generic name and the name of the conserved type, ICBN omits the name of Weber.

1. *Taraxacum officinale* Wiggers, Prim. Fl. Holsat. 56. 1780; Greenwood in J. Arnold Arb. 30: 78. 1949; Yuncker in Bishop Mus. Bull. 220: 270. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 119. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 326. 1972; Backer & Bakh. f. Fl. Java 2: 434. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 68. 1970; McVaugh, Fl. Novo-Galic. 12: 926. fig. 133 (upper). 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 40. 1985.

Leontodon taraxacum L. Sp. Pl. 798. 1753.

Perennial herb with a long taproot, seen as a lawn weed at an elevation of about 850 m. (probably infrequent in or absent from warmer parts of the archipelago); flowers bright yellow, borne in heads to 25 mm. across.

TYPEIFICATION: Linnaeus cited a number of prior references in his publication of the name *Leontodon taraxacum*.

DISTRIBUTION: Presumably indigenous in temperate Europe and Asia, *Taraxacum officinale*, as often construed, is now a worldwide adventive.

LOCAL NAME: *Dandelion*.

AVAILABLE COLLECTION: VITI LEVU: MBA: Nandarivatu, Greenwood 1172.

The true identity of the common weed passing in most Pacific areas as *Taraxacum officinale* must remain provisional (cf. Backer and Bakhuizen, 1965). Sykes (1970) suggested that the Niue plant may be referable to *T. laevigatum* (Willd.) DC. Grierson (in Rev. Handb. Fl. Ceylon 1: 271. 1980) refers the weed of Ceylon to *T. javanicum* v. Soest. With limited conviction, we here follow custom and utilize the binomial *T. officinale*, pending another look at Pacific taxa of the genus by a specialist.

The *dandelion* was apparently first noted in Fiji by Greenwood in the 1940's, but of course it may have been established around European residences at Nandarivatu for a longer period; in Fiji it has not been recorded at lower elevations.

10. *SIGESBECKIA* L. Sp. Pl. 900. 1753; Seem. Fl. Vit. 142. 1866; Backer & Bakh. f. Fl. Java 2: 400. 1965; McVaugh & C. Anderson in Contr. Univ. Michigan Herb. 9: 485. 1972; Koster in Blumea 25: 274. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 210. 1980; McVaugh, Fl. Novo-Galic. 12: 842. 1984.

Sigesbeckia Steudel, Nomencl. Bot. ed. 2. 2: 582, orth. var. 1841; et auct.

Erect, mostly annual herbs with opposite, simple, dentate leaves; flowering heads heterogamous, radiate, small to medium-sized, the capitulescences paniculiform to corymbiform, lax, the phyllaries in 2 series, the outer ones (usually 5) spreading or reflexed, clavate, stipitate-glandular, the inner ones erect and partly enveloping the ray achenes, the receptacle bearing concave paleae embracing the disk achenes; ray flowers ♀, fertile, few, uniseriate, the corolla limb short, 3-lobed; disk flowers ♂, fertile, the corollas tubular, mostly 5-lobed, the anther bases sagittate, the style branches short, flattened, obtuse; achenes obovoid-oblong, tetragonous, often curved, the pappus obsolete.

LECTOTYPE SPECIES: *Sigesbeckia orientalis* L. (vide Steudel, Nomencl. Bot. 1: 777. 1821), one of Linnaeus's two original species.

DISTRIBUTION: Tropics and subtropics of both hemispheres, with nine or ten species, at least one of which is widely adventive.

As pointed out by McVaugh and Anderson (1972), Linnaeus consistently used the spelling *Sigesbeckia*, although he had originally named the genus in honor of J. G. Siegesbeck. In the present treatment we have not indicated the spelling used by each cited author.

1. *Sigesbeckia orientalis* L. Sp. Pl. 900. 1753; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 142. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 206. 1890; Rechinger in Denkschr. Akad. Wiss. Wien 85: 384. 1910; Christophersen in Bishop Mus. Bull. 128: 210. 1935; Yuncker in op. cit. 184: 67. 1945, in op. cit. 220: 267. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 114. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 325. 1972; Backer & Bakh. f. Fl. Java 2: 401. 1965; McVaugh & C. Anderson in Contr. Univ. Michigan Herb. 9: 488. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 11. 1972; Koster in Blumea 25: 274. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 210. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 39. 1985.

As noted in Fiji, *Sigesbeckia orientalis* is a weedy herb 15–60 cm. high, occurring from near sea level to about 900 m. in dry areas, clearings, waste places, and gardens, along roadsides, and on open hillsides, often in some local abundance. The flowers are yellow and occur throughout the year, as do fruits.

TYPIFICATION: McVaugh and Anderson (1972) indicated Herb. Linn. 1018-1 (LINN LECTOTYPE), from Linnaeus's garden in Uppsala; but Grierson (1980) has suggested Herb. Hort. Cliff. p. 412 (BM LECTOTYPE).

DISTRIBUTION: Warmer areas of the Old World, sparingly introduced into North and South America. Most authors who mention the species discuss it as occurring in all warmer countries of both the Old and New Worlds. However, in most Pacific areas it gives every appearance of being an adventive rather than an indigene, although of course it could have been an inadvertent aboriginal introduction. Collections by Milne and Seemann indicate that it has been long established in Fiji.

LOCAL NAME: *Senikata*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Lautoka, DA 10338, 10339; hills inland from Lautoka, Greenwood 231; Nandi and vicinity, DA 8566, 9627, 9703; New Reservoir road, DA 11368; Tonge, Mba River, DA 10422; vicinity of Nandarivatu, Gillespie 4177. RA: Mborotu Valley, DA 9506. NAITASIRI: Langgere, DA 11180; Nasinu, DA 9656, 9878; Tamavua, DA 11074. REWA: Suva, DA 12231. VITI LEVU without further locality, Milne 414 (November, 1854), Seemann 263, p. p. LAKEMBA: Seemann 263, p. p.

11. *ZINNIA* L. Syst. Nat. ed. 10. 1221, 1377. 1759; Backer & Bakh. f. Fl. Java 2: 399. 1965; Koster in Blumea 25: 280. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 68. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 210. 1980; McVaugh, Fl. Novo-Galic. 12: 1108. 1984. Nom. cons.

Annual or perennial herbs or shrubs with opposite, mostly sessile and entire leaves; flowering heads heterogamous, radiate, showy, solitary, terminal on hollow, often inflated peduncles, the phyllaries in 3–several imbricated series, each with a thin, dark or discolored and crumpled summit band, the receptacle flat to conical, with conduplicate hyaline or colored paleae enclosing the disk achenes; ray flowers ♀, fertile, the corolla limb sessile or nearly so, marcescent and persistent on the achenes; disk flowers ♂, fertile, the corollas tubular, 5-lobed, the anther bases truncate to auriculate, the style branches filiform, truncate; achenes compressed or angular, the pappus nearly obsolete or composed of 1 or 2 erect awns.

TYPE SPECIES: *Zinnia peruviana* (L.) L. (*Chrysogonum peruvianum* L.).

DISTRIBUTION: Southern U. S. to Brazil and Chile, with about eleven or perhaps as many as 20 species. One species is known to be cultivated in Fiji.

1. *Zinnia violacea* Cav. Icon. Descr. Pl. 1: 57. pl. 81. 1791; McVaugh, Fl. Novo-Galic. 12: 1123. frontispiece. 1984.

Zinnia elegans Jacq. Icon. Pl. Rar. 3: 15. pl. 589. 1794, Collect. 5: 152. 1797; Christophersen in Bishop Mus. Bull. 128: 210. 1935; Yuncker in op.cit. 178: 116. 1943, in op. cit. 184: 67. 1945; J. W. Parham, Pl. Fiji Isl. 236. 1964; Backer & Bakh. f. Fl. Java 2: 400. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 70. 1970; Koster in Blumea 25: 281. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 68. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 41. 1985.

Zinnia haageana sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 328. 1972; non Regel.

As occasionally cultivated in Fiji, *Zinnia violacea* is a coarse annual herb 45–60 cm. high, grown at low elevations. Although the ray corollas of the sole available collection were noted as orange, they vary greatly in color in this species, being violet to purple in many cultivars but also noted as scarlet to orange or yellow and sometimes nearly white.

TYPIFICATION: *Zinnia violacea* was based on a cultivated plant that first flowered in the Royal Botanical Garden, Madrid, about 1790, probably from Mexican seed sent by Sessé or Cervantes. Seeds from this plant were dispersed to other European gardens, and Jacquin (1797) indicated that he received seeds under the name *Z. elegans*, the binomial that is indeed the one most often used for this most widely cultivated *zinnia* (McVaugh, 1984).

DISTRIBUTION: Mexico, but now cosmopolitan in cultivation. In some Pacific areas the species has escaped from cultivation and has become naturalized. All available collections of *Zinnia* we have seen from Fiji to the Society Islands seem referable to *Z. violacea*.

LOCAL NAME AND USE: *Zinnia*; a cultivated annual ornamental.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16759.

Zinnia violacea is characterized by having its receptacular paleae pectinate-fimbriate at tip, its numerous phyllaries in three or four series and often 7–10 mm. long, its ray flowers 5–21 in number (or more in cultivars) with ligules 1–2.5 cm. long and

tapering to a narrow base, its disk flowers 100–200 or more with corollas 7–8 mm. long, its ray achenes 6–7 × 3–3.5 mm., and its disk achenes awnless.

12. *WOLLASTONIA* DC. ex Dec. in Nouv. Ann. Mus. Hist. Nat. Paris 3: 414. 1834; DC. Prodr. 5: 546. 1836; Seem. Fl. Vit. 142. 1866; Fosberg & Sachet in Smithsonian Contr. Bot. 45: 30. 1980, in op. cit. 46: 61. 1980.

Wedelia sensu (p. p.) Backer & Bakh. f. Fl. Java 2: 404. 1965; Koster in Blumea 25: 268. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 214. 1980; non sensu Jacq. (1760).

Perennial herbs or weak shrubs with opposite, often trinerved leaves; flowering heads heterogamously, radiate, pedunculate, solitary or in very open, terminal, corymbiform-paniculiform capitulescences of up to 20 or more, the phyllaries chiefly in one series, with a few smaller outer bracts constituting a second series, the receptacle with strongly nerved, keeled, oblanceolate, obtuse, sometimes apiculate paleae enfolding the disk achenes; ray flowers mostly 6–10, ♀, fertile, the limb of the corolla 2- or 3-toothed at apex; disk flowers ♂, fertile, the corollas tubular, 5-lobed, the anther bases obtuse or sagittate, the style branches rather broad, acute or obtuse; achenes 3-angled (ray) or 4-angled (disk), the pappus composed of 1 short awn or obsolete.

LECTOTYPE SPECIES: *Wollastonia scabriuscula* DC. ex Dec. (designated by Fosberg and Sachet in Smithsonian Contr. Bot. 45: 32. 1980), nom. illeg. = *W. biflora* (L.) DC. No lectotype species had been indicated by ING (1979).

DISTRIBUTION: A small genus of a few Asiatic-Pacific species, possibly to be expanded to include part of the Hawaiian genus *Lipochaeta* DC. One species is very widespread in the southern Pacific.

USEFUL TREATMENT OF GENUS: FOSBERG, F. R. & M.-H. SACHET. *Wollastonia* de Candolle ex Decaisne. Smithsonian Contr. Bot. 45: 30–34. 1980.

In their informative discussion of 1980, Fosberg and Sachet discuss the close relationship between *Wollastonia* and *Lipochaeta* DC. (1836), concluding that, as the genera of Heliantheae are now delimited, at least part of *Lipochaeta* is congeneric with *Wollastonia*, the latter having priority. No definite transfers were made, however, pending research in progress by other students. *Wedelia biflora* and most other African species of *Wedelia* had already been transferred to *Melanthera* Rohr (1792) by H. Wild (in Kirkia 5: 1–17. 1965), but *Wollastonia* seems much closer to *Lipochaeta* than to either *Melanthera* or *Wedelia* Jacq. (1760). We here follow the conclusions of Fosberg and Sachet in this complex matter, pending an ultimate solution.

1. *Wollastonia biflora* (L.) DC. Prodr. 5: 546. 1836; Fosberg & Sachet in Smithsonian Contr. Bot. 45: 32. 1980, in op. cit. 46: 62. 1980. FIGURE 31.

Verbesina biflora L. Sp. Pl. ed. 2. 1272. 1763.

Verbesina strigulosa Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 463. 1829.

Wedelia aristata Less. in Linnaea 6: 160. 1831; Guillaumin in J. Arnold Arb. 13: 10. 1932.

Wedelia biflora DC. in Wight, Contr. Bot. India, 18. 1834; Reching in Denkschr. Akad. Wiss. Wien 85: 384. 1910; Christophersen in Bishop Mus. Bull. 128: 210. 1935; Yuncker in op. cit. 178: 117. 1943, in op. cit. 184: 67. 1945, in op. cit. 220: 267. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 106. 1959, Pl. Fiji Isl. 236. 1964, ed. 2. 327. 1972; Backer & Bakh. f. Fl. Java 2: 404. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 70. 1970; St. John & A. C. Sm. in Pacific Sci. 25: 343. 1971; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 17. 1972; St. John in Phytologia 36: 389. 1977; Koster in Blumea 25: 268. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 216. 1980.

Wollastonia strigulosa DC. in Dec. in Nouv. Ann. Mus. Hist. Nat. Paris 3: 414. 1834; DC. Prodr. 5: 548. 1836; Seem. in Bonplandia 9: 257. 1861, Fl. Vit. 142. 1866.

Wollastonia scabriuscula DC. in Dec. in Nouv. Ann. Mus. Hist. Nat. Paris 3: 414, nom. illeg. 1834; DC. Prodr. 5: 547. 1836.

Wollastonia insularis sensu Benth. in London J. Bot. 2: 225. 1843; non DC.

Wollastonia forsteriana sensu A. Gray in Proc. Amer. Acad. Arts 5: 319. 1862, in Bonplandia 10: 36. 1862; Seem. Viti, 438. 1862; non DC.

Wedelia strigulosa K. Schum. in Bot. Jahrb. 9: 223. 1887; Drake, Ill. Fl. Ins. Mar. Pac. 207. 1890.

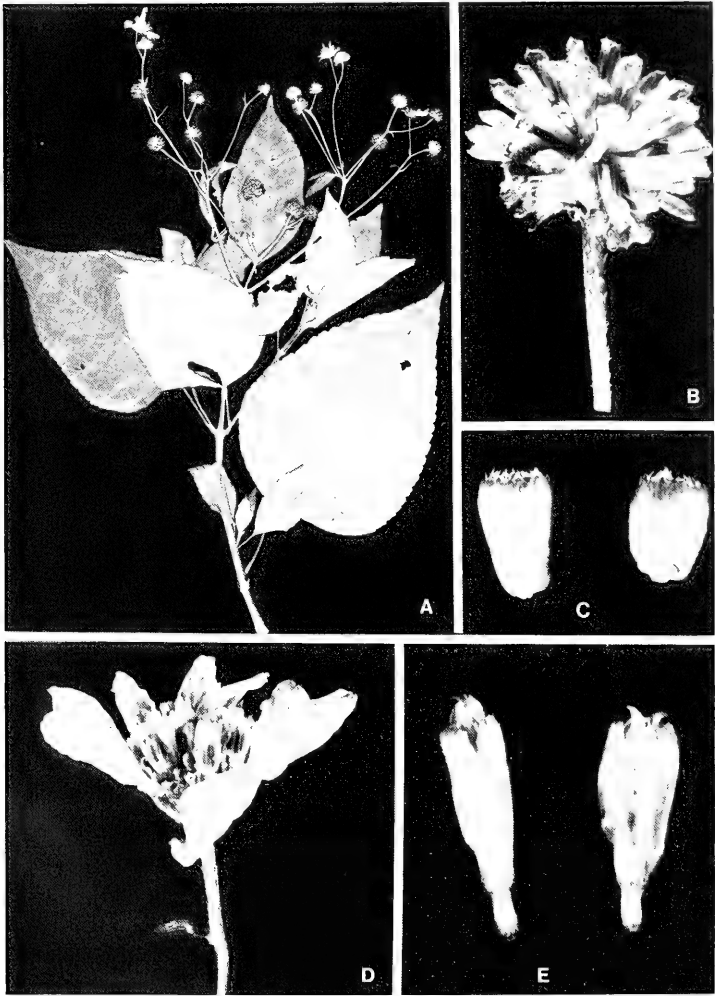


FIGURE 31. *Wollastonia biflora*; A, distal portion of stem, with foliage and capitulescences, $\times 1/3$; B, fruiting head, $\times 5$; C, achenes, $\times 10$; D, flowering head, $\times 3$; E, disk flowers, $\times 10$. A from Smith 1090, B & C from Meebold 16480, D & E from Weiner 184.

In Fiji *Wollastonia biflora* is a coarse herb or shrub 1–3 m. high, abundant along coasts, on edges of mangrove swamps, in thickets and waste places, and on grassy hills and the edges of forest at elevations from sea level to about 450 m. Its appearance along roadsides and near gardens often makes it appear adventive, although it is clearly indigenous. The Fijian population is highly variable, the stems and leaves being densely to sparsely canescent-strigose and often subglabrescent, the petioles 1.5–7 cm. long, and the ovate, coarsely serrate leaf blades (4–) 7–20 × (1.5–) 3–16 cm. The ray and disk flowers are bright yellow and the achenes are brown. Flowers and fruits are not seasonal.

TYPIFICATION AND NOMENCLATURE: For *Verbesina biflora* Linnaeus gave only the reference "Habitat in India;" the type (Grierson, 1980) may be taken as Herb. Linn. 1021/4 (LINN HOLOTYPE). *Verbesina strigulosa* was based on collections from the Moluccas, several islands having been mentioned by Gaudichaud. *Wedelia aristata* was probably also based on material from the Moluccas; de Candolle (1836) reduced it to *Wollastonia strigulosa* and also noted in the synonymy (as did Seemann, 1866) *Buphthalmum helianthoides* Forst. f. (Fl. Ins. Austr. Prodr. 57. 1786; "passim intra tropicos"), non L'Hér. *Wollastonia scabriuscula*, the lectotype species of the genus, is illegitimate because *Verbesina biflora* was cited as a synonym. Two other species have been mentioned as occurring in Fiji, but it is doubtful that, in the sense of their types, they are synonyms of *Wollastonia biflora*. Bentham (1843) referred a *Barclay* specimen to *Wollastonia insularis* DC., typified by a Cunningham collection from Australia, and A. Gray (1862) assigned *Seemann 268* to *Wollastonia forsteriana* (Endl.) DC., based in part on Norfolk Island material referred by G. Forster (Fl. Ins. Austr. Prodr. 91. 1786) to *Buphthalmum uniflorum*, nom. nud.

DISTRIBUTION: East coast of Africa to India, China, Japan, Malesia, Australia and eastward throughout the southern Pacific. More than 40 Fijian collections are at hand.

LOCAL NAMES AND USES: Recorded local names are *kovekove*, *sekawa*, *thekawa*, *lawati*, *kulukulu*, and *malawati*. The species is said to have various medicinal uses, especially for the relief of stomach pains.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Yalombi, *St. John 18011*. VITI LEVU: MBA: Near Lautoka, *Greenwood 20*. NADRONGA & NAVOSA: Korolevu: *DA 9283 (McKee 2852)*. SERUA: Shore near Ngaloa, *Degener & Ordonez 13621*. TAILEVU: Near Londoni wharf, *DA 9933*. REWA: Suva, *Meebold 16480*; Nukulau Island, *Barclay*, in 1840. MBENGGGA: Raviravi, *Weiner 184*. KANDAVU: Namalata isthmus region, *Smith 5*. OVALAU: Levuka, *Parks 20498*. KORO: East coast, *Smith 1090*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7802*. VANUA LEVU: MATHUATA: Nakuthi Island, *DA 15287*. THAKAUNDROVE: Maravu, near Salt Lake, *Degener & Ordonez 14130*. TAVEUNI: Somosomo, *Seemann 268*. MOALA: *Bryan 316a*. MATUKU: *Moseley*, July, 1874. VANUA MBALAVU: Near Lomaloma, *DA 10227*. LAKEMBA: Hills above Naivanavana Valley, *Garnock-Jones 928*. FIJI without further locality, *Harvey*, Nov., 1855.

In their two treatments of 1980, Fosberg and Sachet recognize two varieties of *Wollastonia biflora*: var. *biflora* and var. *canescens* (Gaud.) Fosberg. The latter is said to have the vegetative indument denser, giving the plants a grayish or grayish green color, and the achenes are shorter (1.5–2 (–3) mm. rather than 2.5–4 mm. long). Both varieties probably occur in Fiji, but the indument and achene characters seem difficult to interpret and not well linked, and one must question the value of infraspecific categories in such a widespread and variable taxon.

13. *ECLIPTA* L. Mant. Pl. Alt. 157, 286. 1771; Seem. Fl. Vit. 141. 1866; Backer & Bakh. f. Fl. Java 2: 402. 1965; Koster in Blumea 25: 273. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 34. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 211. 1980; McVaugh, Fl. Novo-Galic. 12: 314. 1984. Nom. cons.

Annual or perennial, decumbent to erect herbs with opposite, subentire leaves; flowering heads small, heterogamous, radiate, pedunculate, solitary or in small clusters, terminal or axillary, the phyllaries in 1 or 2 series, subequal, the receptacle bearing rather delicate filiform paleae; ray flowers numerous, usually 2-several-seriate, ♀, partially fertile, the corolla limb narrow, entire or bidentate; disk flowers ♂, fertile, the corolla tubular, 4(or 5)-lobed, the anther bases obtuse to auriculate, the style branches short, flat, obtuse; achenes 3- or 4-angled, oblong, truncate, often tuberculate, the pappus obsolete or composed of 2 minute teeth on a short crown.

TYPE SPECIES: *Eclipta erecta* L., nom. illeg. (*Verbesina alba* L., *E. alba* (L.) Hassk.), typ. cons. = *E. prostrata* (L.) L.

DISTRIBUTION: Mostly in South America but also in Central and North America, perhaps with as many as 15 species, one of which is now a widespread weed in all warm countries.

1. *Eclipta prostrata* (L.) L. Mant. Pl. Alt. 286. 1771; Seem. Fl. Vit. 141. 1866; Backer & Bakh. f. Fl. Java 2: 402. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 65. 1970; Koster in Blumea 25: 273. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 212. 1980; McVaugh, Fl. Novo-Galic. 12: 315. fig. 49. 1984.

Verbesina prostrata L. Sp. Pl. 902. 1753.

Verbesina alba L. Sp. Pl. 902. 1753.

Eclipta erecta L. Mant. Pl. Alt. 286, nom. superfl. 1771; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862; J. W. Parham, Pl. Fiji Isl. 234. 1964.

Eclipta alba Hassk. Pl. Jav. Rar. 528. 1848; Drake, Ill. Fl. Ins. Mar. Pac. 206. 1890; J. W. Parham in Dept. Agr. Fiji Bull. 35: 106. 1959, Pl. Fiji Isl. ed. 2. 324. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 34. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 36. 1985.

In Fiji *Eclipta prostrata* is seen as a coarse herb 30–90 cm. high, found near sea level and said to be locally common (although this is not borne out by the number of collections) as a naturalized weed in waste places, cultivated areas, and open fields, often near ditches. The stems are sometimes reddish and somewhat decumbent proximally, the flowers are white, and the achenes are pale brown. Flowers and fruits do not appear seasonal.

TYPIFICATION: For *Verbesina prostrata* Linnaeus cited two prior references; Grierson (1980) has designated as the type a specimen in the Plukenet Herbarium (BM LECTOTYPE). Linnaeus cited a number of earlier references for *V. alba*; Grierson (1980) indicates as the type Herb. Hort. Cliff. (BM LECTOTYPE). *Eclipta erecta* is an illegitimate name because *V. alba* L. is cited in synonymy.

The three competing names for the present species, if it is used in the broad sense, are *Eclipta prostrata* (based on *Verbesina prostrata*, 1753), *E. alba* (based on *V. alba*, 1753), and *E. erecta* (a superfluous name). The first author to unite these taxa was Roxburgh (Fl. Ind. ed. 2. 3: 438. 1832), under the name *E. prostrata*, which therefore is to be used if the taxa are united in the genus *Eclipta* (ICBN Art. 57.2, Ex. 5, Sydney and Berlin editions, 1983, 1988). Earlier editions of ICBN had considered the first author to unite these taxa to be Hasskarl (1848), who used the name *E. alba*.

DISTRIBUTION: Tropical America, now widespread as a semi-cosmopolitan weed, established in Fiji prior to Seemann's visit.

LOCAL NAMES: *Tumandu*, *tamandu*, *tumundi*, *tholulu*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Ndreketi, Lautoka, DA 11762. NAITASIRI: Korongganga, DA 10820; Koronivia, DA 7554. REWA: Suva, Walu Bay, DA 11597; Suva, King's Wharf, DA 14429. VITI LEVU without further locality, Graeffe 1433. FIJI without further locality, Seemann 269, Horne 103.

14. *ELEUTHERANTHERA* Poit. ex Bosc in (Déterville) Nouv. Dict. Hist. Nat. 7: 498. 1803; Backer & Bakh. f. Fl. Java 2: 407. 1965; Koster in Blumea 25: 265. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 217. 1980.

Annual, erect herbs with opposite, petiolate, simple leaves; flowering heads small, homogamous, discoid, or sometimes heterogamous and radiate, sessile or on short axillary peduncles, solitary or in clusters of 2-4, the phyllaries few, in 1 or 2 series, the inner ones often stramineous, the receptacle bearing keeled, oblong-elliptic, acuminate, scarious, pilose paleae embracing the achenes; ray flowers usually absent or, when present, few, neuter, and with the corolla limb small; disk flowers ♂, fertile, the corolla tubular, 5-lobed, the anther bases sagittate, the style branches linear, acute or acuminate, pilose at apex; achenes narrowly obovoid, somewhat compressed, subangular, narrowed to a small cylindrical boss at apex, the pappus absent.

TYPE SPECIES: *Eleutheranthera ruderalis* (Sw.) Schultz-Bip. (syn. *E. ovata* Poit. ex Steudel) (Grierson, 1980).

DISTRIBUTION: One species in tropical America, introduced into tropical Asia, Africa, Malesia, and farther east, at least to Tonga and Samoa.

1. *Eleutheranthera ruderalis* (Sw.) Schultz-Bip. in Bot. Zeitung 24: 165, 239. 1866; Hitchcock in Missouri Bot. Gard. Rep. 4: 99. 1893; Greenwood in Proc. Linn. Soc. 154: 100. 1943, in J. Arnold Arb. 36: 398. 1955; J. W. Parham in Dept. Agr. Fiji Bull. 35: 117, p. p. 1959, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972; Backer & Bakh. f. Fl. Java 2: 407. 1965; Koster in Blumea 25: 266. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 217. 1980.

Melampodium ruderalis Sw. Fl. Ind. Occ. 3: 1372. 1806.

Erect herb to about 75 cm. high, with sparse indument; the flowers are yellow, and the achenes are minutely white-puberulent distally. The species bears a resemblance to *Sigesbeckia orientalis*, and the specimen cited by Parham (1959) as well as his distribution within Fiji are referable to that species. Flowers have been noted in March and June.

TIPIFICATION: The type is a specimen in the Swartz Herbarium (S HOLOTYPE) from Jamaica.

DISTRIBUTION: Tropical America; now a widespread weed, but infrequent in Fiji; it also occurs sparingly in Samoa and Tonga.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, Greenwood 772A. RA: Penang, Greenwood 772. REWA: Suva, H. B. R. Parham 46. LAKEMBA: Near Tumbou, Garnock-Jones 910.

Greenwood (1943) first observed this plant in the Penang district in 1930 and later at Lautoka in 1939; in 1951 he noticed it around Suva but apparently did not collect it there (1955). H. B. R. Parham's Suva collection was presumably made after 1932 (cf. this *Flora*, Vol. 1, p. 55). The species is obviously not well established in Fiji and probably arrived there through one of the ports not much earlier than 1930.

15. *SYNEDRELLA* Gaertn. Fruct. Sem. Pl. 2: 456. 1791; Backer & Bakh. f. Fl. Java 2: 410. 1965; Koster in Blumea 25: 271. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 52. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 222. 1980; McVaugh, Fl. Novo-Galic. 12: 908. 1984. Nom. cons.

Erect or sprawling annual herbs with opposite, petiolate, simple leaves; flowering heads small, heterogamous, radiate, mostly sessile and clustered in the upper leaf axils, the phyllaries few, the outer ones 2, leafy, the inner ones stramineous, narrow, the receptacle with concave or flat, linear-elliptic, obtuse paleae; ray flowers 3-5 (-8), ♀, fertile, the corolla limb short, 2-4-dentate; disk flowers (5-) 8 or 9, ♂, fertile, the corolla tubular, 4-lobed, the anther bases sagittate-auriculate, the style branches pubescent, complanate with long-tapering appendages; achenes dorsally compressed with lacerate wings (ray) or 3- or 4-angled and wingless (disk), the pappus composed of 2 (-4) rigid, pubescent awns.

TYPE SPECIES: *Synedrella nodiflora* (L.) Gaertn. (*Verbesina nodiflora* L.).

DISTRIBUTION: A monotypic genus, American in origin but now worldwide as an adventive.

1. *Synedrella nodiflora* (L.) Gaertn. Fruct. Sem. Pl. 2: 456. t. 171. 1791; Reehinger in Denkschr. Akad. Wiss. Wien 85: 384. 1910; Setch. in Carnegie Inst. Wash. Publ. 341: 41. 1924; Christophersen in Bishop Mus. Bull. 128: 210. 1935; A. C. Sm. in Sargentia 1: 141. 1942; Greenwood in Proc. Linn. Soc. 154: 100. 1943; Yuncker in Bishop Mus. Bull. 178: 117. 1943, in op. cit. 184: 67. 1945; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 103. 1948; Greenwood in J. Arnold Arb. 30: 77. 1949; Yuncker in Bishop Mus. Bull. 220: 268. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 104. fig. 52. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 326. 1972; Backer & Bakh. f. Fl. Java 2: 410. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 68. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 60, 115. 1972; St. John in Phytologia 36: 373. 1977; Koster in Blumea 25: 271. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 52. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 222. 1980; McVaugh, Fl. Novo-Galic. 12: 908. fig. 153. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 40. 1985.

Verbesina nodiflora L. Cent. Pl. 1: 28. 1755, Amoen. Acad. 4: 290. 1759.

A coarse, spreading herb 0.2-1 m. high, found from near sea level to about 200 m. as a naturalized weed in open areas, villages, cultivated areas, and along roads, often locally abundant. The ray and disk flowers are yellow or pale yellow, and the anthers are brown. Flowers and fruits occur throughout the year.

TIPIFICATION: The type is from a Caribbean plant, presumably (Grierson, 1980) in the Sloane Herbarium (BM HOLOTYPE).

DISTRIBUTION: Tropical America, now introduced into most tropical countries. About 45 Fijian collections have been seen.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 91*; Sambeto Valley, Nandi, *DA 10293*; New Reservoir road, Mba, *DA 11366*. NANDRONGA & NAVOSA: Upper Singatoka Valley road, *DA 10159*; Agricultural Station, Singatoka, *DA 9129*. SERUA: Ngaloa, *Smith 9499*. RA: Yanggara, *DA 11874*; Pasture Seed and Production Farm, Ndombulevu, *DA 9527*; Penang, *Greenwood 91A*. NAITASIRI: Nathokaika, Rewa River, *DA 10054*; Nasinu, *Gillespie 3547*. TAILEVU: Navuloa, *DA 9333*; Mbau road, near Kuku, *DA 10620*. REWA: Suva and vicinity, *H. B. R. Parham 28*, *Degener & Ordonez 13518*. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, *Smith 7973*. VANUA LEVU: MATHUATA: Semaniura, Lambasa, *DA 10468*. THAKAUNDRIVE: Between Nayarambale and Seavathi, *DA 167*; along road from Salt Lake to Natewa Bay, *Bierhorst F196*. VANUA MBALAVU: Lomaloma Botanical Garden, *DA 10203*. LAKEMBA: Near Tumbou Village, *Garnock-Jones 922*.

Surprisingly, the earliest Fijian record of this weed seems to be *Gillespie 3547* (October, 1927), although Greenwood (1943) suggests that it arrived in the archipelago about 1905. In spite of its local abundance, it does not appear to be very aggressive; the lack of reported local names suggests that the species has not made much of an impression as a weed.

16. *LAGASCEA* Cav. in *Anales Ci. Nat.* 6: 331, as *Lagasca*. 1803; Grierson in *Rev. Handb. Fl. Ceylon* 1: 204. 1980; McVaugh, *Fl. Novo-Galic.* 12: 550. 1984. *Nom. et orth. cons.*

Copiously pubescent, often stipitate-glandular, perennial shrubs or herbs or one species (ours) an annual herb with opposite leaves and branches, at least below; heads 1-flowered, homogamous, discoid, aggregated into compact headlike clusters subtended by a false involucre of (usually 5) specialized herbaceous bracts, the true phyllaries calyxlike, tubular, gamophyllous, 4(-7)-toothed; flowers all alike, tubular, (4 or)5-lobed, ♂, fertile, the anther bases sagittate-auriculate, the style branches elongate, tapering-attenuate, flattened within, convex and densely antrorsely barbed on outer surface; achenes narrowly obovoid or fusiform, somewhat compressed, pubescent above, the pappus minutely coroniform or absent.

TYPE SPECIES: *Lagascea mollis* Cav.

DISTRIBUTION: Tropical America, with eight or more species, one of which has become a widely dispersed adventive elsewhere.

1. *Lagascea mollis* Cav. in *Anales Ci. Nat.* 6: 333. *pl. 44*, as *Lagasca mollis*. 1803; Grierson in *Rev. Handb. Fl. Ceylon* 1: 204. 1980; McVaugh, *Fl. Novo-Galic.* 12: 556. 1984.

Diffusely branched annual herb, adventive and perhaps ephemeral near sea level, up to 0.6 or 1 m. high; stems finely white-pubescent; cauline leaves up to 6 × 4 cm., white-pubescent on both surfaces; capitula 1-flowered, sessile, usually 8-15 (-50) together in pedunculate clusters simulating many-flowered capitula at tips of slender, naked branches; corolla white with purplish veins, 4.5-6.5 mm. long, pilose; anthers purple-black; achenes black, 2.5-3.5 mm. long, the pappus about 0.2 mm. high, forming a pale, lacerate crown. Flowers and fruits were obtained in August.

TYPIFICATION: The type was a cultivated plant grown in 1803 at the Royal Botanical Garden, Madrid, from seeds received from Cuba.

DISTRIBUTION: Mexico, Central America, West Indies, and South America, now adventive at least in India, Ceylon, and Malaya (Grierson, 1980). A single Fijian collection is here noted as a new record of the genus as a weed in Fiji.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, *Meebold 16786*.

The cited collection of this widespread but apparently erratically dispersed weed was collected in August, 1932, and had been erroneously filed in the genus *Tridax*; we are indebted to D. L. Schulz (Leipzig) for the identification. Found in Fiji only in Suva, as far as we are aware, it may have been a transient weed spread in ship's ballast; whether it persists in Fiji is doubtful. No other Pacific records have been noted by us, and the species is not included by Backer and Bakhuizen van den Brink as occurring in Java.

17. *Helianthus* L. Sp. Pl. 904. 1753; Backer & Bakh. f. Fl. Java 2: 406. 1965; McVaugh, Fl. Novo-Galic. 12: 494. 1984.

Coarse annual and perennial herbs with leaves opposite below and alternate above; flowering heads large, heterogamous, radiate, pedunculate, solitary or in corymbiform clusters, the phyllaries in 2-several series, the receptacle with conduplicate paleae clasping the disk achenes; ray flowers neuter, the corolla limb often large and showy; disk flowers very numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases entire or subauriculate, the style branches flattened, with narrow stigmatic lines and short or long hispidulous appendages; achenes obovate, laterally compressed, generally glabrous, the pappus commonly composed of 2 deciduous, paleaceous awns.

LECTOTYPE SPECIES: *Helianthus annuus* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 477. 1913), one of the ten species originally included in the genus by Linnaeus.

DISTRIBUTION: Temperate North America and southward into South America, with about 70 species, several of which are widely cultivated and sometimes naturalized elsewhere. Three species have been recorded as cultivated in Fiji.

USEFUL TREATMENT OF GENUS: SCHILLING, E. E., & C. B. HEISER. Infrageneric classification of *Helianthus* (Compositae). Taxon 30: 393-403. 1981.

KEY TO SPECIES

Plants perennial, the roots tuberous; disk of flowering heads yellow, usually 1-2 cm. in diameter (sect. *Divaricati*). 1. *H. tuberosus*

Plants annual, the roots not tuberous; disk of flowering heads purplish (to brown or reddish), usually 2-30 cm. in diameter (sect. *Helianthus*).

Leaf blades white-silky-pubescent, 15-25 cm. long; disk of flowering heads 2-4 cm. in diameter.

2. *H. argophyllus*

Leaf blades scabrous-hispid, up to 40 × 35 cm.; disk of flowering heads 3-30 cm. in diameter.

3. *H. annuus*

1. *Helianthus tuberosus* L. Sp. Pl. 905. 1753; W. L. Parham in Agr. J. Dept. Agr. Fiji 10: 34. 1939; Yuncker in Bishop Mus. Bull. 178: 117. 1943; Backer & Bakh. f. Fl. Java 2: 407. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 66. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972; Grierson in Rev. Handb. Fl. Ceylon 1: 219. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 37. 1985.

Tuberous perennial herb 1-4 m. high, sparingly cultivated near sea level; leaf blades narrowly ovate, 10-20 cm. long; flowering heads yellow, 5-8 cm. in diameter, the discoid part 1.5-2 cm. in diameter; corolla of ray flowers golden-yellow, of disk flowers bright yellow. Flowers and fruits have been noted in January and February.

TYPIFICATION: Several prior references were included by Linnaeus.

DISTRIBUTION: North America, cultivated elsewhere.

LOCAL NAMES AND USES: *Sunflower*, *topine*; elsewhere commonly known as *Jerusalem artichoke*. The tubers are edible and are also a source of inulin and industrial alcohol. Although the species can be grown with success in Fiji (W. L. Parham, 1939), it seems infrequent.

AVAILABLE COLLECTIONS: VITI LEVU: NADRONGA & NAVOSA: Agricultural Station, Singatoka, DA 11703, 12320.

2. *Helianthus argophyllus* Torr. & A. Gray, Fl. N. Amer. 2: 318. 1842; Backer & Bakh. f. Fl. Java 2: 406. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 66. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972.

Coarse annual herb 1.5-2 m. high, sparingly cultivated near sea level; stems densely white-tomentose to-floccose; leaf blades ovate to ovate-lanceolate, 15-25 cm. long and nearly as broad, densely white-lanate-sericeous with long silky hairs; ray flowers 15 or more, 2.5-3.5 cm. long, yellow to orange-yellow; disk flowers usually deep purple; achenes 4-6 mm. long. Flowers and fruits have been noted in March.

TYPIFICATION: The type is a specimen from Texas collected by Drummond.

DISTRIBUTION: North America, cultivated elsewhere.

LOCAL NAME AND USE: *Sunflower*; a garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Principal Agricultural Station, Koronivia, DA 12354.

3. ***Helianthus annuus*** L. Sp. Pl. 904. 1753; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 325. 1972; Backer & Bakh. f. Fl. Java 2: 406. 1965; Grierson in Rev. Handb. Fl. Ceylon 1: 219. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 37. 1985.

Coarse annual herb 1-3 m. high, the petioles long, the leaf blades up to 40 × 35 cm., usually hispid on both surfaces; ray flowers 17 or more, light yellow or golden-yellow, 2.5-10 cm. long or longer; disk flowers purplish or reddish; achenes 6-17 mm. long.

TYPIFICATION: Several prior references were cited by Linnaeus.

DISTRIBUTION: North America, now widely cultivated elsewhere.

LOCAL NAME AND USES: *Sunflower*; although no Fijian herbarium vouchers are available, the species is sometimes grown as an ornamental, and it has also been grown experimentally, having potential as an oilcrop.

18. **TITHONIA** Desf. ex Juss. Gen. Pl. 189. 1789; Backer & Bakh. f. Fl. Java 2: 405. 1965; Koster in Blumea 25: 264. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 55. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 218. 1980; McVaugh, Fl. Novo-Galic. 12: 926. 1984.

Herbs, shrubs, or small trees with leaves alternate or opposite at base; flowering heads few and large, heterogamous, radiate, solitary at ends of terminal and axillary branches, the peduncles thin-walled, hollow, fistulose, the phyllaries 2-5-seriate, oblong-lanceolate, basally indurate, the receptacle bearing rigid, striate, concave or conduplicate, aristate-acuminate paleae embracing the disk achenes; ray flowers 8-20, uniseriate, neuter, the corolla limb showy, emarginate or 2- or 3-toothed; disk flowers very numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases sagittate-auriculate, the style branches flattened within, hairy on the outside toward the lanceolate or linear-lanceolate, acute, sterile tips; achenes oblong to oblanceolate, compressed or 4-angled, the pappus composed of 1 or 2 awns and 4-12 free or united scales.

TYPE SPECIES: *Tithonia tagetiflora* Desf. (in Ann. Mus. Hist. Nat. (Paris) 1: 49. 1802).

DISTRIBUTION: Northern Mexico to Panama, with about ten species, some of which have been introduced elsewhere. Two species have been recorded from Fiji.

KEY TO SPECIES

- Phyllaries 4-seriate, rounded; heads 6-12 cm. broad. 1. *T. diversifolia*
Phyllaries 2-seriate, acute or acuminate; heads 5-8 cm. broad. 2. *T. rotundifolia*

1. ***Tithonia diversifolia*** (Hemsl.) A. Gray in Proc. Amer. Acad. Arts 19: 5. 1883; Rechner in Denkschr. Akad. Wiss. Wien 85: 384. 1910; Yuncker in Bishop Mus. Bull. 178: 117. 1943; Greenwood in Proc. Linn. Soc. 154: 100. 1943, in J. Arnold Arb. 30: 77. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 118. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 326. 1972; Backer & Bakh. f. Fl. Java 2: 405. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 69. 1970; Koster in Blumea 25: 265. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 55. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 218. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 40. 1985.

Mirasolia diversifolia Hemsl. Biol. Centr.-Amer. Bot. 2: 168. t. 47. 1881.

Branching shrub 1–4 m. high, found near sea level as a naturalized garden escape along roadsides and in open waste places; corollas of the ray and disk flowers golden-yellow. Flowers and fruits have been noted between May and August.

TYPIFICATION: The type of *Mirasolia diversifolia* is *Bourgeau 2319* (K HOLOTYPE; ISOTYPE at US 42401).

DISTRIBUTION: Indigenous in eastern Mexico and Central America, now cultivated and naturalized in various tropical areas.

LOCAL NAMES AND USE: *Sunflower*, *Mexican sunflower*. Introduced into cultivation in Fiji probably about 1905, largely as a garden fence, the species has spread as a weed on the two large islands (Greenwood, 1943).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 88*. NANDRONGA & NAVOSA: Near Lomawai, Queen's Road, *DA 10278*; near Thuvu beach, west of Singatoka, *DA 11414*. REWA: Suva, *Bryan 199*. VANUA LEVU: MATHUATA: Lambasa, *DA 10495*. FIJI without further locality, *H. B. R. Parham*.

2. *Tithonia rotundifolia* (Mill.) Blake in Contr. Gray Herb. n. s. 52:41. 1917; Backer & Bakh. f. Fl. Java 2:406. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200:69. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972; Grierson in Rev. Handb. Fl. Ceylon 1:219. 1980; McVaugh, Fl. Novo-Galic. 12:931. 1984.

Tagetes rotundifolia Mill. Gard. Dict. ed. 8. 1768.

Tithonia tagetiflora Desf. in Ann. Mus. Hist. Nat. (Paris) 1:49. pl. 4. 1802; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 40. 1985.

Helianthus speciosus Hook. in Bot. Mag. 61:pl. 3295. 1834.

Tithonia speciosa Hook. ex Griseb. Cat. Pl. Cubens. 155. 1866; Yuncker in Bishop Mus. Bull. 178:117. 1943.

Coarse herb 0.6–1 m. high, occasionally cultivated near sea level; corollas of the ray and disk flowers orange-yellow to reddish orange. Flowers and fruits have been noted in March.

TYPIFICATION AND NOMENCLATURE: *Tagetes rotundifolia* is typified by *Houstoun* (BM HOLOTYPE), from Veracruz, Mexico, *Tithonia tagetiflora* is based on a collection by Thiéry, presumably also from Veracruz, and *Helianthus speciosus* on material grown from seed from Mexico. All three specific epithets have been utilized in references to Pacific cultivated plants.

DISTRIBUTION: Mexico, now occasionally cultivated elsewhere, in the Pacific at least in New Caledonia, Fiji, Niue, and Hawaii.

USE: A garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Principal Agricultural Station, Koronivia, *DA 12355*.

19. *RUDBECKIA* L. Sp. Pl. 906. 1753; Backer & Bakh. f. Fl. Java 2:402. 1965.

Coarse, mostly perennial herbs with alternate leaves; flowering heads few, large and showy, heterogamous, radiate (ours), pedunculate, mostly terminal, the phyllaries 2- or 3-seriate, herbaceous, spreading or reflexed, the receptacle conical to columnar, bearing firm, boat-shaped paleae clasping the achenes; ray flowers neuter, the corolla limb usually linear-oblong, large and showy, often becoming reflexed; disk flowers numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases obtuse or sagittate, the style branches flattened, with externally hairy appendages that are short and obtuse (ours) or long and subulate; achenes 4-angled, the pappus a short crown or obsolete.

LECTOTYPE SPECIES: *Rudbeckia hirta* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3:469. 1913), one of the five species first included by Linnaeus.

DISTRIBUTION: North America, with 25–30 species, some of which are cultivated and occasionally naturalized elsewhere.

1. **Rudbeckia laciniata** L. Sp. Pl. 906. 1753; Backer & Bakh. f. Fl. Java 2: 403. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 38, as cv. 'Hortensia.' 1985.

Herb 0.6–1 m. high, sparingly cultivated near sea level. The ray and disk flowers are yellow; flowering material was obtained in March.

TYPIFICATION: Linnaeus cited several prior references.

DISTRIBUTION: North America, now widely cultivated elsewhere and with various cultivars.

LOCAL NAME AND USE: No local name has been reported from Fiji for this garden ornamental, but the species is commonly known elsewhere as *golden glow*. If the species is divided, our material falls into var. *laciniata*.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Principal Agricultural Station, Koronivia, DA 12351.

20. **BIDENS** L. Sp. Pl. 831. 1753; Seem. Fl. Vit. 142. 1866; Backer & Bakh. f. Fl. Java 2: 412. 1965; Koster in Blumea 25: 258. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 21. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 227. 1980; McVaugh, Fl. Novo-Galic. 12: 122. 1984.

Annual or perennial herbs or shrubs with opposite leaves, or the upper leaves sometimes alternate, the stems often angular and striate; flowering heads mostly small to medium-sized, heterogamous and radiate or homogamous and discoid, pedunculate, solitary, few, or more commonly numerous and disposed in corymbiform or paniculiform clusters, the phyllaries usually biseriate, the outer ones herbaceous, the inner ones membranous, longitudinally brown-orange-striate, the receptacle with narrow, flat, membranous, often deciduous paleae; ray flowers mostly 5–8 (or in our species commonly fewer or none), uniseriate, usually neuter, the limb of the corolla entire or dentate; disk flowers ♂, fertile, the corolla tubular, (4 or) 5-lobed, the anther bases entire, subsagittate, or auriculate, the style branches somewhat flattened, distally bearded, terminated in acute to subulate appendages; achenes often compressed, usually somewhat 4-angled, the pappus consisting of mostly 2–4 rigid, commonly retrorsely barbed awns.

LECTOTYPE SPECIES: *Bidens tripartita* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 494. 1913), one of the eleven species included by Linnaeus.

DISTRIBUTION: A genus of more than 200 species in temperate and tropical areas of the world, mostly American. Two species have been recorded from Fiji, but it seems probable that only the first of those discussed below is actually present.

KEY TO SPECIES

- Leaves 3 (or rarely 5)-partite or undivided, the leaflets simple with serrate margins; ray flowers 4–7 or absent; outer phyllaries narrowly spatulate. 1. *B. pilosa*
 Leaves mostly pinnate, the 3–5 leaflets deeply dentate to pinnatifid; ray flowers mostly 3; outer phyllaries linear or linear-lanceolate. 2. *B. biternata*

1. **Bidens pilosa** L. Sp. Pl. 832. 1753; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 143. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 211. 1890; Reching in Denkschr. Akad. Wiss. Wien 85: 384. 1910; Christophersen in Bishop Mus. Bull. 128: 211. 1935; Yuncker in op. cit. 178: 118. 1943, in op. cit. 184: 67. 1945, in op. cit. 220: 269. 1959; J. W. Parham in Dept. Agr. Fiji Bull. 35: 106. 1959, Pl. Fiji Isl. 232. 1964, ed. 2. 322. 1972; Backer & Bakh. f. Fl. Java 2: 413, as var. *minor*. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 63. 1970, in op. cit. 219: 86. 1977; Koster in Blumea 25: 259, as var. *minor*. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 22. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 227. 1980; McVaugh, Fl. Novo-Galic. 12: 139. 1984; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 33. 1985.

Herb 0.4–1 m. high, naturalized along trails and roads, in cultivated areas, and on waste land from near sea level to an elevation of about 900 m.; the corollas of ray flowers (if present) are whitish, those of disk flowers yellow, and the achenes are black. Flowers and fruits are found throughout the year.

TYPIFICATION: Linnaeus cited three references, including his *Hortus Cliffortianus* and *Hortus Upsaliensis*; Grierson (1980) indicates the type as Herb. Linn. 975/8 (LINN HOLOTYPE).

DISTRIBUTION: California southward through Mexico and Central America, but now a widespread weed in many temperate and tropical areas. It was probably an inadvertent aboriginal introduction throughout the Pacific; it was widespread in Fiji at the time of Seemann's visit.

LOCAL NAMES AND USE: *Mbatimandramandra*, *mbatikalawau*, *matakaro*, *matua kamate*, *cobbler's pegs*; the leaves are said to have been used as part of a remedy for influenza on Taveuni.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 124*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4312*; Nandarivatu and vicinity, *Parks 20718*, *Gillespie 4176*. NAITASIRE: Nasinu, *DA 11085*, *11107*, *11203*; Tamavua, *DA 7435*. REWA: Suva, *Simmonds "J"*; Samambula, *DA 6082*. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, *Smith 7982*. TAVEUNI: Navakawau, *Weiner 71-7-14D*. MOALA: On summit ridges, *Bryan 316b*. YATHATA: Naveranavula, *DA 15546*. LAKEMBA: Near Tumbou, *Garnock-Jones 884*. FIJI without further locality, *Seemann 270*.

Two varieties, var. *pilosa* and var. *minor* (Bl.) Sherff, are commonly recognized in the Old World tropics (Fosberg & Sachet, 1980; Grierson, 1980). Both varieties may be present in Fiji; they intergrade, but in general var. *pilosa* has rayless heads and var. *minor* has small, whitish ray flowers.

2. *Bidens biternata* (Lour.) Merr. & Sherff in Bot. Gaz. **88**: 293. 1929; Yuncker in Bishop Mus. Bull. **220**: 269. 1959; J. W. Parham, Pl. Fiji Isl. 232. 1964, ed. 2. 322. 1972; Backer & Bakh. f. Fl. Java **2**: 413. 1965; Koster in Blumea **25**: 261. 1979; Grierson in Rev. Handb. Fl. Ceylon **1**: 229. 1980.

Coreopsis biternata Lour. Fl. Cochinch. 508. 1790.

TYPIFICATION: The type is *Loureiro* (BM HOLOTYPE), from Canton, China.

DISTRIBUTION: Warmer parts of Asia, and also in Malesia and Australia, widely adventive elsewhere.

Bidens biternata was reported from Fiji by Parham (1964, 1972) apparently on the strength of Yuncker's (1959) remark that it occurs there; however, we have seen no Fijian material of it. It does occur in Malesia and Australia, and material of it from the Solomons and New Caledonia is also available. Yuncker's Tongan record appears to have been based solely on a Forster collection.

21. *COREOPSIS* L. Sp. Pl. 907. 1753; Backer & Bakh. f. Fl. Java **2**: 410. 1965; Koster in Blumea **25**: 255. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 30. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 223. 1980; McVaugh, Fl. Novo-Galic. **12**: 255. 1984.

Annual or perennial herbs or shrubs with opposite leaves; flowering heads heterogamous, radiate, medium to large, pedunculate, solitary or in corymbiform-paniculiform clusters, the phyllaries usually 2-seriate, the outer ones herbaceous and often spreading, the inner ones larger, scarious, membranous, longitudinally brown-orange-striate, the receptacle with flat or concave, membranous, linear-lanceolate

paleae; ray flowers in 1 series, often about 8, usually neuter, the limb of the corolla entire or 2- or 3-dentate; disk flowers numerous, ♂, fertile or the innermost sterile, the corolla tubular, (4 or)5-lobed, the anther bases minutely sagittate or subauriculate, the style branches apically truncate or conical or with subulate or caudate appendages; achenes greatly compressed, elliptic-oblong, usually less than 2.5-times longer than broad, often laterally winged, the pappus (in ours) absent or comprising 2 minute teeth.

LECTOTYPE SPECIES: *Coreopsis lanceolata* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 489. 1913), one of Linnaeus's eight original species.

DISTRIBUTION: North and South America and Africa, with more than 100 species, one of which is occasionally cultivated and sometimes naturalized in Fiji.

1. *Coreopsis tinctoria* Nutt. in J. Acad. Nat. Sci. Philadelphia 2: 114. 1821; Yuncker in Bishop Mus. Bull. 178: 118. 1943; J. W. Parham, Pl. Fiji Isl. 236. 1964, ed. 2. 322. 1972; Backer & Bakh. f. Fl. Java 2: 411. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 64. 1970; Koster in Blumea 25: 255. 1979; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 31. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 224. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 35. 1985.

Coarse herb 0.3-1 m. high, cultivated and occasionally naturalized at elevations from near sea level to about 250 m.; lower leaves usually bipinnate, with linear leaflets; ray corollas dark purple or brownish at base, yellow distally; disk corollas maroon to brownish. Flowers and fruits were noted in March.

TYPE SPECIFICATION: The type, presumably collected by Nuttall and deposited at PH, was obtained "throughout Arkansas territory to Red River, chiefly in prairies subject to temporary inundation."

DISTRIBUTION: Central North America, cultivated and naturalized elsewhere.

LOCAL NAME AND USE: *Coreopsis*; a garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRE: Toninaiwau, Tholo-i-suva, DA 16742.

22. *COSMOS* Cav. Icon. Descr. Pl. 1: 9. t. 14. 1791; Backer & Bakh. f. Fl. Java 2: 413. 1965; Koster in Blumea 25: 257. 1979; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 32. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 224. 1980; McVaugh, Fl. Novo-Galic. 12: 262. 1984.

Annual or perennial herbs with opposite leaves; flowering heads heterogamous, radiate, medium-sized, solitary or in loose corymbiform clusters, long-pedunculate, the phyllaries in 2 series, connate at base, the outer ones herbaceous, the inner ones membranous, longitudinally brown-orange- or purple-striate, the receptacle with flat or somewhat concave, narrowly oblong, acute paleae; ray flowers in 1 series, usually 5 or 8, neuter, the limb of the corolla obovate, entire or dentate at apex; disk flowers numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases entire, subsagittate, or auriculate, the style branches flattened distally and outwardly densely tufted, with the tip acute or sagittate or more commonly ending in an apiculate awnlike appendage; achenes linear-fusiform, more or less quadrangular, compressed, commonly beaked, the pappus generally of 2-4 stiff, retrorsely barbed awns from the summit of the achenial beak.

TYPE SPECIES: *Cosmos bipinnatus* Cav.

DISTRIBUTION: America, concentrated in Mexico, with about 30 species, some of which have been introduced into other tropical and subtropical regions. Two species are recorded from Fiji.

KEY TO SPECIES

- Ray flower corollas pink or reddish, sometimes white, the limbs commonly 1-1.5 cm. long; outer phyllaries 6-10 (-15) mm. long, equalling or a little shorter than the inner series; hairs on inner surface of disk corolla lobes 0.2-0.3 mm. long. 1. *C. caudatus*
- Ray flower corollas intense orange or golden-yellow, the limbs commonly 1.8-2.8 cm. long; outer phyllaries 5-7 (-10) mm. long, usually half to two-thirds as long as the inner series; hairs on inner surface of disk corolla lobes about 0.1 mm. long. 2. *C. sulphureus*

1. *Cosmos caudatus* H. B. K. Nova Gen. et Sp. 4: 240. 1820; Christophersen in Bishop Mus. Bull. 128: 211. 1935; Greenwood in Proc. Linn. Soc. 154: 100. 1943, in J. Arnold Arb. 30: 77. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 118. fig. 59. 1959, Pl. Fiji Isl. 233. 1964, ed. 2. 322. 1972; Backer & Bakh. f. Fl. Java 2: 414. 1965; Koster in Blumea 25: 257. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 225. 1980; McVaugh, Fl. Novo-Galic. 12: 266. 1984.

Coarse herb 0.3-2 m. high, occurring from sea level to about 200 m., sometimes cultivated but frequently naturalized as a weed in waste places and along roadsides. Flowers and fruits do not appear seasonal.

TYPIFICATION: The type is *Humboldt & Bonpland s. n.* (P HOLOTYPE), collected near Havana, Cuba, in March, 1801 (Grierson, 1980).

DISTRIBUTION: West Indies and Central America, widely introduced into cultivation and sometimes naturalized elsewhere.

LOCAL NAME AND USE: *Cosmos*; a garden ornamental, but more frequently considered a weed in Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 169*; Namulomulo road, Nandi, *DA 10283*. NANDRONGA & NAVOSA: Upper Singatoka Valley road, *DA 10184*; Loma, Singatoka Valley road, *DA 11321*; Ndumbulevu, Singatoka Valley, *DA 11347*. RA: Waimare, *DA 9539*. REWA: Suva Botanical Gardens, *DA 12110*. VANUA LEVU: MATHUATA: Ngasauva, Ndreketi River, *DA 12958*; Lambasa, *DA 10499*. LAKEMBA: Near Tumbou, *Garnock-Jones 907*.

Although the first mention of *Cosmos caudatus* in Fiji was that of Greenwood (1943), the species was said to be "common everywhere, sometimes in pure stands on waste land in both islands up to 500 feet." It was doubtless introduced as an ornamental considerably earlier.

2. *Cosmos sulphureus* Cav. Icon. Descr. Pl. 1: 56. t. 79. 1791; Yuncker in Bishop Mus. Bull. 178: 118. 1943; Greenwood in Proc. Linn. Soc. 154: 100. 1943; J. W. Parham, Pl. Fiji Isl. 233. 1964, ed. 2. 323. 1972; Backer & Bakh. f. Fl. Java 2: 414. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 64. 1970; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 32. 1980; McVaugh, Fl. Novo-Galic. 12: 280. 1984; McKee, Pl. Intro. Cult. Nouv.-Caléd. 35. 1985.

Herb 1-2 m. high, cultivated and sparingly naturalized near sea level.

TYPIFICATION: The species was based on a cultivated plant that flowered in Madrid in 1790, probably from seed collected in Mexico by Sessé and Moçino (McVaugh, 1984).

DISTRIBUTION: Mexico and Central America, now cultivated and widely established elsewhere.

The Fijian record, although we have seen no supporting specimens, is based on Greenwood's (1943) mention of its being naturalized near settlements on Viti Levu. Greenwood applies the name 'Klondyke' to the form seen in Fiji; this is apparently the cultivar commonly cultivated in the Pacific, although it seldom naturalizes. Material is at hand from Samoa, Niue, and other southern Pacific areas.

23. *DAHLIA* Cav. Icon. Descr. Pl. 1: 56. 1791; Backer & Bakh. f. Fl. Java 2: 411. 1965; McVaugh, Fl. Novo-Galic. 12: 283. 1984.

Mostly large, perennial, often hollow-stemmed herbs (sometimes suffrutescent) with fascicled, tuberous rootstocks and opposite, simple or commonly pinnately compound leaves; flowering heads relatively few, large, heterogamous, radiate, long-peduncled, solitary or solitary and axillary at tips of branches, the phyllaries biseriate, the outer ones (4 or) 5 (-7), small, leafy, spreading to reflexed at anthesis, the inner ones (7 or) 8 (or 9), commonly 12-21 mm. long, membranous, brown-orange (to purple)-striate, enlarging in fruit, the receptacle with deciduous, membranous-scarious paleae similar to inner phyllaries but narrower; ray flowers commonly 8, neuter or ♀, usually sterile (apparently fertile in ours), the limb of the corolla showy; disk flowers numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases subauriculate, the style branches flattened, triangular-subulate, pilose on outer distal surfaces; achenes linear to oblanceolate, usually greater than 3.5-times longer than broad, moderately compressed, truncate, the pappus none or composed of 2 projections 1 mm. long or less.

TYPE SPECIES: *Dahlia pinnata* Cav.

DISTRIBUTION: Mexico to Central and South America, with perhaps 20-30 species, some of which are widely cultivated.

1. *Dahlia pinnata* Cav. Icon. Descr. Pl. 1: 57. t. 80. 1791; Yuncker in Bishop Mus. Bull. 178: 118. 1943; J. W. Parham, Pl. Fiji Isl. 236. 1964, ed. 2. 324. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 65. 1970; Grierson in Rev. Handb. Fl. Ceylon 1: 226. 1980.

The common garden dahlia is occasionally cultivated near sea level; it bears single or double flowering heads, of which the showy corollas of ray flowers are seen in many colors.

TIPIFICATION: The type was a cultivated plant grown at the Royal Botanical Garden, Madrid, from seeds received from Mexico.

DISTRIBUTION: Eastern Mexico, now widely cultivated elsewhere, although presumably as cultivars or as hybrids with other species.

LOCAL NAME AND USE: *Dahlia*; a garden ornamental.

No herbarium specimens support the record of *Dahlia pinnata* in Fiji (Parham, 1964, 1972) and Niue (Yuncker, 1943; Sykes, 1970), but plants are occasionally seen in Suva gardens. It is probable that most of the garden dahlias have resulted from hybrids involving *D. coccinea* Cav. and other species, including *D. pinnata* (McVaugh, 1984).

24. *GLOSSOGYNE* Cass. in F. Cuvier, Dict. Sci. Nat. 51: 475. 1827, in op. cit. 59: 320. 1829; Seem. Fl. Vit. 144. 1866; Koster in Blumea 25: 256. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 43. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 230. 1980.

Glabrous perennial herbs from thickened woody rootstocks, the leaves mostly basal, pinnatisect with narrow segments, the cauline leaves few and remote or absent, alternate; flowering heads small, mostly heterogamous, radiate, solitary, terminal on long peduncles, the phyllaries shortly connate at base, 2- or 3-seriate, the receptacle with concave, scarious paleae; ray flowers few, ♀, apparently fertile, the limb of the corolla oblong, 3-lobed; disk flowers ♂, fertile, the corolla tubular, 4- or 5-lobed, the anther bases obtuse, the style branches long, subulate, hirsute; achenes dorsally compressed, linear or ovate-oblong, the pappus consisting of 2 (-4) retrorsely barbed awns.

LECTOTYPE SPECIES: *Glossogyne tenuifolia* (Labill.) Cass. ex Less. (*Bidens tenuifolia* Labill.) = *G. tannensis* (Spreng.) Garnock-Jones.

DISTRIBUTION: Tropical Asia at least from Formosa southward and from India eastward, through Malesia to Australia and New Zealand, and from the Bonin and Marianas Islands to New Caledonia and eastward to Fiji, where the generic range apparently terminates with one widespread species. The genus is generally taken to include 6-9 species.

1. *Glossogyne tannensis* (Spreng.) Garnock-Jones in Taxon 35: 125. 1986.

Coreopsis Forst. f. Fl. Ins. Austr. Prodr. 91. 1786.

Coreopsis tannensis Spreng. in Biehler, Pl. Nov. Herb. Spreng. 39. 1807.

Bidens tenuifolia Labill. Sert. Austro-Caled. 44. t. 45. 1825.

Glossogyne tenuifolia Cass. ex Less. Syn. Gen. Comp. 212. 1832; DC. Prodr. 5: 632. 1836; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 144. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 211. 1890; Koster in Blumea 25: 256. 1979; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 43. 1980.

Perennial herb 10-40 cm. high, rare in Fiji and probably from fairly dry areas at comparatively low elevations, the branches 1-several ascending or spreading from a strong rootstock; ray and disk flowers with yellow corollas.

TYPIFICATION AND NOMENCLATURE: As indicated by Garnock-Jones (1986), no holotype (i. e. definitely a part of Sprengel's herbarium) of *Coreopsis tannensis* with the notation "ex Insula Tanna" has been traced. Forster specimens are available at BM and K marked "*Bidens*" and indicated as from New Caledonia. Although there is no clear link between these specimens and the listing of "*Coreopsis*. Tanna" by G. Forster (1786), they so closely match Sprengel's protologue that Garnock-Jones considers them parts of the same collection, remarking that confusion regarding localities (of the New Hebrides and New Caledonia) on Forster specimens is not uncommon. A suggested citation is: *J. R. & G. Forster* (K LECTOTYPE designated by Garnock-Jones; ISOLECTOTYPE at BM), collected in New Caledonia during Cook's second voyage.

Bidens tenuifolia is based on *Labillardière* (HOLOTYPE presumably at FI), from New Caledonia. The synonymy of *Bidens tenuifolia* and *Coreopsis tannensis* has been suggested several times (by Steudel in 1841, in the first edition of *Index Kewensis*, by Guillaumin in 1948 according to Garnock-Jones, and by H. S. McKee in litt. to A. C. Smith, 1984), but a correct combination based on the earlier epithet was not made until 1986.

DISTRIBUTION: A widespread species occurring from southern China, Formosa, and the Bonin Islands into Malesia and Australia, and eastward to the Marianas and Caroline Islands, New Caledonia, and Fiji, where it is known only from the Seemann Vanua Levu collection cited below. There seems no doubt of the locality and identity of this. In spite of the epithet, the species has apparently not been collected in the New Hebrides (H. S. McKee, in litt.).

AVAILABLE COLLECTION: VANUA LEVU: MATHUATA: Without definite locality, *Seemann 271* (BM, K).

Although Seemann's (1866) locality was stated as "mountains of Vanua Levu," it is unlikely that during his brief visits to the Mathuata coast in 1860 (cf. Viti, 225-268. 1862) he went far inland or to any really mountainous area. It is more likely that the Fijian collection of *Glossogyne tannensis* came from one of the dry coastal valleys or ridges of Mathuata, some of which have not been revisited by a botanist. A similar instance of a rare plant from this area is provided by *Pimia rhamnoides* (Sterculiaceae; cf. vol. 2 of this *Flora*, p. 395).

25. *ACMELLA* L. C. Rich. in Pers. Syn. Pl. 2:472. 1807; R. K. Jansen in Syst. Bot. 6:231. 1981, in Syst. Bot. Monogr. 8: 19. 1985.

Erect or decumbent annual or perennial herbs with fascicled roots and opposite leaves; flowering heads small, heterogamous and radiate (ours) or homogamous and discoid, pedunculate, terminal or axillary, usually solitary, the phyllaries 4-24, 1(ours)-3-seriate, the receptacle high-conic, with obtuse to acuminate, often stramineous paleae loosely enclosing the disk achenes; ray flowers (when present) ♀, fertile, the corolla limb often inconspicuous, 2- or 3-lobed; disk flowers many to very numerous, ♂, fertile, the corolla tubular, 4(ours)- or 5-lobed, the anther bases with short, acute to acuminate tails, the style branches obtuse; achenes triangular (ray flowers) or compressed (disk flowers), narrowly obovoid or ellipsoid, the pappus obsolete or composed of 1-10 soft, rudimentary bristles.

LECTOTYPE SPECIES: The type species (more appropriately lectotype species) designated by ING (1979) was *Acmella mauritiana* [L. C. Rich in] Pers. (*Spilanthes acmella* J. A. Murray). However, this choice was superseded by Jansen (1985, p. 19), who designated as lectotype species for the genus *Acmella oppositifolia* (Lam.) R. K. Jansen (*Anthemis oppositifolia* Lam.). *Acmella mauritiana* (cf. Jansen, 1985, p. 98) was a superfluous name and is to be considered a nomenclatural synonym of *Blainvilllea acmella* (L.) Philipson (*Verbesina acmella* L.). The epithet *oppositifolia* obviously was not utilized for any of the five species originally included in *Acmella* by Richard. One of the names used by Richard, however, was *Acmella occidentalis* (Willd.) L. C. Rich., based on *Anthemis occidentalis* Willd., nom. superfl., a synonym of *Acmella oppositifolia* (cf. Jansen, p. 30).

DISTRIBUTION: Warm temperate and tropical America and (two species) tropical southeastern Asia to Malesia and Australia, with 30 species. Several of the American species have become widely dispersed adventives elsewhere, one of them occurring in Fiji.

USEFUL TREATMENTS OF GENUS: JANSEN, R. K. Systematics of *Spilanthes* (Compositae: Heliantheae). Syst. Bot. 6: 231-257. 1981. JANSEN, R. K. The systematics of *Acmella* (Asteraceae-Heliantheae). Syst. Bot. Monogr. 8: 1-115. 1985.

Until recently most concerned authors have been inclined to combine *Acmella* with *Spilanthes*, but the genera were clearly demarcated by Jansen (1981, 1985), *Spilanthes* comprising six species and *Acmella* 30 species. Relationships among these genera and their immediate relatives are summarized by Jansen (1981, p. 238). Because most earlier authors had defined *Spilanthes* to include *Acmella*, references to their generic descriptions are not useful.

1. *ACMELLA uliginosa* (Sw.) Cass. in F. Cuvier, Dict. Sci. Nat. 24: 331. 1822; R. K. Jansen in Syst. Bot. Monogr. 8: 55. 1985.

Spilanthes uliginosa Sw. Nov. Gen. & Sp. Prodr. 110. 1788.

Spilanthes iabadicensis A. H. Moore in Proc. Amer. Acad. Arts 42: 542. 1907; Backer & Bakh. f. Fl. Java 2: 408. 1965; Koster in Blumea 25: 279. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 221. 1980.

Spilanthes acmella sensu A. C. Sm. in Sargentia 1: 141. 1942; Greenwood in J. Arnold Arb. 30: 78. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 117. fig. 58. 1959, Pl. Fiji Isl. 235. 1964; non J. A. Murray. *Spilanthes paniculata* sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972; non Wall. ex DC.

Coarse herb 0.2-1 m. high, often locally abundant from near sea level to about 100 m. as a naturalized weed in villages, pastures, and cultivated areas, on open hillsides and the rocky shores of rivers, and along roadsides. The ray and disk flowers are bright yellow distally. Flowers and fruits occur throughout the year.

TYPIFICATION: The type of *Spilanthes uliginosa* is Swartz (BM HOLOTYPE), from Jamaica; that of *S. iabadicensis* is Teijsmann s. n. (GH HOLOTYPE), from Bogor garden, Java (Jansen, 1985). The species, throughout its wide occurrence as a well established adventive in the Old World, has passed under various other names prior to the clarifying work of Jansen. It may have been present in Fiji since early in this century, although the earliest published record seems to have been in 1942.

DISTRIBUTION: Tropical America, now widely established in parts of Africa, south-eastern Asia, Malesia, and eastward in the Pacific to Fiji and Samoa. About 40 collections from Fiji have been seen.

LOCAL NAME: *Mbotembotekoro*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: SERUA: Tawavulu Creek, north of Ngaloa, *Webster & Hildreth 14343*; Tokotoko road, Navua, *DA 10547*; in hills, *Greenwood 1025*. NAITASIRE: Vunindawa, *DA 7788*; Nanduna, *DA 9601*; near Nausori, *Greenwood 1025A*; Tamavua, *DA 11821*. TAILEVU: Korovou, *DA 7679*; Vuthi road, Raralevu, *DA 10632*; Naitalasese, *DA 10562*. REWA: Suva, *Meebold 16483*. OVALAU: Lovoni Village, *Smith 7484*; valley of Mbureta and Lovoni Rivers, *Smith 7390*. VANUA LEVU: MATHUATA: Naliuninga, Seanganga area, *DA 10492*; Ndaku, *DA 11478*. THAKAUNDOVE: Savusavu Bay region, *DeGener & Ordenez 13827*; Mbutha Bay, *DA 11526*. VANUA MBALAVU: Sawana, Lomaloma, *DA 10238*.

26. *TRIDAX* L. Sp. Pl. 900. 1753; Backer & Bakh. f. Fl. Java 2: 414. 1965; Koster in *Blumea* 25: 263. 1979; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 55. 1980; Grierson in *Rev. Handb. Fl. Ceylon* 1: 232. 1980; McVaugh, *Fl. Novo-Galic.* 12: 937. 1984.

Annual or perennial creeping-ascending herbs with opposite leaves; flowering heads medium-sized, usually solitary, heterogamous, radiate, long-peduncled, the phyllaries 2- or 3-seriate, subequal, the inner ones often membranous, the receptacle with persistent, concave, scarios paleae; ray flowers uniseriate, ♀, fertile (?), the corolla limb 3-dentate; disk flowers ♂, fertile, the corolla tubular, 5-lobed, the anther bases sagittate, the style branches with subulate appendages; achenes turbinate, terete or angular, pilose, the pappus composed of numerous plumose setae.

TYPE SPECIES: *Tridax procumbens* L., the only original species.

DISTRIBUTION: Mexico to Central America and Andean South America, with 25 or more species, one of which is widely adventive elsewhere.

1. *Tridax procumbens* L. Sp. Pl. 900. 1753; Turrill in *J. Linn. Soc. Bot.* 43: 29. 1915; Greenwood in *Proc. Linn. Soc.* 154: 100. 1943; J. W. Parham in *Dept. Agr. Fiji Bull.* 35: 116. fig. 57. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 327. 1972; Backer & Bakh. f. Fl. Java 2: 414. 1965; Koster in *Blumea* 25: 263. 1979; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 56. 1980; Grierson in *Rev. Handb. Fl. Ceylon* 1: 232. 1980; McVaugh, *Fl. Novo-Galic.* 12: 948. 1984; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 40. 1985.

Sprawling herb with suberect branches 10–50 cm. high, found in some local abundance at elevations from near sea level to 600 m. as a naturalized weed in villages, gardens, and plantations, on grassy hills and open slopes, and along roadsides. The phyllaries are whitish, the corollas of ray flowers pale yellow to white, those of disk flowers bright to pale yellow; the anthers are bright yellow, the styles pale yellow, and the achenes brown. Flowers and fruits do not appear seasonal.

TYPIFICATION: Of the two references cited by Linnaeus, the type is *Houstoun* s. n. (BM LECTOTYPE), from Veracruz, Mexico (Grierson, 1980; McVaugh, 1984).

DISTRIBUTION: Indigenous in Mexico and Central America, now widespread as an adventive throughout tropical and subtropical regions of the world. More than 30 Fijian collections are at hand.

LOCAL NAMES: *Tumbualeka*, *voti*, *wild daisy*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: Mba: Lautoka, *Greenwood 6*; Vunda Point, *DA 9721*; Tonge area, Mba River, *DA 10421*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4313*; Tavua, *DA 9488*; Nandarivatu, *im Thurn 77* (Feb. 4, 1906). NANDRONGA & NAVOSA: Lawangga, *DA 9778*. SERUA: Ngaloa, *Smith 9616*. RA: Yanggara, *Greenwood 6C*; Penang, *Greenwood 6B*. NAITASIRE: Prince's Road, *DA 12612*. REWA: Vicinity of Suva, *H. B. R. Parham 33*. OVALAU: Levuka, *DA 1362*. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, *Smith 7958*. VANUA LEVU: MATHUATA: Vicinity of Lambasa, *Greenwood 6A*; Mt. Uluibau, south of Lambasa, *Smith 6591*. THAKAUNDRIVE: Nangingi, *DA 10782*. MATUKU: *Bryan 227*. VANUA MBALAVU: Nambavatu, *DA 3455*; near Lomaloma, *Bryan 585*. LAKEMBA: Near Tumbou, *Garnock-Jones 906*.

The first Fijian record we have noted is that of Turrill (1915), based on an im Thurn collection of 1906; the species was presumably established in Fiji about the turn of the century.

27. *XANTHIUM* L. Sp. Pl. 987. 1753; Backer & Bakh. f. Fl. Java 2: 399. 1965; Koster in *Blumea* 25: 253. 1979; Grierson in Rev. Handb. Fl. Ceylon 1: 208. 1980; McVaugh, Fl. Novo-Galic. 12: 1092. 1984.

Hispid or pubescent annual herbs with alternate petiolate leaves; flowering heads small, unisexual, solitary or clustered in axils; ♂ heads uppermost, homogamous, many-flowered, the phyllaries in 1-3 series, separate, the receptacle conical or cylindrical, chaffy, the corollas tubular, 5-lobed, the anther bases obtuse, the pistil rudimentary with an unbranched style; ♀ heads below, at leafy nodes, solitary or few in axils, mostly 2-flowered, the outer phyllaries free, the inner ones connate, covered with uncinate spines, forming an ellipsoid, 2-chambered bur, the corolla absent, the style branches exerted from the apical beaks of the involucre; achenes thick, solitary in each chamber of the hardened bur, the pappus obsolete.

LECTOTYPE SPECIES: *Xanthium strumarium* L. (vide Fourreau in Ann. Soc. Linn. Lyon II. 17: 110. 1869), one of the two original species.

DISTRIBUTION: North and South America, Eurasia, and Africa, with about 70 species, some of which have become very widespread adventives elsewhere. Two species are recorded from Fiji, but it is doubtful if the second of these persists there.

KEY TO SPECIES

- Plants without spines at bases of petioles; petioles up to 15 cm. long; leaf blades ovate-triangular, 3-5-lobed, 4-20 × 3-15 cm. 1. *X. pungens*
 Plants with 3-branched spines arising at bases of petioles; petioles up to 3 cm. long; leaf blades narrowly ovate, entire or with 2-4 lateral lobes, 2.5-7.5 × 0.6-2.5 cm. 2. *X. spinosum*

1. *Xanthium pungens* Wallr. Beitr. Bot. 231. 1844; Mune & Parham in Dept. Agr. Fiji Bull. 31: 32. fig. 8. 1957; J. W. Parham in op. cit. 35: 114. fig. 56. 1959, Pl. Fiji Isl. 236. 1964, ed. 2. 327. 1972; Mune & Parham in Dept. Agr. Fiji Bull. 48: 54. fig. 14. 1967; Koster in *Blumea* 25: 253. 1979.

Xanthium macrocarpum var. *glabratum* DC. Prodr. 5: 523. 1836.

Xanthium italicum sensu Greenwood in Proc. Linn. Soc. 154: 99. 1943, in J. Arnold Arb. 25: 400. 1944; non Moretti.

Coarse herb or spreading shrub 0.3-2 m. high, occurring near sea level or at low elevations probably not exceeding 100 m. as a naturalized weed in open places, cultivated areas, and grasslands, and along roadsides, sometimes locally abundant. The inconspicuous flowers are greenish or white, and the achenes are black; both may occur throughout the year.

TYPIFICATION: *Xanthium pungens* was evidently based on *X. macrocarpum* var. *glabratum* DC. (Prodr. 5: 523. 1836), which was said to be based on Bosc and Bertero specimens at G-DC from Carolina. At least the Bosc material may have been obtained in 1798-1800, while he was serving as the French consul in "Carolina" (Stafleu & Cowan, Tax. Lit. ed. 2. 1: 287. 1976).

DISTRIBUTION: North America, widely introduced elsewhere. It is a serious weed wherever it occurs and was declared a noxious weed in Fiji in 1924. Twenty-four Fijian specimens have been examined.

LOCAL NAMES: *Ovuka*, *nggatima ni vavalangi*, *Noogoora burr*; the last of these is the usual name used in Australia.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 715, 715B*; Nawaka, Nandi, *DA 10701*; Tonge area, Mba River, *DA 10430*; Tavua, *DA 9466*. NANDRONGA & NAVOSA: Keiyasi, upper Singatoka Valley, *DA 10175*; road to Nalembalemba, upper Singatoka Valley, *DA 10674*; Singatoka Valley road, *DA 9144*; inland from Mbalo, near Singatoka, *O. & I. Degener 31909*. RA: Yanggara, *Greenwood 715A*; between Penang and Ellington, *DA 2808*. REWA: Herbarium garden, Department of Agriculture, Suva, *DA 10813*; Suva Point, *DA 6088*.

Xanthium pungens was first recorded from Fiji between 1900 and 1920 (Mune and Parham, 1967, who detail methods for its control). Although it is widespread in western Viti Levu and the Singatoka Valley, it has thus far been seen only on Viti Levu. It is a pernicious weed in Queensland; for nomenclatural purposes we have been guided by Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 553. 1986, although not all Australian botanists agree with his disposition of the two species known from southeastern Queensland (the same two species here recorded). An alternatively used name in Australia is *X. chinense* Mill. (considered a synonym of *X. strumarium* L. by McVaugh, Fl. Novo-Galic. 12: 1093. 1984). Farther eastward we have also noted material of this species from the Cook, Society, Marquesas, and Mangareva Islands, usually identified as *X. strumarium*.

2. *Xanthium spinosum* L. Sp. Pl. 987. 1753; J. W. Parham, Pl. Fiji Isl. ed. 2. 327. 1972; McVaugh, Fl. Novo-Galic. 12: 1093. 1984.

TYPIFICATION: Linnaeus listed several prior references; McVaugh (1984) indicates that the type was originally from Portugal.

DISTRIBUTION: Apparently an Old World species, but now widely naturalized elsewhere.

LOCAL NAME: *Bathurst burr* (the name used in Australia).

AVAILABLE COLLECTION: VITI LEVU: REWA: King's Wharf, Suva, *DA L.13382*.

The single known Fijian specimen (SUVA only) was taken for identification by G. Langdale on Nov. 14, 1967; hopefully the species does not now occur in Fiji, but the record is here included as a matter of interest. The species is a declared noxious weed in Australia (Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 553. 1986).

28. TAGETES L. Sp. Pl. 887. 1753; Backer & Bakh. f. Fl. Java 2: 415. 1965; Koster in Blumea 20: 225. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 54. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 233. 1980; McVaugh, Fl. Novo-Galic. 12: 910. 1984.

Strongly scented annual or perennial herbs, the leaves gland-dotted, opposite or the upper ones alternate, usually pinnate; flowering heads medium-sized, heterogamous, radiate, pedunculate, solitary or sometimes in corymbiform clusters, the phyllaries uniseriate, connate nearly to apex, glandular, the receptacle naked; ray flowers few, ♀, fertile, uniseriate, the corolla with a rather long tube and an obovate limb; disk flowers numerous (in ours), ♂, fertile, the corolla tubular, 5-lobed, the anther bases rounded or auriculate, the style branches apically pilose or penicillate, truncate or acute; achenes linear-clavate, compressed-angular, minutely strigose especially on angles, the pappus variable, of 1-10 scales and/or awns.

LECTOTYPE SPECIES: *Tagetes patula* L. (vide Rydberg in N. Amer. Fl. 34: 149. 1915), one of Linnaeus's three original species.

DISTRIBUTION: Tropical and subtropical America from Arizona to Argentina, with 30-50 species, one of which is cultivated in Fiji.

1. *Tagetes erecta* L. Sp. Pl. 887. 1753; Yuncker in Bishop Mus. Bull. 178: 119. 1943; Backer & Bakh. f. Fl. Java 2: 416. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 68. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 54. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 234. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 40. 1985.

As sparingly cultivated in Fiji, *Tagetes erecta* is an annual herb 15-60 cm. high, seen in gardens near sea level. The flowers are orange to yellow and have been noted in May.

TYPIFICATION: Several references were given by Linnaeus. Grierson (1980) lists the type as in Herbarium Cliffortianum (BM LECTOTYPE).

DISTRIBUTION: Mexico, now widely cultivated elsewhere and often naturalized (as it is on Niue in our area); in Fiji no escapes from cultivation have been noted.

LOCAL NAMES AND USE: *Marigold*; *African marigold* and *French marigold* have been recorded on Niue; a garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, in private garden, DA 12395.

29. ADENOSTEMMA J. R. & G. Forst. Char. Gen. Pl. 45. 1775, ed. 2. 89. 1776; Seem. Fl. Vit. 140. 1866; Backer & Bakh. f. Fl. Java 2: 376. 1965; Koster in Nova Guinea Bot. 24: 515. 1966; R. King & H. Robinson in Phytologia 29: 2. 1974; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 15. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 137. 1980; R. King & H. Robinson, Gen. Eupator. 58. 1987.

Perennial, creeping or erect, often glandular-pubescent herbs with few or no branches and opposite leaves; flowering heads small to medium-sized, homogamous, discoid, pedunculate, terminal in lax, cymose-corymbiform clusters, the phyllaries subequal, biseriate, herbaceous, connate at base, the receptacle naked; disk flowers 10-60, ♂, the corolla tubular, usually glandular or puberulent, 3-5-lobed, the anther bases obtuse, the style branches clavate, sometimes much exerted; achenes obovoid, slightly curved, usually 3-angled, often tuberculate, attached to the receptacle by an asymmetrical basal knob (carpopodium), the pappus of usually 3 thick, clavate, glandular-knobbed bristles attached to apical ring of achene.

TYPE SPECIES: *Adenostemma viscosum* J. R. & G. Forst. (as *A. viscosa*), the only original species.

DISTRIBUTION: Tropical America, Africa, Asia, and eastward in the Pacific to Polynesia and Hawaii, with about 24 species. Two species are indigenous in Fiji, one of them believed to be endemic.

KEY TO SPECIES

Corolla 1-1.5 mm. long, the tube eglandular, copiously short-pilose distally; style branches scarcely exerted, 0.3-1 mm. long; achenes tuberculate; leaves very minutely or not at all glandular-punctate on lower surfaces. 1. *A. viscosum*

Corolla 2-2.9 mm. long, the tube glandular; style branches strongly exerted, 1.5-3 mm. long; achenes smooth or slightly glandular; leaves more obviously glandular-punctate on lower surfaces.

2. *A. vitiense*

1. *Adenostemma viscosum* J. R. & G. Forst. Char. Gen. Pl. 45. t. 45, as *A. viscosa*. 1775, ed. 2. 90. t. 45, as *A. viscosa*. 1776; Forst. f. Fl. Ins. Austr. Prodr. 54, as *A. viscosa*. 1786; Seem. in Bonplandia 9:257. 1861, Viti, 438. 1862, Fl. Vit. 140. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 202. 1890; Gibbs in J. Linn. Soc. Bot. 39: 154. 1909; Rechinger in Denkschr. Akad. Wiss. Wien 85: 383. 1910; R. King & H. Robinson in Phytologia 29: 9. 1974; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 17. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 32. 1985; R. King & H. Robinson, Gen. Eupator. 60. 1987.

FIGURE 32.

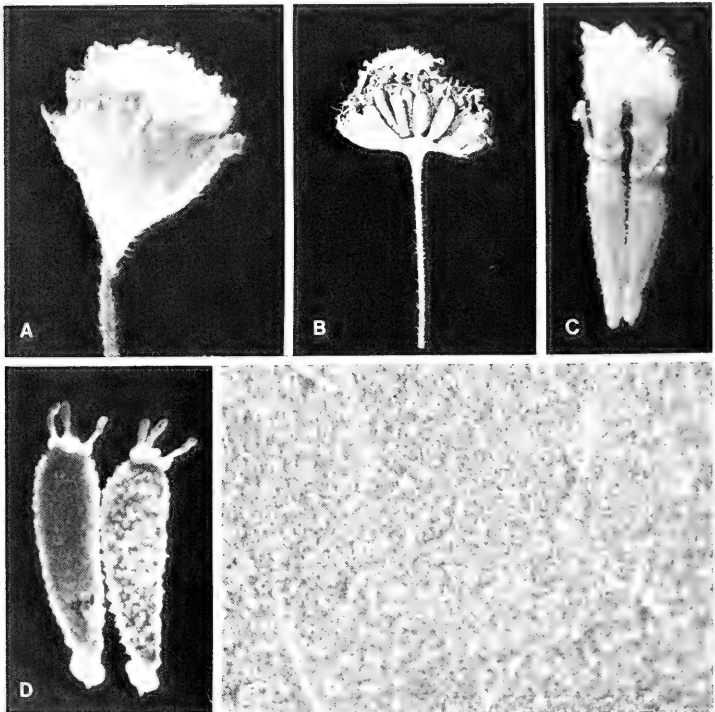


FIGURE 32. *Adenostemma viscosum*; A, flowering head, $\times 8$; B, young fruiting head with some phyllaries removed, showing achenes, with some persisting corollas and style branches, $\times 4$; C, flowers, showing corollas, with distal indument, and style branches, $\times 15$; D, achenes, $\times 15$; E, portion of lower surface of leaf blade, showing minute glands, $\times 70$. A & C from Gillespie 4357, B, D, & E from Smith 989.

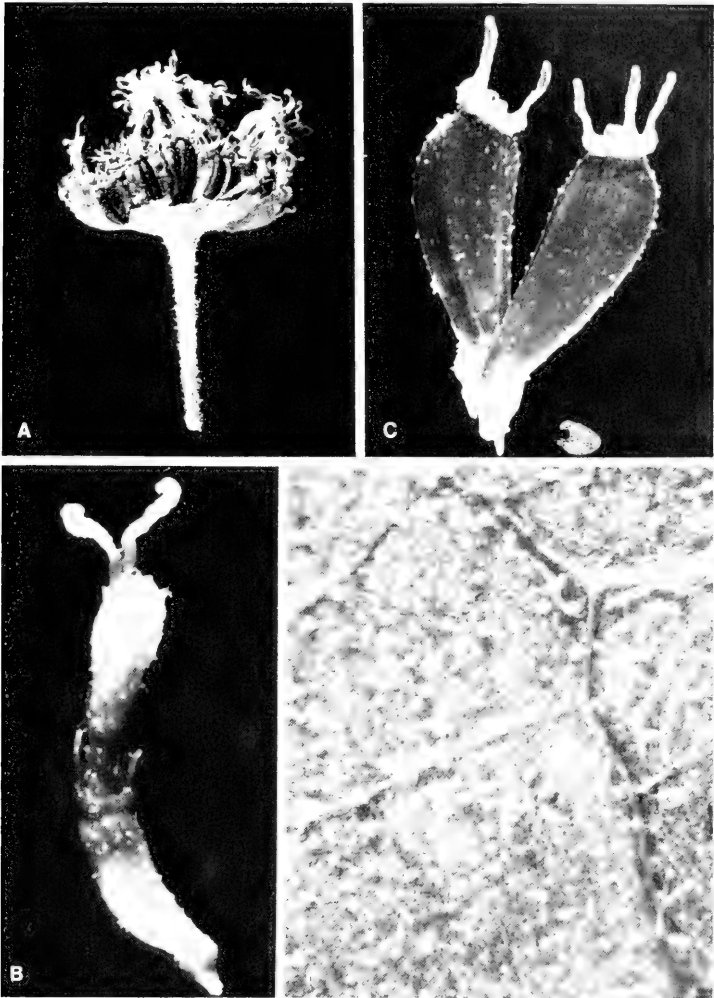


FIGURE 33. *Adenostemma vitiense*, from Smith 4799: A, young fruiting head with some phyllaries removed, showing achenes, with some persisting corollas and style branches, $\times 4$; B, flower, showing corolla and style branches, $\times 15$; C, achenes, $\times 15$; D, portion of lower surface of leaf blade, showing comparatively obvious glands, $\times 70$.

Adenostemma lavenia sensu Christophersen in Bishop Mus. Bull. **128**: 209. 1935; Yuncker in op. cit. **178**: 116. 1943, in op. cit. **184**: 66. 1945, in op. cit. **220**: 266. 1959; J. W. Parham, Pl. Fiji Isl. **232**. 1964, ed. 2. **321**. 1972; Backer & Bakh. f. Fl. Java **2**: 376. 1965; Koster in Nova Guinea Bot. **24**: 516. 1966; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 62. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 100. 1972; non Kuntze.

As seen in Fiji, *Adenostemma viscosum* is a coarse herb 0.4–2 m. high occurring at elevations from about 100 m. to 1,100 m. in dense forest, often along trails, and sometimes in swampy places. The corolla and styles are white. Flowers and fruits occur between June and February.

TYPIFICATION: The type is *J. R. & G. Forster* (BM LECTOTYPE; ISOLECTOTYPE at K), collected on Tahiti, Society Islands, during the second Cook voyage. The BM sheet is marked with a comparatively new label as "Type specimen;" it bears the numbers 172 and 284, the latter being the number under which it was listed by G. Forster (1786).

DISTRIBUTION: Widely distributed from Africa through Malesia and into the Pacific to the Tuamotu Islands and Hawaii.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 312*; vicinity of Nandarivatu, *Gibbs 644*; Mt. Nangaranambuluta, east of Nandarivatu, *Vaughan 3240*, *Smith 6247*, *DA 10386*; Mt. Tomanivi, *DA 13046*. MOTURIKI: *Seemann 262*. KORO: Eastern slope of main ridge, *Smith 989*. NGAU: *Milne 145*. TAVEUNI: Vicinity of lake east of Somosomo, *DA 12420*. FIJI without further locality, on "cleared summit," *Gillespie 4357*.

Adenostemma viscosum has long been confused with *A. lavenia* (L.) Kuntze, which actually is nearly restricted to its type locality, Ceylon (King & Robinson, 1987, p. 60).

Some of the specimens cited here as *Adenostemma viscosum* have not been reviewed in connection with the present work; they should be reexamined in view of the possibility that some of them may represent the following endemic species. It is also possible that *A. lanceolatum* Miq. occurs in Fiji (King & Robinson, 1974, p. 9); that Malesian-Pacific species is common in Micronesia (Fosberg & Sachet, 1980, p. 15) and is also known to occur in the Society Islands and Samoa.

2. *Adenostemma vitiense* H. Robinson in *Phytologia* **29**: 8. 1974; R. King & H. Robinson, Gen. Eupator. **60**. 1987. FIGURE 33.

Coarse herb 1–2 m. high, occurring in dense forest, probably along trails, at elevations from about 900 to 1,100 m. (although the Exploring Expedition specimen cited below was probably collected close to sea level). The corolla and styles are white. Flowers and fruits have been obtained between May and July.

TYPIFICATION: The type is *Smith 4799* (US 1965549 HOLOTYPE; ISOTYPES at A, BISH, K), collected June 19, 1947, at an elevation of 1,000–1,100 m. on the western slopes of Mt. Nangaranambuluta, east of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji, and thus far known with certainty only from Viti Levu.

AVAILABLE COLLECTIONS: VITI LEVU: Without further locality, *Parks*, May–July, 1927 (BISH). FIJI without further locality, *U. S. Expl. Exped.* (US).

The two species of *Adenostemma* indigenous in Fiji are very similar in general appearance and leaf shape and size. The glandular-punctate lower leaf surface of *A. vitiense*, utilized as a distinguishing character for the species by Robinson (1974), is actually not very useful, since some specimens of *A. viscosum* also have foliar glands, although they are smaller than those of *A. vitiense* and are noticeable only under high

magnification. The corolla length (with the lack of indument and the presence of glands), the exerted style branches, and the smooth achenes appear to be more dependable features to separate *A. vitiense* from *A. viscosum*.

It is to be noted that the two species of the genus definitely known from Fiji are not necessarily allopatric; for instance, *Smith 6247* represents *Adenostemma viscosum* (verified by Robinson), although it occurs at the type locality of *A. vitiense*. Of the two specimens other than the type that may definitely be referred to *A. vitiense*, the cited Parks collection from Viti Levu may indeed have been obtained from essentially the type locality near Nandarivatu, where Parks did much of his Fijian collecting. The Exploring Expedition specimen bears the handwritten locality "Nania," but the Fijian transcription closest to this is "Naniu." Of the several "Naniu Creeks" in Fiji, the one most likely to have been visited by members of the Exploring Expedition is that on the Natewa Peninsula (Thakaundrove Province, Vanua Levu), flowing into Natewa Bay slightly south of Ndrekeniwai; the Expedition probably charted the coast of this bay. There is also a tiny Naniu Islet offshore of the Lauan island of Yathata, an unlikely locality for *Adenostemma*.

30. *AGERATUM* L. Sp. Pl. 839. 1753; Seem. Fl. Vit. 140. 1866; Backer & Bakh. f. Fl. Java 2: 376. 1965; Koster in Nova Guinea Bot. 24: 523. 1966; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 17. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 140. 1980; McVaugh, Fl. Novo-Galic. 12: 47. 1984; R. King & H. Robinson, Gen. Eupator. 142. 1987.

Annual or perennial herbs or subshrubs with usually opposite, simple leaves; flowering heads fairly small to medium-sized, homogamous, discoid, in terminal, cymose-corymbiform, sometimes congested clusters, the phyllaries 2- or 3-seriate, subequal, usually lanceolate-linear, often with scarious margins, the receptacle convex to conical, naked or a few of the innermost phyllaries paleaeform; disk flowers 20-125, ♂, the corolla tubular, 5-lobed, the anther bases obtuse, the style branches elongate, filiform-clavate, strongly exerted; achenes oblong, 4- or 5-ribbed, the basal attachment (carpopodium) usually enlarged and asymmetrical, the pappus (in ours) of about 5 scales, 1 or more of which may be awned.

LECTOTYPE SPECIES: *Ageratum conyzoides* L. (vide Britton & Wilson, Sci. Surv. Porto Rico 6: 286. 1925), one of the three original species.

DISTRIBUTION: Tropical America, but with several widely cultivated and adventive species. King and Robinson (1987) recognize 40 species in the genus, two of them occurring in Fiji.

KEY TO SPECIES

- Phyllaries glabrous or sparingly pubescent, eglandular, mostly elliptic-oblancoate, rather abruptly pointed, the margins erose or dentate; flowering heads usually 5-8 mm. in diameter and with 60-75 flowers, the corolla lobes and styles white to pale blue or pale lavender; leaves commonly subacute or obtuse to rounded at base. 1. *A. conyzoides*
- Phyllaries pilose and glandular, mostly lanceolate or subulate, long-tapering to firm, subulate, glandular tips 1-2 mm. long, the margins entire; flowering heads usually 6-10 mm. in diameter and with 75-100 flowers, the corolla lobes and styles pale blue to purple; leaves commonly truncate to cordate at base. 2. *A. houstonianum*

1. *Ageratum conyzoides* L. Sp. Pl. 839. 1753; Seem. in *Bonplandia* 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 140. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 202. 1890; Rechanger in *Denkschr. Akad. Wiss. Wien* 85: 383. 1910; Guillaumin in *J. Arnold Arb.* 13: 10. 1932; Christophersen in *Bishop Mus. Bull.* 128: 209. 1935; Yuncker in op. cit. 178: 116. 1943; Greenwood in *Proc. Linn. Soc.* 154: 99. 1943; Yuncker in *Bishop Mus. Bull.* 184: 67. 1945; J. W. Parham in *Agr. J. Dept. Agr. Fiji* 19: 102. 1948, in *Dept. Agr. Fiji Bull.* 35: 111. *fig.* 55. 1959; Yuncker in *Bishop Mus. Bull.* 220: 266. 1959; J. W. Parham, *Pl. Fiji Isl.* 232. 1964, ed. 2. 321. 1972; Backer & Bakh. *f. Fl. Java* 2: 377. 1965; Koster in *Nova Guinea Bot.* 24: 523. 1966; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 62. 1970; B. E. V. Parham in *New Zealand Dept. Sci. Indust. Res. Inform. Ser.* 85: 11, 63, 115. 1972; St. John in *Phytologia* 36: 389. 1977; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 18. 1980; Grierson in *Rev. Handb. Fl. Ceylon* 1: 141. 1980; McVaugh, *Fl. Novo-Galic.* 12: 48. *fig.* 3, p. p. 1984; MacKee, *Pl. Intro. Cult. Nouv.-Caléd.* 32. 1985; R. King & H. Robinson, *Gen. Eupator.* 145. 1987.

Coarse herb 0.2–1 m. high, occasionally cultivated but most often seen in Fiji as an abundantly naturalized weed at elevations from near sea level to about 950 m. in clearings, cultivated areas, grassland, and forest, often along trails and roads. The corolla and styles are white to pale lavender. Flowers and fruits are seen throughout the year.

TYPIIFICATION: Linnaeus gave three prior references; Grierson (1980) lists the type as in *Herbarium Cliffortianum* (BM LECTOTYPE).

DISTRIBUTION: Mexico and the West Indies to South America, now often cultivated and established as an adventive in most warm countries. It was probably an early European introduction into Fiji as an ornamental, becoming well established as an adventive by the time of Seemann's visit. More than 70 Fijian collections have been examined.

LOCAL NAMES AND USES: *Mbotembotekoro*, *mata mothemothe*, *songovanua*, *goat-weed*. It is less frequently seen as a garden ornamental than the following species. Medicinally, it has been reported that a leaf infusion applied to wounds is said to be antitetic, and the leaves have been used as part of an internal remedy for influenza.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 19A*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4258*; Nandarivatu, *Parks 20625*. NANDRONGA & NAVOSA: Keiyasi, upper Singatoka River, *DA 10169*. SERUA: Mt. Tuvutau, *DA 14616*; Navua, *DA 10541*. NAMOSI: Namuamua, *Parks 20170*. RA: Ndombuilevu, *DA 9549*. NAITASIRI: Nathokaika, Rewa River, *DA 10055*; Nasinu, *DA 11081*. TAILEVU: Matavatathou, *DA 9935*; Raralevu, *DA 10605*. REWA: Suva, *H. B. R. Parham 309*. OVALAU: *Milne 244*. WAKAYA: *Milne 39*. NGAU: Hills east of Herald Bay, inland from Sawaieke, on slopes of Mt. Vonda and toward Waikama, *Smith 7991*. VANUA LEVU: MATHUATA: Near Ndaku, *DA 8784*. THAKAUNDOVE: Mt. Kasi, Yanawai River region, *Smith 1828*; Valethi, Savusavu, *DA 10762*. TAVEUNI: Korovou Village, *Weiner 71-7-14A*. MOALA: Summit ridges, *Bryan 316e*. MATUKU: *Moseley s. n.* TOTOYA: *Milne 75*. VANUA MBALAVU: Lomaloma Botanical Gardens, *DA 10210*. LAKEMBA: Near Tumbou, *Garnock-Jones 889*. FIJI without further locality, *Seemann 267*.

2. *Ageratum houstonianum* Mill. *Gard. Dict.* ed. 8. 1768; J. W. Parham in *Dept. Agr. Fiji Bull.* 35: 113. 1959, *Pl. Fiji Isl.* 232. 1964, ed. 2. 322. 1972; Backer & Bakh. *f. Fl. Java* 2: 377. 1965; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 219: 85. 1977; Grierson in *Rev. Handb. Fl. Ceylon* 1: 142. 1980; McVaugh, *Fl. Novo-Galic.* 12: 55. 1984; R. King & H. Robinson, *Gen. Eupator.* 145. *pl.* 43. 1987.

Coarse herb, semiprostrate toward base and with ascending branches 0.3–1 m. high, sometimes cultivated and also naturalized at elevations from near sea level to 1,127 m. in open places, along roadsides, on river banks, and on cleared upland slopes and crests. The corolla lobes and styles are pale blue to purple. Flowers and fruits do not appear seasonal.

TYPEFICTION: The type (BM HOLOTYPE) is a cultivated plant grown from seed sent from Veracruz, Mexico, by Houston. The misspelling of the specific epithet seems to be universally accepted, doubtless as an intentional latinization (ICBN, Art. 73.7); a similar case is found in the generic name *Houstonia* L.

DISTRIBUTION: Mexico and the West Indies into South America, widely cultivated and adventive elsewhere. Probably it was introduced into Fiji as an ornamental early in the present century.

LOCAL NAMES AND USE: *Mbotembotekoro*, *songovanua*, *goatweed*, *ageratum*; a garden ornamental, becoming naturalized but less frequent than the preceding species.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu and vicinity, *Parks 20625, 20626, Smith 5019, DA 2729, 8530, 11114*; summit of Mt. Nanggaranambuluta, east of Nandarivatu, *DA 10371, Vaughan 3246*. NANDRONGA & NAVOSA: Navula, Singatoka Valley road, *DA 11327*. RA: Nandali, *DA 11123*. NATTASIRI: Principal Agricultural Station, Koronivia, *DA 12117*. FIJI without further locality, *Gillespie 3896*.

31. *MIKANIA* Willd. Sp. Pl. 3: 1742. 1803; Backer & Bakh. f. Fl. Java 2: 379. 1965; Koster in Nova Guinea Bot. 24: 520. 1966; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 45. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 146. 1980; McVaugh, Fl. Novo-Galic. 12: 611. 1984; R. King & H. Robinson, Gen. Eupator. 419. 1987. Nom. cons.

Mostly scandent twining herbs or woody vines with opposite, usually petiole leaves; flowering heads small, 4-flowered, homogamous, discoid, in mostly corymbiform terminal clusters (often on short lateral shoots), the phyllaries 4, subequal (often with a single additional smaller bract at base), the receptacle naked; disk flowers ♂, the corolla tubular, 5-lobed, the anther bases obtuse, the style branches slender, subobtuse, long-exserted; achenes oblong, prismatic, (4 or)5(-10)-angled, the basal attachment (carpopodium) short-cylindric, the pappus composed of about 35–60 fine, scabrid, contiguous or congested bristles in 1 or 2 series.

TYPE SPECIES: *Mikania scandens* (L.) Willd. (*Eupatorium scandens* L.), typ. cons.

DISTRIBUTION: Pantropical, with a few species occurring northward into the southeastern United States; 415 species are recognized by King and Robinson (1987). A single widespread weedy species is found in Fiji.

1. *Mikania micrantha* H. B. K. Nova Gen. et Sp. 4: 134. 1820; Christophersen in Bishop Mus. Bull. 128: 209. 1935; A. C. Sm. in Sargentia 1: 141. 1942; Yuncker in Bishop Mus. Bull. 178: 116. 1943; Greenwood in J. Arnold Arb. 25: 400. 1944; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in Dept. Agr. Fiji Bull. 35: 110. fig. 54. 1959, Pl. Fiji Isl. 235. 1964, ed. 2. 325. 1972; Koster in Nova Guinea Bot. 24: 522. 1968; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 67. 1970; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 40. 1972; McVaugh, Fl. Novo-Galic. 12: 612. fig. 101. 1984; R. King & H. Robinson, Gen. Eupator. 425. 1987.

FIGURE 34.

Mikania scandens sensu Knowles in Kew Bull. 1907: 306. 1907; Greenwood in Proc. Linn. Soc. 154: 100. 1943; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 45. 1980; non Willd.

As seen in Fiji, *Mikania micrantha* is a scrambling or climbing vine found at elevations from near sea level to about 800 m. as a pernicious and often abundant weed on the edges of forest, in clearings, thickets, second-growth forest, and pastures, and along roadsides; the corollas and styles are white. Flowers and fruits occur throughout the year.

TYPIFICATION: The type is *Humboldt & Bonpland* (P HOLOTYPE), from the vicinity of Caripe, Venezuela.

DISTRIBUTION: Mexico and the West Indies to South America, widely introduced into Asia, Malesia, and the Pacific Islands. About 45 Fijian collections have been examined, but the weed is even more abundant and widespread in the archipelago than thus implied.

LOCAL NAMES AND USES: *Wa mbosuthu, wa mbosuvu, wa mbutako, wa ndamele, ovaova, mile-a-minute*; the macerated plant is used to apply to new wounds, insect stings, and other skin irritations, and the leaves, after being boiled in salt water and cooled, are applied to skin to relieve itching.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 94*; Tonge road, south of Mba, *DA 10409*; slopes of Mt. Nairosa, eastern flank of Mt. Evans Range, *Smith 4009*. NANDRONGA & NAVOSA: Upper Singatoka Valley road, *DA 10161*. SERUA: Vicinity of Ngaloa, *Degener 15084*; Navua, *DA 10530*. RA: Yanggara, *DA 11861*; Ndombuilevu, *DA 9554*. NAITASIRE: Waindina River Valley, *Weiner 257*; Principal Agricultural Station, Koronivia, *DA 11915*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakui-vuna, *Smith 7226*; Mbau road, *DA 10595*. REWA: Suva, *DA 12615*. VITI LEVU without further locality, *Knowles s. n.* (κ). KANDAVU: Namalata isthmus region, *Smith 13*. OVALAU: Hills above Levuka, *Bryan 605*. VANUA LEVU: MBUA: Lower Wainunu River Valley, *Smith 1733*. MATHUATA: Ndaku, *DA 8769*. THAKAUNDROVE: Southern slope of Valanga Range, *Smith 391*. TAVEUNI: Waiyevo, *DA 5726*. VANUA MBALAVU: Lomaloma Botanical Gardens, *DA 10215*. LAKEMBA: Near Tumbou, *Garnock-Jones 893*.

Some authors have utilized the name *Mikania scandens* (L.) Willd. for this concept (e. g. Fosberg and Sachet, 1980, who state that they adopt *M. scandens* in an extremely broad sense). There is a degree of geographic overlap between the introduced *M. micrantha* and the indigenous *M. cordata* (Burm. f.) B. L. Robinson, which is noted to occur in Java by Backer and Bakhuizen van den Brink (Fl. Java 2: 380. 1965). It is probable that MacKee's reference to *M. cordata* in New Caledonia (Pl. Intro. Cult. Nouv.-Caléd. 38. 1985) refers to *M. micrantha*. King and Robinson (1987) note the range of *M. scandens* as eastern North America, northeastern Mexico, and the Bahamas, of *M. cordata* as southeastern Asia and Malesia. Comments on the separation of *M. micrantha* from *M. scandens* are provided by B. L. Robinson in Contr. Gray Herb. 64: 24. 1922, and in op. cit. 104: 56. 1934.

The earliest available Fijian collection of *Mikania micrantha* is *Knowles s. n.* (κ), which also bears a letter from the collector, Charles H. Knowles, then Superintendent of Agriculture, dated May 16, 1907, stating: "Weed known as *wa butaka*, from the Department of Agriculture, Fiji. It is common all over the wet zone of the Island of Viti Levu." Presumably it first reached Fiji about the beginning of the present century and has rapidly spread throughout the archipelago as a smothering weed in forest openings as well as in cultivated and open areas.

32. DICHROCEPHALA L'Hér. ex DC. in Guillemin, Arch. Bot. 2: 517. 1833; Seem. Fl. Vit. 143. 1866; Backer & Bakh. f. Fl. Java 2: 381. 1965; Koster in Nova Guinea Bot. 24: 594. 1966; Grierson in Rev. Handb. Fl. Ceylon 1: 148. 1980.

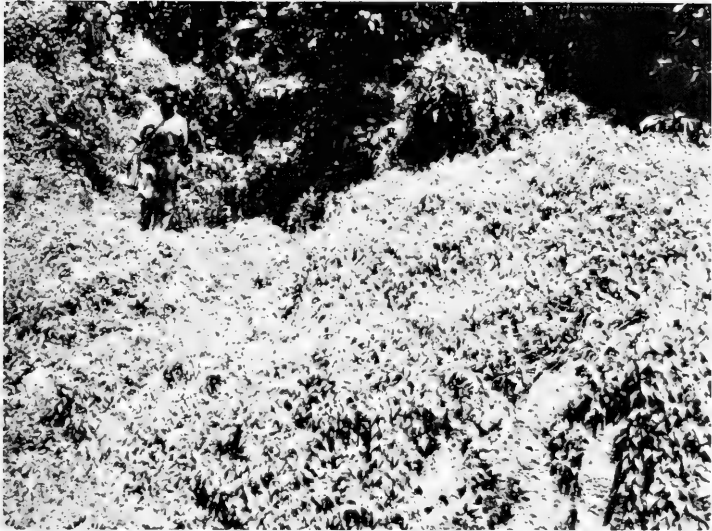


FIGURE 34. *Mikania micrantha*, from Smith 4009, in a forest opening in the Mt. Evans Range, Mba Province, Viti Levu.

Annual or perennial herbs with erect or decumbent stems and alternate leaves; flowering heads very small, globose, heterogamous, disciform, in loose, paniculiform, terminal or axillary clusters, the phyllaries 1- or 2-seriate, erose or fimbriate, subequal, the receptacle naked, conical or depressed-globose; peripheral flowers ♀, fertile, numerous, in several series, the corolla tubular, 2- or 3-lobed at apex; central (disk) flowers ♂, fewer than ♀ flowers, fertile, the corolla tubular, 4- or 5-lobed, the anther bases minutely sagittate, the style branches short, flattened, with minute acuminate appendages; achenes compressed, obovoid, marginally thickened, glandular at apex, the pappus absent in ♀ flowers, absent or composed of 2 or 3 delicate, minute, hairlike bristles less than 0.5 mm. long in ♂ flowers.

TYPE SPECIES: *Dichrocephala latifolia* (Desf.) L'Hér. ex DC. (*Grangea latifolia* Desf.) = *D. integrifolia* (L. f.) Kuntze.

DISTRIBUTION: Tropical Africa and Madagascar to Japan and southeastern Asia into Malesia and Queensland, and eastward in the Pacific to the Society and Austral Islands and Hawaii, with about ten species, one of which has essentially the generic range.

1. *Dichrocephala integrifolia* (L. f.) Kuntze, Rev. Gen. Pl. 1: 333. 1891; Grierson in Rev. Handb. Fl. Ceylon 1: 149. 1980; Fosberg & Sacht in Smithsonian Contr. Bot. 47: 33. 1981.

Cotula bicolor Parkinson, J. Voy. Endeavour, 43, nom. nud. 1773; Solander ex Forst. f. Fl. Ins. Austr. Prodr. 91, nom. nud. 1786; Roth, Cat. Bot. 2: 116. 1800.

Ethulia paniculata Houtt. Nat. Hist. 10: 551. pl. 67, fig. 2. 1779; non *Dichrocephala paniculata* Miq. (1856).

Hippia integrifolia L. f. Suppl. Pl. 389. 1782.

Grangea latifolia Desf. Tabl. École Bot. Mus. Hist. Nat. 95. 1804.

Cotula latifolia Pers. Syn. Pl. 2: 464, nom. illeg. 1807.

Dichrocephala latifolia L'Hér. ex DC. in Guillemin, Arch. Bot. 2: 518. 1833; DC. Prodr. 5: 372. 1836; Seem. in Bonplandia 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 144. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 203. 1890; Yuncker in Bishop Mus. Bull. 220: 266. 1959; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 36. 1985.

Dichrocephala bicolor Schlechtendal in Linnaea 25: 209. 1852; Backer & Bakh. f. Fl. Java 2: 381. 1965; Koster in Nova Guinea Bot. 24: 594. 1966.

Erect herb 10–80 cm. high, the stems and leaves sparsely pilose; leaves ovate to oblong-lyrate, 2–12 × 0.5–6 cm., dentate-crenate; flowering heads hemispherical to globose, 3–5 mm. broad; corollas pale yellow or nearly white, becoming distally purplish to reddish brown, 0.5–1 mm. long; achenes about 1 mm. long. (From non-Fijian specimens.)

TYPIFICATION: *Cotula bicolor*, although earlier published as a nomen nudum, was first validly published by Roth (1800); Grierson (1980) indicates the type as "Nat. Hist. Mus. Oldenburg, Germany." *Ethulia paniculata* Houtt. (1779) is apparently the earliest validly published binomial applicable to this species, but the epithet cannot be used for the present taxon because of *Dichrocephala paniculata* Miq. (1856), which was not proposed as a new name based on Houttuyn's binomial; the material that typified Houttuyn's taxon has not been traced. The first available epithet is provided by *Hippia integrifolia* L. f. (1782), of which the type is Herb. Linn. 1039/1 (LINN HOLOTYPE), "Habitat in India." *Grangea latifolia* Desf. (1804) may have been based on the illustration of *Grangea* (without a specific epithet) published by Lamarck (Encycl. Méth. Bot. 4: pl. 699. 1796). *Cotula latifolia* Pers. is illegitimate because *C. bicolor* Roth was cited as a synonym. The complicated nomenclature of the species usually passing as *Dichrocephala latifolia* (Desf.) L'Hér. ex DC. [not necessarily with that authorship] or *D. bicolor* (Roth) Schlechtendal is fully discussed by Fosberg and Sacht in their 1981 publication.

DISTRIBUTION: Tropical Africa and Madagascar; Japan to India and Ceylon and eastward through Malasia to Queensland; eastward in the Pacific to the Society and Austral Islands and Hawaii. Although the species appears frequent in New Guinea (Koster, 1966), it is certainly rare in Fiji, having been noted only from Seemann's collection, even though he indicated "Common all over Viti." There seems no doubt of the identity of Seemann's plant. In the Societies the species is occasional (Fosberg and Sacht, 1981), but in all other southern Pacific areas and in Hawaii it is indeed extremely rare or possibly extinct.

AVAILABLE COLLECTION: FIJI without further locality, *Seemann 264* (BM, GH, K).

33. *KEYSSERIA* Lauterb. in *Repert. Sp. Nov.* **13**: 241. 1914; Cabrera in *Blumea* **14**: 286. 1966; Koster in *Nova Guinea Bot.* **24**: 597. 1966.

Lagenophora sensu Seem. *Fl. Vit.* 143. 1866; non Cass.

Perennial herbs or short shrubs, usually procumbent, often rhizomatous, the leaves alternate, crowded or subrosulate or rosulate, sessile or rarely petiolate; flowering heads solitary, terminal, small to medium-sized, heterogamous, radiate, often nodding, on long scapiform peduncles, the phyllaries subequal, subfoliaceous, with membranous, distally minutely fringed margins, the receptacle slightly convex, naked; ray flowers numerous, 2- or 3-seriate, ♀, fertile, the corolla limb narrow, commonly 1.5–8 mm. long; disk flowers numerous, ♂ or ♀ and sterile, the corolla tubular, 4-lobed, the anther bases subobtusate, the style branches filiform or lanceolate, very short, acute; achenes (ray flowers) narrowly obovate-lageniform with a beak or apical rim, laterally compressed, subtrigonal, often with somewhat thickened edges, glabrous or nearly so, glandular, the pappus obsolete.

TYPE SPECIES: *Keysseria papuana* Lauterb. (= *K. radicans* (F. v. Muell.) Mattf., cf. Koster, 1966, p. 598).

DISTRIBUTION: Malesia (Borneo, Celebes, and New Guinea), Fiji, and Hawaii, with about 14 species, including one endemic to Fiji. The extraordinary disjunct range of *Keysseria* is reminiscent of that of *Tetramolopium* Nees (also Astereae), which is even more restricted, occurring only in New Guinea and Hawaii (cf. Koster, 1966, pp. 562–586; Lowrey in *Allertonia* **4**: 203–265. 1986). *Keysseria*, however, has one New Guinean species extending to Celebes and a second to Borneo, in addition to the Fijian occurrence.

USEFUL TREATMENT OF GENUS: CABRERA, A. L. The genus *Lagenophora* (Compositae). *Blumea* **14**: 285–308. 1966. Although Cabrera's treatment provides a revision of the 15 species of *Lagenifera*¹ which he accepts, it is also important in indicating the relationships of that genus with four allied genera, each of which is briefly described and discussed as to its range; several new combinations are made in *Keysseria*. Koster's (1966, pp. 597–608) treatment of *Keysseria* provides a full discussion of the Malesian species of the genus, although the Fijian and Hawaiian species are not mentioned.

1. *Keysseria pickeringii* (A. Gray) Cabrera in *Blumea* **14**: 307. 1966; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 325. 1972.

Lagenophora pickeringii A. Gray in *Proc. Amer. Acad. Arts* **5**: 121. 1861; Seem. *Viti*, 438. 1862, *Fl. Vit.* 143. 1866; Drake, *Ill. Fl. Ins. Mar. Pac.* 203. 1890; J. W. Parham, *Pl. Fiji Isl.* 235. 1964.

Rhizomatous herb; leaves oblong to ovate, repand-dentate, attenuate at base, when young villose-lanate; peduncle 15–20 cm. long, the flowering heads about 6 mm. in diameter; achenes 8–10-costate.

TIPIFICATION: The type is *U. S. Expl. Exped.* (US 71603 HOLOTYPE), collected in 1840 on the "mountains of Mathuata," Mathuata Province, Vanua Levu. It seems probable that the Exploring Expedition collection was made on the Mathuata

¹*Lagenophora* Cass. (in *Bull. Sci. Soc. Philom. Paris* **1818**: 34. 1818) was intended as a correction of *Lagenifera* Cass. (in *op. cit.* **1816**: 199. 1816). The spelling *Lagenophora* has been used by most subsequent authors (including Cabrera and Koster), *Lagenifera* by Backer and Bakhuizen van den Brink (*Fl. Java* **2**: 381. 1965). The latter would appear to be correct (ING, 1979), since the spelling *Lagenophora* has not been conserved in ICBN.

(Nawavi) Range (summit elevation 631 m.), the only "mountains" near the north coast of Vanua Levu readily accessible to its members. The higher parts of this range, although not difficult of access, have probably not been visited by a botanist since the 1840 Expedition. Another example of a species from the area known only from an Exploring Expedition type is *Jasminum tetraquetrum* A. Gray (cf. this *Flora*, vol. 4, p. 133).

DISTRIBUTION: Endemic to Fiji and thus far known only from the type.

It is not possible to suggest a New Guinean relative of *Keyseria pickeringii*, which is remarkable for its very small heads and its costate achenes.

34. *SOLIDAGO* L. Sp. Pl. 878. 1753; Backer & Bakh. f. Fl. Java 2: 380. 1965; McVaugh, Fl. Novo-Galic. 12: 853. 1984.

Perennial herbs from a fibrous-rooted rhizome or caudex, the leaves alternate, simple, usually narrow; flowering heads generally numerous, small, heterogamous, radiate, campanulate, commonly in paniculiform or corymbiform clusters, the phyllaries usually several-seriate, thin and dry, sometimes green-tipped, the receptacle small, naked; ray flowers ♀, fertile, in 1 series, the corolla limb fairly small; disk flowers ♂, fertile, the corolla tubular, 5-lobed, the anther bases obtuse, the style branches flattened, with externally minutely hairy, mostly lanceolate appendages; achenes subterete or angled, elongate, usually striate, the pappus of numerous equal to unequal, usually whitish, subcapillary bristles.

LECTOTYPE SPECIES: *Solidago virgaurea* L. (vide Britton & Brown, Fl. N. U. S. ed. 2. 3: 380. 1913), one of Linnaeus's original 15 species.

DISTRIBUTION: Temperate North America, but extending into South America and Eurasia, with 100 or more species. One species is occasionally found cultivated in the Fijian Region.

Identifications of our specimens have kindly been confirmed by A. Cronquist.

1. *Solidago nemoralis* Ait. Hort. Kew. 3: 213. 1789; Backer & Bakh. f. Fl. Java 2: 380. 1965.

Coarse herb 1-2.5 m. high, occasionally cultivated near sea level; stem and leaves on both surfaces short-hispid, the leaves grayish green, becoming essentially glabrous above, remotely and minutely spinulose-serrate; corollas yellow. Our specimens bore flowers and fruits between February and April.

TYPIFICATION: The species was said to have been introduced into England from North America in 1769 by S. Martin.

DISTRIBUTION: North America, occasionally cultivated elsewhere. Two varieties have been noted in Fiji.

LOCAL NAME AND USE: This species of *goldenrod* is an infrequent garden ornamental.

KEY TO VARIETIES

Distal portions of stem without lateral branches below flowering clusters for 20-40 cm. or more; leaves lanceolate, the upper ones 3-8 × 0.4-1 cm., plane or slightly recurved at margin.

1a. var. *nemoralis*

Distal portions of stem with lateral branches below flowering clusters; leaves linear-lanceolate, the upper ones 1.8-3 × 0.2-0.5 cm., strongly recurved at margin.

1b. var. *haleana*

1a. *Solidago nemoralis* var. *nemoralis*; J. W. Parham, Pl. Fiji Isl. ed. 2. 325. 1972.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, in private garden, DA 12616.

The typical variety of the species has also been noted in cultivation in Tonga (Tongatapu) and Samoa (Savai'i, Tutuila).

1b. *Solidago nemoralis* var. *haleana* Fernald in Rhodora 38: 227. pl. 431, fig. 1, 2. 1936; J. W. Parham, Pl. Fiji Isl. ed. 2. 326. 1972.

TYPIFICATION: The type is *Josiah Hale s. n.* (GH HOLOTYPE), from Louisiana, U. S. A.

DISTRIBUTION: Southeastern United States, sometimes cultivated elsewhere.

AVAILABLE COLLECTION: VITI LEVU: NANDRONGA & NAVOSA: Agricultural Station, Nathotholevu, near Singatoka, DA 16703.

35. *ASTER L.* Sp. Pl. 872. 1753; Backer & Bakh. f. Fl. Java 2: 384. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 21. 1980; McVaugh, Fl. Novo-Galic. 12: 80. 1984.

Perennial or rarely annual herbs (rarely shrubby) with simple, alternate leaves; flowering heads solitary to numerous, small or more commonly fairly large, heterogamous, radiate, commonly in corymbiform to paniculiform clusters, the phyllaries usually definitely graduated in few to several series, at least the inner ones commonly chartaceous at base but with a distinctly green tip, the receptacle naked, flat or convex; ray flowers ♀, fertile, in 1-3 series, the corolla white or pink to violet or purple, with a long and showy or rarely short and inconspicuous limb; disk flowers ♂, fertile, the corolla tubular, 5-lobed, the anthers obtuse or subauriculate at base, the style branches flattened, with acute, lanceolate, papillose or hirtellous tips; achenes elongate, fusiform or clavate, usually with 5 or more ribs, the pappus of numerous, equal or unequal, barbellate bristles in 1-3 series.

LECTOTYPE SPECIES: *Aster amellus* L. (vide Britton & Brown, Fl. N. U. S. ed. 2. 3: 406. 1913); 30 species were included in the genus by Linnaeus in 1753.

DISTRIBUTION: North Temperate zone, especially in America, extending into the American tropics, with 200 or more species. Many species are cultivated elsewhere, sometimes becoming naturalized. It seems probable that the three species recorded from Fiji were introduced comparatively recently, at least during the present century.

KEY TO SPECIES

Perennials; rays very conspicuous, greatly exceeding the involucre, the ligule of the ray corolla several times the length of the tubular portion.

Bracts of the capitulescence narrowly oblong; phyllaries tending to be spreading, the outer ones green, somewhat squarrose; herbage glabrous or hairy, not glaucous, the leaves oblong to linear-lanceolate.

1. *A. novi-belgii*

Bracts of the capitulescence broadly elliptic; phyllaries closely appressed, the outer ones not herbaceous or squarrose; herbage glabrous, or with some lines of hairs in the capitulescence, generally glaucous, the leaves ovate to oblong or lanceolate. 2. *A. laevis*

Annuals; rays inconspicuous, about equalling the involucre, the ligule of the ray corolla subequalling or mostly somewhat shorter than the tubular portion. 3. *A. subulatus*

1. *Aster novi-belgii* L. Sp. Pl. 877. 1753; Backer & Bakh. f. Fl. Java 2: 384. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 322. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 21. 1980; McKee, Pl. Intro. Cult. Nouv.-Caléd. 33. 1985.

As cultivated near sea level in Fiji, *Aster novi-belgii* is a coarse herb 15-30 cm. high; the ray corollas are pale pink to blue-violet, the disk corollas yellow. Flowers were noted in January.

TYPEIFICATION: Linnaeus gave three prior references, including his own *Hortus Cliffortianus* and *Hortus Upsaliensis*.

DISTRIBUTION: Indigenous in the eastern U. S., widely cultivated elsewhere as an ornamental.

LOCAL NAME AND USE: *Michaelmas daisy*; often seen in Suva in parks and in small gardens along streets; doubtless cultivated in other coastal towns; an attractive ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva Botanical Gardens, *DA 12291*; identification confirmed by A. Cronquist.

2. *Aster laevis* L. Sp. Pl. 876. 1753; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 62. 1970; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 21. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 155. 1980.

Coarse herb to about 1 m. high, sparingly cultivated near sea level; ray corollas light blue; disk corollas yellow. The only available Fijian collection was flowering in January.

TYPEIFICATION: The only collection originally cited by Linnaeus was that of Pehr Kalm.

DISTRIBUTION: North America, often cultivated and sometimes naturalized elsewhere.

USE: A garden ornamental, not known to be naturalized in Fiji but sometimes found so in the Societies.

AVAILABLE COLLECTION: VITI LEVU: MBA: Lautoka, *Greenwood*, Jan. 3, 1941 (GH; identified by M. L. Fernald).

3. *Aster subulatus* Michx. Fl. Bor.-Amer. **2**: 111. 1803; J. W. Parham, Pl. Fiji Isl. ed. 2. 322. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **219**: 85. 1977; McVaugh, Fl. Novo-Galic. **12**: 88. *fig. 11*. 1984.

Coarse herb 30–75 cm. high, sparingly naturalized in waste places near sea level; the short ray corollas are white to pink or blue, and the pappus is white or becoming pink-tinged. Flowers and fruits were noted in September and October.

TYPEIFICATION: The type is a collection from the eastern United States, *Michaux* (P HOLOTYPE).

DISTRIBUTION: United States southward through Mexico, Central America, the West Indies, and into northern South America; a widespread adventive in Australasia (Stanley in Stanley & Ross, Fl. S.-E. Queensland **2**: 517. 1986) and also in the Kermadecs (Sykes, 1977).

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Suva, on waste land, *DA 12235*; Suva, King's Wharf, *DA 14428* (identified by H. E. Kleinschmidt).

The species was a comparatively recent arrival in Fiji and perhaps has not persisted, the Suva localities suggesting dispersal in ship ballast; apparently it is not an escape from cultivation.

36. ERIGERON L. Sp. Pl. 863. 1753; Backer & Bakh. f. Fl. Java **2**: 385, p. p. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 41. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 153. 1980; McVaugh, Fl. Novo-Galic. **12**: 328. 1984.

Mostly annual or perennial herbs (ours a weak shrub) with alternate leaves; flowering heads medium-sized, heterogamous, radiate, mostly few or solitary on naked or nearly naked peduncles, the phyllaries narrow, herbaceous or subscarious, subequal or in graduated series, the receptacle flat or convex, naked; ray flowers numerous, in 2 or more series, ♀, fertile, the corolla white to pink or purplish, with a usually conspicuous and strongly exerted, elongate, narrow limb generally less than 1 mm. broad; disk flowers ♂, fertile, usually more numerous than ray flowers, the corolla tubular, 5-lobed, the anther bases obtuse, the style branches flattened, with short, triangular or obtuse appendages; achenes ellipsoid or narrowly obovoid, compressed, 2-nerved on margins, the pappus composed of several-numerous conspicuous, fragile, subcapillary bristles and often also of at least a few much shorter setae or scales.

TYPE SPECIES: McVaugh (1984) unequivocally states that the type species is *Erigeron uniflorus* L. However, ING (1979) indicates a disagreement; Britton and Brown (Ill. Fl. N. U. S. ed. 2. 3: 436. 1913) selected *E. acris* L., while M. L. Green (Prop. Brit. Bot. 181. 1929) selected *E. uniflorus* ("uniflorum") L. Linnaeus originally included twelve species in *Erigeron*; in spite of his use of the genus as neuter, it should be treated as masculine (ICBN, Art. 76.1, Ex. 1).

DISTRIBUTION: North and South America, Europe, and Asia, probably with about 200 species. Of the three species in Fiji that have in the past been referred to *Erigeron*, two are now commonly placed in *Conyza*, the following genus in the present treatment.

1. **Erigeron karvinskianus** DC. Prodr. 5: 285, as *E. karvinskianum*. 1836; Backer & Bakh. f. Fl. Java 2: 385. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2. 324. 1972; Grierson in Rev. Handb. Fl. Ceylon 1: 154. 1980; McVaugh, Fl. Novo-Galic. 12: 334. fig. 54. 1984.

As occasionally cultivated near sea level in Fiji, *Erigeron karvinskianus* is seen as a low, slender, repent shrub with suberect capitulescence-bearing branches; ray corollas white, fading to purplish; disk corollas yellow. Flowers and fruits have been observed in January and March.

TYPIFICATION: The type is *Karwinski* (G HOLOTYPE), from Mexico. De Candolle's spelling of the epithet is doubtless to be taken as an intentional latinization and is to be retained (ICBN, Art. 73.7).

DISTRIBUTION: Mexico, and perhaps also indigenous in Central America, the West Indies, and South America; cultivated and sometimes naturalized elsewhere.

LOCAL NAME AND USE: *Daisy*; a garden ornamental. Probably a comparatively recent introduction into Fiji.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Lami, in private garden, DA 16438; Suva, in private garden, DA 16091.

37. **CONYZA** Less. Syn. Gen. Compos. 203. 1832; Cronquist in Bull. Torrey Bot. Club 70: 629. 1943; Backer & Bakh. f. Fl. Java 2: 386. 1965; Koster in Nova Guinea Bot. 24: 555. 1966; Fosberg & Sacht in Smithsonian Contr. Bot. 46: 28. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 156. 1980; McVaugh, Fl. Novo-Galic. 12: 242. 1984. Nom. cons.

Erigeron sensu Seem. Fl. Vit. 140. 1866; Koster in Nova Guinea Bot. 24: 559. 1965; non L.

Annual or perennial erect herbs with alternate leaves; flowering heads rather small, numerous, in terminal corymbiform or paniculiform clusters, heterogamous, more or less disciform, the phyllaries narrow, thin, scarcely herbaceous, 2-4-seriate, soon spreading and becoming reflexed, the receptacle convex or flat, naked; ♀ flowers very numerous, commonly 30-200, in few-several peripheral series, fertile, the corolla tubular and eligulate or in some species the outermost ones with a very short but well-defined ligule; disk (central) flowers commonly fewer than 20, ♂, fertile or sterile, the corolla tubular, (4 or) 5-lobed, the anther bases obtuse or somewhat auriculate, the style branches flattened, nearly linear to lanceolate; achenes oblong-elliptic to obovoid, more or less compressed, the pappus composed of mostly 10-30 conspicuous, subcapillary, barbellate bristles, sometimes with an outer series of much shorter bristles.

TYPE SPECIES: *Conyza chilensis* Spreng. (Novi Provent. 14. 1818), typ. cons.

DISTRIBUTION: Temperate and subtropical regions of the world, with about 60 species. Two widespread adventives occur in Fiji.

USEFUL TREATMENT OF GENUS: CRONQUIST, A. The separation of *Erigeron* from *Conyza*. Bull. Torrey Bot. Club 70: 629-632. 1943.

Specialists in Asteraceae have found it difficult satisfactorily to delimit the genera *Aster*, *Erigeron*, and *Conyza* (especially the last two), as a result of which the nomenclature of some of the widespread species of this complex has become much involved. A substantial consensus of opinion seems now to have been reached; the problem is well stated by Cronquist (1943), and the solution proposed by him (and briefly outlined in our key to genera) is currently generally accepted.

The only species discussed under their concepts of *Erigeron* by Seemann (1866) and Koster (1965) are now considered to be representatives of *Conyza*.

KEY TO SPECIES

Phyllaries mostly about 3 mm. long, essentially glabrous; mature heads usually 3-4 mm. long; corolla of outer ♀ flowers with a very small but well-defined ligule, exceeding the style branches by up to about 1 mm.; leaves glabrous or with a few spreading hairs along margin and midrib. . . . 1. *C. canadensis*
Phyllaries mostly about 4.5 mm. long, conspicuously hispid; mature heads usually 4-6 mm. long; corolla of outer ♀ flowers eligulate or with a vestigial ligule, subequalling or somewhat surpassed by the style branches; leaves with appressed hairs on both surfaces. 2. *C. bonariensis*

1. *Conyza canadensis* (L.) Cronquist in Bull. Torrey Bot. Club 70: 632. 1943; McVaugh, Fl. Novo-Galic. 12: 245. 1984.

Erigeron canadensis L. Sp. Pl. 863, as *E. canadense*. 1753.

TYPIFICATION: Linnaeus cited several prior references, including *Hortus Cliffortianus* and *Hortus Upsaliensis*.

DISTRIBUTION: North America and southward, now widely adventive elsewhere. The form widespread in Malesia and the Pacific is usually referred to the following variety.

1a. *Conyza canadensis* var. *pusilla* (Nuttall) Cronquist in Bull. Torrey Bot. Club 74: 150. 1947; McVaugh, Fl. Novo-Galic. 12: 246. 1984.

Erigeron pusillus Nuttall, Gen. N. Amer. Pl. 2: 148, as *E. pusillum*. 1818; Robinson in *Rhodora* 15: 205. 1913; Greenwood in J. Arnold Arb. 25: 400. 1944, in op. cit. 30: 78. 1949; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972.

Erigeron canadensis sensu J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in Dept. Agr. Fiji Bull. 35: 107. 1959; Koster in *Nova Guinea Bot.* 24: 561. 1966; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 64. 1970; non L. sensu str. (var. *canadensis*).

Conyza canadensis sensu Fosberg & Sacht in *Smithsonian Contr. Bot.* 46: 29. 1980; non Cronquist sensu str. (var. *canadensis*).

In Fiji *Conyza canadensis* var. *pusilla* is seen as an erect herb 15–100 cm. high from near sea level to 850 m., adventive and sometimes locally common on sandy soils near coast, sand dunes, and open grassy hills, in villages, gardens, and waste places, and along roadsides; pappus white to yellowish. Fruiting plants (with inconspicuous flowers) have been noted between February and May.

TYPIIFICATION: The type is from New Jersey or Pennsylvania, presumably collected by Nuttall and deposited at PH.

DISTRIBUTION: Northeastern U. S. to the Caribbean basin and Mexico, widely adventive elsewhere.

LOCAL NAMES: *Mandramandra*, *horseweed*, *fleabane*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Ndreketi, Lautoka, DA 11761; Vunda Point, DA 11410; mountains inland from Lautoka, Greenwood 1164. NANDRONGA & NAVOSA: Navuso, DA 2920; Thuvu, west of Singatoka, Greenwood 921; Volivolivi, near Singatoka, DA 10672, p. p.; Navula, Singatoka Valley road, DA 11329.

In Fiji this taxon was first noted by Greenwood (1944), who believed it then to be a fairly recent arrival. Specimens available to us seem limited to the dry areas of western Viti Levu, but Parham (1948) noted its occurrence (as *Erigeron canadensis*, but without a herbarium voucher) in the Suva Botanical Gardens.

Although var. *pusilla* seems the only variety of *Conyza canadensis* that has become well established in most Pacific, Malesian, and Australasian areas (cf. also Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 526. 1986), some students (e. g. Fosberg and Sachet, 1980) believe it difficult to discern clear varieties in the species at present.

2. *Conyza bonariensis* (L.) Cronquist in Bull. Torrey Bot. Club 70: 632. 1943; Grierson in Ceylon J. Sci., Biol. Sci. 10: 53. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 219: 87. 1977; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 28. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 158. 1980; McVaugh, Fl. Novogalic. 12: 245. 1984.

Erigeron bonariensis L. Sp. Pl. 863, as *E. bonariense*. 1753; Seem. in Bonplandia 9: 257. 1861.

Erigeron sumatrensis Retz. Obs. Bot. 5: 28, as *E. sumatrense*. 1788; A. C. Sm. in J. Arnold Arb. 26: 110. 1945; Greenwood in op. cit. 36: 399. 1955; Yuncker in Bishop Mus. Bull. 220: 267. 1959; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972; Backer & Bakh. f. Fl. Java 2: 385. 1965; Koster in Nova Guinea Bot. 24: 560. 1966.

Conyza floribunda H. B. K. Nova Gen. et Sp. 4: 73. 1820.

Erigeron albidus sensu A. Gray in Proc. Amer. Acad. Arts 5: 319, as *E. albidum*. (Jan.) 1862, in Bonplandia 10: 36. (Feb.) 1862; Seem. Viti, 438, as *E. albidum*. 1862, Fl. Vit. 140, as *E. albidum*. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 204. 1890; non sensu basionymi *Conyza albida* Willd.

Erigeron floribundus Schultz-Bip. in Bull. Soc. Bot. France 12: 81. 1865; Greenwood in Proc. Linn. Soc. 154: 99. 1943, in J. Arnold Arb. 30: 78. 1949; J. W. Parham in Dept. Agr. Fiji Bull. 35: 107. 1959, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972.

Conyza sumatrensis E. H. Walker in J. Jap. Bot. 46: 72. 1971, Fl. Okinawa & S. Ryukyu Isl. 1025. 1976; Stanley in Stanley & Ross, Fl. S.-E. Queensland 2: 526. 1986.

As seen in Fiji, *Conyza bonariensis* is a coarse herb 0.5–1.5 m. high from near sea level to 900 m., naturalized on sand dunes and on open hills among ferns and reeds, along roadsides, and in forested areas along streams; corolla white or brown-tinged; style branches white; pappus stramineous to white. Flowers and fruits have been obtained mostly between February and August.

TYPIIFICATION: As the species is here understood three basionyms are involved. For *Erigeron bonariensis* Linnaeus gave three prior references; Grierson (1980) lists Herb. Dillen. (OXF), which may be taken as the LECTOTYPE. *Erigeron sumatrensis* is based on a collection by Wennerberg (HOLOTYPE presumably at LD) from Sumatra. The type of *Conyza floribunda* is *Humboldt & Bonpland* (P HOLOTYPE), collected in Peru.

DISTRIBUTION: Indigenous in South America, but now widely adventive; sometimes also considered indigenous in southeastern Asia and Malesia by authors who distinguish *Conyza sumatrensis* as a distinct taxon (see discussion below). It was probably an early arrival in Pacific archipelagoes, possibly an inadvertent aboriginal introduction in some areas. About 30 collections from Fiji are available.

LOCAL NAMES: *Wavuwavu*, *tho ni vavalangi*, *tho ni papalangi*, *tumbua*, *thovuka*, *matakaro*, *fleabane*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 246*; mountains inland from Lautoka, *Greenwood 410*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4264*; Nandarivatu, *Parks 20623*. NANDRONGA & NAVOSA: Volivoli, near Singatoka, *DA 10672*, p. p. REWA: Nukulau Island, *Barclay s. n.* OVALAU: *Milne 238*. WAKAYA: *Milne 375*. NAIRAI: *Milne 157*. NGAU: *Milne 206*. VANUA LEVU: MATHUATA: Vunimoli road, *DA 10513*; between Ndravoningatandamu and Nanenivunda River, *Harwood 94*. TAVEUNI: Somosomo, *Seemann 261*. MATUKU: *Milne 111*. TOTOTYA: *Milne 73*. VANUA MBALAVU: *Graeffe s. n.* LAKEMBA: Naivanavana Valley, *Garnock-Jones 927*.

We refer the present taxon to *Conyza bonariensis*, as suggested by Fosberg and Sachet (1980) and by most current herbarium practice, with some diffidence. *Conyza floribunda* is sometimes maintained as a distinct species (Grierson, 1972, 1980), primarily on the basis of capitulescence shape. Some recent treatments maintain both *C. bonariensis* and *C. sumatrensis* (cf. Walker, 1976; Stanley, 1986). Stanley's separation of the two taxa is indicated as follows:

"Newly exposed receptacles of old heads (2-) 2.5-4.5 mm across, not angular pitted or rarely with 2-3 pits in centre; mature heads 5-6 mm long. *C. bonariensis*
Newly exposed receptacles of old heads usually 1.5-2.5 (-3) mm across, angular pitted with projecting points at the angles, sometimes pits and pit margins eroded with age; mature heads 4-5 mm long
C. sumatrensis"

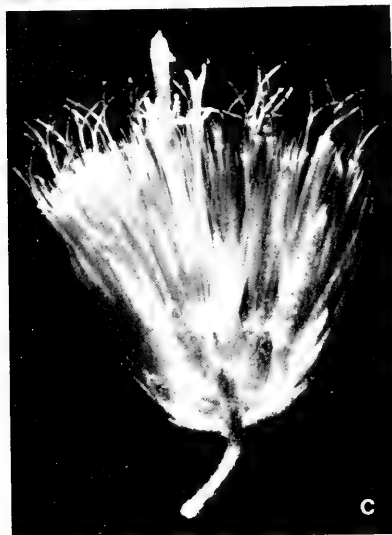
On the basis of receptacle size and pitting, our taxon would appear to be better placed in *C. sumatrensis*; the length of mature heads seems too variable to be consequential. Whether the median cauline leaves are linear or narrowly lanceolate (Walker, 1976) also seems highly variable.

Whether there are one, two, or three species of this complex in tropical Asia and the Pacific clearly cannot be here decided but must be left to a specialist in the genus, who should also contemplate whether the complex is entirely American in origin or whether part of it evolved in the Paleotropics. In treating *Erigeron sumatrensis*, Koster (1966) considered the Old World population to be indigenous; Stanley's (1986) comment on the range of *Conyza sumatrensis* ("Native of south-eastern Asia and South America") seems unsatisfactory.

38. BLUMEA DC. in Guillemin, Arch. Bot. 2: 514. 1833; Seem. Fl. Vit. 141. 1866; Randeria in Blumea 10: 205. 1960; Backer & Bakh. f. Fl. Java 2: 387. 1965; Koster in Blumea 20: 211. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 23. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 161. 1980. Nom. cons.

Annual or perennial herbs or shrubs with alternate leaves; flowering heads heterogamous, disciform, mostly numerous in terminal or axillary paniculiform clus-

FIGURE 35. *Blumea milnei*: A, distal portion of stem, with foliage and fruiting capitulescence, $\times 1/4$; B, terminal portion of capitulescence, $\times 2$; C, flowering head, with many peripheral flowers and 2 disk flowers remaining, one of these with protruding anthers, $\times 8$; D, peripheral ♀ flower, the corolla much exceeded by the style branches, $\times 12$; E, disk (central) ♂ flower, the protruding anthers slightly exceeded by the style branches, $\times 12$. A from *DA 11496* (large detached leaf from *St. John 18287*), B from *St. John 18287*, C-E from *Smith 5491*.



ters, the phyllaries several-seriate, graduated in length, linear or oblong, the inner ones often scarious or chartaceous, the receptacle naked; ♀ flowers numerous, in several peripheral series, the corolla filiform-tubular, 2-4-lobed; disk (central) flowers ♂, the corolla tubular, 4- or 5-lobed, the anther bases sagittate, finely caudate, the style branches filiform, obtuse at apex; achenes small, oblong, angular or subterete, 5-10-ribbed, hairy, with an oblique, white, cartilaginous, basal ring, the pappus composed of numerous fine setae in 1 series.

TYPE SPECIES: *Blumea balsamifera* (L.) DC. (Prodr. 5:447. 1836) (*Conyza balsamifera* L.), typ. cons.

DISTRIBUTION: Africa, Madagascar, and southeastern Asia to Malesia and Australia and into the Pacific to Samoa, with about 50 species. One species is indigenous in Fiji.

USEFUL TREATMENT OF GENUS: RANDERIA, A. J. The Composite genus *Blumea*, a taxonomic revision. *Blumea* 10: 176-317. 1960.

1. *Blumea milnei* Seem. in *Bonplandia* 9: 257, nom. nud. 1861, Viti, 438, nom. nud. 1862, Fl. Vit. 141. t. 27. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 205. 1890; *Randeria* in *Blumea* 10: 231. 1960; J. W. Parham, Pl. Fiji Isl. ed. 2. 322. fig. 93. 1972; Fosberg & Sachet in *Smithsonian Contr. Bot.* 46: 24. 1980. FIGURE 35.

Blumea virens sensu Seem. in *Bonplandia* 9: 257. 1861, Viti, 438. 1862, Fl. Vit. 141. 1866; Drake, Ill. Fl. Ins. Mar. Pac. 205. 1890; J. W. Parham, Pl. Fiji Isl. 232. 1964, ed. 2. 322. 1972; non DC.

Blumea densiflora sensu Gibbs in *J. Linn. Soc. Bot.* 39: 155. 1909; Guillaumin in *J. Arnold Arb.* 13: 10. 1932; J. W. Parham, Pl. Fiji Isl. 232. fig. 81. 1964; non DC.

In Fiji *Blumea milnei* is seen as a coarse, suffrutescent herb 1-3 m. high at elevations from near sea level to 1,100 m. in dense forest (often along trails) and on its edges, on forested ridges, in thickets, and occasionally in waste places. The phyllaries are green, and the corollas and styles are yellow. Collections in flower and fruit have been made in months scattered throughout the year.

TYPIFICATION: The type was erroneously cited by *Randeria* (1960) as "*Milne* 273 (κ)." Actually Seemann (1866) cited two collections: *Milne* (not indicated as such by Seemann but actually *Milne* 239 (κ), collected in waste places on Ovalau, Oct. 1854; two other *Milne* collections not annotated by Seemann but probably seen by him are cited below) and *Seemann* 273. The second of these specimens is the better; attached are sketches that served as the basis for t. 27. A suggested citation is: *Seemann* 273 (κ LECTOTYPE; ISOLECTOTYPE at BM), collected Aug. 22-Sept. 2, 1860, in the vicinity of Namosi, Namosi Province, Viti Levu.

DISTRIBUTION: New Guinea to Fiji and Samoa, and also in the Caroline Islands (Kusaie only).

LOCAL NAME AND USE: In upper Naitasiri Province the name *viavia tobacco* has been noted, and an extract from the leaves is used for sore eyes (*St. John* 18287).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu and vicinity, *Gibbs* 637, *Parks* 20693, 20736, *DA* 8527, *Degener & Ordonez* 13573; Mt. Nanggaranambuluta, east of Nandarivatu, *Vaughan* 3245, *DA* 10392, *Webster & Hildreth* 14210. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith* 5491. NAMOSI: Lower slopes of Mt. Voma, *DA* 549. NAITASIRI: Between Rarandawai and Nairairaikinasavu, Wainisavulevu Creek, Wainimala River Valley, *St. John* 18287; vicinity of Tamavua, *Yeoward* 2. VITI LEVU without further locality, *Graeffe* s. n. OVALAU: Vicinity of Levuka, *Gillespie* 4423.1; Port Kinnaird, *Seemann* 272 (as labelled at κ, err. cit. as Viti Levu by Seemann, 1866); Ovalau without further locality, *Milne* 49, *Horne* 36. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA* 11496, 12837. MOALA: *Milne* 107. FIJI without further locality, *Horne* s. n.

39. *CHRYSANTHEMUM* L. Sp. Pl. 887. 1753; Backer & Bakh. f. Fl. Java 2: 419. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 26. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 236. 1980; McVaugh, Fl. Novo-Galic. 12: 228. 1984.

Annual or perennial herbs (sometimes basally woody) with alternate leaves; flowering heads generally showy, often large, heterogamous, radiate, solitary and terminal on long peduncles or few to numerous in corymbiform clusters, the phyllaries 2-4-seriate, some of them scarious, at least at margins, the receptacle flat or convex, naked; ray flowers ♀, fertile, commonly 10-25, in 1 series (to many in cultivars), the limb of the corolla often large and showy, entire or toothed; disk flowers numerous, ♂, fertile, the corolla tubular, (4 or)5-lobed, the anther bases rounded, the style branches included, flattened, truncate, minutely penicillate; achenes cylindric, 5-10-striate or angular with a posterior wing (disk) or triquetrous with winged angles (ray), the pappus a short scalelike crown or absent.

LECTOTYPE SPECIES: *Chrysanthemum coronarium* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 3: 518. 1913), one of the 14 species originally placed in the genus by Linnaeus.

DISTRIBUTION: Primarily in the Northern Hemisphere, especially in the Old World, with 100-200 species and many hybrids and cultivars, one of which is cultivated in Fiji.

1. *Chrysanthemum morifolium* Ramat. in J. Hist. Nat. 2: 240. 1792; L. H. Bailey in Gentes Herb. 1: 131. 1923; Merr. in Trans. Amer. Philos. Soc. 24 (2): 392. 1935; Backer & Bakh. f. Fl. Java 2: 421. 1965; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 63. 1970; J. W. Parham, Pl. Fiji Isl. ed. 2. 322. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 26. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 34. 1985.

Coarse herb to 3 m. high, suffrutescent at base, occasionally cultivated near sea level. The flowering heads are variable in size and shape, with ray corollas variously colored, often yellow, and disk corollas yellow or greenish yellow. The cited collection was flowering in September.

TIPIFICATION: No type citation was given in the original protologue, but the original material was doubtless from a cultivated plant.

DISTRIBUTION: A plant of ancient cultivation, indigenous in eastern Asia; the wild prototype of this cultigen introduced from China and now widely cultivated throughout the world is not yet recognized (Bailey, 1923).

LOCAL NAME AND USE: The florist's *chrysanthemum* of temperate countries; a garden ornamental.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva Botanical Gardens, DA 12181.

The correct taxonomic placement of the garden hybrids involving *Chrysanthemum morifolium* is not clear; perhaps because of different achenial structure they should be referred to the genus *Dendranthema* Des Moul. (cf. Grierson in Rev. Handb. Fl. Ceylon 1: 237-238. 1980), but we here follow the placement still used in most Floras.

40. *ARTEMISIA* L. Sp. Pl. 845. 1753; Backer & Bakh. f. Fl. Java 2: 422. 1965; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 19. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 240. 1980; McVaugh, Fl. Novo-Galic. 12: 76. 1984.

Perennial or annual, usually bitter-aromatic herbs or shrubs with alternate, mostly toothed, lobed or dissected leaves; flowering heads small, heterogamous, usually disciform, mostly in terminal paniculiform clusters, the phyllaries in 2-4 series, at least the inner ones scarious or scarious-margined, the receptacle convex or conical, naked; peripheral ♀ flowers usually present, fertile, the corolla tubular, 2- or 3-lobed; disk (central) flowers ♂, generally fertile, the corolla tubular, 5-lobed, the anther bases obtuse or auriculate, the style branches flattened, truncate, fimbriate, included or short-exserted; achenes ellipsoid, usually glabrous, the pappus obsolete or rarely represented by a short crown.

LECTOTYPE SPECIES: *Artemisia vulgaris* L. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2: 3: 522. 1913), one of 19 species originally included in the genus by Linnaeus.

DISTRIBUTION: Temperate parts of the Northern Hemisphere (and into South America and some tropical areas, e. g. Hawaii), with about 400 species, several of which have been cultivated in tropical areas and have become naturalized. One species is an infrequent weed in Fiji.

1. *Artemisia vulgaris* L. Sp. Pl. 848. 1753; Backer & Bakh. f. Fl. Java 2: 422. 1965; J. W. Parham, Pl. Fiji Isl. ed. 2: 322. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 19. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 33. 1985.

Artemisia vulgaris, an infrequent roadside weed in Fiji, is seen there as an herb 1-1.5 m. high; leaves pinnately incised, densely white-pilose beneath; young flowering heads white.

TYPIFICATION: Several prior references, including *Hortus Cliffortianus*, were cited by Linnaeus.

DISTRIBUTION: Eurasian, at least in the broad sense, and presumably widely dispersed elsewhere either in cultivation or as an adventive.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva, Queen Elizabeth Drive at Veiuto, DA 17341.

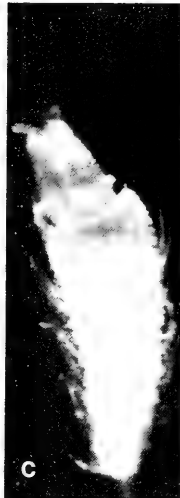
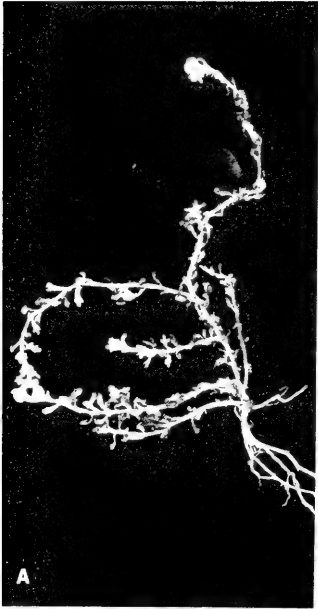
The true identity of the weedy *Artemisia* in the Pacific should await study by a specialist. Apparently our taxon was a garden introduction into Micronesia (Fosberg & Sachet, 1980, who treat it as *A. vulgaris* var. *indica* (Willd.) Maxim.). The taxon generally treated as *A. vulgaris* in Ceylon is referred to *A. dubia* var. *grata* (Wall. ex DC.) Pampan. by Grierson (1980). There is no indication that the single Fijian collection at hand came from a cultivated plant, although of course it may have been introduced as such; it was collected by M. E. Parham in February, 1970, with the notation: "Weed; several patches noted."

41. CENTIPEDA Lour. Fl. Cochinch. 492. 1790; Backer & Bakh. f. Fl. Java 2: 421. 1965; Koster in Blumea 22: 215. 1975; Grierson in Rev. Handb. Fl. Ceylon 1: 235. 1980.

Myriogyne Less. in Linnaea 6: 219. 1831; DC. Prodr. 6: 139. 1838; Seem. Fl. Vit. 144. 1866.

Low-growing herbs with alternate, oblanceolate or spatulate, entire or coarsely dentate leaves; flowering heads very small, heterogamous, disciform, subglobose, solitary and more or less sessile in leaf axils, the phyllaries 1- or 2-seriate, nearly equal, membranous, the receptacle convex, naked; peripheral flowers numerous, ♀, fertile, in several series, the corolla shortly tubular, 2- or 3-lobed; disk (central) flowers fewer,

FIGURE 36. *Centipeda minima*, from Smith 6885; A, entire plant, with a few flowering heads, × 1; B, flowering head and associated leaves, × 10; C, peripheral ♀ flower, the corolla slightly exceeded by the style branches, × 70; D, disk (central) ♂ flower, showing 4 corolla lobes, anthers, and tips of style branches, × 70; E, dried achenes of disk (left) and peripheral (right) flowers, with persistent corollas, × 50.



♂, sometimes sterile, the corolla shortly tubular, with 4 spreading lobes, the anther bases obtuse, the style branches very short and more or less acute or the style undivided and clavate; achenes (3 or)4(or 5)-angled, sparsely puberulent on ribs, the floral parts generally persistent, the pappus a minute, spongy, pale, obscurely toothed corona.

TYPE SPECIES: The type species of *Centipeda* is *C. orbicularis* Lour. That of *Myriogyne* has not been designated in ING (1979); Lessing included two species, *M. minuta* (Forst. f.) Less. and *M. elatinoides* Less., sp. nov.

DISTRIBUTION: Asia from Afghanistan and eastern Siberia southward, Madagascar and Mauritius, and eastward through Malesia to Australia, New Zealand, and the Society Islands, and also Chile, with about six species. One widespread species is indigenous in Fiji.

1. *Centipeda minima* (L.) A. Braun & Aschers. Ind. Sem. Hort. Berol. App. 6. 1867; Merr. in Trans. Amer. Philos. Soc. n. s. 24 (2): 392. 1935; Christophersen in Bishop Mus. Bull. 128: 211. 1935; A. C. Sm. in J. Arnold Arb. 33: 117. 1952; J. W. Parham, Pl. Fiji Isl. 232. 1964, ed. 2. 322. 1972; Backer & Bakh. f. Fl. Java 2: 422. 1965; Koster in Blumea 22: 215. 1975; Grierson in Rev. Handb. Fl. Ceylon 1: 235. 1980. FIGURE 36.

Artemisia minima L. Sp. Pl. 849. 1753.

Cotula minuta Forst. f. Fl. Ins. Austr. Prodr. 57. 1786.

Centipeda orbicularis Lour. Fl. Cochinch. 493. 1790.

Cotula minima Willd. Sp. Pl. 3: 2170. 1803.

Grangea minuta Poir. Encycl. Méth. Bot. Suppl. 2: 825. 1812.

Myriogyne minuta Less. in Linnaea 6: 219. 1831; DC. Prodr. 6: 139. 1838; Seem. Viti, 438. 1862, Fl. Vit. 144. 1866, op. cit. 430. 1873.

Myriogyne minima Less. ex Seem. in Bonplandia 9: 257. 1861.

Centipeda minuta Benth. ex C. B. Clarke, Compos. Ind. 151. 1876; Drake, Ill. Fl. Ins. Mar. Pac. 212. 1890; Reehinger in Denkschr. Akad. Wiss. Wien 85: 383. 1910.

An infrequent sprawling herb from near sea level to about 200 m. in moist, open, swampy places and on the edges of ponds in open, rolling country; stems much branched, slender, subprostrate, to 20 cm. long; leaves sessile, spathulate to pinnatilobate, 5–20 × 1–7 mm., arachnoid-pilose on both surfaces when young, glabrescent; flowering heads 2–5 mm. in diameter, the ray corollas white or green, 0.2–0.3 mm. long, the disk corollas yellow or violet-tinged, 0.5–0.7 mm. long. Flowering and fruiting material has been noted in July, November, and December.

TYPIFICATION AND NOMENCLATURE: Three basionyms are included in the above synonymy. The type of *Artemisia minima* is a collection by *Lagerström*, Herb. Linn. 988/48 (LINN HOLOTYPE) (Grierson, 1980), from China. For *Cotula minuta* no type material was found at BM, but an appropriate citation is: *J. R. & G. Forster* (κ LECTOTYPE), obtained in New Caledonia during Cook's second voyage. The type of *Centipeda orbicularis* is *Loureiro* (BM HOLOTYPE), "Habitat inculta in agris Cochinchinae."

DISTRIBUTION: Eastern Siberia, Afghanistan, Korea, Japan, China, India, Madagascar, and Mauritius into Malesia, Australia, New Zealand, and eastward in the Pacific to the Society Islands.

AVAILABLE COLLECTIONS: VITI LEVU: TAILEVU: Mbau Island, *Seemann* 265. VITI LEVU without further locality, *Graeffe* 1495. VANUA LEVU: MATHUATA: Seangangga Plateau, in drainage of Korovuli River, vicinity of Natua, *Smith* 6885. FIJI without further locality, *Harvey*, Nov. 1855.

Although this species is assigned a vast range, citations in various Floras seem to indicate that it is nowhere abundant. This is certainly the case in Fiji, possibly because a precise habitat of open, moist, sunny, clayey soil is uncommon.

42. *Erechtites* Raf. Fl. Ludov. 65. 1817; Belcher in Ann. Missouri Bot. Gard. 43: 10. 1956; Backer & Bakh. f. Fl. Java 2: 423. 1965; Koster in Blumea 26: 242. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 243. 1980; McVaugh, Fl. Novo-Galic. 12: 325. 1984.

Erect annual herbs with alternate, subentire to lyrate divided leaves; flowering heads usually numerous, heterogamous, disciform, in terminal or axillary corymbiform-paniculiform clusters, the phyllaries equal, in 1 initially connivent series forming an urceolate-campanulate involucre with much smaller calyculiform bracts at base, later separating and becoming strongly reflexed, the receptacle naked; peripheral flowers ♀, fertile, in 1 or several series, the corolla filiform-tubular, 4- or 5-lobed; disk (central) flowers numerous, ♂, fertile, the corolla tubular, 5-lobed, the anther bases obtuse, the style branches elongate, with short appendages of fused papillose hairs; achenes subcylindric to subfusiform, conspicuously callose-annulate at summit and slightly so at base, about 10-ribbed, the pappus copious, composed of very fine, soft hairs.

TYPE SPECIES: *Erechtites prealta* Raf. (= *E. hieracifolia* (L.) Raf. ex DC.).

DISTRIBUTION: North and South America and the West Indies, with five species, two of which have become adventive elsewhere; one species occurs in Fiji.

USEFUL TREATMENT OF GENUS: BELCHER, R. O. A revision of the genus *Erechtites* (Compositae), with inquiries into *Senecio* and *Arrhenechites*. Ann. Missouri Bot. Gard. 43: 1-85. 1956.

1. *Erechtites valerianifolia* (Wolf) DC. Prodr. 6: 295, as *E. valerianaefolia*. 1838; Greenwood in Proc. Linn. Soc. 154: 100. 1943; Backer & Bakh. f. Fl. Java 2: 424. 1965; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. 85: 35. 1972; Koster in Blumea 26: 242. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 243. 1980; McVaugh, Fl. Novo-Galic. 12: 327. 1984.

Senecio valerianaefolius Wolf, Ind. Sem. Hort. Berol. [p?]. 1825 (teste Reichenb. 1827); Link ex Spreng. Syst. Veg. 3: 565. 1826; Reichenb. Icon. Bot. Exot. 1: 59. t. 85. 1827.

Erechtites valerianaefolia DC.; Gibbs in J. Linn. Soc. Bot. 39: 155. 1909; Rechanger in Denkschr. Akad. Wiss. Wien 85: 383. 1910; Christophersen in Bishop Mus. Bull. 128: 211. 1935; Yuncker in op. cit. 184: 68. 1945; Belcher in Ann. Missouri Bot. Gard. 43: 25. 1956; Yuncker in Bishop Mus. Bull. 220: 269. 1959; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972.

Coarse, succulent herb 0.6-2 m. high, with milky latex, found from near sea level to the highest elevation in Fiji (1,323 m.) as an often locally frequent naturalized weed in clearings, dense forest often along streams, and thickets on crests and ridges, and along roadsides; corollas white, faintly blue-tinged at apex, or mauve or pale violet; stigmas usually blue; pappus pink to pale purple distally, fading to white. Flowers and fruits occur throughout the year.

TIPIFICATION AND NOMENCLATURE: AS NEOTYPE Belcher (1956, p. 26) indicates "Senecio valerianaefolius ex h. Raffeliano, 1825" (w, "collectio Reichenbach fil., aqu. 1889, no. 16256"). This specimen, presumably from the American tropics, is said to be in very excellent detailed agreement with Reichenbach's (1827) description and appears to be the original from which his t. 85 was prepared. In view of the probable destruction of any type material that may have been at v, Belcher's choice of a neotype appears sound.

There seem to be questions as to the actual authorship of the binomial *Senecio valerianaefolius*, generally accredited to "Wolf, Ind. Sem. Hort. Berol. 1825." Belcher (1956) was unable to locate a copy of the 1825 seed list (at κ this series is available only back to 1852); it is not even known whether the name was validly published in 1825. N. M. von Wolf (1724-1784) could not have proposed the name himself in 1825. It seems possible that J. H. F. Link (1767-1851) was responsible for the 1825 mention of the

binomial and attributed it to Wolf. If the 1825 use of the binomial proves to have been invalid (lacking a description), the first publication would presumably be that of Link ex Spreng. (1826) in a "brief but sufficient paragraph" to validate the name (Belcher, 1956, p. 28). Attribution of the binomial (and hence the parenthetical authorship in *Erechtites*) to Wolf (1825) by de Candolle (1838) seems to have been followed by subsequent botanists. We have here accepted that authorship with the caveat that it may be replaced by "Link ex Spreng." in a final solution.

DISTRIBUTION: Widespread in Central and South America and the West Indies. Belcher (1956) recognizes four forms; one of these, f. *valerianifolia*, is adventive as an aggressive weed in tropical Asia, Malesia, Australia, and the Pacific; it is the form of the species occurring in Fiji. A second form is mentioned as sporadically adventive in parts of the Old World but has not been noted in Fiji.

LOCAL NAMES: *Thovuka*, *Ceylon thistle*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lautoka, *Greenwood 180A*; mountains inland from Lautoka, *Greenwood 180*; summit of Mt. Koroyanitu, high point of Mt. Evans Range, *Smith 4194*; Nandarivatu, *Gibbs 811*; summit of Mt. Tomanivi, *DA 7097*. SERUA: Summit of Mt. Tuvutau, *DA 14620*; Navua, *DA 3817*. NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8670*. RA: Mountains inland from Penang, *Greenwood 180B*. NAITASIRI: Sawani-Serea road, *DA 11502*; Agricultural School, Navuso, *DA 11047*; Nanduruloulou, *DA 11744*; Tholo-i-suva, *DA 10980*; Nasinu, *Gillespie 3542*. TALEVU: Naivithula, *Valentine 23*; Vuthi road, Raralevu, *DA 10609*. OVALAU: Levuka, *DA 1357*. VANUA LEVU: MATHUATA: Ndaku road, *DA 8798*; Mt. Ndelaikoro, *DA 11487*. THAKAUNDOVE: Hills south of Nakula Valley, near Savusavu, *Smith 333*. FIJI without further locality, in gardens, *Yeoward 93*.

The earliest available Fijian collection of this weed seems to be *Yeoward 93*, collected in October, 1894. Greenwood (1943) had suggested that it may have arrived in Fiji about 1895, but perhaps it was established a few years earlier than that.

43. CRASSOCEPHALUM Moench, Meth. Pl. 516. 1794; Belcher in Kew Bull. 1955: 461. 1955; Backer & Bakh. f. Fl. Java 2: 425. 1965; Koster in Blumea 26: 236. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 33. 1980; Grierson in Rev. Handb. Fl. Ceylon 1: 247. 1980.

Erect annual herbs with alternate, toothed to lyrate-pinnatifid leaves; flowering heads medium-sized, homogamous, discoid, several-numerous in loose corymbiform clusters or solitary, nodding at anthesis, becoming erect, the phyllaries equal, in 1 or 2 initially cohering series forming a cylindrical involucre with much smaller calyculiform bracts at base, later separating and becoming reflexed, the receptacle naked; flowers all alike, ♂, fertile, the corolla tubular, 5-lobed, the anther bases minutely sagittate, the style branches filiform with long subulate appendages of fused papillose hairs; achenes cylindrical, more or less terete, 8-10-ribbed, with a pale ring at base and apex, the pappus capillaceous, long and silky, caducous.

TYPE SPECIES: *Crassocephalum cernuum* (L. f.) Moench (*Senecio cernuus* L. f.), nom. illeg. (*Senecio rubens* B. Juss. ex Jacq.) = *C. rubens* (B. Juss. ex Jacq.) S. Moore. *Crassocephalum* (1794) is a nomen rejiciendum vs. *Gynura* Cass. (1825); however, that fact does not prevent the use of *Crassocephalum* as a genus distinct from *Gynura*, since it is not a nomenclatural synonym but is based on a different type species. Practically all synantherologists consider the two genera quite different, a viewpoint enhanced by the discussions of Moore (1912) and Belcher (1955).

DISTRIBUTION: Tropical Africa and Madagascar, with about 20 species, one of which has become an aggressive weed in other tropical areas.

USEFUL TREATMENTS OF GENUS: MOORE, S. LE M. The genus *Crassocephalum* Moench. J. Bot. **50**: 209-213. 1912. BELCHER, R. O. The typification of *Crassocephalum* Moench and *Gynura* Cass. Kew Bull. **1955**: 455-465. 1955.

1. *Crassocephalum crepidioides* (Benth.) S. Moore in J. Bot. **50**: 211. 1912; Belcher in Kew Bull. **1955**: 462. 1955; Backer & Bakh. f. Fl. Java **2**: 426. 1965; A. C. Sm. in Contr. U. S. Nat. Herb. **37**: 104. 1967; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 64. 1970; St. John & A. C. Sm. in Pacific Sci. **25**: 343. 1971; J. W. Parham, Pl. Fiji Isl. ed. 2. 323. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 35. 1972; Koster in Blumea **26**: 237. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 33. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 248. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. 35. 1985.

Gynura crepidioides Benth. in Hook. Niger Fl. 438. 1849.

Coarse or succulent herb 0.2-1.2 m. high, naturalized and often locally abundant from near sea level to about 850 m. along streams and on open gravel banks and rocky shores of rivers, on roadsides, and in pastures and cultivated areas; corollas and styles dull yellow, distally tinged with bright or reddish orange; pappus white. Flowering and fruiting do not appear seasonal.

TYPIFICATION: Bentham cited two specimens: *G. Don, Jr.*, from Sierra Leone, and *Heudelot*, from Senegal. Grierson (1980) noted as the type *G. Don, Jr.* (BM LECTOTYPE), from Sierra Leone.

DISTRIBUTION: Indigenous in tropical Africa, now a weed throughout paleotropical regions. The earliest Fijian collection we have noted is *DA 6094*, collected in February, 1950; since that date (or slightly earlier) the species has increasingly spread and may now be anticipated on most of the larger Fijian islands. About 25 Fijian collections are at hand.

LOCAL NAME: No common name has been noted in Fiji, but in Queensland, where the species has become an increasingly abundant weed since about 1950, the name *thickhead* is commonly used (R. J. F. Henderson in Proc. Roy. Soc. Queensland **84** (4): 55-60. 1973).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Inland from Lautoka, *DA 10365*; Tonge area, south of Mba, *DA 10427*; Nandarivatu, *DA 10415*. NAMOSE: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8669*; hills east of Wainikoroiluva River, near Namuamua, *Smith 9069*. RA: Demonstration Farm, Ndombuilevu, *DA 11003*. NAITASIRI: Mendrausuthu Range, *DA 15468*; Sawani-Sereca road, *DA 11504*; Agricultural School, Navuso, *DA 11048*; Nasinu, *DA 11080*; Tamavua, *DA 7424*. TAILIEVU: Wailotua Cave, near Wainimbuka River, *DA 9415*; Londoni, *DA 9968*; Nambua (Namara), *DA 10067*; on an Indian *ndalo* plantation, *DA 6094*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7393*. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA 11489*. THAKAUNDRIVE: Along trail from Nikawa Bay to Valethi, *Bierhorst s. n.*

44. *EMILIA* Cass. in Bull. Sci. Soc. Philom. Paris **1817**: 68. 1817; Backer & Bakh. f. Fl. Java **2**: 427. 1965; Fosberg in Ceylon J. Sci., Biol. Sci. **10**: 61. 1972; Koster in Blumea **26**: 237. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 38. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 249. 1980.

Annual or perennial erect herbs with alternate, frequently clasping, dentate or entire to lyrate pinnatifid leaves, the herbage often glaucous; flowering heads 1-several, homogamous, discoid, usually in loose corymbiform or subumbelliform terminal clusters, the phyllaries few, usually 6-13, equal, connivent in 1 series forming an ecalyculate, cylindrical to campanulate involucre, separating and reflexed in age, the receptacle naked; flowers all alike, ♂, usually only the outer ones fertile, the corolla

tubular, with 5 spreading lobes, the anther bases entire, the style branches filiform, short, obtuse or acute, penicillate, triangular at apex; achenes prismatic, usually 5-ribbed, truncate, the pappus of numerous thin, soft, white-silky, scabridulous, caducous hairs.

TYPE SPECIES: *Emilia flammea* Cass. (in F. Cuvier, Dict. Sci. Nat. 14: 404. 1819, nom. illeg.) (*Cacalia sagittata* Willd., 1803, nom. illeg., non Vahl, 1794, nom. illeg.) = *E. coccinea* (Sims) G. Don (*Cacalia coccinea* Sims).

DISTRIBUTION: Paleotropical, with about 45 species, three of which have become naturalized in America. The indigenous eastern limits of the genus are difficult to assess, but it is unlikely that any taxa are indigenous in the Pacific east of Malesia. Two species are known to occur in Fiji, one of them with two varieties.

USEFUL TREATMENTS OF GENUS: GARABEDIAN, S. A revision of *Emilia*. Kew Bull. 1924: 137-144. 1924. NICOLSON, D. H. Summary of cytological information on *Emilia* and the taxonomy of four Pacific taxa of *Emilia* (Asteraceae: Senecioneae). Syst. Bot. 5: 391-407. 1980.

KEY TO SPECIES

Lower leaves spatulate, sometimes petiolate, strongly dentate; involucre broadly cylindrical (twice as long as broad), about 3/4 the corolla length, the phyllaries 10-13; flowers about 50 per head, the corolla brick-red or rich pink to reddish purple, the lobes 1.1-1.5 mm. long. 1. *E. fosbergii*
Lower leaves lyrate; involucre narrowly cylindrical (2-3-times as long as broad), equalling the corolla length, the phyllaries 6-10; flowers 15-35 per head, the corolla pale purple to magenta or violet.

2. *E. sonchifolia*

1. *Emilia fosbergii* Nicolson in Phytologia 32: 34. 1975, in Syst. Bot. 5: 395. fig. 2. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. 46: 38. 1980.

Herb to 1 m. high, rare in Fiji from near sea level to 600 m. on reed-covered hillsides or on edges of lowland forest; leaves variable, dentate, sometimes petiolate; peduncles 15-30 cm. long; flowering heads broadly cylindrical, 10-15 × 6-10 mm., the flowers about 50 per head, obviously exceeding phyllaries in length; corollas and styles brick-red or rich pink to reddish purple, the lobes 1.1-1.5 mm. long. Flowers were obtained in May and July.

TIPIFICATION: The type is *A. H. Curtiss 6* (US 428506 HOLOTYPE; ISOTYPES at F, GH, MO, NY, US), collected Dec. 26, 1902, near Nassau, New Providence, Bahamas.

DISTRIBUTION: Probably indigenous in central or eastern Africa but widely established in the New World in the latter part of the nineteenth century centering in the U. S. and the West Indies, and subsequently from Mexico to northern South America. It was apparently introduced into Pacific areas in the early part of the present century (cf. Nicolson, 1980, fig. 5). *Emilia fosbergii* is consistently tetraploid (cf. Nicolson, 1980, p. 402 seq. for discussion of its possible derivation).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nalotawa, eastern base of Mt. Evans Range, Smith 4334. MATUKU: Bryan 253A.

2. *Emilia sonchifolia* (L.) DC. in Wight, Contr. Bot. India, 24. 1834, Prodr. 6: 302. 1838; Reehinger in Denkschr. Akad. Wiss. Wien 85: 383. 1910; Turrill in J. Linn. Soc. Bot. 43: 29. 1915; Christophersen in Bishop Mus. Bull. 128: 212. 1935; Yuncker in op. cit. 178: 119. 1943; Greenwood in Proc. Linn. Soc. 154: 100. 1943; Yuncker in Bishop Mus. Bull. 184: 68. 1945; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 102. 1948, in Dept. Agr. Fiji Bull. 35: 107. 1959; Yuncker in Bishop Mus. Bull. 220: 269. 1959; J. W. Parham, Pl. Fiji Isl. 234. 1964, ed. 2. 324. 1972; Backer & Bakh. f. Fl. Java 2: 428. 1965; Sykes in New Zealand Dept. Sci. Indust. Res.

Bull. **200**: 65. 1970; Fosberg in Ceylon J. Sci., Biol. Sci. **10**: 65. 1972; B. E. V. Parham in New Zealand Dept. Sci. Indust. Res. Inform. Ser. **85**: 36, 81. 1972; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 39. 1980; Koster in Blumea **26**: 238. 1980; Nicolson in Syst. Bot. **5**: 398. 1980; Grierson in Rev. Handb. Fl. Ceylon **1**: 251. 1980; MacKee, Pl. Intro. Cult. Nouv.-Caléd. **36**. 1985.

Cacalia sonchifolia L. Sp. Pl. 835. 1753.

Suberect or spreading, coarse herb to 1 m. high, naturalized from near sea level to about 900 m. as a weed in cultivated areas and villages, along roadsides, on open hillsides among reeds and on edges of open ponds, and sometimes in forested areas; leaves variable, the lower ones lyrate; peduncles 15–30 cm. long; flowering heads narrowly cylindrical, 2–3-times as long as broad, 10–13 × 3–8 mm., the phyllaries 6–10, the flowers 15–35 per head, about equalling the phyllaries in length; corollas and styles magenta to purple or violet, but not brick-red or with a reddish tinge, the lobes 0.5–1.5 mm. long. Flowers and fruits are found throughout the year.

Although both well-known varieties of the species occur in Fiji, var. *sonchifolia* is by far the more common; they are readily distinguished as noted in the following key.

KEY TO VARIETIES

Heads narrowly cylindrical, about 3-times as long as broad, 10–12 × 3–4 mm., the phyllaries 6–10, the flowers 15–30 per head, the corolla lobes 0.5–0.7 mm. long. 2a. var. *sonchifolia*
 Heads broadly cylindrical, about twice as long as broad, 10–13 × 6–8 mm., the phyllaries 8–10, the flowers 25–35 per head, the corolla lobes 1–1.5 mm. long. 2b. var. *javanica*

2a. *Emilia sonchifolia* var. *sonchifolia*; Koster in Blumea **26**: 239. 1980; Nicolson in Syst. Bot. **5**: 398. fig. 3. 1980; Fosberg & Sachet in Smithsonian Contr. Bot. **46**: 39. 1980.

TYPIFICATION: Of the several elements listed by Linnaeus as representing *Cacalia sonchifolia*, Nicolson (1980) has indicated "*Anonymous s. n.* (HOLOTYPE? LINN Savage Cat. 976.10, microfiche!)." However, Grierson (1980) chose as type a specimen in Herb. Hermann (BM LECTOTYPE). The latter would appear the better choice, since the original reference to "Fl. zeyl. 305" is marked with an asterisk.

DISTRIBUTION: Now pantropical, but probably originating in southern Asia, first noted from Ceylon in the early 1700's. In the Neotropics it was collected before 1850 in Trinidad, Surinam, and Dominica, presumably introduced. The earliest available Fijian collection of this adventive appears to be *im Thurn 130* (BM, K), collected at Nandarivatu, Viti Levu, Nov. 21, 1906. *Vaupel 511* was collected in Samoa the same year (Nicolson, 1980), suggesting that the species arrived in the Fijian Region about the beginning of the century. We have referred about 25 Fijian collections to this variety, but not all of them have been reexamined in connection with the present study; therefore there is a possibility that some are referable to var. *javanica* or even to *Emilia fosbergii*.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Yalombi, *St. John 18173*. VITI LEVU: Mba: Lautoka, *Greenwood 167*; Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, *Smith 4311*; Tonge area, south of Mba, *DA 10424*; Nandarivatu, *im Thurn 130*, *Parks 20622*. NANDRONGA & NAVOSA: Singatoka Experimental Farm, *DA 5996*. NAMOSI: Below Mt. Voma, *DA 1891*. RA: Penang, *Greenwood 167A*. NAITASIRE: Principal Agricultural Station, Koronivia, *DA 11914*; Nasinu, *DA 11079*. TAILEVU: Ndakuivuna, *Smith 7089*; Mbau road, near Kuku, *DA 10624*. OVALAU: Wainiloka, *DA 1300*. VANUA LEVU: MATHUATA: Seangganga Plateau, in drainage of Korovuli River, vicinity of Natua, *Smith 6883*.

- 2b. *Emilia sonchifolia* var. *javanica* (Burm. f.) Mattf. in Bot. Jahrb. **62**: 445. 1929; Koster in Blumea **26**: 239. 1980; Nicolson in Syst. Bot. **5**: 399. fig. 4. 1980; Fosberg & Sacht in Smithsonian Contr. Bot. **46**: 40. 1980.

Hieracium javanicum Burm. f. Fl. Ind. 174. t. 57, fig. 1. 1768.

Emilia javanica C. B. Robinson in Philipp. J. Sci. Bot. **3**: 217. 1907; Backer & Bakh. f. Fl. Java **2**: 428. 1965.

TYPIFICATION: *Hieracium javanicum* is based on *Laurent Garcin s. n.* (G HOLOTYPE), from Java.

DISTRIBUTION: Presumably indigenous in eastern Asia and Malesia, spreading eastward as far as the Tuamotus, Marquesas, and Hawaii. Probably it reached the Fijian Region early in the present century; the earliest available Fijian collections are those of Parks and Gillespie, obtained in the 1920's.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Namulomulo road, Nandi, DA 10291; Mt. Evans Range, northern portion between Mt. Vatuyanitu and Mt. Natondra, Smith 4335; Nandarivatu, Parks 20621. NANDRONGA & NAVOSA: Singatoka Experimental Farm, DA 5994. NAITASIRI: Plant Introduction and Quarantine Station, Nanduruloulou, DA 9815. VANUA LEVU: MATHUATA: Nakama, Lambasa, DA 5694. THAKAUNDRIVE: Thavanandi, DA 10775. FIJI without further locality, Gillespie 3897.

Emilia sonchifolia var. *javanica*, like *E. fosbergii*, is tetraploid, while var. *sonchifolia* is diploid (assuming that 5 is the basic chromosome number) (Nicolson, 1980). A striking but teratological form of *E. sonchifolia* var. *javanica* occurs sporadically across the Pacific, being well represented in the Fijian Region. In fact, all the specimens cited above as var. *javanica*, with the single exception of Gillespie 3897, represent the teratological form, in which the leaves are much reduced, the heads much expanded, with spreading bracts, the flowers frequently unopened (but when open with large lobes characteristic of the variety), and the pollen and pappus are seriously aborted. This teratological form was described as *Senecio rapae* by F. Brown in Bishop Mus. Bull. **130**: 361. 1931 (for discussion cf. Nicolson, 1980, p. 401).

CLASS MONOCOTYLEDONES (LILIATAE) (continued)

SUBCLASS LILIIDAE (continued)

ORDER ORCHIDALES

BY PAUL J. KORES

(Tulane University)

In most current angiosperm classifications the order Orchidales comprises one lineage, the orchids, represented either by a single family (Melchior, 1964; Hutchinson, 1973; Takhtajan, 1980, 1987)¹ with a number of well-defined subfamilies or by a small group of separate families (Vermeulen, 1966; Dahlgren, 1980; Dahlgren & Clifford, 1982) which collectively have the same circumscription. A similar view is held by Thorne (1976), but the orchids are assigned only subordinal rank within his broadly circumscribed order Liliales. Cronquist (1968, 1981) has a slightly more expansive interpretation of the order, placing the families Geosiridaceae, Burmanniaceae, and Corsiaceae, as well as the Orchidaceae, within the Orchidales. But Cronquist's broad order has not been generally accepted. The Geosiridaceae are more frequently allied with the Iridaceae (Thorne, 1976; Takhtajan, 1980, 1987; Dahlgren, 1980; Dahlgren & Clifford, 1982), while Burmanniaceae and Corsiaceae are either included in the same suborder as Geosiridaceae (Thorne, 1976) or they are placed in a separate order, Burmanniales (Hutchinson, 1973; Takhtajan, 1980, 1987; Dahlgren, 1980; Dahlgren & Clifford, 1982). Reasons for recognizing the Burmanniales as a distinct order are summarized by Dahlgren & Clifford (1982); as their arguments appear to have considerable merit, the order Orchidales is interpreted in the present treatment in the more restrictive sense and includes only the family Orchidaceae *sensu lato*.

Below the ordinal level there is widespread agreement that the orchids can be subdivided into a number of distinct groups, but there is little agreement as to how many subgroups should be recognized or to what rank such taxa should be assigned. Thus Vermeulen (1966), Dahlgren (1980), and Dahlgren & Clifford (1982) divide the orchids into three families, Apostasiaceae, Cypripediaceae, and Orchidaceae *sensu str.*, while Cronquist (1981) recognizes these same three taxa at subfamilial rank. Garay (1960, 1972) apportions the genera within the family among five subfamilies, Apostasioideae, Cypripedioideae, Orchidoideae, Neottioideae, and Epidendroideae. Dressler (1981) recognizes six subfamilies (some of which have the same circumscription as Garay's), while Burns-Balogh & Funk (1986) advocate as many as seven subfamilies in a recent cladistic treatment of the family. Since the number and circumscription of the subfamilies within the Orchidaceae still remain a matter of opinion, and since Garay's infrafamilial classification is now familiar to most orchid systematists, the five subfamilies he proposed are utilized for present purposes. It may be noted, however, that only the three most advanced of these subfamilies, Orchidoideae, Neottioideae, and Epidendroideae, are represented in the Fijian Region.

USEFUL TREATMENTS OF ORDER: VERMEULEN, P. The system of the Orchidales. *Acta Bot. Neerl.* 15: 224-253. 1966. DAHLGREN, R. M. T., & H. T. CLIFFORD. The Monocotyledons: a Comparative Study, 1-378. 1982. Both of these treatments provide useful information on the delimitation of the order and discuss its possible affinities to other orders within the subclass Liliidae.

¹References indicated by parenthetical dates in the present discussions of the order Orchidales and the family Orchidaceae have been listed either following the Introduction to Volume 1 of *Flora Vitiensis Nova* (pp. 84-88. 1979), or following the Introductions of subsequent volumes of the work, or (if dealing more narrowly with orchids or monocotyledons) in the treatments of the order and family herewith presented.

FAMILY 32. ORCHIDACEAE

BY PAUL J. KORES

(Tulane University)

ORCHIDACEAE Juss. Gen. Pl. 64, as *Orchideae*. 1789.

Strongly mycotrophic, terrestrial or epiphytic, autotrophic or occasionally saprophytic, perennial herbs, sometimes climbing or scandent, very rarely monoecious or dioecious, rhizomatous or not; roots adventitious, fasciculate or scattered, fibrous or fleshy, often covered by a well-developed, spongy, water-absorbing layer of dead cells derived from the epidermis (velamen); stems commonly elongate or sometimes reduced, articulate, usually terete or laterally compressed, occasionally angular, often modified into water storage organs (pseudobulbs) or rarely cormlike or tuberous, either with determinate apical growth (sympodial) or with indeterminate apical growth (monopodial); leaves 1-many, radical or cauline, alternate, opposite, or whorled, sometimes greatly reduced, rarely entirely absent (sometimes absent at time of flowering), simple, entire or infrequently palmately lobed, convolute or conduplicate in aestivation; inflorescences terminal, axillary, or lateral, spicate, racemose, paniculate, or subumbellate, less commonly fasciculate or 1-flowered; flowers gynandrous, ♂ or rarely unisexual, almost always strongly zygomorphic, epigynous, the perianth segments typically 6 in 2 series, the series free or connate with or adnate to each other, the segments all petaloid or the outer ones somewhat sepaloid; petals 3, dissimilar, the medial petal (labellum) commonly much larger than the lateral petals, usually strongly differing from them in form and color, often spurred or provided with nectaries; gynandrium (column) erect or arcuate, fleshy, cylindrical or semiterete, often with a basal outgrowth (foot); anther 1 (seldom 2, very rarely 3)¹, terminal or subterminal, dithecal, the two thecae sometimes widely separated, dehiscing by longitudinal slits; pollen frequently cohering in 2-8 distinct masses (pollinia) (rarely granular), the masses entire or sometimes subdivided into smaller massulae, mealy to hard and waxy in texture, either unappendaged or provided at one end with a slender extension (caudicle) or attached to a nonviscid band of tissue (stipe) derived from the column which terminates in a sticky, glandlike structure (viscidium); stigmas 3, but only 2 fertile, subterminal or rarely basal, often confluent, the third stigma (rostellum) often enlarged, sterile, separating the anther from the fertile stigmas; ovary inferior, usually pedicellate, unilocular (in our genera), with expanded, parietal placentation; fruit a dry capsule, dehiscing through 1-6 longitudinal sutures, rarely indehiscent and fleshy, the seeds extremely numerous, dustlike, essentially without endosperm, the embryo hardly or not differentiated.

DISTRIBUTION: Pantropical and subtropical but also extensively extratropical, with approximately 1,000 genera and 15,000-20,000 species. The family is represented in Fiji by 63 genera, 59 of which have indigenous species; 171 species are recorded as occurring in Fiji, 164 of which are indigenous (51 of these being endemic) (Kores, 1989, emend.). No doubt additional genera and many species are present in Fiji only in cultivation (and are not known to have become naturalized). A few species, however, have become naturalized and one species is apparently adventive; these are included in the present treatment.

USEFUL TREATMENTS OF FAMILY: The literature on Orchidaceae is so extensive that an enumeration of all the significant publications would be impractical in the present treatment. Only a few of the most essential works on the subject of classification at the infrafamilial level and some modern floristic works which have a bearing on Fiji are listed here. Other references of more limited scope are noted under the generic treatments.

PFITZER, E. H. H. Orchidaceae. In: Engler, H. G. A., & K. A. E. Prantl, Nat. Pflanzenfam. II. 6: 53-220. 1888-1889. SCHLECHTER, R. Die Orchidaceen von Deutsch-Neu-Guinea. Repert. Sp. Nov. Beih. 1: 1-1079. 1911-1914 (the figures which illustrate this work appeared in op. cit. 21: t. 1-372. 1923-1928). SCHLECHTER,

¹Multiple anthers are not normally found in any of the genera which occur in the Fijian Region.

R. Das System der Orchidaceen. Notizbl. Bot. Gart. Berlin 9: 563-591. 1926. WILLIAMS, L. O. Orchid studies, IV. The orchids of the Fijian Islands. Bot. Mus. Leaflet 5: 105-144. 1938. PARHAM, B. E. V. A note on Fijian orchids. Trans. & Proc. Fiji Soc. 2: 21-35. 1953. GARAY, L. A. On the origin of the Orchidaceae. Bot. Mus. Leaflet 19: 57-96. 1960. GARAY, L. A. On the origin of the Orchidaceae. II. J. Arnold Arb. 53: 202-215. 1972. GARAY, L. A. On the systematics of the monopodial orchids I. Bot. Mus. Leaflet 23: 149-212. 1972. HALLÉ, N. Orchidacées. In: Aubréville, A., & J.-F. Leroy (eds.). Fl. Nouv.-Caléd. et Dépend. 8: 1-565. 1977. DRESSLER, R. L. The Orchids: Natural History and Classification, 1-332. 1981. BURNS-BALOGH, P., & V. A. FUNK. A phylogenetic analysis of the Orchidaceae. Smithsonian Contr. Bot. 61: 1-79. 1986. KORES, P. J. A precursory study of Fijian orchids. Allertonia 5: 1-222. (Aug.) 1989. LEWIS, B., & P. CRIBB. Orchids of Vanuatu, 1-171. (Oct.) 1989.

The Orchidaceae are one of the largest families of angiosperms (the Asteraceae being the only other family of comparable size), and their members are frequently a minor component of most tropical vegetation worldwide. The family is well circumscribed, although some authors recognize a number of segregate families (e. g. Apostasiaceae and Cyripedioaceae); these are not widely accepted at family rank, nor are they represented in Fiji. Numerous tribes (and subtribes) have been recognized within the family, but the arrangement of these tribes into subfamilies is far from settled. The traditional classifications of Pfitzer (1888-1889) and Schlechter (1926) divide the family into two groups, one having a single fertile anther, the other with two or three fertile anthers. However, this classification ignores the important differences which exist among the representatives of the Monandrae and is no longer adequate. A more natural classification, proposed by Garay (1960, 1972), takes into account anther number, but it also considers the structure of the pollinarium within the segment of the family having only a single anther. In Garay's classification the extent to which the anther is fused with the column and the consistency of the pollinia are considered important in the delimitation of subfamilies. Garay recognized five subfamilies within the Orchidaceae, but only the three most advanced of these occur in Fiji.

Among the authors cited above there is widespread agreement that the most primitive living orchids are found within the Apostasioideae and Cyripedioideae, but the phylogenetic relationships of the other three subfamilies are far from certain. Dressler (1981) maintains that certain elements within Garay's Neottioideae represent the basal lineage within the monandrous orchids, while Garay (1960) attributes this distinction to members of the Orchidoideae. Both authors agree that the terminal lineages within Epidendroideae are more highly evolved than those of the other two subfamilies, but the origins of this subfamily still remain uncertain. In the present treatment the subfamilies are treated in the sequence advocated by Garay; the generic sequence is the one utilized in the precursory treatment of the family for Fiji (Kores, 1989) and is adapted from Schlechter (1926).

Other than the flavoring vanilla, which is derived from the partially fermented fruits of some species of the genus *Vanilla*, the Orchidaceae include no major commercial products. Many species are grown as ornamentals and some are utilized as a source of cut flowers for the florist trade. In Fiji some of the indigenous species are occasionally cultivated in gardens as ornamentals, but otherwise the family appears to have few local uses.

After the present treatment was essentially completed, I had an opportunity to visit Fiji in May, 1989, for a brief period of 13 days as part of a larger research trip to New Zealand and Australia with a colleague, Mia Molvray. While in Fiji we spent five days collecting and photographing orchids at various localities on Viti Levu. Areas visited included coastal areas in the vicinity of Suva and near the campus of the University of

the South Pacific, Mt. Korombamba, Tholo-i-suva, along King's Road, the vicinity of Nandarivatu, and the western slopes of Mt. Tomanivi. Although our stay in Fiji was brief, we collected and photographed 32 species of orchids in flower or fruit and observed several additional species in a vegetative state. A previously undescribed species of *Bulbophyllum* was found, in addition to two species of *Dendrobium* (coll. R. H. Phillips or noted in the herbarium at SUVA) not previously recorded from Fiji. These three species are discussed in a supplement to the present treatment rather than being inserted and keyed at appropriate places, but they are reflected in the emended figures noted in the above discussion of the distribution of the family. The *Kores & Molvray* specimen are mostly unicates and are deposited at SUVA; spirit collections representing many of the numbers will be deposited at K. For their assistance during our brief visit I here express my appreciation to faculty and staff members of the University of the South Pacific, to the Department of Forestry, and to Richard H. Phillips.

The study of the orchids of Vanuatu by Lewis and Cribb (1989) has also come to hand since publication of my precursory study (Kores, 1989) of Fijian orchids. Pertinent bibliographic references to *Orchids of Vanuatu* are given in the present treatment of Fijian orchids. A few changes in the scientific names utilized in my 1989 treatment have been made in the present revision, some of them suggested by the Vanuatu treatment of Lewis and Cribb.

KEY TO SUBFAMILIES OCCURRING IN FIJI

- Anther firmly adnate to column, not deciduous or withering, the thecae often widely spaced, parallel or converging; pollinia in soft massulae, with caudicles, the caudicles directed toward base of anther. 1. ORCHIDOIDEAE
- Anther movably attached to column through a connective, commonly deciduous or persistent and soon withering, the thecae usually closely approximate, parallel; pollinia unappendaged or appendaged, the appendages (if present) directed toward apex of anther.
- Pollinia granular, sectile or occasionally mealy, 2; anther commonly persistent and soon withering; plants often facultative geophytes. 2. NEOTTIOIDEAE
- Pollinia waxy or cartilaginous (or rarely mealy but then always more than 2), 2, 4, 6, or 8; anther commonly deciduous; plants often facultative epiphytes. 3. EPIDENDROIDEAE

KEYS TO GENERA

SUBFAMILY 1. ORCHIDOIDEAE

- Stigmata extended with clavate or papillose processes, not adnate to base of labellum; spur longer than ovary.
- Petals deeply 2-lobed; rostellum small, not extended in front of column. 1. *Habenaria*
- Petals entire; rostellum large, extending in front of column. 2. *Cynorkis*
- Stigmata sessile, partially adnate to base of labellum; spur less than half as long as ovary. 3. *Peristylus*

SUBFAMILY 2. NEOTTIOIDEAE

- Plants leafless or appearing so during flowering.
- Stems climbing, rooting at nodes; inflorescences much branched; seeds winged. 6. *Pseudovanilla*
- Stems not climbing; inflorescence unbranched; seeds not winged.
- Plants saprophytic, the inflorescences white to light brown.
- Dorsal sepal not adnate to petals; labellum spurred. 8. *Epipogium*
- Dorsal sepal and petals adnate to one another forming a single trifid segment; labellum not spurred. 9. *Didymoplexis*
- Plants autotrophic, the inflorescences pale to dark green. 7. *Nervilia*
- Plants with leaves which are usually present during flowering.
- Inflorescence arising from an underground tuber or a condensed, leafless stem; leaves radical; petioles without sheathing bases.
- Plants without underground tubers; flowers not resupinate. 4. *Cryptostylis*
- Plants with annual underground tubers; flowers resupinate. 7. *Nervilia*
- Inflorescence arising from an elongated, aerial stem; leaves cauline; petioles, when present, usually with sheathing bases.

Plants long, climbing vines.

Inflorescence short, unbranched; capsules indehiscent; seeds not winged. 5. *Vanilla*

Inflorescence elongated, branched; capsules dehiscent; seeds winged. 6. *Pseudovanilla*

Plants herbaceous, not climbing.

Stems soft, fleshy, rhizomatous, decumbent; roots scattered along nodes; leaves not plicate.

Stigma 1.

Base of labellum not spurred, sometimes slightly saccate.

Labellum with numerous hairlike appendages inside, the apex usually not widened into a blade. 10. *Goodyera*

Labellum with 2 sessile glands inside, the apex abruptly widened into a blade.

11. *Pristiglottis*

Base of labellum with a prominent spur which projects between lateral sepals. 12. *Erythrodes*

Stigmata 2, separate.

Flowers resupinate.

Base of labellum not spurred, completely concealed by lateral sepals, the apex abruptly widened into a blade. 13. *Zeuxine*

Base of labellum with a prominent spur which projects between lateral sepals, the apex not widened into a blade.

Inflorescences few-flowered, lax; spur with 2 sessile wartlike glands inside.

14. *Anoectochilus*

Inflorescences usually with numerous, small flowers congested near apex of rachis; spur with 2 stalked glands inside. 15. *Vrydagzynea*

Flowers not resupinate. 16. *Hetaeria*

Stems hard, wiry; roots fasciculate; leaves plicate.

Inflorescence terminal; flowers not resupinate; labellum with a saccate base; column short.

17. *Tropidia*

Inflorescences axillary; flowers resupinate; labellum without a saccate base; column long.

18. *Corymborkis*

SUBFAMILY 3. EPIDENDROIDEAE

Plants leafless or appearing so during flowering, or with rudimentary scalelike leaves.

Column foot present; labellum articulate with column foot, mobile. 51. *Chiloschista*

Column foot absent; labellum adnate to column, immobile.

Rachis with stipulelike appendages on either side of floral bracts; pollinia 2. 62. *Microtorchis*

Rachis without stipulelike appendages; pollinia 4. 63. *Taeniophyllum*

Plants with leaves which are usually present during flowering, not squamate.

Leaves convolutive in bud, the margins overlapping one another.

Inflorescences terminal on a leafy stem or at apex of a rudimentary, leafless shoot.

Labellum not embracing column; inflorescence at apex of a rudimentary, leafless shoot; pollinia 2. 22. *Chrysoglossum*

Labellum embracing column; inflorescence terminal on a leafy stem; pollinia 4 or 8.

Stems pseudobulbous; leaves not grasslike; pollinia 4, waxy. 23. *Coelogyne*

Stems not pseudobulbous; leaves grasslike; pollinia 8, somewhat mealy. 24. *Arundina*

Inflorescences axillary or lateral.

Plants scandent or climbing, the stems slender, elongated; leaves sessile; pollinia 4. 25. *Pseudertia*

Plants erect, the stems pseudobulbous, cormlike or less commonly terete; leaves rather prominently petiolate; pollinia 2 or 8.

Pollinia 8.

Sepals free; column foot absent or hardly developed and very short.

Column face partially or completely adnate to labellum; labellum frequently spurred.

Labellum adnate to face of column over whole length of column, the distal portion not embracing column. 39. *Calanthe*

Labellum adnate to face of column for only a short distance above base of column, the distal portion embracing column. 40. *Phaius*

Column face not adnate to labellum; labellum not spurred. 41. *Spathoglottis*

Sepals connate, forming an obliquely urceolate, sepaline cup; column foot well developed, very long, slender. 42. *Acanthephippium*

Pollinia 2.

Rachis of inflorescence nodding during anthesis; flowers not resupinate. 44. *Geodorum*

Rachis of inflorescence erect during anthesis; flowers resupinate. 45. *Eulophia*

Leaves conduplicate in bud, the margins not overlapping (including plants with terete or laterally compressed leaves).

Stems with limited apical growth, the new shoots usually arising from base of older shoots.

Inflorescence terminal or axillary from upper nodes of stem.

Pollinia 4.

Pollinia without caudicles, stipes, or a viscidium.

Column foot absent.

Leaves laterally compressed, equitant. 20. *Oberonia*

Leaves not laterally compressed or equitant.

Flowers not resupinate; column short. 19. *Malaxis*

Flowers resupinate; column usually elongated. 21. *Liparis*

Column foot present.

Branches of sympodium unifoliate; leaves flat.

Apex of pseudobulbs not conspicuously elongated or becoming bright yellow with age; sepals not narrowly attenuate.

Plants small, caespitose, 5–10 cm. tall; flowers persistent; blade of labellum not fimbriate. 26. *Cadetia*

Plants large, laxly branched, over 25 cm. long; flowers fugacious; blade of labellum fimbriate. 28. *Flickingeria*

Apex of pseudobulbs conspicuously elongated, often becoming bright yellow with age; sepals narrowly attenuate. 29. *Diplocaulobium*

Branches of sympodium with 2 or more leaves or with a single terete leaf. 27. *Dendrobium*

Pollinia with caudicles or a distinct viscidium, or with both structures.

Flowers congested in dense heads or borne on long racemes or panicles.

Inflorescences racemose or paniculate; lateral sepals free; column long, slender.

34. *Earina*

Inflorescences capitate; lateral sepals partially connate along ventral margins; column short, stout. 35. *Glomera*

Flowers solitary.

Base of labellum spurred or saccate; column short. 36. *Glossorhyncha*

Base of labellum not spurred or saccate; column long. 37. *Aglossorhyncha*

Pollinia 6 or 8.

Pollinia 6. 38. *Appendicula*

Pollinia 8.

Stems pseudobulbous.

Sepals connate, free only at tips. 31. *Mediocalcar*

Sepals not connate.

Pseudobulbs unifoliate; new shoots usually arising near apex of older pseudobulbs; inflorescences fasciculate. 32. *Epiblastus*

Pseudobulbs with 2 or more leaves; new shoots arising near base of older pseudobulbs; inflorescences racemose or flowers solitary. 30. *Eria*

Stems not pseudobulbous.

Inflorescences terminal, capitate or elongate-fasciculate-racemose; basal portion of labellum separated from blade by a transverse callus or thickening. 33. *Agrostophyllum*

Inflorescences axillary, racemose; basal portion of labellum not separated from blade by a transverse callus.

Stems elongate; leaves laterally compressed; column foot absent. 47. *Octarrhena*

Stems congested; leaves usually not laterally compressed; column foot present, although usually very short. 48. *Phreatia*

Inflorescence lateral.

Pseudobulbs homoblastic, large, 15–350 cm. long; pollinia 2. 46. *Grammatophyllum*

Pseudobulbs heteroblastic or absent, 0.3–8 cm. long; pollinia 4 or 8.

Labellum articulate with column, mobile; pollinia 4. 43. *Bulbophyllum*

Labellum adnate to column foot, immobile; pollinia 8. 48. *Phreatia*

Stems with unlimited apical growth, often ramified.

Labellum not spurred or saccate, the base sometimes slightly concave or not.

Inflorescence paniculate; leaves flat. 49. *Calymmanthera*

Inflorescence racemose; leaves terete. 53. *Luisia*

Labellum spurred or saccate.

Column with a distinct foot.

Leaves flat.

Labellum adnate to column foot by a broad base, immobile.

- Flowers fugacious; sepals and petals membranous; labellum saccate; column foot well developed, long. 50. *Thrixspermum*
- Flowers persistent; sepals and petals somewhat fleshy; labellum spurred; column foot short, stout. 60. *Cleisostoma*
- Labellum articulate with apex of column foot, mobile.
- Roots terete; labellum with a prominent callus on inner surface of anterior wall. 51. *Sarcochilus*
- Roots flattened; labellum with a prominent callus on inner surface of posterior wall. 52. *Chiloschista*
- Leaves terete. 54. *Papilionanthe*
- Column lacking a foot.
- Spur or saccate base of labellum pointed toward base of inflorescence.
- Plants very large, 1–3 m. tall; flowers showy, 1.5–3 cm. across. 55. *Sarcantopsis*
- Plants small, generally less than 0.5 m. tall; flowers small, inconspicuous, 0.1–0.5 cm. across.
- Sepals and petals free (although connivent in some species); inflorescences without stipule-like appendages on both sides of floral bracts.
- Leaf blades flat, much broader than thick; anther with apex not geniculately inflexed; rostellum shortly bilobed, the lobes not acicular.
- Inflorescence slender, the rachis laxly flowered; labellum not compressed laterally. 56. *Saccolabiopsis*
- Inflorescence stout, abbreviated, the rachis densely flowered; labellum compressed laterally. 57. *Trachoma*
- Leaf blades terete or linear, about as broad as thick; anther with apex prominently geniculately inflexed; rostellum prominently bilobed, the lobes acicular. 59. *Schoenorchis*
- Sepals and petals partially fused into a short tube; inflorescence with stipulelike appendages on both sides of floral bracts. 62. *Microtororchis*
- Spur or saccate base of labellum pointed toward apex of inflorescence.
- Labellum conspicuously spurred, without internal appendages. 58. *Robiquetia*
- Labellum saccate, with a distinct, dactyliform or lamellate appendage projecting from posterior wall toward anterior apex. 61. *Pomatocalpa*

1. **HABENARIA** Willd. Sp. Pl. 4: 44. 1805; Reichenb. f. in Seem. Fl. Vit. 293, p. p. 1868; Kraenzl. in Bot. Jahrb. 16: 52. 1892; Backer & Bakh. f. Fl. Java 3: 250. 1968; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 548. 1977; Kores in Allertonia 5: 6. 1989; Lewis & Cribb, Orch. Vanuatu, 45. 1989.

Terrestrial plants, with radical tubers or a rhizome, the stem erect, unbranched; leaves alternate or basal, convolutive in bud, membranous, not articulate, with sheathing bases; inflorescences terminal, spicate or racemose; flowers small to comparatively large, resupinate; dorsal sepal frequently connivent with petals forming a hood over column; lateral sepals spreading or reflexed; petals entire or frequently 2-partite, sometimes with one or both parts further divided into narrow segments; labellum adnate to base of column, 3-lobed, 3-partite, or rarely entire, spurred, the spur long, slender, the lateral lobes when present entire or divided into narrow segments along margins; column very short, with a small, tubercular stielid on either side; anther terminal, erect, inserted by a broad base, persistent, the cells mostly distant, prolonged at base into a long or short, forward-projecting tube; pollinia 2, sectile, short-clavate, each with a caudicle turned downward toward base of anther and a small viscidium, the caudicles enclosed in short to moderately long tubes, the rostellum small or rarely large; stigmas 2, remote from each other, each on a long to short stigmatophore extending from column, clavate or cylindric, not adnate to base of labellum; ovary erect, twisted.

LECTOTYPE SPECIES: *Habenaria macroceratitis* Willd. (*Orchis habenaria* L.); vide Kraenzlin in Bot. Jahrb. 16: 58. 1892.

DISTRIBUTION: Predominantly pantropical, but extending into warm temperate areas, with 600–800 species. Two indigenous (and endemic) species occur in Fiji, both representative of sect. *Salaccenes* Kraenzl. (cf. Kores, 1989).

USEFUL TREATMENT OF GENUS: KRAENZLIN, F. Beiträge zu einer Monographie der Gattung *Habenaria* Willd. Bot. Jahrb. 16: 52-223. 1892.

KEY TO SPECIES

- Labellum with the lateral lobes filiform, 0.25-0.5 mm. broad, the midlobe 0.5-0.75 mm. broad; petals with the lower segment filiform to subulate, 0.2-0.5 mm. broad, projecting forward and upward, not geniculately reflexed. 1. *H. superflua*
 Labellum with the lateral lobes linear-subulate, 0.5-1.35 mm. broad, the midlobe 0.75-2 mm. broad; petals with the lower segment linear-lanceolate, 0.3-1.25 mm. broad, geniculately reflexed near base and erect. 2. *H. supervacanea*

1. *Habenaria superflua* Reichenb. f. in Seem. Fl. Vit. 293. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 314. 1892; Kraenzl. in Bot. Jahrb. 16: 83. 1892, Orchid. Gen. Sp. 1: 231. 1897; Rolfe in J. Linn. Soc. Bot. 39: 178. 1909; L. O. Williams in Bot. Mus. Leaflet 5: 107, quoad spec. vit. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 22. 1953; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972; Kores in Allertonia 5: 8. 1989. FIGURE 37A & B.

Habenaria sp. Seem. in Bonplandia 9: 260, p. p. 1861, Viti, 443, p. p. 1862.

Plants 40-75 cm. tall; leaves cauline, scattered throughout upper half of stem, the blades lanceolate to linear-lanceolate, 8-20 cm. long, 0.8-2.5 cm. broad, narrowly acuminate at apex; inflorescence (15-) 25-40 cm. long, the rachis moderately to densely 30-60-flowered; flowers pale green to greenish yellow; dorsal sepal ovate-acuminate, 8-12 mm. long, 3-3.5 mm. broad, narrowly acuminate and ultimately aristate at apex; lateral sepals reflexed, lanceolate, 9-13 mm. long, 3-3.5 mm. broad, narrowly acuminate-aristate at apex; petals 2-partite, the upper segment erect, linear to linear-subulate, 8-12 mm. long, 0.75-1.5 mm. broad, the lower segment projecting forward and upward, filiform to subulate, 9-10.5 mm. long, 0.2-0.5 mm. broad; labellum pendent, deeply 3-lobed almost to base, the spur narrowly cylindrical, 15-25 mm. long, 0.5-1 mm. broad, slightly or not inflated distally, the lateral lobes filiform, 8-16 mm. long, 0.25-0.5 mm. broad, the midlobe linear-ligulate with revolute margins, 11-16 mm. long, 0.5-0.75 mm. broad; column erect, 2.5-3 cm. long; pollinia obovoid, about 1.5 mm. long, 0.75-1 mm. broad, the caudicles 1-1.5 mm. long, the tubes surrounding caudicles slightly ascending, 1-1.25 mm. long; rostellum small; stigmato-phores perrect, linguiform, 1.75-2.35 mm. long, 0.5-0.75 mm. thick.

TYPIFICATION: The type is *Seemann 608*, p. p. (K HOLOTYPE; ISOTYPES at BM, G), collected in May, 1860, near Somosomo, Taveuni. *Seemann's* number was a mixture of the present species and *H. tradescantifolia* (*Peristylus tradescantifolius* in the present treatment); specimens of the number coming from Ovalau represent the latter species (Kores, 1989).

DISTRIBUTION: Endemic to Fiji and now known from four of the high islands; it is found in dense forest at elevations from near sea level to about 975 m. Although the species has also been accredited to Samoa (Williams, 1938), material of this relationship from that archipelago appears better referred to the related *Habenaria samoensis* F. v. Muell. & Kraenzl. (Kores, 1989).

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Mountains near Lautoka, *Greenwood 929*; Mt. Evans Range, *Greenwood 431*; vicinity of Nandarivatu, *Gibbs 652*. NANDRONGA & NAVOSA: Vicinity of Mbalo, near Vatukarasa, *Degener 13037*. NAMOSI: Hills east of Navua River, *Greenwood 1013*. NAITASIRE: Vunikawai, Prince's Road, *Vaughan 3184*. REWA: Vicinity of Lami, *Meebold 16817*. VITI LEVU without further locality, *Horne 913*, Parks "A," "B." OVALAU: U. S. Expl. Exped. (AMES); slopes of Mt. Koronimoko, vicinity of Thawathi, *Smith 8080*. VANUA LEVU: Mba: Upper Ndama River Valley, *Smith 1601*.

Renz and Vodonaivalu (in *Blumea* 34: 90-92. 1989) did not realize that *Seemann 608* is a mixture, the respective parts serving as the types of two species, *Habenaria superflua* (at BM, G, and K) and *Peristylus tradescantifolius* (at AMES, K, and W). For a clarification of the situation, cf. Kores in *Allertonia* 5: 8, 12. 1989.

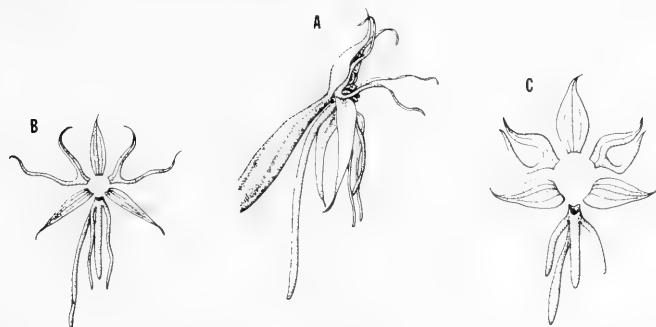


FIGURE 37. A & B, *Habenaria superflua*; A, complete flower, $\times 1\frac{1}{2}$; B, perianth segments, $\times 1$. C, *Habenaria supervacanea*; perianth segments, $\times 1$. A & B from Smith 8080, C from Smith 4279.

2. *Habenaria supervacanea* Reichenb. f. in Seem. Fl. Vit. 293. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 314. 1892; Kraenzl. in Bot. Jahrb. 16: 83. 1892, Orchid. Gen. Sp. 1: 230. 1897; L. O. Williams in Bot. Mus. Leafl. 5: 107, quoad spec. vit. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 22. 1953; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972; Kores in Allertonia 5: 9. 1989. FIGURE 37C.

Plants 45–80 cm. tall; leaves cauline, scattered throughout upper 1/3 of stem, the blades elliptic to obovate-elliptic, 8–17 cm. long, 2–6 cm. broad, more or less abruptly acuminate at apex; inflorescence 20–35 cm. long, the rachis moderately to densely 15–30-flowered; flowers pale green to greenish yellow; dorsal sepal broadly ovate and somewhat cucullate, 7–15 mm. long, 4–6 mm. broad, acuminate and with a short dorsal mucro at apex; lateral sepals reflexed, lanceolate, 7–15 mm. long, 2.5–5.5 mm. broad, acuminate-aristate at apex; petals 2-partite, the upper segment erect, lanceolate, 5.5–11 mm. long, 1–2.5 mm. broad, the lower segment initially porrect for a short distance above base, distally geniculately reflexed and erect, linear-lanceolate, 4.5–14 mm. long, 0.3–1.25 mm. broad; labellum pendent, deeply 3-lobed almost to base, the spur narrowly cylindrical, 10–20 mm. long, 0.75–1.5 mm. broad, slightly inflated distally, the lateral lobes spreading, linear-subulate, 5–14 mm. long, 0.5–1.35 mm. broad, the midlobe linear with slightly revolute margins, 6–16 mm. long, 0.75–2 mm. broad; column erect, 2.5–4 mm. long; pollinia short-clavate, 1.5–2 mm. long, 0.75–1.5 mm. broad, the caudicles 1.5–3 mm. long, the tubes surrounding caudicles slightly ascending, 1–2.5 mm. long; rostellum small, transverse; stigmatophores porrect, linguiform, 0.75–2.5 mm. long, 0.25–0.4 mm. thick.

TYPIIFICATION: The type is *Graeffe s. n.* (W 1795 HOLOTYPE; ISOTYPE at K), collected in Fiji without detailed locality in 1862 or 1864.

DISTRIBUTION: Endemic to Fiji and known with certainty only from Viti Levu and a single collection from Vanua Levu; it is found in dense or sunny forest at elevations of about 500–1,050 m. It has also been accredited to Samoa (Williams, 1938), presumably on the basis of specimens better referred to *H. monogyne* Schlechter. Differences between these two superficially similar species have recently been discussed (Kores, 1989).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 207*; Mt. Evans Range, *Greenwood 207a*; northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, *Smith 4279*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4144*; vicinity of Nandarivatu and southward to Nandala and Nauwanga, in *Thurn 4*, *Vaughan 3396*, *Degener 14729*, *14813*, *14820*, *14849*. NANDRONGA & NAVOSA: Nausori Highlands, *Melville et al. 7006*; vicinity of Nandrau, *Degener 14885*. VANUA LEVU: MATHUATA: In mountains, *U. S. Expl. Exped.* (AMES).

2. *CYNORKIS* Thou. in Nouv. Bull. Sci. Soc. Philom. Paris 1: 317. 1809; Kores in Allertonia 5: 10. 1989.

Cynorchis Thou. Hist. Orchid. pl. 13, orth. var. 1822.

Cynosorchis Thou. Hist. Orchid. pl. 14, 15, orth var. 1822; Kraenzl. Orchid. Gen. Sp. 1:472. 1898, op. cit. 1: 914. 1901.

Terrestrial or rarely epiphytic plants with fleshy, fasciculate roots or radical tubers; leaves radical, few or solitary, convolutive in bud, membranous, not articulate; inflorescences terminal, erect, short to elongate, racemose, the rachis laxly few-many-flowered; flowers small to large (perianth 0.6–4 cm. long), resupinate; dorsal sepal erect, concave, together with dorsal petals forming a hood over column; lateral sepals oblique, reflexed; petals entire, narrower than dorsal sepal; labellum adnate to base of column, 3–5-lobed (sometimes with the midlobe cleft as well) or rarely entire, spurred, the spur short to long, slender; column very short and broad; anther erect, inserted by a broad base, persistent, the cells diverging, prolonged at base into long forward-projecting tubes adnate to outer edges of rostellum; pollinia 2, sectile, shortly clavate, each with a long caudicle turned downward toward base of anther and ending in a small viscidium; rostellum 3-lobed, the middle lobe concave or complicate, often large, the side lobes elongated and forming channels for pollinia caudicles; stigmas 2, remote from each other, each on an elongated, oblong or clavate, papillose process extended from column; ovary erect, twisted.

LECTOTYPE SPECIES: *Cynorkis fastigiata* Thou. (vide C. Schweinfurth in Bishop Mus. Bull. 141: 18. 1936; Kores in Allertonia 5: 10. 1989).

DISTRIBUTION: Approximately 140 species, widespread throughout tropical Africa from Ethiopia to South Africa, and also in Madagascar, the Comoro and Mascarene Islands, and with a single species in the Seychelles. One species is locally and abundantly naturalized in Fiji, but strangely there seems to be no other occurrence of the genus outside the indigenous area except for a single recent collection from the Horne Islands. The single exotic species found in this very limited Pacific area, with its 3-lobed labellum, is a representative of sect. *Cynorkis*.

The opinion of Renz and Vodonaivalu (in *Blumea* 34: 97. 1989) that *Cynorkis* formerly occupied a territory extending eastward to Fiji and the Horne Islands is not tenable. In its restricted Pacific occurrence *C. fastigiata* is clearly a "weed orchid," appearing primarily in road cuts and other newly disturbed areas in considerable profusion, only rarely in forested areas. If the genus had a natural distribution into Melanesia and western Polynesia, it is scarcely possible that it would not also occur between the Indian Ocean islands and Pacific areas.

1. *Cynorkis fastigiata* Thou. Hist. Orchid. pl. 13, as *Cynorchis f.* 1822; Lindl. in Bot. Reg. 23: t. 1998. 1837; Kraenzl. Orchid. Gen. Sp. 1: 480, as *Cynosorchis f.* 1898, op. cit. 1: 918, as *Cynosorchis f.* 1901; Renz & Vodonaivalu in *Blumea* 34: 93. fig. 3, 4, 5. 1989; Kores in Allertonia 5: 11. 1989. FIGURE 85 (upper left).

Cynorchis isocynis Thou. Hist. Orchid. pl. 13, nom. alt. 1822.

Habenaria cynosorchidacea C. Schweinf. in Bishop Mus. Bull. 141: 18. fig. 6, b. 1936; L. O. Williams in Bot. Mus. Leaflet. 5: 107. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 22. 1953; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Plants terrestrial, 10–60 cm. tall; leaves 2 or rarely 1, the blades lanceolate to linear-lanceolate, 5–15 (–30) cm. long, 0.8–3.5 cm. broad, acuminate at apex; inflorescences 10–40 cm. long, with 1–8 flowers congested near apex; flowers pale purple or white to lavender; dorsal sepal ovate and distinctly cucullate, 5–6 mm. long, 2.5–4 mm. broad, subacute at apex; lateral sepals reflexed, broadly elliptic-ovate, about 5.5 mm. long and 3.5 mm. broad, subacute to obtuse at apex; petals oblong-ovate, 3.5–4.5 mm. long, 1.5–2 mm. broad, appressed to margins of dorsal sepal, rounded at apex; labellum pendent, conspicuously 3-lobed throughout distal half, the spur narrowly

cylindric, 15–30 mm. long, 0.75–1.25 mm. broad, the lateral lobes subrectangular, 5–8 mm. long, 2–3 mm. broad, the midlobe obcordate, 7–10 mm. long, 5–7 mm. broad, with a deep apical sinus; column 2.5–3 mm. long; pollinia 1–1.5 mm. long, 0.75–1 mm. broad, the caudicles 2–2.5 mm. long; rostellum 3-lobed, the middle lobe ascending, aliform, 1–1.5 mm. long, the lateral lobes patent, dactyliform, 1.75–2 mm. long; stigmatic processes clavate, 1.75–2.25 mm. long, 1.5–2 mm. broad.

TIPIFICATION AND NOMENCLATURE: In his original publication, Du Petit-Thouars indicated that his species had been collected in Mauritius, La Réunion, and Madagascar. The type of *Habenaria cynosorchidacea* is *Smith 1364* (AMES 41967 HOLOTYPE; ISOTYPE at BISH), collected March 22, 1934, on Ndelaimoala, the high point of the island of Moala. Schweinfurth noted the general similarity of his new species with *Cynorkis fastigiata*, but indicated that the structure of the column is different. Examination of much material does not bear out this statement.

DISTRIBUTION: Indian Ocean islands from the Seychelles to the Comoro and Mascarene Islands, and adventive in Fiji, where it is sometimes locally frequent, at least on Viti Levu, from near sea level to about 1,000 m. on clay banks, along roadsides, in open places, and sometimes in dense forest. The earliest Fijian collection is dated 1924. Flowers and fruits are seen throughout the year. The species has recently appeared in the Horne Islands (Kores, 1989).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 1268*; northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, *Smith 4336*; vicinity of Nandari-vatu, *Degener 14321*; Mt. Nanggaranambuluta, east of Nandari-vatu, *Vaughan 3236*. SERUA: Hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith 9460*; inland from Ngaloa, *DA 16553*. NAMOSI: Hills east of Navua River, *Greenwood 1042*. NAITASIRE: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5780*; Tholo-i-suva, *DA 12990*, *Kores & Molvray F9*; Suva Ditch trail, *Bryan 368*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndaakuivuna, *Smith 7010*; Matavatathou, *DA 7756*. REWA: Vicinity of Lami, *Krauss 437*; vicinity of Suva, *Meebold 26532*. NGAU: *Tothill 876*. VANUA LEVU: THAKAUNDOVE: Savarekareka, Savusavu Bay, *DA 8855*. PROVINCE?: Lomi, *Krauss 3026*.

3. *PERISTYLUS* Bl. *Bijdr. Fl. Ned. Ind.* 404. 1825; J. J. Sm. *Orchid. Java*, 30. 1905; *Seidenfaden in Dansk Bot. Arkiv* 31 (3): 27. 1977; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 549. 1977; Kores in *Allertonia* 5: 11. 1989; Lewis & Cribb, *Orch. Vanuatu*, 40. 1989. *Nom. cons.*

Peristylis Benth. in Benth. & Hook. f. *Gen. Pl.* 3: 625, orth. var. 1883.

Terrestrial plants, with radical tubers or a cluster of thickened roots, the stem erect, unbranched; leaves alternate or basal, convolutive in bud, membranous, not articulate, with sheathing bases; inflorescences terminal, erect, spicate or racemose; flowers small, resupinate; dorsal sepal connivent with petals forming a hood over column; lateral sepals spreading, reflexed or erect; labellum connate at base with margins of column, distally 3-lobed or entire, shortly spurred; column very short, with a small auricle on either side; anther terminal, erect, inserted by a broad base, persistent, the cells narrowly separated; pollinia 2, sectile, usually short-clavate, each with a caudicle turned downward toward base of anther and a small viscidium, the caudicles enclosed in short tubes, more or less widely separated by a small rostellum; stigmas 2, remote from each other, not placed on stigmatophores, entirely adnate to base of labellum and to auricles of column, slightly convex; ovary erect, twisted.

TYPE SPECIES: *Peristylus grandis* Bl.

DISTRIBUTION: Eastern Asia including Japan to northern Australia and eastward to the Society Islands, with 60–75 species. Four species occur in Fiji, one of them endemic.

A justification of retaining *Peristylus* as generically distinct from *Habenaria*, together with notes on the relationships of the Fijian species, has recently been outlined (Kores, 1989).

KEY TO SPECIES

- Spur narrowly cylindrical to cylindrical-fusiform, 3.5–10 mm. long.
 Dorsal sepal 2.25–3.25 mm. long; petals 1-nerved; lateral lobes of labellum filiform or narrowly linear-attenuate, 0.2–1 mm. broad, 1- or 2-nerved.
 Lateral lobes of labellum filiform, distally circinate, 4.25–5.5 mm. long; spur narrowly cylindrical, not distally inflated. 1. *P. tradescantifolius*
 Lateral lobes of labellum linear-attenuate, rarely distally circinate, 2.5–4.5 mm. long; spur cylindrical-fusiform. 2. *P. maculifer*
 Dorsal sepal 4.5–5 mm. long; petals 2- or 3-nerved; lateral lobes of labellum ensiform to oblong-obovate, 1.75–2 mm. broad, 3–5-nerved. 3. *P. aliformis*
 Spur globular or scrotiform, 1–1.5 mm. long. 4. *P. noveobudarium*

1. *Peristylus tradescantifolius* (Reichenb. f.) Kores in *Allertonia* 5: 12. 1989.

FIGURE 38A & B.

Habenaria sp. Seem. in *Bonplandia* 9: 260, p. p. 1861, Viti, 443, p. p. 1862.*Habenaria tradescantifolia* Reichenb. f. in Seem. *Fl. Vit.* 293. 1868; Drake, *Ill. Fl. Ins. Mar. Pac.* 314. 1892; Kraenzl. in *Bot. Jahrb.* 16: 180. 1892, *Orchid. Gen. Sp.* 1: 386. 1898; H. Fleischm. & Reching in *Denkschr. Akad. Wiss. Wien* 85: 250. t. 2, fig. 7. 1910; L. O. Williams in *Bot. Mus. Leaf.* 5: 107, p. p. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 22. 1953; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 384. 1972; Renz & Vodonaivalu in *Blumea* 34: 89. fig. 2. 1989.*Habenaria papuana* Kraenzl. in *Bot. Jahrb.* 18: 188. 1894.*Habenaria tradescantifolia* var. *pinquior* H. Fleischm. & Reching in *Denkschr. Akad. Wiss. Wien* 85: 250. 1910.*Habenaria cyrtostigma* Schlechter in *Repert. Sp. Nov.* 9: 83. 1910; Christophersen in *Bishop Mus. Bull.* 128: 60. 1935.*Peristylus papuanus* J. J. Sm. in *Nova Guinea* 12: 3. 1913; Renz & Vodonaivalu in *Blumea* 34: 90. fig. 1, d. 1989; Lewis & Cribb, *Orch. Vanuatu*, 41. fig. 3. 1989; M. Clements, *Cat. Austral. Orch.* 103. 1989.

Plants 30–65 (–100) cm. tall; leaves cauline, clustered throughout upper half of stem, the blades lanceolate, (5–) 8–20 cm. long, 1–2 (–4) cm. broad, long-acuminate at apex; inflorescence 19–55 cm. long, the rachis laxly flowered; flowers pale green to greenish white; dorsal sepal ovate, 2.25–3.25 mm. long, 1.25–2 mm. broad, obtuse at apex; lateral sepals erect, subfalcate-oblong, 2.5–3 mm. long, 1–1.5 mm. broad, slightly carinate dorsally throughout upper half, subacute to obtuse at apex, with (or rarely without) a small dorsal mucro; petals obliquely ovate, 2.5–3.25 mm. long, 1.5–2 mm. broad, subacute at apex; labellum distally moderately reflexed, deeply 3-lobed to base of epichile, the spur cylindrical-fusiform to-clavate, 6–7.5 mm. long, 0.75–1.25 mm. broad, the hypochile concave, the lateral lobes pendulous, subulate, 4.25–5.5 mm. long, 0.2–0.4 mm. broad, 1-nerved, incurved or circinate at apex, the midlobe fleshy, ligulate, 1.5–2 mm. long, 0.6–0.8 mm. broad, the disk with 3 very small calli joined by a low transverse ridge at base of epichile; column short, 0.8–1.25 mm. long, the auricles 0.5–0.75 mm. long, 0.75–1 mm. broad at apex; pollinia obovoid, the caudicles 0.1–0.2 mm. long.

TIPIFICATION AND NOMENCLATURE: *Habenaria tradescantifolia* is typified by *Seemann 608*, p. p. (W HOLOTYPE, "Herbarium Musei Caesarei Palatini Vindobonensis"; ISOTYPES AT AMES, K), collected in July, 1860, near Port Kinnaird, Ovalau. The other part of *Seemann 608*, from Taveuni, is the type of *Habenaria superflua* Reichenb. f. (q. v.). *Habenaria papuana* is based upon *Hellwig 585* (B HOLOTYPE, destroyed), collected April 10, 1889, in New Guinea near Finschhafen; to replace this, M. Clements (1989) has suggested *Schlechter 14669* (BRI NEOTYPE), from "Neu Mekenburg; In den Gebirgs-waldern bei Punam, 600 m.", July, 1902. The type of *H. tradescantifolia* var. *pinquior* is *Reching 1802* (w 3121 HOLOTYPE), collected on Upolu, Samoa. The three syntypes of *H. cyrtostigma* are *Reching 732*, from Upolu, and *Vaupel 584* and *Reching 1146*, from Savai'i, Samoa. Reasons for combining some of these taxa were discussed by me in 1989, and I also commented on the similarity between *H. tradescantifolia* and *H. papuana* without actually reducing the latter. Renz and Vodonaivalu (1989), in

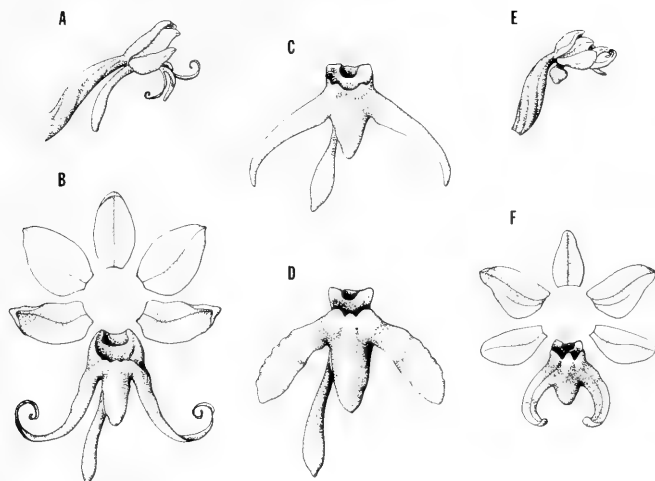


FIGURE 38. A & B, *Peristylus tradescantifolius*; A, complete flower, $\times 2\frac{1}{2}$; B, perianth segments, $\times 5$. C, *Peristylus maculifer*, labellum, $\times 5$. D, *Peristylus aliformis*, labellum, $\times 5$. E & F, *Peristylus novoebudarium*; E, complete flower, $\times 2\frac{1}{2}$; F, perianth segments, $\times 5$. A & B from Seemann 608, p. p. (κ), C from Smith 1911, D from Smith 257, E & F from Degener & Ordóñez 13917.

accepting the combination *Peristylus papuanus*, reduced *H. cyrtostigma* to it, and I agree with them that a broad concept of this taxon is advisable.

DISTRIBUTION: New Guinea, Bismarck Archipelago, Solomon Islands, New Hebrides, Fiji, Tonga, and Samoa; the species is infrequent in Fiji, occurring in forest from near sea level to a few hundred meters.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Hills between Navua River and Rewa boundary, Greenwood 1013A; 2 miles from Namuamua near trail to Namosi, Gillespie 3008. NAITASIRI: Central road, Tothill 885; near Nasinu, Greenwood 1129. REWA: Foothills of Mt. Korombamba, Vaughan 3192. FIJI without further locality, U. S. Expl. Exped.

2. *Peristylus maculifer* (C. Schweinf.) Renz & Vodonaivalu in *Blumea* 34: 89, fig. 1, b, as *P. maculiferus*. (June) 1989; Kores in *Allertonia* 5: 13. (Aug.) 1989; Lewis & Cribb, *Orch. Vanuatu*, 40, as *P. maculiferus*. (Oct.) 1989. FIGURE 38C.

Habenaria tradescantifolia sensu Rolfe in J. Linn. Soc. Bot. 39: 178. 1909; non Reichenb. f.

Habenaria maculifera C. Schweinf. in Bishop Mus. Bull. 141: 18, fig. 6, c. 1936; L. O. Williams in Bot. Mus. Leaflet 5: 107. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 22. 1953; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Plants 60–105 cm. tall; leaves cauline, scattered throughout upper $1/2$ – $1/3$ of stem, the blades lanceolate to narrowly oblanceolate, 8–20 cm. long, 1.2–3 (–4) cm. broad, long-acuminate at apex; inflorescence 25–55 cm. long; flowers pale green to greenish yellow; dorsal sepal ovate, 2.75–3.25 mm. long, 1.5–2 mm. broad, obtuse or rarely subacute at apex; lateral sepals spreading or reflexed, obliquely oblong-ovate, 3–3.25 mm. long, 1.75–2 mm. broad, obtuse at apex; labellum distally slightly to moderately geniculate-reflexed, deeply 3-lobed to base of epichile, the spur narrowly cylindrical-form, (3.5–) 5–6.5 mm. long, 0.75–1 mm. broad, the hypochile channelled, the

lateral lobes spreading, ensiform or lanceolate, 2.5–4.5 mm. long, 0.75–1 mm. broad, 2 (or very rarely 1)-nerved, not or rarely incurved or circinate at apex, acute, the midlobe fleshy, ligulate to linear-lanceolate, 1.5–2.5 mm. long, 1.25–2 mm. broad, obtuse at apex, the disk at base of epichile slightly concave with a low transverse ridge; column short, 1.5–2 mm. long, the auricles 0.75–1 mm. long, 0.5 mm. broad; pollinia obovoid, the caudicles 0.1–0.2 mm. long.

TYPIFICATION: The type is *Smith 1911* (AMES 41968 HOLOTYPE; ISOTYPES at BISH, NY), collected June 6, 1934, on the eastern slope of Mt. Ndikeya, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Banks Islands (a single collection from Vanua Lava) and Fiji, where it is the most frequently collected species of *Peristylus* in the archipelago, occurring in usually dense forest from near sea level to an elevation of about 1,100 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Gibbs 659*, *Degener & Ordenez 13708*; western slope of Mt. Nangaranambuluta, east of Nandarivatu, *Smith 6322*; hills between Nandala and Nukunuku Creeks, *Smith 6209*; hills east of Nandala Creek, south of Nandarivatu, *Smith 5944*, *6233*. NANDRONGA & NAVOSA: Near Mbelo, vicinity of Vatukarasa, *Tabulewa 13037*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8482*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8722*; vicinity of Namosi, *Parks 20231*; hills east of Wainikoroiuva River, near Namuamua, *Smith 8955*; trail up Mt. Vakarongasiu from Namuamua, *Gillespie 3278*. RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomani, *Smith 5693*. NAITASIRI: Rarandawai to Nairairaikinasavu, Wainisavulevu Creek, upper Wainimala River Valley, *St. John 18288*; Suva Pumping Station, *Degener & Ordenez 13749*; vicinity of Tamavua, *Gillespie 2438*. REWA: Slopes of Mt. Korombamba, *Gillespie 2256*; Lami River, *Livingston*, in 1945. VITI LEVU without further locality, *Parks 20346*, *Gillespie 2036*. VANUA LEVU: THAKAUNDRIVE: Mt. Mariko, *Smith 427*. TAVEUNI: Slopes of Mt. Manuka, east of Wairiki, *Smith 8157*.

3. *Peristylus aliformis* (C. Schweinf.) Renz & Vodonaivalu in *Blumea* 34: 88, fig. 1, a. (June) 1989; *Kores in Allertonia* 5: 14. (Aug.) 1989. FIGURE 38D.

Habenaria aliformis C. Schweinf. in *Bishop Mus. Bull.* 141: 17, fig. 6, a, as *H. alaeformis*. 1936; L. O. Williams in *Bot. Mus. Leaflet* 5: 107, as *H. alaeformis*. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 22, as *H. alaeformis*. 1953; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 384. 1972.

Plants 80–160 cm. tall; leaves cauline, scattered throughout upper half of stem, the blades lanceolate to narrowly oblanceolate, 15–28 cm. long, 1.8–4 cm. broad, long-acuminate at apex; inflorescence 26–67 cm. long; flowers pale greenish yellow to greenish white; dorsal sepal ovate, 4.5–5 mm. long, 2–2.5 mm. broad, obtuse at apex; lateral sepals spreading, obliquely oblong-ovate, 4.5–5 mm. long, 2–2.3 mm. broad, dorsally slightly carinate throughout upper half, subacute to obtuse at apex, sometimes with a small, dorsal, subapical mucro; petals obliquely triangular-ovate to ovate, 4–5.25 mm. long, 2.5–4 mm. broad, obtuse at apex; labellum distally slightly reflexed or not, deeply 3-lobed to base of epichile, the spur narrowly cylindrical to cylindrical-fusiform, 6–10 mm. long, 0.75–1 mm. broad, the hypochile concave or weakly channelled, the lateral lobes spreading, obliquely cuneiform to oblong-obovate, 4.5–5 mm. long, 1.75–2 mm. broad, sometimes irregularly crenulate on posterior margin above, 3–5-nerved, subacute to obtuse at apex, the midlobe fleshy, ligulate, 2–2.6 mm. long, 1.5–2 mm. broad, obtuse at apex, the disk with 2 small raised calli along lateral edges and a single larger median callus at base of epichile; column stout, 1.25–1.75 mm. long, the auricles 1–1.25 mm. long, 0.5–1 mm. broad at apex; pollinia not seen.

TYPIFICATION: The type is *Smith 257* (AMES 41969 HOLOTYPE; ISOTYPES at BISH, NY, P, US), collected Oct. 23, 1933, on Mt. Mbuke Levu, Kandavu.

DISTRIBUTION: Endemic to Fiji and now known from four of the high islands, occurring in dense forest at elevations of approximately 200–900 m.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Nandarivatu, on hill along Mba road, *im Thurn F5*; vicinity of Nandarivatu, *Degener 14618*; Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14499, 14729*. NAMOSI or REWA: Between Wainandoi River and Wainamboro Creek, *Vaughan 3366*. OVALAU: Hills east of Lovoni Valley, *Smith 7349*. TAVEUNI: Summit and adjacent slopes of Mt. Manuka, east of Wairiki, *Smith 8224*.

The specimens composing the Ovalau collection tend to be more robust than type material, with plants 100–160 cm. high as opposed to 80–100 cm., and also to have the lateral lobes of the labellum with more or less entire posterior margins unlike those of the type collection, in which these margins are weakly crenulate. However, these differences appear fairly minor. The close relationships of *Peristylus aliformis* and *P. maculifer* were discussed by me (Kores, 1989) in comments regarding the four species of the genus known from Fiji.

4. *Peristylus novoebudorum* F. v. Muell. Contr. Phyt. New Hebr. 22. 1873; Lewis & Cribb, Orch. Vanuatu, 41. 1989. FIGURE 38E & F.

Habenaria physoplectra Reichenb. f. in *Linnaea* 41: 17. 1877; Kraenzl. in *Bot. Jahrb.* 16: 180, as *H. physoplectron*. 1892. *Orchid. Gen. Sp.* 1: 388. 1898.

Habenaria scrotiformis L. O. Williams in *Sargentia* 1: 7, fig. 1 (5–11). 1942; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Peristylus physoplectrus Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 550, in adnot. 1977; Kores in *Allertonia* 5: 14. 1989.

Peristylus scrotiformis Renz & Vodonaivalu in *Blumea* 34: 89, fig. 1, c. 1989.

Plants up to 60 cm. tall; leaves cauline, scattered throughout upper half of stem, the blades linear-lanceolate, 6–16 cm. long, 0.8–1.6 cm. broad, acute at apex; inflorescence up to 25 cm. long; flowers greenish; dorsal sepal ovate-lanceolate, 2–2.5 mm. long, about 1.25 mm. broad, obtuse at apex; lateral sepals spreading, obliquely ovate, 2–2.5 mm. long, 1–1.5 mm. broad, obtuse at apex; petals broadly and obliquely ovate, 2–2.5 mm. long, 1.5–2 mm. broad, obtuse at apex; labellum not reflexed distally, prominently 3-lobed throughout epichile, the spur scrotiform or globular with a short neck, about 1.5 mm. long and 1 mm. broad, the hypochile slightly concave, the lateral lobes ascending, linear or linear-oblong, 2.5–3 mm. long, 0.6–0.8 mm. broad, 1-nerved, strongly inflexed and subacute at apex, the midlobe fleshy, subtriangular, 0.6–0.8 mm. long, 0.75–1 mm. broad, subacute at apex, the disk with 2 small raised calli along lateral edges and a single large, prominent, raised median callus at base of epichile; column and pollinia not seen.

TYPEIFICATION AND NOMENCLATURE: *Peristylus novoebudorum* is typified by *Campbell s. n.* (MEL HOLOTYPE), from Aneityum, New Hebrides; *Habenaria physoplectra* by *MacGillivray N.27*, p. p. (W HOLOTYPE; ISOTYPES at BM, G, P), also from Aneityum; and *H. scrotiformis* by *Degener & Ordonez 13917* (AMES HOLOTYPE; ISOTYPES at K, NY), obtained Dec. 30, 1940, east of Mbalanga, Savusavu Bay region, Thakaundrove Province, Vanua Levu. The similarity between *H. physoplectra* and *H. scrotiformis* was discussed by me in 1989, but I failed to examine von Mueller's earlier taxon, which is utilized by Lewis and Cribb (1989).

DISTRIBUTION: New Caledonia, Banks Islands, New Hebrides, Fiji, and Tonga. In Fiji the species is known from only two collections, the type of *Habenaria scrotiformis*, occurring in forest on Vanua Levu at about 100 m., and a specimen from the adjacent island of Rambi. From Tonga I have seen only one collection, from the island of Niuafou. In the New Hebrides the species is known to me from six of the islands and 17 collections, listed in my 1989 discussion.

AVAILABLE COLLECTION: RAMBI: In mountains, *Horne*, March, 1878.

4. *Cryptostylis* R. Br. Prodr. Fl. Nov. Holl. 317. 1810; Backer & Bakh. f. Fl. Java 3: 256. 1968; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 481. 1977; Kores in Allertonia 5: 15. 1989; Lewis & Cribb, Orch. Vanuatu, 37. 1989.

Terrestrial plants with short, fleshy, erect rhizomes and thick, spreading roots; leaves solitary or 2 or 3 per shoot, erect, not articulate, with long, slender, nonsheathing petioles, convolutive in bud, the blades usually ovate or elliptic-ovate, frequently with irregular, brownish black blotches; inflorescences terminal on a rudimentary leafless shoot, racemose, few-flowered; flowers erect, moderately large (perianth 1.5–3 cm. long), nonresupinate; sepals and petals free, spreading or pendulous, very narrow, the petals smaller than sepals; labellum sessile, erect, closely appressed to column proximally, much broader than other segments, entire, ecalcarate, frequently slightly recurved distally, the disk with a prominent concave cavity near base partially surrounding column; column very short, with lateral auricles at apex; anther at back of column, erect, more or less acuminate; pollinia 2, soft and mealy, deeply 2-lobed, ecaudiculate, attached to a small, common viscidium at apex of anther; rostellum strongly reduced, more or less entire; stigma prominent, entire, borne on a fleshy process at the front of column.

LECTOTYPE SPECIES: *Cryptostylis erecta* R. Br. (vide Hallé, 1977; Kores, 1989).

DISTRIBUTION: India, southeastern Asia, Malesia, and northern Australia, extending eastward in the Pacific to Samoa. In listing it as a genus with a range terminating in Fiji, Smith (in J. Arnold Arb. 36: 276. 1955) had not noted its occurrence in western Polynesia. Many of the species within the genus appear very similar, and there is considerable disagreement as to the status of many taxa, especially those of Malaya and Java. The single species occurring in Fiji is now considered widespread.

Although the inflorescence of *Cryptostylis* appears to be lateral, it is not. In actuality the inflorescence in this genus arises from the apex of a rudimentary, leafless shoot which is slightly below ground or buried in leaf litter. Therefore the inflorescence of *Cryptostylis* is terminal, despite appearances to the contrary. The presence of rudimentary leafless shoots, basal leaves, fleshy fasciculate roots, and relatively large, nonresupinate, reddish brown flowers makes *Cryptostylis* one of the most distinctive genera of orchids in Fiji.

1. *Cryptostylis arachnites* (Bl.) Hassk. Cat. Hort. Bogor. 48. 1844; Reichenb. f. in Bonplandia 5: 36. 1857; Bl. Fl. Javae Nov. Ser. 112. t. 45, fig. 2. 1858 or 1859, Coll. Orchid. 133. t. 45, fig. 2. 1859; Holtum, Fl. Malaya 1: 103, fig. 15. 1953; Backer & Bakh. f. Fl. Java 3: 257. 1968; P. Hunt in Kew Bull. 24: 75. 1970; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 481. pl. 191. 1977; Seidenfaden in Dansk Bot. Arkiv 32 (2): 106, fig. 66. 1978; Kores in Allertonia 5: 15. 1989; Lewis & Cribb, Orch. Vanuatu, 37. 1989.

Zosterostylis arachnites Bl. Bijdr. Fl. Ned. Ind. 419. 1825, Tab. Pl. Jav. Orchid. fig. 32. 1825.

Cryptostylis alismifolia F. v. Muell. in S. Sci. Rec. 1: 172. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 313. 1892; Kraenzl. in Bot. Jahrb. 25: 599. 1898; Schlechter in Repert. Sp. Nov. 9: 85. 1910; Christophersen in Bishop Mus. Bull. 128: 61. 1935.

Cryptostylis stenochila Schlechter in Bot. Jahrb. 39: 49. 1906; Guillaumin in Notul. Syst. (Paris) 10: 81. 1941, Fl. Nouv.-Caléd. 76. 1948.

Cryptostylis vitiensis Schlechter in Repert. Sp. Nov. 3: 16. 1906; L. O. Williams in Bot. Mus. Leaf. 5: 108. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 26. 1953; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 380. 1972.

Plants terrestrial, erect, up to 40 cm. tall, the roots fasciculate, fleshy, flexuose, lanuginose; leaves solitary or 2 or 3 per shoot, basal, petiolate, the petioles slender, sulcate, 9–11 cm. long, the blades elliptic, 10–19 cm. long, 3.5–5 cm. broad, subcoriaceous, gradually angustate at base, acuminate at apex; inflorescences glabrous, the

peduncle well developed, terete, generally somewhat longer than foliage, with 3 or 4 widely spaced, clasping cataphylls, the rachis slender, laxly 7-15-flowered, the bracts erect, lanceolate-acuminate, about 12 mm. long; flowers erect or ascending, the outer perianth segments pale green sometimes tinged with dull red, the labellum dark reddish brown at base, gradually fading to pale green at apex, with scattered reddish brown spots; medial sepal pendent, linear-lanceolate, 14-16 mm. long, about 2.8 mm. broad, narrowly attenuate at apex; lateral sepals subpatent, linear-attenuate, 15-18 mm. long, about 2.5 mm. broad; petals broadly spreading, narrowly lanceolate, 10-13 mm. long, about 1.7 mm. broad, narrowly attenuate at apex; labellum erect, broadly lanceolate, (13-) 15-20 mm. long, 5.5-7 mm. broad, the base broadly cuneate, concave, the apex narrowly acute, the disk densely puberulous-papillate distally; column brief, stout; anther ovoid, minutely papillate distally, obtuse at apex with a small subapical aliform appendage; pollinia hemiellipsoid, mealy, about 2 mm. long and 0.6 mm. broad; rostellum not seen; stigma slightly elevated, subcapitate; ovary cylindrical, 15-18 mm. long, weakly 6-ribbed distally, glabrous.

TIPIFICATION AND NOMENCLATURE: *Zosterostylis arachnites* is based on Blume specimens (some deposited at L, P) from the Salak and Seribu regions of Java. The type of *Cryptostylis alismifolia* is *Betche s. n.* (MEL? HOLOTYPE), obtained near Apia, Upolu, Samoa; that of *C. stenochila* is *Schlechter 15596* (B HOLOTYPE, destroyed), collected in January, 1903, on the slopes of Mt. Ou-Hinna, New Caledonia; and that of *C. vitiensis* is *Thomson s. n.* (B HOLOTYPE, destroyed), recorded as from Fiji and collected in 1893 without details (identity of collector otherwise not traced). Recent students consider these taxa inseparable, following the appraisal by Hunt (1970).

DISTRIBUTION: India and tropical Asia eastward through Malesia and into the Pacific as far as Fiji and Samoa. In Fiji it occurs in dense forest, often along creeks, and on forested ridges at elevations of about 100-1,000 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu and vicinity, *in Thurn 81, 325, Gillespie 4052*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8610*; Korombasambasanga Range, *DA 2173*; Mt. Nambui track, Korombasambasanga Range, *DA 14552*; hills near Navua River, *Greenwood 1044*. NAITASIRI: Prince's Road near Tholo-i-suva, *Vaughan 3278*. TAILEVU: Wainivesi River, near copper mine, *DA 15848*. REWA: Mt. Korombamba, *Vaughan 3188, DA 1277, Webster & Hildreth 14072*. VANUA LEVU: MBUA: Southern slope of Mt. Seatura, *Smith 1638, 1641*. THAKAUNDRIVE: Eastern drainage of Yanawai River, *Degener & Ordenez 14076*; track to Mt. Nasorolevu, *DA 17157*. TAVEUNI: Wainggilo, *DA 15886*. FIJI without further locality, *DA 3887*.

Hunt (1970) pointed out the considerable variation in coloration and orientation of the floral segments in collection of *Cryptostylis arachnites* from the Solomon Islands, noting that material from other areas was also quite polymorphic. On the basis of this variability he concluded that the Fijian material was referable to *C. arachnites*, at the same time reducing a number of species from neighboring areas. More recently Hallé (1977) has indicated that New Caledonian, Fijian, and Samoan collections also belong here, and Seidenfaden (1978), in his study of the orchids of Thailand, agreed with this disposition and included *C. vitiensis* in his synonymy, emphasizing that the species is both widespread and polymorphic.

5. VANILLA Plumier ex Mill. Gard. Dict. Abridg. ed. 4. 1754; Sw. in Nova Acta Soc. Sci. Upsal. 6: 66. t. 5. 1799; Rolfe in J. Linn. Soc. Bot. 32: 439. 1896; Kores in Allertonia 5: 16. 1989.

Myrobroma Salisb. Parad. Lond. 2: t. 82. 1807.

Robust, extensively climbing plants with long, jointed stems bearing a leaf and a root at each node; leaves not articulate, either well developed, somewhat fleshy, convolute in bud, and with short, thick, nonsheathing petioles, or reduced and scalelike; inflorescences terminal or axillary, short, racemose, few-many-flowered;

flowers moderately large (perianth 1–5 cm. long), resupinate; sepals and petals free or shortly connate at base of column, differing slightly from one another; labellum briefly adnate at base to base of column and forming a distinct pouch or tube, much broader than other segments, ecalcarate, the distal portion free, broadened, clasping column, more or less 3-lobed, undulate at margin, the disk frequently with hairy appendages; column long, curved near top, with a small stolidium on either side of anther; anther terminal, inclined-incumbent, generally quite broad, with the cells separate; pollinia granular, ecaudiculate; rostellum broad, more or less obscuring the short, transverse stigma; capsules long, cylindrical or cylindrical-fusiform, somewhat fleshy, indehiscent; seed rather large for the family, frequently dark brown or black, with crustaceous testa, not winged.

LECTOTYPE SPECIES: *Vanilla mexicana* Mill. (*Epidendrum vanilla* L.); vide Mansfeld in *Kulturpflanze* 2: 587. 1959.

DISTRIBUTION: A pantropical genus of about 100 species. One American species is sparingly cultivated in Fiji and is occasionally naturalized.

USEFUL TREATMENTS OF GENUS: ROLFE, R. A. A revision of the genus *Vanilla*. *J. Linn. Soc. Bot.* 32: 439–478. 1896. BOURIQUET, G. *Le Vanillier et la Vanille dans le Monde* (in Lechevalier, *Encycl. Biologique* 46). 1954.

1. *Vanilla planifolia* Jackson in Andrews, *Bot. Repos.* 8: *pl.* 538. 1808; Rolfe in *J. Linn. Soc. Bot.* 32: 463. 1896; H. Fleischm. & Reehinger in *Denkschr. Akad. Wiss. Wien* 85: 251. 1910; Hill in *Bot. Mus. Leafl.* 10: 170. 1942; Garay & Sweet in R. Howard, *Fl. Lesser Antilles—Orchidaceae*, 44. *fig.* 7. 1974; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 407. *pl.* 167, 168. 1977; St. John in *Phytologia* 36: 381. 1977; Kores in *Allertonia* 5: 17. 1989.

Myrobroma fragrans Salisb. *Parad. Lond.* 2: *t.* 82, nom. illeg. 1807.

Vanilla aromatica sensu H. Fleischm. & Reehinger in *Denkschr. Akad. Wiss. Wien* 85: 251. 1910; non Sw. *Vanilla fragrans* Ames, *Sched. Orch.* 7: 36, nom. illeg. 1924; L. O. Williams in *Bot. Mus. Leafl.* 5: 110. 1938; Yuncker in *Bishop Mus. Bull.* 178: 40. 1943; J. W. Parham, *Pl. Fiji Isl.* 295. 1964, ed. 2. 389. 1972; Purselglove, *Trop. Crops, Monocot.* 403. *fig.* 27. 1972.

Vanilla mexicana sensu Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 265. 1970; non Mill.

Plants climbing or scandent, vinelike, up to 15 m. long, the stems simple or laxly branched, terete, flexuose, 1–2 cm. in diameter, fleshy; leaves alternate, patent, subsessile, oblong-elliptic to -lanceolate, 8–25 cm. long, 2–8 cm. broad, coriaceous, broadly rounded at base, acute or acuminate at apex; inflorescences axillary, subpatent, 5–8 cm. long, the peduncle much abbreviated, the rachis congested, subdensely 6–15(–20)-flowered, the bracts patent, ovate, 5–15 mm. long, about 7 mm. broad; flowers pale greenish yellow, fragrant, fugacious; sepals slightly dissimilar, broadly spreading, oblong-lanceolate, 4–7 cm. long, 1–1.5 cm. broad, obtuse or slightly retuse at apex; petals spreading, similar to sepals in shape but slightly smaller; labellum partially adnate to face of column near base, distally free and embracing column, unguiculate, 4–5 cm. long, 1.5–3 cm. broad, the claw linear-oblong, channelled, about 1.2 cm. long and 0.3 cm. broad, the blade more or less flabelliform in outline when flattened, weakly 3-lobed distally, with the lateral margins irregularly dentate, the apex truncate or briefly emarginate, the disk with a series of longitudinal, verrucose or papillate lines along nerves and provided with a medial tuft of retrorse pubescence; column slender, semiterete, 3–4 cm. long, laxly puberulous on ventral surface, the stolidia broad, truncate; clinandrium relatively shallowly excavate, weakly lobed on dorsal margin; anther subquadrate, about 3.2 mm. across, with a broad dorsal umbo, truncate or briefly retuse at apex; pollinia granular; rostellum porrect or slightly reflexed, transversely oblong, broad; stigma transverse; ovary cylindrical, up to 4 cm. long, glabrous; capsules cylindrical, 10–25 cm. long, 5–15 mm. in diameter, the seeds subglobose, dark gleaming black.

TIPIFICATION AND NOMENCLATURE: The earliest name for the commercial vanilla, *Myrobroma fragrans*, is superfluous and illegitimate because Salisbury cited *Epidendrum rubrum* in his synonymy; therefore *Vanilla planifolia*, published a year later, provides the earliest legitimate epithet. Both names are based on West Indian material introduced into cultivation in England. As herbarium material was not preserved by Jackson, his original illustration is to be considered the lectotype (Garay and Sweet, 1974). *Vanilla mexicana* is a different species, confined to Mexico, and of this *V. aromatica* is a synonym.

DISTRIBUTION: Southeastern Mexico and parts of Central America and the West Indies, now extensively cultivated and often becoming naturalized. It may have been first introduced into Fiji by J. B. Thurston, who listed it in his 1886 *Catalogue*, for commercial experimentation, and it is infrequently seen naturalized in low elevation, dry forest.

LOCAL NAME AND USES: Commercial vanilla is obtained from the developed fruits, harvested, fermented, and cured before they are fully ripe; it is extensively used as a flavoring in ice cream, chocolate, beverages, pastries, and confectionery. Purseglove (1972) provides an interesting account of its origin, introduction into Europe, propagation, etc. Away from its natural pollinators, vanilla requires artificial pollination, which is now very successful. Most commercial vanilla is currently produced in Madagascar and other Indian Ocean islands. In Fiji the species has been established in several areas but commercial cultivation was not seriously tried until about 1970, when attempts to make it a crop plant were undertaken in Serua Province, Viti Levu (Parham, 1972).

AVAILABLE COLLECTION: VITI LEVU: SERUA: Naturalized in dry forest in hills between Wainigere and Waisee Creeks, between Ngaloa and Wainiyambia, *Smith 9633*.

6. PSEUDOVANILLA Garay in Bot. Mus. Leaflet. **30**: 234. 1986; Kores in Allertonia **5**: 18. 1989.

Galeola sensu Schlechter in Repert. Sp. Nov. Beih. **1**: 27, p. 1911; non Lour.

Vanilla sensu Ames & L. O. Williams in Bot. Mus. Leaflet. **5**: 108, p. 1938; non Plumier ex Mill.

Large, climbing or scandent, terrestrial, lianoid plants with slender, much elongated, aphyllous stems¹, these often laxly branched, many nodes in length, with a single adhesive root at each of the lower nodes; inflorescences terminal or sometimes lateral, large, laxly paniculate, glabrous, few-flowered, with an enlarged, foliaceous bract at the base of each branch, these bracts usually oblong-obovate to -elliptic, gradually decreasing in size toward apex of inflorescence, subcoriaceous, with prominently reticulate venation; flowers moderately large, not fleshy, resupinate; sepals and petals free, spreading or patent, more or less similar or the petals slightly narrower than sepals; labellum briefly adnate at base to base of column and forming a brief, saccate nectary, much broader than other segments, ecalcarate, the distal portion free, entire, somewhat convolute, the disk densely verrucose; column long, slender, slightly arcuate, weakly clavate distally; clinandrium small; anther terminal, more or less incumbent, subquadrate-cucullate, imperfectly 2-celled; pollinia 2, bipartite, more or less powdery-granulose, ecaudiculate; rostellum short, transverse; stigma directly beneath rostellum, deeply recessed, suborbicular; capsules long, slender, cylindrical, dry, dehiscent, the seeds prominently winged, the wings cleft or bipartite.

¹Although leafless, many species of *Pseudovanilla* produce very large, foliaceous bracts at the bases of the inflorescences and at the bases of the major branches within the inflorescence itself. These bracts have been misinterpreted as true leaves by some authors, but they are relatively thin or subcoriaceous at maturity, with prominently reticulate venation, and they are not found anywhere else on the plant.

TYPE SPECIES: *Pseudovanilla foliata* (F. v. Muell.) Garay (*Ledgeria foliata* F. v. Muell.).

DISTRIBUTION: Malesia to Fiji, with eight species, now known from the Philippines, Java, the Moluccas, Papuasia, northern Australia, the Solomon Islands, Ponape, and Fiji; in Fiji it is represented by a single endemic species.

USEFUL TREATMENT OF GENUS: GARAY, L. A. *Olim* Vanillaceae. Bot. Mus. Leaflet. 30: 223-237. 1986. This treatment provides a brief survey of the literature dealing with the tribe Vanilleae (sensu Garay), proposes a number of new genera including *Pseudovanilla*, and lists several new combinations for some of the previously described taxa of the tribe. It is too soon to ascertain how widely the nomenclatural and taxonomic changes proposed by Garay will be followed by future authors, but the recent treatment seems clarifying. Garay's use of "Vanillaceae" alludes to the establishment of the separate family by Lindley (Key Struct. Phys. Syst. Bot. 73. 1835).

1. *Pseudovanilla anomala* (Ames & L. O. Williams) Garay in Bot. Mus. Leaflet. 30: 235. 1986; Kores in *Allertonia* 5: 18. 1989.

Vanilla anomala Ames & L. O. Williams in Bot. Mus. Leaflet. 5: 108. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 23. 1953; Bouriquet, Le Vanillier et la Vanille dans le Monde, 167 (in Lechevalier, Encycl. Biologique 46). 1954; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972.

Plants climbing or scandent, lianoid, probably several meters in length, the stems simple or laxly branched, slender, somewhat fractiflex, terete or weakly angled, slightly enlarged at nodes; leaves absent; inflorescences terminal or lateral, very laxly branched, up to 50 cm. long, with a single, conspicuously enlarged, foliaceous bract at base of each major branch and at base of peduncle, few-flowered, the bracts dimorphic, the foliaceous bracts patent or slightly reflexed, oblong-lanceolate to -ovate, gradually decreasing in size toward apex of inflorescence, 1-7 cm. long, 0.5-4 cm. broad, subcoriaceous, reticulate-veined, the floral bracts at bases of pedicels ascending, ovate-cucullate, about 1-2 mm. long, obtuse at apex; flowers with sepals and petals greenish yellow to dull yellow, the labellum yellow with reddish markings; dorsal sepal narrowly elliptic-lanceolate, 2-2.5 cm. long, 0.4-0.9 cm. broad, subacute at apex; lateral sepals narrowly oblong-elliptic, 2-2.6 cm. long, 0.5-0.7 cm. broad, slightly cucullate and subacute at apex; petals narrowly lanceolate to oblong-lanceolate, slightly falcate, 2-2.5 cm. long, 0.2-0.4 cm. broad, subacute at apex; labellum briefly adnate to face of column near base, more or less obovate in outline, 1.9-2.1 cm. long, about 12 mm. broad, with the lateral margins slightly convolute proximally and irregularly undulate distally, the basal nectary short, saccate, 2-3 mm. long, the apex broadly rounded, the disk with a single, prominent, dorsoventrally flattened carina extending from base almost to apex of labellum and distally subdensely verrucose throughout; column semiterete, about 1.8 cm. long, glabrous; clinandrium small, prominently lobed or appendaged on dorsal margin; anther subquadrate-cucullate; pollinia and rostellum not seen; stigma deeply recessed, sub-orbicular; capsule cylindrical, dehiscent, the seeds large, prominently alate, about 1 mm. across, dark brown, the wing deeply cleft at one point and strongly undulate throughout.

TYPIIFICATION: The type is *Gillespie 3630* (AMES 46907 & 46908 HOLOTYPE; ISOTYPES at BISH, K), obtained Oct. 29, 1927, in the vicinity of Nasinu, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from southern Viti Levu, apparently infrequent in dry or dense forest at elevations of 50-150 m. Flowers have been obtained in October and December, fruits only in December.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith 9493*; hills between Wainingere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith 9513*.

7. *NERVILIA* Commerson ex Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 421. 1829; Schlechter in Bot. Jahrb. 45: 399. 1911; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 410. 1977; Kores in Allertonia 5: 19. 1989; Lewis & Cribb, Orch. Vanuatu, 45. 1989. Nom. cons.

Pogonia sensu Reichenb. f. in Seem. Fl. Vit. 296. 1868; non Juss.

Small terrestrial herbs with jointed, subterranean tubers, bearing a single leaf and an inflorescence at different times; leaves erect, with a short to long, slender, nonsheathing petiole, the blades convolute in bud, more or less reniform to cordate or ovate, membranous, frequently plicate; inflorescences lateral, erect, racemose, the scape well developed, the rachis 1-many-flowered; flowers moderately large (perianth 1.5–3.5 cm. long), resupinate; sepals and petals free, spreading, similar, rather long and narrow; labellum more or less embracing column, entire to 3-lobed, ecalcarate, frequently with longitudinal ridges and hairs within, sometimes glabrous; column rather long, slightly thickened distally, unwinged; anther incumbent, somewhat fleshy, obscurely 2-celled; pollinia 2, granulose, ecaudiculate; rostellum short; stigma directly below rostellum, entire, more or less oblong.

TYPE SPECIES: *Nervilia aragoana* Gaud., typ. cons.

DISTRIBUTION: Paleotropical and subtropical, from Africa and southeastern Asia to Australia, Micronesia, and eastern Polynesia, with approximately 80 species. Three species are known to occur in Fiji.

USEFUL TREATMENT OF GENUS: SCHLECHTER, R. *Nervilia* in Die Polychondreae (Neottiinae Pfitz.) und ihre systematische Einteilung. Bot. Jahrb. 45: 375–410 (*Nervilia*, pp. 399–405). 1911. This treatment, although now seriously out of date, provides a synopsis of Schlechter's infrageneric classification of *Nervilia* and a key to all the species known at the time.

Nervilia has leaves differing from those of most orchids and is quite easy to recognize in a vegetative state; plants rarely bear leaves and flowers at the same time (Kores, 1989). The genus is readily overlooked and may be more frequent in Fiji and adjacent archipelagoes than here indicated, only ten Fijian collections having been located. Each of the three species indigenous in Fiji belongs to a different section.

KEY TO SPECIES BASED ON VEGETATIVE CHARACTERS

Leaf blade glabrous.

Petioles 15–30 cm. long, the blade broadly cordate at base, up to 18 cm. broad, with the margins evenly rounded. 1. *N. aragoana*

Petioles 3–10 cm. long, the blade subcordate to deeply cordate at base, up to 9 cm. broad, with the margins somewhat angled at apices of nerves. 2. *N. punctata*

Leaf blade laxly pilose above, slightly cordate at base, up to 7 cm. broad, with the margins evenly curved. 3. *H. platytila*

KEY TO SPECIES BASED ON FLORAL CHARACTERS

Inflorescence 5–15-flowered, up to 45 cm. long; labellum prominently 3-lobed near apex, the midlobe about as long as broad (sect. *Nervilia*). 1. *N. aragoana*

Inflorescence with 1–3 flowers, 6–10 cm. long; labellum either 3-lobed about midway to apex or entire, the midlobe much longer than broad or absent.

Labellum 3-lobed, with the apex narrowly acute, the disk with 2 minutely pubescent carinae; inflorescence 1-flowered (sect. *Linervia*). 2. *N. punctata*

Labellum entire, with the apex obtuse to slightly retuse, the disk naked; inflorescence 2- or rarely 3-flowered (sect. *Vinerlia*). 3. *N. platytila*

1. *Nervilia aragoana* Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 422. 1829 (Atlas, pl. 35. 1827); Schlechter in Bot. Jahrb. 39: 48. 1906, in Repert. Sp. Nov. 9: 85. 1910, in Bot. Jahrb. 45: 404. 1911, in Denkschr. Akad. Wiss. Wien 89: 523. 1913; L. O. Williams in Bot. Mus. Leaflet 5: 110, p. p. 1938; Guillaumin in Notul.

Syst. (Paris) **10**: 80. 1941; Yuncker in Bishop Mus. Bull. **178**: 41. 1943; Guillaumin, Fl. Nouv.-Caléd. **75**. 1949; J. W. Parham, Pl. Fiji Isl. **293**. 1964, ed. 2. **386**. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 261. 1970; St. John & A. C. Sm. in Pacific Sci. **25**: 347. 1971; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 411. *pl.* **169**. 1977; Seidenfaden in Dansk Bot. Arkiv **32**(2): 164. *fig.* **103, 104**. 1978; Kores in Allertonia **5**: 20. 1989; Lewis & Cribb, Orch. Vanuatu, **46**. 1989.

Pogonia flabelliformis Lindl. in Wall. Num. List, 247, no. 7400, nom. nud. 1832, Gen. Sp. Orchid. Pl. 415, nom. illeg. 1840; Kraenzl. in Bot. Jahrb. **25**: 599. 1898; Duthie in Ann. Bot. Gard. Calcutta **9**: 158. *pl.* **129**. 1906.

Pogonia nervilia Bl. Mus. Bot. Lugd.-Bat. **1**: 32, nom. illeg. 1849, Fl. Javae Nov. Ser. **130**. *pl.* **56**. *fig.* **2**. 1858 or 1859, Coll. Orchid. **154**. *pl.* **56**. *fig.* **2**. 1859; Drake, Ill. Fl. Ins. Mar. Pac. **313**. 1892.

Leaf erect, up to 45 cm. long, the petiole 15–30 cm. long, the blade broadly cordate to reniform-cordate, (10–) 12–15 cm. long, (10–) 14–18 cm. broad, glabrous, more or less plicate, with evenly curved, entire to slightly undulate margins, broadly and deeply cordate at base, apiculate at apex; inflorescence laxly to subdensely 5–15-flowered, up to 45 cm. tall, the bracts reflexed, linear to linear-lanceolate, 1.5–2.5 cm. long; flowers pendulous, greenish yellow with the labellum white to rose-colored or with purple markings; sepals and petals similar, spreading, linear-lanceolate to -oblong, 2–2.5 (–3) cm. long, acute at apex; labellum slightly shorter than sepals, prominently 3-lobed near apex, the base narrowly cuneate, channelled, the lateral lobes small, erect, more or less triangular with the tips acute to obtuse, the midlobe subovate, about as broad as long, with undulate margins, acute to obtuse at apex, the disk laxly to subdensely puberulent medially; column clavate, about 7 mm. long.

TIPIFICATION AND NOMENCLATURE: The type is *Gaudichaud s. n.* (P HOLOTYPE), from Guam. *Pogonia flabelliformis* and *P. nervilia* are both illegitimate, their proto-logues having included Gaudichaud's name and/or its type (Kores, 1989). Hallé (1977) calls attention to the fact that *Nervilia aragoana* was validly published by the illustration of 1827 (ICBN, Art. 42.2) and that such publication validated the genus *Nervilia* as of that date, instead of 1829 as listed (as nom. cons.) in ICBN.

DISTRIBUTION: Widely distributed from India and southern China through south-eastern Asia and Malesia to northern Australia and eastward to parts of Micronesia and eastern Polynesia. In the Fijian Region it is known from the New Hebrides, Tonga, Niue, the Horne Islands, and Samoa as well as Fiji. In Fiji it has been noted at elevations from near sea level to about 400 m., occurring in forest and sometimes on low ridges.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Rovondrau Bay, *DA 7201, 7202*. RA: Hills near Penang, *Greenwood 752*. TAILEVU: Weisere Creek, *DA 2690*. PROVINCE?: Vunikawai, *Vaughan 3352*. OVALAU: *U. S. Expl. Exped.* (AMES, w). VANUA LEVU: MATHUATA: Mountains near Lambasa, *Greenwood 546*. FIJI without further locality, *in Thurn s. n.*

2. *Nervilia punctata* (Bl.) Makino in Bot. Mag. (Tokyo) **16**: 199. 1902; Schlechter in Bot. Jahrb. **45**: 402. 1911, in Repert. Sp. Nov. Beih. **1**: 40, in adnot. 1911; Holttum, Fl. Malaya **1**: 106. 1953; Backer & Bakh. f. Fl. Java **3**: 261, p. p. 1968; Seidenfaden in Dansk Bot. Arkiv **32** (2): 151. *fig.* **93**. 1978; Kores in Allertonia **5**: 20. 1989.

Pogonia punctata Bl. Mus. Bot. Lugd.-Bat. **1**: 32. 1849, Fl. Javae Nov. Ser. **127**. *pl.* **49**. *fig.* **2, a-c, 54, b**. 1858 or 1859, Coll. Orchid. **150**. *pl.* **49**. *fig.* **2, a-c, 54, b**. 1859; J. J. Sm. Orchid. Java, **55**. 1905, Orchid. Java Fig.-Atlas, *fig.* **34**. 1908.

Leaf ascending, up to 19 cm. long, the petiole 3–10 cm. long, the blade suborbicular, 3.5–8 cm. long, 4–9 cm. broad, glabrous, with the margins somewhat angled at apices of nerves, deeply cordate to subcordate at base, broadly subacute at apex; inflorescence 1-flowered, 6–10 cm. tall, the bract erect, oblong-lanceolate, about 0.8 cm. long; flower more or less patent, the outer segments greenish white to pale yellow, frequently spotted with purple, the labellum white to pale rose with small purple spots; sepals and petals similar, spreading, lanceolate, 1.5–2.2 (–2.5) cm. long, 2–3 cm. broad,

acute at apex; labellum somewhat shorter than sepals, prominently 3-lobed about midway, the base embracing column, more or less oblong, the lateral lobes small, erect, subtriangular with the tips subacute, the midlobe much larger, more or less rhomboid, distinctly longer than broad, with the lateral margins slightly incurved and weakly undulate, narrowly acute at apex, the disk with 2 minutely pubescent carinae; column slightly dilated at ends, about 7 mm. long, laxly puberulent ventrally.

TYPIFICATION: The type is *Kuhl* (L HOLOTYPE, ex herb. Bogor. 2597), from Pangerango, Java, a specimen now consisting only of a short piece of stem without any trace of a flower, this perhaps having been destroyed by Keultjes in making his illustration (Bl. pl. 54, b. 1858 and/or 1859, cited above); that drawing of the flower should be considered part of the type (Kores, 1989).

DISTRIBUTION: Sumatra, Java, Borneo, and Fiji, represented by a single recent collection from Viti Levu at an elevation of not more than 429 m. While this distribution seems unexpectedly disjunct, in 1989 I adduced reasons for considering that *Nervilia punctata* very probably occurs in intermediate areas (New Guinea and the New Hebrides) as well.

AVAILABLE COLLECTION: VITI LEVU: REWA: Mt. Korombamba, *Hassall 107915* (K spirit coll.), in flower Oct. 30, 1979.

Seidenfaden (1978) is of the opinion that Backer and Bakhuizen van den Brink, Jr. (1968) unintentionally included more than one taxon in their concept of *Nervilia punctata*; since this problem is beyond the scope of the present *Flora* I have not pursued it further.

3. *Nervilia platychila* Schlechter in Bot. Jahrb. 39: 48. 1906, in op. cit. 45: 403. 1911; Guillaumin in Notul. Syst. (Paris) 10: 81. 1941, Fl. Nouv.-Caléd. 75. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 412. pl. 170. 1977; Kores in Allertonia 5: 21. 1989.

Pogonia biflora sensu Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862; Guillaumin in Notul. Syst. (Paris) 10: 81. 1941, Fl. Nouv.-Caléd. 75. 1948; non Wight.

Pogonia sp. Reichenb. f. in Seem. Fl. Vit. 296. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 313. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 27. 1953.

Nervilia aragoana sensu L. O. Williams in Bot. Mus. Leaflet. 5: 110, p. p. 1938; non Gaud.

Leaf ascending, up to about 9.5 cm. long, the petiole 1–2.5 cm. long, the blade 4–7 cm. across, laxly pilose above, with the margins evenly curved, slightly cordate at base, broadly acute to minutely apiculate at apex; inflorescence 2- or rarely 3-flowered, 6–10 cm. tall, the bracts patent, ovate-acuminate, about 0.4 cm. long; flowers patent, the outer segments brownish green, the labellum white to pale rose; sepals and petals similar, spreading, linear-lanceolate, 1.7–2.2 cm. long, about 4 mm. broad, acute at apex; labellum entire, obovate, 1.7–1.8 cm. long, about 1.2 cm. broad, with the lateral margins slightly turned upward and more or less entire, obtuse to slightly retuse at apex, the disk naked; column very slender, abruptly dilated near apex, 9–11 mm. long.

TYPIFICATION: The type is *Schlechter 15747* (B HOLOTYPE, destroyed; no isotypes located), collected in January, 1903, near Ou-Hinna, New Caledonia.

DISTRIBUTION: New Caledonia and Fiji; known in Fiji from a single collection only, this being in vegetative condition.

AVAILABLE COLLECTION: TAVEUNI: Without further locality, *Seemann 604* (err. "404" on some labels) (AMES, BM, K, P), collected in 1860 in dark woods.

Although the Seemann material bears leaves only, these patently do not represent *Nervilia aragoana* and remained unidentified by Reichenbach. Inclusion of the specimens in the otherwise New Caledonian *N. platychila*, as suggested by Hallé (1977), seems entirely justified. Material of *Nervilia* being so easily overlooked, it is hoped that future collectors in both Fiji and the New Hebrides will seek additional material of the present species as well as of the two preceding ones.

8. *EPIPOGIUM* Gmelin ex Borkh. Tent. Disp. Pl. German. 139. 1792; R. Br. Prodr. Fl. Nov. Holl. 330. 1810; Kores in Allertonia 5: 22. 1989; Lewis & Cribb, Orch. Vanuatu, 48. 1989.

Epipogium L. C. Rich. Orchideis Eur. Annot. 20, orth. var. 1817, in Mém. Mus. Hist. Nat. 4: 42. 1818. *Epipogon* Patze et al. Fl. Prov. Preussen, 93, orth. var. 1850; Ledeb. Fl. Ross. 4: 77. 1852.

Small, pale, leafless saprophytes with fleshy or tuberous, subterranean rhizomes; inflorescences terminal, erect, racemose, the peduncle somewhat fleshy, the rachis laxly few-many-flowered; flowers small (perianth 8–12 mm. long), resupinate; sepals and petals free, erect or slightly spreading, more or less similar, narrow; labellum erect, much broader than other segments, entire, spurred, the blade concave, with small papillae or longitudinal ridges within; column short; anther more or less incumbent, dorsally somewhat fleshy; pollinia 2, granular, each with a filiform stipe; rostellum short, broad; stigma some distance below rostellum, prominent, broad.

TYPE SPECIES: *Epipogium aphyllum* Sw. (*Satyrium epipogium* L.), the only original species.

DISTRIBUTION: Western Europe and Asia (including Japan), tropical Africa, and eastward through Malesia to Australia and into the Pacific as far as Fiji, with two species, one of these occurring in Fiji.

USEFUL TREATMENT OF GENUS: TUYAMA, T. On *Epipogium roseum* (D. Don) Lindl. in Japan and its adjacent regions, with remarks on other species of the genus. J. Jap. Bot. 42: 295–316. 1967.

1. *Epipogium roseum* (D. Don) Lindl. in J. Proc. Linn. Soc. Bot. 1: 177. 1857; Tuyama in J. Jap. Bot. 42: 295. 1967; Garay & Sweet, Orch. S. Ryukyu Isl. 58. fig. 3, i. 1974; Walker, Fl. Okinawa & S. Ryukyu Isl. 346. 1976; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 456. pl. 183. 1977; Seidenfaden in Dansk Bot. Arkiv 32(2): 171. fig. 106. 1978; Kores in Allertonia 5: 22. 1989; Lewis & Cribb, Orch. Vanuatu, 48. fig. 5, A–H. 1989.

Limodorum roseum D. Don, Prodr. Fl. Nepal. 30. (Feb.) 1825.

Galera nutans Bl. Bijdr. Fl. Ned. Ind. 416. (Sept.–Dec.) 1825, Tab. Pl. Jav. Orchid. fig. 3. (Dec.) 1825.

Epipogium nutans Reichenb. f. in Bonplandia 5: 36, as *Epipogium n.*, nom. illeg. 1857.

Leafless saprophyte with tuberous subterranean rhizomes; inflorescence erect, racemose, pale white to light brown, up to 50 cm. tall, the peduncle with 2 or 3 membranous, sheathing cataphylls, the rachis with the apex nodding or not, laxly flowered; flowers pendent, pale rose to pale yellow with a few pink or brownish purple spots or markings; sepals erect or slightly spreading, lanceolate to elliptic-lanceolate, 6–12 mm. long, 2–2.5 mm. broad, acute at apex; petals erect, ovate-acuminate, 5–10 mm. long, 2.5–3.5 mm. broad, acute at apex; labellum erect, broadly ovate to ovate-cordate in outline, 10–12 mm. long, 9–12 mm. broad, the spur short, blunt, up to 4.5 mm. long, the lateral margins inflexed and weakly erose-denticulate, the apex acute, the disk more or less minutely papillate distally; column erect, short; pedicel and ovary up to 8 mm. long.

TYPEFICTION AND NOMENCLATURE: The type of *Limodorum roseum* is *Wallich s. n.* (K HOLOTYPE in Lindley orch. herb.), from upper Nepal; that of *Galera nutans* is *Blume* (HOLOTYPE probably at L), collected in the mountain forests of Salak Province, Java. Reichenbach's combination must be rejected in favor of Lindley's, based on the earlier epithet.

DISTRIBUTION: Japan, tropical Asia, Africa, and eastward through Malesia to Australia, New Caledonia, the New Hebrides, and Fiji. The species is rare (or readily overlooked) in Fiji, where it occurs in densely shaded forest at elevations of about 800–1,000 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 946* (AMES); vicinity of Nandarivatu, *N. Gardiner*, Nov. 16, 1981 (BISH).

9. *DIDYMOPLEXIS* Griffith in *Calcutta J. Nat. Hist.* **4**: 383. 1843; Hemsl. in *J. Linn. Soc. Bot.* **20**: 308. 1883; Benth. in Benth. & Hook. f. *Gen. Pl.* **3**: 1226. 1883; Garay & Sweet, *Orch. S. Ryukyu Isl.* **62**. 1974; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 452. 1977; Kores in *Allertonia* **5**: 23. 1989; Lewis & Cribb, *Orch. Vanuatu*, 47. 1989.
- Leucorchis* Bl. *Mus. Bot. Ludg.-Bat.* **1**: 31. 1849; Benth. in Benth. & Hook. f. *Gen. Pl.* **3**: 616. 1880; non E. Meyer (1839).
- Epiphanes* sensu Reichenb. f. in Seem. *Fl. Vit.* 295. 1868; non Bl.

Small, leafless saprophytes with fleshy, subterranean rhizomes; inflorescences borne from rhizome, erect, racemose, slender, few-many-flowered, the bracts small, ovate-triangular; flowers small (perianth 4–12 mm. long), resupinate, spurless, frequently ephemeral; sepals and petals connate at base forming a short tube, distally divided into 2 distinct lobes, the uppermost formed by the connate dorsal sepal and 2 petals, the lowermost formed by the fused lateral sepals; labellum joined to column foot, free from sepals and petals, short-clawed, entire or lobed, the disk with 1 or more calli or appendages; column long, slender, sometimes winged distally, somewhat broadened at top; column foot short; anther declinate; pollinia 2, sectile, ecaudiculate; rostellum short; stigma slightly beneath apex of column, fairly broad; fruits borne on erect pedicels often elongating considerably during maturation, ultimately dehiscent by means of 6 longitudinal sutures.

TYPE SPECIES AND NOMENCLATURE: The type species and only original species of *Didymoplexis* is *D. pallens* Griffith. *Leucorchis* Bl. (an illegitimate later homonym of *Leucorchis* E. Meyer) was also originally proposed as a monotypic genus, its type species being *L. sylvatica* Bl. Hemsley (1883) first pointed out the identity of Blume's genus with *Didymoplexis*, and his opinion has been supported by subsequent authors.

DISTRIBUTION: Tropical Africa and Madagascar and tropical Asia from India and the southern Ryukyu Islands eastward through Malesia to Australia and Pacific archipelagoes to Samoa, with approximately 20 species. One fairly widespread species is indigenous in Fiji. The difficulty of distinguishing among *Didymoplexis* and two closely related genera in the absence of flowers (which are usually ephemeral) has recently been discussed (Kores, 1989).

1. *Didymoplexis micradenia* (Reichenb. f.) Hemsl. in *J. Linn. Soc. Bot.* **20**: 311. 1883; L. O. Williams in *Bot. Mus. Leafl.* **5**: 110. 1938; J. W. Parham, *Pl. Fiji Isl.* 290. 1964, ed. 2. 382. 1972; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 454, in obs. 1977; Kores in *Allertonia* **5**: 24. 1989; Lewis & Cribb, *Orch. Vanuatu*, 47, p. p. 1989.

Orchidea Seem. in *Bonplandia* **9**: 260. 1861, Viti, 443. 1862.

Epiphanes micradenia Reichenb. f. in Seem. *Fl. Vit.* 295. 1868; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 25. 1953.

Leucorchis micradenia Benth. & Hook. f. ex Drake, *Ill. Fl. Ins. Mar. Pac.* 313, as *Leuchorchis m.* 1892. *Didymoplexis neocaledonica* Schlechter in *Bot. Jahrb.* **39**: 50. 1906; Kraenzl. in *Viert. Naturf. Ges. Zürich* **74**: 67. 1929; Guillaumin in *Notul. Syst. (Paris)* **10**: 81. 1941, *Fl. Nouv.-Caléd.* 73. 1948.

Didymoplexis minor subsp. *samoensis* H. Fleischm. & Reinger in *Denkschr. Akad. Wiss. Wien* **85**: 251. t. 1, fig. 7. 1910.

Didymoplexis samoensis Schlechter in *Repert. Sp. Nov.* **9**: 85. 1910.

Didymoplexis pallens sensu Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 258. 1970; non Griffith.

Didymoplexis minor sensu Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 452. pl. 182. 1977; non J. J. Sm.

Saprophyte with subterranean, fusiform, tuberous rhizomes; inflorescence erect, slender, 7–10 (–25) cm. tall, the peduncle relatively long, glabrous, with 2–4 small, tubular, sheathing cataphylls 1–3 mm. long, the rachis abbreviated, 3–5-flowered, the bracts small, ovate-acuminate, 1–1.5 mm. long, about 1 mm. broad, the pedicels erect or ascending, 2–5 mm. long prior to anthesis, becoming noticeably thicker and rapidly increasing in length to 5–20 cm. after fertilization; flowers dull brown to brownish gray externally, somewhat paler within with yellow markings on labellum, bilabiate, 5–7 mm. long; sepaline tube short, 1–1.5 mm. long; dorsal sepal adnate to petals forming a

hood over column, the hood more or less oblong-obovate in outline when flattened, 5.5–6.5 mm. long, 2.5–3.5 mm. broad, weakly 3-lobed at apex; lateral sepals almost entirely fused, initially closely appressed to labellum, distally conspicuously reflexed, oblong to oblong-oblongeolate, 5–6 mm. long, 1.5–2 mm. broad, weakly divided into 2 obtuse to subacute lobes at apex; labellum narrowly cuneiform to oblong-cuneiform, 5.5–6.5 mm. long, 2.5–3.2 mm. broad, weakly 3-lobed at apex, the lobes obtuse, with erose or irregularly dentate margins, the disk slightly fleshy, initially naked for 1–2 mm. above base, distally with 3 weakly defined rows of small papillae, these often becoming more numerous toward base and apex of disk; column slender, clavate, 4.7–5.5 mm. long; column foot short, slender, 0.25–0.5 mm. long; clinandrium shallowly excavate, with the dorsal margin weakly 3-lobed; anther subquadrate, about 1.25 mm. across; pollinia oblong, about 1 mm. long and 0.3 mm. in diameter; stigma deeply recessed, transverse; capsules cylindrical-fusiform, 1.8–2.8 cm. long.

TYPIFICATION AND NOMENCLATURE: *Epiphanes micradenia* is based on *Seemann 610* (W 48230 HOLOTYPE; ISOTYPE at K), collected in October, 1860, at Port Kinnaird, Ovalau. The type of *Didymoplexis neocaledonica* is *Schlechter 15748* (B HOLOTYPE, presumably destroyed), obtained in January, 1903, near Ou-Hinna, New Caledonia; and that of *D. minor* subsp. *samoensis* is *Rechinger 1641* (W 3080 HOLOTYPE), collected in July, 1905, between Sasina and Aopo, Savai'i, Samoa. The synonymy and different interpretations of the present taxon were recently (1989) discussed by me.

DISTRIBUTION: New Caledonia, the New Hebrides, Fiji, Tonga, Niue, and Samoa. In Fiji the species appears to be rare (or perhaps readily overlooked by collectors), occurring sparsely on four of the high islands in forested areas from near sea level to an elevation of about 1,070 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Lower southwestern slope of Mt. Tomanivi, *DA 7137* (coll. *Elizabeth H. Parham*) (US). KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith 114* (BISH). VANUA LEVU: MATHUATA: Mountains near Lambasa, *Greenwood 553* (K).

In their recent treatment, Lewis and Cribb (1989) include *Didymoplexis minor* J. J. Sm., a Javanese species, among the synonyms of *D. micradenia*, expanding its distribution accordingly. However, there appear to be some differences between these two taxa (Kores, 1989), and I am reluctant to accept this broader circumscription of *D. micradenia*, at least until additional studies are conducted.

10. GOODYERA R. Br. in Ait. f. Hort. Kew. ed. 2. 5: 197. 1813; J. J. Sm. Orchid. Java, 118. 1905; Schlechter in Repert. Sp. Nov. Beih. 1: 47. 1911, in Bot. Jahrb. 45: 391. 1911; Garay & Sweet, Orch. S. Ryukyu Isl. 65. 1974; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 526. 1977; Kores in Allertonia 5: 25. 1989; Lewis & Cribb, Orch. Vanuatu, 27. 1989.

Terrestrial plants with succulent, decumbent or ascending, rhizomelike stems rooting at nodes; leaves alternate, petiolate, not articulate, the blades convolutive in bud, sometimes with distinct markings or colored venation; inflorescences terminal, erect, racemose, few-many-flowered; flowers small (perianth 0.5–1 cm. long), resupinate; dorsal sepal connivent with petals forming a hood over column; lateral sepals free, erect to patent or sometimes reflexed, similar to dorsal sepal; petals entire, usually slightly smaller than sepals, distinctly oblique; labellum parallel to column, entire, the base ventricosely expanded to distinctly saccate, with numerous hairlike appendages within, the distal portion narrowed to acuminate, often with the apex recurved or revolute, or sometimes ending in a small blade; column short to rather long, without ventral or basal appendages, sometimes weakly winged distally; anther erect, persistent, short to relatively long, acuminate; pollinia 2, frequently deeply 2-partite, sectile, narrowly clavate, the caudicles turned toward top of anther and joined to a common,

relatively large viscidium; rostellum usually long, deeply cleft; stigma undivided, in front of column at base of rostellum, frequently deeply concave.

LECTOTYPE SPECIES: *Goodyera repens* (L.) R. Br. (*Satyrium repens* L.); vide Britton and Brown, Ill. Fl. N. U. S. ed. 2. 1: 569. 1913; Sprague in J. Bot. 64: 113. 1926. The choice between Brown's two original species was further discussed by me in 1989.

DISTRIBUTION: A genus of about 40 species found throughout the temperate and tropical parts of the world except Africa, in the Pacific extending eastward to Fiji, Tonga, and Samoa. Two indigenous species, one of them endemic, represent the genus in Fiji.

KEY TO SPECIES

- Mature leaf blades 6–9 cm. long; labellum with the apex expanded to form a small, broadly ovate to obovate blade. 1. *G. vitiensis*
 Mature leaf blades (10–) 12–18 cm. long; labellum without an apical blade, the apex abruptly acuminate to ligulate. 2. *G. rubicunda*

1. *Goodyera vitiensis* (L. O. Williams) Kores in Allertonia 5: 25. 1989.

Goodyera waitziana var. *vitiensis* L. O. Williams in Bot. Mus. Leaflet 5: 111. 1938; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Plants decumbent, up to 60 cm. tall; leaves scattered throughout upper 1/2–1/3 of stem, the petioles slender, 3.5–4.5 cm. long, with inflated, tubular, sheathing bases 0.6–1.2 cm. long, the blades membranous, ovate to elliptic-ovate, slightly oblique, 6–9 cm. long, 2.5–3.5 cm. broad, broadly cuneate to rounded at base, acuminate at apex; inflorescence up to 30 cm. long, relatively lax; flowers pale reddish brown externally, whitish yellow to faint pink internally; dorsal sepal erect, lanceolate-cymbiform, 7–8.5 mm. long, 2–2.5 mm. broad, laxly to subdensely hirtellous externally, subacute at apex; lateral sepals broadly spreading, obliquely ovate, 7–8 mm. long, 3.5–4 mm. broad, laxly hirtellous externally, subacute at apex; petals unequally obtrullate, 6.5–7 mm. long, about 2 mm. broad, acute at apex; labellum 7–8 mm. long, entire, the base adnate to column along lateral edges for 2–3 mm., saccate, with numerous hairlike appendages within, externally weakly divided longitudinally by a shallow groove, the distal portion gradually narrowed, deeply channelled, ending in a small, recurved blade, this partially separated from rest of labellum by a shallow sinus along lateral margins, distally transverse-obovate in outline, about 2 mm. long and 2.5 mm. broad, subacute to obtuse at apex; column relatively slender, 5–6.5 mm. long, slightly winged along lateral margins throughout upper 1/3; anther deeply embedded within column, narrowly acuminate, 4–4.5 mm. long; pollinia clavate, 3–3.5 mm. long, about 0.75 mm. in diameter, the caudicles 0.75–1.25 mm. long, the viscidium large, narrowly elliptic, 1–1.5 mm. long, about 0.5 mm. broad; rostellum 2–2.5 mm. long, deeply 2-lobed, the lobes narrowly attenuate; stigma large, deeply recessed.

TYPIFICATION: The type is *Smith 1062* (AMES 42090 HOLOTYPE; ISOTYPES at BISH, K, NY, P, US), collected Feb. 5, 1934, on the eastern slope of the main ridge of Koro.

DISTRIBUTION: Endemic to Fiji and apparently rare, known from only two of the high islands, where it occurs in forested areas at elevations of 300–500 m. Flowers have been noted in January and February.

AVAILABLE COLLECTION: VANUA LEVU: THAKAUNDRIVE: East of Mbalanga, Savusavu Bay, *Degener & Ordenez 13900*.

Goodyera vitiensis differs from *G. waitziana* Bl. in having its labellum adnate to the face of the column for 2–3 mm. above the base along the lateral margins, the basal portion of the labellum partially divided longitudinally by a shallow groove along the ventral surface, the labellum terminating in a small, transverse, ovate to obovate blade, and the column with two small wings along the lateral margins throughout the upper third.

2. *Goodyera rubicunda* (Bl.) Lindl. in Bot. Reg. 25: 61, Misc. no. 92. 1839, Gen. Sp. Orchid. Pl. 493. 1840; J. J. Sm. Orchid. Java, 121, 1905, Orchid. Java Fig.-Atlas, fig. 88. 1909; L. O. Williams in Bot. Mus. Leaflet 5: 111. 1938; Holtum, Fl. Malaya 1: 122. 1953; J. W. Parham, Pl. Fiji Isl. 290. 1964, ed. 2. 383. 1972; Backer & Bakh. f. Fl. Java 3: 273. 1968; Garay & Sweet, Orch. S. Ryukyu Isl. 69, pro syn. 1974; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 530. 1977; Kores in Allertonia 5: 26. 1989; Lewis & Cribb, Orch. Vanuatu, 27, as var. *rubicunda*. 1989.

Neottia rubicunda Bl. Bijdr. Fl. Ned. Ind. 408. 1825.

Neottia grandis Bl. Bijdr. Fl. Ned. Ind. 407. 1825.

Goodyera grandis Bl. Fl. Javæ Nov. Ser. 36. 1858 or 1859, Coll. Orchid. 43. 1858 or 1859; J. J. Sm. Orchid. Java, 121, pro syn. 1905; Garay & Sweet, Orch. S. Ryukyu Isl. 69, fig. 4, i. 1974.

Goodyera rubens Bl. Fl. Javæ Nov. Ser. 36. t. 9. 1858 or 1859, Coll. Orchid. 43. t. 9. 1858 or 1859; Kraenzl. in Bot. Jahrb. 25: 600. 1898.

Goodyera triandra Schlechter in Bull. Herb. Boissier II. 6: 298. 1906.

Goodyera waitziana sensu H. Fleischm. & Reehinger in Denkschr. Akad. Wiss. Wien 85: 254. 1910; non Bl.

Goodyera anomala Schlechter in Repert. Sp. Nov. 9: 86. 1910; Christophersen in Bishop Mus. Bull. 128: 61. 1935; L. O. Williams in Bot. Mus. Leaflet 5: 110. 1938; Hotta in Acta Phytotax. Geobot. 19: 155. 1963; J. W. Parham, Pl. Fiji Isl. 290. 1964, ed. 2. 383. 1972; Hürlimann in Bauhinia 3: 193. 1967.

Rhaphidia rubicunda sensu Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 530, pro syn. 1977; non Reichenb. f.

Goodyera rubicunda var. *triandra* Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 532. pl. 209. 1977; Lewis & Cribb, Orch. Vanuatu, 27. 1989.

Plants decumbent, up to 70 cm. tall; leaves scattered throughout upper 1/2-1/3 of stem, the petioles slender, 4-7 cm. long, with conspicuously inflated, tubular, sheathing bases 1.5-2 cm. long, the blades membranous, obliquely elliptic to elliptic-ovate, (10-) 12-18 cm. long, 3.5-6 cm. broad, broadly cuneate to rounded at base, acuminate at apex; inflorescence up to 40 cm. long, with numerous flowers throughout the upper half, laxly to subdensely pubescent throughout; flowers reddish brown to greenish pink; dorsal sepal erect, narrowly ovate, 7-8.5 mm. long, 2.5-3 mm. broad, subdensely pubescent externally, subacute at apex; lateral sepals spreading or reflexed, ovate, slightly oblique, 7-8.5 mm. long, 3-4 mm. broad, laxly to subdensely pubescent externally, acute at apex; petals distinctly clawed, 7-7.5 mm. long, with an obliquely ovate to subrhomboid blade 2.5-3 mm. broad and subacute at apex; labellum 6-7.5 mm. long, entire, the base saccate, with numerous hairlike appendages within, the distal portion initially gradually narrowed for 2-3 mm., deeply channelled, ultimately abruptly constricted with a recurved, ligulate to narrowly attenuate apex 2-3 mm. long and 1-1.5 mm. broad, with entire or weakly undulate lateral margins; column 5-6.5 mm. long, without wings or appendages; anther deeply embedded within column, acuminate, 3-3.5 mm. long; pollinia clavate, 2.5-3 mm. long, about 0.75 mm. in diameter, the caudicles 0.25-0.5 mm. long, the viscidium narrowly elliptic, about 0.75 mm. long and 0.5 mm. broad; rostellum 1-1.5 mm. long, 2-lobed; stigma large, slightly or not recessed.

TYPIFICATION AND NOMENCLATURE: The complex synonymy of *Goodyera rubicunda*, in our general area, was discussed by me in 1989 and is here briefly summarized. The type of *Neottia rubicunda* is *Blume s. n.* (L HOLOTYPE; ISOTYPE at P), from the mountains Salak and Gede, Java; that of *N. grandis* is a Blume collection from Bantam Province, Java. These two taxa, simultaneously published, were both maintained as species of *Goodyera* until they were combined by J. J. Smith (1905) under the name *G. rubicunda*, which therefore should be used for the species rather than *G. grandis* (ICBN, Art. 57.2). Blume mentioned no type for *G. rubens*, from the mountains of Java, but it has been widely considered a synonym of *G. rubicunda* or *G. grandis*. The type of *G. triandra* is *Morrison s. n.* (B HOLOTYPE, presumably destroyed; ISOTYPE at AMES), collected Aug. 18, 1896, near Mt. MacDonald, Efaté, New Hebrides. This taxon, the column of which produces one normal and two smaller, abnormal anthers,

was reduced to varietal status by Hallé in 1977, but actually the column type is variable even in specimens from the same locality and is here not considered worthy of nomenclatural recognition at any level. *Goodyera anomala* is represented by two collections from Savai'i, Samoa: *Vaupel 405* (B SYNTYPE, presumably destroyed), collected Aug. 16, 1905, near Olonono, and *L. & K. Reching 94* (w 3054 ISOSYNTYPE), collected in July, 1905, in forest near Sasina; this taxon was described as having an abnormally developed column like that of *G. triandra*.

DISTRIBUTION: *Goodyera rubicunda* has a wide distribution from the southern Ryukyu Islands and Malaya throughout Malesia to northern Australia and eastward in the Pacific to Tonga and Samoa. In Fiji it occurs in often dense forest, frequently on shaded, rocky slopes, at elevations of 100–1,050 m., and is now known from seven of the high islands, although its occurrence on other islands is to be anticipated. The observed flowering season extends from April to December.

LOCAL NAME: *Papara* (*Degener 15408*, Ra Province).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 890*; slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, *Smith 4015, 4390*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5623*; vicinity of Mbalo, near Vatukarasa, *Degener 15253*. NAMOSI: Mt. Naitarandamu, *Gillespie 3121.9*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8727*. RA: Vicinity of Rewasa, near Vaileka, *Degener 15408, 15527*. KANDAVU: Mt. Mbuke Levu, *Smith 256*. OVALAU: Slopes of Mt. Korotolotolu, west of Thawathi, *Smith 8004*; hills southeast of Mbureta River, *Smith 7435*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7840*. VANUA LEVU: MBUA: Southern portion of Seatovo Range, *Smith 1576*. TAVEUNI: Slopes of Mt. Manuka, east of Wairiki, *Smith 8130, 8325*. MOALA: Without further locality, *Bryan 318*.

11. PRISTIGLOTTIS Cretz. & J. J. Sm. in Acta Fauna Fl. Universali II. Bot. 1 (14): 4. 1934; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 516. 1977; Kores in Allertonia 5: 27. 1989; Lewis & Cribb, Orch. Vanuatu, 30. 1989.

Cystopus Bl. Fl. Javae Nov. Ser. 69. 1858 or 1859, Coll. Orchid. 82. 1859; non Lévillé (1847).

Anoetochilus sensu Reichenb. f. in Seem. Fl. Vit. 294, as *Anecochilus*. 1868; non Bl.

Odontochilus sensu Drake, Ill. Fl. Ins. Mar. Pac. 312, p. p. 1892; non Bl.

Cheirostylis sensu L. O. Williams in Bot. Mus. Leaflet 7: 138. 1939; non Bl.

Terrestrial plants with fleshy, decumbent stems rooting at lower nodes; leaves alternate, patent, petiolate, not articulate, the blades convolutive in bud, membranous; inflorescences terminal, erect, racemose, few-flowered; flowers moderate in size (perianth 1–2.5 cm. long), resupinate; dorsal sepal connivent with lateral petals forming a hood over column; lateral sepals erect, closely appressed to labellum; petals entire, somewhat oblique; labellum more or less parallel to column, entire, the base completely enclosed by lateral sepals, saccate, with 2 small, sessile glands within, the mesochile with inflexed margins forming a long, slender, dorsally flattened claw, more or less crenulate-pectinate along lateral edges, the epichile somewhat reflexed, more or less expanded into an entire or weakly 2-lobed blade; column long, with 2 parallel lamellate appendages on ventral surface projecting into the saccate base of labellum; anther erect, persistent, narrowly acuminate; pollinia 2, setile, clavate, the caudicles turned toward top of anther and joined to a common viscidium; rostellum relatively long, narrowly attenuate to linear-ligulate, deeply 2-lobed; stigma 1, at base of rostellum, slightly recessed; ovary erect, twisted.

LECTOTYPE SPECIES: *Pristiglottis uniflora* (Bl.) Cretz. & J. J. Sm. (*Cystopus uniflorus* Bl., one of Blume's six original species of *Cystopus*, for which *Pristiglottis* is a substitute name); vide Weatherby in Rehder et al. in Kew Bull. 1935: 421. 1935. My 1989 discussion elaborates on this choice.

DISTRIBUTION: India and southeastern Asia through Malesia to Fiji and Samoa, with approximately 15 species. Two species occur in Fiji, one fairly widespread and the other endemic.

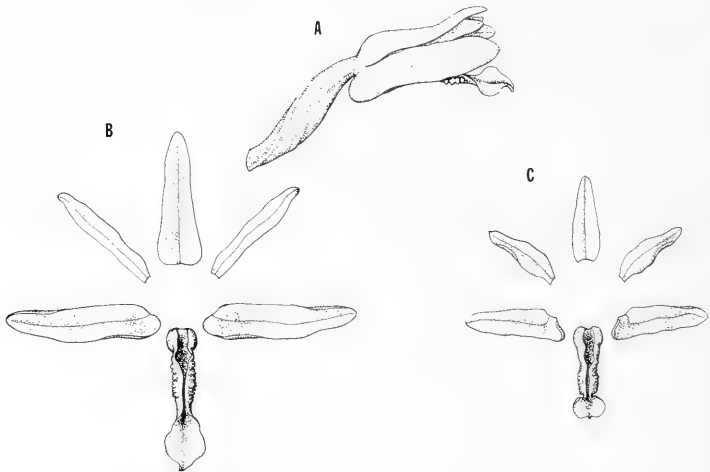


FIGURE 39. A & B, *Pristiglottis longiflora*; A, complete flower, $\times 1\ 1/2$; B, perianth segments, $\times 1\ 1/2$. C, *Pristiglottis degeneri*; perianth segments, $\times 1\ 1/2$. A & B from Morrison & Cribb 5229 (K spirit 41945), C from R. & E. Melville & J. W. Parham 7148, p. p.

KEY TO SPECIES

- Labellum 15–20 mm. long, the blade entire, elliptic to elliptic-ovovate, 5–8 mm. long; sepals 13–20 mm. long; petals 11–18 \times 1.5–2.5 mm. 1. *P. longiflora*
 Labellum 9–11 mm. long, the blade obreniform-trilobulate, 3.5–4.5 mm. long; sepals 8–12 mm. long; petals 9–10 \times 3.5–4 mm. 2. *P. degeneri*

1. *Pristiglottis longiflora* (Reichenb. f.) Kores in *Allertonia* 5: 28. 1989.

FIGURE 39A & B.

- Dorsinia marmorata* sensu Seem. in *Bonplandia* 9: 260, p. p. 1861, Viti, 443, p. p. 1862; non Lindl.
Anecochilus longiflorus Reichenb. f. in Seem. *Fl. Vit.* 294. 1868; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 24, as *Anoetochilus* 1. 1953.
Odontochilus longiflorus Benth. & Hook. f. ex Drake, *Ill. Fl. Ins. Mar. Pac.* 312. 1892; Rolfe in *J. Linn. Soc. Bot.* 39: 177. 1909; L. O. Williams in *Bot. Mus. Leafl.* 5: 112. 1938, in *Sargentia* 1: 9. 1942; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 26. 1953; J. W. Parham, *Pl. Fiji Isl.* 293. 1964.
Goodyera biflora sensu Kraenzl. in *Bot. Jahrb.* 25: 600. 1898; non Hook. f.
Cystopus funkii Schlechter in *Repert. Sp. Nov.* 9: 89. 1910.
Odontochilus upoluensis Kraenzl. in *Mitt. Inst. Allg. Bot. Hamburg* 5: 236. 1922.
Pristiglottis funkii Cretz. & J. J. Sm. in *Acta Fauna Fl. Universali* II. *Bot.* 1 (14): 4. 1934.
Cheirostylis longiflora L. O. Williams in *Bot. Mus. Leafl.* 7: 138. 1939; J. W. Parham, *Pl. Fiji Isl.* ed. 2. 380. 1972.
Pristiglottis montana sensu Lewis & Cribb, *Orch. Vanuatu*, 31. *pl. 1, f.* p. p. 1989; non Cretz. & J. J. Sm.

Plants 8–20 cm. tall; leaves scattered throughout upper half of stem, the petioles 0.5–1.5 (–2) cm. long, with tubular sheathing bases 2–5 mm. long, the blades ovate, (1.3–) 2.5–4 (–6.5) cm. long, 1–1.8 (–2.5) cm. broad, rounded to broadly cuneate at base, acuminate or acute at apex; inflorescence relatively short, 5–10 cm. long, 2–10-flowered; flowers yellowish white to pure white; dorsal sepal linear-lanceolate, 13–20 mm. long, 3–4 mm. broad, glabrous or with a few scattered hairs externally, subacute to obtuse at apex; lateral sepals similar to dorsal sepal but with bases somewhat expanded ventrally to accommodate the saccate base of labellum; petals ligulate, 11–18 mm. long, 1.5–2.5 mm. broad, obtuse at apex; labellum 15–20 mm.

long, the base saccate, 2–3 mm. across, the claw relatively slender, channelled, 8–10 mm. long, weakly to moderately crenulate-pectinate at lateral margins, the blade entire, elliptic to elliptic-obovate, 5–8 mm. long, 3–5 mm. broad, subacute to obtuse at apex; column slender, 8–10 mm. long, with 2 more or less triangular lamellae projecting from ventral surface into hypochile; anther conspicuously elongated, occupying almost the entire back of column, narrowly ovate-acuminate, 8–9 mm. long; pollinia narrowly clavate, 1.5–3 mm. long, 0.5–0.75 mm. in diameter, the caudicles slender, 3–5 mm. long, the viscidium relatively large, narrowly elliptic to elliptic-obovate, 2.5–3.5 mm. long, 0.5–1 mm. broad; rostellum linear-ligulate, 5.5–7 mm. long, 2-lobed throughout upper 1/3–1/4; stigma entire, slightly recessed.

TIPIFICATION AND NOMENCLATURE: *Anecochilus longiflorus* is typified by two collections which I (1989) maintain as syntypes: *Seemann 601* (K in toto, BM p. p., mixed with *Anoetochilus imitans*), collected in 1860 from the vicinity of Somosomo, Taveuni; and *Graeffe s. n.* (not seen), obtained in 1862 or 1864 in Fiji without definite locality. *Cystopus funkii* was originally represented by four syntypes, all from Upolu, Samoa: *Funk s. n.*, *Vaupel 543*, *Reinecke 217*, and *Hochreutiner 3267* (L, Z). The type of *Odontochilus upoluensis* is *Graeffe 1258*, also from Upolu. There seem to be no significant differences among these three concepts (Kores, 1989).

DISTRIBUTION: New Hebrides, Fiji, Samoa, and probably also the Solomon Islands; the relationships of the species were discussed by me in 1989. In Fiji *Pristiglotis longiflora* is known from four of the high islands, occurring in dense forest, often in wet or swampy places, or in crest thickets, at elevations of 200–1,323 m., the latter altitude indicating the high point of the archipelago.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Gibbs 701*; summit of Mt. Tomanivi, *Smith 5179*; slopes of Mt. Tomanivi, *R. & E. Melville & J. W. Parham 7148*, p. p. (K, mixed with the following species in the present treatment). NANDRONGA & NAVOSA-NAITASIRI BOUNDARY: Central plateau between Wainimala and Singatoka River drainages, Wainisavulevu–Numbulolo divide, Taunaisali, *St. John 18372*. NAMOSI: Saliandrau, Wayauyau Creek, Wainikoroiuva River, *DA 15004*; Mt. Voma, *DA 1999*; Namosi without further locality, *DA 3112*. RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, *Smith 5688*. NAITASIRI: Central road, *MacDaniels 1162*, *Tohill 843*. REWA: Mt. Korombamba, *DA 1146*. VITI LEVU, from “central mountains,” *Morrison & Cribb 5229* (K spirit coll. 41945). OVALAU: Summit of Mt. Ndelaivalau and adjacent ridge, *Smith 7367*. VANUA LEVU: MBUA: Southern slope of Mt. Seatura, *Smith 1628*; “Koro” (probably Korolevu River, cf. Horne, *A Year in Fiji*, 52, 1881), *Horne 590*. TAVEUNI: Above Nggathavula Estate, *DA 16917*. FIJI without further locality, *U. S. Expl. Exped.* (AMES, at least partially from Ovalau; US 37653).

2. *Pristiglotis degeneri* (L. O. Williams) Kores in *Allertonia* 5: 29. 1989.

FIGURES 39C, 85 (upper right).

Odontochilus degeneri L. O. Williams in *Sargentia* 1: 9, fig. 1 (1–4). 1942; J. W. Parham, *Pl. Fiji Isl.* 293. 1964, ed. 2. 386. 1972.

Plants 6–15 cm. tall; leaves scattered throughout the upper half of stem, the petioles 0.9–1.5 cm. long, with inflated, tubular, sheathing bases 2–3 cm. long, the blades ovate, 1–4 cm. long, 1–2 cm. broad, acuminate or acute at apex; inflorescence short, 3–6 cm. long, 1–6-flowered; flowers white to pale yellow; dorsal sepal oblong-lanceolate, 8–10 mm. long, about 3 mm. broad, laxly pilose externally, obtuse at apex; lateral sepals similar to dorsal sepal but slightly larger, 11–12 mm. long, about 3.5 mm. broad, somewhat expanded at base ventrally to accommodate the saccate base of labellum; petals oblong-lanceolate, 9–10 mm. long, 3.5–4 mm. broad, obtuse at apex; labellum 9–11 mm. long, the base saccate, 2–3 mm. across, the claw channelled, 4–5 mm. long, somewhat fleshy, weakly crenulate-pectinate at lateral margins, the blade obreniform-trilobulate, 3.5–4.5 mm. long, 5–6 mm. broad, broadly emarginate with a small, medial, subacute lobe 1–1.5 mm. long at apex; column slender, 5–6 mm. long, with 2 small obtuse lamellae on ventral surface; anther elongated, narrowly ovate-acuminate, 4.5–5.5 mm. long; pollinia clavate, 1–1.5 mm. long, 0.5–0.75 mm. in diameter, the caudicles 2–2.5 mm. long, the viscidium narrowly elliptic, 1.5–2 mm. long, 0.5–1 mm. broad.

TIPIFICATION: The type is *Degener 14736* (AMES HOLOTYPE), collected March 6, 1941, at Nauwanga, south of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known from only three collections from the northern uplands of Viti Levu, occurring in forest at approximate elevations of 750–1,125 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Tomanivi, R. & E. Melville & J. W. Parham 7148, p. p. (k) [the other part of this collection represents *Pristiglottis longiflora*], Kores & Molvray F21.

Pristiglottis degeneri seems less closely related to its Fijian congener, *P. longiflora*, than to *P. montana* (Schlechter) Cretz. & J. J. Sm., from New Caledonia and the New Hebrides, from which it differs in having the blade of the labellum conspicuously obreniform-trilobulate rather than transversely obovate with a truncate apex.

12. *ERYTHRODES* Bl. Bijdr. Fl. Ned. Ind. 410. 1825, Tab. Pl. Jav. Orchid. t. I. fig. 72. 1825; Schlechter in Bot. Jahrb. 45: 392. 1911; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 510. 1977; Kores in Allertonia 5: 29. 1989. Lewis & Cribb, Orch. Vanuatu, 25. 1989.

Physurus L. C. Rich. Orch. Europ. Annot. 33, nom. nud. 1817 (repr. Mém. Mus. Hist. Nat. 4: 55. 1818); L. C. Rich. ex Lindl. Gen. Sp. Orchid. Pl. 501. 1840; Schlechter in K. Schum. & Lauterb. Nachr. Fl. Deutsch. Schutzgeb. Südsee, 87, in adnot. 1905, in Bot. Jahrb. 45: 393. 1911.

Terrestrial plants with fleshy, decumbent stems rooting at lower nodes; leaves alternate, patent, not articulate, convolutive in bud, with membranous blades; inflorescences terminal, erect, racemose, many-flowered; flowers small (perianth 3–12 mm. long), resupinate; dorsal sepal somewhat vaulted, connivent with lateral petals forming a hood over column; lateral sepals spreading or rarely erect; petals entire, usually somewhat narrower than sepals; labellum closely appressed to column throughout lower portion, entire or with a small apical blade, the base prolonged into a prominent spur projecting between lateral sepals, the spur short or rather long, slightly or not inflated distally, entire or with the apex distinctly 2-lobed, with or without 2 or sometimes 4 sessile glands within, the distal portion of labellum slightly to moderately reflexed, small, entire, somewhat concave; column short; anther erect, acuminate, persistent; pollinia 2, sectile, narrowly clavate, the caudicles turned toward top of anther and joined to a common viscidium; rostellum relatively short, 2-lobed; stigma at base of rostellum, concave, entire; ovary erect, twisted.

TYPE SPECIES AND NOMENCLATURE: The only original species of *Erythroides* was *E. latifolia* Bl. No type species was originally designated for *Physurus*, but the lectotype species is *P. plantagineus* (L.) Lindl. (*Satyrium plantagineum* L.); vide Britton & Millspaugh, Bahama Fl. 87. 1920.

DISTRIBUTION: Widespread throughout the tropics of America and the Old World (excluding Africa), with approximately 100 species. In the paleotropics the genus is represented by 15–20 species occurring from northern India and China eastward through Malesia and into the Pacific as far as Tonga and Samoa. Two species are indigenous in Fiji.

In Fiji, where the subtribe Physurinae is only poorly represented, the genus *Erythroides* may be distinguished on the basis of its relatively lax spike, its single, entire, concave stigma, and its spur projecting between the lateral sepals.

KEY TO SPECIES

- Lateral sepals 2.5–4 mm. long, glabrous or with a few scattered hairs externally; labellum ending in a small, reflexed, ovate to obtuse blade; leaf blades (3–) 4–5.5 cm. long. 1. *E. parvula*
 Lateral sepals 6–8 mm. long, densely pubescent externally; labellum not ending in a blade, the apex narrowly acute; leaf blades 5–9 (–10.5) cm. long. 2. *E. oxyglossa*

1. *Erythrodos parvula* Kores in *Allertonia* 5: 30. 1989.

This recently described species has comparatively small leaf blades (3-) 4-5.5 × 1.5-2.5 cm., small flowers with the sepals 2.5-4 mm. long and glabrous or with only a few scattered hairs externally, the labellum (excluding spur) only 2.5-4.5 mm. long and transversely expanded apically into an ovate or suborbicular blade 1-1.5 × 0.75-1 mm., and the spur 1.5-2.5 mm. long and without internal glands or calli.

TIPIFICATION: The type is *Smith 7165* (US 2190145 HOLOTYPE; ISOTYPES at AMES, BISH, K), collected April 20, 1953, in hills east of Wainimbuka River, vicinity of Ndakuivuna, Tailevu Province, Viti Levu.

DISTRIBUTION: Fiji, Tonga, and Samoa, found in dense forest at elevations of 100-700 m. In Fiji it is known only from the two largest islands.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Vicinity of Mbalo, near Vatukarasa, *Degener 15254*. SERUA: In hills, *Greenwood 1024*. NAMOSI: Hills east of Navua River, *Greenwood 1016A*. VANUA LEVU: MBUA: Southern slope of Mt. Seatura, *Smith 1636*.

Erythrodos parvula is readily distinguished from *E. oxyglossa*, the only other species of the genus known from the Fijian Region, by its smaller leaves and flowers and its different labellum, as indicated in the above key. It seems more closely related to the New Guinean *E. purpurascens* Schlechter, differing in its uniformly light to dark green rather than reddish purple foliage, its column without a rostellum rather than with a prominent, fairly broad, beaklike rostellum, and its pollinarium lacking caudicles and a viscidium rather than being fully developed.

2. *Erythrodos oxyglossa* Schlechter in *Bot. Jahrb.* 39: 53. 1906; Guillaumin in *Notul. Syst. (Paris)* 10: 83. 1941, *Fl. Nouv.-Caléd.* 76. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 510. *pl. 202*. 1977; Kores in *Allertonia* 5: 32. 1989. Lewis & Cribb, *Orch. Vanuatu*, 26. 1989.

Physurus lilyanus H. Fleischm. & Rechner in *Denkschr. Akad. Wiss. Wien* 85: 253. *t. 1, fig. 3*. 1910. *Erythrodos lilyana* Schlechter in *Repert. Sp. Nov.* 9: 87. 1910, in *Bot. Jahrb.* 45: 393. 1911.

Plants decumbent, 20-45 cm. tall; leaves scattered along the erect portion of stem, the petioles slender, (2-) 2.5-3.3 cm. long, with inflated, tubular, sheathing bases 3-5 mm. long, the blades membranous, obliquely oblong-lanceolate to obliquely oblong-ovate, 5-9 (-10.5) cm. long, 1.5-2.5 cm. broad, cuneate or rarely rounded at base, narrowly acuminate at apex; inflorescence 12-27 cm. long, the peduncle slender, approximately twice the length of rachis, initially glabrous, gradually becoming subdensely covered with short, multicellular hairs distally, the rachis lax, few-flowered, subdensely pilose throughout, the bracts lanceolate, 8-10 mm. long, 1.5-2 mm. broad, laxly pilose externally, with a few scattered hairs along lateral margins; flowers dull brownish white; dorsal sepal lanceolate, slightly concave, 6-8 mm. long, 1.75-2.2 mm. broad, subdensely pubescent externally, subacute at apex; lateral sepals obliquely ovate-lanceolate, similar to dorsal sepal but 2-2.3 mm. broad; petals obliquely oblanceolate, 5.5-7.5 mm. long, 1.5-1.75 mm. broad, acuminate to acute at apex; labellum 6-8.5 mm. long excluding spur, the spur dorsoventrally compressed and weakly divided longitudinally, 2.5-3.5 mm. long, slightly inflated distally, distinctly bilobed throughout distal 1/3-1/4, frequently with 2 small, sessile glands within near apex, the blade initially closely appressed to column, distally slightly reflexed or not, entire, lanceolate to oblong-lanceolate, conspicuously channelled, gradually tapering to a narrowly acute apex, the disk naked; column 2.5-3.5 mm. long; clinandrium deeply excavate near base, with 1 or more small teeth along dorsal margin, these occasionally unequally developed or wanting, the lateral margins conspicuously prolonged to form 2 erect, narrowly attenuate appendages surmounting column on either side of anther; anther ovate-attenuate, 2.5-3.3 mm. long, 1-1.4 mm. broad; pollinia

ovoid, about 1 mm. long, the caudicles and viscidium apparently absent; rostellum much shorter than lateral lobes of clinandrium, nonfunctional, reduced to a small, ascending, ligulate or attenuate tooth 0.3–1 mm. long; stigma directly below rostellum and in contact with bases of pollinia, prominent, slightly concave.

TIPIFICATION AND NOMENCLATURE: *Erythrodes oxyglossa* is based on *Schlechter 15749* (B HOLOTYPE, destroyed), collected in January, 1903, at Ou-Hinna, New Caledonia; *Physurus lilyanus* on three Samoan collections: *Rechinger 63* (w 3080 SYNTYPE), obtained in July, 1905, between Aopo and Asua, Savai'i, *Rechinger 1590* (w 3088 SYNTYPE), also collected in July, 1905, on Mt. Maungaafi, Savai'i, and *Rechinger 1515* (w 3090 SYNTYPE), collected in June, 1905, above Utumapu, Upolu. Hallé (1977) noted the occurrence of *E. oxyglossa* in Fiji, and study of available material shows that *Physurus lilyanus* cannot be maintained as distinct (Kores, 1989).

DISTRIBUTION: New Caledonia, New Hebrides, Fiji, Tonga, and Samoa. In Fiji the species is infrequent and appears limited to northern Viti Levu, occurring in forested areas at elevations of about 600–900 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *in Thurn F3* (K), *Degener 14548* (AMES), *14815* (AMES); Mt. Matomba, vicinity of Nandala, south of Nandarivatu, *Degener 14441* (AMES). NANDRONGA & NAVOSA: Nausori Highlands, "Block 2A," R. & E. Melville & J. W. Parham 7011 (K).

13. ZEUXINE Lindl. Collect. Bot. Append. n. 18, as *Zeuxina*. 1826 (repr. Orchid. Scelet. 9. 1826); corr. Roeser in *Linnaea* 2: 532. 1827; Schlechter in *Repert. Sp. Nov. Beih.* 1: 77. 1911; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 518. 1977; Kores in *Allertonia* 5: 32. 1989; Lewis & Cribb, *Orch. Vanuatu*, 35. 1989. Nom. et orth. cons.

Adenostylis Bl. *Bijdr. Fl. Ned. Ind.* 414. 1825, Tab. Pl. Jav. *Orchid. t. I.* 1825; non *Adenostyles* Cass. (1816).

Monochilus Wall. ex Lindl. *Gen. Sp. Orchid. Pl.* 486. 1840; *Reichenb. f. Otia Bot. Hamb.* 52. 1878 (repr. *Xenia Orchid.* 3: 29. 1881); non Fischer & C. Meyer (1835).

Terrestrial plants with succulent, decumbent, rhizomelike stems rooting at nodes; leaves alternate, petiolate, not articulate, the blades convolutive in bud, membranous; inflorescences terminal, erect, densely to laxly racemose, usually many-flowered; flowers small (perianth 0.5–1 cm. long), resupinate; dorsal sepal frequently connivent with petals forming a hood over column; lateral sepals erect or spreading; petals entire, usually somewhat oblique; labellum more or less adnate to front of column, entire, the base saccate or cymbiform, with 2 or more small glands within, either abruptly contracted at apex or narrowed to form a short claw, the apex abruptly widened into a small, transverse blade, the disk either naked or callose above base; column short, with or without lamellate appendages along ventral surface; anther dorsal, erect, persistent, 1-celled; pollinia 2, sectile, clavate, the caudicles turned toward top of anther and joined to a broad common stipe, the viscidium relatively large; rostellum prominent, rather broad, deeply divided into 2 erect laciniae; stigmas 2, remote from one another on each side of column, convex and sometimes papillose; ovary erect, twisted.

TYPE SPECIES: *Zeuxine sulcata* (Roxb.) Lindl. (*Pterygodium sulcatum* Roxb., as *P. sulcata*); vide Lindl. *Gen. Sp. Orchid. Pl.* 485. 1840; this may prove to be a synonym of *Zeuxine strateumatica* (L.) Schlechter (vide Siedenfaden in *Dansk Bot. Arkiv* 32 (2): 79. 1978). *Adenostylis* Bl. and *Monochilus* Wall. ex Lindl., both illegitimate later homonyms, are referable to *Zeuxine*.

DISTRIBUTION: Paleotropical, from Africa, Madagascar, India, and the southern Ryukyu Islands eastward through Malesia into portions of Micronesia and to Tonga, Niue, and Samoa, with approximately 70 species. Two indigenous species represent the genus in Fiji.

The genus *Zeuxine* is very closely related to *Hetaeria* Bl., differing in having the flower resupinate, with the labellum at the bottom and its apex expanded to form a transverse blade. *Hetaeria* is characterized by nonresupinate flowers, with the labellum at the top and with its apex usually not expanded to form a distinct blade. The two genera are often confused by collectors, and their limits with respect to one another need to be critically studied on a worldwide basis.

KEY TO SPECIES

Leaves lanceolate to oblong-lanceolate, 0.6–1 (–1.3) cm. broad; petals obliquely ovate; labellum with the blade divided into 2 oblong to oblong-obovate lobes, these not papillose above. 1. *Z. stenophylla*
 Leaves ovate to ovate-elliptic, 1.3–2.3 cm. broad; petals obovate; labellum with the blade divided into 2 subquadrate lobes, these minutely papillose above. 2. *Z. vieillardii*

1. ***Zeuxine stenophylla*** (Reichenb. f.) Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 312. 1892; Kraenzl. in Bot. Jahrb. 25: 599. 1898; H. Fleischm. & Rechanger in Denkschr. Akad. Wiss. Wien 85: 251. t. 2, fig. 9. 1910; Schlechter in Repert. Sp. Nov. 9: 91. 1910; Kores in Allertonia 5: 33. 1989. FIGURE 40C.

Monochilus stenophyllus Reichenb. f. Otia Bot. Hamb. 52. 1878 (repr. Xenia Orchid. 3: 29. 1881).

Adenostylis vitiensis Rolfe in J. Linn. Soc. Bot. 39: 177. 1909.

Zeuxine vitiensis L. O. Williams in Bot. Mus. Leaflet 5: 112. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 25. 1953; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972.

Zeuxine erimae sensu Lewis & Cribb, Orch. Vanuatu, 35. 1989; non Schlechter.

Plants 12–25 cm. tall; leaves cauline, scattered throughout the upper 1/2–1/3 of stem, the petioles 1–2.5 cm. long, with tubular, sheathing bases, the blades lanceolate to oblong-lanceolate, (1.5–) 3–8 cm. long, 0.6–1 (–1.3) cm. broad, cuneate at base, acute at apex; inflorescence lax, few-flowered, 15–20 cm. long, the peduncle, rachis, and bracts laxly pilose; flowers pale green to greenish yellow, the blade of labellum bright yellow to white; dorsal sepal ovate, 3.5–4 mm. long, 2.5–3 mm. broad, laxly to densely pilose externally, subacute at apex; lateral sepals erect, ovate, 3.5–4 mm. long, 1.5–2 mm. broad, laxly pilose externally, subacute at apex; petals obliquely ovate-acuminate, 2.5–3 mm. long, 1.75–2.25 mm. broad, subacute at apex; labellum erect, closely appressed to column, 3–3.5 mm. long, the base cymbiform, with 2 small dactyliform glands within, hardly or not noticeably divided longitudinally within, gradually tapering to base of blade, with inrolled lateral margins, the blade slightly deflexed, 0.75–1 mm. long, 3.5–4 mm. broad, 2-lobed, the lobes divaricate, oblong to oblong-obovate, weakly 1–3-nerved; column short, 1–1.5 mm. long; anther ovate-acuminate, 1–1.5 mm. long, about 0.75 mm. broad; pollinia clavate, about 0.75 mm. long and 0.3 mm. in diameter, the caudicles about 0.3 mm. long, the stipe oblong, about 0.5 mm. long and 0.25 mm. broad, the viscidium elliptic, about 0.3 mm. long; rostellum erect, 2-lobed, the lobes linear-attenuate, 0.3–0.5 mm. long; stigmas small.

TYPIFICATION AND NOMENCLATURE: *Monochilus stenophyllus* was based on a series of three U. S. Exploring Expedition collections from Samoa, all mounted on a single sheet (w 1198 SYNTYPES); the material came from Savai'i and Tutuila, but it is not now possible to tie each collection to its locality. The type of *Adenostylis vitiensis* is *Gibbs 618* (BM HOLOTYPE), collected in September, 1907, in the vicinity of Nandarivatu, Mba Province, Viti Levu. No significant differences separate the Samoan and Fijian taxa.

DISTRIBUTION: Fiji, Tonga, Samoa, and the New Hebrides (cf. Kores, 1989). In Fiji the species seems infrequent, thus far known only from Viti Levu, found in dense forest at elevations of about 150–1,000 m. Flowers have been noted in August and September.

AVAILABLE COLLECTIONS: VITI LEVU: Mba; Mt. Evans Range, *Greenwood 334* (K), 1143 (AMES). NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8615*. NAITASIRI: Upper Wainimala River Valley, divide between Wainisavulevu and Wainamo Creeks, Rarandawai, *St. John 18276*.

Lewis and Cribb (1989) referred to this species as *Zeuxine erimae* Schlechter but did not explain how that taxon differs from *Z. stenophylla*. I have not had an opportunity to examine authenticated material of *Z. erimae* from New Guinea, its type locality, and cannot comment on the status of Schlechter's species. However, the collections of this relationship from the New Hebrides that I have examined are referable to *Z. stenophylla*. In the event that these two taxa should prove to be conspecific, Reichenbach's basionym would have priority over Schlechter's binomial.

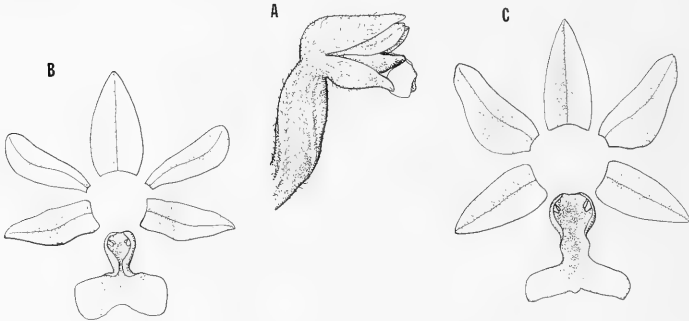


FIGURE 40. A & B, *Zeuxine vieillardii*; A, complete flower, $\times 5$; B, perianth segments, with blade of labellum partially flattened, $\times 5$. C, *Zeuxine stenophylla*; perianth segments, $\times 5$. A & B from Greenwood 53, C from Smith 8615.

2. *Zeuxine vieillardii* (Reichenb. f.) Schlechter in Bot. Jahrb. 39: 55. 1906; Guillaumin in Notul. Syst. (Paris) 10: 83. 1941, Fl. Nouv.-Caléd. 77. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 521. pl. 205. 1977; Kores in Allertonia 5: 34. 1989; Lewis & Cribb, Orch. Vanuatu, 35. 1989.

FIGURE 40A & B.

Monochilus vieillardii Reichenb. f. in Linnaea 41: 60. 1877.

Zeuxine daenikeri Kraenzl. in Viert. Naturf. Ges. Zürich 74: 69. 1929; Guillaumin in Notul. Syst. (Paris) 10: 83. 1941, Fl. Nouv.-Caléd. 77. 1948.

Zeuxine flava sensu Jayaweera in Rev. Handb. Fl. Ceylon 2: 323, solum quoad spec. vit. 1981; non Trimen.

Plants decumbent, 20–40 cm. tall; leaves cauline, crowded near apex of stem, more or less patent, the petioles 0.8–1.8 cm. long, with conspicuously inflated, tubular, sheathing bases 5–8 mm. long, the blades membranous, ovate to ovate-elliptic, sometimes slightly falcate, (1.8–) 2.5–6 cm. long, 1.3–2.3 cm. broad, broadly cuneate at base, acute at apex; inflorescence 14–26 cm. long, with 6–15 (–20) flowers, the peduncle, rachis, and bracts laxly to subdensely villose; flowers pale greenish yellow to greenish white, the labellum white; dorsal sepal ovate, 3.3–4 mm. long, 2–3 mm. broad, with a few scattered hairs externally, subacute at apex; lateral sepals erect, ovate-elliptic, 3.5–4 mm. long, 1.75–2.25 mm. broad, laxly pilose externally, subacute to acute at apex; petals obovate, 3–3.5 mm. long, 1–1.25 mm. broad, broadly subacute to obtuse at apex; labellum erect, initially closely appressed to column, somewhat reflexed distally, 3.5–4 mm. long, the base narrowly cymbiform, with 2 long, slender, retrorsely curled, dactyliform glands within, distally rather abruptly narrowed to form a short claw 1–1.5 mm. long with slightly inrolled lateral margins, the blade conspicuously deflexed, 1.5–2 mm. long, 2.5–3 mm. broad, 2-lobed, the lobes spreading, more or less

subquadrate, minutely papillose above, 2- or 3-nerved; column 1.5–2 mm. long; anther ovate-acuminate, 1.25–1.75 mm. long, 0.75–1 mm. broad; pollinia clavate, about 1 mm. long and 0.5 mm. in diameter, the caudicles about 0.5 mm. long, the stipe oblong, about 0.75 mm. long and 0.25 mm. broad, the viscidium oblong, about 0.5 mm. long; rostellum prominent, erect, 2-lobed, the lobes linear-ligulate, 0.75–1 mm. long; stigmas more or less oblong.

TYPEFICATION AND NOMENCLATURE: *Monochilus vieillardii* is based on *Vieillard 1311*, p. p. (P SYNTYPES; ISOSYNTYPES at BM, K); the material is a series of collections made by Vieillard between 1855 and 1867 from three different localities in New Caledonia: Balade, Wagap, and Kanala (Canala); furthermore it is a mixture of the present species and *Rhamphidia discoidea* Reichenb. f. (*Hetaeria oblongifolia* Bl. in the present treatment). The type of *Zeuxine daenikeri* is *Daniker 163* (Z HOLOTYPE), collected Oct. 30, 1924, in the valley of the Pirogue River, Mt. Kananémoa, New Caledonia; Hallé (1977) has combined these two species.

DISTRIBUTION: New Caledonia, the New Hebrides, Fiji, Niue, and Samoa. In Fiji the species is apparently rare, known only from Viti Levu, where it occurs in forested areas at elevations of approximately 60–1,000 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains inland from Lautoka, *Greenwood 53* (K); Mt. Evans Range, *Greenwood 956* (AMES). REWA: Veisari River, *Vaughan 3271* (K).

14. ANOECTOCHILUS Bl. Fl. Javae, Praef. 6, in adnot. 1828; Rolfe in J. Linn. Soc. Bot. **39**: 176. 1909; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 512. 1977; Kores in Allertonia **5**: 35. 1989. Nom. et orth. cons.

Anecoehilus Bl. Bijdr. Fl. Ned. Ind. 411. 1825, Tab. Pl. Jav. Orchid. t. 1. 1825. Orth. rejic.

Odontochilus Bl. Fl. Javae Nov. Ser. 66. 1858 or 1859, Coll. Orchid. 79. 1859.

Terrestrial plants with succulent, decumbent, rhizomelike stems rooting at nodes; leaves alternate, petiolate, not articulate, the blades convolutive in bud, membranous, frequently iridescently colored with contrasting venation; inflorescences terminal, erect, racemose, few-flowered; flowers fairly large (perianth 1–2 cm. long), resupinate; dorsal sepal connivent with petals forming a hood over column; lateral sepals spreading or sometimes erect; petals entire, usually slightly broader than lateral sepals; labellum more or less parallel to column, the base either prolonged into a prominent spur projecting between lateral sepals or saccate and completely enclosed by sepals, with 2 large, unstalked glands within, the mesochile sometimes with distinct sidelobes at base, the upper portion with inflexed margins, narrowed into a long, slender, channelled claw with a toothed or fringed flange along lateral edges (teeth sometimes greatly reduced in some species), the epichile widened into a transverse, 2-lobed blade or rarely reduced, entire, and linear-ligulate; column short, with 2 parallel, lamellate appendages on ventral surface projecting into base of labellum; anther erect, persistent, acuminate; pollinia 2, sectile, clavate, the caudicles turned toward top of anther and joined to a common viscidium; rostellum relatively short, attenuate, 2-lobed, the lobes frequently loosely twisted about one another; stigmas 2, on either side of column at base of lobes or rostellum, slightly raised; ovary erect, twisted.

TYPE SPECIES AND NOMENCLATURE: *Anoectochilus setaceus* (Bl.) Lindl. (*Anecoehilus setaceus* Bl.). Although this is not stated in ICBN, *A. setaceus* is noted as the conserved type species by ING (1979). No type species has been designated for *Odontochilus*, which is regarded as a generic synonym by most recent orchid students (Kores, 1989).

DISTRIBUTION: Southeastern Asia from Ceylon, India, and Japan through Malesia and eastward in the Pacific to Fiji and Hawaii, with approximately 60 species. One species is indigenous in Fiji.

1. *Anoectochilus imitans* Schlechter in Bot. Jahrb. 39: 54. 1906; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 514. pl. 203. 1977; Kores in Allertonia 5: 35. 1989.

Dorsinia marmorata sensu Seem. in Bonplandia 9: 260, p. p. 1861, Viti, 443, p. p. 1862; non Lindl. *Anoectochilus vitiensis* Rolfe in J. Linn. Soc. Bot. 39: 176. 1909; L. O. Williams in Bot. Mus. Leaflet 5: 112. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 24. 1953; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 378. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 514, in adnot. 1977.

Plants 5–20 cm. tall; leaves 3–6, clustered near apex of stem, the petioles 1.2–2 cm. long, with inflated, tubular, sheathing bases 3–6 mm. long, the blades broadly ovate to ovate-elliptic, 1.5–4.5 cm. long, 2–3.5 cm. broad, dark iridescent brownish green, with reddish pink or golden venation, broadly rounded to truncate at base, acute at apex; inflorescence up to 15 cm. long, 2–7-flowered, the peduncle and rachis laxly pubescent throughout; flowers greenish white to white, laxly to subdensely villose externally; dorsal sepal ovate-lanceolate, 11–13 mm. long, 4–5 mm. broad, narrowly acuminate at apex; lateral sepals obliquely oblong-lanceolate, 11–12 mm. long, 3.5–4 mm. broad, acuminate at apex; petals narrowly oblong-oblancheolate, 10–11 mm. long, 2.5–3 mm. broad, acuminate at apex; labellum 14–17 mm. long overall, spurred, the spur conical-obtuse, 4–5 mm. long, 1.5–2 mm. in diameter, with 2 internal oblong-papillose glands near apex, the combined hypochile and mesochile more or less oblong, 6–7 mm. long, 4–5 mm. broad near base and apex, slightly constricted medially, distinctly channelled throughout, the epichile small, oblong-oblancheolate, 5–6 mm. long, 2–3 mm. broad, with lateral margins somewhat inflexed, externally with 3–5 pairs of papillae 0.25–0.75 mm. long arranged in 2 longitudinal rows along lateral edges, abruptly acute at apex; column 8–9 mm. long, ventrally with 2 prominent aliform lamellae ascending from base to stigmas; anther loosely attached to back of column by a narrow hinge, elongated, narrowly acuminate, 6–7 mm. long, 2–2.5 mm. broad; pollinia clavate, 2.5–3.5 mm. long, 0.75–1 mm. in diameter, the caudicles slender, 2–3 mm. long, the viscidium large, elliptic, 3–3.5 mm. long, 1–1.5 mm. broad; rostellum large, initially arising perpendicular to column, geniculately deflexed near base and ultimately porrect, narrowly lanceolate, 4.5–5.5 mm. long, entire; stigmas slightly convex.

TYPIIFICATION AND NOMENCLATURE: *Anoectochilus imitans* is typified by Schlechter 14864 (B HOLOTYPE, probably destroyed; ISOTYPE at P), collected Oct. 1, 1902, near Païta, New Caledonia; *A. vitiensis* by Gibbs 635 (BM HOLOTYPE; ISOTYPE at K), collected in August, 1907, in the vicinity of Nandarivatu, Mba Province, Viti Levu. The probable conspecificity of these taxa was pointed out by Hallé (1977), and indeed the now available material bears out his observation.

DISTRIBUTION: New Caledonia and Fiji. In Fiji it is infrequent in dense forest at elevations from 150 to 900 m.; flowers and capsules have been noted between May or June and September.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8618* (US). NGAU: Slopes of Mt. Ndelaitho, on northern spur, toward Navukailangi, *Smith 7881* (US). TAVEUNI: Inland from Somosomo, *Seemann 601*, p. p. (BM, p. p.).

15. *VRYDAGZYNEA* Bl. Fl. Javae Nov. Ser. 59. 1858 or 1859, Coll. Orchid. 71. 1858 or 1859; Reichenb. f. in Seem. Fl. Vit. 293. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 311. 1892; Backer & Bakh. f. Fl. Java 3: 265. 1968; Kores in Allertonia 5: 36. 1989; Lewis & Cribb, Orch. Vanuatu, 32. 1989.

Terrestrial plants with succulent, decumbent, rhizomelike stems rooting at nodes; leaves alternate, petiolate, not articulate, the blades convolutive in bud, membranous; inflorescences terminal, erect, racemose, the rachis usually densely few-many-flowered; flowers small (perianth 0.3–1 cm. long), resupinate; dorsal sepal connivent with petals forming a hood over column; lateral sepals erect, closely appressed to labellum; petals entire, usually much smaller than sepals; labellum more or less parallel to column, entire, prominently spurred, the spur projecting between lateral sepals,

more or less ventricose, entire or somewhat 2-lobed distally, with 2 stalked glands within, the distal portion small, frequently concave, never expanded into a transverse blade; column very short; anther erect, persistent, relatively short; pollinia 2, setile, clavate, the caudicles turned toward top of anther and joined to a common viscidium; rostellum relatively short, 2-lobed; stigmas 2, prominent on either side of apex of column; ovary erect, twisted.

TYPE SPECIES: No type species has been designated from among Blume's six original species, all well illustrated and with floral details provided. A lectotype species should be chosen by a student of Malesian orchids.

DISTRIBUTION: Northern India and southeastern Asia and eastward through Malasia to Micronesia, Fiji, Tonga, and Samoa, with approximately 20 species. Two species are indigenous in Fiji.

KEY TO SPECIES

- Leaf blades uniformly light to dark green throughout; lateral sepals distinctly galeate; apex of labellum with lateral margins inrolled and appearing cuspidate. 1. *V. samoana*
 Leaf blades dark green to greenish brown, with a white stripe along midrib; lateral sepals not galeate; apex of labellum obtuse. 2. *V. vitiensis*

1. *Vrydagzynea samoana* Schlechter in Repert. Sp. Nov. 9: 91. 1910; Kores in Allertonia 5: 36. 1989. FIGURE 41A & B.

Vrydagzynea albida var. *purpurascens* Kraenzl. in Bot. Jahrb. 25: 599. 1898.

Vrydagzynea whitemei sensu H. Fleischm. & Reehinger in Denkschr. Akad. Wiss. Wien 85: 253, as *V. whitemei*. 1910; non Schlechter.

Plants erect or decumbent, 10–20 cm. tall, the stem fleshy, about 2.5 mm. in diameter, with the distal half laxly few-foliolate; leaves petiolate, the petioles 1–1.5 cm. long, with tubular sheathing bases 3–6 mm. long, the blades patent, light to dark green, narrowly ovate to elliptic-ovate, 2.5–5.5 cm. long, 1–2 cm. broad, cuneate at base, acuminate at apex; inflorescence 6–10 cm. long, the peduncle as long as or more frequently distinctly longer than rachis, slender, glabrous or with a few scattered hairs near apex, the rachis short, laxly to subdensely tomentose, congested-many-flowered; flowers pale green to greenish white, occasionally with a faint pink tinge; dorsal sepal ovate, 3–3.5 mm. long, 1.75–2.25 mm. broad, somewhat fleshy, obtuse at apex; lateral sepals obliquely oblong-ovate, distinctly galeate distally, 2.75–3.5 mm. long, 1.5–2.25 mm. broad, somewhat fleshy, distinctly carinate externally, obtuse at apex; petals obliquely oblong-obovate, 2.5–3 mm. long, 1.75–2 mm. broad, subacute to obtuse at apex; labellum more or less oblong-suborbicular in outline when flattened, 2–2.5 mm. long excluding spur, about 2 mm. broad, the spur broadly cylindrical-subfusiform, 4–5 mm. long, about 1.5 mm. in diameter, with the apex shortly bilobed, the glands extending approximately 3/4 the distance to apex, clavate, the lateral margins inflexed throughout upper half, the apex obtuse to slightly retuse but with the lateral margins inrolled to appear ovate-cuspidate, the disk with a slightly fleshy, broad, longitudinal crest extending from anterior margin of spur almost to apex; column very short, 1–1.5 mm. long, 1.5–2 mm. broad; anther small, broadly ovate, 1–1.25 mm. long; pollinia obovoid, 1–1.25 mm. long, 0.5 mm. in diameter, the caudicles 0.2 mm. long, the viscidium relatively large, 0.5 mm. across; rostellum short, bilobed, 0.4–0.7 mm. long; stigmas relatively large, more or less ligulate.

TYPIFICATION AND NOMENCLATURE: *Vrydagzynea samoana* is based on two SYNTYPES: *Reehinger 1145* (BM, US, w 2698), collected in July, 1905, near Patamea, Savai'i, Samoa, and *Vaupel 655* (B, perhaps destroyed), obtained July 1, 1905, near Olonona, also from Savai'i. *Vrydagzynea albida* Bl. var. *purpurascens* is typified by *Reinecke 542* (not seen), collected in November, 1894, near Vaipouli, Savai'i; the epithet was not utilized by Schlechter.

DISTRIBUTION: Fiji and Samoa; it is infrequent in Fiji, found in forested areas at elevations of about 100–1,200 m.

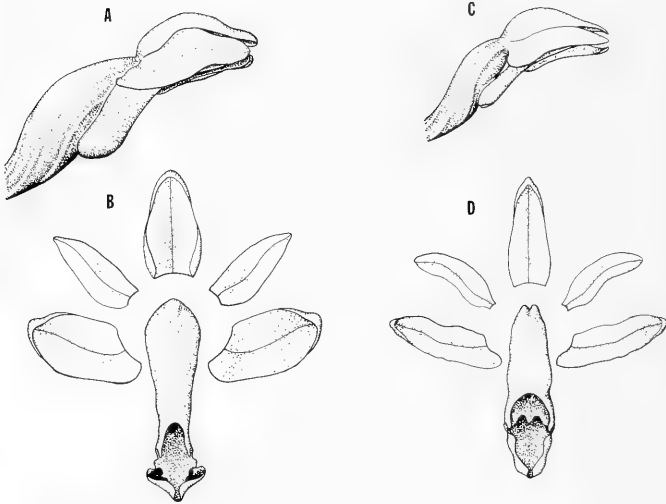


FIGURE 41. A & B, *Vrydagzynea samoana*; A, complete flower, $\times 5$; B, perianth segments, $\times 5$. C & D, *Vrydagzynea vitiensis*; C, complete flower, $\times 5$; D, perianth segments, $\times 5$. A & B from *Smith 7160*, C & D from *im Thurn 13a*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Tomanivi, *im Thurn s. n.*, p. p. (mixed with *V. vitiensis*). NAITASIRI: Forest Reserve, Tholo-i-suva, *Lam 6942*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7160*.

2. *Vrydagzynea vitiensis* Reichenb. f. *Otia Bot. Hamb.* 51. 1878 (repr. *Xenia Orchid.* 3: 29. 1881); Drake, *Ill. Fl. Ins. Mar. Pac.* 312. 1892; L. O. Williams in *Bot. Mus. Leaflet.* 5: 112. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 25. 1953; J. W. Parham, *Pl. Fiji Isl.* 295. 1964, ed. 2. 389. 1972; Kores in *Allertonia* 5: 37. 1989.

FIGURES 41C & D, 85 (lower left).

Orchidea Seem. in *Bonplandia* 9: 260. 1861, Viti, 443. 1862.

Vrydagzynea purpurea sensu Reichenb. f. in Seem. *Fl. Vit.* 294. 1868; Drake, *Ill. Fl. Ins. Mar. Pac.* 311. 1892; L. O. Williams in *Bot. Mus. Leaflet.* 5: 112. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 25. 1953; J. W. Parham, *Pl. Fiji Isl.* 295. 1964, ed. 2. 389. 1972; non Bl.

Vrydagzynea whitmeei Schlechter in *Bull. Herb. Boissier* II. 6: 296. 1906, in *Repert. Sp. Nov.* 9: 92. 1910; Christophersen in *Bishop Mus. Bull.* 128: 62. 1935; Hürlimann in *Bauhinia* 3: 193. 1967; Lewis & Cribb, *Orch. Vanuatu*, 33. 1989.

Plants erect or decumbent, 8–25 cm. tall, the stem fleshy, 2.5–4 mm. in diameter, laxly few-foliolate near apex; leaves petiolate, the petioles slender, 0.8–1.5 cm. long, with slightly inflated, tubular, sheathing bases 1.5–4 mm. long, the blades patent, in vivo dark olive-green with a white stripe along midrib, lanceolate to narrowly ovate, sometimes slightly falcate, (2.5–) 3.5–6 cm. long, (0.8–) 1.2–2 cm. broad, cuneate at base, acuminate at apex; inflorescence 2–7 cm. long (rarely up to 15 cm. when in fruit), the peduncle usually relatively short, often $1/2$ – $1/4$ the length of rachis, laxly to subdensely villose distally, the rachis short, laxly villose, congested-many-flowered; flowers greenish white to white, sometimes with the bases of perianth segments faint pink; dorsal sepal oblong-ovate, 3–3.5 mm. long, 1–1.5 mm. broad, obtuse at apex; lateral

sepals obliquely ovate to oblong-ovate, 3–3.5 mm. long, 1.5–2 mm. broad, slightly carinate externally, subacute at apex; petals oblong-lanceolate, 2–2.5 mm. long, 1–1.75 mm. broad, obtuse at apex; labellum more or less oblong in outline when flattened, 2–2.5 mm. long excluding spur, 1–1.75 mm. broad, the spur conical, 2.5–3 mm. long, 0.75–1.5 mm. in diameter, not inflated distally, with the apex entire, or weakly bilobed, the glands extending approximately half the distance to apex, small, clavate, the apex obtuse, with slightly inflexed margins, the disk naked; column very short, 1.5–2 mm. long, 1.25–1.75 mm. broad; anther small, ovate, 1.25–1.5 mm. long; pollinia clavate, 0.75–1 mm. long, 0.5 mm. in diameter, the caudicles 0.3 mm. long, the viscidium elliptic, about 0.5 mm. long and 0.3 mm. broad; rostellum short, bilobed, 0.25–0.5 mm. long; stigmas fairly prominent, oblong-elliptic.

TYPIFICATION AND NOMENCLATURE: Reichenbach based his new species on three U. S. Exploring Expedition collections at w, one from Fiji and two from Samoa. In view of the specific epithet *I* (1989) have indicated the type as *U. S. Expl. Exped.* (w HOLOTYPE; ISOTYPE at AMES 72104), collected in 1840 on Ovalau. The type of *Vrydagzynea whitmeei* is *Whitmee s. n.* (B HOLOTYPE, destroyed; no ISOTYPES located), collected in 1872 in Samoa without further locality. Combination of these taxa into a single species and past interpretations of it as *V. purpurea* Bl. have recently been discussed (Kores, 1989).

DISTRIBUTION: New Hebrides, Fiji, Tonga, and Samoa; in Fiji the species occurs in dense forest at elevations of about 50–1,200 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *in Thurn 13a, 13b*; Mt. Tomanivi, *in Thurn s. n.*, p. p. (mixed with *V. samoana*), Kores & Molvray F25. SERUA: Hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith 9305*; hills north of Ngaloa, in drainage of Waininggere Creek, *Smith 9156*; Vatuvilakia, near Ngaloa, *Degener 15126*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8619*; vicinity of Namosi Village, *Gillespie 2573*; hills east of Navua River, *Greenwood 1016*. NAMOSI or REWA: Queen's Road between Wainandoi River and Wainamoro Creek, *Vaughan 3334*. VITI LEVU without further locality, *Parks 20327*. TAVEUNI: Above Somosomo, *Seemann 618* (the κ sheet so labelled, although Reichenbach cited this number as from Viti Levu; Seemann may have assigned to the number specimens from both islands).

16. **HETAERIA** Bl. *Bijdr. Fl. Ned. Ind.* 409, as *Etaeria*. 1825, Tab. Pl. Jav. Orchid. t. I, as *Etaeria*. 1825, Fl. Javae, Praef. vii, in adnot. 1828, Fl. Javae Nov. Ser. 84. 1858 or 1859, Coll. Orchid. 101. 1859; Schlechter in *Bot. Jahrb.* 45: 395. 1911; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 538. 1977; L. G. Adams in *Taxon* 36: 651. 1987; Kores in *Allertonia* 5: 37. 1989; Lewis & Cribb, *Orch. Vanuatu*, 31. 1989. Nom. et orth. cons. prop.

Rhamphidia Lindl. in *J. Proc. Linn. Soc. Bot.* 1: 181. 1857; Reichenb. f. in *Seem. Fl. Vit.* 294. 1868.

Terrestrial plants with succulent, decumbent, rhizomelike stems rooting at nodes; leaves alternate, petiolate, not articulate, the blades convolute in bud, frequently asymmetric, membranous; inflorescences terminal, erect, racemose, many-flowered; flowers small (perianth 0.3–1 cm. long), not resupinate; medial sepal connivent with petals forming a hood below column; lateral sepals free, closely appressed to and completely enclosing the saccate base of labellum; petals entire, usually smaller than sepals; labellum more or less parallel to column, entire, the base saccate with 2 or more unstalked glands or papillae within, sometimes alternately divided longitudinally by a medial ridge, the distal portion of labellum usually small, concave, often contracted into a short, narrow claw with or without a slightly expanded apex, or rarely the claw ending in a transversely expanded 2-lobed blade; column short, with 2 parallel lamellae or keels along ventral surface; anther erect, persistent, usually short; pollinia 2, sectile, clavate, the caudicles turned toward top of anther and joined to a common viscidium; rostellum short, 2-lobed; stigmas 2, on either side of column at base of lobes of rostellum, pulvinate; ovary erect, not twisted.

LECTOTYPE SPECIES: *Hetaeria oblongifolia* Bl.; vide Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 540. 1977; L. G. Adams in Taxon 36: 651. 1987; Kores in Allertonia 5: 38. 1989. The type species of *Rhamphidia* is *R. elongata* (Lindl.) Lindl. (*Goodyera elongata* Lindl.).

DISTRIBUTION: India and Ceylon through Indo-Malesia to northern Australia and eastward in the Pacific to Tonga, Niue, and Samoa, with approximately 74 species. An African species and one from the New World tropics have also been assigned to *Hetaeria*. Two species are indigenous in Fiji.

KEY TO SPECIES

- Leaves broadly elliptic to elliptic-ovate, 4–12 × 2–4.5 cm.; apex of labellum not transversely expanded into a distinct, 2-lobed blade. 1. *H. oblongifolia*
 Leaves narrowly elliptic to lanceolate, (6–) 10–22 × 0.7–2.5 cm.; apex of labellum transversely expanded into a distinct, 2-lobed blade. 2. *H. whitmeei*

1. *Hetaeria oblongifolia* Bl. Bijdr. Fl. Ned. Ind. 410, as *Etaeria o.* 1825, Tab. Pl. Jav. Orchid. fig. 14, as *Etaeria o.* 1825, Fl. Javae Nov. Ser. 85. pl. 32, fig. 3. 1858 or 1859, Coll. Orchid. 102. pl. 32, fig. 3. 1859; Kraenzl. in Bot. Jahrb. 25: 599, p. p. 1898; Ames, Orchidaceae 2: 163. 1908; L. O. Williams in Bot. Mus. Leafl. 5: 113. 1938; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972; Hürlimann in Bauhinia 3: 193. 1967; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 260. 1970; Seidenfaden in Dansk Bot. Arkiv 32 (2): 96. fig. 59. 1977; Kores in Allertonia 5: 38. 1989; Lewis & Cribb, Orch. Vanuatu, 31. 1989. FIGURE 42A.

Hetaeria rubicunda Reichenb. f. in Bonplandia 3: 214, as *Etaeria r.*, excl. syn. 1855; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 24. 1953.

Rhamphidia tenuis Lindl. in J. Proc. Linn. Soc. Bot. 1: 182. 1857; H. Fleischm. & Rechanger in Denkschr. Akad. Wiss. Wien 85: 254. t. 2, fig. 1, t. 4, fig. 1. 1910.

Rhamphidia rubicunda Reichenb. f. in Seem. Fl. Vit. 294, excl. syn. 1868; Benth. in Benth. & Hook. f. Gen. Pl. 3: 604. 1880.

Rhamphidia discoidea Reichenb. f. in Linnaea 41: 59. 1876.

Hetaeria forcipata Reichenb. f. in Linnaea 41: 62, as *Etaeria f.* 1876; L. O. Williams in Bot. Mus. Leafl. 5: 112. 1938; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Goodyera discoidea Schlechter in Bot. Jahrb. 39: 57. 1906.

Hetaeria similis Schlechter in Repert. Sp. Nov. 9: 88. 1910; Hotta in Acta Phytotax. Geobot. 19: 155. 1963.

Hetaeria discoidea Schlechter in Repert. Sp. Nov. 9: 98. 1911; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 540. pl. 212. 1977.

Plants up to 50 cm. tall, the stems laxly foliate throughout the upper 1/3; leaves petiolate, the petioles 1.5–4 cm. long, with conspicuously inflated, tubular, sheathing bases 0.5–1.2 cm. long, the blades obliquely elliptic to elliptic-ovate, 4–12 cm. long, 2–4.5 cm. broad, dark green, abruptly acuminate to acute at apex; inflorescence somewhat slender, 10–30 cm. long, many-flowered; flowers small, white to cream-colored; medial sepal ovate, 3–4 mm. long, 1.25–1.75 mm. broad, subacute at apex; lateral sepals obliquely oblong-ovate, 3–4 mm. long, 1–1.25 mm. broad, acute at apex; petals linear-oblancoelate, 3–3.5 mm. long, 0.75–1 mm. broad, acute at apex; labellum 3–3.5 mm. long, entire, ovate in outline, navicular, the base saccate with 1 or more pairs of glands or papillae within, the distal portion gradually narrowed to a short, mucronate apex, granulosely thickened distally with convolute lateral margins; column very short, 1–1.5 mm. long and broad; anther small, broadly ovate, 0.75–1 mm. long; pollinia globose, deeply cleft, 0.75–1 mm. long, about 0.5 mm. in diameter, the caudicles 0.2 mm. long, the viscidium elliptic, 0.3 mm. across; rostellum short, bilobed, 0.25–0.5 mm. long; stigmas large, oblong-pulvinate.

TYPIFICATION AND NOMENCLATURE: The complex problems surrounding some of the names listed in the above synonymy were discussed in my 1989 preliminary

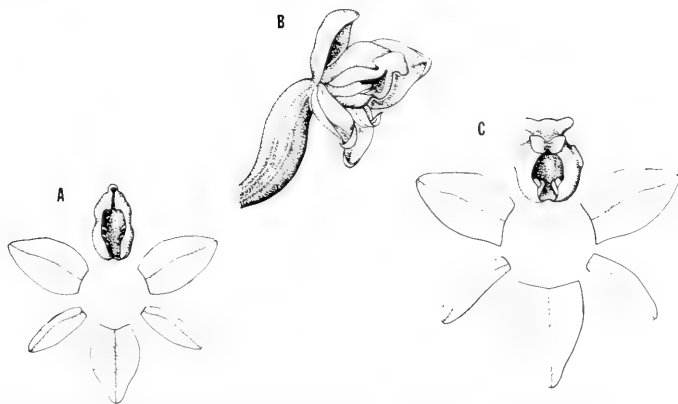


FIGURE 42. A, *Hetaeria oblongifolia*; perianth segments, $\times 5$. B & C, *Hetaeria whitmeei*; B, complete flower, $\times 5$; C, perianth segments, $\times 5$. A from *Smith* 8863, B & C from *McLoughlin s. n.*

treatment, and here the typification of each is merely mentioned. *Hetaeria oblongifolia* has as its type *Blume s. n.* (L HOLOTYPE), from Tjangor, Java. *Hetaeria rubicunda* is based on *Cuming 2109* (w 1746 HOLOTYPE; ISOTYPES at BM, K), from the Philippines. The type of *Rhamphidia tenuis* is *Cuming s. n.* (K HOLOTYPE), also from the Philippines. *Rhamphidia rubicunda* was described by Reichenbach in 1868 as a new species, and the synonym listed by him should not be considered the basionym of a new combination; the type is *Graeffe 33* (w 1748 HOLOTYPE; ISOTYPE at BM; photograph of holotype at AMES), from Viti Levu, Fiji. *Rhamphidia discoidea* is based on *Vieillard 1311*, p. p. (P HOLOTYPE; ISOTYPE at K), collected from three different New Caledonian localities: Balade, Wagap, and Kanala (Canala). The type of *Hetaeria forcipata* was said to have been a Fijian plant, but no collector, locality, or depository was mentioned by Reichenbach; nevertheless, the description strongly suggests *H. oblongifolia*. *Hetaeria similis* was based by Schlechter on four specimens from Savai'i, Samoa, which may be considered syntypes: *Vaupel 657* and *K. & L. Rechanger 102, 1147, and 1884*, p. p.; depositories and localities were given in my earlier discussion.

DISTRIBUTION: Malesia (including the Philippines) and eastward to Micronesia, Tonga, Niue, and Samoa. In Fiji the species has been noted at elevations from near sea level to 550 m. in dense, thin, or open forest.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 625, 956A*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8591, 8863*; vicinity of Namosi, *Gillespie 2572, 2700*; 2 miles from Namuamua along trail to Namosi, *Gillespie 3007*. TAILEVU: Waisei Creek, *DA 2687*. REWA: Mt. Korombamba, *Meebold 16816*. KANDAVU: Mt. Mbuke Levu, *Smith 208*; Namalata isthmus region, *Smith 30*; hills above Namalata and Ngaloa Bays, *Smith 135*. VANUA LEVU: MBUA: Near Sikethi Creek, Rukuruku Bay, *H. B. R. Parham 439*. MATHUATA: Mathuata coast, *Greenwood 625A*; southern slopes of Mt. Numbuiloa, east of Lambasa, *Smith 6437*. MOALA: *Tothill 880*. VANUA MBA-LAVU: *Bryan 581a*. AVEA: Central rocky plateau, *Bryan 581*. FIJI without further locality, *Seemann 602*.

2. *Hetaeria whitmeei* Reichenb. f. in J. Bot. 15: 133, as *Etaeria w.* 1877; Schlechter in Rept. Sp. Nov. 9: 88. 1910; Kores in Allertonia 5: 39. 1989. FIGURE 42B & C.

Hetaeria polyphylla Reichenb. f. in Otia Bot. Hamb. 52, as *Etaeria p.* 1878 (repr. Xenia Orchid. 3: 29. 1881); Drake, Ill. Fl. Ins. Mar. Pac. 312. 1892; L. O. Williams in Bot. Mus. Leaflet. 5: 113. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 24. 1953; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972; Hürlimann in Bauhinia 3: 194. 1967.

Adenostylis stricta Rolfe in J. Linn. Soc. Bot. 39: 177. 1909.

Zeuxine sphaerocheila H. Fleischm. & Rechinger in Denkschr. Akad. Wiss. Wien 85: 251. t. 2, fig. 6. 1910; Schlechter in Rept. Sp. Nov. 9: 91. 1910; Christophersen in Bishop Mus. Bull. 128: 62. 1935; C. Schweinf. in op. cit. 141: 19. 1936; L. O. Williams in Bot. Mus. Leaflet. 5: 111. 1938; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972.

Hetaeria francisii Schlechter in Rept. Sp. Nov. 9: 161. 1911. L. O. Williams in Bot. Mus. Leaflet. 5: 113. 1938; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 384. 1972.

Zeuxine francii Schlechter in Rept. Sp. Nov. 9: 289. 1911; Guillaumin in Notul. Syst. (Paris) 10: 89. 1941, Fl. Nouv.-Caléd. 77. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 520. 1977.

Zeuxine stricta L. O. Williams in Bot. Mus. Leaflet. 5: 111. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 25. 1953; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972.

Habenaria sp. Yuncker in Bishop Mus. Bull. 220: 87. 1959.

Zeuxine triandra Hotta in Acta Phytotax. Geobot. 19: 156. fig. 1-5. 1963.

Plants up to 60 cm. tall, the stems laxly foliate throughout the upper 2/3; leaves petiolate, the petioles slender, 2-3.5 cm. long, with inflated, tubular, sheathing bases 0.5-1 cm. long, the blades narrowly elliptic to lanceolate, (6-) 10-22 cm. long, 0.7-2.5 cm. broad, narrowly attenuate at apex; inflorescence 20-40 cm. long, many-flowered; flowers rather large for the genus, brownish white without, cream-colored within; medial sepal ovate, 4-5 mm. long, 1.75-2.25 mm. broad, subacute at apex; lateral sepals obliquely oblong-ovate, 4.5-5.5 mm. long, 2-2.5 mm. broad, subacute at apex; petals oblong, 4-4.5 mm. long, 0.75-1 mm. broad, rounded at apex; labellum 4.5-5.5 mm. long, the base hemispherical, 3-4 mm. across, longitudinally divided externally by a shallow groove, with 2 linear, lamellate papillae within, conspicuously infolded at lateral margins, invaginate along interior surface of labellum for 1-1.5 mm., the distal portion abruptly constricted, ending in a small, transversely expanded, 2-lobed blade 1-1.5 mm. long and 1.5-2 mm. broad; column short, about 1.5 mm. long and broad, with 2 prominent, longitudinal, aliform appendages projecting from ventral surface into base of labellum; anther 2-2.5 mm. long, acuminate; pollinia clavate, 1.5-2 mm. long, about 0.75 mm. in diameter, the caudicles 0.3-0.5 mm. long, the viscidium small, orbicular, 0.2 mm. across; rostellum very short, bilobed, 0.2-0.4 mm. long; stigmas small, slightly concave.

TYPIFICATION AND NOMENCLATURE: The type of *Hetaeria whitmeei* is *Whitmee s. n.* (K HOLOTYPE; ISOTYPES at W, 2 sheets), from Upolu, Samoa; that of *H. polyphylla* is *U. S. Expl. Exped.* (W 1356 HOLOTYPE; ISOTYPE and photograph at AMES), collected in 1840 from Mbua (Sandalwood) Bay, Mbua Province, Vanua Levu. *Adenostylis stricta* is based on *Gibbs 667* (BM HOLOTYPE), obtained in August, 1907, near Vatavula, Mt. Nambauthara, Naitasiri Province, Viti Levu. Two specimens from Samoa were originally cited for *Zeuxine sphaerocheila*: *Rechinger 3710* (W 3105 SYNTYPE), above Vaipouli, Savai'i, and *Rechinger 1663* (W 3106 SYNTYPE), above Utumapa, Upolu. The type of *Hetaeria francisii* was cited as "Dr. Francis," a specimen from Fiji dated 1896; the HOLOTYPE was presumably at B and is perhaps destroyed. As no collector named Francis has been noted in Fiji, it is suggested that the collection may have been that of *Frances C. Prince*, listed below as having been collected at Tamavua, Naitasiri Province, Viti Levu; the specimen is dated Aug. 28, 1898. *Zeuxine francii* is typified by *Franc 767* (ISOTYPE at P), collected in January, 1907, at Tenda, New Caledonia. The type of *Z. triandra* is *Hotta 5332* (KYO HOLOTYPE), collected Sept. 4, 1960, on 'Eua, Tonga. These collections were discussed in my 1989 treatment; as the young bud matures, there are complex changes in the labellum which probably account for the several redescrptions of the species under different names.

DISTRIBUTION: As here circumscribed, *Hetaeria whitmeei* is restricted to New Caledonia, Fiji, Tonga, and Samoa; in Fiji it is found in often dense forest at elevations from near sea level to about 900 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills between Nandala and Nukunuku Creeks, along trail from Nandarivatu toward Lewa, *Smith 6194*; vicinity of Nandarivatu, *in Thurn F2, Degener 14373, 14619, 14727*; Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14443, 14634*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8457*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8711*; hills along Queen's Road about 22 miles west of Suva, *McLoughlin s. n.* NAITASIRI: Tholo-i-suva and vicinity, *Vaughan 3382, Lam 6936, DA 9849*; Tamavua, Aug. 28, 1898, *Frances C. Prince s. n.* (AMES). REWA: Vicinity of Suva, *Simmonds s. n.* PROVINCE?: Near Queen's Road, *Vaughan 3368*. KANDAVU: Mt. Mbuke Levu, *Smith 255*. OVALAU: U. S. *Expl. Exped.* (AMES). VANUA LEVU: MATHUATA: Korovuli River, *DA 13493*. TAVEUNI: Western slope between Somosomo and Wairiki, *Smith 798*. FIJI without further locality, *Gillespie 2682*.

17. *Tropidia* Lindl. in Bot. Reg. **19**: sub *t.* 1618. 1833, Gen. Sp. Orchid. Pl. 497. 1840; Reichenb. f. in Seem. Fl. Vit. 295. 1868; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 396. 1977; Kores in Allertonia **5**: 41. 1989; Lewis & Cribb, Orch. Vanuatu, **24**. 1989.

Cnemidia Lindl. in Bot. Reg. **19**: sub *t.* 1618. 1833, Gen. Sp. Orchid. Pl. 462. 1840.

Relatively large, erect, terrestrial plants with fibrous, fasciculate roots and hard, wiry, leafy stems; leaves short-petiolate, not articulate, the blades convolute in bud, frequently somewhat plicate when mature; inflorescences terminal or axillary, dense, frequently distichous-paniculate or racemose, few-many-flowered; flowers developing sequentially, moderately small (perianth 0.8–2 cm. long), not resupinate; sepals free, connivent or the lateral ones more or less connate and embracing base of labellum, somewhat dissimilar, the medial sepal sometimes slightly smaller; petals free, similar to medial sepal; labellum sometimes slightly larger than other segments, sessile, more or less parallel to column, entire or variously lobed, the base saccate, gibbous, or spurred, the disk with 2 longitudinal carinae; column rather short; anther at dorsal apex of column, erect, acuminate, shorter than rostellum, 1-celled; pollinia 2, granulate, with a long, thin, terete stipe attached to a small, more or less peltate viscidium; rostellum rather prominent, 2-lobed; stigma transverse.

TYPE SPECIES: *Tropidia curculigoides* Lindl., the only original species. *Cnemidia* was originally established with two species, *C. angulosa* Lindl. and *C. semilibera* Lindl., but a lectotype species has not been designated. Since Blume (Fl. Jav. Nov. Ser. 102. 1858 or 1859) combined the genera under the name *Tropidia*, this usage has generally been followed.

DISTRIBUTION: India, Ceylon, and Japan through southeastern Asia and Malesia and eastward to New Caledonia, Fiji, and Samoa, with approximately 20 species; one or two species from tropical America have also been referred to the genus. One species is indigenous in Fiji.

1. *Tropidia effusa* Reichenb. f. in Seem. Fl. Vit. 295. 1868; L. O. Williams in Bot. Mus. Leaf. **5**: 113. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 25. 1953; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972; Kores in Allertonia **5**: 42. 1989.

Orchidea Seem. in Bonplandia **9**: 260. 1861, Viti, 443. 1862.

Cnemidia ctenophora Reichenb. f. Otia Bot. Hamb. **51**. 1878 (repr. Xenia Orchid. **3**: 28. 1881).

Tropidia ctenophora Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 311. 1892; Schlechter in Repert. Sp. Nov. **9**: 92. 1910; L. O. Williams in Bot. Mus. Leaf. **5**: 113. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 25. 1953; J. W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 388. 1972.

Plants terrestrial, 30–75 (–90) cm. tall, the stem erect, slender, 3.5–5 mm. in diameter, leafy; leaves erect or ascending, with tubular sheathing bases, the blades membranous, lanceolate to narrowly ovate, (8–) 15–35 cm. long, (2–) 2.5–4.8 cm. broad, cuneate at base, narrowly acuminate at apex; inflorescence terminal, erect, commonly shorter than the uppermost leaves, loosely paniculate or rarely racemose, many-

flowered, the rachis slightly fractiflex, laxly to subdensely covered with conspicuous bracts, these distichous, patent, conduplicate, broadly ovate-acuminate, 5–12 mm. long, 4–7 mm. broad, with 5–7 nerves; flowers sequentially maturing, yellow; medial sepal narrowly ovate to ovate-acuminate, 7–10 mm. long, 2–3 mm. broad; lateral sepals narrowly ovate-acuminate, 7–9 mm. long, 2.5–3.5 mm. broad; petals narrowly oblong-ovate to lanceolate, slightly oblique, 6–8 mm. long, 1.5–2.5 mm. broad, acuminate at apex; labellum initially closely appressed to column and conduplicate, distally geniculately retroflexed, with slightly revolute margins, more or less ovate-attenuate in outline when flattened, 5–7 mm. long, 2.5–3.5 mm. broad at base, narrowly acute at apex; column terete, 2.5–3 mm. long; anther 1.5–2 mm. long; pollinia clavate, about 1 mm. long and 0.3 mm. in diameter, the caudicles 0.75–1.25 mm. long, the viscidium small, obovate; rostellum prominent, rostrate, minutely cleft at apex; stigma very prominent, transverse, slightly convex, the posterior margin raised; capsules cylindrical-fusiform, about 2.2 cm. long.

TIPIFICATION AND NOMENCLATURE: *Tropidia effusa* is typified by *Seemann 612* (κ HOLOTYPE; ISOTYPE at w 46507), collected in May or June, 1860, in the vicinity of Somosomo, Taveuni; the type of *Cnemidia ctenophora* is *U. S. Expl. Exped.* (w 46506 LECTOTYPE; ISOLECTOTYPE at AMES), collected in 1840 on Ovalau. In 1989 I discussed the typification in detail and justified the reduction of Reichenbach's second species.

DISTRIBUTION: Fiji and Samoa, occurring in Fiji in dense or thin forest from near sea level to an elevation of 825 m.; it is known from six of the high islands and about 40 collections, but in Samoa it appears comparatively infrequent. Flowers and fruits seem to occur throughout the year.

REPRESENTATIVE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Vicinity of Mbalo, near Vatukarasa, *Degener 15298*. SERUA: North of Korovou, *St. John 18947*; north of Ngaloa, in drainage of Wainigere Creek, *Smith 9197*. NAMOSI: Vicinity of Namuamua, *Gillespie 3024*; hills east of Navua River, *Greenwood 1006*. RA: Vicinity of Rewasa, near Vaileka, *Degener 15516*. NAITASIRI: Prince's Road, *Meebold 26536*. REWA: Mt. Korombamba, *Meebold 16805*; near Suva, *H. B. R. Parham 70*. OVALAU: Hills east of Lovoni Valley, *Smith 7333*. KORO: Eastern slope of main ridge, *Smith 972*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7841*. VANUA LEVU: MBUA: Upper Ndama River Valley, *Smith 1596*. MATHUATA: Vicinity of Lambasa, *im Thurn s. n.* THAKAUNDROVE: Eastern drainage of Yanawai River, *Degener & Ordenez 14085*; southern slope of Korotini Range, below Navitho Pass, *Smith 505*; Navonu Ridge, Natewa Peninsula, *DA 16885*. TAVEUNI: Vicinity of Waivevo, *Gillespie 4719*; slopes of Mt. Manuka, east of Wairiki, *Smith 8245*.

18. *CORYMBORKIS* Thou. in *Nouv. Bull. Sci. Soc. Philom. Paris* 1: 318. 1809; Garay & Sweet, *Orch. S. Ryukyu Isl.* 93. 1974; Rasmussen in *Bot. Tidsskr.* 71: 170. 1977; Kores in *Allertonia* 5: 43. 1989; Lewis & Cribb, *Orch. Vanuatu*, 23. 1989.

Corymborchis Thou. *Hist. Orchid., Prem. Tabl. Esp., as Corcurborchis*, orth. err., t. 37, 38, orth var. 1822; *Bl. Fl. Javae Nov. Ser.* 105. 1858 or 1859, *Coll. Orchid.* 125. 1859.

Corymbis Thou. ex Lindl. *Veg. Kingd.* 183, nom. illeg. 1846; Reichenb. f. in *Seem. Fl. Vit.* 295. 1868.

Large, erect, terrestrial plants up to several meters tall, with fibrous, fasciculate roots and hard, wiry, simple or occasionally branched, leafy stems; leaves short-petiolate, not articulate, the blades convolute in bud, large, somewhat chartaceous and plicate when mature; inflorescences axillary, short, laxly paniculate or simple and racemose; flowers moderately small to occasionally showy (perianth up to 4.5 cm. long in some species), resupinate; sepals and petals similar, more or less spreading, sometimes shortly connate or connivent basally to form a shallow cup or tube, narrowly spatulate; labellum more or less parallel to column, linear-canaliculate with a recurved apex, the disk with 2 longitudinal keels throughout basal portion; column long, slender, clavate, not curved; anther at dorsal apex of column, erect, parallel to rostellum, short, 1-celled; pollinia 2, granulose, cylindrical to ellipsoid, with a slender, terete stipe attached to a peltate viscidium; rostellum prominently 2-lobed; stigma transverse, sometimes with the lower margin prolonged into 2 recurved lobes.

TYPE SPECIES: *Corymborkis corymbis* Thou. (vide Friis and Rasmussen in *Taxon* 24: 315. 1975); ING (1979) did not designate a type species.

DISTRIBUTION: Pantropical, with about five species; one widespread species is indigenous in Fiji.

USEFUL TREATMENTS OF GENUS: FRIIS, I., & F. N. RASMUSSEN. The two alternative systems of nomenclature proposed and used for orchids by Du Petit-Thouars, with special regard to *Corymborkis* Thouars. *Taxon* 24: 307-318. 1975. RASMUSSEN, F. N. The genus *Corymborkis* Thouars. *Bot. Tidsskr.* 71: 161-192. 1977.

1. *Corymborkis veratrifolia* (Reinw.) Bl. *Fl. Javae Nov. Ser.* 105. *pl.* 43. 1858 or 1859, *Coll. Orchid.* 125. *pl.* 43. 1859; L. O. Williams in *Bot. Mus. Leaflet* 5: 114, as *Corymborchis* v. 1938; Yuncker in *Bishop Mus. Bull.* 220: 87, as *Corymborchis* v. 1959; J. W. Parham, *Pl. Fiji Isl.* 285. 1964, ed. 2. 380. 1972; Rasmussen in *Bot. Tidsskr.* 71: 170. 1977; Kores in *Allertonia* 5: 44. 1989; Lewis & Cribb, *Orch. Vanuatu*, 23. 1989.

Hysteria veratrifolia Reinw. in *Bl. Cat. Pl. Buitenz.* 99, nom. nud. 1823, in *Syll. Pl. Nov.* 2: 5. 1825.

Rynchanthera paniculata Bl. *Tab. Pl. Jav. Orchid. fig.* 78. (Dec.) 1825.

Macrostylis disticha Breda, *Gen. Sp. Orchid. Asclep. t.* 2. 1828.

Corymbis disticha Lindl. *Fol. Orchid., Corymbis*, 1. 1854; Seem. in *Bonplandia* 9: 260. 1861, Viti, 443. 1862.

Corymbis veratrifolia Reichenb. f. in *Flora* 48: 184. 1865, in Seem. *Fl. Vit.* 295. 1868; Drake, *Ill. Fl. Ins. Mar. Pac.* 311. 1892; Hemsl. in *J. Linn. Soc. Bot.* 30: 194. 1894; Schlechter in *Repert. Sp. Nov.* 9: 92. 1910; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 23. 1953.

Plants terrestrial, large, 0.4-3.1 m. tall, the stem erect, leafy; leaves petiolate, the blades large, narrowly elliptic to ovate, 15-50 (-110) cm. long, 3-14 (-18) cm. broad, entire or sometimes slightly undulate at margin, acute to subacuminate at apex; inflorescences erect or spreading, occasionally pendulous, paniculate, many-flowered; flowers white to greenish white or rarely pale yellow, fragrant, the perianth segments spreading; dorsal sepal linear-spathulate to narrowly oblong-spathulate, 1.6-5.3 cm. long, 2.3-5.3 mm. broad, acute to obtuse at apex; lateral sepals similar to dorsal sepal but slightly shorter and somewhat oblique; petals variable, obliquely linear-spathulate to obliquely obovate, about as long as sepals, 2-8 mm. broad, often with undulate margins, acute at apex; labellum somewhat variable, conspicuously unguiculate, 16-48 mm. long overall, the claw narrow, conduplicate, 2-6 mm. broad, the blade ovate to suborbicular, up to 1/5-1/2 the length of labellum, 4.8-14 mm. broad, more or less undulate at lateral margins, acute to obtuse or sometimes mucronate at apex; column terete, slightly shorter than labellum, about 1 mm. in diameter; anther much shorter than column, the anther cap more or less narrowly ovoid, 3.5-7 mm. long, attenuate at apex; rostellum 1.5-6 mm. long, considerably longer than broad; capsules up to 4 cm. long, about 0.7 cm. in diameter.

TIPIFICATION AND NOMENCLATURE: As *Hysteria veratrifolia* was not typified by Reinwardt, Rasmussen (1977) designated a neotype: *T. Lobb 162* (K HOLONEOTYPE; ISONEOTYPE at BM; photograph at c), from Java. *Rynchanthera paniculata* may be typified by Blume's original illustration, probably prepared from living material at Buitenzorg. The type of *Macrostylis disticha* is Breda's (1828) illustration. These and other synonyms were discussed by Rasmussen (1977); cf. Kores (1989).

DISTRIBUTION: India and tropical Asia eastward through Malesia and into the Pacific as far as Tonga and Samoa. In Fiji it is found in forested areas from near sea level to about 800 m. Flowers and fruits have been noted between December and July.

LOCAL NAME: *Vavara* (often applied to large ground orchids).

AVAILABLE COLLECTIONS: VITI LEVU: M8A: Mountains near Lautoka, *Greenwood 288*; slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, *Smith 4016*; slopes of escarpment north of Nandarivatu, *Smith 6291*. NANDRONGA & NAVOSA: Above Kalavo Village, *H. B. R. Parham 230*; Sovi Bay, *Greenwood 824*, *W. L. Parham 192*; Lumuku, vicinity of Mbelo, near Vatukarasa, *Degener 15225*; Viro, near Saru, *Tabualewa 15617*. TAILEVU: Namara, *Seemann 603*. VITI LEVU without further locality, *Barclay* (probably REWA: Nukulau Island), *Horne 436*. OVALAU: Slopes of Mt. Koronimoko, vicinity of Thawathi, *Smith 8086*; south of Levuka, along trail to west coast, *Gillespie 4541*. VANUA LEVU: THAKAUNDROVE: Mt. Uluina-

mbathi, Savusavu Bay region, *Degener & Ordenez 13933*; Navonu Creek, Natewa Peninsula, *DA 13816, 14336*. TAVEUNI: Vicinity of Waiyevo, *Gillespie 4627a*; western slope between Somosomo and Wairiki, *Smith 803*. MOALA: Near Maloku, *Smith 1382*.

19. *MALAXIS* Solander ex Sw. Nov. Gen. & Sp. Prodr. 8. 1788; Lindl. Gen. Sp. Orchid. Pl. 23. 1830; Benth. in Benth. & Hook. f. Gen. Pl. 3: 493. 1883; Ridley in J. Linn. Soc. Bot. 24: 347. 1888; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 129. 1888; Holttum, Fl. Malaya 1: 193. 1953; Backer & Bakh. f. Fl. Java 3: 293. 1968; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 260. 1977; Seidenfaden in Dansk Bot. Arkiv 33 (1): 42. 1978; Kores in Allertonia 5: 44. 1989; Lewis & Cribb, Orch. Vanuatu, 68. 1989.

Microstylis (Nutt.) Eaton, Man. Bot. ed. 3. 115, as *Microstylus*. 1822; Lindl. Gen. Sp. Orchid. Pl. 18. 1830; Reichenb. f. in Seem. Fl. Vit. 302. 1868; Benth. in Benth. & Hook. f. Gen. Pl. 3: 494. 1883; Ridley in J. Linn. Soc. Bot. 24: 314. 1888; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 130. 1888; Drake, Ill. Fl. Ins. Mar. Pac. 305. 1892; Schlechter in Repert. Sp. Nov. Beih. 1: 110. 1911. Nom. et orth. cons.

Terrestrial or occasionally epiphytic plants, the stems creeping, decumbent or erect, frequently with the base swollen to form a pseudobulb-like structure, the roots either fasciculate at base of pseudobulb or scattered throughout basal portion of stem, usually lanuginose; leaves 1-many, caulescent or rarely basal, not articulate, conduplicate in bud, petiolate, the blades membranous and usually plicate when mature or sometimes somewhat fleshy, occasionally tinged with dark red or purple, entire or weakly undulate at margin; inflorescences terminal, erect, racemose, the rachis laxly to subdensely few-many-flowered; flowers rather small, non-resupinate, often green or greenish yellow; sepals free, spreading or rarely reflexed, subequal; petals free, spreading, generally much narrower than sepals; labellum adnate to base of column, sessile, patent, ecalcarate, entire or variously lobed, often with the base prolonged into 2 conspicuous auricles which embrace column; column very short, semiterete, frequently with 2 small apical stelia; column foot absent; anther terminal, incumbent, operculate, 2-celled; pollinia 4, weakly cohering in 2 pairs, waxy, without appendages; rostellum short, transverse; stigma directly beneath rostellum, recessed.

LECTOTYPE SPECIES AND NOMENCLATURE: The lectotype species of *Malaxis* is *M. spicata* Sw. (vide Britton & Brown, Ill. Fl. N. U. S. ed. 2. 1: 570. 1913), one of the two species originally proposed by Swartz. The type species of *Microstylis* is *M. ophioglossoides* (Willd.) Eaton, nom. illeg. (*Malaxis ophioglossoides* Willd., nom. illeg. = *Malaxis unifolia* Michx. = *Microstylis unifolia* (Michx.) Britton, Sterns, & Poggenburg). *Microstylis* is not conserved against *Malaxis*.

DISTRIBUTION: Cosmopolitan, occurring throughout the wet temperate areas of the Old and New World excluding Australia, with about 300 species. In Oceania (excluding New Zealand) there are many localized species. Thirteen species are here recognized from Fiji, eight of them being endemic.

USEFUL TREATMENTS OF GENUS: RIDLEY, H. N. A revision of the genera *Microstylis* and *Malaxis*. J. Linn. Soc. Bot. 24: 308-351. 1888. (This treatment is the only monograph of the genus thus far undertaken, but it deals with only 69 of at least 300 now recognized species, and it is seriously out of date.) SEIDENFADEN, G. Orchid genera in Thailand VII. *Oberonia* Lindl. & *Malaxis* Sol. ex Sw. Dansk Bot. Arkiv 33 (1): 42-85. 1978. (Although this treatment is restricted to the species occurring in Thailand, Seidenfaden provides a brief summary of the taxonomic history of *Malaxis* and resolves a number of nomenclatural problems associated with some of Schlechter's sectional names.)

A brief discussion of the reduction of *Microstylis* to *Malaxis*, attempts to divide the genus into sections, and some of the taxonomic problems, together with a suggested placement of the 13 Fijian species into four sections, have recently been provided by the present writer (Kores, 1989).

KEY TO SPECIES

Labellum with anterior margin dentate or deeply dissected.

Stems erect, usually closely spaced, often somewhat swollen or pseudobulb-like at base; roots fasciculate (sect. *Crepidium*).

Anterior margin of labellum fimbriate or lacerate; leaf blades lanceolate, linear-lanceolate, or elliptic-lanceolate.

Leaf blades lanceolate or elliptic-lanceolate; midlobe of labellum oblong, oblong-obovate, or elliptic-subquadrate, slightly longer than lateral lobes, the disk with a weakly raised crest along anterior margin of fovea.

Plants large, 30–69 cm. tall; leaf blades 15–21 cm. long, 1.8–4.2 cm. broad. . . . 1. *M. comans*

Plants smaller, 9.5–23 cm. tall; leaf blades 4–10 (–13) cm. long, 1–2.2 cm. broad.

2. *M. schlechteri*

Leaf blades linear-lanceolate; midlobe of labellum suborbicular or subquadrate, much longer than lateral lobes, the disk naked. 3. *M. longifolia*

Anterior margin of labellum dentate or weakly dentate; leaf blades ovate or elliptic-ovate.

Labellum 7.5–11 mm. long, 6–13 mm. broad, the blade somewhat incurved distally, subentire or prominently bilobulate, the auricles broadly rounded at apex.

Blade of labellum transversely obovate, entire or weakly bilobulate distally, the fovea very large, deeply concave to subsaccate. 4. *M. radicolica*

Blade of labellum prominently bilobulate, the fovea very small, not deeply concave or subsaccate.

5. *M. tetraloba*

Labellum about 3.3 mm. long and 3 mm. broad, the blade not incurved distally, weakly 3-lobed, the auricles subacute at apex. 6. *M. brevidentata*

Stems decumbent or ascending, arising from a creeping base, usually widely spaced, hardly or not thickened at base; roots scattered (sect. *Commelinodes*).

Flowers greenish yellow to pale yellow. 7. *M. lunata*

Flowers dark red to reddish purple.

Fovea of labellum oblong-elliptic, the midlobe of blade entire. 8. *M. latisejala*

Fovea of labellum semicircular, the midlobe of blade usually bifid. 9. *M. resupinata*

Labellum with anterior margin entire or once-cleft at apex, not dentate or deeply dissected.

Blade of labellum 3-lobed; petals linear-ligulate or oblong-oblancoate (sect. *Malaxis*).

Stems decumbent or ascending, hardly or not thickened basally; apex of labellum briefly cleft or notched, the fovea oblong-elliptic. 10. *M. imthurnii*

Stems erect, usually prominently thickened basally; apex of labellum entire, not cleft or notched, the fovea semicircular. 11. *M. vittensis*

Blade of labellum entire; petals spatulate or oblong-obovate (sect. *Oistochilus*).

Labellum deeply cordate at base, the auricles embracing column, oblong-obovate to oblong-falcate.

12. *M. latisegmenta*

Labellum very shallowly cordate at base, the auricles hardly or not embracing column, ovate or subdeltoid. 13. *M. platycheila*

1. *Malaxis comans* C. Schweinf. in Bishop Mus. Bull. 141: 21, fig. 7, b. 1936; L. O.

Williams in Bot. Mus. Leaflet 5: 114. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed.

2. 385. 1972; Kores in Allertonia 5: 47. 1989.

FIGURE 43A.

Oberonia comans C. Schweinf. ex B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 27. 1953.

Terrestrial plants 30–69 cm. tall, the rhizome much abbreviated, the roots fasciculate, short, stout, the stems crowded, erect, up to 8 cm. long, slightly bulboso-thickened at base, completely obscured by bases of petioles, densely 5–7-foliolate; leaves erect or ascending, the petioles 6–9 cm. long, 0.8–1.1 cm. broad, gradually dilated to form a short, slightly inflated sheathing base, the blades lanceolate to elliptic-lanceolate, slightly oblique, 15–21 cm. long, 1.8–4.2 cm. broad, chartaceous, narrowly acuminate at apex, cuneate at base; inflorescences erect, 17.7–37 cm. long, the peduncle slender, weakly angled, usually somewhat longer than foliage, the rachis slender, 4–7 cm. long, densely many-flowered, the bracts reflexed, lanceolate-acuminate, 3.5–5 mm. long, 0.75–1.25 mm. broad; flowers ascending, pale yellow to yellowish orange; medial sepal patent, broadly elliptic-ovate, 4.7–5 mm. long, about 3.2 mm. broad, rounded at apex;

lateral sepals patent, suborbicular or elliptic-suborbicular, about 4.4 mm. long and 3 mm. broad, obtuse at apex; petals broadly spreading to subpatent, lanceolate-elliptic to oblong-elliptic, about 4.6 mm. long and 1.8 mm. broad, subacute to obtuse at apex; labellum suborbicular-reniform in outline, 5.9–7 mm. across, prominently auriculate at base, the auricles broadly oblong to semiorbicular, about 3.2 mm. across, broadly rounded at apex, the blade weakly 3-lobed, the lateral lobes small, subquadrate, each deeply divided into 4–6 long, linear-ligulate teeth, the midlobe oblong to elliptic-subquadrate, slightly longer than lateral lobes, prominently 2-lobed at apex, with the tips of lobules entire or sometimes weakly bifid, the disk with a weakly raised lunate crest along anterior margin of fovea, the fovea semicircular, relatively large; column brief, stout; ovary prominently pedicellate, filiform-cylindric, 1.7–2.5 cm. long overall, weakly 6-costate.

TYPIFICATION: The type is *Smith 1739* (AMES 41964 HOLOTYPE; many ISOTYPES), collected May 7, 1934, in the lower Wainunu River Valley, Mbua Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and still known only from the two collections originally cited, collected in forest from near sea level to an elevation of about 500 m. in western Vanua Levu. Flowers have been obtained in April and May.

AVAILABLE COLLECTION: VANUA LEVU: MBUA: Southern slope of Mt. Seatura, *Smith 1684*.

The first six species here treated are representatives of sect. *Crepidium* (Bl.) Seidenfaden, the largest section of the genus. Of the six species indigenous in Fiji, four are endemic.

2. *Malaxis schlechteri* (Rolfe) L. O. Williams in Bot. Mus. Leafl. 5: 115. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 386. 1972; Kores in Allertonia 5: 48. 1989.

FIGURE 43B.

Orchidea Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Microstylis purpurea sensu Reichenb. f. in Seem. Fl. Vit. 302. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 305. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 28. 1953; non Lindl.

Microstylis vitiensis Schlechter in Repert. Sp. Nov. 10: 249, nom. illeg. 1911; non Rolfe (1909) nec *Malaxis vitiensis* L. O. Williams.

Microstylis schlechteri Rolfe in Kew Bull. 1921: 53. 1921.

Malaxis purpurea sensu L. O. Williams in Bot. Mus. Leafl. 5: 115, quoad spec. vit. 1938; non Kuntze.

Terrestrial plants 9.5–16 (–23) cm. tall, the rhizome much abbreviated, the roots fasciculate, filiform, flexuose, the stems erect, short, 2.5–7 cm. long, not or scarcely dilated at base, completely obscured by bases of petioles, densely 4–6-foliolate; leaves erect or ascending, the petioles slender, 2–3.8 cm. long, 0.3–0.5 cm. broad, gradually dilated to form a short, slightly inflated sheathing base, the blades elliptic-lanceolate, slightly oblique, 4–10 (–13) cm. long, 1–2.2 cm. broad, chartaceous, narrowly acuminate at apex, gradually angustate at base; inflorescences erect, 8–25 cm. long, the peduncle slender, terete, 5.5–13 cm. long, the rachis slender, weakly costate, (2–) 5–10 cm. long, subdensely many-flowered, the bracts broadly spreading to patent, lanceolate-acuminate, 4–11 mm. long, about 1 mm. broad; flowers erect or ascending, pale green to greenish yellow; medial sepal patent, oblong-elliptic, about 4.5 mm. long and 1.7 mm. broad, obtuse at apex; lateral sepals patent, broadly elliptic-ovate, slightly oblique, 4–4.5 mm. long, 2.4–3.5 mm. broad, obtuse at apex; petals broadly spreading, linear-falcate, about 4.2 mm. long and 0.7 mm. broad, subacute to obtuse at apex; labellum suborbicular-reniform in outline, about 5.5 mm. across, prominently auriculate at base, the auricles broadly oblong to subquadrate, about 2.5 mm. across, broadly rounded at apex, the blade weakly 3-lobed, about 2.75 mm. long, the lateral lobes small, obtuse, with each anterior portion deeply divided into 2–4 long linear-ligulate teeth, the midlobe oblong-obovate, slightly longer than lateral lobes, prominently 2-lobed at apex, the disk with a weakly raised crest along anterior margin of fovea, the fovea semicircular, relatively small; column brief, stout; ovary rather prominently pedicellate, slender, cylindric-clavate, 1–2 cm. long overall, weakly 6-costate.

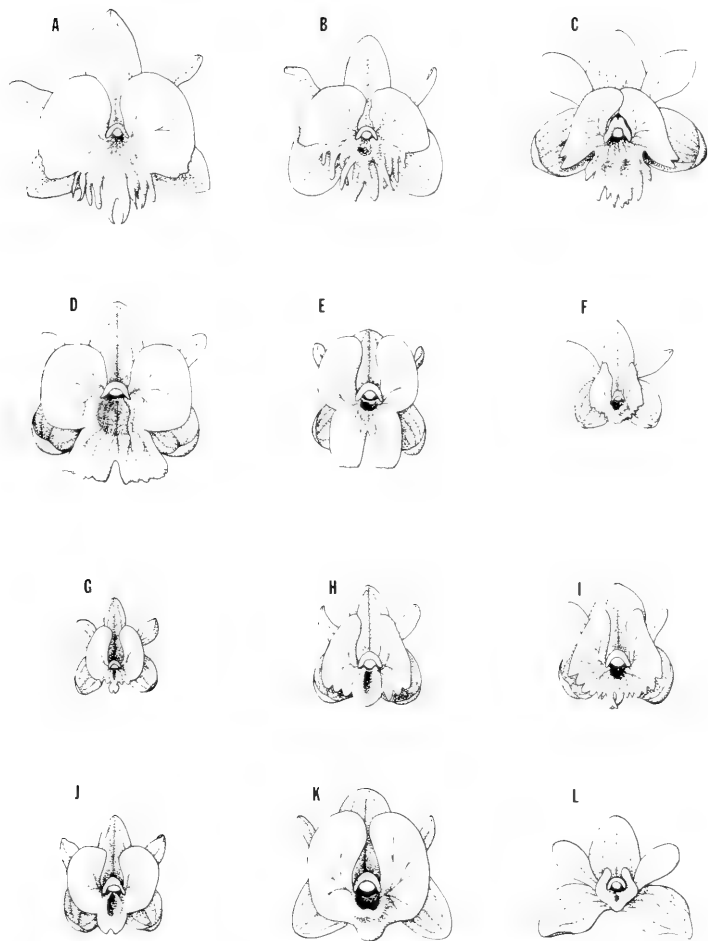


FIGURE 43. *Malaxis* flowers, all $\times 4$: A, *M. comans*; B, *M. schlechteri*; C, *M. longifolia*; D, *M. radicolica*; E, *M. tetraloba*; F, *M. brevidentata*; G, *M. lunata*; H, *M. latisejala*; I, *M. resupinata*; J, *M. imthurnii*; K, *M. vitiensis*; L, *M. latisejmentata*. A from Smith 1739, B from Greenwood 996, C from Gillespie 4748, D from Degener 14728, E from Degener 14762, F from Smith 1620, G from A. Morrison s. n. (Aneityum, New Hebrides), H from Smith 1063, I from Degener 15477, J from Degener 15089, K from Parks 20761, L from Smith 967.

TYPIFICATION AND NOMENCLATURE: *Microstylis vitiensis* Schlechter is based on "*Dr. Lucae*" s. n. (B HOLOTYPE), collected in 1884 along the upper Rewa River (probably in Naitasiri Province), Viti Levu; nothing further is known about this specimen, and I am not aware of any other Fijian material collected by Lucae, who may have been a passing traveler. Since Schlechter's binomial was a later homonymy (for the species now known as *Malaxis vitiensis* (Rolfe) L. O. Williams), Rolfe in 1921 proposed *Microstylis schlechteri* as a new name for it. Other entities in the above synonymy refer to *Seemann 613*, which I believe best placed in *M. schlechteri*.

DISTRIBUTION: Endemic to Fiji and now known from three of the high islands, where it occurs from near sea level to an elevation of about 300 m. Flowers and fruits have been obtained between December and May.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Hills east of Navua River, *Greenwood 996*. NAITASIRI: Forest Reserve (Tholo-i-suva?), *Vaughan 3177*; Central road, *Tothill 413a*; Tamavua Creek, *Bernardi 12399* (G). VANUA LEVU: MATHUATA: Without further locality, *Greenwood 572*. THAKAUNDRUVE: SAVUSAVU Bay region, *Degener 13854*.

Probably this species, but all in capsule: VITI LEVU: RA: Vicinity of Rewasa, near Vaileka, *Degener 15530*. VITI LEVU without further locality, *Graeffe 1278*. TAVEUNI: Western slope, between Somosomo and Wairiki, *Smith 736*. FIJI without further locality, *Seemann 613*.

3. *Malaxis longifolia* (Rolfe) L. O. Williams in Bot. Mus. Leaf. 5: 115. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 385. 1972; Kores in Allertonia 5: 49. 1989.

FIGURE 43C.

Microstylis longifolia Rolfe in Kew Bull. 1921: 54. 1921.

Plants terrestrial or sometimes epiphytic, 17–35 cm. tall, the rhizome much abbreviated, the roots fasciculate, slender, flexuose, the stems crowded, erect, up to 10 cm. long, slightly thickened at base, almost completely obscured by several sheathing cataphylls and bases of petioles, densely (3 or) 4–7-foliate; leaves erect, the petioles 2–5.5 cm. long and about 0.6 cm. broad, gradually dilated to form a short, often rather prominently inflated, sheathing base, the blades linear-lanceolate, 6–18 cm. long, 0.5–1.5 cm. broad, chartaceous, narrowly acute at apex, gradually angustate at base; inflorescences erect, 10–15 (–41) cm. long, the peduncle well developed, weakly angled, 7–10 (–25) cm. long, the rachis slender, weakly costate, 3–5 (–15) cm. long, laxly several-many-flowered, the bracts broadly spreading to patent, lanceolate-attenuate, 4–9 mm. long, 0.75–1.5 mm. broad; flowers ascending, pale greenish yellow to yellowish orange; medial sepal patent, broadly ovate, 3–4 mm. long, 2–3 mm. broad, obtuse at apex; lateral sepals patent, oblong-ovate, 3–4 mm. long, 2.5–3.5 mm. broad, broadly rounded and weakly cucullate at apex; petals broadly spreading, linear-oblongate to -elliptic, 4–5 mm. long, 1–2 mm. broad, subacute to obtuse at apex; labellum more or less elliptic-suborbicular in outline, 5.2–6.5 mm. long, 4–5.5 mm. broad, prominently auriculate at base, the auricles more or less oblong, 2.5–3 mm. long, 1.8–2.5 mm. broad, obtuse at apex, the blade 3-lobed, the lateral lobes small, obtuse to subdeltoid, with each anterior margin subentire or irregularly dentate, the midlobe much longer than lateral lobes, suborbicular or subquadrate, 2.2–2.5 mm. across, subentire or weakly cleft distally, with the anterior margin prominently and irregularly dentate, the disk naked, the fovea poorly developed, semicircular; column short, stout, somewhat deflexed distally; ovary pedicellate, filiform-cylindric, 0.5–0.9 (–1.5) cm. long, weakly 6-costate.

TYPIFICATION: The type is *Horne s. n.* (K HOLOTYPE), collected in January, 1878, in Fiji without further locality, but probably in either Ovalau, Moturiki, or the Rewa River region of Viti Levu (cf. Kores, 1989).

DISTRIBUTION: Endemic to Fiji and known with certainty from four of the high islands, where it occurs from near sea level to an elevation of approximately 300 m. Flowers have been observed between December and May, fruits in February and March.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Vicinity of Mbalo, near Vatukarasa, *Degener 15300a*. SERUA: Vicinity of Ngaloa, *Degener 15193a*. MOTURIKI: *Seemann 616*. VANUA LEVU: MATHUATA: Southern base of Mathuata Range, north of Natua, *Smith 6864*; near Mbatiri, *DA 13906*; Mathuata coast, *Greenwood 662*; Wainikoro River, *Greenwood 662a*. THAKAUNDRIVE: Eastern drainage of Yanawai River, *Degener & Ordonez 14086*. TAVEUNI: Vicinity of Wairiki, *Gillespie 4748*.

4. ***Malaxis radlicicola*** (Rolfe) L. O. Williams in Bot. Mus. Leafl. 5: 115, quoad lectotypum. 1938; J. W. Parham, Pl. Fiji Isl. 292, p. p. 1964, ed. 2. 386, p. p. 1972; Kores in Allertonia 5: 49. 1989. FIGURE 43D.

Microstylis radlicicola Rolfe in Kew Bull. 1921: 53, quoad lectotypum. 1921.

Terrestrial plants up to 28 cm. tall, the rhizome much abbreviated, the roots fasciculate, slender, flexuose, the stems crowded, erect, up to 7.5 cm. long, distinctly conical-thickened at base, partially obscured by several sheathing cataphylls and bases of petioles, densely 3–6-foliolate; leaves erect, the petioles 3–4.5 cm. long and about 0.6 cm. broad, gradually dilated to form a very brief, moderately inflated sheathing base, the blades ovate to elliptic-ovate, slightly oblique, (5–) 9–15 cm. long, 2–3.5 cm. broad, chartaceous, weakly plicate, acuminate at apex, broadly rounded at base; inflorescences erect, 20–35 cm. tall, the peduncle well developed, terete, the rachis about as long as peduncle or somewhat shorter, slender, weakly costate, laxly to subdensely several-many-flowered, the bracts reflexed, lanceolate-acuminate, 5–11 mm. long, 1–2 mm. broad; flowers ascending, the outer perianth segments pale green to greenish yellow, the labellum greenish white with the fovea darker green; medial sepal patent, oblong-elliptic, 6–7 mm. long, 3–3.5 mm. broad, obtuse at apex; lateral sepals patent, broadly oblong-obovate, slightly falcate, about 5.5 mm. long and 4.5 mm. broad, rather prominently cucullate distally, broadly rounded at apex; petals subpatent, linear-oblong to -oblanceolate, 7.5–8 mm. long, about 2 mm. broad, subacute at apex; labellum subcruciform in outline, 10–11 mm. long, 11–13 mm. broad, prominently auriculate at base, the auricles broadly oblong to oblong-obovate, 4–5 mm. across, broadly rounded at apex, the blade somewhat incurved, transversely obovate, entire or sometimes weakly bilobulate distally, 6–8 mm. long, 8–10 mm. broad, with the anterior margin irregularly dentate, broadly rounded to truncate at apex, the disk with a weakly raised, transverse crest along posterior margin of fovea, the fovea very large, semicircular in outline, deeply concave to subsaccate; column very brief, stout; ovary prominently pedicellate, filiform-cylindric, 1.3–1.5 cm. long, weakly 6-costate.

LECTOTYPIFICATION: The species is based solely on *im Thurn 64* (K), collected Feb. 1, 1906, on mossy tree roots in shaded forest at Nandarivatu, Mba Province, Viti Levu. However, the collection is a mixture of two species of *Malaxis*. Two complete flowering plants attached to the sheet represent *M. tetraloba* (Schlechter) Kores, and the inflorescence in the fragment pocket has been designated as the lectotype (Kores, 1989).

DISTRIBUTION: Endemic to Fiji and known definitely only from Viti Levu from near sea level to an elevation of about 900 m. A specimen with old flowers, from Ngau, is also provisionally placed in this species. Flowers have been collected between December and April.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: About 2 miles south of Nandarivatu, *im Thurn 14*; Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14728*. NAMOSI: Melimeli, *McLoughlin 913* (K spirit 29201). REWA: Mt. Korombamba, *DA 16519*, *Hassall 01-8039*.

Probably this species, but with old flowers and impossible to place with certainty: VITI LEVU: REWA: Vicinity of Suva, *Meebold 16812*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7857*.

5. *Malaxis tetraloba* (Schlechter) Kores in *Allertonia* 5: 50. 1989. FIGURE 43E.

Microstylis tetraloba Schlechter in *Repert. Sp. Nov.* 9: 94. 1910.

Microstylis radlicola Rolfe in *Kew Bull.* 1921: 53, p. p. 1921.

Malaxis radlicola L. O. Williams in *Bot. Mus. Leafl.* 5: 115, p. p. 1938; J. W. Parham, *Pl. Fiji Isl.* 292, p. p. 1964, ed. 2. 386, p. p. 1972.

Terrestrial plants up to 30 cm. tall, the rhizome much abbreviated, the roots fasciculate, slender, elongate, flexuose, the stems crowded, erect, (2-) 4-7 cm. long, 1-1.3 cm. in diameter, distinctly conical-thickened at base, completely obscured by bases of petioles, densely 3-5-foliolate; leaves erect or ascending, the petioles slender, (2.5-) 4-6 cm. long, 0.8-1.2 cm. broad, gradually dilated to form a slightly inflated, sheathing base, the blades elliptic to elliptic-ovate, (8-) 10-15.5 cm. long, (3.3-) 4-6 cm. broad, chartaceous, acuminate at apex, broadly cuneate at base; inflorescences erect, 12-25 cm. long, the peduncle stout, terete, 7-17 cm. long, the rachis weakly costate, 5-8 cm. long, very densely many-flowered, the bracts weakly reflexed, linear-attenuate, 3-5 mm. long, 0.5-1 mm. broad; flowers patent, pale green or greenish yellow; medial sepal patent, oblong-elliptic, 4-5 mm. long, about 1.75 mm. broad, subacute at apex; lateral sepals patent, broadly elliptic to elliptic-obovate, slightly oblique, 3.5-4.5 mm. long, 2-2.25 mm. broad, obtuse at apex; petals patent to weakly reflexed, linear-ligulate, about 4 mm. long and 0.75 mm. broad, subacute at apex; labellum more or less oblong-obpandurate in outline, about 7.5 mm. long and 6 mm. broad, very prominently auriculate at base, the auricles oblong-obovate, 3-3.5 mm. long, 2.25-2.75 mm. broad, broadly rounded at apex, the blade somewhat incurved, broadly oblong-obovate, 4.5-5.5 mm. long, 4-5 mm. broad, prominently bilobulate distally, the lobules obliquely oblong to oblong-obovate, with the anterior margins irregularly dentate or weakly crenulate, broadly rounded to truncate at tips, the disk with a weakly developed hippocrepiform crest along anterior margin of fovea, the fovea very small, semi-circular; column about 1 mm. long, slightly expanded laterally at apex; ovary briefly pedicellate, cylindrical-clavate, about 6 mm. long, rather prominently 6-costate.

TYPIFICATION: *Microstylis tetraloba* is based on *Betche s. n.* (B HOLOTYPE), from Upolu, Samoa; no further information about this collection can be provided.

DISTRIBUTION: Samoa (Savai'i and Upolu) and Fiji; from the latter archipelago the species is sparsely known from Viti Levu and Ovalau, occurring at elevations up to about 900 m. Flowers have been obtained in September, February, and March.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *in Thurn 64*, p. p., *Degener 14762*. REWA: Suva, *Simmonds s. n.* (K spirit 21131), possibly cultivated from an originally upland plant. OVALAU: Without further locality, *Graeffe 1282, 1285*.

6. *Malaxis brevidentata* C. Schweinf. in *Bishop Mus. Bull.* 141: 20. *fig. 7, a*. 1936; L. O. Williams in *Bot. Mus. Leafl.* 5: 114. 1938; J. W. Parham, *Pl. Fiji Isl.* 292. 1964, ed. 2. 385. 1972; Kores in *Allertonia* 5: 51. 1989. FIGURE 43F.

Oberonia brevidentata C. Schweinf. ex B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 27. 1953.

Terrestrial plants up to 56 cm. tall, the rhizome much abbreviated, the roots fasciculate, slender, flexuose, the stems crowded, erect, up to 10 cm. long, slightly bulbous-thickened at base, almost completely obscured by several sheathing cataphylls and bases of petioles, densely 5-7-foliolate; leaves ascending, the petioles slender, 4-6.5 cm. long, gradually dilated to form a brief, slightly inflated, sheathing base, the blades obliquely elliptic-ovate, (3-) 6-13.1 cm. long, (0.7-) 2.1-4.8 cm. broad, chartaceous, acute or abruptly acuminate at apex, broadly cuneate at base; inflorescences erect, up to 25 cm. long, the rachis slender, up to 14.3 cm. long, densely many-flowered, the bracts reflexed, linear-lanceolate, 7-8 mm. long; flowers ascending, greenish white to white, the labellum tinged with darker green; medial sepal patent, elliptic-ovate, about 3.2 mm. long and 2 mm. broad, obtuse to rounded at apex; lateral sepals patent, suborbicular-ovate, about 3.1 mm. long and 2.1 mm. broad, obtuse to rounded at apex; petals broadly spreading, elliptic-lanceolate to -oblanceolate, about 3.2 mm.

long and 1.2 mm. broad, subacute to minutely unequally bilobulate at apex; labellum suborbicular in outline, about 3.3 mm. long and 3 mm. broad, prominently auriculate at base, the auricles subdeltoid, about 2 mm. long and 1.2 mm. broad, subacute at apex, the blade weakly 3-lobed, the lateral lobes brief, broadly rounded, with the anterior margin briefly irregularly dentate, the midlobe obtuse, slightly longer than lateral lobes, subentire, weakly dentate at apex, the disk with a slightly raised V-shaped callus along anterior margin of fovea, the fovea small, semicircular; column very brief, stout; ovary briefly pedicellate, cylindrical-clavate, 4-8 mm. long, terete.

TYPIFICATION: The species is based on *Smith 1620* (AMES 41965 HOLOTYPE; ISOTYPES at BISH, K, NY, P), collected April 27, 1934, on the southern slopes of Mt. Seatura, Mbua Province, Vanua Levu, at an altitude of about 500 m.

DISTRIBUTION: Fiji and New Hebrides; in Fiji it seems infrequent in densely shaded forest from near sea level to approximately 500 m. Flowers have been obtained between January and April, fruits between April and July.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Vicinity of Ngaloa, *Degener 15210*. NAITASIRI: Savura Water Supply, *DA 12552*. REWA: Mt. Korombamba, *DA 16520*.

7. **Malaxis lunata** (Schlechter) Ames in J. Arnold Arb. **13**: 129, in obs. 1932; Kores in *Allertonia* **5**: 51. 1989; Lewis & Cribb, *Orch. Vanuatu*, **69**. fig. 11, *D.* 1989.

FIGURE 43G.

Microstylis lunata Schlechter in *Repert. Sp. Nov.* **9**: 162. 1911.

Terrestrial plants up to 35 cm. tall, the rhizome absent, the roots scattered, slender, flexuose, the stems usually widely spaced, decumbent or ascending, terete, 5-20 cm. long, partially obscured by bases of petioles, laxly 3-7-foliolate; leaves ascending to patent, the petioles slender, 2-4.5 cm. long, 0.6-0.8 cm. broad, gradually dilated to form a brief, slightly inflated, sheathing base, the blades obliquely elliptic to elliptic-ovate, 5-10 cm. long, 2.5-4 cm. broad, chartaceous, abruptly acuminate at apex, broadly angustate at base; inflorescences erect, 15-25 cm. tall, the peduncle weakly costate, 8-15 cm. long, the rachis slender, costate, 7-10 cm. long, densely many-flowered, the bracts reflexed, lanceolate-acuminate, 6-15 mm. long, 1.25-2 mm. broad; flowers ascending, greenish yellow; medial sepal patent, oblong-ovate, about 3.5 mm. long and 1.75 mm. broad, subacute to obtuse at apex; lateral sepals patent, broadly elliptic-obovate, about 3 mm. long and 2 mm. broad, rounded at apex; petals broadly spreading, oblong-obovate, about 3.5 mm. long and 1.5 mm. broad, broadly rounded at apex; labellum suborbicular in outline, about 4 mm. long and 3.5 mm. broad, prominently auriculate at base, the auricles oblong to oblong-attenuate, falcate, about 2.5 mm. long and 1.25 mm. broad, obtuse to subacute at apex, the blade weakly 3-lobed, the lateral lobes very brief, broadly rounded, with 2 or 3 small, irregular, subdeltoid teeth along anterior margin, the midlobe oblong-obovate, noticeably longer than lateral lobes, briefly bifid at apex, with the tips of the lobules obtuse, the disk naked, the fovea relatively small, oblong-elliptic; column very brief, about 0.5 mm. long; ovary briefly pedicellate, cylindrical-clavate, 0.3-0.7 cm. long, weakly 6-ribbed.

TYPIFICATION: The species is based on *A. Morrison s. n.* (B HOLOTYPE, possibly destroyed; ISOTYPES at AMES, K), collected July 6, 1896, on the ridge between Ithumey and Anelgauhat, Aneityum, New Hebrides.

DISTRIBUTION: New Hebrides and Fiji; in the latter archipelago it seems infrequent in dense forest at altitudes of about 100-800 m. The few available specimens flowered in scattered months.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Prince's Road, near Tholo-i-suva, *Vaughan 3363*, p. p.; Central road, north of Suva, *Tothill 845*. REWA: Mt. Korombamba, *DA 3869*. TAVEUNI: Above Ngathavula Estate, *DA 16922*; track to Mt. Uluingalau, *DA 14084*.

Probably this species, but with poor flowers and impossible to place with certainty: OVALAU: Mountains above Levuka, *Gillespie 4456a*.

8. **Malaxis latisejala** (Rolfe) C. Schweinf. in Bishop Mus. Bull. 141: 23, p. p. 1936; L. O. Williams in Bot. Mus. Leaflet 5: 115, p. p. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 385. 1972; Kores in Allertonia 5: 52. 1989. FIGURE 43H.

Microstylis latisejala Rolfe in Kew Bull. 1921: 53. 1921.

Oberonia latisejala C. Schweinf. ex B. E. V. Parham in Trans & Proc. Fiji Soc. 2: 27. 1953.

Plants terrestrial or rarely epiphytic, 20–40 cm. tall, the rhizome absent, the roots scattered, slender, flexuose, the stems usually widely spaced, decumbent, terete, (6–) 10–20 cm. long, partially obscured by bases of petioles, laxly 5–14-foliolate; leaves ascending to patent, the petioles slender, 5.5–10.5 cm. long, 0.8–1.2 cm. broad, gradually dilated to form a very brief, inflated, sheathing base, the blades elliptic, oblong-elliptic, or rarely elliptic-ovate, 7–16.5 cm. long, (1.3–) 2–6.8 cm. broad, chartaceous, abruptly acuminate at apex, cuneate at base; inflorescences erect, 10–32 cm. long, the peduncle weakly costate, about as long as foliage, the rachis relatively stout, costate, 6–15 cm. long, very densely many-flowered, the bracts strongly reflexed, narrowly attenuate, 5–12 mm. long, 1–1.5 mm. broad; flowers weakly ascending to subpatent, dark red to reddish purple; medial sepal patent, oblong-elliptic to -ovate, 4–4.5 mm. long, about 2 mm. broad, subacute to acute at apex; lateral sepals patent, broadly oblong-elliptic, slightly oblique, about 4 mm. long and 2.25 mm. broad, slightly reflexed distally, broadly acute to subacute at apex; petals patent, oblong, 3.5–4 mm. long, about 1 mm. broad, acute at apex; labellum oblong-elliptic in outline, 4.5–5 mm. long, 4–4.5 mm. broad, prominently auriculate at apex, the auricles subdeltoid, about 2 mm. long and 1.5 mm. broad, subacute at apex, the blade weakly 3-lobed, the lateral lobes very brief, broadly rounded, with 1–4 short, blunt, subdeltoid teeth along anterior margin, the midlobe transversely subdeltoid to semiorbicular, slightly longer than lateral lobes, with the anterior margin entire, the disk naked, the fovea relatively large, oblong-elliptic; column brief, about 0.5 mm. long, somewhat expanded laterally at apex; ovary briefly pedicellate, filiform-cylindric, 5–10 mm. long, weakly 6-costate.

TIPIFICATION: The type is *im Thurn 209* (K HOLOTYPE), collected March 28, 1906, at Navai, south of Nandarivatu, Mba Province, Viti Levu. Schweinfurth and Williams cited several additional specimens, but one of them is referable to another species, *Malaxis vitiensis*.

DISTRIBUTION: Endemic to Fiji and moderately common at some localities at elevations of about 200–1,120 m. Flowers have been obtained throughout much of the year, between August and March, fruits in August and October.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14504*; Nauwanga, south of Nandarivatu, *Degener 14756*. NAMOSI or REWA: Between Wainamboro Creek and Wainandoi River, *Vaughan 3343*. NAITASIRE: Near Tholo-i-suva, *Vaughan 3347, 3350*. REWA: Limestone hills near quarry beyond Lami, *Gillespie 4583*. OVALAU: *Jonsson 2452*. KORO: Eastern slope of main ridge, *Smith 1063*. VANUA LEVU: THAKAUNDRIVE: Southern slope of Korotini Range, below Navitho Pass, *Smith 484*; Savusavu Bay region, *Degener 13945*.

Probably this species, but in capsule only: KANDAVU: Mt. Mbuke Levu, *Smith 254*.

9. **Malaxis resupinata** (Forst. f.) Kuntze, Rev. Gen. Pl. 2: 673. 1891; Yuncker in Bishop Mus. Bull. 184: 31. 1945, in op. cit. 220: 88. 1959; Kores in Allertonia 5: 53. 1989.

FIGURE 43I.

Epidendrum resupinatum Forst. f. Fl. Ins. Austr. Prodr. 61. 1786.

Microstylis resupinata Drake, Ill. Fl. Ins. Mar. Pac. 305. 1892; F. Br. in Occas. Pap. Bishop Mus. 9(4): 22. fig. 6. 1930.

Terrestrial plants 20–40 cm. tall, the rhizome absent, the roots scattered, flexuose, the stems decumbent or ascending, terete, 5–10 cm. long, partially to completely obscured by bases of petioles, laxly 3–5-foliolate; leaves erect or ascending, the petioles

relatively stout, 6–10.5 cm. long, (0.6–) 1–1.4 cm. broad, gradually dilated to form a very brief, moderately inflated, sheathing base, the blades ovate- to oblong-elliptic, slightly oblique, 10–22 cm. long, 4.5–8 cm. broad, chartaceous, abruptly acuminate at apex, broadly cuneate at base; inflorescences erect, 21–45 cm. long, the peduncle weakly angular, 15–25 cm. long, the rachis slender, weakly costate, 6.5–22 cm. long, laxly many-flowered, the bracts ascending to patent, lanceolate-acuminate, 2.5–5 mm. long, 1–1.25 mm. broad; flowers patent, maroon; medial sepal patent, oblong to oblong-elliptic, 3.5–4.5 mm. long, 1–1.5 mm. broad, subacute at apex; lateral sepals patent, oblong-falcate, 3–4 mm. long, about 1.5 mm. broad, obtuse at apex; petals patent to slightly reflexed, linear-ligulate, slightly falcate, 3.5–4 mm. long, about 0.75 mm. broad, subacute at apex; labellum more or less oblong-obovate in outline, 5–6 mm. long, 4–5 mm. broad, prominently auriculate at base, the auricles subdeltoid, 2.5–3 mm. long, 1.5–2 mm. broad, acute at apex, the blade weakly 3-lobed, the lateral lobes brief, broadly rounded, with several short deltoid teeth along anterior margin, the midlobe relatively small, semiorbicular, slightly longer than lateral lobes, 2-lobed, the lobules attenuate-falcate, distally crossing over each other, narrowly acute at tips, the disk with a well-developed hippocrepiform crest along anterior margin of fovea, the fovea relatively large, semicircular; column stout, 0.5–1 mm. long, laterally expanded at apex; ovary briefly pedicellate, filiform-cylindric, about 6 mm. long, weakly 6-ribbed.

TYPIFICATION: The species is based on *J. R. & G. Forster* (BM LECTOTYPE ex herb. Banks), obtained in Tahiti on Cook's second voyage.

DISTRIBUTION: Widely dispersed in the southern Pacific from the New Hebrides to the Society and Tubuai Islands. In Fiji, however, it seems infrequent, scattered in densely shaded forest at altitudes of about 100–400 m. Flowers and fruits have been obtained between December and June.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Waimbale, near Namboutini, *Degener 15477*. OVALAU: Hills southeast of valley of Mbureta River, *Smith 7430*.

Probably also representing this species: VITI LEVU: RA: Vicinity of Rewasa, near Vaileka, *Degener 15528*. VANUA LEVU: THAKAUNDOVE: Hills east of Mbalanga, Savusavu Bay, *Degener 13918*.

10. *Malaxis imthurnii* (Rolfe) L. O. Williams in Bot. Mus. Leaflet. 5: 114. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 385. 1972; Kores in Allertonia 5: 53. 1989.

FIGURE 43J.

Microstylis imthurnii Rolfe in Kew Bull. 1921: 53. 1921.

Microstylis everardii Rolfe in Kew Bull. 1921: 54. 1921.

Malaxis everardii L. O. Williams in Bot. Mus. Leaflet. 5: 114. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 385. 1972.

Terrestrial plants 16–37 cm. tall, the rhizome absent, the roots scattered, slender, flexuose, the stems ascending, terete, 6–16 cm. long, 0.6–0.8 cm. in diameter, partially to completely obscured by bases of petioles, laxly (3–)5–10-foliolate; leaves ascending to patent, the petioles (3–) 4–6.5 cm. long, 0.8–1.2 cm. broad, gradually dilated to form a very brief, moderately inflated, sheathing base, the blades elliptic-lanceolate to -ovate, slightly oblique, (3–) 6–14 cm. long, (1.8–) 2.5–4.5 cm. broad, chartaceous, gradually to abruptly acuminate at apex, cuneate at base; inflorescences erect, (7–) 15–49 cm. long, the peduncles weakly angular, generally shorter than foliage, the rachis slender, costate, much longer than peduncle, subdensely few-many-flowered, the bracts patent or reflexed, lanceolate-attenuate, (2–) 4–12 mm. long, 0.3–2 mm. broad; flowers ascending to patent, pale greenish yellow to dark yellow; medial sepal patent, oblong-elliptic to -obovate, 5–6 mm. long, 2.5–3 mm. broad, obtuse at apex; lateral sepals broadly spreading, broadly oblong-obovate to suborbicular, (3–) 3.5–4 mm. long, 3–4 mm. broad, slightly reflexed distally, broadly subacute or rounded at apex; petals broadly spreading, ligulate to oblong-lanceolate, 4–5.5 mm. long, 1–1.5 mm. broad, obtuse at apex; labellum more or less elliptic-orbicular in outline, (3.5–) 4.5–5.5 mm.

across, prominently auriculate at base, the auricles obliquely oblong-ovate, 1.5–2.5 mm. long, 1–2 mm. broad, obtuse at apex, the blade 3-lobed, the lateral lobes brief, broadly rounded to obtuse, with the anterior margins entire, the midlobe transversely ovate to semicircular, much longer than lateral lobes, with the anterior margin entire, briefly emarginate at apex, the disk with a weakly developed crest along anterior margin of fovea, the fovea oblong-elliptic, with the posterior margin prominently raised and extended toward column; column weakly compressed laterally, about 1.5 mm. long; ovary pedicellate, cylindric-clavate, 5–10 mm. long, 6-costate.

TIPIFICATION AND NOMENCLATURE: The type of *Microstylis imthurnii* is *im Thurn 208* (K HOLOTYPE), collected March 28, 1906, at the foot of Mt. Tomanivi near Navai, Mba Province, Viti Levu; that of *M. everardii* is *im Thurn s. n.* (K HOLOTYPE), obtained in March, 1906, from the same locality. Except for the fact that the former of these collections is from a large specimen, more than 37 cm. tall, while the latter is from a smaller plant about 16 cm. tall, no significant differences are apparent. Subsequent collections are variable in size, and no reason can be found for maintaining both species.

DISTRIBUTION: Endemic to Fiji and known to occur on Viti Levu at elevations from near sea level to about 850 m.; a single collection from Ovalau probably also belongs here. Flowers have been noted between February and June, fruits in April and May.

AVAILABLE COLLECTIONS: VITI LEVU: SERUA: Vicinity of Ngaloa, *Degener 15089*. NAMOSI: Mt. Voma, *DA 11690*. NAITASIRE: Near Tholo-i-suva, *Vaughan 3348*.

Probably this species: OVALAU: Hills above Levuka, *Gillespie 4456*.

11. *Malaxis vitiensis* (Rolfe) L. O. Williams in Bot. Mus. Leafl. 5: 116. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 386. 1972; Kores in Allertonia 5: 54. 1989.

FIGURE 43K.

Microstylis vitiensis Rolfe in J. Linn. Soc. Bot. 39: 173. 1909; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 28. 1953; non Schlechter (1911).

Malaxis latisejala sensu C. Schweinf. in Bishop Mus. Bull. 141: 23, p. 1936; L. O. Williams in Bot. Mus. Leafl. 5: 115, p. 1938.

Terrestrial plants 20–40 cm. tall, the rhizome short, the roots fasciculate, slender, flexuose, the stems crowded, erect, 6–16 cm. long, usually somewhat conical-thickened at base, completely obscured by a series of sheathing cataphylls and bases of petioles, subdensely 3- or 4-foliate; leaves erect or ascending, the petioles stout, 5–8.5 cm. long, 0.8–1.5 cm. broad, gradually dilated to form a relatively long, slightly inflated, sheathing base, the blades elliptic- to oblong-lanceolate, 8–22 cm. long, 2–7.5 cm. broad, chartaceous, gradually acuminate at apex, cuneate at base; inflorescences erect, 13–25 cm. long, the peduncle weakly costate, 5–12 cm. long, the rachis slender, weakly costate, 8–13 cm. long, subdensely many-flowered, the bracts patent to weakly reflexed, lanceolate-acuminate, 6–15 mm. long, 0.75–2 mm. broad; flowers patent, pale green to greenish yellow, with the labellum and column tinged with orange; medial sepal patent, oblong-elliptic to -obovate, 4–4.5 mm. long, about 2 mm. broad, obtuse at apex; lateral sepals patent, broadly elliptic-obovate, 3.5–4 mm. long, 2.25–2.5 mm. broad, slightly reflexed distally, broadly rounded at apex; petals broadly spreading, linear-ligulate to -oblanceolate, 3–3.5 mm. long, about 1 mm. broad, obtuse at apex; labellum orbicular-obovate to -oblong in outline, 5–6 mm. across, prominently auriculate at base, the auricles oblong-ovate to -elliptic, 3.2–4 mm. long, 1.5–2 mm. broad, obtuse at apex, the blade 3-lobed, the lateral lobes broadly rounded to transversely subdeltooid, with the anterior margins entire, the midlobe small, broadly oblong to transversely oblong, slightly longer than lateral lobes, somewhat inflexed distally, with the anterior margin entire, broadly rounded at apex, the disk with a very prominently raised hippocrepiform crest along anterior margin of fovea, the fovea relatively large, semicircular; column brief, stout, about 1 mm. long; ovary briefly pedicellate, cylindric-clavate, 0.6–10 mm. long, 6-costate.

TYPIFICATION: *Microstylis vitiensis* is based on *Gibbs 653* (BM HOLOTYPE; ISOTYPE at K), collected in September, 1907, on "Col i Nandarivatu" (Mt. Nanggaranambuluta?), Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and now known from four of the high islands, found between 250 and 1,100 m. Flowers and fruits have been collected between July and October.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Nandarivatu, *Parks 20761*; western slope of Mt. Tomanivi, *Smith 5269*. RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, *Smith 5719*. KANDAVU: Summit of Mt. Mbuke Levu, *Smith 271*.

Probably this species, but in capsule only: VANUA LEVU: THAKAUNDOVE: Mt. Mbatini, crest of range, *Smith 641*. TAVEUNI: Valley between Mt. Manuka and main ridge of island, *Smith 8287*.

12. *Malaxis latisegmenta* C. Schweinf. in *Bishop Mus. Bull.* **141**: 22. fig. 7, c. 1936; L. O. Williams in *Bot. Mus. Leafl.* **5**: 114. 1938; J. W. Parham, *Pl. Fiji Isl.* **292**. 1964, ed. 2. 385. 1972; Kores in *Allertonia* **5**: 54. 1989. **FIGURE 43L.**

Oberonia latisegmenta C. Schweinf. ex B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 27. 1953.

Terrestrial plants 12–30 cm. tall, the rhizome absent, the roots scattered, slender, flexuose, the stems decumbent or ascending, terete, 4.5–14 cm. long, 0.4–0.6 cm. in diameter, partially covered by bases of petioles, 3–7-foliolate; leaves ascending, the petioles slender, 2.5–7 cm. long, 0.6–0.8 cm. broad, gradually dilated to form a brief, weakly inflated sheathing base, the blades ovate to ovate-elliptic, (2.4–) 6–10.5 cm. long, (1–) 2.5–5.2 cm. broad, chartaceous, abruptly acuminate at apex, obliquely rounded at base; inflorescences erect, 8–23 (–46) cm. long, the peduncle weakly angled, 4.5–12 (–27) cm. long, the rachis slender, weakly costate, 4–18 cm. long, laxly to subdensely many-flowered, the bracts reflexed, lanceolate-acuminate, 5–11 mm. long, 0.75–2 mm. broad; flowers ascending, greenish yellow to pale yellow; medial sepal patent, broadly elliptic to elliptic-ovate, 5–6 mm. long, 3–5 mm. broad, subacute to obtuse at apex; lateral sepals patent, obliquely suborbicular-obovate, about 4 mm. long, 3.1–3.8 mm. broad, obtuse to rounded at apex; petals broadly spreading, spatulate or elliptic-obovate, sometimes slightly falcate, 4.5–5 mm. long, (1.2–) 1.8–2.5 mm. broad, obtuse at apex; labellum very small, cordate, elliptic-cordate, or occasionally transversely cordate, somewhat fleshy, 2.5–3.5 mm. long, 2.3–3 mm. broad, prominently auriculate and deeply cordate at base, the auricles oblong-obovate to -falcate, 1–1.5 mm. long, 0.75–1 mm. broad, obtuse at apex, the blade entire, a little incurved distally, with the anterior margin entire, obtuse or rounded at apex, the disk naked or with a weakly raised lunate crest along anterior margin of fovea, the fovea small (sometimes absent), semicircular; column very brief, about 0.75 mm. long, hardly or not expanded distally; ovary pedicellate, filiform-cylindric, 8–10 mm. long, 6-costate.

TYPIFICATION: The type is *Smith 967* (AMES 41966 HOLOTYPE; many ISOTYPES), collected Jan. 29, 1934, on the eastern slope of the main ridge of Koro.

DISTRIBUTION: Fiji and Tonga; in Fiji it is comparatively frequent, found from near sea level to an elevation of approximately 1,100 m. Flowers and fruits are found between January and June.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Mountains inland from Lautoka, *Greenwood 378, 441*; Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14442*. NAMOSI: Hills east of Navua River, *Greenwood 1043*. NAITASIRI: Vicinity of Tholo-i-suva, *Vaughan 3173, 3363*, p. p. REWA: Namboro Prison road, *McLoughlin 912* (K spirit 29256); Mt. Korombamba, *Hassall 01-8040*; Suva (possibly brought in from wild), *Simmonds s. n.* (K accession no. 521-1951). OVALAU: Hills southeast of valley of Mbureta River, *Smith 7431*. VANUA LEVU: MATHUATA: In mountains, *U. S. Expl. Exped.* (w 4471). THAKAUNDOVE: Between Nikawa Bay and Valeti, *Bierhorst F83*; vicinity of Savusavu, *Bierhorst F42*; Maravu, near Salt Lake, *Degener 14177*.

Probably this species, but in capsule only: VITI LEVU: NAITASIRI: Tholo-i-suva, *Parks 2071*. NGAU: Hills east of Herald Bay, inland from Sawaike, *Smith 7831*. VANUA LEVU: MBUA: Southern portion of Seatovo Range, *Smith 1547*; southern slope of Mt. Seatura, *Smith 1627*.

13. **Malaxis platytila** (Reichenb. f.) Kuntze, Rev. Gen. Pl. 2: 673. 1891; L. O. Williams in Bot. Mus. Leaflet 5: 115. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 386. 1972; Kores in Allertonia 5: 55. 1989.

Microstylis rheedii sensu Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862; non Lindl.

Microstylis platytila Reichenb. f. in Seem. Fl. Vit. 302. 1868; Benth. in Benth. & Hook. f. Gen. Pl. 3: 494, in obs. 1883; Ridley in J. Linn. Soc. Bot. 24: 342, as *M. platycheila*. 1888; Drake, Ill. Fl. Ins. Mar. Pac. 305. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 28. 1953.

Terrestrial plants 15–25 cm. tall, the rhizome absent, the roots scattered, slender, flexuose, the stems decumbent or ascending, sometimes closely spaced, terete, 4–8 cm. long, 0.3–0.5 cm. in diameter, partially covered by bases of petioles, laxly 3–5-foliolate; leaves erect or ascending, the petioles slender, 4–7.5 cm. long, 0.4–0.8 cm. broad, gradually dilated to form a moderately long, weakly inflated sheathing base, the blades ovate to elliptic-ovate, slightly oblique, 4.5–10 cm. long, 2–5.2 cm. broad, chartaceous, abruptly acuminate at apex, broadly cuneate or obliquely rounded at base; inflorescences erect, 18–35 cm. long, the peduncle slender, weakly angled, much longer than foliage, the rachis slender, weakly costate, 8–18 cm. long, laxly many-flowered, the bracts reflexed, lanceolate-attenuate, 5–7 mm. long, 0.5–1 mm. broad; flowers ascending, greenish yellow to pale yellow, probably cleistogamous; medial sepal oblong-ovate, about 5.5 mm. long and 3 mm. broad, acute at apex; lateral sepals obliquely elliptic-ovate, about 4.5 mm. long and 3.8 mm. broad, obtuse at apex; petals oblong-ovate, about 5 mm. long and 2.2 mm. broad, obtuse at apex; labellum more or less transversely subdeltoïd in outline, about 3.5 mm. long and 5.2 mm. broad, weakly auriculate and broadly cordate at base, the auricles hardly or not embracing column, ovate to subdeltoïd, about 2 mm. across, obtuse at apex, the blade entire, somewhat fleshy, with the anterior margin entire, broadly subacute at apex, the disk with a weakly raised, hippocrepiform crest along anterior margin of fovea, the fovea weakly developed, small, elliptic; column very brief, about 0.5 mm. long; ovary pedicellate, clavate, 7–12 mm. long, weakly 6-costate.

TIPIFICATION: *Microstylis platytila* is based on *Seemann 590* (W HOLOTYPE (photo at AMES); ISOTYPES at AMES, BM, K, P). This number is presumably a mixture from two localities on the islands of Taveuni and Kandavu. The actual holotype bears a small label indicating the locality Somosomo (on Taveuni), but at least some of the isotypes doubtless came from Kandavu. It is now impossible to specify their localities. Seemann often labelled as "Somosomo" specimens that he actually obtained at considerable elevations in the hills east of that coastal village; his Kandavu material, also, could have been obtained from a mountainous locality.

DISTRIBUTION: Endemic to Fiji and apparently rare; possibly from mountainous areas from a few hundred to 1,050 m. Flowers and fruits have been obtained between February and May.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4131*; vicinity of Nandarivatu, *Degener 14804*.

20. **OBERONIA** Lindl. Gen. Sp. Orchid. Pl. 15. 1830, Fl. Orchid., Oberonia. 1859; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 265. 1977; Seidenfaden in Dansk Bot. Arkiv 33 (1): 7. 1978; Kores in Allertonia 5: 56. 1989; Lewis & Cribb, Orch. Vanuatu, 71. 1989. Nom. cons.

Iridorkis Thou. in Nouv. Bull. Sci. Soc. Philom. Paris 1: 319. 1809. Nom. rejic.

Malaxis sensu Reichenb. f. in Seem. Fl. Vit. 302. 1868; non Sw.

Epiphytic plants with short or elongate, leafy, pseudobulbless stems; leaves 2-ranked, often congested, articulate or not, the blades equitant, conduplicate in bud, conspicuously compressed laterally, often somewhat fleshy; inflorescences terminal,

spicate, the rachis usually densely flowered; flowers often verticillate, inconspicuous (perianth 0.7–2 mm. long), resupinate or not; sepals and petals free, erect or spreading, rarely reflexed, more or less equal or the petals narrower; labellum sessile, entire or variously lobed, the base generally somewhat concave, with the lateral margins embracing the column; column very short, terete; column foot absent; anther terminal, incumbent, operculate, 2-celled; pollinia 4, cohering in 2 pairs, waxy, without appendages; rostellum short, broad; stigma beneath rostellum, slightly recessed.

TYPE SPECIES: *Oberonia iridifolia* Lindl., nom. illeg. = *Oberonia ensiformis* (Sm.) Lindl. (*Malaxis ensiformis* Sm.), typ. cons. No type species has been designated for *Iridorkis* Thou. (ICBN).

DISTRIBUTION: Paleotropical, comparatively rare in Africa but abundant in Asia and Malesia, extending eastward through the southern Pacific islands to the Tuamotus, with approximately 200 species. Three species represent the genus in Fiji. All the Fijian species have nonarticulate leaves and fall into subgen. *Menophyllum* (Schlechter in Repert. Sp. Nov. Beih. 1: 143. 1911).

KEY TO SPECIES

Plants caulescent, the stem ensheathed by alternating, distichous, closely spaced, equitant leaves; flowers patent, greenish white to cream-colored; ovary and pedicel about 1.5 mm. long. . . . 1. *O. equitans*
Plants acaulescent, the leaves borne in a dense, irislike clump; flowers erect or ascending, pale yellow to yellowish orange, sometimes with darker reddish or brown portions; ovary and pedicels less than 1 mm. long.

Leaves 1.5–6 cm. long; inflorescence 4–8 cm. long, glabrous; labellum prominently 3-lobed, with the apex acute to obtuse. 2. *O. titania*

Leaves (10–) 14–40 cm. long; inflorescence (15–) 25–45 cm. long, laxly to subdensely tomentose throughout; labellum entire, with the apex truncate or slightly retuse. 3. *O. heliophila*

1. ***Oberonia equitans*** (Forst. f.) Mutel in Mém. Soc. Roy. Centr. Agr. Sci. Arts Dépt. Nord 1835–1836: 84. 1837 (repr. Premier Mém. Orchid. 8. 1838); Drake, Ill. Fl. Ins. Mar. Pac. 305. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 27. 1953; J. W. Parham, Pl. Fiji Isl. 293. 1964; Sykes in New Zealand Dept. Sci. Ind. Res. Bull. 200: 261. 1970; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 270. pl. 114. 1977; Seidenfaden in Dansk Bot. Arkiv 33 (1): 27, in adnot. 1978; Kores in Allertonia 5: 57. 1989; Lewis & Cribb, Orch. Vanuatu, 72. fig. 12, E, F. 1989.

FIGURE 85 (lower right).

Epidendrum equitans Forst. f. Fl. Ins. Austr. Prodr. 60. 1786.

Cymbidium equitans Sw. in Nova Acta Soc. Sci. Upsal. 6: 72. 1799.

Oberonia glandulosa Lindl. Fol. Orchid., Oberonia, 6. 1859; Seem. in Bonplandia 9: 260. 1861; Kraenzl. in Bot. Jahrb. 25: 601. 1898; H. Fleischm. & Rechner in Denkschr. Akad. Wiss. Wien 85: 256. 1910; Schlechter in Repert. Sp. Nov. 9: 93. 1910; Ames in J. Arnold Arb. 14: 105. 1933; Christophersen in Bishop Mus. Bull. 128: 63. 1935; L. O. Williams in Bot. Mus. Leaflet 5: 116. 1938; Yuncker in Bishop Mus. Bull. 178: 41. 1943; J. W. Parham in Agr. J. Dept. Agr. Fiji 19: 104. 1948; Yuncker in Bishop Mus. Bull. 220: 88. 1959; J. W. Parham, Pl. Fiji Isl. ed. 2. 386. 1972.

Malaxis glandulosa Reichenb. f. in Walp. Ann. Bot. Syst. 6: 215. 1861, in Seem. Fl. Vit. 302. 1868.

Oberonia brevifolia sensu Seem. in Bonplandia 10: 153. 1862, Viti, 443. 1862; non Lindl.

Oberonia flexuosa Schlechter in Bot. Jahrb. 39: 61. 1906.

Oberonia palmicola sensu B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 27. 1953; non F. v. Muell.

Malaxis equitans Bl. sensu Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 270, pro syn. 1977; non sensu typi.

Plants epiphytic or sometimes terrestrial, small, 14–20 cm. long, the stem elongate, flexuose, densely foliate, up to 14 cm. long; leaves distichous, equitant, erect or ascending, narrowly lanceolate-falcate, 2–6 cm. long, 0.4–0.8 cm. broad, somewhat fleshy, not articulate, acute at apex; inflorescence slender, up to 10 cm. long, the rachis subdensely many-flowered, minutely pubescent, the bracts subdeltoid, about 1.8 mm. long and 0.9 mm. broad, with irregularly dentate margins; flowers more or less

verticillate, patent, greenish white to cream-colored; sepals spreading, oblong, about 1 mm. long, sparsely subciliate-papillate externally, obtuse at apex; petals spreading, oblong-ovate, slightly smaller than sepals, glabrous, acute to subacute at apex; labelum subentire, more or less subquadrate in outline, about 1 mm. long, the base a little dilated and briefly biauriculate, somewhat concave, the apex briefly bilobulate, the lobules broadly rounded to obliquely truncate, with the anterior margins subentire or minutely denticulate; column brief, terete; anther suborbicular, briefly obtuse-acuminate at apex; pollinia subglobose, about 0.15 mm. in diameter; rostellum brief, with the anterior margin weakly retuse; stigma transversely elliptic; ovary subsessile, cylindrical-clavate, about 1.5 mm. long, laxly papillate distally.

TYPIIFICATION AND NOMENCLATURE: The type of *Epidendrum equitans* was collected in Tahiti, Society Islands, by the Forsters on the second Cook voyage, labelled as Forster "170" (BM LECTOTYPE; ISOLECTOTYPE at P); in G. Forster's *Prodromus* the number is 316. *Oberonia glandulosa* is typified by two Tahitian collections: Kartalsky (*Prescott*) s. n. (K SYNTYPE) and A. Matthews 158 (K SYNTYPE), April, 1830; no lectotype has been designated. The type of *O. flexuosa* is Schlechter 15496 (B HOLOTYPE, destroyed), collected in January, 1903, from hills near Ou-Hinna, New Caledonia. The typification and the other names listed above were more fully discussed in my 1989 treatment.

DISTRIBUTION: New Caledonia eastward to the Tuamotus (Makatea), occurring in all the principal southern Pacific archipelagoes. In Fiji, from which 40 collections are now known, the species has been obtained on four of the islands but seems frequent only on Viti Levu; it occurs from near sea level to an elevation of 1,200 m. in dense forest, the forest-grassland transition zone, and in hillside thickets; for the most part flowers seem to occur between October and July, capsules between February and October.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1155*; vicinity of Nandarivatu, *Greenwood 854*; western and southern slopes of Mt. Tomanivi, *Smith 5241*, *Kores & Molvray F19*; Mba without further locality, *im Thurn 34*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5528*. SERUA: Vicinity of Korovisilou, *Damanu 82*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8586*. NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5751*; vicinity of Viria, *Parks 20477*; above Wainawangga, Waindina River, *DA 1823*; vicinity of Tamavua, *Vaughan 3181*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7075a*. REWA: Mt. Korombamba, *DA 147*; Suva, *Simmonds s. n.* (K spirit 20553, 21015, 24121). SERUA and TAILEVU: Navua River and Namara, *Seemann 588*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7551*. VANUA LEVU: MBUA: Lower Wainunu River Valley, *Smith 1731*. THAKAUNDOVE: Navonu Ridge, Natewa Peninsula, *DA 16888*. VANUA MBA-LAVU: Northern limestone section, *Smith 1485*. FIJI without further locality, *U. S. Expl. Exped.* (AMES 3040).

Oberonia equitans is the only caulescent species of the genus presently known from Fiji and is readily distinguished on this basis alone. However, it is highly variable vegetatively, some specimens having relatively slender, ascending leaves laxly spaced along the stem and free from adjacent leaves for a considerable portion of their length, while other plants have shorter, almost erect leaves crowded along the stem and free from adjacent leaves only in their distal portions. The two extremes appear quite different, but actually these changes in vegetative morphology seem to represent a continuous range of variation and are not associated with any corresponding changes of floral morphology. From data provided by labels, it appears that plants growing at higher altitudes or in more exposed places tend to be somewhat more compact and to have dense foliage, while those growing near sea level or in sheltered spots appear somewhat more lax and with widely spaced leaves.

2. **Oberonia titania** Lindl. *Fol. Orchid.*, *Oberonia*, 8. 1859; Lewis & Cribb, *Orch. Vanuatu*, 74. fig. 12, C, D. 1989. FIGURE 86 (upper left).

Titania miniata Endl. *Prodr. Fl. Norfolk*. 31. 1833.

Oberonia neocaledonica Schlechter in *Bot. Jahrb.* 39: 61. 1906; Guillaumin in *Notul. Syst. (Paris)* 10: 86. 1941; *Fl. Nouv.-Caléd.* 78. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 269. pl. 113. 1977; Kores in *Allertonia* 5: 58. 1989.

Plants epiphytic, acaulescent, small, erect, up to 10 cm. tall; leaves distichous, ascending, ligulate-subfalcate, 1.5–6 cm. long, 0.2–0.6 cm. broad, somewhat fleshy, not articulate, acute or briefly acuminate at apex; inflorescence slender, 4–8 cm. long, glabrous, the peduncle terete, 2–6 cm. long, the rachis (1–) 2–6 cm. long; densely many-flowered, the bracts minute, ovate-attenuate, much shorter than ovary; flowers verticillate, ascending, yellow to yellowish orange; sepals patent, slightly dissimilar, the medial sepal ovate, about 0.75 mm. long, glabrous, subacute at apex, the lateral sepals similar to medial sepal but slightly oblique; petals broadly spreading, oblong-ovate to elliptic-obovate, slightly oblique, a little smaller than sepals, glabrous; labellum prominently 3-lobed, about 1 mm. long overall, the base cuneate, slightly concave, the lateral lobes small, obliquely triangular-ovate, obtuse at apex, the midlobe large, broadly ovate to transversely obovate, broadly acute to obtuse at apex, with the anterior margins entire; column very brief, stout; anther suborbicular, broadly subacute at apex; pollinia subglobose, about 0.1 mm. in diameter; rostellum brief, with the anterior margin very weakly tridentate; stigma transversely elliptic; ovary briefly pedicellate, subcylindric, about 1 mm. long, glabrous.

TYPEIFICATION AND NOMENCLATURE: *Titania miniata*, the basionym of *Oberonia titania*, is typified by *F. Bauer s. n.* (W HOLOTYPE). The type of *O. neocaledonica* is *Schlechter 14766* (B HOLOTYPE, destroyed; ISOTYPES at K, NSW, P, Z), collected Sept. 22, 1902, near Yahoué, New Caledonia. The latter name was recently relegated to synonymy by Lewis and Cribb (1989), whose usage is followed in the present treatment.

DISTRIBUTION: Norfolk Island, Lord Howe Island, New Caledonia, the New Hebrides, and Fiji, where it is currently known only from a single collection occurring at an elevation of 200–300 m. and flowering in May. However, a second specimen (not collected) with immature capsules was recently observed and photographed by the present author in the vicinity of Nandarivatu, Mba Province, at an elevation of about 850 m., May 21, 1989.

AVAILABLE COLLECTION: VITI LEVU: NAMOSI: Hills east of Navua River, *Greenwood 1052* (AMES).

3. **Oberonia heliophila** Reichenb. f. *Otia Bot. Hamb.* 56. 1878 (repr. *Xenia Orchid.* 3: 32. 1881); Drake, *Ill. Fl. Ins. Mar. Pac.* 305. 1892; Kraenzl. in *Bot. Jahrb.* 25: 601. 1898; L. O. Williams in *Bot. Mus. Leafl.* 5: 116. 1938; J. W. Parham, *Pl. Fiji Isl.* 293. 1964, ed. 2. 386. 1972; Kores in *Allertonia* 5: 58. 1989; Lewis & Cribb, *Orch. Vanuatu*, 72. fig. 12, A, B. 1989.

Oberonia Seem. in *Bonplandia* 9: 260. 1861, Viti, 442. 1862.

Malaxis heliophila Reichenb. f. *Otia Bot. Hamb.* 56, nom. alt. 1878 (repr. *Xenia Orchid.* 3: 32, nom. alt. 1881).

Oberonia iridifolia sensu Kraenzl. in *Bot. Jahrb.* 25: 610. 1898; H. Fleischm. & Rechner in *Denkschr. Akad. Wiss. Wien* 85: 256. 1910; non Lindl.

Oberonia verticillata sensu Kraenzl. in *Bot. Jahrb.* 25: 601. 1898; H. Fleischm. & Rechner in *Denkschr. Akad. Wiss. Wien* 85: 256. 1910; non Wight.

Oberonia betchei Schlechter in *Bull. Herb. Boissier II.* 6: 303. 1906, in *Repert. Sp. Nov.* 9: 92. 1910; Christophersen in *Bishop Mus. Bull.* 128: 63. 1935.

Oberonia sp. Ames in *J. Arnold Arb.* 14: 105. 1933.

Plants epiphytic, acaulescent, large, up to 50 cm. long; leaves distichous, equitant, ascending, ligulate or lanceolate, slightly falcate, (10-) 14-40 cm. long, up to 1.4 cm. broad, coriaceous, not articulate, acute at apex; inflorescence (15-) 25-45 cm. long, laxly to subdensely tomentose throughout, the rachis elongate, densely many-flowered, the bracts oblong-ovate, with irregularly dentate margins; flowers subverticillate, ascending, yellow to yellowish orange, with the labellum frequently somewhat darker reddish or brown; sepals spreading, slightly dissimilar, glabrous, the medial sepal oblong-ovate, about 1 mm. long and 0.75 mm. broad, broadly subacute at apex, the lateral sepals similar to medial sepal but slightly oblique, obtuse at apex; petals spreading, ligulate-lanceolate, a little falcate, about as long as sepals but much narrower, obtuse to truncate at apex, with the anterior margin erose; labellum entire, more or less oblong-subquadrate in outline, about 1.2 mm. across, somewhat fleshy, a little concave, the base briefly biauriculate, the apex truncate or briefly retuse; column very brief, stout; anther transversely ovate-cucullate, briefly acuminate at apex; pollinia subglobose, about 0.15 mm. in diameter; rostellum and stigma not examined; ovary clavate, about 1 mm. long, glabrous.

TYPIFICATION AND NOMENCLATURE: Of the six collections originally listed by Reichenbach for *Oberonia heliophila*, the best seems to be *U. S. Expl. Exped.* (w 37726, p. p. LECTOTYPE; ISOLECTOTYPES at AMES 3034, US 37773, p. p.), collected in Savai'i, Samoa, without further data, presumably in 1839 (cf. Kores, 1989). *Oberonia betchei* was based on *Betche 38* (B HOLOTYPE, destroyed; ISOTYPE at MEL), collected in 1886 in Samoa without further details. The inadequacy of the assumed differences between the two taxa was discussed by me in 1989. Other binomials listed in the above synonymy were represented by misidentified Samoan collections.

DISTRIBUTION: The species has a compact range extending from the Solomon Islands through the New Hebrides and Fiji to Samoa. From Fiji some 30 collections are available from three of the high islands; there the species occurs at elevations from near sea level to 200 m. or perhaps slightly higher, frequently being found in dense masses in sunny places in beach thickets, on forest edges, or in thin and somewhat open forest. Flowers and fruits have most often been collected between January and July.

REPRESENTATIVE COLLECTIONS: VITI LEVU: NAMOSI: Vicinity of Namosi, *Parks 20174*; Waindina River Valley, *Gillespie 2877*. RA: Waindava, vicinity of Rewasa, near Vaileka, *Degener 15465*. NAITASIRI: Navolau, Rewa River, *DA 3139* (coll. *P. Turaga*); Waindina River basin, *MacDaniels 1064*; near Nasinu, *Greenwood 1113*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7075*; Namara, *Seemann 587* (PARATYPE at AMES, K, P, w 37711). REWA: Vicinity of Suva, *Meebold 16813*. OVALAU: *U. S. Expl. Exped.* (PARATYPE at w 37727, p. p.). VANUA LEVU: MBUA: Koro Creek, Rukuruku Bay, *H. B. R. Parham 451*; lower Wainunu River Valley, *Smith 1732*. MATHUATA: Wainikoro River, *Greenwood 709*. THAKAUNDOVE: Maravu, near Salt Lake, *Degener & Ordenez 14166*.

21. LIPARIS L. C. Rich. Orch. Europ. Annot. 21. 1817 (repr. in *Mém. Mus. Hist. Nat.* 4: 43. 1818); Reichenb. f. in Seem. Fl. Vit. 301. 1868; Ridley in *J. Linn. Soc. Bot.* 22: 252. 1886; Seidenfaden in *Dansk Bot. Arkiv* 31 (1): 7. 1976; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 276. 1977; Kores in *Allertonia* 5: 59. 1989; Lewis & Cribb, *Orch. Vanuatu*, 61. 1989. Nom. cons.

Leptorkis Thou. in *Nouv. Bull. Sci. Soc. Philom.* 1: 317. 1809. Nom. rejic.

Terrestrial or epiphytic plants with pseudobulbous stems; leaves 1-many, frequently petiolate, with conduplicate blades, either nonarticulate (with membranous or chartaceous blades in terrestrial species) or articulate (with usually somewhat fleshy or coriaceous blades in epiphytic species); inflorescences terminal, racemose, the rachis laxly few-many-flowered; flowers variable in size from minute to relatively showy, resupinate; sepals free, spreading, similar or the dorsal sepal somewhat narrower; petals free, spreading, similar to sepals or somewhat narrower; labellum sessile or more or less clawed, correct, entire or variously lobed, frequently with the apex reflexed, the

base usually with 1 or more thickenings or calli; column either elongate, slender, curved, and with a small wing on either side of stigma, or short, broad, and straight; column foot none; anther terminal, incumbent, operculate, 2-celled; pollinia 4, in 2 weakly cohering pairs, waxy, without appendages; rostellum short, broad; stigma under rostellum, recessed.

TYPE SPECIES: *Liparis loeselii* (L.) L. C. Rich. (*Ophrys loeselii* L.), the only original species. No type species has been designated for *Leptorkis* Thou. (ICBN).

DISTRIBUTION: Worldwide, excluding arctic and antarctic regions, with more than 200 species. In Fiji the genus is represented by eight species.

USEFUL TREATMENTS OF GENUS: RIDLEY, H. N. A monograph of the genus *Liparis*. J. Linn. Soc. Bot. 22: 244–297. 1886. SEIDENFADEN, G. Orchid genera in Thailand IV. *Liparis* L. C. Rich. Dansk Bot. Arkiv 31(1): 1–105. 1976.

Various authors have proposed infrageneric systems of classification for *Liparis*, some of them quite complex (Kores, 1989). The division of the genus into three sections as proposed by J. D. Hooker (Fl. Brit. Ind. 5: 691–706. 1890) seems adequate to deal with the comparatively few species found in Fiji.

KEY TO SPECIES

- Leaves nonarticulate, the blades membranous or chartaceous; plants usually terrestrial (sect. *Liparis*).
- Pseudobulbs poorly developed, elongated, cylindrical; leaf blades ovate to elliptic-ovate, (3–) 5–7 cm. broad, membranous; flowers purple; sepals slightly dissimilar. 1. *L. layardii*
- Pseudobulbs well developed, ovoid; leaf blades lanceolate to linear-lanceolate, 1–3.5 cm. broad, somewhat chartaceous; flowers green to greenish yellow; sepals conspicuously dissimilar. 2. *L. disepala*
- Leaves articulate, the blades coriaceous or chartaceous, never membranous; plants usually epiphytic (but sometimes also growing on boulders and rocks).
- Rachis lax, without prominent imbricate bracts (sect. *Coriifoliae*).
- Pseudobulbs unifoliate; flowers 2–2.6 mm. long; labellum with the apex truncate and minutely cuspidate. 3. *L. caespitosa*
- Pseudobulbs with 2 or more leaves; flowers 2.5–10 mm. long; labellum with the apex obtuse with an acumen or notch, briefly emarginate or truncate but not minutely cuspidate.
- Peduncle 2-winged; pseudobulbs more or less ovoid-lenticular; labellum not geniculately reflexed, the apex obtuse, with a prominent tip. 4. *L. elliptica*
- Peduncle terete or prismatic; pseudobulbs ovoid, oblong-ovoid, or narrowly obclavate; labellum geniculately reflexed, the apex without a prominent tip.
- Inflorescence many-flowered; ovary and pedicel 3–8 mm. long; labellum 2.5–4 mm. long, oblong to oblong-obovate or oblong-elliptic.
- Pseudobulbs ovoid to oblong-ovoid, 1–3 cm. long; labellum oblong to oblong-obovate, 3.5–4 mm. long, glabrous. 5. *L. elegans*
- Pseudobulbs obclavate, (4–) 8–20 cm. long; labellum oblong-elliptic, 2.5–3 mm. long, frequently laxly puberulent along lateral margins in anterior half. 6. *L. condylobulbon*
- Inflorescences laxly 5–15-flowered; ovary and pedicel 15–40 mm. long; labellum 8.5–10 mm. long, orbicular-obovate to transversely obovate. 7. *L. orbiculata*
- Rachis congested, with prominent, distichous, imbricate bracts; pseudobulbs unifoliate (sect. *Distichae*).
8. *L. gibbosa*

1. *Liparis layardii* F. v. Muell. in S. Sci. Rec. n. s. 1: 1885 (repr. in Bot. Centralbl. 25: 87. 1886); Schlechter in Bot. Jahrb. 39: 60. 1906; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 292. pl. 123. 1978; Lewis & Cribb, Orch. Vanuatu, 66. fig. 10, K–S, pl. 3, D. 1989. FIGURE 44A–D.

Liparis stricta Schlechter in Repert. Sp. Nov. 9: 95, nom. illeg. 1910; Christophersen in Bishop Mus. Bull. 128: 64. 1935; non J. J. Sm. (1907).

Liparis mataanensis J. J. Sm. in Bull. Jard. Bot. Buitenzorg II. 8: 56. 1912; Kores in Allertonia 5: 59. 1989.

Plants terrestrial, erect, 20–45 cm. tall, the rhizome much abbreviated; pseudobulbs poorly developed, cylindrical, initially completely concealed by a series of loosely clasping, ovate-attenuate cataphylls, distally more stemlike and only partially concealed by a few remotely spaced cataphylls, with 2 (rarely 3) leaves borne near apex; leaves nonarticulate, erect or ascending, the petioles 2–3.5 cm. long, with slightly inflated, sheathing, tubular bases, the blades membranous, ovate to elliptic-ovate,

6.5–10 (–15) cm. long, (3–) 5–7 cm. broad, abruptly narrowed at base, acuminate at apex; inflorescence 12–30 cm. long, laxly 8–15-flowered; flowers ascending, purple; dorsal sepal spreading, oblong-lanceolate, 7–12 mm. long, 1.75–2.5 mm. broad, subacute at apex; lateral sepals spreading, oblong to oblong-ovate, slightly falcate, 6.5–10 mm. long, 2.5–3 mm. broad, subacute to obtuse at apex; petals spreading or reflexed, linear-ligulate, 6–12 mm. long, 0.75–1.25 mm. broad, obtuse at apex; labellum erect, slightly arcuate, broadly obovate, 6.5–10 mm. long, 5.5–7.5 mm. broad, the base cuneate, the apex broadly rounded and sometimes minutely mucronate, with weakly crenulate margins, the disk with 2 small aliform calli near base; column slightly curved, semiterete, narrowly winged distally, 5–6 mm. long; clinandrium shallowly excavate, with the margin weakly 3-lobed; anther suborbicular, truncate at apex; paired pollinia hemispherical, about 0.4 mm. in diameter; ovary pedicellate, about 1.2 cm. long, hexagonal.

TIPIFICATION AND NOMENCLATURE: *Liparis layardii* is based upon *Layard s. n.* (MEL HOLOTYPE) from New Caledonia. The type of *Liparis stricta* Schlechter, for which *L. mataanensis* is a substitute name, is *Vaupel 134* (B HOLOTYPE, destroyed; ISOTYPES at AMES, K), collected Sept. 20, 1906, with flowers and fruits, near Mataana, Savai'i, Samoa. In my preliminary paper (1989) I noted the similarity between these two taxa and pointed out the possibility that future studies might prove their conspecificity. *Liparis mataanensis* was subsequently reduced to the synonymy of *L. layardii* by Lewis and Cribb (1989).

DISTRIBUTION: New Caledonia, Solomon Islands, New Hebrides, Fiji, and Samoa; in Samoa the species is fairly frequent, known from several islands at elevations of 500–1,700 m., but in Fiji it appears rare, known from only two collections obtained in dense ridge forest at 1,165–1,200 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Summit of Mt. Koroyanitu, high point of Mt. Evans Range, *Smith 4200* (AMES, unicate), May 2, 1947; upper slopes of Mt. Tomanivi, *Kores & Molvray F26*, May 20, 1989 (fruits only).

2. *Liparis disepala* Reichenb. f. in *Linnaea* 41:97. 1877; Ridley in *J. Linn. Soc. Bot.* 22: 265. 1886; Schlechter in *Bot. Jahrb.* 39: 60. 1906; Guillaumin in *Notul. Syst.* (Paris) 10: 87. 1941, *Fl. Nouv.-Caléd.* 79. 1948; Hallé in *Fl. Nouv.-Caléd.* et *Dépend.* 8: 289. *pl. 121.* 1977; Kores in *Allertonia* 5: 60. 1989. FIGURE 44E–H.

Liparis kenejiae sensu Yuncker in *Bishop Mus. Bull.* 220: 89. 1959; non Schlechter.

Plants terrestrial, erect, 20–50 cm. tall; pseudobulbs ovoid, 1–3.5 cm. tall, 0.6–2.5 cm. broad, completely surrounded by 1–3 tightly clasping, lanceolate-attenuate cataphylls, with 2 (rarely 3) leaves borne near apex; leaves nonarticulate, erect, the petioles clasping, 4.5–9 cm. long, with tightly sheathing, tubular bases, the blades more or less chartaceous, slightly plicate, lanceolate to linear-lanceolate, 12–29 cm. long, 1–3.5 cm. broad, gradually narrowed at base, narrowly acute at apex; inflorescence 15–30 cm. long, subdensely 6–30-flowered; flowers erect or ascending, green to greenish yellow, sometimes with brownish markings; dorsal sepal spreading or reflexed, oblong-lanceolate, 7–8 mm. long, 1.25–1.75 mm. broad, subacute at apex; lateral sepals initially erect, geniculately reflexed distally, ovate-falcate, 4.5–6 mm. long, 2–3 mm. broad, subacute at apex; petals reflexed, linear-oblongate, slightly falcate, 6–7 mm. long, 1–1.25 mm. broad, obtuse at apex; labellum prominently arcuate, oblong-obovate, 3.5–5 mm. long, 3–4.5 mm. broad, with entire margins, the base slightly narrowed, somewhat channelled, the apex retuse, the disk with a small, transverse, oblong, weakly trilobulate callus near its base; column slightly curved, semiterete, somewhat broader near apex and prominently winged, 3–3.5 mm. long; clinandrium rather deeply excavate, with the dorsal margin weakly 3-lobed; anther ovate, about 1 mm. long and 0.75 mm. broad, abruptly acute at apex; paired pollinia hemiellipsoid, 1–2.5 mm. long and about 0.25 mm. broad; rostellum transverse, weakly tridentate; ovary pedicellate, 0.6–0.9 cm. long, weakly 6-ribbed.

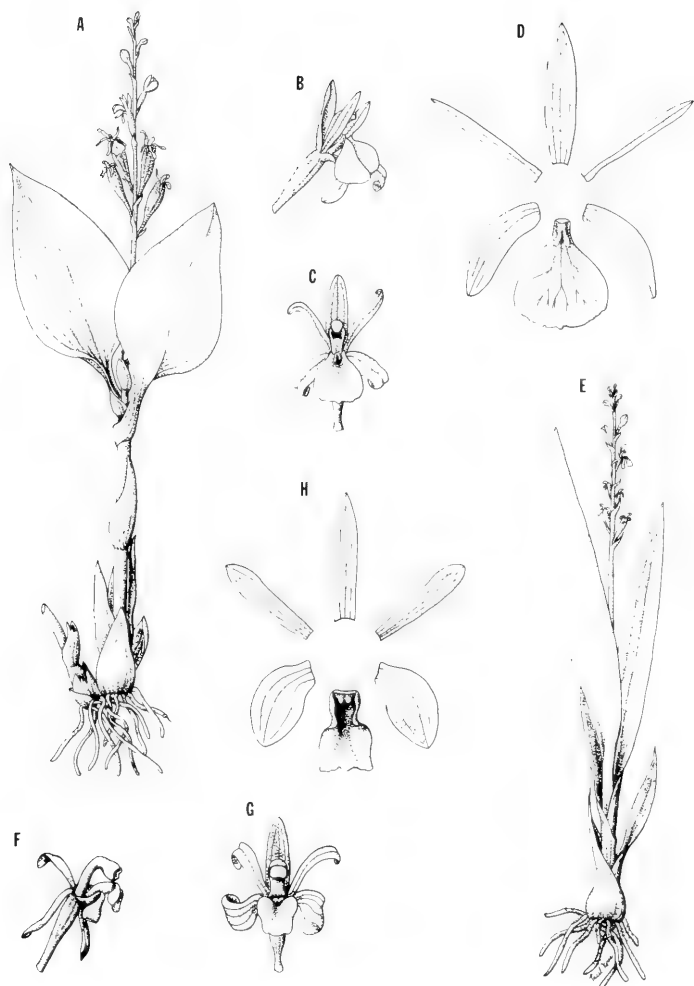


FIGURE 44. A-D, *Liparis layardii*; A, flowering plant, $\times 1/3$; B, complete flower viewed from side, $\times 1 1/2$; C, complete flower viewed from front, $\times 1 1/2$; D, perianth segments, $\times 3$. E-H, *Liparis disepala*; E, flowering plant, $\times 1/3$; F, complete flower viewed from side, $\times 1 1/2$; G, complete flower viewed from front, $\times 1 1/2$; H, perianth segments, $\times 3$. A-D from *Smith 4200*, E-H from *Degener 15299*.

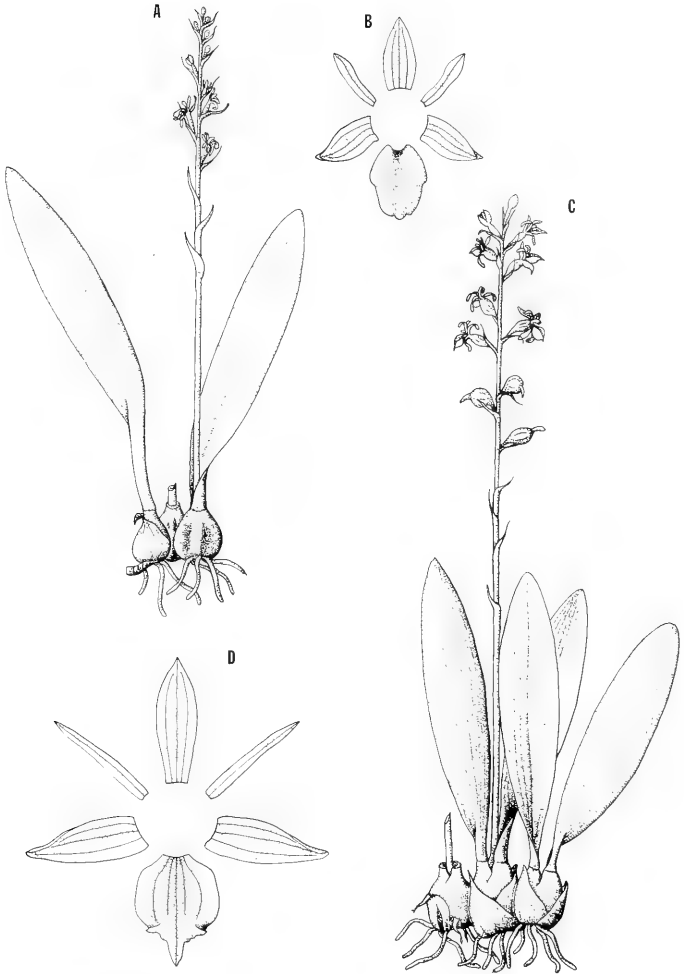


FIGURE 45. A & B, *Liparis caespitosa*; A, flowering plant, $\times 1$; B, perianth segments, $\times 5$. C & D, *Liparis elliptica*; C, flowering plant, $\times 1$; D, perianth segments, $\times 5$. A from Degener 14929, B from Simmonds s. n. (κ spirit 21031), C & D from Smith 5756.

TYPIFICATION: *Liparis disepala* is typified by three syntypes from New Caledonia: *Deplanche 150* (P), collected at Conception; *Deplanche 355* (P), without specific locality, and *Vieillard 1320* (P), collected between 1855 and 1860 at Balade; no lectotype has been designated. Drawings of each collection are to be found at w.

DISTRIBUTION: New Caledonia, Fiji, and Tonga (known from Tofua and 'Eua only). In Fiji the species is found at elevations of 120–900 m. in forest openings or in shrubby areas with partial sun, obtained past flowering in April and May.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Northern portion of Mt. Evans Range, between Mt. Vatyanitu and Mt. Natondra, *Smith 4337* (AMES, BISH, K, NY, P, US); vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4315* (AMES). NANDRONGA & NAVOSA: Vicinity of Mbelo, near Vatukarasa, *Degener 15299* (AMES). VANUA LEVU: Without further locality, *U. S. Expl. Exped.* (AMES 3294, US 37763).

3. *Liparis caespitosa* (Thou.) Lindl. in *Bot. Reg.* **11**: sub *t.* 882. 1825, Gen. Sp. Orchid. Pl. 32. 1830; Ridley in *J. Linn. Soc. Bot.* **22**: 290. 1886; Seidenfaden in *Dansk Bot. Arkiv* **31** (1): 61. 1976; Hallé in *Adansonia* II. **20**: 359. 1981; Kores in *Allertonia* **5**: 60. 1989; Lewis & Cribb in *Orch. Vanuatu*, **62**, fig. 9, K-S. 1989. FIGURE 45A & B.

Malaxis caespitosa Thou. *Hist. Orchid. pl.* **90**. 1822.

Leptorchis caespitosa Kuntze, *Rev. Gen. Pl.* **2**: 671. 1891.

Cestichis caespitosa Ames, *Orchidaceae* **2**: 132, fig. (after Thou. *pl.* **90**). 1908.

Plants epiphytic, caespitose, 10–18 cm. tall, the rhizome abbreviated; pseudobulbs crowded together, ovoid, slightly compressed, 0.8–1.5 cm. tall, 0.6–1.3 cm. broad, unifoliate; leaves articulate, erect, short-petiolate, the blades coriaceous, linear-lanceolate to oblanceolate, 6–17 cm. long, 1–1.4 cm. broad, narrowed and channelled at base, abruptly acute or subacute-mucronate at apex; inflorescence subequal to leaf, the peduncle slender, slightly flattened, up to 8 cm. long, the rachis approximately as long as peduncle, laxly to subdensely many-flowered, the bracts small, attenuate; flowers greenish yellow; sepals spreading or reflexed, oblong-elliptic to -ovate, 2–2.6 mm. long, 0.8–1.1 mm. broad, acute at apex; petals reflexed, linear, 2–2.4 mm. long, about 0.3 mm. broad, acute at apex; labellum slightly fleshy, somewhat recurved distally, more or less oblong-ovate or subquadrate, 2.2–2.5 mm. long, 1.7–2 mm. broad, with entire margins, the base slightly auriculate, somewhat channelled, the apex more or less truncate and minutely cuspidate, the disk naked; column slightly curved, semiterete, about 2.2 mm. long; clinandrium shallowly excavate, with an entire margin; anther depressed-ovate, about 0.5 mm. long and 0.4 mm. broad; paired pollinia hemiellipsoid, about 0.4 mm. long and 0.2 mm. broad; rostellum with the anterior margin slightly acute; stigma deeply recessed, transversely elliptic; ovary short-pedicellate, up to 4.5 mm. long overall, weakly trigonal.

TYPIFICATION: According to Lindley (1830), material of *Liparis caespitosa* was obtained from Mauritius and La Réunion. Orchids described by Du Petit-Thouars (1822) are represented by an incomplete first set deposited at P; if specimens of *L. caespitosa* are not found there among his specimens, *pl.* **90** (1822) could be taken as the type.

DISTRIBUTION: Eastern tropical Africa, Indian Ocean islands, Ceylon, and north-eastern India, eastward through portions of Malesia and with a scattered distribution in the Pacific as far as the Austral Islands. In Fiji the species appears infrequent and is thus far known only from north-central Viti Levu at elevations of 750–900 m., flowering between November and March.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Degener 14929* (AMES). FIJI without further locality (but almost certainly also from the vicinity of Nandarivatu), *Simmonds*, Nov. 5, 1952 (K spirit 21031), in 1960 (K spirit 550).

4. *Liparis elliptica* Wight, Icon. Pl. Ind. Orient. 5: t. 1735. 1851; Ridley in J. Linn. Soc. Bot. 22: 265. 1886; Seidenfaden in Dansk Bot. Arkiv 31 (1): 79. fig. 54. 1976; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 284. pl. 119. 1977; Kores in Allertonia 5: 61. 1989. FIGURE 45C & D.

Liparis concava Schlechter in Repert. Sp. Nov. 9: 283. 1911; Guillaumin in Notul. Syst. (Paris) 10: 87. 1941, Fl. Nouv.-Caléd. 79. 1948.

Plants epiphytic, caespitose, 15–30 cm. tall, the rhizome abbreviated; pseudobulbs crowded together, more or less ovoid-lenticular, (0.5–) 1–2.5 cm. long, (0.3–) 1–1.5 cm. broad, bifoliate; leaves articulate, erect, the petioles stout, 0.3–1.3 cm. long, somewhat carinate, the blades chartaceous, narrowly elliptic to oblanceolate, (2–) 5–12 cm. long, (0.8–) 1.1–2.5 cm. broad, narrowed at base, acute to subacute at apex; inflorescence (5–) 7–15 (–22) cm. long, the peduncle weakly 2-winged in the lower 2/3, the rachis terete, subdensely many-flowered, the bracts small, subulate; flowers patent, pale green; sepals spreading, oblong-lanceolate, sometimes slightly unequal, 3.8–4.5 mm. long, 1.1–1.5 mm. broad, subacute to abruptly acuminate at apex; petals erect, linear to linear-attenuate, 3–3.8 mm. long, 0.3–0.5 mm. broad, acute at apex; labellum erect, suborbicular, 2.9–3.5 mm. long, 2.2–3 mm. broad, with the lateral margins turned upward throughout the lower 2/3, the base rounded, slightly concave, the apex obtuse with a prominent tip, the disk naked; column slender, slightly curved, semiterete, about 2.4 mm. long; clinandrium shallowly excavate, with a small lobe along dorsal margin; anther subquadrate, about 0.5 mm. across; paired pollinia hemiellipsoid, about 0.4 mm. long and 0.2 mm. broad; rostellum somewhat retroflexed, with an acute apex; stigma transversely elliptic, deeply recessed; ovary very short-pedicellate, about 3.4 mm. long overall, trigonal and weakly 6-ribbed.

TYPIIFICATION AND NOMENCLATURE: The specimen used in the preparation of Wight's original illustration (Seidenfaden, 1976) is *Wight s. n.* (K HOLOTYPE), from Coonoor, Nilgiri, India. The type of *L. concava* is *Le Rat s. n.* (B HOLOTYPE, probably destroyed), from Mt. Dzumac, New Caledonia. The combination of these two taxa was suggested by Hallé (1977).

DISTRIBUTION: Southeastern Asia (from Ceylon to Sikkim and Taiwan) to Java, New Caledonia, and Fiji. In the last archipelago it is infrequent, occurring in north-central Viti Levu in forest at elevations of 725–970 m., flowering in February and August.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *im Thurn 112* (K). NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5599* (AMES). NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5756* (AMES, BISH, K). Two of these specimens were cited by Hallé (1977).

5. *Liparis elegans* Lindl. Gen. Sp. Orchid. Pl. 30. 1830; Ridley in J. Linn. Soc. Bot. 24: 350. 1888; Holttum, Fl. Malaya 1: 208. 1957; Seidenfaden in Dansk Bot. Arkiv 31 (1): 70. fig. 45. 1976; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 298, in obs. 1977; Kores in Allertonia 5: 61. 1989. FIGURE 46.

Liparis indifferens J. J. Sm. in Repert. Sp. Nov. 12: 24. 1913, in Nova Guinea 12: 224. t. 74, fig. 130. 1915; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 296, solum quoad spec. vit. et neobud. 1977.

Liparis vitiensis Rolfe in Kew Bull. 1921: 54. 1921; L. O. Williams in Bot. Mus. Leaf. 5: 117. 1938; J. W. Parham, Pl. Fiji Isl. 292. 1964, ed. 2. 385. 1972.

Plants epiphytic, 20–35 cm. tall, the rhizome slender, creeping; pseudobulbs laxly spaced along rhizome, ovoid to oblong-ovoid, 1–3 cm. long, 0.8–1.5 cm. broad, bifoliate; leaves articulate, erect, the petioles stout, 1.5–6 cm. long, carinate, the blades subcoriaceous, lanceolate to oblanceolate, (8–) 11–25 cm. long, 1.5–3 cm. broad, gradually narrowed at base, acute at apex; inflorescence 14–35 cm. long, the peduncle



FIGURE 46. Flowering plant of *Liparis elegans* from Naitasiri Province, Viti Levu (Kores & Molvray F2),
× about 1/2.

terete, the rachis laxly many-flowered, the bracts linear-lanceolate, 4–6 mm. long; flowers ascending, with the sepals and petals pale greenish yellow and the labellum orange to salmon-colored; sepals recurved, slightly unequal, oblong to oblong-elliptic, 3.5–4 mm. long, 1.2–1.7 mm. broad, subacute to obtuse at apex; petals spreading or recurved, linear, 3.5–4 mm. long, 0.4–0.7 mm. broad, acute at apex; labellum parallel to column throughout the lower half and somewhat channelled, geniculately reflexed above, oblong to oblong-obovate, 3.5–4 mm. long, about 1.5 mm. broad near apex, the base oblong to slightly narrowed, the apex broadly truncate, sometimes also slightly notched, with the anterior margin irregularly crenulate, the disk with a small, sometimes poorly developed, subentire to 2-lobed callus near base; column slender, curved, clavate, slightly winged distally, 2–2.5 mm. long; clinandrium shallowly excavate; anther transversely ovate, about 0.4 mm. long and 0.5 mm. broad; paired pollinia hemispherical, about 0.3 mm. across; ovary pedicellate, 3–5 mm. long overall.

TYPIFICATION AND NOMENCLATURE: The type of *Liparis elegans* is Wallich 1943, p. p. (K HOLOTYPE), from the vicinity of Penang, Malaya. *Liparis indifferens* is based on Gjellerup 310 (L 913.323.545 HOLOTYPE), collected near Hollandia in West New Guinea; the actual holotype was obtained from material cultivated at Bogor, to which Gjellerup had sent his plant. *Liparis vitiensis* is based on *im Thurn* 370 (K HOLOTYPE), collected July 28, 1907, near the mouth of the Veisari River, Rewa Province, Viti Levu.

DISTRIBUTION: Malaya into parts of Malesia including West New Guinea, and also in the New Hebrides, Fiji, and Tonga. In Fiji the species seems known from a fairly limited area in southeastern Viti Levu, occurring from near sea level to approximately 400 m. elevation, with flowers or capsules obtained between March and August.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Viria, Meebold 16815; Tholo-i-suva, Parks 20082, Kores & Mohvray F2; Central road, Tothill 413b; vicinity of Tamavua Village, Gillespie 2106. REWA: Mt. Korombamba, Parks 20349, Vaughan 3189, DA 17359; vicinity of Lami, Krauss 438.

Liparis aaronii Cribb & B. Lewis (Lewis & Cribb, Orch. Vanuatu, 62, fig. 8, 1989, sine descr. lat.) from the New Hebrides appears to be very similar to *L. elegans*, and the two taxa should be critically compared. As figured, *L. aaronii* has a labellum which is not geniculately reflexed and of which the apex is retuse, with weakly fimbriate lobules. If these differences prove consistent, recognition of the two taxa may be justified.

6. *Liparis condylobulbon* Reichenb. f. in *Hamburger Garten-Blumenzeitung* 18: 34. 1862; L. O. Williams in *Bot. Mus. Leafl.* 5: 116. 1938; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 384. 1972; *Seidenfaden* in *Dansk Bot. Arkiv* 31 (1): 70. fig. 44. 1976; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 286. pl. 120. 1977; Kores in *Allertonia* 5: 63. 1989; Lewis & Cribb, *Orch. Vanuatu*, 64, fig. 9, A–J, pl. 3, C. 1989.

FIGURE 86 (upper right).

Orchidea Seem. in *Bonplandia* 9: 260. 1861, Viti, 443. 1862.

Liparis longipes sensu Reichenb. f. in Seem. *Fl. Vit.* 302. 1868; Ridley in *J. Linn. Soc. Bot.* 22: 293, quoad spec. sam. et vit. 1886; Drake, *Ill. Fl. Ins. Mar. Pac.* 306. 1892; Kraenzl. in *Bot. Jahrb.* 25: 600. 1898; H. Fleischm. & Rechinger in *Denkschr. Akad. Wiss. Wien* 85: 256. 1910; L. O. Williams in *Bot. Mus. Leafl.* 5: 116, quoad spec. vit. 1938; Guillaumin in *Notul. Syst. (Paris)* 10: 87. 1941, *Fl. Nouv.-Caléd.* 79. 1948; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 28. 1953; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 385. 1972; non Lindl. (1830) nec *Seidenfaden* (1976, pro syn.).

Liparis nesophila Reichenb. f. *Otia Bot. Hamb.* 56. 1878 (repr. *Xenia Orchid.* 3: 21. 1881); Drake, *Ill. Fl. Ins. Mar. Pac.* 306. 1892; L. O. Williams in *Bot. Mus. Leafl.* 5: 117. 1938; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 385. 1972.

Liparis savaiiensis H. Fleischm. & Rechinger in *Denkschr. Akad. Wiss. Wien* 85: 255. t. 1, fig. 4. 1910; Schlechter in *Repert. Sp. Nov.* 9: 94. 1910; Christophersen in *Bishop Mus. Bull.* 128: 64. 1935.

Plants epiphytic or sometimes lithophytic, erect, (10-) 25-40 cm. tall, the rhizome long, slender, branched; pseudobulbs widely spaced, narrowly obclavate, (4-) 8-20 cm. long, 0.7-1.2 cm. in diameter near base, bifoliate; leaves articulate, erect, the petioles stout, 0.5-1.5 cm. long, slightly carinate, the blades chartaceous, lanceolate to linear-oblancoelate, (4-) 10-25 cm. long, (0.7-) 1-2.8 cm. broad, gradually narrowed at base, acute at apex; inflorescence about as long as leaves, subdensely to densely many-flowered, the peduncle terete, much shorter than rachis, the bracts subulate, up to 5 mm. long; flowers patent, light green to pale yellow, with the labellum dull orange to reddish orange; sepals recurved, oblong to oblong-elliptic, slightly unequal, 2.5-3.5 mm. long, 1-1.7 mm. broad, subacute to obtuse at apex; petals recurved, linear to linear-oblancoelate, 2-3 mm. long, 0.25-0.5 mm. broad, subacute to obtuse at apex; labellum initially erect and slightly channelled, distally geniculately reflexed, somewhat fleshy, more or less oblong-elliptic, 2.5-3 mm. long, 1.5-2 mm. broad, frequently laxly puberulent along lateral margins in anterior half, the base slightly cuneate, the apex obtuse to truncate, with a small, medial notch, the disk with a small, more or less obscure, 2-lobed callus at base; column semiterete, slightly broadened toward base, 1.25-2 mm. long; clinandrium shallowly excavate, with the dorsal margin weakly 2-lobed; anther ovate, about 0.4 mm. across; paired pollinia hemiovoid, about 0.3 mm. long and 0.2 mm. broad; rostellum with the anterior margin acute; stigma transversely elliptic, deeply recessed; ovary very short-pedicellate, 4-8 mm. long overall, terete, weakly 6-ribbed.

TYPIFICATION AND NOMENCLATURE: The type of *Liparis condylobulbon* is a Parish collection from Moulmein, Burma, probably lost; however, a fragment at w may represent a portion of it (Hallé, 1977). *Liparis nesophila* is typified by *Seemann 614* (K HOLOTYPE; ISOTYPES at AMES, P), said to be from Ovalau and Vanua Levu; there is no duplicate of this collection at w. The type of *L. savaiiensis* is *K. & L. Rechinger 1889* (w 3091 HOLOTYPE), collected in July, 1905, near Matautu, Savai'i, Samoa. These types and some of the usages of *L. condylobulbon*, *L. nesophila*, *L. longipes* Lindl., and *L. viridiflora* (Bl.) Lindl. were discussed in my 1989 treatment.

DISTRIBUTION: Southeastern Asia through Malasia and into the Pacific as far as Samoa. In Fiji the species is comparatively frequent, now known from about 40 collections obtained on six islands and occurring in dense or open forest from near sea level to about 1,100 m. It often forms dense masses on trees or on rocks and flowers principally between May and August, although capsules persist throughout much of the year.

LOCAL NAME: The name *varasa ni Viti* has been recorded from Naitasiri (*St. John 18245*).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1063*; slopes of Mt. Nairova, eastern flank of Mt. Evans Range, *Smith 4040*; upper slopes of Mt. Koromba, *Smith 4698*; Nandarivatu, *im Thurn 274*; Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 4795*; Nandala, south of Nandarivatu, *Degener 14751*. NANDRONGA & NAVOSA: Vicinity of Nandrau, *DA L.13592 (DF 1175)*; Naruku, vicinity of Mbalo, near Vatukarasa, *Degener 15324*. NAMOSI: Mt. Naitarandamu, *Gillespie 3355*; hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8468*. NAITASIRI: Nggoronggorotambuatini, Nasonggo, *DA 15332*; Wainimala Valley, *St. John 18245*; Viria, *Parks 20468*; vicinity of Tamavua, *im Thurn 45*. TAILEVU: King's Road near Korovou, *Kores & Molvray F17*. REWA: Vicinity of Suva, *Simmonds*, Nov. 19, 1957 (K spirit 20556). KANDAVU: Namalata isthmus region, *Smith 37*. OVALAU: Valley of Mbureta and Lovoni Rivers, *Smith 7468*. VANUA LEVU: MATHUATA: Southern slopes of Mt. Numbuloa, east of Lambasa, *Smith 6357*. THAKAUNDROVE: Mbalanga, Savasavu Bay, *Degener & Ordenez 14009*. YATHATA: Summit of Nakoro Levu, *Bryan 595*. VATU VARA: *Bryan 595a*.

Liparis condylobulbon is the most frequently collected species of the genus in Fiji, and it is one of only three species (of a total of eight) that have been obtained on other islands than Viti Levu.

7. *Liparis orbiculata* L. O. Williams in Amer. Orchid Soc. Bull. 10: 201. pl. 7. 1941, in Sargentia 1: 9. 1942; J. W. Parham, Pl. Fiji Isl. 291. 1964, ed. 2. 385. 1972; Kores in Allertonia 5: 64. 1989.

Liparis pullei sensu Lewis & Cribb, Orch. Vanuatu, 66. 1989; non J. J. Sm.

Plants epiphytic or infrequently on humus-covered boulders, erect, up to 35 cm. tall, the rhizome creeping; pseudobulbs closely spaced, ovoid, 2–4 cm. long, 0.5–1 cm. broad, partially surrounded by loosely clasping cataphylls, bi- or rarely trifoliate; leaves articulate, erect, the petioles slender, 1.5–6 cm. long, carinate, the blades chartaceous, linear-oblongate, (10–) 20–35 cm. long, (0.8–) 1.5–2 cm. broad, gradually narrowed at base, narrowly acute at apex; inflorescence 10–30 cm. long, laxly 5–15-flowered, the peduncle and rachis terete, the bracts lanceolate, 5–6 mm. long; flowers ascending, bright yellow; dorsal sepal recurved, lanceolate to oblong-lanceolate, 9–10 mm. long, 2.5–3 mm. broad, acute at apex; lateral sepals patent to slightly recurved, oblong-lanceolate, slightly oblique, 8–9.5 mm. long, 2.5–3 mm. broad, acute at apex; petals recurved, linear-oblongate, 9–10 mm. long, 1–1.5 mm. broad, subacute to obtuse at apex; labellum parallel to column and channelled throughout lower half, geniculately reflexed distally, orbicular-obovate to transversely obovate, 8.5–10 mm. long, 8–10 mm. broad, the base briefly narrowed, the apex broadly emarginate, with a small medial tooth and with entire or slightly erose margins, the disk with a small, transverse, oblong callus at base; column semiterete, somewhat broadened at ends, 4–5 mm. long; clinandrium well excavate, with the margin entire; rostellum with the anterior margin broadly acute; stigma transversely oblong, deeply recessed; ovary conspicuously pedicellate, 1.5–4 cm. long overall, weakly trigonal.

TYPEIFICATION: *Liparis orbiculata* is based on *Degener 14810* (AMES HOLOTYPE), collected in flower and fruit March 13, 1941, at Nauwangga, south of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Fiji and the New Hebrides (known from Tanna only). In Fiji it has been collected infrequently and only on Viti Levu, known in forest at elevations of 400–900 m. and flowering and fruiting in scattered months.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Wainisavulevu Creek (Wainimala River tributary), Hassall 117928, p. p. (mixed with *Malaxis* sp.). REWA: Mt. Korombamba, slopes near summit, Gillespie 2328, Vaughan 3147, p. p. (probably mixed with *Chrysoglossum* sp.), DA 16550, 18154.

8. *Liparis gibbosa* Finet in Bull. Soc. Bot. France 55: 342. t. 11, fig. 36–44. 1908; Seidenfaden in Dansk Bot. Arkiv 31 (1): 95. fig. 65. 1976; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 277. pl. 116. 1977; Kores in Allertonia 5: 64. 1989; Lewis & Cribb, Orch. Vanuatu, 66. fig. 10, A–J. 1989.

Malaxis gibbosa Bl., nom. in sched.

Liparis disticha sensu Schlechter in Bot. Jahrb. 39: 60. 1906; Guillaumin in Notul. Syst. (Paris) 10: 87. 1941, Fl. Nouv.-Caléd. 79. 1948; non Lindl.

Plants epiphytic (sometimes in masses on rocks on steep slopes), erect, up to 25 cm. tall, the rhizome freely branched; pseudobulbs laxly spaced, ovoid, 1–2 cm. long, 1–1.5 cm. broad, partially surrounded by a series of loosely clasping, ovate-attenuate cataphylls, unifoliate; leaves articulate, erect, short-petiolate, the blades somewhat coriaceous, linear, 15–23 cm. long, 0.8–1.2 cm. broad, gradually narrowed and slightly channelled at base, acute at apex; inflorescence 6–18 cm. long, the peduncle slender, somewhat flattened, distally winged, up to 14 cm. long, the rachis much abbreviated, 1–4 cm. long, with prominent, distichous, imbricate, conduplicate, ovate-acuminate, coriaceous bracts; flowers developing sequentially, yellowish green to pale orange, occasionally with the labellum darker orange-brown; sepals reflexed, oblong-elliptic to -ovate, 5–6 mm. long, 2.2–2.4 mm. broad, abruptly acuminate at apex; petals erect, oblongate, 4.5–5.5 mm. long, 1–1.5 mm. broad, subacute to obtuse at apex; label-

lum fleshy, recurved, more or less orbicular-ovate when flattened, 4–4.5 mm. long, 3.5–4 mm. broad, with the margins prominently vaulted near base and apex, finely crenulate throughout anterior half, the base subtruncate, somewhat channelled, the apex acute, the disk with a small, 2-lobed callus near base; column conspicuously dilated laterally toward base, 2–2.5 mm. long, with 2 small, ventral, porrect, aliform or obtuse appendages near apex; clinandrium shallowly excavate, with an entire margin; anther operculate, about 0.8 mm. across; paired pollinia hemiovoid, about 0.6 mm. long and 0.2 mm. broad; stigma transverse, deeply recessed; ovary pedicellate, 1.2–1.5 cm. long, weakly 6-ribbed.

TYPIFICATION: *Liparis gibbosa* is typified by *Blume s. n.* (P HOLOTYPE), collected in Java without detailed locality. Finet adopted the epithet that Blume had used in annotating the P sheet as *Malaxis gibbosa* but had never published.

DISTRIBUTION: From India and Ceylon through southeastern Asia and portions of Malesia, extending eastward in the Pacific to Fiji and Samoa. In Fiji it seems scattered in dense forest at elevations of about 100–1,000 m., flowers and fruits having been obtained between May and September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Navai, *DA 2316*; valley of Nggaliwana Creek, north of the sawmill at Navai, *Smith 5363*; Mt. Tomanivi (presumably lower slopes), *Greenwood 1168*; western and southern slopes of Mt. Tomanivi, *Smith 5134*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5553*. VITI LEVU without further locality, *Prince s. n.* (AMES), *Simmonds* (K spirit 24105). OVALAU: Hills southeast of valley of Mbureta River, *Smith 7434*. VANUA LEVU: THAKAUNDROVE: Eastern buttress of Mt. Ndikeva, *Smith 1869*. TAVEUNI: Above Nggathavula Estate, *DA 16934*.

Although *Liparis gibbosa* is very suggestive of *L. disticha* (Thou.) Lindl., most current authors (Seidenfaden, 1976; Hallé, 1977) treat the non-African material of this relationship as *L. gibbosa*.

22. **CHRYSOGLOSSUM** Bl. *Bijdr. Fl. Ned. Ind.* 337. 1825, Tab. Pl. Jav. Orchid. t. IV. *fig.* 7. 1825; Lindl. *Gen. Sp. Orchid. Pl.* 13. 1830; Bl. *Fl. Jav. Nov. Ser.* 136. 1858 or 1859, *Coll. Orchid.* 161. 1859; Reichenb. f. in Seem. *Fl. Vit.* 304. 1868; J. J. Sm. *Orchid. Java*, 173. 1905, in *Bull. Jard. Bot. Buitenzorg II.* 8: 1. 1912; Holttum, *Fl. Malaya I*: 178. 1953; A. C. Sm. in *J. Arnold Arb.* 36: 276. 1955; Backer & Bakh. f. *Fl. Java* 3: 289. 1968; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 257. 1977; Seidenfaden in *Opera Bot.* 72: 19. 1983; Kores in *Allertonia* 5: 65. 1989; Lewis & Cribb, *Orch. Vanuatu*, 151. 1989.

Collabium Bl. *Bijdr. Fl. Ned. Ind.* 357. 1825, Tab. Pl. Jav. Orchid. t. III. 1825; Lindl. *Gen. Sp. Orchid. Pl.* 96. 1830; Schlechter in *Repert. Sp. Nov. Beih.* 1: 97. 1911; J. J. Sm. in *Bull. Jard. Bot. Buitenzorg II.* 8: 1, pro syn. 1912; Seidenfaden in *Opera Bot.* 72: 22. 1983.

Terrestrial plants with creeping rhizomes, with erect, small, slender, heteroblastic, unifoliate pseudobulbs; leaves erect, articulate, often conspicuously petiolate, the blades convolutive in bud; inflorescences terminal racemes, erect, often elongate, usually lax, borne on leafless, rudimentary pseudobulbs alternating with normal vegetative shoots; flowers moderately showy (perianth up to 2 cm. long), resupinate or not; sepals and petals more or less similar, free, erect or spreading, the lateral sepals decurrent along column foot, forming a short to long mentum; labellum joined to column foot, somewhat motile, 3-lobed to subtire, with or without a spur, with 1 or more longitudinal keels within; column fairly long, slender, curved, with 2 or more wings or appendages (rarely unappendaged); column foot short or long, with 2 incurved lobes or concave and spurlike to saccate; anther terminal, incumbent, operculate, 2-celled; pollinia 2, waxy, unappendaged; rostellum short; stigma below rostellum, slightly recessed.

TYPE SPECIES: Two species were originally included in *Chrysoglossum* by Blume: *C. ornatum* Bl. and *C. villosum* Bl.; the latter was chosen as the lectotype species by J. J. Smith (1912). The type species of *Collabium* is *C. nebulosum* Bl., the only original species. The two genera were combined by J. J. Smith (1912) under the name *Chrysoglossum*, and this conclusion has been generally accepted, although Seidenfaden (1983) is inclined to accept both taxa at the generic level.

DISTRIBUTION: Tropical and subtropical Asia through Malasia and eastward in the Pacific as far as Fiji and Samoa; it has been discovered only recently in the last archipelago. Approximately 23 species are now recognized.

USEFUL TREATMENTS OF GENUS: SMITH, J. J. Die Gruppe der Collabinae. Bull. Jard. Bot. Buitenzorg II. 8: 1-6. 1912. SEIDENFADEN, G. The genera *Chrysoglossum* and *Collabium* (pp. 19-27); in Orchid genera in Thailand XI. Cymbidieae Pfitz. Opera Bot. 72: 1-124. 1983.

KEY TO SPECIES

Inflorescence 4-10 (-24) cm. long; flowers with a prominent, saccate mentum 3-4.5 mm. long and 2.5-3 mm. in diameter; petals slightly oblique, lanceolate; column fleshy, 4-5 mm. long; ovary 6-winged distally.
 1. *C. vesicatum*
 Inflorescence 30-65 cm. long; flowers with a small, obtuse mentum 1.5-2 mm. long; petals oblong-falcate; column slender, 7-8 mm. long; ovary terete. 2. *C. ornatum*

1. ***Chrysoglossum vesicatum*** Reichenb. f. in Seem. Fl. Vit. 304. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 308, as *C. vesicarium*. 1892; L. O. Williams in Bot. Mus. Leaflet. 5: 117. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 31. 1953; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 380. 1972; Kores in Allertonia 5: 66. 1989; Lewis & Cribb, Orch. Vanuatu, 151, p. p. 1989.

FIGURE 47.

Orchidea Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Collabium vesicatum Schlechter in Repert. Sp. Nov. Beih. 1: 98, in adnot. 1911; Seidenfaden in Opera Bot. 72: 22, in obs. 1983.

Chrysoglossum aneityumense Ames in J. Arnold Arb. 14: 105. 1933; Guillaumin in Bull. Soc. Bot. France 103: 281. 1956.

Collabium aneityumense Seidenfaden in Opera Bot. 72: 22, as *C. aneitycumensis*, in obs. 1983.

Terrestrial, erect plant 10-15 (-24) cm. tall, the pseudobulbs widely spaced along rhizome, erect, terete, 0.6-1.4 cm. long, about 2.5 mm. in diameter; leaves erect, glabrous, the petioles 0.5-1.5 cm. long, the blades more or less membranous, elliptic, 8-11 (-15) cm. long, 3-4.5 cm. broad, rounded to broadly cuneate at base, acuminate at apex; inflorescence erect, 4-10 (-24) cm. long, glabrous, laxly 4-8-flowered; flowers resupinate, with the outer segments pale green and the labellum pale yellowish white; dorsal sepal lanceolate to oblong-lanceolate, 0.9-1.1 cm. long, 2.5-3.3 mm. broad, narrowly acuminate-apiculate at apex; lateral sepals spreading, the free portion oblong-lanceolate, slightly falcate, 0.9-1 cm. long, 3-4 mm. broad, narrowly acuminate-apiculate at apex; mentum prominent, saccate, 3-4.5 mm. long, 2.5-3 mm. in diameter; petals spreading, lanceolate, slightly oblique, 9-9.5 mm. long, 2.5-3 mm. broad, acute at apex; labellum unguiculate, conspicuously 3-lobed, 9-10 mm. long, 5.5-6.5 mm. broad, the claw linear, about 3 mm. long, 1-1.5 mm. broad, with the lateral margins slightly inflexed, the lateral lobes more or less oblong, 2.5-3 mm. long, 2-2.5 mm. broad, subacute to obtuse at apex, the midlobe separated from lateral lobes by an abbreviated isthmus, suborbicular, 5-6 mm. long, 6-8 mm. broad, weakly undulate at margin, obtuse at apex, the disk with 3 longitudinal carinae, the lateral carinae extending to center of midlobe, somewhat auriculate near base of lateral lobes, distally elevated to form small, semielliptic lamellae near tips, the middle carina slightly shorter than lateral ones, slightly raised and weakly undulate throughout, not

conspicuously elevated distally; column fleshy, clavate, 4–5 mm. long, prominently winged near apex and base, the wings decurrent on column foot; column foot slender, with a slitlike anterior opening into the saccate mentum; clinandrium deeply excavate, with the dorsal margin weakly 3-lobed, the lateral margins somewhat shorter, obtuse to truncate; anther transversely ovate, with 2 small inflexed points on either side near apex; pollinia depressed-ovoid, about 0.4 mm. long and 0.7 mm. in diameter; rostellum reduced to a small transverse ridge along ventral margin of clinandrium; stigma obdeltoid, slightly concave; ovary 6-winged distally.

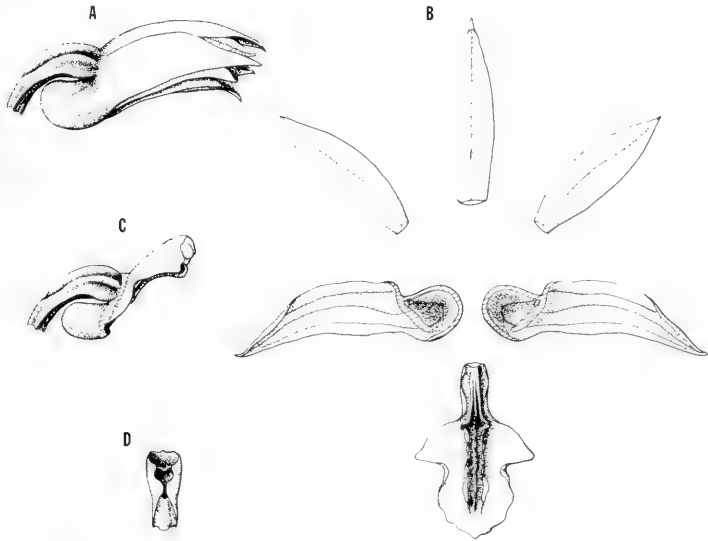


FIGURE 47. *Chrysoglossum vesicatum*, from P. F. Hunt (RSS) 2323 (San Cristobal, Solomon Islands); A, complete flower, $\times 3$; B, perianth segments, $\times 3$; C, column and saccate spur, viewed from side, $\times 3$; D, apical portion of column with pollinarium removed, showing clinandrium, rostellum, and stigma, $\times 3$.

TYPIFICATION AND NOMENCLATURE: *Chrysoglossum vesicatum* is typified by *Seemann 611* (w 35674 HOLOTYPE), collected in 1860 on Taveuni without further locality. The type of *C. aneityumense* is *A. Morrison s. n.* (K HOLOTYPE; ISOTYPE at AMES 39055), obtained in June, 1896, near Anelgauhat, Aneityum, New Hebrides. The two types do not disclose any significant differences.

DISTRIBUTION: Fiji, the New Hebrides, and the Solomon Islands (San Cristobal), in forest at recorded elevations of approximately 200–760 m. The species appears to be extremely rare, thus far known from only three collections (one from each of the archipelagoes mentioned).

Further collections are required to establish the full variation within *Chrysoglossum vesicatum*, which may also be found to extend to New Guinea and New Ireland (Kores, 1989).

2. *Chrysoglossum ornatum* Bl. Bijdr. Fl. Ned. Ind. 338. 1825; Lindl. Gen. Sp. Orchid. Pl. 14. 1830; Bl. Fl. Jav. Nov. Ser. 136. pl. 46. 1858 or 1859; J. J. Sm. Orchid. Java, 175. 1905, Orchid. Java Fig.-Atlas, fig. 132. 1909; L. O. Williams in Bot. Mus. Leaflet. 5: 117. 1938; Holttum, Fl. Malaya 1: 178. 1953; Backer & Bakh. f. Fl. Java 3: 290. 1968; Seidenfaden in Opera Bot. 72: 20. fig. 7. 1983; Kores in Allertonia 5: 66. 1989.

Chrysoglossum neocaledonicum Schlechter in Bot. Jahrb. 39: 58. 1906; Guillaumin in Notul. Syst. (Paris) 10: 85. 1941, Fl. Nouv.-Caléd. 78. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 257. pl. 109, 110. 1977; Seidenfaden in Opera Bot. 72: 21, pro syn. 1983; Lewis & Cribb, Orch. Vanuatu, pl. 8, F. 1989.

Chrysoglossum gibbsiae Rolfe in J. Linn. Soc. Bot. 39: 175. 1909; L. O. Williams in Bot. Mus. Leaflet. 5: 117. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 31. 1953; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 380. 1972; Whistler in Bull. Pacific Trop. Bot. Gard. 9: 36, as *Chrysophyllum* g. 1979; Seidenfaden in Opera Bot. 72: 21, as ?*Chrysoglossum* g., pro syn. 1983. *Chrysoglossum vesicatum* sensu Lewis & Cribb, Orch. Vanuatu, 151, p. p. 1989; non Reichenb. f.

Terrestrial, erect plant 30–65 cm. tall, the pseudobulbs somewhat laxly spaced along rhizome, erect, narrowly conical, 2.5–4 cm. long, 0.5–0.8 cm. in diameter at base; leaves erect, glabrous, the petioles slender, sulcate, (3–) 5–11 cm. long, the blades chartaceous, elliptic to oblong-elliptic, (15–) 20–30 cm. long, (4.5–) 5.5–9.5 cm. broad, broadly cuneate at base, acute to abruptly acuminate at apex; inflorescence erect, 30–65 cm. long, glabrous, laxly flowered; flowers resupinate, greenish yellow to yellow, with or without red or purple markings on labellum; dorsal sepal oblong to oblong-lanceolate, 1.2–1.7 cm. long, 3–3.75 mm. broad, abruptly acute at apex; mentum obtuse, 1.5–2 mm. long, minutely umbonate externally; lateral sepals oblong-falcate, 1–1.5 cm. long, 2.5–3.5 mm. broad, acute at apex; petals similar to lateral sepals but slightly broader; labellum 3-lobed, 0.9–1.1 cm. long, 5–6 mm. broad, the base cuneate, with auriculate-undulate lateral margins, the lateral lobes ascending, oblong-obtuse, 2–3 mm. long, 1.5–2 mm. broad, the midlobe broadly obovate to obovate-suborbicular, 5–6 mm. long, 4.5–6 mm. broad, somewhat incurved distally at lateral margins, broadly acute to obtuse at apex, the disk with 3 longitudinal carinae, the lateral carinae extending throughout lower 2/3–3/4 of disk, initially prominently raised and undulate, gradually becoming less distinct distally, the middle carina about half as long as lateral ones, slightly raised, not undulate; column slender, slightly incurved, 7–8 mm. long, prominently winged, the wings decurrent on column foot, conspicuously expanded approximately midway along the column to form a pair of prominent, ventrally projecting, aliform appendages; column foot short, slightly incurved, with a small, slit-shaped fovea near apex; clinandrium shallowly excavate, with the dorsal margin entire; anther cucullate, briefly acuminate at apex; pollinia subpyramidal, about 0.5 mm. across; rostellum oblong, about 0.5 mm. long and 0.4 mm. broad, slightly bilobed at apex; stigma more or less semicircular, concave; ovary terete.

TIPIFICATION AND NOMENCLATURE: *Chrysoglossum ornatum* is based on *Blume* s. n. (K ISOTYPE), collected along the banks of the Tjapus River, Salak, Java. The type of *C. neocaledonicum* is *Schlechter* 15477 (B HOLOTYPE, destroyed; ISOTYPES at K, P), obtained Dec. 18, 1902, on Mt. Ignambi, near Oubatche, New Caledonia; and that of *C. gibbsiae* is *Gibbs* 886 (BM HOLOTYPE; ISOTYPE at K), collected in September, 1907, near Nandarivatu, Mba Province, Viti Levu. Seidenfaden (1983) suggested the conspecificity of the three taxa, although he qualified the reduction of *C. gibbsiae* because he had not seen the type. That type and more recent Fijian collections bear out his opinion that only one species can be recognized in this immediate relationship.

DISTRIBUTION: From India and southeastern Asia throughout Malesia and into the Pacific to Samoa (although apparently very rare in the last archipelago). In Fiji it has

been noted in forested areas at elevations of 300–1,100 m.; flowers have been obtained between October and February.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 366*; eastern slope of Mt. Koroyanitu, Mt. Evans Range, *Smith 4132*; vicinity of Nandarivatu, *in Thurn 64, 80, Gillespie 3196, 3199.1*. VITI LEVU without further locality, *Tohill 879*. VANUA LEVU: MBUA: Mbua Bay (doubtless from hills inland), *U. S. Expl. Exped. (AMES 3181, w)*. TAVEUNI: Western slope between Somosomo and Wairiki, *Smith 764*; summit and adjacent slopes of Mt. Manuka, east of Wairiki, *Smith 8243*.

23. *COELOGYNE* Lindl. *Collect. Bot. sub t. 33*, as *Caelogogyne*. 1821?; corr. Lindl. *op. cit. sub t. 37*. 1826; Pfitzer & Kraenzl. in *Pflanzenr.* 32 (IV. 50. II. B. 7); 20. 1907; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 251. 1977; Kores in *Allertonia* 5: 67. 1989; Lewis & Cribb, *Orch. Vanuatu*, 59. 1989.

Epiphytic or rarely terrestrial plants with creeping rhizomes and uni- or bifoliate pseudobulbs; leaves articulate, petiolate, the blades convolutive in bud, chartaceous; inflorescences terminal at apex of developing pseudobulbs or on rudimentary shoots, erect, nodding, or pendulous, racemose, few-many-flowered; flowers either opening simultaneously on the same raceme or developing and opening sequentially, usually showy (perianth up to 5 cm. long), resupinate; sepals free, spreading, chlorophyllose, often concave, frequently with the odd sepal slightly dissimilar; petals free, erect or spreading, similar to sepals or much narrower; labellum sessile, usually 3-lobed, the base usually somewhat concave, the lateral lobes erect, more or less embracing column, the midlobe generally somewhat enlarged, slightly or not reflexed, frequently with longitudinal rows of calli or carinae within; column long, slender, distally with a continuous wing along lateral edges and across apex; column foot absent; anther terminal, below the winged clinandrium, obliquely incumbent, operculate, 2-celled; pollinia 4, waxy, caudiculate, cohering in two pairs, without a viscidium; rostellum large, arching over stigma, this deeply recessed.

LECTOTYPE SPECIES: *Coelogogyne nitida* Lindl. (= *C. punctulata* Lindl.) (vide Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 251. 1977); it should be noted that this lectotypification was omitted from ING (1979).

DISTRIBUTION: Paleotropical and subtropical, from China and India through southeastern Asia and Malesia into the Pacific to Samoa and parts of Micronesia, with about 140 species. The genus is represented in Fiji by two species.

USEFUL TREATMENTS OF GENUS: PFITZER, E. H. H., & F. W. L. KRAENZLIN. *Coelogogyne* Lindl. *Pflanzenr.* 32 (IV. 50. II. B. 7): 20–86. 1907. BUTZIN, F. *Bestimmungsschlüssel für die in Kultur genommenen Arten der Coelogyninae (Orchidaceae)*. Willdenowia 7: 245–260. 1974. SEIDENFADEN, G. *Orchid genera in Thailand III. Coelogogyne* Lindl. *Dansk Bot. Arkiv* 29 (4): 1–88. 1975. BUTZIN, F. *The genus Coelogogyne*. In: Brieger, F. G. (ed.). *Schlechter, Die Orchideen*, ed. 3. 1: 919–940. 1986.

Coelogogyne includes many species with showy flowers and is of some economic importance as a source of ornamentals. It has been divided into a number of subgenera and sections based on the structure of the inflorescence and flowers, the two species present in Fiji both being members of subgen. *Coelogogyne* sect. *Speciosae* Lindl. This section is characterized by its few-flowered inflorescences and by having the peduncle and the base of the rachis naked, without sheathing cataphylls or bracts; the flowers open sequentially or a few at a time and are generally quite showy.

KEY TO SPECIES

- Pseudobulbs unifoliate; inflorescence about as long as foliage, the rachis slender, 2.5–10 cm. long, somewhat fractiflex; midlobe of labellum reflexed, the central carina extending from base of disk to base of midlobe. 1. *C. lycastoides*
 Pseudobulbs bifoliate; inflorescence about half as long as foliage, the rachis stout. 0.5–2 (–3) cm. long, not fractiflex; midlobe of labellum more or less porrect, the central carina extending from base of disk to apex of midlobe. 2. *C. macdonaldii*

1. *Coelogyne lycastoides* F. v. Muell. & Kraenzl. in Oesterr. Bot. Z. 45: 179. 1895; Pfitzer & Kraenzl. in Pflanzenz. 32 (IV. 50. II. B. 7): 32. fig. 8, F. 1907; Schlechter in Repert. Sp. Nov. 9: 92. 1910; Christophersen in Bishop Mus. Bull. 128: 62. 1935; Butzin in Willdenowia 7: 248. 1974; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 251. pl. 107. 1977; Kores in Allertonia 5: 68. 1989; Lewis & Cribb, Orch. Vanuatu, 59. 1989.

Coelogyne lamellata sensu Ames in J. Arnold Arb. 13: 129. 1932; non Rolfe.

Coelogyne sp. L. O. Williams in Bot. Mus. Leaflet 5: 117. 1938.

Plants epiphytic, erect, 35–70 cm. tall, the rhizome stout; pseudobulbs 1–2.5 cm. apart, erect, narrowly ovoid, (4–) 6–12 cm. long, 1–2.5 cm. in diameter, unifoliate; leaf erect, the petiole slender, sulcate, 2.5–5.5 cm. long, the blade lanceolate to elliptic, 25–57 cm. long, (8–) 12–16 cm. broad, gradually narrowed to petiole, acuminate to narrowly acute at apex; inflorescence about as long as leaf, laxly 2–4-flowered, the peduncle terete, (16–) 22–37 cm. long, entirely naked, the rachis slender, somewhat fractiflex, 2.5–10 cm. long, the bracts caducous, lanceolate, 3.8–6.5 cm. long, 0.8–1.2 cm. broad, convolute, acute at apex; flowers opening more or less simultaneously, patent, the sepals and petals pale green, the labellum within rusty-brown from base to middle of midlobe, distally white; dorsal sepal narrowly ovate to elliptic-ovate, 3.8–4.7 cm. long, 1.2–1.6 cm. broad, slightly carinate dorsally, acute at apex; lateral sepals oblong-ovate, slightly oblique, 3.6–4.8 cm. long, 1.1–1.5 cm. broad, acute at apex; petals linear to linear-lanceolate, 3.5–4.8 cm. long, about 3.5 mm. broad, acute at apex; labellum prominently lobed about midway, 3.2–4 cm. long overall, 2–2.6 cm. broad, the lateral lobes small, erect, more or less semicircular, the midlobe reflexed, sub-oblong to oblong-obovate, 1.5–2 cm. long, 0.9–1.3 cm. broad, obtuse to abruptly acuminate at apex, the disk laxly to subdensely verrucose, with 3 slightly raised carinae, the lateral carinae extending from base of labellum to about middle of midlobe, slightly curved, more or less crenulate, the central carina somewhat shorter, straight, more or less entire; column slightly curved, subdilated distally, 2–2.4 cm. long, glabrous; ovary prominently 6-winged.

TYPE: The type is *Betche s. n.*, collected Nov. 24, 1880, in Upolu, Samoa, without further locality; the holotype is presumably at MEL.

DISTRIBUTION: New Caledonia, the New Hebrides, Fiji, and Samoa. The species is reasonably frequent in the other three archipelagoes mentioned, occurring at elevations of 300–400 m. in New Caledonia and up to 1,550 m. in Samoa. In Fiji it is known definitely only from north-central Viti Levu at an elevation of about 1,100 m. and seems rare there. A specimen flowering in February was presumably cultivated.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near summit of Mt. Nanggaranambuluta, east of Nandarivatu, Gillespie 4293 (BISH). REWA: SUVA, probably cultivated, Simmonds, Feb. 2, 1960 (K spirit 23118). Much of Simmonds's collecting was done near Nandarivatu, and he often cultivated specimens and brought them into flower in Suva; the present species may therefore be very limited in area in Fiji.

Coelogyne lycastoides was originally described as having the disk of the labellum completely smooth, without raised crests or lines. However, all specimens of it that I have examined, including some identified by Schlechter and Mansfeld, have some degree of ornamentation on the disk. Generally the disk is laxly, or in some instances subdensely, verrucose along the median in the region of the lateral lobes, being marked by three weakly raised keels. These slightly raised, wartlike thickenings and the keels are the same color as the rest of the disk and may be more or less obscure in dried material. This disk ornamentation was also noted by Butzin (1974), who in his key described the labellum as lacking keels or with keels only suggested by darkened thickenings.

2. *Coelogyne macdonaldii* F. v. Muell. & Kraenzl. in Oesterr. Bot. Z. **44**: 209, as *C. M'Donaldii*. 1894; Pfitzer & Kraenzl. in Pflanzenr. **32** (IV. 50. II. B. 7): 31, as *C. Macdonaldii*. 1907; Kores in Allertonia **5**: 68. 1989; Lewis & Cribb, Orch. Vanuatu, **60**, pl. 3, E. 1989.

Plants epiphytic, erect, 25–40 cm. tall, the rhizome stout; pseudobulbs 0.5–1 cm. apart, erect, narrowly ovoid, 3.5–6 cm. long, 1–1.5 cm. in diameter, bifoliate; leaves erect, the petioles slender, sulcate, 1.5–2.5 (–3.5) cm. long, the blades lanceolate to oblong-lanceolate, 16–28 cm. long, 3.5–5.5 (–7.5) cm. broad, gradually narrowed to petiole, acuminate at apex; inflorescence about half as long as leaves, laxly (1 or) 2- or 3-flowered, the peduncle terete, 10–15 cm. long, entirely naked, the rachis stout, abbreviated, 0.5–2 (–3) cm. long, the bracts caducous, lanceolate, 3–4.5 cm. long, 1.2–1.6 cm. broad, convolute, acute at apex; flowers opening simultaneously or rarely sequentially, patent, the sepals and petals pale green to greenish white, the labellum within brownish orange from base to middle of midlobe, distally white; dorsal sepal elliptic to elliptic-ovate, 4–4.7 cm. long, 1.5–1.8 cm. broad, prominently carinate dorsally throughout lower half, acute at apex; lateral sepals oblong-ovate, slightly falcate, 3.8–4.4 cm. long, 1.2–1.4 cm. broad, weakly carinate externally, acute at apex; petals linear-ligulate to -oblanceolate, 3.6–4.4 cm. long, 4–6 mm. broad, acute to subacute at apex; labellum prominently 3-lobed about midway, arcuate, 3.5–4 cm. long, about 2.8 cm. broad, the lateral lobes erect, more or less transversely ovate, the midlobe separated from the rest of labellum by a broad isthmus, somewhat porrect, 1.5–1.8 cm. long overall, somewhat expanded distally to form a small, transverse, ovate blade, the isthmus 5–8 mm. long, 10–12 mm. broad, with the lateral margins entire or weakly crenulate, the blade 7–13 mm. long, 14–18 mm. broad, with the lateral margins slightly turned upward and weakly undulate, broadly acute to obtuse or sometimes briefly emarginate at apex, the disk subdensely to densely verrucose, with 3 prominently raised carinae, the lateral carinae extending from base of disk to base of blade, subcrenulate and gradually becoming more prominent distally, ultimately somewhat incurved, the central carinae extending from base of disk to apex of midlobe, entire or weakly crenulate proximally, becoming gradually less prominent distally; column slightly curved, subdilated distally, 1.8–2.2 cm. long, glabrous; ovary prominently 6-winged.

TYPEFICTION: The type is an inflorescence (HOLOTYPE presumably at MEL) obtained from a plant which flowered in the Royal Botanic Gardens, Melbourne, prior to 1894; this material had originally been collected by Rev. M. McDonald and sent to Mueller for cultivation. Although the date and precise locality are uncertain, the specimen probably came from the New Hebrides; McDonald is known to have been collecting on Aneityum in 1864 (Kores, 1989). The epithet is here spelled *macdonaldii* in accord with ICBN Rec. 73C.4 (a).

DISTRIBUTION: New Hebrides and Fiji. Several collections are now known from different islands of the New Hebrides; in Fiji the species is known to occur on four of the high islands in forested areas or on ridges and crests, having been recorded at elevations of approximately 200–1,000 m. (but more frequently at the higher elevations).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 433*; eastern slope of Mt. Koroyanitu, Mt. Evans Range, *Smith 4163*; vicinity of Nandarivatu, *im Thurn 121, 310*; between Nandarivatu and Nandala, *Degener 14761*; valley of Nggaliwana Creek, north of the sawmill at Navai, *Smith 5362*. NAITASIRI: Wainisavulevu Creek, upper Wainimala River Valley, *Hassall 117916* (K spirit coll.). PROVINCE?: Namosi road, *B. & W. Gagné s. n.* (Waimea Arboretum & Botanical Garden accession no. 81P1099F). OVALAU: *Graeffe 1283* (HBG); summit of Mt. Ndelaiovalau and adjacent ridge, *Smith 7614*. VANUA LEVU: THAKAUNDROVE: Eastern slope of Mt. Ndikeya, *Smith 1908*. TAVEUNI: Valley between Mt. Manuka and main ridge of island, east of Wairiki, *Smith 8292*. FIJI without further locality, *Simmonds*, Sept. 18, 1956 (K spirit 23065), Nov. 5, 1956 (K spirit 17519). The Simmonds collections may have been cultivated in Suva from specimens obtained in the vicinity of Nandarivatu.

24. *ARUNDINA* Bl. Bijdr. Fl. Ned. Ind. 401. 1825, Tab. Pl. Jav. Orchid. t. II. fig. 73. 1825; Garay & Sweet, Orch. S. Ryukyu Isl. 52. 1974; Kores in Allertonia 5: 68. 1989.

Terrestrial plants with short, branched, leafless rhizomes and erect, often rather tall, thin, culmlike, leafy stems; pseudobulbs absent; leaves numerous, articulate, with sheathing bases, the blades grasslike, convolutive in bud, thin-coriaceous; inflorescences terminal, racemose or laxly panicleate; flowers usually developing sequentially over a long interval but individually relatively short-lived, showy (perianth up to 5.5 cm. long), resupinate; sepals free, spreading, slightly unequal; petals free, spreading, usually much broader than sepals; labellum sessile, erect, conspicuously larger than other floral segments, weakly 3-lobed, the base embracing the column, the distal portion somewhat expanded, porrect, with the apex often deeply cleft, the disk with a series of longitudinal keels; column long, slender, slightly winged or angled distally; column foot absent; clinandrium more or less cucullate; anther terminal, incumbent, 2-celled; pollinia 8, slightly mealy, ovoid, somewhat compressed laterally, caudiculate, without a stipe or viscidium; rostellum large, overarching stigma, this transverse, recessed.

LECTOTYPE SPECIES: *Arundina speciosa* Bl. (vide Garay & Sweet, Orch. S. Ryukyu Isl. 52. 1974) = *A. graminifolia* (D. Don) Hochr. (*Bletia graminifolia* D. Don).

DISTRIBUTION: Indigenous in Ceylon, India, China, and Indo-Malesia, with about five species. One species is cultivated in Fiji and is here included because it is becoming sparsely naturalized.

1. *Arundina graminifolia* (D. Don) Hochr. in Bull. New York Bot. Gard. 6: 270. 1910; Holtum, Fl. Malaya 1: 188. 1953; Backer & Bakh. f. Fl. Java 3: 292. 1968; Garay & Sweet, Orch. S. Ryukyu Isl. 53. 1974; Seidenfaden in Opera Bot. 89: 16. fig. 4. 1986; Kores in Allertonia 5: 68. 1989.

Cymbidium bambusifolium Roxb. Hort. Beng. 63, nom. nud. 1814, Fl. Ind. ed. 2. 3: 460, nom. illeg. 1832. *Bletia graminifolia* D. Don, Prodr. Fl. Nepal. 29. (Jan.-Feb.) 1825.

Arundina speciosa Bl. Bijdr. Fl. Ned. Ind. 401. (Sept.-Dec.) 1825, Tab. Pl. Jav. Orchid. fig. 73. (Dec.) 1825; Lindl. Gen. Sp. Orchid. Pl. 126. 1831.

Arundina bambusifolia Roxb. ex Lindl. in Wall. Num. List, no. 3751, nom. nud. 1831, Gen. Sp. Orchid. Pl. 126, nom. illeg. 1831; J. W. Parham, Pl. Fiji Isl. ed. 2. 379. 1972.

Slender, terrestrial plants variable in size, up to 3 m. tall, the rhizome short, much branched, the stems usually crowded together, erect, canelike, leafy; leaves distichous, ascending, sheathing at base, the blade linear-lanceolate, 8-30 cm. long, 0.5-1.2 (-2.5) cm. broad, narrowly acute at apex; inflorescence terminal, erect or ascending, racemose or panicleate, the flowers developing sequentially, showy, the outer segments light pink to rose-colored or sometimes nearly white, the labellum light to dark reddish purple, with or without internal yellow markings; sepals similar, spreading, narrowly ovate or ovate-lanceolate, 3-4.5 (-5) cm. long, 0.8-1 cm. broad, acute or acuminate at apex; petals spreading, broadly elliptic to obovate, 2.5-3.8 (-4.5) cm. long, 1.5-2 (-2.5) cm. broad, abruptly acuminate to obtuse at apex; labellum more or less broadly salverform, 3-lobed, 4-5 (-6) cm. long, the lateral lobes embracing column, semiovate, the midlobe slightly recurved, with irregularly crenulate margins, deeply cleft at apex, the disk with 3-5 parallel, longitudinal, crenulate, fleshy carinae; column slender, semiterete, 2-2.5 cm. long; ovary pedicellate, up to 3 cm. long.

TYPIFICATION AND NOMENCLATURE: The earliest available name for this taxon, *Bletia graminifolia*, is based on *Buchanan-Hamilton s. n.* (BM HOLOTYPE), from Nepal. *Arundina speciosa* is typified by a series of collections made by Blume in Java. *Arundina bambusifolia* (1831) is illegitimate because *Bletia graminifolia* was listed by Lindley as a synonym.

DISTRIBUTION: India, southern China, southeastern Asia, and Malesia as far as Celebes. The species is widely cultivated and has become naturalized in parts of the Pacific, although observation suggests that it remains sparsely established in Fiji.

LOCAL NAME AND USE: *Bamboo orchid*; an attractive ornamental.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, DA 16709. REWA: Suva Botanical Gardens, DA 12294.

25. *PSEUDERIA* Schlechter in Repert. Sp. Nov. Beih. 1:644. 1912, in Bot. Jahrb. 56:473. 1921; L. O. Williams in Bot. Mus. Leaflet. 5: 118. 1938; Kores in Allertonia 5: 69. 1989.

Dendrobium sect. *Pseudo-Eria* Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 174. 1905.

Generally large, terrestrial or rarely epiphytic, scandent or climbing plants with slender, branching, leafy stems; leaves articulate, convolutive in bud, usually ovate to lanceolate, somewhat chartaceous, glossy, with tubular, sheathing bases; inflorescences short, lateral, more or less persistent, racemose, with the base of the peduncle covered with small, imbricate cataphylls; flowers moderately small, usually less than 2.5 cm. long, nonresupinate, somewhat fleshy; sepals free, slightly spreading, usually dissimilar, the medial sepal more or less ligulate, often somewhat longer than the lateral sepals, these somewhat falcate; petals free, erect, usually shorter and narrower than sepals, often slightly falcate; labellum adnate to column foot or sessile, immobile, more or less erect, often somewhat recurved distally, entire, about as long as petals or somewhat shorter, the disk with a longitudinal carina along middle and often laxly to subsdensely puberulous distally; column slender, semiterete, slightly curved; column foot very short or absent; clinandrium poorly developed, with the dorsal margin often more or less denticulate; anther terminal, incumbent, ovate-cucullate, 2-celled, with a dorsal crest; pollinia 4, weakly cohering in 2 pairs, unequal, waxy, unappendaged; rostellum small, transverse, entire; stigma directly below rostellum, deeply recessed, more or less scutellate.

LECTOTYPE SPECIES: *Pseudertia similis* (Schlechter) Schlechter (*Dendrobium similis* Schlechter); vide Kores (1989).

DISTRIBUTION: The Moluccas and New Guinea eastward to parts of Micronesia, Fiji, and Samoa, with about 18 species, two of which are believed endemic to Fiji. As noted by Williams (1938), species of this relationship were not discussed by Reichenbach in Seemann's *Flora Vitiensis*. In fact, although *Pseudertia* is by no means uncommon in the archipelago, no Fijian material of it seems to have been obtained by the U. S. Exploring Expedition, Seemann, or other nineteenth century collectors, the earliest Fijian material seen by me dating from about 1920.

Species of *Pseudertia* have very actively growing branches with immature foliage near the apex; as a result the leaves tend to be comparatively small toward branch apices in many herbarium collections. For that reason the measurements of mature leaves (i. e. leaves some distance from the apex) are specified in the following key, while more variable dimensions are indicated parenthetically in the species descriptions.

KEY TO SPECIES

- Mature leaves 7.5-15 cm. long and 0.7-1.8 cm. broad, symmetrical at base; labellum elliptic to ovate-elliptic, the carina slightly raised and weakly sulcate near base. 1. *P. smithiana*
 Mature leaves 15-21 cm. long and 2.7-6 cm. broad, asymmetrical at base; labellum oblong-ovate, the carina prominently raised and longitudinally divided into 2 divergent crests at base. 2. *P. platyphylla*

1. *Pseuderia smithiana* C. Schweinf. in Bishop Mus. Bull. **141**: 23. fig. 7, d. 1936; L. O. Williams in Bot. Mus. Leaflet. **5**: 119. 1938; Kores in Allertonia **5**: 70. 1989.

Pseuderia smithiana var. *smithiana*; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 387. 1972.

Terrestrial or rarely epiphytic plants, climbing or scandent, to 8 m. long or more, the stems much branched, slender, terete, about 0.5 cm. in diameter, completely obscured by the persistent leaf sheaths, distally multifoliate; leaves distichous, ascending, narrowly elliptic- to oblong-lanceolate, 7.5–15 (–19.5) cm. long, 0.7–1.8 (–2.4) cm. broad, chartaceous, narrowly cuneate at base, gradually acuminate to narrowly acute at apex; inflorescences ascending, 1.5–2.5 (–4.5) cm. long, the peduncle very short, the rachis slender, weakly fractiflex, 3–7-flowered, the bracts reflexed, broadly ovate-cucullate, 4–7 mm. long, 3–6 mm. broad; flowers ascending, the outer perianth segments white to pale green or greenish yellow with reddish brown or purple spots, the labellum and column white to pale green, occasionally also tinged with pink or with purple markings at base; medial sepal erect, ligulate or elliptic-ligulate, 10–17 mm. long, 2.2–3 mm. broad, 5-nerved, somewhat fleshy distally, broadly subacute at apex; lateral sepals weakly spreading, narrowly elliptic- or lanceolate-oblong, falcate, 9–14 mm. long, 3.2–4 mm. broad, 5-nerved, slightly carinate distally, subacute at apex with a small dorsal mucro; petals erect, linear-falcate, 7–9 mm. long, 1.2–2 mm. broad, weakly 3-nerved, obtuse to broadly subacute at apex; labellum arcuate, elliptic to ovate-elliptic, 6.3–8 mm. long, 3.8–4.5 mm. broad, somewhat channelled, broadly rounded at base, broadly subacute at apex, the disk with a single carina extending throughout its length and densely minutely papillate distally, the carina a little dilated and weakly sulcate near base, more distally entire, gradually diminishing in height toward apex; column curved, semiterete, about 5.5 mm. long; column foot perpendicular to column, broad, about 1.5 mm. long; clinandrium small, the anterior margin irregularly denticulate; anther broadly elliptic-ovate, about 1 mm. across, with a prominent dorsal keel-like crest, obtuse at apex; pollinia more or less obovoid, about 0.8 mm. long and 0.4 mm. in diameter; rostellum transverse, broadly rounded at apex; stigma transverse, deeply recessed; ovary shortly pedicellate, slightly clavate, about 6 mm. long, 6-ribbed.

TIPIFICATION: The species is based on *Smith 161* (AMES 41963 HOLOTYPE; many ISOTYPES), collected Oct. 16, 1933, at an elevation of 200–400 m. in hills above Namalata and Ngaloa Bays, Kandavu.

DISTRIBUTION: Endemic to Fiji and known from about 30 collections from four of the islands, occurring at elevations of 50–900 m. in dense or open forest, in thickets, or in patches of forest in open areas, sometimes locally abundant. Flowers have been noted in most months, fruits in November and December.

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Nangua, *St. John 18158*. VITI LEVU: NANDRONGA & NAVOSA: Southern slopes of Nausori Highlands, in drainage of Namosi Creek above Tumbenasolo, *Smith 4606*. SERUA: Near Mt. Nggamu, east of Ngaloa, *Degener 15063*. NAMOSI: Hills east of Navua River, *Greenwood 992*; Wainandoi River, *DA 12994*. NAITASIRI: Tamavua–Sawani road, *Setchell & Parks 15083*; Tholois-suva, *DA 13277*; vicinity of Tamavua, *Gillespie 2177*. REWA: Veisari, *DA 10988*; Mt. Korombamba, *Gillespie 2264*. VANUA LEVU: MATHUATA: Seanggangga Plateau, in drainage of Korovuli River, vicinity of Natua, *Smith 6670*. MATHUATA–THAKAUNDROVE boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith 561*. THAKAUNDROVE: Mt. Kasi, Yanawai River region, *Smith 1776*; Navonu Creek, Natewa Peninsula, *DA 15087*.

2. *Pseuderia platyphylla* L. O. Williams in Bot. Mus. Leaflet. **5**: 118. 1938; J. W. Parham, Pl. Fiji Isl. 293. 1964, ed. 2. 387. 1972; Kores in Allertonia **5**: 70. 1989.

Pseuderia smithiana var. *amplifolia* C. Schweinf. in Bot. Mus. Leaflet. **11**: 55. 1943; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 387. 1972.

Robust, epiphytic, climbing or scandent plants to 8 m. long or more, the stems much branched, terete, 1–1.5 cm. in diameter, completely obscured by the persistent leaf sheaths, distally multifoliate; leaves distichous, broadly spreading to patent,

broadly elliptic-lanceolate to lanceolate, (10-) 15-21 cm. long, (2.3-) 2.7-6 cm. broad, chartaceous, unequally cuneate at base, acuminate at apex; inflorescences ascending, 3-6.5 cm. long, the peduncle short, the rachis slender, subdensely 5-9-flowered, the bracts reflexed, broadly elliptic-ovate, 4-7 mm. broad; flowers similar to those of *Pseuderia smithiana* but slightly larger overall, the lateral sepals sometimes only 3-nerved, the labellum oblong-ovate in shape, the disk with a carina prominently raised and longitudinally divided into 2 divergent crests at base.

TYPIFICATION AND NOMENCLATURE: *Pseuderia platyphylla* is typified by Parks 20928 (AMES 46919 & 46920 HOLOTYPE; ISOTYPE at BISH), collected in July, 1927, on Mt. Kombalevu, Naitasiri-Rewa boundary, Viti Levu; the type of *P. smithiana* var. *amplifolia* is Greenwood 661D (AMES 61891 HOLOTYPE; ISOTYPE at BISH), collected Oct. 15, 1942, in the Mt. Evans Range, Mba Province, Viti Levu. The two taxa are scarcely separable (Kores, 1989).

DISTRIBUTION: Endemic to Fiji and now represented by about 35 collections from three of the high islands, found in dense or open forest, in the forest-grassland transition, and in thickets. Flowers seem to occur throughout the year, fruits between August and December.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *O. & I. Degener 32031*; Nauwangga, south of Nandarivatu, *Degener 14696*; foot of Mt. Tomanivi, *DA 13018*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8425*; hills east of Wainikoroiuva River, near Namuamua, *Smith 9035*; Mt. Voma, *DA 11678*. NAITASIRI: Vicinity of Tamavua, *Gillespie 2412*; vicinity of Nasinu, *Gillespie 3499*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7145*. REWA: Vicinity of Suva, *Meebold 16917*. KANDAVU: Hills above Naikorokoro, *DA 11697 (Krauss 400)*. VANUA LEVU: MATHUATA: Korovuli River, *DA 13435*; southern slopes of Mt. Numbuloa, east of Lambasa, *Smith 6410*. THAKAUNDRIVE: Mt. Uluinambathi, Savusavu Bay region, *Degener & Ordenez 13943*; hills west of Mbutha Bay, Natewa Peninsula, *Smith 824*.

Although the two endemic Fijian species of *Pseuderia* are sometimes essentially sympatric, they are readily distinguished from one another by leaf size and base, as well as by floral characters pertaining to the shape and carina of the labellum. Each of the two species seems more closely related to taxa of neighboring archipelagoes than it is to its congener within Fiji (Kores, 1989).

26. CADETIA Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 422. 1829; Schlechter in Repert. Sp. Nov. Beih. 1: 423. 1912; Dockrill, Austr. Indig. Orchids, 319. 1969; Kores in Allertonia 5: 71. 1989; Lewis & Cribb, Orch. Vanuatu, 93. 1989.

Dendrobium sect. *Cadetia* Benth. in Benth. & Hook. f. Gen. Pl. 3: 499. 1883; Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 149. 1905; J. J. Sm. in Bull. Jard. Bot. Buitenzorg II. 8: 15. 1912.

Small, usually caespitose, epiphytic plants with creeping rhizomes and short, erect, pseudobulbous stems; pseudobulbs heteroblastic, slender, cylindric or 3- or 4-angled, unifoliate; leaves often erect, articulate, with nonsheathing bases, the blades conduplicate in bud, somewhat coriaceous; inflorescences terminal, sometimes also pseudoterminal on the same pseudobulb, 1-flowered or fasciculate, the peduncles short, essentially obscured by 1 or more chaffy bracts; flowers small, resupinate, fleshy, usually white or cream-colored; sepals dissimilar, the dorsal sepal free, spreading or somewhat reflexed, more or less ovate, the lateral sepals obliquely joined to column foot and partially connate with each other basally to form a small, spurlike mentum, the free portions erect or spreading, generally broader than dorsal sepal; petals free, erect or spreading, usually narrower than sepals; labellum adnate to column foot and forming a distinct spur, entire or more commonly 3-lobed, the lateral lobes when present ascending, the midlobe larger, usually short-clawed, more or less oblong or

transversely expanded distally, the disk frequently pubescent, with or without thickenings; column short, stout, often with the ventral surface laxly pubescent proximally; column foot retrorsely reflexed, short to long; clinandrium with the anterior margin toothed or lobed; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, somewhat compressed laterally, unappendaged; rostellum short, transverse; stigma directly below rostellum, deeply recessed, more or less scutiform.

TYPE SPECIES: *Cadetia umbellata* Gaud., the only original species.

DISTRIBUTION: India and southeastern Asia through Malesia to Australia and eastward in the Pacific to the Solomon Islands, Santa Cruz Islands, and Fiji, where the range terminates with a single species.

1. *Cadetia hispida* (A. Rich.) Schlechter in Repert. Sp. Nov. Beih. 1: 424, in obs. 1912; Kores in Allertonia 5: 72. 1989. FIGURE 48.

Dendrobium hispidum A. Rich. Sert. Astrolab., Atlas, t. 5. 1833, op. cit. 13. 1834; Benth. in Benth. & Hook. f. Gen. Pl. 3: 499, in obs. 1883; Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 156, in obs. 1905; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 283, p. p. 1910.

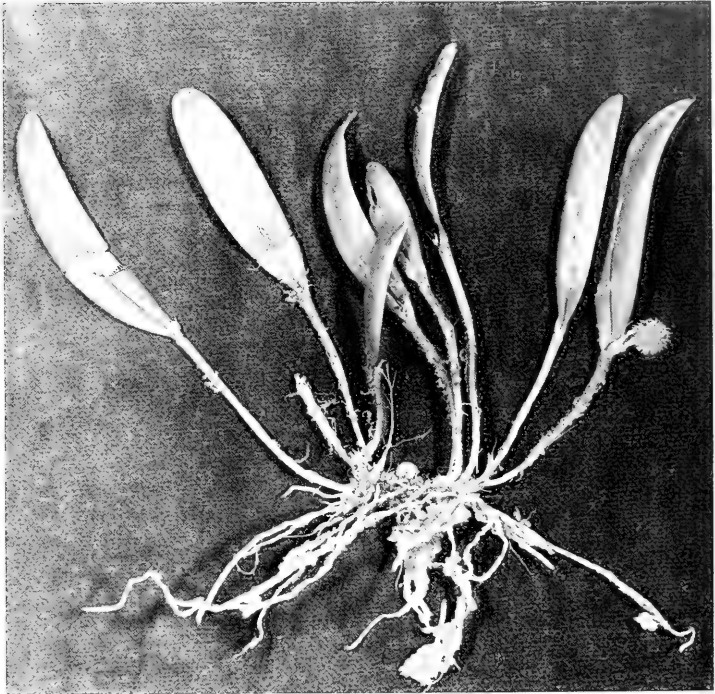


FIGURE 48. Mature fringing plant of *Cadetia hispida* from Naitasiri Province, Viti Levu (Kores & Molvray F4), about life-size.

Very small epiphytic plants 3–5 cm. tall, the rhizome abbreviated; pseudobulbs closely spaced, erect, slender, terete or weakly 4-angled distally, slightly broader toward apex, (1.5–) 2.5–4.5 cm. long, 1–1.5 mm. in diameter, unifoliate; leaf erect or ascending, the blade coriaceous, oblong-elliptic to ligulate, 2–4 cm. long, 0.3–1 cm. broad, cuneate at base, acute to obtuse or minutely bilobed at apex; inflorescence 1–3-flowered; flowers usually developing sequentially, small, greenish white to cream-colored; dorsal sepal erect, slightly curved, broadly ovate, 2.5–3 mm. long, 1.75–2 mm. broad, broadly obtuse at apex, the lateral margins somewhat vaulted throughout lower half, gradually becoming slightly incurved distally; lateral sepals above mentum spreading, obliquely subquadrate, 2–2.5 mm. long, 2–2.25 mm. broad, subtruncate at apex, with the anterior margin slightly incurved; mentum more or less cylindrical, slightly flattened dorsoventrally, about 1 mm. long, slightly retuse at apex; petals initially erect, distally somewhat recurved, linear-ligulate, 3–3.5 mm. long, about 0.5 mm. broad, subacute to obtuse at apex; labellum more or less oblong-obovate in outline, weakly 3-lobed near apex, 3–3.5 mm. long, 2–2.25 mm. broad, the base closely appressed to column, narrowed, slightly channelled, with the lateral margins subentire to irregularly crenulate, the lateral lobes minute, erect, narrowly triangular, about 0.25 mm. long, the midlobe separated from rest of labellum by a fleshy transverse crest, abruptly reflexed, semicircular, 0.75–1 mm. long, 2–2.25 mm. broad, somewhat concave, with the anterior margin slightly thickened, broadly obtuse at apex, the disk laxly puberulent throughout; column short, about 1.5 mm. long, somewhat flattened dorsoventrally and conspicuously dilated toward apex; column foot retrorsely reflexed, slender, about 1 mm. long; clinandrium deeply excavate and inwardly inclined, the dorsal margin with a blunt, short tooth, the lateral margins prolonged into 2 prominent, somewhat fleshy, entire or weakly toothed, hornlike appendages surmounting anther; anther transversely oblong, about 0.75 mm. long and 1 mm. broad, truncate or slightly retuse at apex; pollinia oblong, slightly unequal in size, 0.25–0.35 mm. long, about 0.15 mm. broad; rostellum transverse, membranous; stigma transversely obovate, somewhat concave; capsule subglobose to broadly ellipsoid, 7–10 mm. long, 5–6 mm. in diameter, densely echinate throughout.

TYPIFICATION: The type was collected on Vanikoro Island, Santa Cruz Islands, during the voyage of the *Astrolabe*, probably by Lesson; the HOLOTYPE should be at P or G, but if it is lacking the original illustration may serve as the type.

DISTRIBUTION: Santa Cruz Islands and Fiji; the Fijian specimens are not well documented but apparently come from forested areas at elevations up to perhaps 300 m. Buds have been obtained in July, flowers in November and December, and fruits in May and November.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: 10 miles from Suva, *Meebold 16810* (K); Tholo-i-suva, *Kores & Molvray F4* (fruits only). PROVINCE?: Namosi road, *B. & W. Gagné s. n.* (in vivo at Waimea Arboretum & Botanical Garden). VANUA LEVU: MATHUATA: Mathuata coast, *Greenwood 602* (K). FIJI without further locality, *Simmonds*, Dec. 17, 1959 (K spirit 9752), Mar. 12, 1960 (K spirit 5649).

27. *DENDROBIUM* Sw. in *Nova Acta Regiae Soc. Sci. Upsal.* II. 6: 82. 1799; Lindl. *Gen. Sp. Orchid. Pl.* 74. 1830; Reichenb. f. in *Walp. Ann. Bot. Syst.* 6: 279. 1861, in *Seem. Fl. Vit.* 303. 1868; Benth. in *Benth. & Hook. f. Gen. Pl.* 3: 498. 1883; Hook. f. *Fl. Brit. Ind.* 5: 710. 1890, op. cit. 6: 183. 1890; Pfitzer in *Engl. & Prantl, Nat. Pflanzenfam.* II. 6: 173. 1889; Kraenzl. in *Pflanzenr.* 45 (IV. 50. II. B. 21): 25. 1910; Schlechter in *Repert. Sp. Nov. Beih.* 1: 440. 1912; Holtum, *Fl. Malaya* I: 261. 1953; Backer & Bakh. f. *Fl. Java* 3: 344. 1968; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 37. 1977; Seidenfaden in *Opera Bot.* 83: 5. 1985; Kores in *Allertonia* 5: 73. 1989; Lewis & Cribb, *Orch. Vanuatu*, 95. 1989. *Nom. cons.*

Small to large epiphytic or very rarely terrestrial plants with creeping rhizomes, the stems articulate, with 1-many nodes, usually elongated with some or all of the internodes thickened to form relatively long or rarely short homoblastic pseudobulbs, or thin and wiry without apparent pseudobulbs; leaves mostly articulate, conduplicate in bud, with or without sheathing bases, frequently somewhat coriaceous, either flat, terete, or sometimes laterally compressed; inflorescences axillary or pseudoterminal from upper nodes, either fasciculate, racemose, or paniculate; flowers somewhat variable, ephemeral to relatively long-lived, small to large, often showy, resupinate or rarely nonresupinate; sepals dissimilar, the medial sepal free, the lateral sepals obliquely adnate to column foot and slightly connate along ventral margins near base forming a distinct mentum, rarely partially connate above mentum; mentum short to long; petals free, more or less similar to medial sepal or rarely differing considerably in size and shape; labellum either adnate to column foot and immobile or sometimes more or less articulate with column foot and mobile, erect, entire or variously lobed, the disk usually with appendages or a callus; column usually short, more or less winged; column foot short to long; clinandrium with the anterior margin 2- or 3-lobed; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, somewhat compressed laterally, unappendaged; rostellum small, usually indistinct; stigma directly under rostellum, more or less deeply recessed.

LECTOTYPE SPECIES: *Dendrobium moniliforme* (L.) Sw. (*Epidendrum moniliforme* L.), typ. cons. This is indicated as the type species in the current (Berlin, 1988) edition of ICBN; for its approval cf. the report by the Committee for Spermatophyta (in Taxon 31: 542. 1982) and other pertinent discussions (summarized by Kores, 1989).

DISTRIBUTION: A very large genus, with more than 1,400 species, *Dendrobium* occurs throughout tropical and subtropical Asia and extends eastward throughout Malasia to Australia, Micronesia, New Zealand, and Polynesia. Twenty-three species occur in Fiji, 22 of which are indigenous, eight of these being endemic. (However, the following key covers only 21 species. The other two were noted only after this treatment was in final form; they are discussed in a supplement at the end of the family.)

USEFUL TREATMENT OF GENUS: KRAENZLIN, F. *Orchidaceae-Monandreae-Dendrobiinae*. Pflanzenr. 45 (IV. 50. II. B. 21): 1-382. 1910. (This treatment is the only monograph of the genus and, although it is now outdated, it is still useful for specific information on individual species.) SCHLECHTER, R. *Dendrobium*. Repert. Sp. Nov. Beih. 1: 440-643. 1912. (The treatment, even though it deals almost exclusively with New Guinea, includes a complete summary of Schlechter's infrageneric system of classification for *Dendrobium*, and this arrangement is the one most frequently followed today.) SEIDENFADEN, G. *Orchid genera in Thailand XII. Dendrobium* Sw. Opera Bot. 83: 1-296. 1985. (Seidenfaden's introduction to the genus provides a good summary of its taxonomic history and surveys some of the more recent literature which deals with its circumscription. He also provides much background information about the circumscription and typification of the sections that occur in Thailand, but only a few of those sections are also represented in Fiji.)

In addition, there have been a number of useful papers on individual sections within the genus, those that have a bearing on Fijian taxa being here listed. REEVE, T. M., & P. J. B. WOODS. A preliminary key to the species of *Dendrobium* section *Oxyglossum*. *Orchadian* 6: 195-209. 1980. CRIBB, P. J. A revision of *Dendrobium* sect. *Latourea* (Orchidaceae). *Kew Bull.* 38: 229-306. 1982. CRIBB, P. J. A revision of *Dendrobium* sect. *Spatulata* (Orchidaceae). *Kew Bull.* 41: 615-692. 1985.

The several different systems of classification of the complex genus *Dendrobium* have recently been summarized (Kores, 1989). The systematic arrangement proposed by Schlechter (1912), now widely accepted in its general outlines, is followed in the present treatment. This system divides the genus into four subgenera and 41 sections; all four of the subgenera and twelve of the sections recognized by Schlechter are represented by the species now known to occur in Fiji (Kores, 1989).

KEY TO SPECIES

- Leaves without sheaths (subgen. *Athecebiium*).
 Branches of sympodium unifoliate; leaves terete. 1. *D. vagans*
 Branches of sympodium with 2 or more leaves; leaves not terete.
 Pedicel and ovary without setose hairs. 2. *D. macropus*
 Pedicel and ovary with setose hairs. 3. *D. macrophyllum*
- Leaves with distinct sheaths.
 Plants with pseudobulbous or fleshy stems (these sometimes reduced to 1-3 nodes).
 Stems fleshy or pseudobulbous throughout all or most of their length, the distal portion not thin and wiry (subgen. *Dendrobium*).
 Fleshy portion of stems flattened, 3-6 times as broad as thick. 4. *D. platygastrium*
 Fleshy portion of stems not noticeably flattened, about as broad as thick.
 Racemes abbreviated, 0.2-3(-5) cm. long, arising from distal nodes of old generally defoliate stems or near apex of reduced foliate stems less than 3 nodes long.
 Stems elongated, (15-) 20-80 cm. long, nonpseudobulbous, multifoliate distally.
 Labellum not calyptrate distally.
 Inflorescences usually 10-25-flowered; ovary prominently 3-winged and alternately 3-ribbed; stems 1.5-2.8 cm. in diameter, becoming decidedly wrinkled with age. 5. *D. purpureum*
 Inflorescences 3-6-flowered; ovary prominently 6-ribbed; stems 0.2-0.5 cm. in diameter, becoming weakly striate with age. 6. *D. catillare*
 Labellum calyptrate distally. 7. *D. mohlianum*
 Stems reduced, 1-6 cm. long, pseudobulbous, (1 or)2- or 3-foliate distally.
 Leaves 5-14 mm. broad; ovary prominently 3-angled or triangular in cross section. 8. *D. prasinum*
 Leaves 0.7-2 mm. broad; ovary 5-ribbed or weakly 5-winged in cross section. 9. *D. masarangense*
- Racemes slender, (3-) 10-50 cm. long, arising near apex of foliate stems (or rarely from lower nodes of old leafless stems).
 Flowers large, 15-40 mm. long; labellum adnate to column foot, immobile.
 Sepals and petals broadly spreading; midlobe of labellum about as long as broad, transversely oblong-ovate. 10. *D. spatulatum*
 Sepals and petals weakly spreading; midlobe of labellum 1.5-2.5 times as long as broad, elliptic to obovate-elliptic.
 Petals linear-oblancoelate; labellum 26-32 mm. long. 11. *D. tokai*
 Petals linear-ligulate; labellum up to 22 mm. long. 12. *D. hornei*
 Flowers small, 5-8 mm. long; labellum articulate with column foot, somewhat mobile. 13. *D. vittensis*
- Stems fleshy or pseudobulbous for only 3-5 internodes near base, the distal portion thin and wiry (subgen. *Rhopalobium*). 14. *D. crumenatum*
- Plants with slender, reedlike, hard stems, these never pseudobulbous or fleshy (subgen. *Xerobium*).
 Upper margin of leaf sheath not lobed opposite blade, truncate, oriented perpendicular to stem after blade abscises.
 Leaf blades 8-18 cm. long, subcoriaceous; petals oblong, oblong-obovate, or oblong-oblancoelate, sometimes slightly oblique.
 Midlobe of labellum broadly ovate, the apex abruptly acuminate; lateral sepals 9-14 mm. long. 15. *D. kraenzlinii*
 Midlobe of labellum abruptly expanded distally, forming a broad obreniform blade, the apex broadly trilobulate; lateral sepals 7-8 mm. long. 16. *D. trilobulatum*
 Leaf blades 2.5-4 cm. long, rigidly coriaceous; petals ovate. 17. *D. carnicarinum*
- Upper margin of leaf sheath prominently lobed opposite blade, oriented obliquely to stem after blade abscises.
 Labellum 3-lobed; sepals and petals 8-32 mm. long.
 Leaf blades lanceolate, (0.8-) 1-2.5 cm. broad; carina on labellum with the upper margin irregularly crenulate throughout.
 Flowers dark to pale yellow or yellowish white without reddish brown or reddish purple markings; ovary weakly 4-angled in cross section, indistinctly 5- or 6-ribbed. 18. *D. dactylodes*
 Flowers yellow to yellowish white with reddish brown or reddish purple markings; ovary prominently 4-angled in cross section, distinctly 6-ribbed. 19. *D. sladei*
 Leaf blades linear-lanceolate, 0.3-0.7 cm. broad; carina on labellum with the upper margin entire or with only a few small teeth at apex. 20. *D. biflorum*
 Labellum entire; sepals and petals 4-5 mm. long. 21. *D. unicarinatum*

1. *Dendrobium vagans* Schlechter in Repert. Sp. Nov. 9: 104. 1911; Kores in Allertonia 5: 77. 1989; non Schlechter (1923), nom. illeg., nec Gagnep. (1950), nom. illeg.

FIGURE 49A-G.

Dendrobium calamiforme sensu Seem. in Bonplandia 9: 259. 1861; non Lodd.

Dendrobium crispatum sensu Seem. in Bonplandia 10: 153. 1862, Viti, 442. 1862; Reichenb. f. in Seem. Fl. Vit. 303. 1868; Kraenzl. in Pflanzenz. 45 (IV. 50. II. B. 21): 293, p. 1910; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 32. 1953; J. W. Parham, Pl. Fiji Isl. 286. 1964, ed. 2. 381, excl. pl. 3. 1972; non Sw.

Dendrobium sp. nov. Horne, A Year in Fiji, 260. 1881.

Dendrobium calamiforme Rolfe in Kew Bull. 1921: 55, nom. illeg. 1921; non Lodd. (1841).

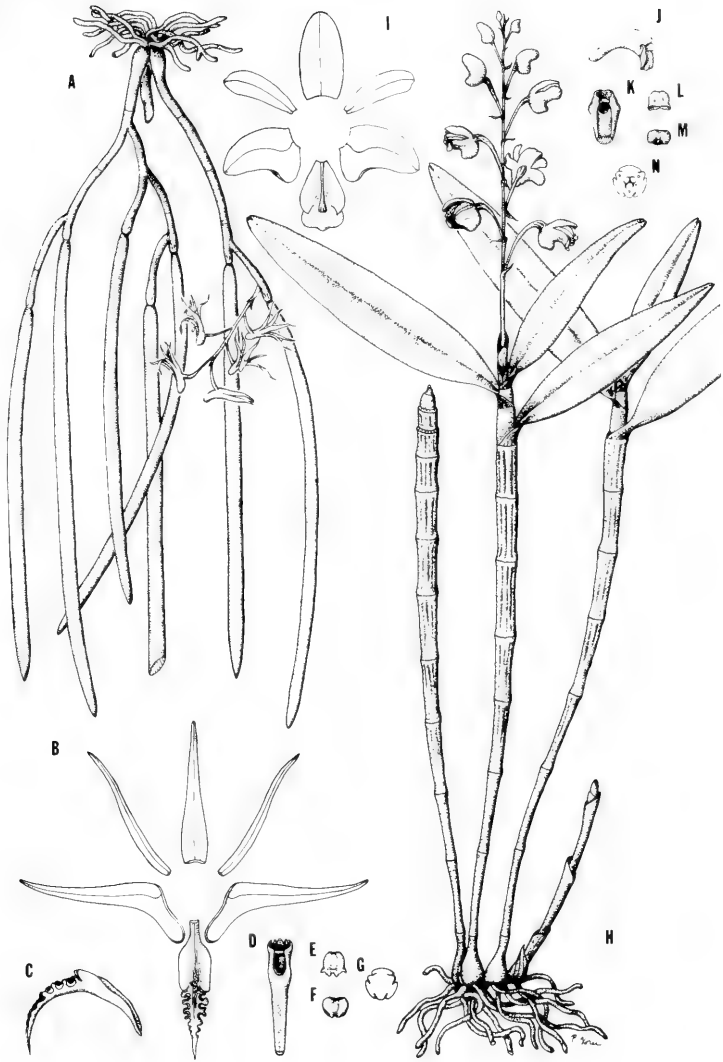
Dendrobium seemannii L. O. Williams in Bot. Mus. Leaflet. 5: 123, quoad spec. vit. et nova-ebud. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 32. pl. 6. 1953; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 382. 1972; Cribb in Kew Bull. 37: 588, in obs. 1983; Hallé in Bull. Mus. Nat. Hist. Nat. (Paris) IV, 8, Sect. B, Adansonia 3: 238. 1986; Lewis & Cribb, Orch. Vanuatu, 97. pl. 5, A. 1989.

Dockrilla vagans Rauschert in Repert. Sp. Nov. 94: 447. 1983.

Epiphytic, pendulous plants up to 2 m. long, the rhizome much branched, flexuous, hard, wiry, terete, weakly rooting at base, the stems widely spaced, nonpseudobulbous, reduced to a single internode, cylindrical, slightly thickened, 3-6 mm. long, 2-3 mm. in diameter, unifoliate; leaves pendent, articulate, sheathless, narrowly cylindrical, 6-18 (-30) cm. long, 2-3 (-5) mm. in diameter, fleshy, slightly attenuate at base, narrowly acute at apex; inflorescences pendent, racemose, the peduncle short, terete, 0.7-3 cm. long, the rachis slender, terete, 5-12 (-15) cm. long, laxly (2-)5-10-flowered, the bracts small, narrowly ovate-attenuate, about 1 mm. long; flowers patent, nonresupinate, pure white to pale yellow, sometimes also tinged with pink; sepals slightly dissimilar, linear-lanceolate, 14-20 (-22) mm. long, 1.5-3 (-4) mm. broad, narrowly attenuate at apex; mentum slightly retrorse, narrowly conical, 3-5 mm. long, obtuse at tip; petals linear-lanceolate, 14-20 mm. long, 1-1.5 mm. broad, narrowly attenuate at apex; labellum adnate to column foot, immobile, arcuate, weakly 3-lobed distally, more or less lanceolate in outline, 16-20 mm. long overall, 3.5-4.5 mm. broad, the base narrowly cuneate, the lateral lobes turned upward, small, acute, 0.75-1.5 mm. long, 0.5-1 mm. broad, with entire margins, the midlobe linear-lanceolate, 10-12 mm. long, 1.5-2 mm. broad, with lateral margins convolute and conspicuously undulate-sinuate proximally, gradually becoming more entire distally, filiform at apex, the disk with 3 prominent longitudinal carinae extending from base of labellum to center of midlobe and becoming slightly more prominent and conspicuously undulate distally; column slender, semiterete, 2-2.5 mm. long; column foot slender, 3-5 mm. long; clinandrium deeply excavate, the dorsal margin lacerate-dentate; anther ovate-galeate, 1-1.5 mm. across, somewhat emarginate at apex, the anterior margin denticulate; pollinia ellipsoid, 0.5-0.75 mm. long, 0.2-0.4 mm. broad; rostellum small, transversely oblong; stigma elliptic; ovary filiform-pedicellate, narrowly clavate, 1.5-2.5 cm. long overall, terete, glabrous.

TYPIIFICATION AND NOMENCLATURE: The type of *Dendrobium vagans* is *Vaupel 651* (B HOLOTYPE, destroyed; ISOTYPES at AMES 35390, 35391), collected Dec. 30, 1906, near Falealupo, Savai'i, Samoa. *Dendrobium calamiforme* Rolfe, for which *D. seemannii* was a new name, is based upon four syntypes, none of which has been designated as a lectotype: *Seemann 579* (K SYNTYPE; ISOSYNTYPES at AMES, BM, W), from Fiji without further locality; *Horne 1085* (K SYNTYPE), from Fiji but also without further data; *im*

FIGURE 49. A-G, *Dendrobium vagans*; A, flowering plant, $\times 1/2$; B, perianth segments, $\times 1 1/2$; C, labellum viewed from side, $\times 2$; D, column viewed from front, showing clinandrium, rostellum, stigma, and column foot, $\times 3$; E, anther cap viewed from front, $\times 4$; F, anther cap viewed from above, $\times 4$; G, cross section of ovary, $\times 6$. H-N, *Dendrobium macropus*; H, flowering plant, $\times 1/2$; I, perianth segments, $\times 1 1/2$; J, labellum viewed from side, $\times 1 1/2$; K, column viewed from front, showing clinandrium, rostellum, and stigma, $\times 3$; L, anther cap viewed from front, $\times 4$; M, anther cap viewed from above, $\times 4$; N, cross section of ovary, $\times 6$. A from *Smith 1442*, B-G from *DA 16854*, H after Hallé, *pl. 51* (1977), I-N from *Hassall 7797*.



Thurn 376 (K SYNTYPE), from the vicinity of Nandarivatu, Mba Province, Viti Levu; and *im Thurn 328* (K SYNTYPE), collected Dec. 26, 1906, at "Rason's Island," Port-Vila, Efaté, New Hebrides.

DISTRIBUTION: The New Hebrides, Fiji, and Samoa; possibly also occurring in New Caledonia and the Loyalty Islands. In Fiji *Dendrobium vagans* is found from near sea level to about 850 m., sometimes along shores or in rocky forest on limestone, but occasionally in montane forest. It is infrequently brought into garden cultivation. Flowers, as far as collections are dated, have been noted between December and August.

LOCAL NAME: *Mbati ni veli* (Mbua).

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRI: Nawanggambena, Waindrandra Creek, Waindina River tributary, *DA 3104*. VANUA LEVU: MBUA: Ndavia, Wainunu River, *DA 2276*. THAKAUNDOVE: West of Valetu, *Bierhorst F115*; Namale (in garden), *DA 16854*. VANUA MBALAVU: Namalata islet, southern limestone section, *Smith 1442*.

The only representative of subgen. *Athecebiium* sect. *Rhizobium* in Fiji and Samoa, *Dendrobium vagans* is related to such southern Pacific and Papuan species as *D. crispatum* (Forst. f.) Sw., *D. flagellum* Schlechter, and *D. casuarinae* Schlechter (Kores, 1989).

2. ***Dendrobium macropus*** (Endl.) Reichenb. f. ex Lindl. in J. Linn. Soc. Bot. 3:9. 1859; Lewis & Cribb, Orch. Vanuatu, 97. pl. 5, C. 1989. FIGURE 49H-N.

Telychiton macropus Endl. Prodr. Fl. Norfolk. 33. 1833.

Dendrobium gracilicaule F. v. Muell. Fragm. Phyt. Austral. 1: 179. 1859; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 272. 1910; Guillaumin in Notul. Syst. (Paris) 10: 62. 1941; Rupp, Orchid. N. S. W. 116. 1944; Guillaumin, Fl. Nouv.-Caléd. 62. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 110. pl. 50-53. 1977; Kores in Allertonia 5: 78. 1989.

Callista gracilicaulis Kuntze, Rev. Gen. Pl. 2: 654. 1891.

Dendrobium comptonii Rendle in J. Linn. Soc. Bot. 45: 247. 1920.

Dendrobium drake-castilloi Kraenzl. in Notul. Syst. (Paris) 4: 135. 1928.

Dendrobium gracilicaule var. *vitiense* Rolfe ex Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 116, nom. nud. 1977.

Tropilis gracilicaulis Rauschert in Repert. Sp. Nov. 94: 470. 1983.

Tropilis comptonii Rauschert in Repert. Sp. Nov. 94: 470. 1983.

Tropilis drake-castilloi Rauschert in Repert. Sp. Nov. 94: 470. 1983.

Epiphytic, erect plants to 55 cm. tall, the rhizome much abbreviated, the stems closely spaced, pseudobulbous, narrowly clavate, 30-50 cm. long, 5-9 mm. in diameter, pluriarticulate, distally 2-4-foliate, the internodes 2-5 cm. long, many-ribbed; leaves ascending to patent, articulate, sheathless, lanceolate- to oblong-elliptic, 6-12 (-15) cm. long, 1.5-3 (-4.5) cm. broad, subcoriaceous, cuneate at base, unequally bilobed or obliquely subacute at apex; inflorescences pseudoterminal, erect, racemose, 6-15 (-20) cm. tall, the peduncle much shorter than rachis, the rachis slender, 5-10 (-14) cm. long, laxly to subdensely few-many-flowered, the bracts small, lanceolate; flowers ascending, resupinate, somewhat fleshy, fragrant, dark yellow to yellow-orange, usually with maroon blotches on the outside; dorsal sepal weakly spreading, oblong, 7-12 mm. long, 3-4 mm. broad, slightly cucullate and subacute to obtuse at apex; lateral sepals broadly spreading, ovate-falcate, somewhat oblique, 6-11 mm. long, 3.5-4.5 mm. broad, subacute to obtuse at apex; mentum slightly inflexed, short, obtuse, about 3 mm. long; petals weakly spreading, narrowly oblong-oblancheolate, falcate, 6-8.5 mm. long, 2-3 mm. broad, subacute to obtuse at apex; labellum adnate to column foot, immobile, arcuate, 3-lobed distally, more or less obovate in outline, 5.5-7 mm. long overall, 4.5-5 mm. broad, the base cuneate, somewhat channelled, the lateral lobes turned upward, ovate, 1-1.5 mm. long, about 1.5 mm. broad, subacute to acute at apex, the midlobe transversely ovate, 2-3 mm. long, 4.5-6 mm. broad,

abruptly acuminate to briefly mucronate at apex, the disk with a callus extending from base of labellum to base of midlobe, the callus rather prominently raised distally and with the anterior margin strongly 3-ribbed; column stout, semiterete, about 1.5 mm. long; column foot relatively broad, about 2 mm. long; clinandrium relatively shallowly excavate, the dorsal margin retuse; anther transversely ovate-galeate, about 1.2 mm. across, broadly rounded to truncate at apex; pollinia oblong-ellipsoid, about 1 mm. long and 0.2 mm. broad; rostellum short, transversely oblong; stigma oblong; ovary manifestly pedicellate, clavate, 1.2–1.8 cm. long overall, terete, weakly 6-ribbed, glabrous.

TYPIIFICATION AND NOMENCLATURE: *Thelychiton macropus* is based on *F. Bauer s. n.* (W HOLOTYPE), from Norfolk Island; the type of *Dendrobium gracilicaule* is *W. Hill s. n.* (MEL HOLOTYPE), collected at Moreton Bay, Queensland, Australia; that of *D. comptonii* is *Compton 1151* (BM HOLOTYPE), obtained in June, 1914, near Canala, New Caledonia; and that of *D. drake-castilloi* is *Vieillard 3287* (P HOLOTYPE), collected between 1861 and 1867 near Gatope, Mt. de Panoui, New Caledonia. The last three taxa are recently treated as synonyms of *D. macropus* by Lewis and Cribb (1989). The source of the name *D. gracilicaule* var. *vitiense* is *im Thurn 373* (K), collected Sept. 1, 1907, at Veisari, Rewa Province, Viti Levu. Although the typical variety of *D. gracilicaule* is quite polymorphic (Hallé, 1977), the Fijian material seems not to warrant recognition at any level (Kores, 1989).

DISTRIBUTION: Northern Australia, Lord Howe Island, Norfolk Island, Kermadec Islands, New Caledonia, New Hebrides, and Fiji. In Fiji the species is infrequent and is known only from Viti Levu, where it occurs from near sea level to about 900 m. in forest or along streams and trails. Flowers have been obtained in August and September, fruits in November.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of escarpment north of Nandarivatu, *Smith 6285*; Nandarivatu, *Gillespie 3172*, *Hassall 7797* (K spirit coll., flowers only). VITI LEVU without further locality, *Simmonds s. n.* (K spirit coll. 14946).

Dendrobium macropus is the only representative of subgen. *Athecebiium* sect. *Dendrocoryne*, a predominantly Australian section, known to occur in Fiji.

3. ***Dendrobium macrophyllum*** A. Rich. in Dumont D'Urville, Sert. Astrolab. 22. 1834, Atlas, t. 9. 1833; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 244. fig. 20, D. E. 1910; Ames in J. Arnold Arb. 13: 133. 1932; Guillaumin, Fl. Nouv.-Caléd. 62. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 134. pl. 63, 64. 1977; Cribb in Orchadian 6: 277. 1981, in Kew Bull. 38: 247. fig. D, E, pl. 11, A, B. 1982; Kores in Allertonia 5: 79. 1989; Lewis & Cribb, Orch. Vanuatu, 98. fig. 17, L-N. 1989.

FIGURE 87 (upper & lower).

Dendrobium gordonii Horne, A Year in Fiji, 260, nom. nud., as *D. gordonii*. 1881; S. Moore in Baker in J. Linn. Soc. Bot. 20: 372, as *D. gordonii*. 1883; Rolfe in op. cit. 39: 174, as *D. gordonii*. 1909; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 247. 1910; L. O. Williams in Bot. Mus. Leaf. 5: 121. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 32. pl. 1. 1953; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 381. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 135, in adnot. 1977.

Dendrobium psyche Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 246. 1910.

Latourea macrophylla Brieger in Schlechter, Die Orchideen, ed. 3. 1: 727. 1981.

Sayeria macrophylla Rauschert in Repert. Sp. Nov. 94: 467. 1983.

Epiphytic, erect plants (25–) 45–65 cm. tall, the rhizome much abbreviated, the stems closely spaced, pseudobulbous, clavate, subclavate, or rarely fusiform, (20–) 25–50 cm. long, 1.4–3 cm. in diameter, pluriarticulate, (2 or) 3-foliolate distally, the internodes 2–8.5 cm. long, many-ribbed, often turning yellow with age; leaves ascending, articulate, sheathless, oblong to oblong-elliptic, 15–35 cm. long, 3.3–9 cm. broad,

coriaceous, cuneate at base, subacute at apex; inflorescences pseudoterminal, erect, racemose, to 40 cm. tall, the peduncle well developed, terete, the rachis about half as long as peduncle, subsdensely 6–20-flowered, the bracts lanceolate, 1.5–2.5 cm. long, 0.4–0.8 cm. broad, narrowly acute at apex; flowers ascending, resupinate, the sepals and petals greenish yellow to yellow with purple spots, the labellum yellow with purple stripes and a white callus; sepals broadly spreading, rather prominently setose externally, the dorsal sepal oblong-ovate to oblong-lanceolate, 21–26 mm. long, 7–10 mm. broad, acute at apex, the lateral sepals obliquely triangular, 23–26 mm. long, 12–14 mm. broad, acute or acuminate at apex; mentum slightly inflexed, obliquely conical, about 10 mm. long; petals spreading, oblanceolate or oblong-oblanceolate, 18–22 mm. long, 8–11 mm. broad, somewhat undulate at margins, broadly acute at apex; labellum adnate to column foot, immobile, strongly recurved distally, 3-lobed, 10–20 mm. long overall, 16–27 mm. broad, the base broadly cuneate, the lateral lobes turned upward, subquadrate-flabellate, truncate at apex, the midlobe transversely oblong, conduplicate, apiculate at apex, the disk with a single callus near base, the callus very prominently raised, brief, oblong, with the anterior margin weakly 3-ribbed; column short, about 3 mm. long; column foot about 10 mm. long; clinandrium relatively deeply excavate, broadly 3-lobed at margin, the lateral lobes obtuse, the dorsal lobes slightly taller, distally inflexed, weakly tridentate at apex; anther broadly rhomboid-cucullate, about 2.8 mm. across, truncate at apex; pollinia oblong-ellipsoid, about 1.5 mm. long and 0.3 mm. broad; rostellum very brief, transverse, the anterior margin weakly trilobulate; stigma transverse; ovary manifestly pedicellate, clavate, up to 20 mm. long overall, terete, densely setose-pilose throughout.

TIPIFICATION AND NOMENCLATURE: *Dendrobium macrophyllum* is typified by *Lesson s. n.*, collected in 1827 during the *Astrolabe* expedition on the mainland of New Guinea. The type of *D. gordonii* is *Horne 942* (K LECTOTYPE; cf. Kores, 1989), collected along Namboumbutho Creek, Wailoa River tributary, Wainimala River basin, Naitasiri Province, Viti Levu. The K sheet also includes a specimen said to have been collected by Graeffe on Upolu, Samoa. The type of *D. psyche* is *Braithwaite* (B HOLOTYPE, probably destroyed), from the New Hebrides. The synonymy of these three taxa has been pointed out by P. J. Cribb (Kores, 1989; Lewis & Cribb, 1989).

DISTRIBUTION: Malesia and Palau eastward to Fiji and Samoa. In Fiji it is one of the more frequently collected species of *Dendrobium*, now known from about 35 collections, occurring from near sea level to an elevation of about 1,150 m. in dense or open forest, in the forest-grassland transition, and in the dense thickets of crests and ridges. Flowers occur between April and September, fruits between August and December.

LOCAL NAME: *Vara sila* (cf. J. W. Parham, 1972).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 257A*; slopes of escarpment north of Nandarivatu, *Smith 6273*; vicinity of Nandarivatu, *Gibbs 603*, *Kores & Molvray F30*; summit of Mt. Nanggaranambuluta, east of Nandarivatu, *Gillespie 3942*; western and southern slopes of Mt. Tomanivi, *Smith 5213*. NADRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5530*; west of Namatakula, *in Thurn 35*. SERUA: Track to Mt. Tuvutau, *DA*, July 21, 1967. NAITASIRI: Central road, *MacDaniels 1164*; vicinity of Tamavua, *Gillespie 2111*. REWA: Mt. Korombamba, *Parks 20145*; Wailoku water supply area, *Vaughan 3199*. OVALAU: Hills west of Lovoni Valley, on ridge south of Mt. Korolevu, *Smith 7516*; summit and adjacent slopes of Mt. Korotolutolu, west of Thawathi, *Smith 8025*. VANUA LEVU: MBUA: Mbua Bay, *U. S. Expl. Exped.* (AMES, W). THAKAUNDROVE: Hills south of Natewa, Natewa Peninsula, *Smith 1956*.

Dendrobium macrophyllum, the most widespread species of subgen. *Athecebiium* sect. *Latourea*, is the only representative of that section found in Fiji. For a more extensive list of synonyms that have been applied to this taxon in other geographic regions, see Lewis and Cribb (1989).

4. *Dendrobium platygastrum* Reichenb. f. *Otia* Bot. Hamb. 55. 1878 (repr. *Xenia* Orch. 3: 31. 1881); Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; Kraenzl. in *Pflanzenr.* 45 (IV. 50. II. B. 21): 267, p. p. 1910; Schlechter in *Repert. Sp. Nov. Beih.* 1: 500, in obs. 1912; L. O. Williams in *Bot. Mus. Leafl.* 5: 123. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 33. 1953; J. W. Parham, *Pl. Fiji Isl.* 287, excl. syn. 1964, ed. 2. 381, excl. syn. 1972; Kores in *Allertonia* 5: 80. 1989; Lewis & Cribb, *Orch. Vanuatu*, 102. *pl.* 5, *F.* 1989.

FIGURE 50.

Dendrobium camptocentrum Schlechter in *Bot. Jahrb.* 39: 69. 1906; Guillaumin in *Notul. Syst.* (Paris) 10: 64. 1941, *Fl. Nouv.-Caléd.* 61. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 105. *pl.* 45, 46. 1977.

Dendrobium goldfinchii sensu Kraenzl. in *Pflanzenr.* 45 (IV. 50. II. B. 21): 269, p. p. fig. 23. 1910; Ames in *J. Arnold Arb.* 13: 131. 1932; Guillaumin in *Bull. Soc. Bot. France* 74: 707. 1927; non F. v. Muell.

Pedilonum camptocentrum Rauschert in *Repert. Sp. Nov.* 94: 458. 1983.

Pedilonum platygastrum Rauschert in *Repert. Sp. Nov.* 94: 462. 1983.

Epiphytic, erect plants to 30 cm. tall, the rhizome much abbreviated, the stems closely spaced, pseudobulbous, oblanceolate-spathulate, prominently flattened, 10–25 cm. long, 1.8–3.5 cm. broad, 0.3–0.6 cm. thick, 6–12 nodes long, 3–6-foolate distally, the internodes 1–2.5 cm. long, yellowing with age; leaves ascending, articulate, the sheaths transversely subdeltoid, conduplicate, 1.2–2.5 cm. long, 2.5–3.5 cm. broad, membranous, the blades lanceolate- to elliptic-oblong, 6–12 cm. long, 2–3.5 cm. broad, subcoriaceous, gradually angustate at base, obliquely acute at apex; inflorescences pseudoterminal or axillary from subapical nodes, erect, racemose, to 4 cm. long, the peduncle slender, terete, to 2 cm. long, the rachis weakly fractiflex, slightly shorter than peduncle, laxly 2–4-flowered, the bracts small, ovate, 2–3 mm. long; flowers ascending, nonresupinate, pure white or white tinged with pink, frequently becoming somewhat purple with age; median sepal erect, ovate to elliptic-ovate, 12–15.5 mm. long, about 6.8 mm. broad, acute at apex; lateral sepals weakly spreading, obliquely ovate, 10–15.5 mm. long, 7–9 mm. broad, acute at apex; mentum slightly retrorse, straight or distally a little inflexed, narrowly conical, 12–15 mm. long, obtuse at tip; petals erect, oblong-obovate, slightly oblique, 10–14 mm. long, about 6.5 mm. broad, broadly subacute to obtuse at apex; labellum adnate to column foot, immobile, arcuate, unguiculate, entire, 16–23 mm. long overall, the claw ligulate, 7–10 mm. long, 2.5–3 mm. broad, weakly channelled distally, the blade broadly subrhombic, 9–13 mm. long, 12–16 mm. broad, weakly undulate on anterior margins, broadly acute at apex, the disk with 5 parallel, slightly raised, weakly undulate carinae near base of blade; column about 3 mm. long; column foot 13–16 mm. long; clinandrium very deeply excavate, 3-lobed at margin, the lateral lobes large, semicircular, irregularly denticulate at tips, the medial lobe much smaller, incurved, deltoid; anther subquadrate-cucullate, about 2.5 mm. long and 2.1 mm. broad, somewhat flattened dorsally, weakly trilobulate at apex; pollinia oblong-ovoid, about 1.3 mm. long and 0.3 mm. broad; rostellum vestigial; stigma large, transverse; ovary manifestly pedicellate, clavate, 1.3–1.8 cm. long overall, semiterete, weakly 6-ribbed, glabrous.

TIPIFICATION AND NOMENCLATURE: The type of *Dendrobium platygastrum* is *U. S. Expl. Exped.* (w 23363) HOLOTYPE; putative ISOTYPES at AMES 4744, 4745), collected in 1840 at Mbua Bay, Mbua Province, Vanua Levu. *Dendrobium camptocentrum* is based on *Schlechter s. n.* (B HOLOTYPE, probably destroyed), obtained in January, 1902, near Ou-Hinna, New Caledonia. Although isotypes of the latter taxon have not been located, Hallé (1977) was aware of the resemblance of the two taxa, which indeed do not seem separable (Kores, 1989). The species is not closely related to *D. goldfinchii* F. v. Muell., with which it has been confused in some of the literature, no doubt because Kraenzlin's (1910) illustration of that species indubitably represents *D. platygastrum*.

DISTRIBUTION: Solomon and Santa Cruz Islands to New Caledonia, the New Hebrides, Fiji, and Tonga. In Fiji it is moderately common, now known from more

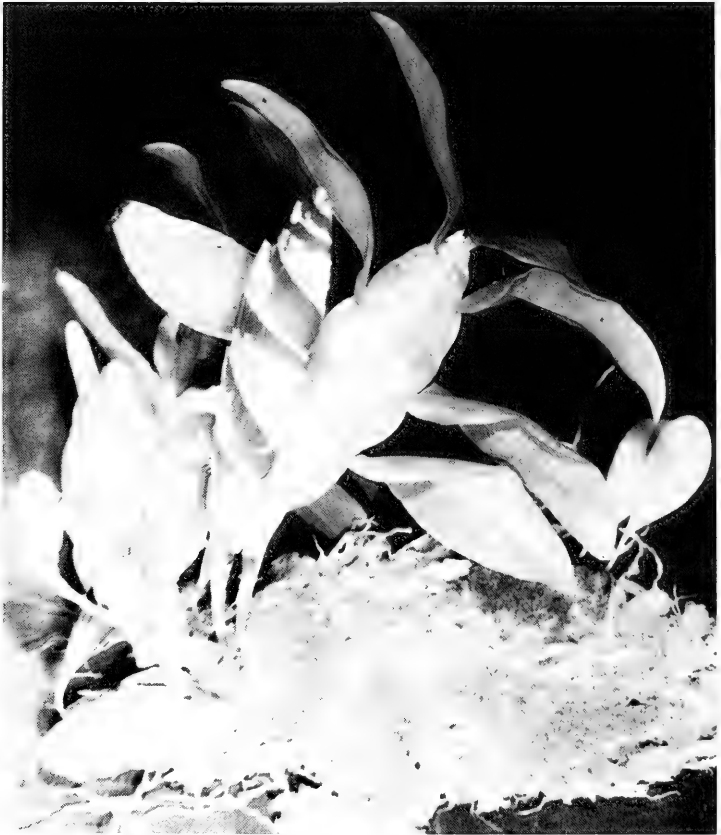


FIGURE 50. Mature plant in vegetative condition of *Dendrobium platygastrum*, collected May 22, 1989, along King's Road north of Nausori, Tailevu Province, Viti Levu (Kores & Molvray, no voucher retained), \times about 1/5; given to R. H. Phillips for cultivation in Suva.

than 20 collections found in usually dense forest at elevations from near sea level to about 600 m. Flowers have been obtained between May and January, fruits only between April and June.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 600B*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4472*. NAMOSI: Wainandoi River Valley, *Vaughan 3328*. NAITASIRI: Vicinity of Nasinu, *Gillespie 3634*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7210*; Copper Mine, Wainivesi River, *DA 15849*; forestry road near Naimasimasi, *Jonsson 2379*. REWA: Mt. Korombamba, *DA 11959*. OVALAU: Hills west of Lovoni Valley, on ridge south

of Mt. Korolevu, *Smith 7657*; hills near Levuka, *im Thurn 335*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7829*. VANUA LEVU: MATHUATA: Mathuata coast, *Greenwood 600A*; summit ridge of Mt. Numbuloa, east of Lambasa, *Smith 6425*. THAKAUDROVE: Uluinambathi Mt., vicinity of Savasavu, *Degener & Ordenez 13940*; Maravu, near Salt Lake, *Degener & Ordenez 14151*.

A representative of subgen. *Dendrobium* sect. *Platybulbon*, *D. platygastrum* is the only member of that section to occur in Fiji. It is related to but quite distinct from several species ranging from tropical Asia to New Guinea and New Ireland (Kores, 1989).

5. *Dendrobium purpureum* Roxb. Fl. Ind. ed. 2. 3:484. 1832; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 132. 1910; Ames in J. Arnold Arb. 14: 109. 1933; Backer & Bakh. f. Fl. Java 3: 367. 1968; Kores in Allertonia 5: 82. 1989; Lewis & Cribb, Orch. Vanuatu, 103. fig. 19, A-J, pl. 6, D. 1989.

Dendrobium glossotis Reichenb. f. Otia Bot. Hamb. 55. 1878 (repr. Xenia Orchid. 3: 31. 1881); Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 101. 1910; L. O. Williams in Bot. Mus. Leaflet. 5: 121. 1938; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 381. 1972; Hallé in L'Orchidophile Bull. no. 40. 1481, in obs. 1980.

Dendrobium serratum Rolfe in J. Linn. Soc. Bot. 39: 174. 1909; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 359, as *D. serratum*. 1938; L. O. Williams in Bot. Mus. Leaflet. 5: 124, as *D. serratum*. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33, pl. 5. 1953; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 382. 1972.

Dendrobium secundum sensu H. G. Jones in Philipp. J. Sci. 104: 91. 1975; non Bl.

Pedilium glossotis Rauschert in Repert. Sp. Nov. 94: 460. 1983.

Epiphytic plants to 1 m. long, the rhizome much abbreviated, the stems closely spaced, slightly flexuous, cylindrical, fleshy, 45–90 cm. long, 1.5–2.8 cm. in diameter, many nodes in length, multifoliate, the internodes 1.3–3.8 cm. long, becoming prominently wrinkled with age; leaves distichous, broadly ascending, articulate, the sheaths tubular, the blades lanceolate to oblong-elliptic, 10–15 cm. long, 1.5–2.8 cm. broad, subcoriaceous, cuneate at base, obliquely subacute or briefly and unequally bilobed at apex; inflorescences axillary from distal nodes of older, usually defoliate stems, much abbreviated, racemose, 1.5–2.5 cm. long, the peduncle short, the rachis slender, angular, 0.5–1 cm. long, densely (6–)10–25-flowered, the bracts patent, lanceolate, 4–7 mm. long, 1–1.5 mm. broad, chaffy; flowers ascending, nonresupinate, pure white or white distally pink-tinged or pale pink throughout; medial sepal erect, lanceolate to ovate, 5–7 mm. long, 2–2.5 mm. broad, acute at apex; lateral sepals weakly spreading, obliquely ovate-acuminate, 9–12 mm. long overall, 2–2.5 mm. broad, acute at apex; mentum retrorse, closely appressed to ovary, cylindrical, slightly inflated distally, 3–4 mm. long, obtuse at tip; petals erect, oblanceolate to oblong-oblanceolate, 5–7 mm. long, 1.5–2 mm. broad, acute at apex; labellum adnate to column foot, immobile, erect, unguiculate, entire, 8–10 mm. long overall, the claw ligulate, 2–2.5 mm. long, 1–1.5 mm. broad, weakly channelled, the blade subrhombic, 5.5–7.5 mm. long, 2.5–3 mm. broad, turned upward on lateral margins near base but gradually becoming less so distally and sometimes irregularly serrulate, acute at apex, the disk with a single, retrorsely appressed, thin, lunate callus at apex of claw; column dorsiventrally somewhat flattened, 2–3 mm. long; column foot slender, 3–5 mm. long, slightly incurved distally; clinandrium deeply excavate, broad, the margin 3-lobed, the lateral lobes small, subquadrate, the medial lobe much longer, dactyliform, somewhat incurved distally; anther subreniform-galeate, about 1.2 mm. across, with a short, very broad, truncate rostrum at apex; pollinia subclavate, about 1 mm. long and 0.25 mm. broad; rostellum retrorse, transverse, relatively long, with a large, darkly pigmented, hemispherical boss at base; stigma deeply recessed, oblong, marginate; ovary manifestly pedicellate, clavate, 1–1.3 cm. long overall, 3-angled, prominently 3-winged and alternately 3-ribbed, glabrous.

TYPIIFICATION AND NOMENCLATURE: The basis of *Dendrobium purpureum* is *Angraecum purpureum* H. *silvestre* Rumph. (Herb. Amb. 6: 109. t. 50, fig. 1. 1750), from Amboina. The type of *D. glossotis* is U. S. Expl. Exped. (w 41214 HOLOTYPE; ISOTYPES AT AMES 74436, w 41213), collected in 1840 on Ovalau. Tahiti is also given as the locality of part of this material, but the species is not otherwise known east of Fiji and the attribution is doubtful (Hallé, 1980). *Dendrobium sertatum* is typified by Gibbs 610 (BM HOLOTYPE; ISOTYPE AT K), collected in September, 1907, in the vicinity of Nandarivatu, Mba Province, Viti Levu. The last two of these taxa, when compared with material of *D. purpureum* from the New Hebrides and westward, do not seem maintainable (Kores, 1989).

DISTRIBUTION: Celebes, the Moluccas, New Guinea, Caroline Islands, Solomon Islands, New Hebrides, and Fiji. In Fiji *Dendrobium purpureum* is now known from 22 collections, all from Viti Levu except the type material of *D. glossotis* from Ovalau; it occurs from near sea level to about 1,150 m. in dense or open forest or in ridge and crest thickets. It flowers freely between December and September, but fruits have been obtained only in September.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 314*; Nandendelevu, Mt. Evans Range, *DA 14843*; Mt. Koromba, *DA 14747*; vicinity of Nandarivatu, *Parks 20544A*; Mt. Tomani, *im Thurn 18*; between Navai and Nandrau, *McLoughlin 918* (κ spirit coll. 29231); Monasavu dam site area, *Jonsson 2502*. NANDRONGA & NAVOSA: Yawe, vicinity of Mbelo, near Vatukarasa, *Degener 15285*. SERUA: Ngaloa Nature Reserve, *DA 16596*. NAMOSI: Vicinity of Namosi, *Parks 20210*. VITI LEVU without further locality, *Simmonds s. n.* (κ spirit coll. 20813).

This species and the following are the only species occurring in Fiji representing subgen. *Dendrobium* sect. *Pedilonum*; they are related to a complex of species extending from southeastern Asia to Samoa, but they are well marked and are readily separated from one another as indicated in the above key to species.

6. *Dendrobium catillare* Reichenb. f. in Seem. Fl. Vit. 304. 1868; Horne, A Year in Fiji, 260. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 306. 1892; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 123. 1910; L. O. Williams in Bot. Mus. Leaflet. 5: 120. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 32. 1953; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 381. 1972; Kores in Allertonia 5: 83. 1989. FIGURE 86 (lower left).

Glomera montana Reichenb. f. ex Seem. in Bonplandia 9: 260, p. p., nom. nud. 1861; non Reichenb. f. (1876).

Dendrobium sp. Seem. Viti, 442, p. p. 1862.

Epiphytic plants to 50 cm. long, the rhizome much abbreviated, the stems closely spaced, slender, terete, slightly fleshy, 10–45 cm. long, 0.2–0.5 cm. in diameter, many nodes in length, distally multifoliate, the internodes (0.8–) 1.5–3 cm. long, becoming finely striate with age; leaves broadly ascending, articulate, the sheaths tubular, weakly striate, slightly expanded distally, the blades lanceolate, 3–6 cm. long, 0.4–0.9 cm. broad, subcoriaceous, cuneate at base, acute or sometimes minutely and unequally bilobed at apex; inflorescences axillary from distal nodes of older, often defoliate stems, much abbreviated, racemose, to 1.5 cm. long, the peduncle short, the rachis slender, 0.5–1 cm. long, subdensely 3–6-flowered, the bracts patent, ovate-acuminate, 3–7 mm. long, 1–3.5 mm. broad, chaffy; flowers broadly ascending to patent, non-reupinate, bright pink with the tips of segments white; medial sepal erect, oblong-ovate, 7–10 mm. long, 3–4 mm. broad, subacute to obtuse at apex; lateral sepals weakly spreading, obliquely ovate, 12–14 mm. long, 4–5 mm. broad, acute at apex; mentum retrorse, closely appressed to ovary, cylindrical-obtuse, 5–8 mm. long; petals weakly spreading, elliptic-to oblanceolate-oblong, 7–10 mm. long, 2.5–3.5 mm. broad, obtuse at apex; labellum adnate to column foot, immobile, erect, unguiculate, entire, 14–18

mm. long overall, the claw oblong, 3.5–4.5 mm. long, 2.5–3 mm. broad, weakly channelled, the blade rhombic, 8–10 mm. long, 4.5–6 mm. broad, minutely serrulate on anterior margin, broadly acute at apex, the disk with a small transverse ridge at apex of claw; column stout, semiterete, 2.5–3 mm. long; column foot 5–6 mm. long, somewhat inflexed distally; clinandrium deeply excavate, 3-lobed at margin, the lateral lobes short, broadly rounded, weakly crenulate on anterior margins, the medial lobe much longer, dactyliform, slightly incurved distally; anther ovate-cucullate, about 1.5 mm. across, with a very short, broadly retuse rostrum at apex; pollinia oblong-ellipsoid, 0.6–0.8 mm. long, about 0.2 mm. broad; rostellum retrorse, transverse, relatively long; stigma broadly scutiform; ovary manifestly pedicellate, clavate, 1–1.5 cm. long overall, weakly 4-angled and prominently 6-ribbed, glabrous.

TYPIFICATION: The type of *Dendrobium catillare* is *Seemann 591*, p. p. (w 41203 HOLOTYPE), collected Sept. 6, 1860, on the slopes of Mt. Mbuke Levu, Kandavu. The Seemann number was a mixture, the K sheet representing the very different *D. mohlianum* and probably actually belonging with *Seemann 578*.

DISTRIBUTION: Endemic to Fiji and now known from five islands, occurring in usually dense forest from near sea level to an elevation of 1,240 m., usually toward the higher elevations. Flowers have been noted in months scattered throughout the year, but fruits have been obtained only between November and January.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1160*; summit of Mt. Koroyanu, high point of Mt. Evans Range, *Smith 4174, 4217*; southern slopes of Mt. Ndelainathovu, on escarpment west of Nandarivatu, *Smith 4941*; near summit of Mt. Nanggaranambuluta, *DA 15263*; Mt. Tomanivi, *Melville et al. 7106, Kores & Molvray F20*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5554*. NAMOSI: Korombasambasanga Range, *DA 2165*. NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 5752, 6116*; Tholo-i-suva, *DA, June 5, 1957*. VANUA LEVU: THAKAUNDRÖVE-MATHUATA boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith 524*. TAVEUNI: Hills east of Somosomo, east of old crater occupied by swamp and lake, *Smith 8400*; borders of lake east of Somosomo, *Smith 871*; summit and adjacent slopes of Mt. Manuka, east of Wairiki, *Smith 8215*, p. p. majore (mixed with *D. mohlianum*); trail east of Wairiki, *Jonsson 2417*; summit of Mt. Uluingalau, *Smith 905*. YATHATA: Navakathuru, *DA 16194*.

7. *Dendrobium mohlianum* Reichenb. f. in Mohl & Schlechtendal in Bot. Zeitung **20**: 214. 1862, in Bonplandia **10**: 334. t. 16. 1862; Seem. Viti, **442**. 1862; Reichenb. f. in Seem. Fl. Vit. 303. t. 91. 1868; Horne, A Year in Fiji, 260. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; Kraenzl. in Bot. Jahrb. **25**: 604. 1898; Rolfe in J. Linn. Soc. Bot. **39**: 174. 1909; Kraenzl. in Pflanzenz. **45** (IV. 50. II. B. 21): 114, p. p. fig. 8, A–E. 1910; Schlechter in Repert. Sp. Nov. Beih. **1**: 511, in obs. 1912; Ames in J. Arnold Arb. **14**: 107. 1933; L. O. Williams in Bot. Mus. Leaflet. **5**: 122. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 32. pl. 2. 1953; J. W. Parham, Pl. Fiji Isl. **287**. fig. 102. 1964, ed. 2. 381. 1972; Whistler in Bull. Pacific Trop. Bot. Gard. **9**: 37. fig. 1979; Wood in Kew Bull. **41**: 815, in obs. 1986; Kores in Allertonia **5**: 84. 1989. Lewis & Cribb, Orch. Vanuatu, 107. pl. 6, C. 1989.

FIGURE 86 (lower right).

Dendrobium sp. nov. Seem. in Bonplandia **9**: 259. 1861; Horne, A Year in Fiji, 260. 1881.
Glomera montana Reichenb. f. ex Seem. in Bonplandia **9**: 260, p. p., nom. nud. 1861; non Reichenb. f. (1876).

Dendrobium sp. Seem. Viti, **442**, p. p. 1862.

Dendrobium neo-ebudatum Schlechter in Bull. Herb. Boissier II. **6**: 456. 1906.

Pedilonum neoebudatum Rauschert in Repert. Sp. Nov. **94**: 461. 1983.

Epiphytic plants to 70 cm. long, the rhizome much abbreviated, the stems closely spaced, straight or weakly flexuous, slender, terete, slightly fleshy, 25–40 (–65) cm. long, 0.2–0.6 cm. in diameter, many nodes in length, distally multifoliate, the inter-

nodes (0.9-) 1.3-3.5 cm. long, becoming many-ribbed with age; leaves broadly ascending, articulate, the sheaths tubular, usually rather prominently expanded distally, often reduced to stiff fibers with age, the blades lanceolate to elliptic-lanceolate, 5-11 cm. long, 1-2.4 cm. broad, subcoriaceous, cuneate at base, subacute to acute at apex; inflorescences axillary from distal nodes of older defoliate stems, short, racemose, to 4.5 cm. long, the peduncle slender, terete, 0.3-2 cm. long, the rachis slender, slightly angular, 0.8-3 cm. long, subdensely 3-8-flowered, the bracts patent, ovate, 5-13 mm. long, 2-6 mm. broad, chaffy; flowers ascending, resupinate, bright orange to reddish orange or rarely yellow; dorsal sepal erect, oblong-obovate, 8-10 mm. long, 3-4 mm. broad, subacute to obtuse at apex; lateral sepals weakly spreading, obliquely ovate, 15-23 mm. long, 6-7 mm. broad, subacute at apex; mentum retrorse, narrowly conical, 10-16 mm. long, subacute at tip; petals weakly spreading, oblanceolate to oblong-ob lanceolate, 8-10 mm. long, 3.5-4 mm. broad, obtuse at apex; labellum adnate to column foot, immobile, erect, unguiculate, entire, 14-16 mm. long overall, 6-8 mm. broad when flattened, the claw narrowly attenuate, channelled, the blade obovate-calyptrate, prominently incurved and irregularly serrate-fimbriate on anterior margin, broadly rounded at apex, the disk naked; column short, semiterete, 3-4 mm. long, prominently winged distally; column foot well developed, slender, 10-16 mm. long, slightly incurved distally; clinandrium relatively shallowly excavate, broad, the margin 3-lobed, the lateral lobes short, broadly rounded, somewhat dentate on anterior margins, the medial lobe much longer, dactyliform, inflexed distally; anther transversely obovate-cucullate, about 2 mm. across, broadly retuse at apex; pollinia oblong-obovoid, 1.5-1.75 mm. long, 0.2-0.4 mm. broad; rostellum retroflex, transverse, broadly retuse at apex; stigma elliptic; ovary manifestly pedicellate, clavate, 1.3-2.5 cm. long overall, terete, weakly 6-ribbed, glabrous.

TYPIIFICATION AND NOMENCLATURE: *Dendrobium mohlianum* is based on *Seemann* 578 (w 41230 HOLOTYPE; ISOTYPES at BM, K, P; photo of holotype at AMES), a mixture (now impossible to separate) from two localities: (1) Mt. Voma, Namosi Province, Viti Levu, collected Aug. 24, 1860, and (2) Mt. Mbuke Levu, Kandavu, collected Sept. 6, 1860. For *D. neo-ebudanum* three isosyntypes have been seen, all collected in the New Hebrides by Morrison in June and August, 1896: (1) *Morrison s. n.* (AMES, K) and (2) *Morrison s. n.* (AMES, K) from Aneityum, and (3) *Morrison s. n.* (AMES, K) from Eromanga. The synonymy was verified by Kraenzlin (1910) and Ames (1933).

DISTRIBUTION: Solomon Islands, New Hebrides, Fiji, and Samoa. In Fiji *Dendrobium mohlianum* is striking and abundant, especially toward the higher elevations, between 300 and about 1,300 m. in dense forest especially on crests and ridges. About 50 Fijian collections have been examined from six islands. Flowers have been observed in most months, fruits between March and September.

LOCAL NAME: *Tokai lailai* (Mba).

REPRESENTATIVE COLLECTIONS: VITI LEVU: Mba; Mt. Evans Range, *Greenwood* 113; summit of Mt. Koroyanitu, high point of Mt. Evans Range, *Smith* 4218; vicinity of Nandarivatu, *Gibbs* 620; summit of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith* 4864; upper slopes of Mt. Tomanivi, *im Thurn* 372, *Webster & Hildreth* 14185, *Kores & Molvray* F22. NAMOSI: Summit of Mt. Naitarandamu, *Gillespie* 3298; near summit of Mt. Voma, *Gillespie* 2783b; Mt. Vakarongasiu, *Gillespie* 3276. NAITASIRE: Taunaisali, Wainisavulevu-Numbulolo divide, central plateau, *St. John* 18371. KANDAVU: Mt. Mbuke Levu, *Seemann* 591, p. p. (K), *im Thurn* 8, *Smith* 269. OVALAU: Summit of Mt. Ndelaiovalau and adjacent ridge, *Smith* 7365. NGAU: *Jonsson* 2472. VANUA LEVU: Mba; Navotuvotu, summit of Mt. Seatara, *Smith* 1650. MATHUATA: Mt. Ndelaikoro, *DA* 12800. THAKAUNDOVE: Mt. Kasi, Yanawai River region, *Smith* 1766; summit of Mt. Mbatini, *Smith* 703; Mt. Uluingala, Natewa Peninsula, *Smith* 1995. TAVEUNI: Edges of lake east of Somosomo, *DA* 12408; valley between Mt. Manuka and main ridge of island, east of Wairiki, *Smith* 8288. FIJI without further locality, *U. S. Expl. Exped., Horne* 793.

This very distinct species is the only representative of subgen. *Dendrobium* sect. *Calyptrochilus* to occur in Fiji.

8. *Dendrobium prasinum* Lindl. in J. Linn. Soc. Bot. 3: 11. 1859; Reichenb. f. in Seem. Fl. Vit. 304, quoad icones Agat. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 307, quoad icones Agat. 1892; Rolfe in J. Linn. Soc. Bot. 39: 174. 1909; L. O. Williams in Bot. Mus. Leaflet 5: 123. 1938; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 382. 1972; T. M. Reeve & P. J. B. Woods in Orchadian 6: 206. 1980; Kores in Allertonia 5: 85. 1989.

Eria sp. aff. *E. baccatae* Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Sarcopodium prasinum Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 322. 1910.

Katherinea prasina A. D. Hawkes in Lloydia 19: 97. 1956.

Small, erect, caespitose, epiphytic plants 5–12 cm. tall, the rhizome much abbreviated, the stems reduced, pseudobulbous, short, ovoid or flask-shaped, 1–4 cm. long, 0.5–1.3 cm. in diameter, 2 or 3 nodes long, initially completely surrounded by fibrous cataphylls, gradually becoming exposed with age, commonly bifoliate at apex; leaves erect or ascending, articulate, the sheaths tubular-complanate, hardly or not expanded distally, the blades ligulate, 2.5–14 cm. long, 0.5–1.4 cm. broad, subcoriaceous, gradually angustate at base, minutely cuspidate at apex; inflorescences borne at upper nodes of older and usually defoliate pseudobulbs, much abbreviated, racemose, (1 or) 2- or 3-flowered, the bracts amplexant, broadly ovate, 5–10 mm. long, 4–10 mm. broad, chaffy; flowers erect, nonresupinate, the perianth pale greenish white to cream-colored, sometimes tinged with darker green or yellow distally, the column dark green with the distal portion greenish white; medial sepal weakly spreading, elliptic-ovate, 13.5–16 mm. long, 5.5–7 mm. broad, narrowly acute at apex; lateral sepals weakly spreading, obliquely oblong-ovate, 20–23 mm. long, 7–8 mm. broad, slightly carinate distally, acuminate at apex; mentum retrorse, closely appressed to ovary, narrowly conical, 7–10 mm. long, somewhat constricted distally, obtuse at tip; petals erect, obovate, 13–16 mm. long, 6–7 mm. broad, abruptly acute at apex; labellum adnate to column foot, immobile, erect, unguiculate, entire, 17–20 mm. long overall, the claw oblong, 3–4 mm. long, about 2.5 mm. broad, slightly saccate at base, the blade partially separated from claw by a transverse invagination, obovate, channelled, 14–16 mm. long, 6.5–7.5 mm. broad, slightly convolute and minutely papillate distally on lateral margins, abruptly acuminate at apex, the disk with a small, retroflex, transverse crest at base of blade; column semiterete, about 4 mm. long, prominently winged distally; column foot broad, 6.5–9.5 mm. long; clinandrium very deeply excavate, broad, 3-lobed at margin, the lateral lobes large, broadly rounded, the medial lobe slightly longer, dactyliform, inflexed distally; anther subreniform-cucullate, 2–2.5 mm. across, broadly retuse or truncate at apex; pollinia oblong-obovoid, about 1.5 mm. long and 0.4 mm. broad; rostellum retroflex, transverse, broadly retuse at apex; stigma elliptic; ovary pedicellate, clavate, 1–1.8 cm. long overall, distinctly 3-angled in cross section and broadly 6-ribbed, glabrous.

TYPIFICATION: In describing *Dendrobium prasinum*, Lindley had available only two watercolor illustrations made by A. T. Agate, apparently lent to him by Gray; these illustrations alone are best taken as the holotype (Kores, 1989). The drawings are now attached to *U. S. Expl. Exped.* (AMES 74551), and one of them is labeled "Mathuata mountains, alt. 2000 ft., June 24, 1840." The type locality of this voucher specimen is assumed to be the Mathuata Range, Mathuata Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and known from five islands, occurring at elevations of 600–1,150 m. in dense or open forest or on forested ridges. The specimen from Yathata, cited below, was recorded as from a coconut plantation and had most probably been taken there from a higher elevation on one of the other islands. In fact, several orchids collected on Yathata, an island of the Lau Group southeast of Taveuni, are not to be expected from Lau, at least not from coconut-growing areas (although the

center of Yathata has an elevation of about 256 m.). Flowers have been obtained between April and September.

LOCAL NAME: *Kambaleka* (Mba).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 429a, 429b*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4170*; upper slopes of Mt. Koromba, *Smith 4677, DA 14740*; Koro-O road, west of Nandarivatu, *DA 13520*; vicinity of Nandarivatu, *Gibbs 663, Parks 20639, DA 3213* (coll. *Vaughan*), *Degener 14879*; western and southern slopes of Mt. Tomanivi, *Smith 5232*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5494*. KANDAVU: Mt. Mbuke Levu, *Seemann 597*. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *DA 12867*. THAKAUNDROVE: Eastern slope of Mt. Ndikeya, *Smith 1901*. TAVEUNI: Hills east of and borders of crater lake east of Somosomo, *Smith 8397, DA 2568, 12422*. YATHATA: Navakathuru, *DA 16195*.

This species is one of three representatives of subgen. *Dendrobium* sect. *Oxyglossum* known to occur in Fiji; it is readily distinguished from the other two representatives of the section by its larger size, ligulate leaf blades, and pale greenish white or cream-colored flowers.

9. *Dendrobium masarangense* Schlechter in Repert. Sp. Nov. 10: 78. 1911, in Repert. Sp. Nov. Beih. 1: 526, in obs. 1912, in op. cit. 74: t. 32, fig. 128. 1934; T. M. Reeve & P. J. B. Woods in Orchadian 6: 199. 1980; Kores in Allertonia 5: 86. 1989; Lewis & Cribb, Orch. Vanuatu, 110. fig. 21, K-T. 1989. FIGURE 51.

Dendrobium pumilio Schlechter in Repert. Sp. Nov. Beih. 1: 527. 1912, in op. cit. 21: t. 78, no. 666. 1925.

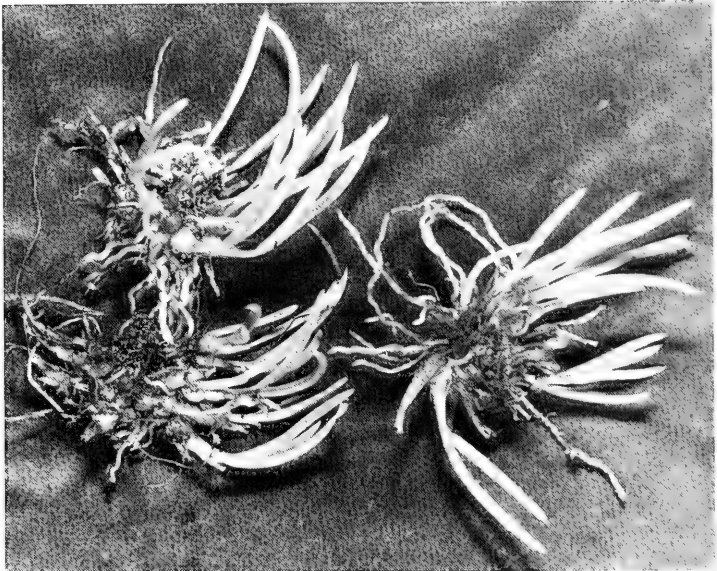


FIGURE 51. Mature plants of *Dendrobium masarangense*, collected for cultivation near Monasavu Reservoir, Viti Levu (*R. H. Phillips*, no voucher retained), about life-size.

Erect, very small, caespitose, epiphytic plants 2.5–5 cm. tall, the rhizome much abbreviated, the stems reduced, pseudobulbous, short, cylindrical-obclavate, 0.4–1.5 cm. long, 0.2–0.35 cm. in diameter, 1–3 nodes in length, initially completely surrounded by thin cataphylls, gradually becoming exposed with age, 1- or 2-foliolate at apex; leaves erect, articulate, the sheaths tubular-complanate, not expanded distally, the blades linear, 1–5.5 cm. long, 0.07–0.2 cm. broad, subcoriaceous, continuous with sheath at base, narrowly attenuate at apex; inflorescences borne at upper nodes of older and usually defoliate pseudobulbs, much abbreviated, racemose, (1 or) 2-flowered, the bracts small, lanceolate-acuminate, chaffy; flowers erect, nonresupinate, the sepals and petals white, the labellum white with the apex suffused with orange or golden-yellow; medial sepal weakly spreading, ovate, 5–9 mm. long, 2.2–2.8 mm. broad, narrowly acute at apex; lateral sepals erect, obliquely lanceolate-acuminate, 9–16 mm. long, 2–2.5 mm. broad, narrowly acuminate at apex; mentum retrorse, narrowly cylindrical-conical, 4.5–7.5 mm. long, slightly incurved distally, subacute at tip; petals erect, linear-oblancheolate, slightly oblique, 4–6.5 mm. long, about 1 mm. broad, acute at apex; labellum adnate to column foot, immobile, entire, erect, ligulate-oblancheolate, 7–12 mm. long, 1.5–2 mm. broad, slightly channelled, narrowly acute at apex, the disk naked; column short, semiterete; column foot slender, 4.3–7.3 mm. long; clinandrium deeply excavate, broad, weakly 3-lobed at margin, the lateral lobes short, broadly rounded to truncate, the medial lobe much longer, dactyliform; anther subquadrate, broadly rounded at apex; pollinia oblong-obovoid; rostellum retroflex, transverse, broadly retuse at apex; stigma large, transverse; ovary pedicellate, clavate, about 1 cm. long overall, prominently 5-ribbed or weakly 5-winged in cross section, glabrous.

TYPIFICATION AND NOMENCLATURE: *Dendrobium masarangense* is based on *Schlechter 20473* (B HOLOTYPE, destroyed), collected in November, 1909, at Gunong Masarang, Minahassa Peninsula, Celebes. *Dendrobium pumilio* has as syntypes four collections from New Guinea collected by Schlechter, but all the actual syntypes at B seem to have been destroyed: *Schlechter 20267, 16545* (ISOSYNTYPES at E, K, L), *17998* (ISOSYNTYPES at E, K, L), and *19165* (detailed localities in Kores, 1989). Schlechter's two taxa were combined by Reeve and Woods (1980).

DISTRIBUTION: Celebes, New Guinea, Solomon Islands, New Hebrides, and Fiji. Its presence in Fiji was noted by P. J. B. Woods (pers. comm.) on the basis of a living plant and is since verified by two collections which, although sterile, seem definitely to belong to this very distinctive species of subgen. *Dendrobium* sect. *Oxyglossum*.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Without detailed locality, *Hassall s. n.*, Sept., 1981 (K). NAITASIRI: Forest along edge of Monasavu Reservoir near dam site, *R. H. Phillips*, April 19, 1989.

10. *Dendrobium spathulatum* L. O. Williams in Bot. Mus. Leaflet 5: 124. fig. 1–5. 1938; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 382. 1972; Cribb in Kew Bull. 37: 586. fig. 1, A. 1983, in op. cit. 41: 687. fig. 19, A–C. 1985; Kores in Allertonia 5: 87. 1989.

FIGURE 52A & B.

Erect epiphytic plants to 70 cm. tall, the rhizome short, the stems closely spaced, terete or slightly complanate, fleshy, to 50 cm. long, about 1 cm. in diameter, many nodes in length, distally plurifoliolate, the internodes 1–5 cm. long, many-ribbed; leaves ascending to patent, articulate, the sheaths tubular, the blades elliptic-oblong, 7–9 cm. long, 2.5–3.5 cm. broad, coriaceous, cuneate at base, unequally and obtusely bilobed at apex; inflorescences axillary from distal nodes, erect or ascending, racemose, to 25 cm. long, the peduncle well developed, terete, the rachis about the same length as peduncle, slender, terete, subdensely 10–20-flowered, the bracts narrowly ovate, 2–3 mm. long, obtuse at apex; flowers more or less patent, resupinate, the outer perianth segments mustard-yellow with the inner surfaces brown-tinged, the labellum somewhat purplish at apex of mentum, the midlobe whitish yellow with faint red veins; dorsal sepal

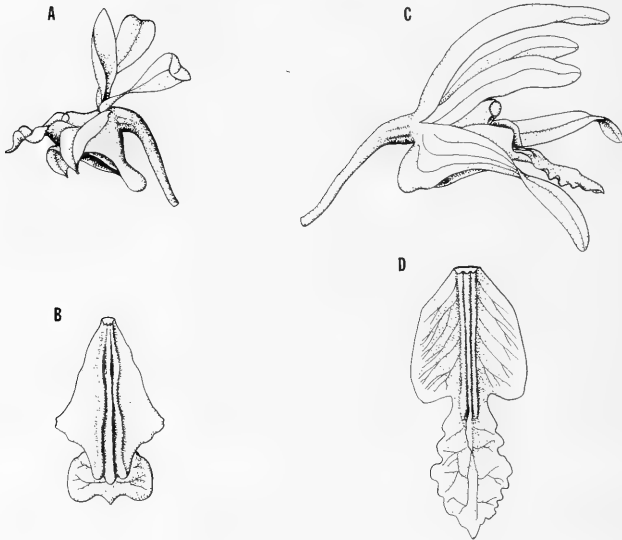


FIGURE 52. A & B, *Dendrobium spathulatum*; A, complete flower, $\times 1\ 1/2$; B, labellum, $\times 2$. C & D, *Dendrobium tokai*; C, complete flower, $\times 1\ 1/2$; D, labellum, partially flattened, $\times 2$. A & B from *Simmonds s. n.* (κ spirit 18041), C & D from *Seemann 584*.

broadly spreading, oblong-elliptic, 10–15 (–20) mm. long, 5–7 mm. broad, obtuse but with a minute acumen at apex; lateral sepals more or less patent, oblong, 14–20 mm. long, 5–7 mm. broad, obtuse at apex; mentum retrorse, narrowly conical, about 5 mm. long, obtuse at tip; petals broadly spreading, narrowly oblong-spathulate, 12–21 mm. long, 4–5 mm. broad, obtuse or minutely apiculate at apex; labellum adnate to column foot, immobile, erect, 3-lobed, more or less broadly elliptic-obovate in outline, 14–20 mm. long overall, about 11–12 mm. broad, the base cuneate, the lateral lobes turned upward, transversely narrowly subdeltoid, 3–4 mm. long, 8–14 mm. broad, the mid-lobe porrect, transversely oblong-ovate, 4–6 mm. long, 6–7 mm. broad, broadly obtuse or slightly retuse and minutely apiculate at apex, the disk with a single callus extending from base of labellum to lower portion of midlobe, the callus obscurely 3-ribbed on upper margin, gradually becoming rather prominently raised distally and ending abruptly; column stout, semiterete, about 4 mm. long; column foot slender, about 4 mm. long; clinandrium relatively broad, deeply excavate, weakly 3-lobed at margin, the lateral lobes short, serrulate, the dorsal lobe somewhat longer, dactyliform, slightly inflexed distally; anther and pollinarium not seen; rostellum retroflex, transverse; stigma transverse; ovary manifestly pedicellate, clavate, 2.2–3.2 cm. long overall, weakly 6-ribbed, glabrous.

TYPIFICATION: The type is *Gillespie 2145* (AMES 47527 HOLOTYPE), collected Aug. 8, 1927, near Tamavua, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from southeastern Viti Levu at elevations presumably of less than 150 m. Flowers have been observed in January, May, and August.



FIGURE 53. Flowering plant of *Dendrobium tokai* in cultivation in Suva, Rewa Province, Viti Levu (Kores & Molvray Fl), \times about 1/8.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Wainandoi River, DA L.8883 (coll. Simmonds) (K). REWA: Suva (probably cultivated), Simmonds s. n. (K spirit coll. 18041).

This species and the two following represent subgen. *Dendrobium* sect. *Spathulata* in Fiji; they are readily distinguished from one another by perianth and labellum characters as noted in the above key to species. Although *D. spathulatum* is represented by only three collections, the species is apparently more common than this would suggest. While in Fiji in 1989 I had an opportunity to visit three local orchid growers, and *D. spathulatum* was represented in two of their collections; I was told by one of the growers that the species is locally abundant in some areas of Viti Levu.

11. *Dendrobium tokai* Reichenb. f. ex Seem. Viti, 442, nom. nud. 1862, in *Hamburger Garten-Blumenzeitung* 21: 293. 1865, in Seem. Fl. Vit. 304. t. 92. 1868; Horne, A Year in Fiji, 260. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; Kraenzl. in *Pflanzenr.* 45 (IV. 50. II. B. 21): 242, p. p. 1910; L. O. Williams in *Bot. Mus. Leafl.* 5: 129, quoad spec. vit. 1938; J. W. Parham, Pl. Fiji Isl. 289. fig. 103. 1964, ed. 2. 382. 1972; St. John in *Phytologia* 36: 381. 1977; Cribb in *Kew Bull.* 37: 588. fig. 1, D, E. 1983, in op. cit. 41: 688. fig. 18, K. 1985; Kores in *Allertonia* 5: 87. 1989.

FIGURES 52C & D, 53, 88 (upper).

Dendrobium sp. vulgo "Tokai" Seem. in *Bonplandia* 9: 259. 1861.

Grastidium tokai Rauschert in *Repert. Sp. Nov.* 94: 453. 1983.

Erect, epiphytic or rarely lithophytic plants to 80 cm. tall, the rhizome short, the stems closely spaced, cylindrical, fleshy, 40–70 cm. long, 0.8–1.7 cm. in diameter, many nodes in length, distally plurifoliate, the internodes 2.2–5 cm. long, many-ribbed; leaves ascending, articulate, the sheaths tubular, the blades narrowly oblong to nar-

rowly elliptic-ovate, 8.5–15 cm. long, 2.3–5 cm. broad, coriaceous, cuneate at base, unequally and obtusely bilobed at apex; inflorescences borne from upper nodes, suberect, to 30 cm. long, the peduncle well developed, terete, to 15 cm. long, the rachis usually a little shorter than peduncle, subdensely to densely 8–20-flowered, the bracts small, deltoid, 1.5–3 mm. long, 1–2 mm. broad, chaffy; flowers weakly ascending, resupinate, greenish yellow to yellow with reddish purple markings on labellum; dorsal sepal weakly spreading, linear-lanceolate, 31–38 mm. long, about 5 mm. broad, acute at apex; lateral sepals weakly spreading, obliquely linear-lanceolate, 32–40 mm. long, 5–6 mm. broad, acute at apex; mentum slightly inclined retrorsely, conical, 7–8 mm. long, subacute at tip; petals erect, linear-oblancoate, 32–40 mm. long, 4–5.5 mm. broad, acute or briefly apiculate at apex; labellum adnate to column foot, immobile, porrect, 3-lobed, 26–32 mm. long overall, the lateral lobes turned upward, obliquely oblong, 13–17 mm. long, 4–5.5 mm. broad, broadly rounded at apex, the midlobe broadly elliptic to obovate-elliptic, 15–18 mm. long, 10–13 mm. broad, broadly acute or abruptly acuminate at apex, the disk with a single longitudinal callus extending from base of labellum to lower half of midlobe, the callus with the upper margin tricarinate, the central carina gradually becoming slightly more raised than the 2 lateral ones at apex; column semiterete, 3–4 mm. long; column foot slender, 6.5–7.5 mm. long; clinandrium deeply excavate, broad, weakly 3-lobed at margin, the lateral lobes short, broadly truncate and irregularly denticulate at tips, the medial lobe much longer, narrowly deltoid; anther transversely elliptic-galeate, about 2 mm. long and 4 mm. broad, broadly rounded to truncate at apex; pollinia obliquely clavate, about 2 mm. long and 0.3 mm. broad; rostellum retroflex, transversely oblong; stigma subquadrate; ovary manifestly pedicellate, clavate, 2.2–4.2 cm. long, terete, broadly 3-ribbed, glabrous.

LECTOTYPIFICATION: The type (Kores, 1989) is *Seemann 584* (w 49093 LECTOTYPE; ISOLECTOTYPES at AMES 74609, BM, K, P), collected in 1860 on Ovalau. A paratype is *Graeffe s. n.* (w), from Viti Levu.

DISTRIBUTION: Fiji and Tonga. From Fiji about 25 collections are at hand, but the species is conspicuous and locally abundant in dense or open forest from near sea level to about 800 m. (more frequently at lower elevations); it is sometimes brought into local cultivation. Flowers and fruits appear most abundant between April and September.

LOCAL NAMES: The species is widely known as *tokai*; more locally applied names are *vandavanda* and *viavia ni ndelana* (Yasawas), *tokau* (Ra), and *latoka* (Ovalau).

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Naruarua Gulch, west side of Mbatinaremba, *St. John 18051*. VITI LEVU: MBA: Vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4467*; slopes of escarpment north of Nandarivatu, *Smith 6285*. RA: Waindawa, vicinity of Rewasa, near Vaileka, *Degener 15467*. NAITASIRI: Viria, *Meebold 16801*; north of Suva, *Bryan 219*. TAILEVU: *Vaughan 3442*. REWA: Suva, *im Thurn s. n.*, *Kores & Molvray F1* (cultivated). OVALAU: Hills southeast of valley of Mbureta River, *Smith 7415*. NGAU: Hills east of Herald Bay, on slopes of Mt. Vonda and toward Waikama, *Smith 7985*. VANUA LEVU: MBUA: Upper Ndama River Valley, *Smith 1698*. MATHUATA: Mathuata coast, *Greenwood 599*. THAKAUNDROVE: Savusavu Bay region, *Degener & Ordonez 13816*; Namale, in garden, *DA 16855*. TAVEUNI: Somosomo, *U. S. Expl. Exped.* (AMES 74610, 74611, US 37912, w 49091). VANUA MBALAVU: Northern limestone section, *Smith 1465*. ONGEA NDRIKI: *Bryan 396*.

12. *Dendrobium hornei* Horne, *A Year in Fiji*, 260, nom. nud. 1881; S. Moore in *J. Linn. Soc. Bot.* **20**: 373. 1883; Kraenzl. in *Pflanzenr.* **45** (IV. 50. II. B. 21): 243. 1910; L. O. Williams in *Bot. Mus. Leafl.* **5**: 122. 1938; J. W. Parham, *Pl. Fiji Isl.* **287**. 1964, ed. 2. 381. 1972; Cribb in *Kew Bull.* **37**: 581. 1983, in op. cit. **41**: 680. 1985; Kores in *Allertonia* **5**: 88. 1989.

Erect epiphytic plants about 45 cm. tall, the rhizome short, the stems closely spaced, cylindrical, fleshy, about 35 cm. long, many nodes in length, slightly swollen at base, distally plurifoliate, the internodes many-ribbed; leaves ascending, articulate, the

sheaths tubular, to 3.1 cm. long, the blades narrowly oblong, 7.5–10.3 cm. long, 1.7–2 cm. broad, coriaceous, cuneate at base, unequally and obtusely bilobed at apex; inflorescences borne from upper nodes, erect or ascending, racemose, to 25 cm. long, the peduncle well developed, terete, the rachis slender, about 9-flowered, the bracts small, subdeltoid, about 1.5 mm. long, chaffy; flowers weakly ascending, resupinate, probably greenish white or yellow (but color not recorded); dorsal sepal weakly spreading, narrowly oblong, about 23 mm. long and 5 mm. broad, subacute at apex; lateral sepals weakly spreading, narrowly oblong, somewhat oblique, about 23 mm. long and 6 mm. broad, acute at apex; mentum perpendicular or slightly inclined anteriorly, subconical, about 5 mm. long, obtuse at tip; petals weakly spreading, linear-ligulate, slightly oblique, about 22 mm. long and 4 mm. broad, acute at apex; labellum adnate to column foot, immobile, porrect, weakly 3-lobed, about 22 mm. long and 10 mm. broad, the lateral lobes obscure, about 1/4 the length of labellum, the midlobe elliptic-obovate, about 13 mm. long and 8 mm. broad, weakly undulate distally on lateral margins, acute at apex, the disk with a single longitudinal callus extending from base of labellum to proximal portion of midlobe, the callus weakly tricarinate on upper margin, the carinae not noticeably raised at apex; column semiterete, about 5 mm. long; column foot not seen; clinandrium denticulate at margin; anther, pollinia, rostellum, and stigma not seen; ovary pedicellate, clavate, about 2 cm. long overall, glabrous.

TYPEFICTION: The type is *Horne s. n.* (K HOLOTYPE), collected in April, 1878, on trees near seashore, Rambi Island.

DISTRIBUTION: Endemic to Fiji and known only from the holotype.

Unfortunately Horne's collection has its few remaining flowers badly damaged by insects, in spite of which (Cribb, 1985) it is readily distinguished from its two allies in Fiji of subgen. *Dendrobium* sect. *Spatulata*, probably being most closely related to *D. samoense* Cribb.

13. ***Dendrobium vitiense*** Rolfe in Kew Bull. 1921: 56. 1921; L. O. Williams in Bot. Mus. Leaf. 5: 129. 1938; J. W. Parham, Pl. Fiji Isl. 289. 1964, ed. 2. 382. 1972; Kores in Allertonia 5: 89. 1989. FIGURE 54.

Erect epiphytic plants 15–25 cm. tall, the rhizome slightly elongated, creeping, the stems a little distant from one another, cylindric or narrowly cylindric-clavate, fleshy, (5.5–) 9–20 cm. long, 0.4–0.8 cm. in diameter, several nodes in length, distally 3–5-foliolate, the internodes 1–3.7 cm. long, many-ribbed; leaves ascending, articulate, the sheaths tubular, membranous, to 1.8 cm. long, the blades oblong-lanceolate, 3.5–7 cm. long, 0.6–1 cm. broad, subcoriaceous, cuneate at base, briefly unequally and obtusely bilobed at apex; inflorescences borne from upper nodes, erect, racemose, 1.5–5 cm. long, the peduncle well developed, terete, 1.2–2.5 cm. long, the rachis usually as long as or somewhat shorter than peduncle, laxly 3–6-flowered, the bracts small, broadly ovate, about 1 mm. across; flowers ascending or patent, probably resupinate, greenish yellow; dorsal sepal erect, elliptic-ovate, 4–5 mm. long, 3–3.5 mm. broad, subacute at apex; lateral sepals spreading, broadly ovate, slightly oblique, 4.5–5 mm. long, about 4.5 mm. broad, subacute at apex; mentum somewhat inclined anteriorly, short, saccate, somewhat compressed laterally, about 2 mm. long, broadly rounded at tip; petals weakly spreading, elliptic to elliptic-obovate, about 4 mm. long and 2.3 mm. broad, obtuse to broadly subacute at apex; labellum articulate with apex of column foot, somewhat mobile, arcuate, unguiculate, 3-lobed, about 4 mm. long and 3.5 mm. broad, the claw ligulate, about 1.5 mm. long and 0.6 mm. broad, the base of blade broadly rounded, the lateral lobes turned upward, small, obliquely ovate, about 2 mm. long and 1.2 mm. broad, broadly rounded at apex, the midlobe slightly reflexed, more or less transversely obovate, about 1.75 mm. long and 2.25 mm. broad, somewhat incurved distally on lateral margins, deeply emarginate at apex, the disk with 2 weakly raised, somewhat undulate carinae extending from base of claw to base of midlobe and with a series of plicate thickenings on proximal portion of midlobe; column abbreviate

viated, about 0.7 mm. long; column foot broad, about 3 mm. long, rather abruptly incurved at apex and deeply cleft; clinandrium dorsiventrally somewhat depressed, very deeply excavate, obtusely lobed on lateral margins; anther transversely elliptic-cucullate, about 0.75 mm. long and 1.3 mm. broad, broadly retuse at apex; pollinia oblong-obovoid, about 0.7 mm. long and 0.3 mm. broad; rostellum porrect, short, transverse; stigma suborbicular; ovary pedicellate, clavate, 0.8–1.4 cm. long overall, terete, broadly 3-ribbed, glabrous.

TYPIFICATION: The type is *im Thurn 317* (K HOLOTYPE), collected Dec. 5, 1906, at about 450 m. in the vicinity of Nandrau, near the upper Singatoka River, Nandronga & Navosa Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known sparingly from Viti Levu only, in forest and along roads at elevations of 150–450 m. Flowers have been obtained in August and December (as far as dated), fruits in August.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Prince's Road, *Meebold 16798*. REWA: Mt. Koromamba, *Parks 20919*, *Gillespie 2399*; vicinity of Lami, *Gillespie 2038*; Suva (probably brought in from wild), *Simmonds*, Aug. 10, 1952 (K spirit coll. 9397).

Dendrobium vitiense appears to be the only species of subgen. *Dendrobium* sect. *Trachyrhizum* known from Fiji; it is one of only two species of this predominantly Papuan section to occur east of mainland New Guinea.

14. *Dendrobium crumenatum* Sw. in Schrad. J. Bot. 2: 237. 1800, in Kongl. Vetensk. Acad. Nya Handl. 21: 246. 1800; Lindl. Gen. Sp. Orchid. Pl. 88. 1830; Hook. f. Fl. Brit. Ind. 5: 729. 1890; J. J. Sm. Orchid. Java, 330. 1905, Orchid. Java Fig.-Atlas, fig. 249. 1909; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 235. fig. 19, C, D, 6–9. 1910; Holttum, Fl. Malaya 1: 329. 1953; Backer & Bakh. f. Fl. Java 3: 349. 1968; H. G. Jones in Philipp. J. Sci. 104: 90. 1975; Seidenfaden in Opera Bot. 83: 200. 1985.

FIGURE 55.

Angraecum crumenatum Rumph. Herb. Amb. 6: 105. t. 47, fig. 2. 1750.

Dendrobium goldfinchii sensu Kores in Allertonia 5: 89, quoad spec. vit. 1989; non F. v. Muell.

Erect epiphytic plants up to 1 m. tall, the rhizome much abbreviated, laxly branched, the stems closely spaced, terete, many nodes in length, conspicuously thickened for 4 or 5 internodes shortly above base, medially rather laxly plurifoliate, more distally gradually tapering to a thin, wiry, defoliate apex, the internodes somewhat elongated distally, 1–3 cm. long, weakly many-ribbed; leaves patent, articulate, the sheaths tubular, hardly or not expanded distally, 1.5–2.5 cm. long, the blades oblong, 3–10 cm. long, 2.5–3.5 cm. broad, coriaceous, broadly rounded at base, obtuse at apex; inflorescences borne at upper, nonfoliate nodes, 1-flowered, the bracts small, deltoid; flowers patent, resupinate, showy, fugacious, the outer perianth segments pure white, the labellum white with a yellow center; dorsal sepal weakly spreading, oblong-lanceolate, 1.7–2.5 cm. long, about 0.7 cm. broad, acute at apex; lateral sepals broadly spreading, obliquely deltoid, 2.5–3.5 cm. long, 0.8–1 cm. broad, acute at apex; mentum retrorsely inclined, conical, about 1.3 cm. long, acute at tip; petals weakly spreading, oblong-lanceolate, 1.8–2.5 cm. long, about 0.7 cm. broad, broadly acute at apex; labellum adnate to column foot, immobile, ascending, arcuate, 3-lobed, 1.8–3 cm. long overall, 1.3–1.6 cm. broad, the base cuneate, the lateral lobes turned upward, transversely subdeltoid, about 0.4 cm. long and 0.5 cm. broad, entire at margins, broadly subacute at apex, the midlobe slightly deflexed, semiorbicular, about 0.8 cm. across, with irregularly crenate and weakly undulate lateral margins, abruptly acuminate at apex, the disk with a single longitudinal carina extending from base of labellum to middle of midlobe, the carina broad, prominently raised, with the upper margin weakly 3-ribbed; column short, stout, semiterete; column foot broad, slightly curved, about 1.1 cm. long; clinandrium deeply excavate, prominently tricornate at margin; anther galeate, about 2.5 mm. across, weakly bilobate dorsally, broadly

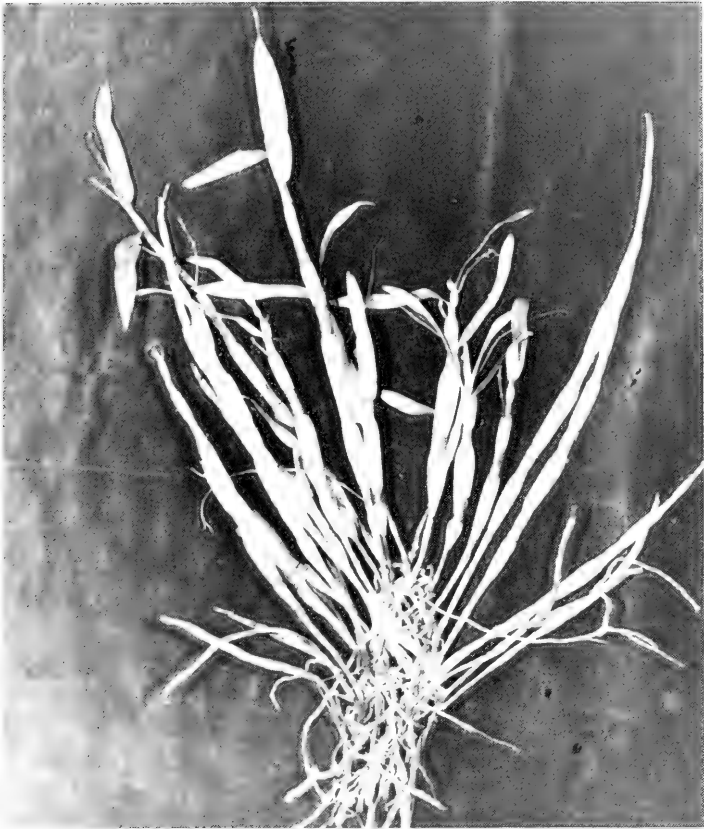


FIGURE 54. Fully grown plant of *Dendrobium vitiense*, collected May 24, 1989, near the summit of Mt. Korombamba, Rewa Province, Viti Levu (Kores & Molvray, no voucher retained), \times about 1/2; given to R. H. Phillips for cultivation in Suva.

truncate at apex; pollinia pyriform, about 1.5 mm. long and 0.4 mm. in diameter; rostellum porrect, transverse; stigma semiorbicular; ovary manifestly pedicellate, clavate, 1-1.5 cm. long overall, terete.

TYPIFICATION: The species is based on Rumphius's illustration of *Angraecum crumenatum* (1750), from Amboina.

DISTRIBUTION: A widespread species found from the Indian subcontinent and southeastern Asia south to Java and east to the Philippines. It was evidently introduced into Fiji as an ornamental and was first reported as being naturalized in the coastal areas near Suva by H. G. Jones (1975). Flowers have been obtained in May.



FIGURE 55. Flowering plant of *Dendrobium crumenatum* growing along the coast in Suva, Rewa Province, Viti Levu (Kores & Molvray F14). \times about 1/8.

AVAILABLE COLLECTION: VITI LEVU: REWA: Queen's Bay Drive, Suva, epiphytic in *Calophyllum* along coast, Kores & Molvray F14.

I was skeptical of H. G. Jones's (1975) report of *Dendrobium crumenatum* from Fiji because there were no previous records of the species east of a line from the Philippines to Java. Therefore, in 1989 I speculated that Jones's record might actually represent *D. goldfinchii* F. v. Muell., another species of subg. *Rhopalobium* sect. *Rhopalobium* which has been collected in the New Hebrides and Samoa. However, a naturalized population of *H. crumenatum* has now been seen in Fiji, as cited above; hence it would appear that Jones's report of this species is correct, and there is no evidence of the presence of *D. goldfinchii* in the archipelago.

15. *Dendrobium kraenzlinii* L. O. Williams in Bot. Mus. Leafl. 5: 122. 1938; J. W. Parham, Pl. Fiji Isl. 287. 1964, ed. 2. 381. 1972; Kores in Allertonia 5: 90. 1989.

FIGURES 56A–G, 88 (lower left).

Dendrobium vitiense Kraenzl. in Mitt. Inst. Allg. Bot. Hamburg 5: 263, nom. illeg. 1922; non Rolfe (1921).

Dendrobium biflorum sensu B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 32. pl. 15. 1953; non Sw.

Epiphytic plants to 2 m. long, the rhizome stout, much abbreviated, the stems closely spaced, slender, reedlike, hard, to 1.8 m. long, 0.3–0.5 cm. in diameter, distally multifoliate, many nodes in length, the internodes 1.6–3 cm. long, smooth, shiny; leaves ascending, articulate, the sheaths tubular, finely striate, truncate on upper margin, oriented perpendicular to stem after blade abscises, the blades narrowly lanceolate to linear-lanceolate, 10–18 cm. long, 0.4–1.4 cm. broad, chartaceous,

cuneate at base, gradually tapering to a narrow, obliquely subacute apex; inflorescences borne at nodes opposite leaves throughout distal portion of stem, short, racemose, the peduncle very short, stout, 0.3–0.6 cm. long, the rachis congested, 2-flowered, the bracts small, subulate, about 1 mm. long; flowers ascending, resupinate, white to whitish yellow with bright green markings at base of column; dorsal sepal spreading, oblong-elliptic, 9–14 mm. long, 4–6 mm. broad, obtuse to subacute at apex; lateral sepals broadly spreading, obliquely oblong-ovate, 9–14 mm. long, 5–6.5 mm. broad, acute to broadly subacute at apex; mentum slightly inclined retrorsely, conical, 4.5–5.5 mm. long, subacute at tip; petals broadly spreading, oblong-obovate, slightly oblique, 9–12 mm. long, 3.5–4.5 mm. broad, broadly subacute at apex; labellum adnate to column foot, immobile, arcuate, 3-lobed, 6–7 mm. long overall, 4–5 mm. broad, the base cuneate, channelled, the lateral lobes turned upward, oblong-falcate, 1–1.5 mm. long, about 1 mm. broad, entire at margins, subacute to obtuse at apex, the midlobe recurved, broadly ovate, 3–3.5 mm. across, entire or weakly undulate at margins, abruptly acuminate at apex, the disk with a single longitudinal carina extending from base of labellum to middle of midlobe, the carina slender, entire on upper margin; column semiterete, 2.5–3 mm. long; column foot 4–5 mm. long; clinandrium deeply excavate, weakly 3-lobed on dorsal margin; anther more or less transversely obovate-galeate, about 1.2 mm. across, dorsally prominently umbonate, broadly retuse at apex; pollinia oblong-obovate, about 0.8 mm. long and 0.2 mm. broad; rostellum slightly retroflex, transverse, short, broadly rounded at apex; stigma a short distance beneath rostellum, scutiform to elliptic; ovary pedicellate, clavate, about 1 cm. long overall, weakly 6-angled, glabrous.

TYPEFICTION: The type of *Dendrobium vitiense* Kraenzl., for which *D. kraenzlinii* is a substitute name, is *Kleinschmidt s. n.* (HBG HOLOTYPE), collected in January, 1879, in Fiji without further locality, but probably on Viti Levu (the source of other Kleinschmidt collections).

DISTRIBUTION: Endemic to Fiji and infrequent, now known from Viti Levu and Vanua Levu, where it occurs in dense or open forest at elevations of 100–600 m. Insofar as specimens are dated, flowers have been obtained in January, fruits in September and December.

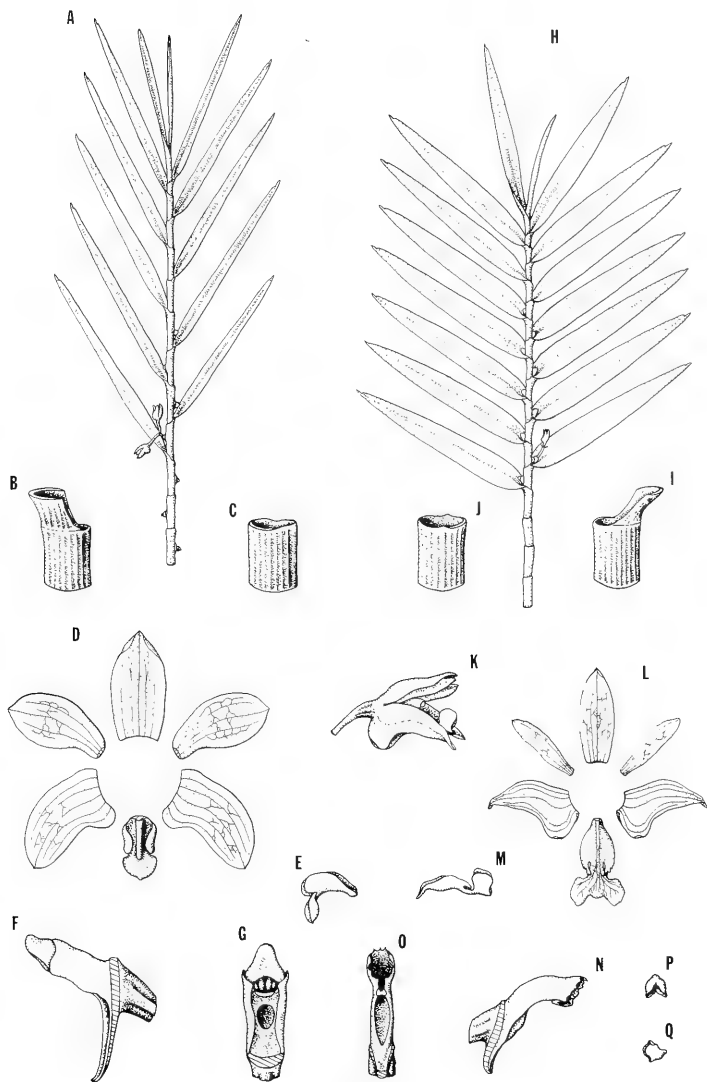
AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 112A*. NANDRONGA & NAVOSA: Nausori Highlands, *O. & I. Degener 32178*. NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8668*. NAITASIRI: Sawani-Serea road, *DA 11056*, *McLoughlin 904* (K spirit coll. 19076). VITI LEVU without further locality, *Gagné s. n.* (K). VANUA LEVU: MATHUATA: Southern base of Mathuata Range, north of Natua, *Smith 6856*. p. p. (BISH, K, p. p., L, p. p., NY, p. p.).

This species and the five following represent subgen. *Xerobium* sect. *Grastidium* in Fiji. The section is readily characterized (Kores, 1989) and its species in Fiji, although superficially somewhat similar, are readily separable by characters referring to details of foliage, perianths, labellums, and ovaries, as noted in the above key to species.

16. *Dendrobium trilobulatum* Kores in *Allertonia* 5: 91. 1989. FIGURE 56H–Q.

This recently described species is characterized by its small, usually solitary flowers (sepals 7–8 × 3–4 mm.; petals 7–7.5 × 1.5–2 mm.) and by the obreniform, bladelike midlobe of the labellum (6–7 mm. long), which is broadly trilobulate at apex. In contrast to its closest relative, *Dendrobium kraenzlinii*, it has more closely spaced leaves, the blades being oblong-elliptic to oblong-lanceolate and somewhat broader (8–14 × 0.8–1.8 cm.).

TYPEFICTION: The type is *Smith 8882* (US 2191503 & 2191504 HOLOTYPE; ISOTYPE AT BISH), collected Oct. 8, 1953, in hills bordering Wainavindrau Creek near Wainimaku, Namosi Province, Viti Levu.



DISTRIBUTION: Endemic to Fiji and now known from four of the high islands, occurring in usually dense forest at elevations of 100–250 m. or possibly somewhat higher. Flowers have been noted between September and December, fruits in June and September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA; Near falls in mountains near Lautoka, *Greenwood 374*. NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8668*; Wainamara, track to Namosi, *DA 11633*. TAILEVU: Along King's Road, *Vaughan 3315*. OVALAU: *U. S. Expl. Exped.* (AMES 74637, w 39536). VANUA LEVU: MATHUATA: Southern base of Mathuata Range, north of Natua, *Smith 6856*, p. p. (AMES, K, p. p., L, p. p., NY, p. p., P, US) (for other parts of this number see preceding species). TAVEUNI: Vicinity of Somosomo, *Seemann 583*.

17. *Dendrobium carnicarinum* Kores in *Allertonia* 5: 92. 1989. FIGURE 57A–I.

A recently described diminutive epiphytic herb, with rigidly coriaceous, lanceolate or linear-lanceolate leaf blades 2.5–4 cm. × 3–4.5 mm., the leaf sheaths with upper margins truncate; inflorescences very short, 2-flowered, the flowers small (sepals 8–10 × 3–5.5 mm.; petals 8–9 × 3.5–4 mm.), the labellum 6–7.5 mm. long, with the midlobe subreniform, 2–3 × 3–4 mm.

TYPIFICATION: The type is *E. McLoughlin* s. n. (K spirit coll. 20209 HOLOTYPE), collected Sept. 19, 1966, at the Navai filling area, south of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from the type collection, obtained in forest at an elevation of 750–900 m.

Not closely related to other Fijian representatives of subgen. *Xerobium* sect. *Grastidium*, *Dendrobium carnicarinum* is readily distinguished from the two preceding species by its small, rigidly coriaceous leaf blades and ovate petals.

18. *Dendrobium dactyloides* Reichenb. f. in *J. Bot.* 15: 132. 1877; Kraenzl. in *Pflanzenr.* 45 (IV. 50. II. B. 21): 189. 1910; Setchell in *Publ. Carnegie Inst. Wash.* 341: 103. 1924; L. O. Williams in *Bot. Mus. Leafl.* 5: 121. 1938; J. W. Parham, *Pl. Fiji Isl.* 286. 1964, ed. 2. 381, as *D. dactyloides*. 1972; Kores in *Allertonia* 5: 93. 1989.

Dendrobium involutum sensu Kraenzl. in *Bot. Jahrb.* 25: 603. 1898; Lewis & Cribb, *Orch. Vanuatu*, 120, p. p. 1989; non Lindl.

Dendrobium biflorum sensu Kraenzl. in *Bot. Jahrb.* 25: 604. 1898; non Sw.

Dendrobium vaupelianum Kraenzl. in *Notizbl. Bot. Gart. Berlin* 5: 109. 1909, in *Pflanzenr.* 45 (IV. 50. II. B. 21): 165. 1910; Schlechter in *Repert. Sp. Nov.* 9: 102, p. p. 1911; Yuncker in *Bishop Mus. Bull.* 184: 32, p. p. 1945.

Dendrobium everardii Rolfe in *Kew Bull.* 1921: 55. 1921; L. O. Williams in *Bot. Mus. Leafl.* 5: 121. 1938; J. W. Parham, *Pl. Fiji Isl.* 287. 1964, ed. 2. 381. 1972.

Dendrobium cheesmanae Guillaumin in *Bull. Soc. Bot. France* 103: 280. 1956.

Epiphytic plants to 1.5 m. long, the rhizome much abbreviated, stout, the stems closely spaced, slender, reedlike, hard, (0.15–) 0.25–1.4 m. long, 0.3–0.4 cm. in diameter, distally multifoliate, many nodes in length, the internodes 1–3 cm. long, smooth, shiny; leaves ascending, articulate, the sheaths tubular, weakly striate, prominently lobed opposite blade on upper margin, obliquely oriented to stem after blade abscises,

FIGURE 56. A–G, *Dendrobium kraenzlinii*; A, apical portion of flowering stem, × 1/4; B, anterior portion of leaf sheath with base of leaf blade, × 2; C, anterior portion of leaf sheath after leaf blade abscission, × 2; D, perianth segments, × 2; E, labellum viewed from side, × 2; F, column viewed from side, × 5; G, column with column foot removed viewed from front, showing anther cap, pollinia, rostellum, and stigma, × 5. H–Q, *Dendrobium trilobulatum*; H, apical portion of flowering stem, × 1/4; I, anterior portion of leaf sheath with base of leaf blade, × 2; J, anterior portion of leaf sheath after leaf blade abscission, × 2; K, complete flower viewed from side, × 2; L, perianth segments, × 2; M, labellum viewed from side, × 2; N, column with anther cap removed viewed from side, × 5; O, column viewed from front, showing clinandrium, rostellum, and stigma, × 5; P, anther cap viewed from front, × 5; Q, anther cap viewed from side, × 5. A–C from *Smith 6856*, p. p., D–G from *McLoughlin 904*, H–Q from *Smith 6856*, p. p. alter.

the blades lanceolate, 3.5–8 cm. long, (0.8–) 1–2.5 cm. broad, subcoriaceous, cuneate at base, briefly, unequally, and obtusely or rarely obliquely subacute at apex; inflorescences borne at nodes opposite leaves throughout distal portion of stem, short, racemose, the peduncle very short, 0.3–0.6 cm. long, the rachis much abbreviated, 2- or rarely 1-flowered, the bracts small, scalelike; flowers ascending, probably resupinate, dark to pale yellow or yellowish white, ephemeral; dorsal sepal erect, linear-lanceolate, 15–24 mm. long, 2.5–3.5 mm. broad, gradually tapering to a narrowly acute apex; lateral sepals weakly spreading, obliquely lanceolate-attenuate, (13–) 18–28 mm. long, 6–10 mm. broad, gradually tapering to a narrowly acute apex; mentum more or less perpendicular, slightly inflexed distally, conical, 5–7 mm. long, obtuse at tip; petals weakly spreading, linear-lanceolate, 15–24 mm. long, 3–4 mm. broad, narrowly acute at apex; labellum adnate to column foot, immobile, arcuate, 3-lobed, 7–14 mm. long overall, 5–8 mm. broad, the base narrowly cuneate, channelled, the lateral lobes turned upward, ovate, 3–6 mm. long, 1.5–2.5 mm. broad, entire or irregularly crenulate at margins, subacute to obtuse at apex, the midlobe recurved, broadly ovate-attenuate, 3–7.5 mm. long, 3–7 mm. broad, irregularly crenulate proximally and gradually becoming more entire distally at lateral margins, narrowly acuminate at apex, the disk with a prominently raised longitudinal carina extending from base of labellum to base of midlobe and proximally laxly rugose-verruculose, the carina somewhat dilated and irregularly crenulate along entire upper margin; column relatively stout, semiterete, 3–3.5 mm. long; column foot slender, 4.5–6 mm. long; clinandrium deeply excavate, broad, 3-lobed at margin, the lateral lobes broad, obtuse, the medial lobe slightly taller, linear-attenuate; anther transversely ovate-galeate, about 1 mm. long and 1.5 mm. broad, prominently umbonate dorsally, broadly retuse at apex; pollinia oblong-ellipsoid, about 1.5 mm. long and 0.3 mm. broad; rostellum retroflex, transversely oblong, broadly retuse at apex; stigma scutiform; ovary pedicellate, clavate, 0.7–1.3 cm. long overall, weakly 4-angled and indistinctly 5- or 6-ribbed, glabrous.

TIPIFICATION AND NOMENCLATURE: Four taxa are involved in the synonymy listed above. *Dendrobium dactylodes* is based on *Whitmee 46* (w 39627 HOLOTYPE, ISOTYPE at K; photo of holotype at AMES), from Samoa but without detailed locality or date. The type of *D. vaupelianum* is *Vaupel 286* (B HOLOTYPE, destroyed; ISOTYPE at AMES 35362), collected Jan. 5 or 6, 1905, at Matante, Savai'i, Samoa. *Dendrobium everardii* is based on two Fijian collections: *im Thurn 316* (K SYNTYPE), obtained Dec. 5, 1906, near Nandrau, Nandronga & Navosa Province, Viti Levu, and *im Thurn 326* (K SYNTYPE), collected Dec. 7, 1906, in the vicinity of Nandarivatu, Mba Province, Viti Levu. The type of *D. cheesmanae* is *L. E. Cheesman A22* (BM HOLOTYPE), collected at Pentec Cotières, Aneityum, New Hebrides. Taking into consideration all the material now available, there appear to be no consequential differences among the four concepts (Kores, 1989).

DISTRIBUTION: New Hebrides, Fiji, and Samoa, apparently more common in the last archipelago than in the two former. In Fiji it is known definitely only from eight collections and from Viti Levu, where it is found from near sea level to about 900 m. in open forest or on isolated trees. Flowers have been obtained between August and February, fruits between November and February.

AVAILABLE COLLECTIONS: VITI LEVU: MBA; Vicinity of Nandarivatu, *Gillespie 3830*. REWA: Vicinity of Lami, *Meebold 26600*; vicinity of Suva, *Meebold 21958, 26599* (cultivated?). FIJI without further locality, *U. S. Expl. Exped.* (AMES 74398), *Gillespie 3172.5*.

This species and the two following form a related group of taxa in subgen. *Xerobium* sect. *Grastidium*, differing from the three preceding species in readily

discernible foliage characters and from one another in floral characters and leaf shape as noted in the above key to species.

19. *Dendrobium sladei* J. J. Wood & Cribb in *Orchid Rev.* **90**: 14, fig. 7. 1982; Kores in *Allertonia* **5**: 95. 1989; Lewis & Cribb, *Orch. Vanuatu*, 120, pl. 5, D. 1989.

Dendrobium vaupelianum sensu Yuncker in *Bishop Mus. Bull.* **184**: 32, p. 1945; non Kraenzl.

Pendent epiphytic plants to 2.25 m. long, the rhizome much abbreviated, stout, the stems closely spaced, slender, reedlike, hard, 0.4–2.2 m. long, about 0.5 cm. in diameter, distally multifoliate, many nodes in length, the internodes 1.5–4 cm. long, smooth, shiny; leaves ascending, articulate, the sheaths tubular, striate, prominently lobed opposite blade on upper margin, obliquely oriented to stem after blade abscises, the blades lanceolate, 5–11 cm. long, 1.5–2.8 cm. broad, coriaceous, cuneate at base, briefly, unequally, and obtusely bilobed at apex; inflorescences borne at nodes opposite leaves throughout distal portion of stem, short, racemose, the peduncle short, to 6 mm. long, the rachis abbreviated, 2-flowered, the bracts small, scalelike; flowers ascending, nonresupinate, somewhat fleshy, fragrant, ephemeral, the outer perianth segments yellow to yellowish white and sometimes tinged with brownish red on inner surfaces, the labellum yellow with reddish purple or reddish brown markings; medial sepal weakly spreading, lanceolate, 20–25 mm. long, about 4 mm. broad, acute at apex; lateral sepals broadly spreading, obliquely lanceolate-falcate, 25–30 mm. long, 4–6 mm. broad, acute at apex; mentum somewhat inclined anteriorly, conical, 5–6 mm. long, slightly retuse at tip; petals spreading, ligulate-lanceolate, about 25 mm. long and 4 mm. broad, acute at apex; labellum adnate to column foot, immobile, arcuate, 3-lobed, about 11 mm. long and 7 mm. broad overall, the base cuneate, channelled, the lateral lobes turned upward, narrowly ovate, about 1 mm. long and 0.5 mm. broad, minutely erose on anterior margins, acute at apex, the midlobe recurved, broadly ovate-attenuate, about 6 mm. long and 5 mm. broad, erose-undulate proximally on lateral margins, narrowly acuminate at apex, the disk with a prominently raised carina extending from base of labellum to middle of midlobe and otherwise entirely subdensely rugose-tuberculate, the carina somewhat dilated and irregularly crenulate along entire upper margin; column relatively stout, semiterete, about 4 mm. long; column foot relatively broad, 5–6 mm. long; clinandrium deeply excavate, broad, 3-lobed at margin, the lateral lobes broad, obtuse, the medial lobe slightly longer, narrowly triangular; anther transversely elliptic-cucullate, about 1 mm. long and 1.2 mm. broad, with a prominently raised, more or less hippocrepiform crest near summit, broadly retuse at apex; pollinia oblong-ellipsoid, about 0.8 mm. long and 0.3 mm. broad; rostellum slightly retroflex, transversely oblong, broadly retuse at apex; stigma sub-orbicular; ovary pedicellate, clavate, about 1.2 cm. long overall, rather prominently 4-angled and distinctly 6-winged, glabrous.

TYPE: *Dendrobium sladei* is based on *im Thurn 330* (K HOLOTYPE), collected in December, 1906, at the harbor of Vila, Efate, New Hebrides.

DISTRIBUTION: New Hebrides, Fiji, and Samoa, appearing more frequent in the last archipelago than in the other two. In Fiji, on the basis of currently available material, it is infrequent and known only from Viti Levu, occurring in open forest and on isolated trees from near sea level to about 900 m. Flowers have been obtained in July and August, fruits in November.

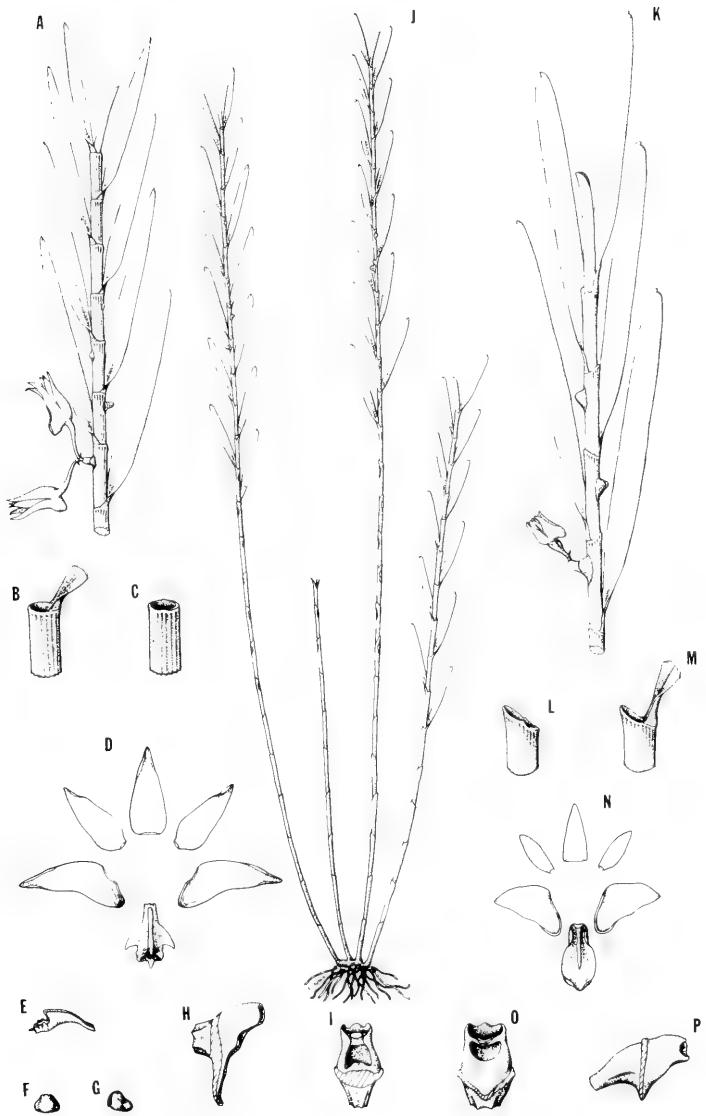
AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Greenwood 54*. REWA: Near Namboro, *Mc Loughlin & Hughes 916* (K spirit coll. 29071); Suva (cultivated?), *Simmonds s. n.* (K spirit coll. 20876).

20. **Dendrobium biflorum** (Forst. f.) Sw. in Nova Acta Regiae Soc. Sci. Upsal. II. 6: 84. 1799, in Kongl. Vetensk. Acad. Nya Handl. 21: 246. 1800; Seem. in Bonplandia 9: 259. 1861, Viti, 442. 1862; Reichenb. f. in Seem. Fl. Vit. 303. 1868; Horne, A Year in Fiji, 260. 1881; Drake, Ill. Fl. Ins. Mar. Pac. 306. 1892; Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 175. fig. 11, A, B. 1910; Rechinger in Denkschr. Akad. Wiss. Wien 85: 259. 1910; Schlechter in Repert. Sp. Nov. 9: 101. 1911; Christophersen in Bishop Mus. Bull. 128: 66. 1935; L. O. Williams in Bot. Mus. Leaf. 5: 119. 1938; Yuncker in Bishop Mus. Bull. 178: 41. 1943, in op. cit. 184: 32. 1945; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 258. 1970; Whistler in Bull. Pacific Trop. Bot. Gard. 9: 36. 1979; Kores in Allertonia 5: 96. 1989; Lewis & Cribb, Orch. Vanuatu, 117. 1989. FIGURE 88 (lower right).

Epidendrum biflorum Forst. f. Fl. Ins. Austr. Prodr. 60. 1786.

Erect or ascending epiphytic plants to 1.7 m. long, the rhizome much abbreviated, the stems closely spaced, slender, reedlike, hard, 0.35–1.6 m. long, 0.2–0.4 cm. in diameter, distally multifoliate, many nodes in length, the internodes 1–1.4 cm. long, smooth, shiny; leaves ascending, articulate, the sheaths tubular, weakly striate, prominently lobed opposite blade on upper margin, obliquely oriented to stem after blade abscises, the blades linear-lanceolate, 7–16 cm. long, 0.4–0.7 cm. broad, chartaceous, cuneate at base, gradually tapering to a narrow, obliquely acute apex; inflorescences borne at nodes throughout distal portion of stem, short, racemose, the peduncle slender, 0.3–0.7 cm. long, the rachis much abbreviated, 2-flowered, the bracts very small, narrowly triangular, about 1.5 mm. long and 0.3 mm. broad, membranous; flowers ascending, probably resupinate, membranous, ephemeral, pale yellow; dorsal sepal erect, linear-lanceolate, 28–32 mm. long, 1.5–2 mm. broad, narrowly attenuate distally, filiform at apex; lateral sepals weakly spreading, obliquely linear-lanceolate, 30–34 mm. long, 2–3 mm. broad, narrowly attenuate distally, filiform at apex; mentum more or less perpendicular, slightly inflexed distally, narrowly conical, 4–6.5 mm. long, subacute at tip; petals weakly spreading, linear-attenuate, 28–32 mm. long, 1–1.5 mm. broad, filiform at apex; labellum adnate to column foot, immobile, arcuate, 3-lobed, 6–8 mm. long overall, 3.5–4.5 mm. broad, the base narrowly cuneate, channelled, the lateral lobes turned upward, oblong-ovate, 2–2.5 mm. long, 0.5–0.75 mm. broad, erose on anterior margins, acute at apex, the midlobe recurved-circinnate, narrowly triangular, 3–4 mm. long, 2–2.5 mm. broad, deeply and irregularly fimbriate on lateral margins proximally, gradually becoming more entire distally, narrowly acute at apex, the disk with a raised carina extending from base of labellum to base of midlobe and with many filiform appendages arranged in 3 rows throughout proximal half of midlobe, the carina slender, entire on anterior margin; column relatively stout, semiterete, 1.5–2 mm. long; column foot slender, 4.5–6 mm. long; clinandrium deeply excavate, broad, 3-lobed at margin, the lateral lobes obtuse, the medial lobe somewhat longer, dactyloform; anther transversely oblong-cucullate, about 1.25 mm. long and 2 mm. broad, broadly retuse at apex; pollinia oblong-ellipsoid, about 1 mm. long and 0.3 mm. broad; rostellum retroflex, transversely oblong; stigma ellipsoid; ovary pedicellate, clavate, 0.7–1.2 cm. long overall, weakly 6-angled, glabrous.

FIGURE 57. A–I, *Dendrobium carnecarinum*; A, apical portion of flowering stem, $\times 2$; B, anterior portion of leaf sheath with base of leaf blade, $\times 4$; C, anterior portion of leaf sheath after leaf blade abscission, $\times 4$; D, perianth segments, $\times 4$; E, labellum viewed from side, $\times 4$; F, anther cap viewed from above, $\times 10$; G, anther cap viewed from side, $\times 10$; H, column viewed from side, $\times 10$; I, column with column foot removed viewed from front, showing clinandrium, rostellum, and stigma, $\times 10$. J–P, *Dendrobium unicarinarum*; J, mature plant, $\times 1\ 1/2$; K, apical portion of flowering stem, $\times 2$; L, anterior portion of leaf sheath after leaf blade abscission, $\times 4$; M, anterior portion of leaf sheath with base of leaf blade, $\times 4$; N, perianth segments, $\times 4$; O, column viewed from front, showing clinandrium, rostellum, and stigma, $\times 10$; P, column viewed from side, $\times 10$. A–I from *McLoughlin s. n.* (κ spirit 20209), J–P from *Gillespie 3841*.



TYPIFICATION: *Epidendrum biflorum* is typified by J. R. & G. Forster (BM LECTOTYPE), collected in Tahiti during Cook's second voyage.

DISTRIBUTION: New Hebrides eastward through Fiji, Niue, Samoa, and the Society Islands. In Fiji the species is known only from Viti Levu and Ovalau, occurring from near sea level to about 900 m. in dense or open forest (rarely in mangrove swamps). Flowers and fruits have been noted between June and January.

AVAILABLE COLLECTIONS: VITI LEVU: Mba: Mountains near Lautoka, *Greenwood 112, 112A*; vicinity of Nandarivatu, *im Thurn 327, Gillespie 3862*. SERUA: Coastal hills in vicinity of Taunovo River, east of Wainiyambia, *Smith 9569*; hills east of Navua River, near Nukusere, *Smith 9107*. NAMOSI: Mt. Voma, *DA 11675*. NAITASIRI: Above Nanggali, Waindina River, *DA 2642*; Viria, *Parks 20469*; Prince's Road, *Meebold 21957*; Suva Pumping Station, *Degener & Ordenez 13752*. REWA: University of South Pacific lath house, Suva, *Kores & Molvray F15* (cult.); Suva Harbor, *im Thurn 364*; mangrove swamp east of Suva, *Parks 20027*, p. p. (AMES, UC, p. p.). OVALAU: *U. S. Expl. Exped. (AMES 74356, w)*. FIJI without further locality, *Seemann 582*.

Dendrobium biflorum is readily distinguished from its close relative in the Fijian Region of subgen. *Xerobium* sect. *Grastidium*, *D. dactyloides*, by characters of foliage and flowers (Kores, 1989).

21. ***Dendrobium uncarinatum*** Kores in *Allertonia* 5: 97. 1989. FIGURE 57J-P.

Dendrobium bilobum sensu Lewis & Cribb, *Orch. Vanuatu*, 122, quoad spec. vit. 1989; non Lindl.

A small, infrequent, epiphytic plant to 60 cm. long, recently described, the leaf sheaths with a truncate upper margin, the leaf blades 4.5–6 cm. × 4–5.5 mm.; inflorescences very short, 1-flowered, the flowers small (sepals 4–5 × 2–4 mm.; petals 4–5 × 3.5–4 mm.), the labellum 4–5.5 mm. long, entire.

TYPIFICATION: The type is *Gillespie 3841* (AMES 16987 HOLOTYPE), collected Nov. 17, 1927, in the vicinity of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the type locality in north-central Viti Levu, seemingly rare in forest at an elevation of 750–900 m. Flowers are known only from the type collected in November, fruits having been obtained in February or March.

AVAILABLE COLLECTION: VITI LEVU: Mba: Vicinity of Nandarivatu, *Degener 14695* (AMES, BISH, K, NY).

The only known Fijian species of subgen. *Xerobium* sect. *Monanthes*, the apparently rare *Dendrobium uncarinatum*, is readily distinguished from the above species of sect. *Grastidium* by its uniformly 1-flowered inflorescences, smaller flowers, and entire labellum.

INADEQUATELY KNOWN SPECIES

Dendrobium schweinfurthianum H. G. Jones in *Philipp. J. Sci.* 104: 87, nom. illeg. 1975; Cribb in *Kew Bull.* 41: 689. 1985; Kores in *Allertonia* 5: 98. 1989; non Hawkes & Heller (1957).

TYPIFICATION: The type (deposited in Jones's private herbarium in Barbados), is cited as "Misc. No. D/488-1968" and is said to have come from Fiji near sea level, sent to Jones by an unspecified collector.

Dendrobium schweinfurthianum H. G. Jones (which at any rate is a later homonym and hence illegitimate) could have been a plant introduced into Fiji by a local resident. It is apparently a member of subgen. *Dendrobium* sect. *Spatulata* and is suggestive of *D. macranthum* A. Rich. (Santa Cruz Islands, New Hebrides, and New Caledonia) or some closely allied species (Cribb, 1985).

28. **FLICKINGERIA** A. Hawkes in *Orchid Weekly* 2: 451. (Jan.) 1961, in *Orquidea* 27: 301. 1965; *Seidenfaden* in *Dansk Bot. Arkiv* 34 (1): 9. 1980; *Kores* in *Allertonia* 5: 98. 1989; *Lewis & Cribb, Orch. Vanuatu*, 123. 1989.

Desmotrichum Bl. *Bijdr. Fl. Ned. Ind.* 329. 1825; *Kraenzl. in Pflanzenr.* 45 (IV. 50. II. B. 21): 343, excl. syn. 1910. *Nom. rejic. vs. Desmotrichum Kuetzing* (1845).

Dendrobium sect. *Desmotrichum* Lindl. *Gen. Sp. Orchid.* Pl. 76. 1830; *Benth. in Benth. & Hook. f. Gen. Pl.* 3: 498. 1883; *Pfitzer in Engl. & Prantl, Nat. Pflanzenfam.* II. 6: 175. 1889; *Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee*, 151. 1905, in *Repert. Sp. Nov. Beih.* 1: 453. 1912; *Holtum, Fl. Malaya* 1: 263. 1953.

Ephemerantha P. F. Hunt & Summerhayes in *Taxon* 10: 102, nom. superfl. (June) 1961; *Hallé in Fl. Nouv.-Caléd. et Dépend.* 8: 150. 1977.

Epiphytic plants with creeping rhizomes, these giving rise to a series of branched stems, the distal portions of branches either fleshy or forming elongated, unifoliate pseudobulbs, with new branches arising from base of pseudobulb or from fleshy portions of old stems; leaves articulate, without sheathing bases, the blades conduplicate in bud, more or less coriaceous; inflorescences terminal or both terminal and pseudoterminal, 1- or rarely 2-flowered, the peduncle short, somewhat obscured by a series of chaffy bracts; flowers moderately small, ephemeral, resupinate or not; sepals dissimilar, the medial sepal free, lanceolate, the lateral sepals obliquely adnate to column foot forming a distinct mentum, more or less lanceolate; petals free, similar to medial sepal; labellum articulate with column foot, erect, slightly or not recurved distally, 3-lobed, the lateral lobes ascending, more or less embracing column, the midlobe much larger than lateral lobes, with a distinctly clawed base, ending in a transversely expanded blade with subentire to irregularly fimbriate lateral margins, the disk with 2 prominently raised longitudinal keels; column short; column foot short, relatively broad; clinandrium with the anterior margin toothed; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, laterally somewhat compressed, unappendaged; rostellum small; stigma directly below rostellum.

LECTOTYPE SPECIES: *Desmotrichum* Bl., with twelve original species, was established without designation of a type species. The name, included by many subsequent students in *Dendrobium*, is rejected in favor of *Desmotrichum* Kuetzing (1845, Phaeophyceae). As a substitute name, A. Hawkes in 1961 proposed *Flickingeria*, again without naming a type species; later in the same year P. F. Hunt and Summerhayes independently proposed the substitute name *Ephemerantha*, which is consequently superfluous, with the type species *E. angulata* (Bl.) P. F. Hunt & Summerhayes (*Desmotrichum angulatum* Bl.). This same species, as *Flickingeria angulata* (Bl.) A. Hawkes, was proposed to lectotypify the genus *Flickingeria* by Seidenfaden (1980, p. 14). A summary of the nomenclature and the differences between this genus and *Dendrobium* was given in my 1989 discussion.

DISTRIBUTION: Southeastern Asia throughout Malesia to northern Australia and eastward to Micronesia, Fiji, and Samoa, with approximately 70 species, one of which is indigenous in Fiji.

USEFUL TREATMENTS OF GENUS: SEIDENFADEN, G. *Orchid genera in Thailand* IX. *Flickingeria* Hawkes and *Epigeneium* Gagnep. *Dansk Bot. Arkiv* 34 (1): 1-104. 1980. RASMUSSEN, H. *Branching pattern and inflorescence bud displacement in Flickingeria* (Orchidaceae). *Nordic J. Bot.* 2: 235-248. 1982.

1. **Flickingeria comata** (Bl.) A. Hawkes in *Orchid Weekly* 2: 453. 1961, in *Orquidea* 27: 302. 1965; *Seidenfaden* in *Dansk Bot. Arkiv* 34 (1): 13, in obs. 1980; *Kores* in *Allertonia* 5: 99. 1989; *Lewis & Cribb, Orch. Vanuatu*, 123. *pl. 7, F.* 1989.

Desmotrichum comatum Bl. *Bijdr. Fl. Ned. Ind.* 330. 1825; *Kraenzl. in Pflanzenr.* 45 (IV. 50. II. B. 21): 349. 1910.

- Dendrobium comatum* Lindl. Gen. Sp. Orchid. Pl. 76. 1830; Holttum, Fl. Malaya I: 266. 1953; Backer & Bakh. f. Fl. Java 3: 345. 1968.
- Dendrobium thysanochilum* Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 152. 1905, in Repert. Sp. Nov. 9: 102. 1911, in Repert. Sp. Nov. Beih. I: 454. 1912, in op. cit. 21: t. 152, no. 571. 1928; Christophersen in Bishop Mus. Bull. 128: 67. 1935.
- Dendrobium scopa* sensu Setchell in Carnegie Inst. Wash. Publ. 341: 103. 1924; non Lindl.
- Desmotrichum thysanochilum* Carr in Kew Bull. 1934: 380. 1934.
- Ephemerantha comata* P. F. Hunt & Summerhayes in Taxon 10: 103, nom. superfl. 1961; P. F. Hunt in Kew Bull. 24: 91. 1970; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 151. pl. 70. 1977.
- Ephemerantha thysanochila* P. F. Hunt & Summerhayes in Taxon 10: 106, nom. superfl. 1961, in Kew Bull. 20: 56. 1966.

Erect, much branched, epiphytic plants, the branches glabrous, shiny, frequently becoming yellow with age, terete proximally, gradually broadened distally and weakly angled, unifoliate; leaf erect to patent, the blade oblong-ovate to -elliptic, 11–15 (–17.5) cm. long, 3–5 (–10) cm. broad, coriaceous, broadly cuneate at base, acute at apex; inflorescences terminal and pseudoterminal, abaxial to leaf, 1- or rarely 2-flowered; flowers resupinate, the outer segments pale yellow with purple spots near base within, the labellum golden-yellow; dorsal sepal spreading, oblong-ovate, 12–14 mm. long, about 4 mm. broad, acute at apex; lateral sepals spreading, oblong to oblong-attenuate, with the anterior margin conspicuously dilated near base, 12–14 mm. long, about 3.5 mm. broad above mentum, acute at apex; mentum 5–6 mm. long; petals spreading or slightly reflexed, linear-lanceolate, 10–12 mm. long, 1.5–2 mm. broad, acute at apex; labellum proximally closely appressed to column, distally correct to slightly reflexed, unguiculate, prominently 3-lobed, 12–14 mm. long (excluding apical appendages), the base oblong-cuneate, the lateral lobes ascending, small, broadly ovate to subquadrate, about 1.5 mm. across, with the anterior margins subentire to irregularly dentate, the midlobe much larger than lateral lobes, oblong, 5.5–6.5 mm. long (excluding appendages), about 2 mm. broad, with the lateral margins near apex provided with erect or ascending, conspicuously elongated, flexuose, filiform appendages up to 1 cm. long, the disk with 2 prominently raised, more or less undulate carinae; column short, stout, 2.5–3 mm. long; column foot nearly perpendicular to column, 4.5–5.5 mm. long; clinandrium deeply excavate, with the lateral margins more or less dentate.

TYPIIFICATION AND NOMENCLATURE: The type of *Desmotrichum comatum* is *Blume s. n.*, collected near Buitenzorg, Java; that of *Dendrobium thysanochilum* is *Schlechter 13720* (B HOLOTYPE, destroyed), collected in November, 1901, between Massawa and Cape Lambert, at the foot of the Beining Mts., New Britain. P. F. Hunt (1970) concluded that the two taxa could not be maintained (cf. also Kores, 1989).

DISTRIBUTION: Southeastern Asia from Taiwan and Malaya through Malesia to northern Australia and eastward to Micronesia, the Solomon Islands, New Caledonia, Fiji, and Samoa. Although ten collections of the species from Samoa have been studied by me, only one specimen has been seen from Fiji, suggesting that the species is either very rare there or has been overlooked.

AVAILABLE COLLECTION: VITI LEVU: REWA: Suva (Lami?) Quarry, *Livingston*, Aug. 1945 (US).

29. *DIPLOCAULOBium* Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 331. 1910; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 152. 1977; Kores in *Allertonia* 5: 100. 1989; Lewis & Cribb, *Orch. Vanuatu*, 122. 1989.

Dendrobium sect. *Diplocaulobium* Reichenb. f. in J. Linn. Soc. Bot. 15: 112. 1876, in *Linnaea* 41: 41. 1876.

Small to large, often caespitose plants with creeping rhizomes and erect, dimorphic, pseudobulbous stems; pseudobulbs heteroblastic, flask-shaped, unifoliate, the

vegetative pseudobulbs somewhat broader basally with the apices not conspicuously elongated, the flowering pseudobulbs more slender, with conspicuously elongated, narrowly attenuate apices; leaves more or less erect, articulate, conduplicate in bud, with nonsheathing bases, somewhat coriaceous; inflorescence terminal, fasciculate, few-flowered, with the buds developing sequentially or in pairs, the immature buds partially enclosed within a sheathlike bract; flowers ephemeral, small to large, resupinate, often white or pale yellow, sometimes turning pink with age, with or without darker markings; sepals slightly dissimilar, the dorsal sepal free, spreading, the lateral sepals obliquely joined to the column foot forming a short to long mentum; petals free, erect or spreading, more or less similar to dorsal sepal; labellum articulate with column foot, erect, often much shorter than other segments, entire or 3-lobed, frequently somewhat villose distally, the disk with 2 prominent longitudinal keels; column very short; column foot more or less perpendicular to column, short to long; clinandrium with anterior margin more or less toothed; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, slightly compressed laterally, unappendaged; rostellum short, transverse; stigma directly beneath rostellum, deeply recessed.

TYPE SPECIES: *Diplocaulobium nitidissimum* (Reichenb. f.) Kraenzl. (*Dendrobium nitidissimum* Reichenb. f.).

DISTRIBUTION: Malesia eastward in the Pacific to parts of Micronesia and to Fiji and Samoa, with approximately 70 species, one of which is endemic in Fiji.

Differences between *Diplocaulobium* and *Dendrobium* and some of the usages of the former (whether genus or section) have recently been discussed (Kores, 1989).

1. *Diplocaulobium tipuliferum* (Reichenb. f.) Kraenzl. in Pflanzenr. 45 (IV. 50. II. B. 21): 335. 1910; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 152, in obs. 1977; Kores in Allertonia 5: 101. 1989.

Dendrobium tipuliferum Reichenb. f. in Gard. Chron. n. s. 7: 72. 1877; Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; L. O. Williams in Bot. Mus. Leaflet 5: 125. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33. 1953; J. W. Parham, Pl. Fiji Isl. 288. 1964, ed. 2. 382. 1972.

Dendrobium crispatum sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 381. pl. 3. 1972; non Sw.

Small, caespitose, epiphytic plants 15–45 cm. tall, with an abbreviated, creeping rhizome; nonflowering pseudobulbs obclavate, 2.5–4 (–5.5) cm. long, 0.5–0.8 cm. in diameter; flowering pseudobulbs narrowly obclavate-attenuate, (10–) 12–29 cm. long, 0.4–0.6 cm. in diameter; leaves erect, somewhat coriaceous, slightly dimorphic; leaves borne by nonflowering pseudobulbs with the blade linear, (8.5–) 12–20 cm. long, 0.5–0.9 cm. broad, narrowly attenuate at base, obtuse to subacute at apex and frequently minutely bilobed; leaves borne by flowering pseudobulbs smaller, with the blade linear-elliptic, (6–) 8–12 cm. long, 0.4–0.8 cm. broad, abruptly attenuate and somewhat conduplicate at base, subacute at apex and minutely bilobed; bract oblong-lanceolate, conduplicate, 12–16 mm. long, 4–5 mm. broad; flowers solitary or rarely in pairs, greenish white to white, with red or pink markings; pedicel slightly longer than bract, slender; ovary slender, 2.5–4.2 cm. long; dorsal sepal spreading, linear-attenuate, 3.5–4 cm. long, 2–2.5 mm. broad at base; lateral sepal spreading, obliquely linear-attenuate, 3.5–4 cm. long, 3–4 mm. broad at base; mentum 3–4 mm. long; petals spreading, filiform-attenuate, 2.8–3.2 cm. long, 0.75–1.25 mm. broad; labellum erect, initially closely appressed to column, distally slightly reflexed, unguiculate, prominently 3-lobed, 2.8–3.2 cm. long, the lateral lobes ascending, embracing column, ovate, 2–3 mm. long, 1.5–2 mm. broad, subacute at apex with an erose or irregularly dentate anterior margin, the midlobe much larger than lateral lobes, 1.8–2.1 cm. long, conspicuously clawed, distally expanded into a prominent, ovate blade with conspicuously and irregularly lacinate margins; column relatively stout, 1.5–2 mm. long; column foot slender, 3–4 mm. long, slightly incurved at apex; clinandrium deeply excavate, with the anterior margin weakly 3-lobed, the lateral margins prolonged into hornlike

appendages surmounting column on either side of anther; anther more or less ovate, 0.75–1.25 mm. long, about 1.25 mm. across; pollinia oblong-ellipsoid, about 0.8 mm. long and 0.3 mm. broad; rostellum small, transverse; stigma deeply recessed, ovate.

TYPIFICATION: *Dendrobium tipuliferum* was based on *Veitch* (w 48182 HOLOTYPE), collected in Fiji without further data, presumably in 1865.

DISTRIBUTION: Endemic to Fiji and found from near sea level to an elevation of about 900 m. in forested areas and occasionally in mangrove swamps. Flowers have been collected between December and May (although *Veitch*'s type material was probably obtained in August, the only month in 1865 during which his Fijian visit is documented).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *im Thurn* 323, *Gillespie* 3831. NAMOSI: Along Queen's Road east of Navua River, *Greenwood* 975. NAITASIRE: Along Prince's Road, *Meebold* 21960. REWA: Mt. Korombamba, *Hassall s. n.* (κ); east of Suva harbor, in mangrove swamp (mouth of Tamavua River?), *Parks* 20026; vicinity of Suva, *Meebold* 26559. PROVINCE?: Namosi road, *B. & W. Gagné s. n.* (in vivo at Waimea Arboretum & Botanical Garden). TAVEUNI: Western slope between Somosomo and Wairiki, *Smith* 800. MOALA: Above Maloku, *Smith* 1369. FIJI without further locality, *U. S. Expl. Exped.* (AMES 74604).

30. *ERIA* Lindl. in *Bot. Reg.* **11**: t. 904. 1825; *Reichenb. f.* in *Seem. Fl. Vit.* **300**, p. p. 1868; *Kraenzl. in Pflanzenr.* **50** (IV. 50. II. B. 21): 15, p. p. 1911; *Hallé* in *Fl. Nouv.-Caléd. et Dépend.* **8**: 154. 1977; *Seidenfaden* in *Opera Bot.* **62**: 24. 1982; *Kores* in *Allertonia* **5**: 101. 1989; *Lewis & Cribb, Orch. Vanuatu*, 74. 1989. *Nom. cons.*

Small to large epiphytic or rarely terrestrial plants with pseudobulbous stems; pseudobulbs composed of 1 or more nodes, short to long, with 2 or more leaves or rarely unifoliate; leaves articulate, the blades conduplicate or rarely convolute in bud (but not convolute in any species that occur in Fiji); inflorescence terminal or axillary from upper nodes, laxly to densely spicate or racemose or rarely reduced to a single flower; flowers small to moderately large, resupinate; sepals slightly dissimilar, glabrous or pilose, the dorsal one free or connate with the others, the lateral ones adnate with column foot forming a short or rarely spurlike mentum, usually somewhat broader; petals similar to dorsal sepal or slightly narrower; labellum adnate or rarely articulate with apex of column foot, entire or 3-lobed, the disk often with longitudinal keels or thickenings; column short, stout, more or less 2-winged; column foot short to long; clinandrium more or less entire; anther terminal, decumbent, operculate, 2- or imperfectly 4-celled; pollinia 8, waxy, slightly compressed, in 2 fascicles each held together by a small viscidium.

TYPE SPECIES: *Eria stellata* Lindl. There is some question whether or not this is an appropriate choice. It also appears that *Eria* was unnecessarily conserved against *Pinalia* Lindl. (1826); however, that nomen rejiciendum is omitted from recent editions of ICBN (cf. *Kores*, 1989).

DISTRIBUTION: Asia and Malesia to Australia and eastward in the Pacific to Polynesia, with more than 350 species. Three species belonging to three different sections of the genus occur in Fiji.

USEFUL TREATMENT OF GENUS: SEIDENFADEN, *G. Orchid genera in Thailand* X. *Trichotisia* Bl. and *Eria* Lindl. *Opera Bot.* **62**: 1–157. 1982.

KEY TO SPECIES

- Flowers solitary; plants less than 1.5 cm. tall; rhizome creeping. 1. *E. bulbophylloides*
 Flowers in lax to dense spikes or racemes; plants (8–) 15–60 cm. tall; rhizome abbreviated.
 Pseudobulbs not obscured by cataphylls; inflorescences glabrous or laxly covered by simple hairs; flowers with a small mentum 0.5–1 mm. long. 2. *E. rostriflora*
 Pseudobulbs completely obscured by a series of cataphylls; inflorescences densely covered by rufous stellate hairs; flowers with a large mentum about 4 mm. long. 3. *E. robusta*

1. *Eria bulbophylloides* C. Schweinf. in Bishop Mus. Bull. **141**: 24. fig. 7, e. 1936; L. O. Williams in Bot. Mus. Leafl. **5**: 129. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 33. 1953; J. W. Parham, Pl. Fiji Isl. **290**. 1964, ed. 2. 383. 1972; Kores in Allertonia **5**: 102. 1989. FIGURE 89 (upper).

Epiphytic, rhizomatous, repent plant, very small, less than 1.5 cm. tall, the rhizome much branched, filiform; pseudobulbs widely spaced along rhizome, subglobose, 1.5–3 mm. across, bifoliate; leaves patent, the blades suborbicular to elliptic or elliptic-obovate, 4–14 mm. long, 3.5–6.5 mm. broad, somewhat membranous, conduplicate in bud, broadly to narrowly cuneate at base, broadly acute to obtuse at apex; inflorescence terminal, erect, 1-flowered, 1.2–2 cm. long, glabrous; flowers dull yellow to yellowish orange or white, the labellum sometimes distally tinged with purple; dorsal sepal slightly spreading, ovate to oblong-ovate, 4–6 mm. long, 1.25–2 mm. broad, obtuse at apex; lateral sepals partially fused along ventral margins for 1–1.5 mm. above mentum, distally free, slightly spreading, obliquely oblong-ovate, 5–6 mm. long, 2.2–2.8 mm. broad, subacute to obtuse at apex; mentum about 1.5 mm. long; petals porrect, oblong to oblong-elliptic, 4–4.5 mm. long, 1.25–2 mm. broad, subacute at apex; labellum porrect, slightly sigmoidally curved, broadly ovate in outline when flattened, 2.5–3.5 mm. long, 2–2.5 mm. broad, the lateral margins curved upward, the base cuneate, somewhat concave, the apex slightly reflexed, subacute to obtuse, the disk naked; column short, stout, about 1 mm. long; column foot a little retroflexed, about 1.25 mm. long; clinandrium shallowly excavate, the margin 3-lobed; anther complanate-suborbicular, about 0.25 mm. long; capsule cylindrical-fusiform, about 7 mm. long and 4 mm. in diameter.

TYPIFICATION: The species is based on *Smith 452* (AMES 41962 HOLOTYPE; ISOTYPE at BISH), collected Nov. 14, 1933, on Mt. Mariko, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji, occurring in dense forest or on trees on open slopes from near sea level to an elevation of about 960 m. Flowers have been obtained in months scattered throughout the year.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Summit of Mt. Nambui, Korombasambasanga Range, *DA 14560*. NAITASIRE: Tholo-i-suva, *DA*, June 1, 1949, 9850, Kores & Molvray F5. REWA: Mt. Korombamba, *Hassall 8799* (K spirit coll.); vicinity of Suva, *Meebold 21936*, *Simmonds s. n.* (K spirit 9442, perhaps cultivated from a wild specimen). VANUA LEVU: MATHUATA: Southern slopes of Mt. Numbuloa, east of Lambasa, *Smith 6557*. THAKAUNDROVE: Mt. Kasi, Yanawai River region, *Smith 1815*. TAVEUNI: Crater Lake east of Somosomo, *DA 14381*.

2. *Eria rostriflora* Reichenb. f. in Seem. Fl. Vit. 301. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 308. 1892; Kraenzl. in Pflanzenr. **50**(IV. 50. II. B. 21): 116. 1911; L. O. Williams in Bot. Mus. Leafl. **5**: 130. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 33. 1953; J. W. Parham, Pl. Fiji Isl. **290**. 1964, ed. 2. 383. 1972; Stone in Micronesica **6**: 158. 1970; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 160, in adnot. 1977; Kores in Allertonia **5**: 102. 1989; Lewis & Cribb, Orch. Vanuatu, **74**. pl. 7. C. 1989.

FIGURE 58.

Orchidea Seem. in Bonplandia **9**: 260. 1861, Viti, 443. 1862.

Eria vieillardii Reichenb. f. in Linnaea **41**: 86. 1877; Drake, Ill. Fl. Ins. Mar. Pac. 95, as *E. vieillardii*. t. 49. 1889, op. cit. 308, as *E. vieillardii*. 1892; Schlechter in Bot. Jahrb. **39**: 76. 1906; H. Fleischm. & Rechanger in Denkschr. Akad. Wiss. Wien **85**: 260, as *E. vieillardii*. 1910; Kraenzl. in Pflanzenr. **50**(IV. 50. II. B. 21): 114. 1911; Guillaumin in Notul. Syst. (Paris) **10**: 64. 1941; Fl. Nouv.-Caléd. **63**. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 159. pl. 73. 1977.

Pinalia rostriflora Kuntze, Rev. Gen. Pl. **2**: 679. 1891.

Eria curvipes Kraenzl. in Notizbl. Bot. Gart. Berlin **5**: 110. 1909, in Pflanzenr. **50**(IV. 50. II. B. 21): 169. 1911; Schlechter in Repert. Sp. Nov. **9**: 105. 1911; Christophersen in Bishop Mus. Bull. **128**: 67. 1935.

Eria consimilis H. Fleischm. & Rechanger in Denkschr. Akad. Wiss. Wien **85**: 260. t. 2. fig. 11. 1910; Kraenzl. in Pflanzenr. **50**(IV. 50. II. B. 21): 114. 1911; Schlechter in Repert. Sp. Nov. **9**: 104. 1911.

Eria setchellii Schlechter ex Setchell in Univ. Calif. Publ. Bot. **12**: 162. 1926; F. Br. in Occas. Pap. Bishop Mus. **9** (4): 19. 1930.



FIGURE 58. *Eria rostriflora*; portion of a flowering plant showing inflorescences, in cultivation on the campus of the University of the South Pacific, Suva (Kores & Molvray F16), \times about 2/3.

Epiphytic, erect plant (8-) 15-35 cm. tall, the rhizome abbreviated, stout; pseudobulbs closely spaced along rhizome, erect, cylindrical, (2.5-) 4-25 cm. long, 1-1.5 cm. in diameter, distally 3-6-foliolate; leaves distichous, ascending, the blades conduplicate in bud, coriaceous, glabrous, linear-ligulate, 6-20 (-25) cm. long, 1-2 cm. broad, gradually narrowed to petiole, acute to subacute at apex; inflorescences axillary from upper nodes, erect or ascending, racemose, 5-20 cm. long, glabrous or with a few scattered, simple hairs, the peduncle abbreviated, less than 1 cm. long, the rachis slender, laxly few-many-flowered; flowers glabrous, pale green to light yellow, the labellum sometimes tinged with dark red or purple; dorsal sepal slightly spreading, lanceolate, (3-) 4-10 mm. long, 0.75-1.5 mm. broad, acute at apex; lateral sepals erect or slightly spreading, lanceolate, slightly oblique, (3-) 4-10 mm. long, 1.25-2.25 mm. broad, acute at apex; mentum small, 0.5-1 mm. long; petals lanceolate, (2.5-) 3.5-9.5 mm. long, 0.75-1.5 mm. broad, acute at apex; labellum porrect, slightly curved, entire, ovate to oblong-ovate, (1.5-) 2-4 mm. long, 0.75-1.5 mm. broad, the lateral margins slightly turned upward in lower half, the base cuneate, the apex acuminate to acute, with entire or weakly undulate margins, the disk naked or with 2 small keels near base; column short, 0.5-1 mm. long; column foot perpendicular to column and about same length; ovary short-pedicellate; capsule narrowly cylindrical.

TYPEIFICATION AND NOMENCLATURE: The nomenclature and relationships of this taxon were recently discussed (Kores, 1989), but the five entities are here briefly typified. The type of *Eria rostriflora* is *Seemann 615* (K HOLOTYPE; ISOTYPES at AMES 74738, p, w 19987), collected in 1860 in the vicinity of Namosi Village, Namosi Province, Viti Levu. *Eria vieillardii* is based on *Vieillard 1335* (P HOLOTYPE), collected between 1855 and 1860 near Canala, New Caledonia. *Eria curvipes* is typified by *Vaupel 416* (B presumed HOLOTYPE, probably destroyed), obtained near Lanuto'o,

Upolu, Samoa; *E. consimilis* by K. & L. Rechinger 96 (w 3119 HOLOTYPE), collected June 23, 1905, above Utumapu, Upolu, Samoa. *Eria setchellii* was a new name for Drake's (1889) concept of *E. vieillardii* and is represented by four syntypes from Tahiti: *Vesco s. n.*, *Lepine 26*, *Nadeaud s. n.*, and *Savatier s. n.*

DISTRIBUTION: Widespread from the Solomon Islands, New Caledonia, and Guam through the New Hebrides, Fiji, Samoa, and the Society Islands. In Fiji it has thus far been collected only on Viti Levu and Taveuni, where it has been obtained from near sea level to an elevation of about 800 m., usually in dense forest.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu and vicinity, *im Thurn 63, 374*, Gillespie 3838. NANDRONGA & NAVOSA: Vicinity of Nandrau, *im Thurn 313*. SERUA: Vicinity of Namboutini, *DF 379*; hills east of Navua River, near Nukusere, *Smith 9103*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8427*; northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8698*. NAITASIRE: Wainisavelevu Creek, upper Wainimala Valley, *Hassall 127934* (K spirit); Nanggali, Waindina River, *DA 2641*; Prince's Road, *Meebold 16912*; Nasinu River, Prince's Road, *Vaughan 3287*; Old Pumping Station, *Vaughan 3197*. REWA: Suva, in cultivation on campus of University of the South Pacific, *Kores & Molvray F16*. VITI LEVU without further locality, *Simmonds s. n.* (K spirit 5689, 21311). TAVEUNI: Track to Crater Lake, east of Somosomo, *DA 17121*; valley between Mt. Manuka and main ridge of island, *Smith 8291*. FIJI without further locality, *U. S. Expl. Exped.* (AMES 74739).

3. *Eria robusta* (Bl.) Lindl. Gen. Sp. Orchid. Pl. 69. 1830; Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 21): 53. 1911; Holtttum, Fl. Malaya 1: 378. 1953; Seidenfaden in Opera Bot. 62: 84. fig. 45. 1982; Kores in Allertonia 5: 104. 1989.

Dendrolirium robustum Bl. Bijdr. Fl. Ned. Ind. 347. 1825.

Eria aeridostachya Reichenb. f. ex Lindl. in J. Proc. Linn. Soc. Bot. 3: 48. 1859, in Seem. Fl. Vit. 301. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 308. 1892; H. Fleischm. & Rechinger in Denkschr. Akad. Wiss. Wien 85: 259. 1910; Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 21): 35. fig. 5. 1911; L. O. Williams in Bot. Mus. Leaf. 5: 129. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33. 1953; J. W. Parham, Pl. Fiji Isl. 290. 1964, ed. 2. 383. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 160. pl. 73. 1977.

Orchidea Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Pinalia aeridostachya Kuntze, Rev. Gen. Pl. 2: 679, as *P. aeridostachya*. 1891.

Epiphytic, erect plant (20–) 30–60 cm. tall, the rhizome abbreviated, stout; pseudobulbs closely spaced, erect, completely obscured by a series of large, somewhat fleshy cataphylls, ovoid to oblong-ovoid, 4.5–7 cm. long, about 2 cm. in diameter, bifoliate; leaves erect, the blades conduplicate in bud, coriaceous, glabrous, lanceolate, (15–) 25–45 cm. long, 2.5–5.5 cm. broad, gradually narrowed to petiole, acute at apex; inflorescences axillary from upper nodes, erect, racemose, 15–30 cm. long, densely covered with rufous stellate hairs throughout, the rachis densely many-flowered; flowers subdensely covered with stellate hairs externally, white to pale yellow; dorsal sepal somewhat hooded over column, oblong to oblong-ovate, 3.5–4 mm. long, 2–2.25 mm. broad, subacute at apex; lateral sepals above mentum slightly spreading, obliquely ovate, 3.5–4 mm. long, 3–3.5 mm. broad, acute at apex; mentum slightly retroflexed, clavate, conspicuously elongate, up to 4 mm. long, obtuse at apex; petals closely appressed to dorsal sepal, narrowly oblong-falcate, 2.75–3.25 mm. long, about 1.25 mm. broad, obtuse at apex; labellum erect throughout proximal 2/3, distally correct to slightly reflexed, oblong-ovate, 4–5 mm. long, 2.5–3 mm. broad, the lateral margins slightly incurved throughout proximal 2/3, weakly undulate distally, the base slightly ventricose, more or less oblong-angustate, the apex broadly acute, the disk naked; column stout, about 1 mm. long; column foot perpendicular to column and somewhat channelled throughout basal half, distally slightly retroflexed, 3.5–4 mm. long, gradually tapering toward apex; ovary short-pedicellate.

TYPIFICATION AND NOMENCLATURE: *Dendrolirium robustum* is typified by *Blume s. n.*, from mountains in the provinces of Buitenzorg and Tjanjor, Java; *Eria aeridostachya* by *Loddiges 229* (K HOLOTYPE), from Batavia, Java. These two taxa have been

considered conspecific by several authors, including Holttum (1953) and Seidenfaden (1982); the available collections from Melanesia and Samoa appear to be indistinguishable from those of Java and other parts of Malesia that have been referred to either of the two taxa.

DISTRIBUTION: India and southeastern Asia into parts of Malesia, and also in the Solomon Islands, New Caledonia, Fiji, and Samoa. The species is infrequent in Fiji, at least on the basis of available collections, thus far known with certainty only from southeastern Viti Levu and presumably from elevations of less than 200 m.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Probably from vicinity of Namosi Village, *Seemann 609*. REWA: Swamp near mouth of Veisari River, *in Thurn 42, 358, s. n.* VITI LEVU without further locality, *Parks 20914*.

31. **MEDIOCALCAR** J. J. Sm. in Bull. Inst. Bot. Buitenzorg 7: 3. 1900; Schlechter in Repert. Sp. Nov. Beih. 1: 224. 1911; J. J. Sm. in Nova Guinea 14: 381. 1929; L. O. Williams in Bot. Mus. Leafl. 5: 130. 1938; van Royen, Alpine Fl. New Guinea 2: 659. 1979; Kores in Allertonia 5: 104. 1989; Lewis & Cribb, Orch. Vanuatu, 76. 1989.

Eria sect. *Ornithidiiformes* Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 21): 27, p. 1911.

Small epiphytic plants with creeping rhizomes and short, pseudobulbous stems; pseudobulbs congested to widely separated, erect or partially adnate to rhizome and ascending, small, slender, heteroblastic, completely surrounded by persistent cataphylls, uni- or bifoliate; leaves more or less erect, conduplicate in bud, articulate, coriaceous, short-petiolate, the base of petiole nonsheathing; inflorescence terminal, sometimes on a rudimentary shoot, 1-flowered or rarely fasciculate and 2-flowered, the peduncle often rather long, slender, with a small apical bract; flowers small, frequently somewhat fleshy, resupinate, often reddish or orange, the apices of segments usually paler in color; sepals connate to one another in the lower 1/2-3/4 and forming an obliquely urceolate tube, dissimilar, the lateral sepals distinctly saccate at base; petals free, erect, much narrower than sepals; labellum adnate to column foot, erect, clawed, the blade entire, with a prominent, shallow to deep, concave to spurlike depression in center, the disk naked; column relatively long, slender, often with 2 lateral stelidia at apex; column foot short; clinandrium deeply excavate, the margins entire or somewhat dentate; anther terminal, decumbent, cucullate, incompletely 2-celled; pollinia 8, waxy, arranged in 2 fascicles of 4, borne on a common caudicle; rostellum small, transverse, entire or weakly 2-lobed; stigma directly below rostellum, transverse, deeply recessed.

TYPE SPECIES: *Mediocalcar bicolor* J. J. Sm., the only original species.

DISTRIBUTION: Malesia, largely confined to Paupasia but occurring eastward to portions of Micronesia, the Santa Cruz Islands, the New Hebrides, Fiji, and Samoa, with approximately 35 species. One species is indigenous in Fiji. Of the two sections of the genus now currently recognized (Smith, 1929; van Royen, 1979), only sect. *Brevicalcar* J. J. Sm. extends eastward to Fiji and Samoa.

1. **Mediocalcar paradoxum** (Kraenzl.) Schlechter in Repert. Sp. Nov. 9: 96. 1910, in Repert. Sp. Nov. Beih. 1: 224, in adnot. 1911; Christophersen in Bishop Mus. Bull. 128: 65. 1935; Kores in Allertonia 5: 105. 1989; Lewis & Cribb, Orch. Vanuatu, 76. *fig. 13, A-G, pl. 3, B.* 1989. FIGURE 59.

Eria paradoxa Kraenzl. in Bot. Jahrb. 25: 606. 1898, in Pflanzenr. 50 (IV. 50. II. B. 21): 30. 1911.

Mediocalcar vanikorense Ames in J. Arnold Arb. 13: 136. 1932.

Mediocalcar sp. L. O. Williams in Bot. Mus. Leafl. 5: 130. 1938.

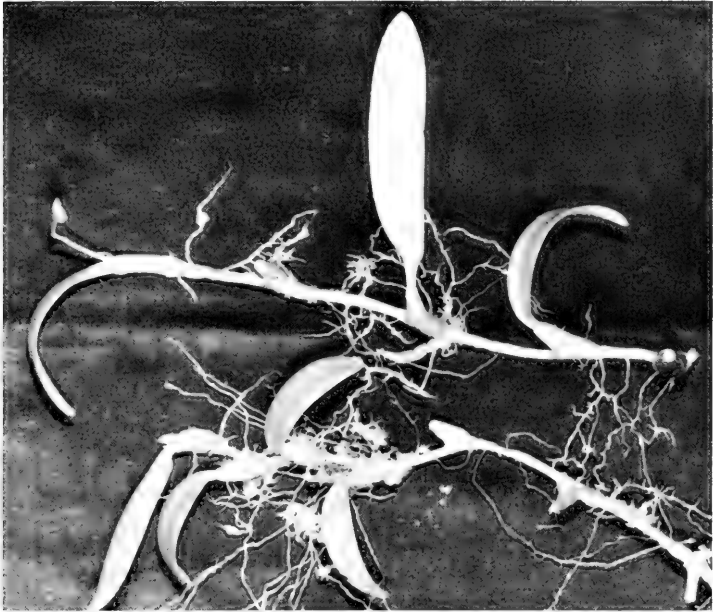


FIGURE 59. A flowering plant of *Medioclcar paradoxum*, collected for cultivation near the Monasavu dam site, Viti Levu (R. H. Phillips, no voucher retained), \times about 1/2.

Epiphytic, creeping plants 5–10 cm. tall, the rhizome elongated, terete, 2.8–4 mm. in diameter, initially completely obscured by persistent, overlapping cataphylls, gradually becoming exposed with age, the cataphylls obliquely tubular-infundibular, 0.5–1.5 cm. long, glabrous, with a broad, hyaline band at upper margin; pseudobulbs (1.3–) 2–4.5 cm. apart, unifoliate, the basal portion adnate to rhizome, the distal portion free, ascending, conical to conical-cylindric, 0.7–1.6 cm. long, 0.4–0.8 cm. in diameter; leaves erect, up to 14 cm. long overall, the blade ligulate to oblong-lanceolate, 4–13 cm. long, 0.8–2.3 cm. broad, coriaceous, gradually attenuate with petiole at base, obliquely subacute to minutely bilobed at apex; inflorescences 1- or rarely 2-flowered, the peduncle filiform, 1.7–3.5 cm. long, glabrous, the bract erect, attenuate-subulate, 1–1.5 mm. long; flowers ascending to patent, orange to yellowish orange, glabrous, the tips of sepals tinged with green; sepals connate throughout proximal 2/3, the dorsal sepal oblong-ovate, 7.2–8.5 mm. long, 3–3.5 mm. broad, subacute at apex, the lateral sepals obliquely ovate, 7.5–9 mm. long, 4.5–5.5 mm. broad, subacute at apex; petals narrowly oblanceolate, 6.5–8 mm. long, about 2 mm. broad, narrowly acute at apex; labellum erect, 8–9 mm. long overall, the claw arcuate, oblong-quadrate, 2–2.5 mm. long, 1.5–2 mm. broad, weakly auriculate at base, the blade ovate, concave, 6–6.5 mm. long, 3.5–4.5 mm. broad, narrowly acuminate at apex, the lateral margins turned upward in

proximal 2/3, gradually becoming slightly convolute near apex, the depression briefly saccate, much shallower than length of claw; column semiterete, slightly dilated near apex, about 4 mm. long, the steldia small, obtuse; column foot slightly reflexed, about 1.5 mm. long; clinandrium with lateral margins briefly dentate; anther subquadrate-cucullate, about 1.3 mm. across, broadly rounded at apex; pollinia broadly obovoid, laterally compressed, about 0.7 mm. across; rostellum entire, hyaline; stigma large; ovary short-pedicellate, cylindrical-clavate, glabrous, 1.1–1.5 mm. long.

TYPIFICATION AND NOMENCLATURE: The type of *Eria paradoxa* is *Reinecke 300* (B HOLOTYPE; ISOTYPE at G), collected in May, 1894, at Lanuto'o, Upolu, Samoa. *Medio-calcara vanikorensis* is based on *Kajewski 641* (AMES 37194 HOLOTYPE and 38078 ISOTYPE), collected Nov. 22, 1928, on Vanikoro, Santa Cruz Islands. Comparison of the two types, together with study of collections of the complex between Samoa and the Santa Cruz Islands, does not indicate significant differences between the two concepts.

DISTRIBUTION: Santa Cruz Islands, New Hebrides, Fiji, and Samoa. In Fiji the species is infrequent and is known with certainty only from Viti Levu, found there in dense forest from near sea level to approximately 1,150 m. Flowers have been obtained in July and August, fruits in September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills between Nggaliwana and Tumbeindreketi Creeks, east of the sawmill at Navai, *Smith 5998*; western and southern slopes of Mt. Tomanivi, *Smith 5120*. REWA: Near Suva, *Simmonds s. n.* (AMES 106236). FIJI without further locality (but probably from Viti Levu), *Parks 20560*, *DA 3884*.

32. **EPIBLASTUS** Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 136. 1905, in Repert. Sp. Nov. 9: 98. 1911, in Repert. Sp. Nov. Beih. 1: 235. 1911; van Royen, Alpine Fl. New Guinea 2: 488. 1979; Kores in Allertonia 5: 106. 1989; Lewis & Cribb, Orch. Vanuatu, 79. 1989.

Eria sect. *Ornithidiiformes* Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 21): 27, p. p. 1911.

Large epiphytic or rarely terrestrial plants with abbreviated rhizomes and long, sympodially branched, pseudobulbous stems, the roots fleshy, densely covered with fine root hairs; pseudobulbs homoblastic, slender, cylindrical, unifoliate, partially or entirely ensheathed in a series of persistent cataphylls, the new pseudobulbs usually arising laterally near tops of old pseudobulbs; leaves articulate, conduplicate in bud, linear or linear-lanceolate, with nonsheathing bases; inflorescences terminal, fasciculate, few-many-flowered, the peduncles long, slender, 1-flowered, with a small apical bract; flowers frequently undergoing anthesis simultaneously, small, resupinate, usually reddish in color; sepals dissimilar, the dorsal sepal free, erect, or weakly spreading, elliptic to oblong-elliptic, the lateral sepals obliquely adnate to column foot and partially connate to each other along ventral margins forming a short, blunt mentum, distally free, weakly spreading, generally somewhat broader than dorsal sepal; petals free, erect, usually a little shorter than sepals; labellum adnate to column foot by a longitudinal crest, immobile, more or less erect, frequently arcuate, clawed, the blade entire or weakly 3-lobed with the lateral lobes often embracing column, the disk frequently with a prominent, fleshy, transverse callus or a pair of small thickenings at apex of claw, rarely naked; column short, stout; column foot well developed, generally somewhat inflexed distally; clinandrium relatively small, deeply excavate; anther terminal, decumbent, cucullate, 2-celled; pollinia 8, waxy, unappendaged; rostellum short, transverse; stigma directly below rostellum, deeply recessed.

TYPE SPECIES: *Epiblastus ornithidioides* Schlechter, the only original species.

DISTRIBUTION: Celebes to Fiji and Samoa, with about 20 species, most of which are Papuanian. A single species occurs in Fiji and Samoa.

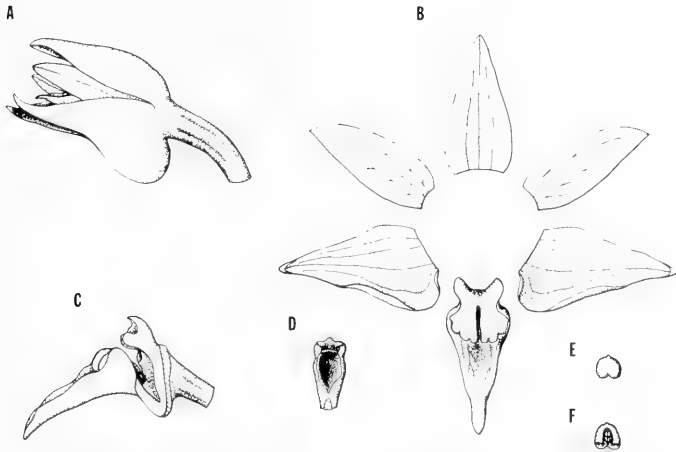


FIGURE 60. *Epiblastus sciadhanthus*, from *Smith 5673*; A, complete flower, $\times 6$; B, perianth segments, $\times 6$; C, column with attached labellum viewed from side, $\times 6$; D, apical portion of column with anther cap and column foot removed, showing clinandrium, rostellum, and stigma, $\times 6$; E, anther cap viewed from above, $\times 6$; F, anther cap viewed from front, $\times 6$.

1. ***Epiblastus sciadhanthus*** (F. v. Muell.) Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 137, in adnot. 1905, in Repert. Sp. Nov. 9: 98. 1911, in Repert. Sp. Nov. Beih. 1: 235, in adnot. 1911; Kores in Allertonia 5: 106. 1989; Lewis & Cribb, Orch. Vanuatu, 79. 1989. FIGURE 60.

Bulbophyllum sciadhanthum F. v. Muell. in S. Sci. Rec. 2: 95. 1882.

Eria ornithioides Kraenzl. in Bot. Jahrb. 25: 606, as *E. ornithioides*. 1898, corr. in Pflanzenz. 50 (IV. 50. II. B. 21): 27, pro syn. 1911; non *Epiblastus ornithioides* Schlechter (1905).

Eria sciadhantha Kraenzl. in Pflanzenz. 50 (IV. 50. II. B. 21): 27, p. 1911.

Epiphytic, scandent plants up to 60 cm. long; pseudobulbs cylindrical, somewhat dilated and slightly compressed laterally toward apex, 5–9 cm. long, 1–1.5 cm. broad; leaves erect, ligulate, 25–36 cm. long, (0.9–) 1.3–3 cm. broad, subcoriaceous, gradually angustate and somewhat channelled at base, obliquely subacute at apex; inflorescences 7–15 cm. long, 4–10-flowered, the peduncles filiform, 4.5–12 cm. long, uniflorous, the bract erect, minute, attenuate-subulate, about 1 mm. long, membranous, glabrous; flowers ascending to patent, salmon-pink to reddish pink throughout, glabrous; dorsal sepal erect, oblong-elliptic, 7–8 mm. long, about 3.5 mm. broad, subacute at apex; lateral sepals weakly spreading distally, obliquely ovate, 7–8 mm. long, about 5 mm. broad at base, narrowly subacute at apex, the ventral margins prominently dilated near base; mentum well developed, obtuse; petals erect, oblong-elliptic, slightly oblique, 6.5–7.5 mm. long, 3–3.5 mm. broad, acute at apex; labellum erect, arcuate, 6–8 mm. long overall, the claw cuneate-attenuate, 1.5–2 mm. long, somewhat channelled distally, the blade entire, ovate-attenuate, 4.5–6 mm. long, 3.5–4.5 mm. broad, narrowly subacute at apex, the lateral margins turned upward throughout proximal half, gradually becoming slightly convolute distally, the disk with a large callus at base of blade, the callus transverse, platelike, deeply cleft medially, the anterior margin weakly undulate; column semiterete, about 5 mm. long; column foot almost perpendicular to column, slightly incurved distally, slender, about 2 mm. long; clinandrium

deeply excavate, the margins weakly 3-lobed; anther reniform-cucullate, about 1.75 mm. across, broadly emarginate at apex; pollinia broadly obovate, laterally compressed, about 0.7 mm. across; rostellum short, transverse; stigma large, elliptic; ovary short-pedicellate, slender, cylindrical-clavate, 2-2.5 mm. long, glabrous.

TYPIFICATION AND NOMENCLATURE: The type of *Bulbophyllum sciadhanum* is *Betche s. n.* (MEL HOLOTYPE), collected in 1880 near the source of the Waimasse River, Upolu, Samoa; that of *Eria ornithidioides* is *Reinecke 313* (B HOLOTYPE; ISOTYPE at G), obtained in the region of the Laili River, also on Upolu. Kraenzlin himself (1911) reduced his taxon to *Epiblastus sciadhanus*, at the same time correcting his original orthography and transferring the taxon to *Eria*.

DISTRIBUTION: Sporadically occurring in the New Hebrides, Fiji, and Samoa, but nowhere frequent. In Fiji it is presumably limited to upland dense forest on Viti Levu at elevations of 850-1,150 m. Flowers have been noted between August and February.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Summit of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 5673*; vicinity of Navai (probably), south of Nandarivatu, *im Thurn 311*; western and southern slopes of Mt. Tomanivi, *Smith 5919*. FIJI without further locality, *im Thurn s. n.*

33. AGROSTOPHYLLUM Bl. Bijdr. Fl. Ned. Ind. 368. 1825, Tab. Pl. Jav. Orchid. t. III. fig. 53. 1825; Reichenb. f. in Seem. Fl. Vit. 296. 1868; Schlechter in Repert. Sp. Nov. Beih. 1: 256. 1912; Hallé in Fl. Nouv-Caléd. et Dépend. 8: 318. 1977; Kores in Allertonia 5: 107. 1989; Lewis & Cribb, Orch. Vanuatu, 79. 1989.

Large epiphytic plants with abbreviated rhizomes and elongated, jointed, leafy stems, these often complanate, completely obscured by the persistent leaf bases; leaves numerous, distichous, articulate, conduplicate in bud, coriaceous, more or less oblong-ligulate to linear-ligulate, with overlapping, clasping, conduplicate, sheathing bases; inflorescences terminal or rarely lateral, either dense and usually nodding many-flowered heads composed of 1-6-flowered spikes and partially enclosed by a series of chaffy involucre-like bracts, or rarely elongated fasciculate racemes; flowers small, nonresupinate; sepals free, spreading, slightly dissimilar; petals free, generally somewhat narrower than sepals; labellum adnate to base of column, immobile, entire, the base closely appressed to ovary, more or less saccate, sometimes fleshy, the distal portion separated from base by a transverse crest, flat or slightly concave; column short to relatively long; column foot indistinct; clinandrium shallowly to deeply excavate, with the anterior margin often toothed or lobed; anther terminal, decumbent, operculate, 2-celled; pollinia 8, waxy, attached to a common viscidium; rostellum entire or 2-lobed; stigma directly beneath rostellum.

TYPE SPECIES: *Agrostophyllum javanicum* Bl., the only original species.

DISTRIBUTION: Throughout Malesia and also in the Seychelles, and eastward through the Solomon Islands, parts of Micronesia, and New Caledonia to Samoa, with approximately 60 species. Two species, of different sections, occur in Fiji, one endemic and one also found in Samoa.

KEY TO SPECIES

- Inflorescence a dense, many-flowered head composed of few-flowered spikes, partially enclosed by a series of involucrelike bracts (sect. *Agrostophyllum*). 1. *A. aristatum*
 Inflorescence an elongated, fasciculate raceme, not surrounded by involucre-like bracts (sect. *Dolichodesme*). 2. *A. megalurum*

1. *Agrostophyllum aristatum* Kores in Allertonia 5: 107. 1989. FIGURE 61A-C.

Agrostophyllum sp. L. O. Williams in Bot. Mus. Leaflet. 5: 130. 1938.

Glomera macdonaldii sensu B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: pl. 10. 1953; non J. J. Sm.

This recently described species, of sect. *Agrostophyllum*, is an erect, epiphytic or rarely terrestrial herb to 80 cm. high, occurring in dense or open forest at recorded elevations between 200 and 1,219 m. It is characterized by its large leaves, of which the blades are 14–25 × 2.2–3.5 cm., its ample, semiglobose inflorescences 4.5–6 cm. in diameter, its aristate sepals 5–6.5 mm. long, and its labellum being only slightly to moderately dilated toward apex. Its closest relationship appears to be with the New Guinean *Agrostophyllum parviflorum* J. J. Sm. Flowers have been noted in February, April, and May, fruits in August and September.

TYPIFICATION: The type is *im Thurn F36* (K HOLOTYPE), consisting of material that was apparently obtained at two different times in the vicinity of Nandarivatu, Mba Province, Viti Levu. Of the two labels, one indicates the locality as Nandarivatu, in April, 1905; the second label indicates "range to west of Matakuli, alt. 4,000 ft.," May 3, 1905. It is not clear whether the same locality was visited twice or whether two different localities are concerned (cf. Kores, 1989).

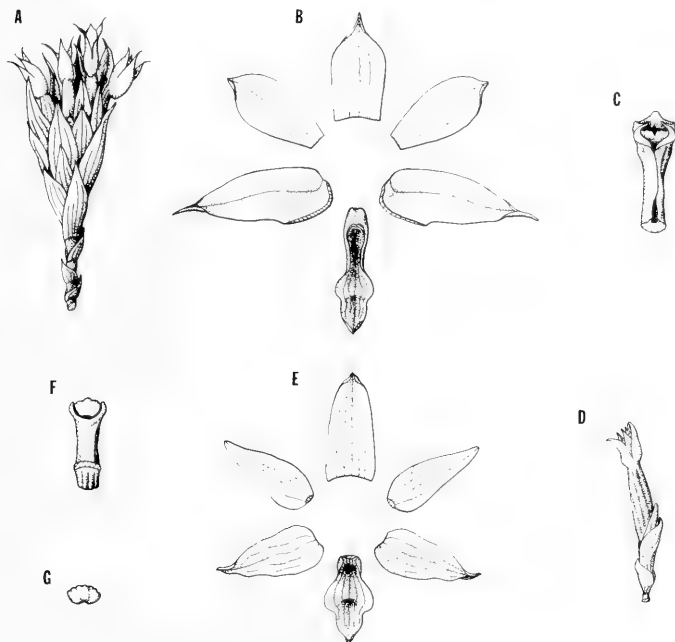


FIGURE 61. A–C, *Agrostophyllum aristatum*; A, individual spike from the inflorescence, × 1 1/2; B, perianth segments, × 3; C, apical portion of column viewed from front, with the anther cap removed, showing clinandrium, rostellum, stigma, and inrolled lateral margins, × 3. D–G, *Agrostophyllum megalurum*; D, individual spike from the inflorescence, × 1 1/2; E, perianth segments, × 3; F, complete column with anther cap viewed from front, × 3; G, anther cap viewed from above, × 3. A–C from *im Thurn F36*, D–G from *DA 14218*.

DISTRIBUTION: Endemic to Fiji and thus far known from the three largest islands, but apparently scattered and infrequent.

LOCAL NAME: *Mbasambasa* (Naitasiri, from *St. John 18254*).

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Mt. Naitarandamu, *Gillespie 3163, 3247.4*; Wainamara, track to Namosi, *DA 11623*. NAITASIRI: Vuva Falls trail, Waisiwiwi Creek (tributary of Wainamo Creek), Wainimala River Valley, *St. John 18254*. VANUA LEVU: MBUA: (Probably inland from) Mbua Bay, *U. S. Expl. Exped. (AMES 74781)*. TAVEUNI: Valley between Mt. Manuka and main ridge of island, *Smith 8304*.

2. *Agrostophyllum megalurum* Reichenb. f. in Seem. Fl. Vit. 296. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 309. 1892; Kraenzl. in Bot. Jahrb. 25: 602. 1898; Schlechter in Repert. Sp. Nov. 9: 96. 1910, in Repert. Sp. Nov. Beih. 1: 257, in obs. 1912; Yuncker in Bishop Mus. Bull. 184: 31. 1945; Kores in Allertonia 5: 109. 1989.

FIGURE 61D-G.

Appendicula bracteosa sensu H. Fleischm. & Rechinger in Denkschr. Akad. Wiss. Wien 85: 257. t. 4, fig. 2. 1910; non Reichenb. f.

Epiphytic plants up to 75 cm. tall, the rhizome much abbreviated, the stems slender, unbranched, about 2.5 mm. across, densely foliate; leaves ascending, the sheathlike bases more or less oblong-elliptic, 2.2-2.8 cm. long, 1-1.8 cm. broad, with a small subdeltoid tooth on the anterior margin on either side of base of blade, the blades ligulate to ligulate-lanceolate, 5.3-9.5 cm. long, 6.5-13 mm. broad, rounded at base, briefly and acutely bilobed at apex; inflorescences terminal, elongated, fasciculate racemes 15-28 cm. long, the fascicles of flowers more or less appressed, each subtended by a single large cataphyll quickly becoming reduced to stiff fibers with age, the peduncles usually in pairs, much abbreviated, completely surrounded by 1 or 2 small sheaths, uniflorous, the bracts clasping, broadly ovate, about 5.5 mm. long and 4 mm. broad; flowers erect, small, probably white; dorsal sepal oblong to oblong-ovate, 3.5-4 mm. long, 1.7-2 mm. broad, acute at apex, the lateral sepals ovate, slightly oblique, 4-4.5 mm. long, 1.5-1.8 mm. broad, narrowly acute at apex; petals narrowly ovate to elliptic-ovate, about 4 mm. long and 1.3 mm. broad, narrowly subacute at apex; labellum closely appressed to column, more or less oblong-pandurate in outline, about 3.5 mm. long and 1.5 mm. broad, the base somewhat fleshy, weakly saccate, the distal portion slightly cucullate, abruptly acuminate at apex, the disk naked; column stout, semiterete, about 2.5 mm. long, somewhat dilated at apex; clinandrium shallowly excavate, broad, the dorsal margin weakly tridentate; anther reniform-cucullate, about 0.7 mm. long and 1.2 mm. broad, somewhat umbonate dorsally, broadly retuse at apex; pollinarium unobservable; rostellum vestigial; stigma large, transversely elliptic, slightly marginate below.

TYPIIFICATION: The species is typified by *Graeffe s. n.* (w 37344 HOLOTYPE), from Upolu, Samoa; *Graeffe 43* (w) may also be part of the type collection (Kores, 1989).

DISTRIBUTION: Samoa and Fiji, uncommon in the first archipelago and apparently very rare in the latter, where it was collected once in forest at a probable elevation of 200-400 m. and was flowering in May.

AVAILABLE COLLECTION: VITI LEVU: NAMOSI: Without further locality but perhaps from vicinity of Namosi Village, *DA 14218*.

34. *EARINA* Lindl. in Bot. Reg. 20: sub t. 1699. 1834; Reichenb. f. Otia Bot. Hamb. 54. 1878 (repr. Xenia Orchid. 3: 30. 1881); Benth. in Benth. & Hook. f. Gen. Pl. 3: 516. 1883; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 134. 1888; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 305. 1977; Kores in Allertonia 5: 109. 1989; Lewis & Cribb, Orch. Vanuatu, 89. 1989.

Large, caespitose, epiphytic or terrestrial plants with abbreviated rhizomes and erect, unbranched, leafy stems, these either condensed and fleshy (as in our species) or conspicuously elongated and slender, completely obscured by the persistent leaf bases;

leaves distichous, articulate, conduplicate in bud, the bases sheathing, conspicuously enlarged and imbricate or relatively widely spaced and tubular, the blades more or less ligulate; inflorescence terminal, more or less distichous, racemose or more commonly paniculate, the bracts small, imbricate; flowers small, resupinate or not, usually white or greenish white; sepals slightly dissimilar, free, erect, or spreading; petals similar to medial sepal or slightly narrower, free, erect or weakly spreading; labellum sessile, immobile, more or less erect, entire or weakly 3-lobed, usually somewhat channelled, the base often saccate, the distal portion more or less reflexed, the disk entirely without indument or thickenings; column long, slender, semiterete; column foot absent; clinandrium deeply excavate, the margins entire or very weakly 2-lobed; anther terminal, decumbent, operculate, 2-celled; pollinia 4, waxy, joined to a small common viscidium; rostellum short, broad; stigma directly below rostellum, transverse, often deeply recessed.

TYPE SPECIES: *Earina mucronata* Lindl., nom. illeg. (*Epidendrum autumnale* Forst. f.) = *Earina autumnalis* (Forst. f.) Hook. f.

DISTRIBUTION: New Zealand, New Caledonia, and eastward to Samoa, with about six species, one of which is indigenous in Fiji.

1. *Earina valida* Reichenb. f. in *Linnaea* **41**: 96. 1876; Schlechter in *Bot. Jahrb.* **39**: 62. 1906; Kraenzl. in *Notul. Syst. (Paris)* **4**: 137, in obs. 1928, in *Viert. Naturf. Ges. Zürich* **74**: 76. 1929; Guillaumin in *Notul. Syst. (Paris)* **10**: 88. 1941, *Fl. Nouv.-Caléd.* **80**. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 306. *pl. 128*. 1977; Kores in *Allertonia* **5**: 110. 1989; Lewis & Cribb, *Orch. Vanuatu*, 89. 1989.

FIGURE 62.

Earina laxior Reichenb. f. *Otia Bot. Hamb.* **54**. 1878 (repr. *Xenia Orchid.* **3**: 30. 1881); Drake, *Ill. Fl. Ins. Mar. Pac.* **309**. 1892; Rolfe in *J. Linn. Soc. Bot.* **39**: 175. 1909; Kraenzl. in *Notul. Syst. (Paris)* **4**: 137, in obs. 1928; L. O. Williams in *Bot. Mus. Leaflet* **5**: 130. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 29. 1953; J. W. Parham, *Pl. Fiji Isl.* **290**. 1964, ed. 2. 382. 1972.

Earina plana Reichenb. f. *Otia Bot. Hamb.* **54**. 1878 (repr. *Xenia Orchid.* **3**: 30. 1881); Drake, *Ill. Fl. Ins. Mar. Pac.* **309**. 1892; Kraenzl. in *Notul. Syst. (Paris)* **4**: 137, in obs. 1928; L. O. Williams in *Bot. Mus. Leaflet* **5**: 130. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 29. 1953; J. W. Parham, *Pl. Fiji Isl.* **290**. 1964, ed. 2. 382. 1972.

Agrostophyllum drakeanum Kraenzl. in *J. Bot.* **17**: 422. 1903; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 306, pro syn. 1977.

Earina brousmichei Kraenzl. in *Notul. Syst. (Paris)* **4**: 136. 1928; Guillaumin in *J. Arnold Arb.* **13**: 109. 1932; Ames in op. cit. **13**: 138. 1932; Guillaumin in *Notul. Syst. (Paris)* **10**: 88. 1941, *Fl. Nouv.-Caléd.* **80**. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 306, pro syn. 1977.

Epiphytic, erect plants to 1.2 m. tall, the rhizome much abbreviated, the stems congested, fleshy, 4–12 cm. long, completely obscured by the persistent, equitant leaf bases; leaves ascending, crowded, subcoriaceous, the base inflated, conduplicate, (5–) 8–12 cm. long, 3–8 cm. broad, the blade narrowly ligulate, 35–90 cm. long, 0.8–2.5 cm. broad, slightly narrowed at base, briefly, unequally, and obtusely bilobed at apex; inflorescence erect, (0.3–) 0.5–1.2 m. tall, the peduncle well developed, complanate, the rachis $1/2$ – $1/4$ the length of peduncle, slightly complanate, somewhat congested, very weakly fractiflex, the primary branches numerous, distichous, unbranched or once-branched, 0.5–1.2 cm. long overall, bracteolate, densely 3–5-flowered, the bracteoles small, imbricate, transversely ovate-conduplicate, about 1 mm. long and 2 mm. broad, fibrous; flowers resupinate, white; dorsal sepal erect, oblong-obovate, 4–4.5 mm. long, about 2.5 mm. broad, broadly acute at apex; lateral sepals weakly spreading, obliquely ovate with the anterior margin a little dilated near base, 4–5 mm. long, about 3 mm. broad, weakly carinate distally, acute at apex; petals erect, oblong to elliptic-oblong, about 4.5 mm. long and 2.7 mm. broad, broadly subacute at apex; labellum entire, oblong-obovate in outline, about 5 mm. long and 3 mm. broad, somewhat constricted medially, rather abruptly reflexed distally, saccate, a little inflated at base, broadly subacute to obtuse at apex; column slender, semiterete, 4.5–5 mm. long; clinandrium deeply excavate, subtire on dorsal margin; anther transversely obovate, about 1 mm.

across, broadly emarginate at apex; pollinia obovoid, about 0.5 mm. long, the viscidium not seen; rostellum short, transverse, the anterior margin slightly concave; stigma large, transversely obovate, deeply recessed; ovary cylindric-clavate, 4.5–6 mm. long, weakly 6-ribbed.

TYPIFICATION AND NOMENCLATURE: The type of *Earina valida* is *Vieillard 1298*, p. p. (P LECTOTYPE), collected near Balade, New Caledonia, between 1855 and 1860 (cf. Hallé, 1977, and Kores, 1989); the remaining part of *Vieillard 1298* represents *E. floripecten* Kraenzl. *Earina laxior* is typified by *U. S. Expl. Exped.* (AMES 74784 HOLOTYPE; ISOTYPE at w 35684), indicated on the label as from Tahiti but more probably from either Fiji or Samoa. The type of *E. plana* is *U. S. Expl. Exped.* (AMES 74789 HOLOTYPE; drawing of holotype and fragments at w 35669), collected in 1840 in the mountains of Mathuata Province, Vanua Levu. *Agrostophyllum drakeanum* is typified by *Baudouin 347* (P HOLOTYPE), from New Caledonia without further locality; *Earina brousmichei* by *Brousmiche 987* (P HOLOTYPE), obtained June 25, 1881, on Mt. Koghi, New Caledonia. There appears to be no justification for the maintenance of these taxa as separate (Kores, 1989).

DISTRIBUTION: *Earina valida* is now known from New Caledonia, the New Hebrides, Fiji, and Samoa. In Fiji it is found at elevations of 700–1,100 m. (perhaps rarely as low as 300 m.) in dense or open forest or on the edges of grassland areas. Flowers seem best developed between November and February, fruits in February and March.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Gibbs 586*, im Thurn 46, 300, *Greenwood 847*, *Gillespie 3179*, *Degener & Ordonez 13678*; western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 4832*; Sovutawambu, near Nandarivatu, *Degener 14653*; Navai Range, *DA 2135*, *2342*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5449*; between Naloka and Koronayalewa, *DA 1390*. NAMOSI: Mt. Voma, *DA 11691*, *11669*. VANUA LEVU: THAKAUNDROVE: Southwestern slope of Mt. Mbatini, *Smith 618*; Mt. Uluingala, Natewa Peninsula, *Smith 2003*.

35. GLOMERA Bl. Bijdr. Fl. Ned. Ind. 372. 1825, Tab. Pl. Jav. Orchid. t. III. fig. 68. 1825; Lindl. Gen. Sp. Orchid. Pl. 253. 1833; Reichenb. f. in *Linnaea* 41: 77. 1876; Benth. in Benth. & Hook. f. Gen. Pl. 3: 516. 1883; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 134. 1888; Schlechter in Repert. Sp. Nov. Beih. 1: 280. 1912; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 315, p. p. 1977; van Royen, Alpine Fl. New Guinea 2: 503. 1979; Kores in *Allertonia* 5: 111. 1989; Lewis & Cribb, Orch. Vanuatu, 90. 1989.

Erect or pendulous epiphytic plants with abbreviated rhizomes and slender, elongated leafy stems, these often branched, many nodes in length, completely obscured by the persistent leaf sheaths; leaves more or less distichous, articulate, conduplicate in bud, coriaceous, the sheaths tubular, smooth or striate, rarely sparsely verruculose, usually unappended on the upper margin, the blades usually lanceolate; inflorescences 2–many, congested into dense heads at the ends of branches and partially enclosed in a series of involucre-like bracts, reduced, 1-flowered, the peduncles very short, each subtended by a small nonsheathing bract and bearing a single apical bracteole; flowers small, nonresupinate; sepals dissimilar, the medial sepal free or partially connate with lateral sepals and usually erect, the lateral sepals partially connate with each other along ventral margins throughout basal half, more or less obscuring base of labellum, erect or slightly spreading distally; petals similar to medial sepal, free, usually erect; labellum adnate to column foot, immobile, erect, entire, sometimes fleshy, the base usually closely appressed to ovary, saccate, the distal portion separated from base by a transverse thickening, prolonged into a small, flat, obtuse blade, the disk usually naked; column short, stout; column foot short, sometimes almost indistinct; clinan-

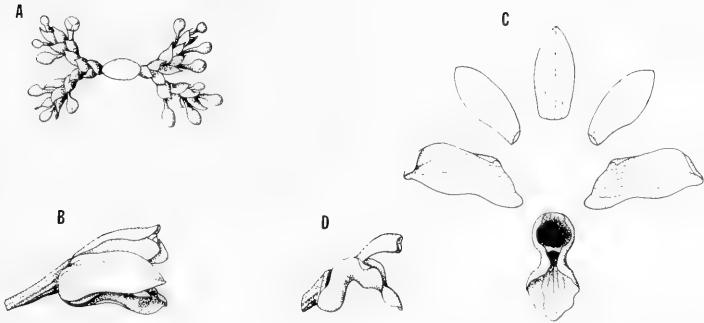


FIGURE 62. *Earina valida*, from *in Thurn 300*; A, cross section through primary rachis, showing secondary flowering branchlets, bracts, and developing flower buds, $\times 1\ 1/2$; B, complete flower, $\times 4$; C, perianth segments, $\times 4$; D, column with anther cap removed and labellum attached, viewed from side, $\times 4$.

drium with anterior margin crenulate; anther terminal, decumbent, operculate, 2-celled, frequently somewhat umbonate dorsally; pollinia 4, waxy, either in 2 pairs each attached to a small viscidium or all in a single fascicle joined by a common, often 2-lobed viscidium; rostellum broad, emarginate at apex; stigma directly beneath rostellum, relatively large, frequently with raised margins.

TYPE SPECIES: *Glomera erythrosma* Bl., the only original species.

DISTRIBUTION: Malesia (especially New Guinea), Caroline Islands, Solomon Islands, New Hebrides, Fiji, and Samoa, with about 50 species. Two species (one of them endemic) represent the genus in Fiji.

USEFUL TREATMENT OF GENUS: ROYEN, P. VAN. The genera *Glomera* and *Glossorhyncha* (Orchidaceae). *Folia Geobot. Phytotax.* 9: 77-85. 1974. This paper provides a good survey of the literature that has dealt with the delimitation of *Glomera* and closely related genera, providing an enumeration of the species in each genus.

KEY TO SPECIES

- Apex of leaves narrowly and obliquely subacute; lateral sepals connate only near base. . . . 1. *G. montana*
 Apex of leaves very very unequally obtusely bilobed; lateral sepals connate throughout basal 1/2-2/3 of their length. 2. *G. emarginata*

1. *Glomera montana* Reichenb. f. in *Linnaea* 41: 77. 1876; Rolfe in *Kew Bull.* 1899: 111, in obs. 1899; Schlechter in *Repert. Sp. Nov. Beih.* 1: 280, in obs. 1912; L. O. Williams in *Bot. Mus. Leafl.* 5: 131, p. p. 1938; J. W. Parham, *Pl. Fiji Isl.* 290. 1964, ed. 2. 383. 1972; van Royen in *Folia Geobot. Phytotax.* 9: 81. 1974; Kores in *Allertonia* 5: 112. 1989; Lewis & Cribb, *Orch. Vanuatu*, 90, fig. 15, A-K, pl. 4, F. 1989.

Agrostophyllum reineckeanum Kraenzl. in *Bot. Jahrb.* 25: 602. 1898.

Glomera samoensis Rolfe in *Kew Bull.* 1908: 414. 1908; Schlechter in *Repert. Sp. Nov.* 9: 96, pro syn. 1910, in *Repert. Sp. Nov. Beih.* 1: 281, in obs. 1912; van Royen in *Folia Geobot. Phytotax.* 9: 81, pro syn. 1974.

Glomera gibbsiae Rolfe in *J. Linn. Soc. Bot.* 39: 176. 1909; L. O. Williams in *Bot. Mus. Leafl.* 5: 131. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 28. 1953; J. W. Parham, *Pl. Fiji Isl.* 290. 1964, ed. 2. 383. 1972; van Royen in *Folia Geobot. Phytotax.* 9: 81. 1974; non J. J. Sm. (1916).

Agrostophyllum megalurum sensu H. Fleischm. & Reching in *Denkschr. Akad. Wiss. Wien* 85: 257. 1910; non Reichenb. f.

Glomera reineckeana Schlechter in *Repert. Sp. Nov.* 9: 96. 1910, in *Repert. Sp. Nov. Beih.* 1: 281, in obs. 1912; Christophersen in *Bishop Mus. Bull.* 128: 65. 1935; Yuncker in op. cit. 184: 31. 1945; van Royen in *Folia Geobot. Phytotax.* 9: 81. 1974.

Epiphytic (or infrequently terrestrial), erect plants to 1.2 m. tall, the rhizome much abbreviated, the stems crowded, branching, slightly complanate, 2.2–4.5 mm. in diameter, distally multifoliate; leaves erect, subcoriaceous, the sheath tubular, 1.2–2.2 (–2.8) cm. long, weakly striate, entire on anterior margin and briefly subdeltoid-lobed opposite blade, the blade lanceolate, 5.5–12 (–14) cm. long, 0.5–1.5 cm. broad, cuneate at base, narrowly and obliquely subacute at apex; heads nodding, semiglobose, partially surrounded by a series of hyaline, involucre-like bracts, 6–15-flowered, the floral bracts elliptic-ovate to -obovate, 9–11 mm. long, 5–7 mm. broad, hyaline; flowers entirely white or with the distal portion of labellum pink- or red-tinged; medial sepal free, erect, oblong- to elliptic-ovate, 6.5–7.5 mm. long, 2.5–3.2 mm. broad, subacute at apex; lateral sepals connate only near very base, weakly spreading, obliquely ovate-falcate, conspicuously dilated basally on anterior margin, 7–8 mm. long, 4–4.5 mm. broad, broadly acute or acuminate at apex and shortly mucronate; petals erect, oblong to oblong-elliptic, slightly oblique, 6–7.5 mm. long, 2.3–3 mm. broad, broadly subacute to obtuse at apex; labellum 4.5–5.5 mm. long overall, the base prominently dilated, subglobose, 2–2.5 mm. across, broadly rounded at tip, the blade more or less porrect, oblong to oblong-obovate, 2–2.5 mm. long, 1.8–2.2 mm. broad, weakly channelled, broadly rounded to truncate at apex; column rather prominently dilated distally, 2–2.5 mm. long; column foot brief; clinandrium deeply excavate, the margin weakly tridentate; anther broadly elliptic-ovate, about 1.3 mm. across, rather prominently umbonate dorsally, conspicuously emarginate at apex; pollinia laterally compressed, obliquely obovoid, about 1 mm. long and 0.75 mm. broad, the viscidium not seen; rostellum transverse, broad, the anterior margin broadly retuse; stigma large, transversely elliptic, the posterior margin prominently raised; ovary cylindrical-fusiform, 6–11 mm. long, somewhat elliptic in cross section and broadly 3-ribbed.

TYPIIFICATION AND NOMENCLATURE: The four types involved in the synonymy differ only slightly in their vegetative and floral morphology (Kores, 1989). That of *Glomera montana* is *Milne 214* (K HOLOTYPE; drawing of holotype at AMES, w 37241), collected in October, 1855, on the island of Ngau. The type of *Agrostophyllum reineckeanum* is *Reinecke 297* (B HOLOTYPE, destroyed; ISOTYPES at E, G), obtained in May, 1894, near Lanuto'o, Upolu, Samoa; that of *Glomera samoensis* is *Funk 11* (K HOLOTYPE), collected in 1901 at Apia, Upolu, Samoa; and that of *Glomera gibbsiae* is *Gibbs 807* (BM HOLOTYPE; ISOTYPE at K), collected in October, 1907, near the summit of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: New Guinea through the Solomon Islands and New Hebrides to Fiji and Samoa. In Fiji *Glomera montana* occurs at elevations of 600–1,300 m. in dense forest, most frequently being noted in the stunted forest of high ridges. Flowers have been obtained between September and February, fruits between December and May.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Eastern slopes of Mt. Koroyanitu, Mt. Evans Range, *Smith 4161*; vicinity of Nandarivatu, *Greenwood 661C*, *Degener 14924*; Mt. Nanggaranambuluta, east of Nandarivatu, *Greenwood 314A*; Mt. Tomanivi, near summit, *DA 7147*, *7148*. NAMOSI: Summit of Korombasambasanga Range, *DA 2199*. KANDAVU: Mt. Mbuke Levu, *DA 14942*. VANUA LEVU: THAKAUNDRIVE: Summit of Mt. Mbatini, *Smith 681*. TAVEUNI: Track to lake above Somosomo, *DA 17120*; Mt. Manuka, east of Wairiki, *Smith 786*.

2. *Glomera emarginata* Kores in *Allertonia* 5: 113. 1989.

Glomera montana sensu L. O. Williams in Bot. Mus. Leafl. 5: 131, p. p. 1938; non Reichenb. f.

The recently described *Glomera emarginata* is readily distinguished from *G. montana* Reichenb. f. in having flowers with the lateral sepals connate along margins in the proximal 1/2–2/3 (rather than only at base), the base of the labellum elliptic-obovoid (rather than subglobose), and the blade of the labellum subquadrate to transversely oblong-elliptic (rather than oblong-obovate). Additionally, *G. emarginata* has com-

paratively stout stems 7–10 mm. (rather than 2.2–4.5 mm.) in diameter, broadly spreading (rather than erect) leaves, and leaf blades inaequilaterally and obtusely bilobed at apex (rather than narrowly and obliquely subacute).

TYPIFICATION: The type is *DA 15477* (coll. *I. Kuruvoli & S. Vodonaivalu*) (K HOLOTYPE; ISOTYPES at BISH, MASS, SUVA), collected March 3, 1968, on the summit of the higher peak (alt. 750 m.) of the Mendrausuthu Range, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and apparently infrequent, occurring at elevations up to about 850 m. on fallen logs or on moss-covered ground in forest. Flowers have been observed in March and April.

AVAILABLE COLLECTIONS: VITI LEVU: M_{BA}: Vicinity of Nandarivatu, *Vaughan 3412*. SERUA or NAMOSI: Hills near Navua River along Queen's Road about 22 miles west of Suva, *McLoughlin 908* (K spirit coll. 29072). OVALAU: Without further locality, *U. S. Expl. Exped.* (AMES, W).

36. *GLOSSORHYNCHA* Ridley in *J. Linn. Soc. Bot.* **28**: 341. *t.* **44**. 1891; Schlechter in *Repert. Sp. Nov. Beih.* **1**: 290. 1912; van Royen, *Alpine Fl. New Guinea* **2**: 545. 1979; Kores in *Allertonia* **5**: 114. 1989; Lewis & Cribb, *Orch. Vanuatu*, **92**. 1989.

Glomera sect. *Glossorhyncha* J. J. Sm. in *Bull. Jard. Bot. Buitenzorg II.* **8**: 11. 1912.

Glomera sensu Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 315, p. p. 1977; non Bl.

Erect or pendulous epiphytic plants with abbreviated rhizomes and slender, elongated leafy stems, these much branched, many nodes long, completely obscured by the persistent leaf sheaths; leaves more or less distichous, often patent, articulate, conduplicate in bud, coriaceous, the sheaths usually ribbed or striate and often verruculose, frequently with stiff, erect, bristlelike appendages along upper margin, the blades usually ligulate to lanceolate; inflorescences terminal, solitary, partially enclosed within 2 opposite, often somewhat inflated, tubular or clasping bracts, 1-flowered, the peduncle very short; flowers small to moderately large, resupinate or not; sepals similar or not, free or rarely with the lateral ones partially connate with each other along the ventral margins near base, usually broadly spreading or somewhat reflexed, usually not obscuring base of labellum; petals free, spreading, usually somewhat shorter and broader than sepals; labellum adnate to column for a short distance above base, immobile, erect, entire, the base closely appressed to ovary, saccate or spurred, the spur if present short to long, often minutely bilobed at tip, the distal portion prolonged into a small blade, the disk naked or with a transverse crest at base of blade; column short, stout; column foot indistinct; clinandrium large, deeply excavate, the dorsal margin entire or irregularly denticulate; anther terminal, decumbent, operculate, 2-celled, frequently slightly umbonate dorsally; pollinia 4, waxy, either joined into a single fascicle by a common viscidium or in two pairs each with a separate viscidium, the viscidium or viscidia small, sometimes inconspicuous; rostellum transverse, crenulate, or briefly 2-lobed at apex; stigma directly below rostellum, transverse.

TYPE SPECIES: *Glossorhyncha amboinensis* Ridley, the only original species.

DISTRIBUTION: Malesia, primarily restricted to New Guinea but also occurring in the Moluccas and the Bismarck Archipelago, and extending eastward through the Solomon Islands, New Caledonia, and the New Hebrides to Fiji, where the range terminates with a single indigenous species.

USEFUL TREATMENT OF GENUS: ROYEN, P. VAN. The genera *Glomera* and *Glossorhyncha* (Orchidaceae). *Folia Geobot. Phytotax.* **9**: 77–85. 1974.

1. *Glossorhyncha macdonaldii* Schlechter in *Repert. Sp. Nov.* **3**: 19. 1906, in *Repert. Sp. Nov. Beih.* **1**: 290, 295, in obs. 1912; van Royen in *Folia Geobot. Phytotax.* **9**: 83. 1974; Kores in *Allertonia* **5**: 115. 1989; Lewis & Cribb, *Orch. Vanuatu*, **92**. *pl.* **4**, *C.* 1989.

Dendrobium aff. *calcaratum* sensu Reichenb. f. in Seem. Fl. Vit. 303, in obs. 2. 1868; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 315, pro syn. 1977; non Lindl.

Glomera macdonaldii J. J. Sm. in Nova Guinea 8: 44. 1909; Ames in J. Arnold Arb. 14: 111. 1933; L. O. Williams in Bot. Mus. Leaflet 5: 131. 1938; J. W. Parham, Pl. Fiji Isl. 290. 1964, ed. 2. 383. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 315. pl. 131. 1977.

Dendrobium montis-movi Kraenzl. in Viert. Naturf. Ges. Zürich 74: 87. 1929.

Dendrobium mouanum Guillaumin in Acta Horti Gothob. 18: 261. t. 26. 1950.

Plants epiphytic, subsucculent, the rhizome much abbreviated, the stems crowded, much branched, up to 30 cm. long, 1–2 mm. in diameter, somewhat complanate and plurifoliate distally; leaves broadly ascending to subpatent, coriaceous, the sheath tubular, slightly inflated distally, 0.6–1.4 cm. long, weakly striate and laxly to subdensely verruculose throughout, weakly subdeltoid-lobed and laxly appendaged on anterior margin opposite blade, the appendages small, setaceous, smooth, the blade ligulate to ligulate-lanceolate, 1.4–3.5 cm. long, 0.2–0.5 (–0.8) cm. broad, cuneate at base, briefly and unequally subacutely bilobed at apex; inflorescences terminal, solitary, 1-flowered, the bracts dissimilar, the outer one broadly oblong- to ovate-elliptic, 9–12 mm. long and 6–7 mm. broad, the inner one elliptic to elliptic-obovate, 7–8 mm. long and about 5 mm. broad; flowers white; sepals free, broadly spreading to patent, slightly dissimilar, narrowly ovate to elliptic-ovate, 8–12 mm. long, 4–5.5 mm. broad, briefly apiculate at apex; petals spreading, obovate to oblong-obovate, 8–11 mm. long, 3.5–5.5 mm. broad, obtuse to broadly subacute at apex; labellum about 10 mm. long overall, spurred, the spur retrorse, narrowly conical-cylindric, 5–6 mm. long, slightly curved distally, more or less obtuse at tip, the blade slightly recurved, transversely subrhombic, 3–4 mm. long, about 6 mm. broad, prominently channelled, broadly rounded or briefly mucronate at apex, the disk with a well-developed, transverse, lunate crest just anterior to opening of spur; column short, stout, 2.7–3 mm. long; clinandrium deeply excavate, broad, the dorsal margin laxly and irregularly denticulate to subentire; anther cap more or less transverse-ovate, about 1.3 mm. across, broadly subacute at apex; pollinia in 2 pairs each with its own viscidium, somewhat compressed laterally, obliquely pyriform, about 0.6 mm. long, the viscidia small, peltate; rostellum erect, transverse, broadly retuse at apex; stigma large, transversely elliptic, the posterior margin prominently raised; ovary cylindric, 7–8 mm. long, broadly 3-ribbed.

TIPIFICATION AND NOMENCLATURE: The type of *Glossorhyncha macdonaldii* is *Rev. M. McDonald s. n.* (B HOLOTYPE, destroyed) from Aneityum, New Hebrides. Two New Caledonian taxa are not separable from Schlechter's concept (Hallé, 1977); they are *Dendrobium montis-movi*, based on three SYNTYPES, *Däniker 544a*, *544b*, and *544c* (all z), collected Dec. 28, 1924, on Mt. Mou, and *D. mouanum*, typified by *Skottsberg 197* (S HOLOTYPE), obtained Jan. 23, 1949, also on Mt. Mou.

DISTRIBUTION: Bougainville in the Solomon Islands, New Caledonia, the New Hebrides, and Fiji. In the last archipelago it occurs as an epiphyte (or on mossy rocks) at elevations of 670–1,190 m., in dense forest or with a degree of local abundance in the dense thickets of the high ridges, where its subsucculent, much-branched stems often form dense masses. Flowers have been noted between June and November, fruits between June and September.

LOCAL NAME: The only recorded name is *mbulengona*, noted by St. John in upper Naitasiri Province.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Near summit of Mt. Nanggaranambuluta, east of Nandari-vatu, *DA 15265*; ridge between Mt. Nanggaranambuluta and Mt. Namama, *Smith 4971*; Mt. Tomanivi, *DA 13042*. NAMOSI: Korombasambasanga Range, *DA 2190*; Mt. Voma, *Seemann 580*, *DA*, June 24, 1939, *DA 13973*. RA: Ridge from Mt. Namama (east of Nandari-vatu) toward Mt. Tomanivi, *Smith 5703*. NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 6118*; Wainimala Valley, *St. John 18331*. KANDAVU: Mt. Mbuke Levu, *im Thurn 1*. VANUA LEVU: THAKAUNDROVE: Summit of Mt. Mbatini, *Smith 701*. TAVEUNI: Track to lake above Somosomo, *DA 17109*. FIJI without further locality, *Simmonds*, May 14, 1952 (K spirit coll. 20129), *Morrison & Cribb S230* (K spirit coll. 42873).

37. *AGLOSSORHYNCHA* Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 133. 1905; Kores in *Allertonia* 5: 116. 1989; Lewis & Cribb, *Orch. Vanuatu*, 89. 1989.

Trailing or pendulous, epiphytic plants with slender, elongated, jointed, somewhat flattened, laxly branched, leafy stems; leaves distichous, usually erect or ascending, articulate, with sheathing bases, the sheaths overlapping one another, slightly ribbed and with the upper margin unappendaged, the blades conduplicate in bud, coriaceous, usually oblong or lanceolate; inflorescence terminal, 1- or rarely 2-flowered; flowers small to moderately large, nonresupinate, usually yellow; sepals similar, free or the lateral ones partially connivent with each other along ventral margins; petals free, more or less similar to medial sepal; labellum somewhat broader than other segments, sessile, erect, entire, neither saccate nor spurred, more or less oblong and with the lateral margins inrolled, the disk frequently with a longitudinal carina; column long, slender; column foot absent; clinandrium deeply excavate, with conspicuously serrate margins; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, ovoid, in 2 pairs each attached to a small viscidium or joined in a single fascicle by a common viscidium; rostellum short, erose; stigma directly below rostellum, transverse.

TYPE SPECIES: *Aglossorhyncha aurea* Schlechter, the only original species.

DISTRIBUTION: Eastern Malesia, the Bismarck Archipelago, and Palau through the Solomon and Santa Cruz Islands, the New Hebrides, and with a single endemic species terminating the generic range in Fiji.

Aglossorhyncha is very similar in appearance to *Glossorhyncha* Ridley, the two genera differing from one another mainly in details of the column and the structure of the labellum (Kores, 1989).

1. *Aglossorhyncha bilobula* Kores in *Allertonia* 5: 117. 1989.

Aglossorhyncha biflora sensu Lewis & Cribb, *Orch. Vanuatu*, 89, quoad spec. vit. 1989; non J. J. Sm.

Trailing or pendulous, spreading epiphyte 25–40 cm. long, most closely allied to *Aglossorhyncha aurea* Schlechter, of New Ireland, but differing in having its leaf blades noticeably constricted near base and conspicuously bilobulate at apex with blunt, equal lobes, in its completely free lateral sepals, its oblong-obovate labellum, its 5-nerved disk, and its cordate anther with a subacute apex.

TIPIFICATION: The species is typified by *Smith 4831* (AMES HOLOTYPE; ISOTYPES AT BISH, K, NY, US), collected June 23, 1947, on the upper western slope of Mt. Nanggaranambuluta, east of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Known only from the type collection, obtained in forest at an elevation of 1,000–1,100 m., and bearing essentially mature capsules with attached perianth segments.

38. *APPENDICULA* Bl. *Bijdr. Fl. Ned. Ind.* 297. 1825, Tab. Pl. Jav. *Orchid. t. V. fig. 40.* 1825; Reichenb. f. in Seem. *Fl. Vit.* 298. 1868; Schlechter in *Repert. Sp. Nov. Beih.* 1: 335. 1912; Holttum, *Fl. Malaya* 1: 502. 1953; Backer & Bakh. f. *Fl. Java* 3: 314. 1968; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 344. 1977; Seidenfaden in *Opera Bot.* 89: 135. 1986; Kores in *Allertonia* 5: 118. 1989; Lewis & Cribb, *Orch. Vanuatu*, 82. 1989.

Podochilus sensu Schlechter in *Mém. Herb. Boissier* 21: 4, p. p. 1900, in *Bot. Jahrb.* 39: 62. 1906; non Bl. *Lobogyne* Schlechter in *Mém. Herb. Boissier* 21: 65. 1900.

Small to large epiphytic (or occasionally lithophytic) plants with compact rhizomes and slender, elongated, leafy stems, these unbranched or laxly branched near base, completely obscured by the persistent leaf sheaths; leaves numerous, distichous, articulate, with overlapping, tubular, sheathing bases, the blades more or less patent,

ligulate, ligulate-lanceolate, or narrowly elliptic, conduplicate in bud; inflorescences terminal or axillary, short to long, racemose or rarely laxly once-branched near base, few-many-flowered; flowers small, resupinate, usually greenish white to greenish yellow; sepals dissimilar, the dorsal sepal free, erect, the lateral sepals decurrent along column foot, forming a prominent (or rarely obscure) mentum; petals more or less similar to dorsal sepal; labellum adnate to apex of column foot, immobile, more or less erect, entire or weakly 3-lobed, the disk with a raised, often hippocrepiform appendage near base, with or without additional carinae or thickenings near apex; column short; column foot usually well developed (or rarely absent in some peloric specimens); clinandrium deeply excavate, the margins often somewhat dentate; anther terminal, incumbent, subcordate to ovate, incompletely 2-celled, obtuse to acute or sometimes briefly bidentate at apex; pollinia 6, waxy, clavate or less commonly pyriform, attached to a single 2-partite caudicle or borne on a pair of slender, aborted pollinia, with a common viscidium; rostellum 2-lobed or with the apex bidentate; stigma directly below rostellum, transverse.

TYPE SPECIES AND NOMENCLATURE: The lectotype species of *Appendicula* is *A. alba* Bl. (vide Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 345. 1977), one of the 18 species originally included in the genus by Blume. *Lobogyne* is typified by *L. bracteosa* (Reichenb. f.) Schlechter (*Appendicula bracteosa* Reichenb. f.). Interrelationships of the genera now considered to comprise the subtribe Podochilinae have recently been discussed, together with a reconsideration of the names of the five sections that constitute the genus *Appendicula* (Kores, 1989).

DISTRIBUTION: *Appendicula* is a relatively large genus, with approximately 100 species found from the Indian subcontinent and southeastern Asia throughout Malaysia and eastward to the Bismarck Archipelago, parts of Micronesia, the Solomon Islands, New Caledonia, the New Hebrides, Fiji, Tonga, and Samoa. The three indigenous Fijian species fall into sect. *Stenodesme* (*A. reflexa*) and sect. *Appendicula* (*A. pendula* and *A. bracteosa*).

USEFUL TREATMENT OF GENUS: SCHLECHTER, R. Monographie der Podochilinae. Mém. Herb. Boissier 21: 1-78. 1900.

KEY TO SPECIES

Inflorescences exclusively axillary, 0.6-1.5 cm. long, the bracts ascending or patent, lanceolate, not becoming reflexed with age. 1. *A. reflexa*
 Inflorescences terminal or rarely both terminal and axillary, 3-15 cm. long, the bracts ovate or elliptic- or oblong-ovate, becoming reflexed with age.

Mentum well developed, prominently elongated; labellum with a hippocrepiform appendage near base. 2. *A. pendula*

Mentum hardly or not developed; labellum without an appendage near base. 3. *A. bracteosa*

1. ***Appendicula reflexa*** Bl. Bijdr. Fl. Ned. Ind. 301. 1825; Schlechter in Repert. Sp. Nov. Beih. 1: 337, in obs. 1912; Guillaumin in J. Arnold Arb. 13: 109. 1932; L. O. Williams in Bot. Mus. Leafl. 5: 139. 1938; Yuncker in Bishop Mus. Bull. 220: 89. 1959; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 345. pl. 141. 1977; Seidenfaden in Opera Bot. 89: 140. fig. 90. 1986; Kores in Allertonia 5: 120. 1989; Lewis & Cribb, Orch. Vanuatu, 83. fig. 14, J-T, pl. 4, A. 1989. FIGURE 63A-D.

Appendicula vieillardii Reichenb. f. in Linnaea 41: 76. 1877.

Appendicula cordata Hook. f. Fl. Brit. Ind. 6: 83. 1890, in Hook. Icon. Pl. 22: t. 2148. 1893.

Podochilus reflexus Schlechter in Mém. Herb. Boissier 21: 31. 1900.

Podochilus vieillardii Schlechter in Bot. Jahrb. 39: 62. 1906; Rendle in J. Linn. Soc. Bot. 45: 252. 1921; Guillaumin in Notul. Syst. (Paris) 10: 88. 1941, Fl. Nouv.-Caléd. 79. 1948.

Epiphytic (or infrequently lithophytic) plants, patent or more or less pendent, the stems fairly numerous, congested, slender, unbranched, 30–70 cm. long; leaves distichous, articulate, the sheaths tubular, somewhat inflated distally, 0.6–1.2 cm. long, weakly striate, the blades ascending, ligulate or ligulate-elliptic, (1.5–) 2.5–5 (–7) cm. long, 0.6–1.5 cm. broad, chartaceous, slightly rounded at base, weakly and unequally obtusely bilobed or obliquely subacute at apex; inflorescences axillary throughout distal portion of stems, ascending, racemose, 0.6–1.5 cm. long, subdensely 3–6(–10)-flowered, the bracts ascending or becoming patent with age, lanceolate, 2.5–3.5 mm. long, 0.8–1 mm. broad; flowers more or less patent, resupinate, green to greenish yellow with the labellum white; dorsal sepal erect, ovate, 2.5–3 mm. long, about 1.5 mm. broad, subacute at apex; lateral sepals weakly spreading distally, obliquely ovate, 2.5–3 mm. long, 1.8–2 mm. broad above mentum, acute at apex; mentum moderately well developed, 1–2 mm. long; petals weakly spreading, ovate to elliptic-ovate, 1.8–2.2 mm. long, 1–1.3 mm. broad, subacute to obtuse at apex; labellum somewhat appressed to column, arcuate, elliptic to elliptic-ovate, 2–2.5 mm. long, 1.7–2.5 mm. broad, slightly saccate at base, broadly acute at apex, the lateral margins prominently incurved throughout proximal half, hardly or not incurved distally, the disk with a single broadly oblong thickening near base; column about 1 mm. long, with 2 small stelia near apex; column foot perpendicular to column, 1–1.8 mm. long; clinandrium deeply excavate; anther terminal, proclined, subcordate-attenuate, about 1 mm. long and 0.8 mm. broad, narrowly acute at apex; fertile pollinia 6, clavate, slightly unequal in size, borne on a pair of slender, aborted pollinia, the viscidium small, elliptic; rostellum small, deltoid, minutely bilobed at apex; stigma transverse, deeply recessed; capsules cylindrical-fusiform, 0.6–0.8 mm. long, 2–2.5 mm. in diameter, weakly 6-ribbed.

TYPIFICATION AND NOMENCLATURE: *Appendicula reflexa* is typified by Blume collections from Java (HOLOTYPE presumably at L). The type of *A. vieillardii* is *Vieillard 1290* (P LECTOTYPE; ISOLECTOTYPE presumably at w), collected near Balade, New Caledonia, between 1855 and 1860. The type of *A. cordata* is *Scortechini* (K HOLOTYPE), from Perak but without further locality. Typification of these taxa and interpretations of them have recently been discussed (Kores, 1989).

DISTRIBUTION: India, Thailand, and Sumatra eastward to Fiji, Tonga, and Samoa. In Fiji the species is known from three of the high islands and 31 collections; it is usually noted as an epiphyte (but is sometimes also found on moss-covered rocks) often in dense forest or on crests or ridges at elevations from near sea level to about 1,030 m. Flowers and fruits have been obtained throughout the year.

LOCAL NAME: The only recorded local name is *laitok* (noted by Gillespie in Namosi Province), but that is not suggestive of a Fijian word and perhaps should be questioned.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *im Thurn 90*; Nauwanga, south of Nandarivatu, *Degener 14763*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8539*; Mt. Voma, *Gillespie 2509*; Wainandoi River, *DA 12993*; hills east of Navua River, *Greenwood 1014*. NAITASIRI: Central road, *Tothill 415*; vicinity of Tamavua, *Gillespie 2100*; Savura Creek, *Bernardi 12387* (G). REWA: Mt. Korombamba, *Parks 20105*; Suva Quarry, *Livingston*. VITI LEVU without further locality, *Simmonds s. n.* (K spirit coll. 18275). VANUA LEVU: MATHUATA–THAKAUNDROVE boundary: Crest of Korotini Range, between Navitho Pass and Mt. Ndelaikoro, *Smith 549*. THAKAUNDROVE: Mt. Kasi, Yanawai River region, *Smith 1806*; Mt. Mbatini, *Smith 660*. TAVEUNI: Track to lake east of Somosomo, *DA 12410*; borders of lake east of Somosomo, *Smith 854*.

For a more comprehensive list of synonyms for *Appendicula reflexa* from other geographic regions see Lewis and Cribb (1989).

2. ***Appendicula pendula*** Bl. Bijdr. Fl. Ned. Ind. 298. 1825; Schlechter in Repert. Sp. Nov. Beih. 1: 336, in obs. 1912; L. O. Williams in Bot. Mus. Leaflet. 5: 132. 1938; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972; Seidenfaden in Opera Bot. 89: 135. fig. 84. 1986; Kores in Allertonia 5: 121. 1989.

FIGURES 63E-H, 89 (lower left).

Podochilus pendulus Schlechter in Mém. Herb. Boissier 21: 48. 1900.

Appendicula bracteosa sensu L. O. Williams in Bot. Mus. Leaflet. 5: 131, p. p. 1938; non Reichenb. f.

Epiphytic, erect plants, the stems few, more or less congested, slender, unbranched, (15-) 30-60 cm. long; leaves prominently distichous, articulate, the sheaths tubular, hardly or not inflated distally, 6-8 mm. long, weakly striate, the blades ascending, lanceolate or elliptic-lanceolate, (1.5-) 2.5-5 (-10) cm. long, 0.6-1.7 cm. broad, chartaceous, slightly rounded at base, obtuse to abruptly acute at apex, frequently with a small ventral mucro; inflorescences terminal, pendulous, racemose or rarely laxly branched near base, 3-15 cm. long, rather laxly few-many-flowered, the bracts becoming prominently reflexed with age, ovate to oblong-ovate, 5-7 mm. long, 2-3 mm. broad, chartaceous; flowers patent, pale green or greenish yellow, sometimes with age becoming suffused with purple, more or less membranous, resupinate; dorsal sepal erect, ovate to oblong-ovate, 3-3.5 mm. long, about 2 mm. broad, subacute to acute at apex; lateral sepals obliquely ovate, 3-3.5 mm. long, about 2 mm. broad above mentum, acute at apex; mentum well developed, 2-2.6 mm. long; petals weakly spreading, oblong-ovate, 2.5-3 mm. long, 1.5-2 mm. broad, broadly subacute at apex; labellum closely appressed to column throughout proximal two-thirds, gradually becoming somewhat reflexed distally, oblong-elliptic, 3.5-4 mm. long, 2.3-2.8 mm. broad, the lateral margins turned inward throughout proximal half, the base slightly concave, with a prominently raised, large, fleshy, hippocrepiform appendage within, the apex broadly acute, the disk with 2 low, slightly divergent, longitudinal keels extending from lateral edges of basal appendage almost to apex, and sometimes also with a small, subfleshy apical thickening or mucro; column short, stout, about 1 mm. long; column foot more or less perpendicular to column, about 2.5 mm. long, the apex somewhat inflexed; clinandrium broad, deeply excavate; anther terminal, incumbent, transversely ovate, about 0.4 mm. long and 0.5 mm. broad, abruptly subacuminate at apex; pollinia 6, pyriform, somewhat unequal in size, the caudicle short, the viscidium small, oblong; rostellum small, erect, subdeltoïd, briefly 2-lobed at apex; stigma large, transverse, deeply recessed; capsules oblong-cylindric, 0.7-1 cm. long, 2-2.5 mm. in diameter, weakly 6-ribbed.

TYPIFICATION: The species is typified by Blume collections from Java (HOLOTYPE presumably at L).

DISTRIBUTION: Southeastern Asia, Malasia, and eastward to the Solomon Islands and Fiji. *Appendicula pendula* has often been recorded from Samoa, but apparently all such Samoan material is referable to *A. bracteosa*, the following species in the present treatment. In Fiji *A. pendula* is now known from 29 collections from four of the high islands, where it occurs as an epiphyte in dense forest at elevations from near sea level to about 650 m. Flowering and fruiting specimens have been obtained in scattered months.

FIGURE 63. A-D, *Appendicula reflexa*; A, complete flower, $\times 4$; B, perianth segments, $\times 6$; C, labellum, ventral surface, $\times 6$; D, column with labellum attached, viewed from side, $\times 8$. E-H, *Appendicula pendula*; E, complete flower, $\times 4$; F, perianth segments, $\times 6$; G, labellum, ventral surface, $\times 6$; H, column with labellum attached, viewed from side, $\times 8$. I-K, *Appendicula bracteosa*; I, complete flower, $\times 4$; J, perianth segments, $\times 6$; K, column with labellum attached, viewed from side, $\times 8$. A-D from *Simmonds s. n.* (K spirit 18275), E-H from *McLoughlin 905* (¼ spirit 29223), I-K from *Christophersen 68* (Upolu, Samoa).



LOCAL NAME AND USE: St. John (18188, Naitasiri) recorded the local name *sekiseki* and was informed that the roots are "used to poison bad people." Such usage seems most unlikely, as orchids are benign in respect to toxic compounds, although a few are known to contain alkaloids.

REPRESENTATIVE COLLECTIONS: VITI LEVU: SERUA: Hills between Navua River and Wainiyavu Creek, near Namuamua, *Smith 9015*. NAMOSI: Hills east of Wainikoroiluva River, near Namuamua, *Smith 9032*; vicinity of Namosi, *Parks 20263*; above Waivaka, Waindina River, *DA 1815*. RA: Vicinity of Nasukamai, *Gillespie 4691.5*. NAITASIRI: Wainamo Creek, near Matawalevu, Wainimala River, *St. John 18188*; Viria, *Parks 20449*; Tholo-i-suva, *DA 10657*, *Kores & Molvray F12*; Savura Creek, *Bernardi 12389(G)*, *McLoughlin 905* (K spirit coll. 29223). TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7196*. REWA: Slopes of Mt. Korombamba, *Gillespie 2206*. OVALAU: *U. S. Expl. Exped.* (w); summit of Mt. Ndelaivalau and adjacent ridge, *Smith 7606*. VANUA LEVU: THAKAUNDOVE: Southern slope of Korotini Range, below Navitho Pass, *Smith 485*; eastern slope of Mt. Ndikeya, *Smith 1919*. TAVEUNI: Wainggilo, Ngeleni, *DA 15883*. FIJI without further locality, *U. S. Expl. Exped.* (AMES, US 37782).

3. *Appendicula bracteosa* Reichenb. f. in Seem. Fl. Vit. 299. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 311. 1892; Schlechter in Repert. Sp. Nov. Beih. 1: 325, in obs. 1912; Christophersen in Bishop Mus. Bull. 128: 64. 1935; L. O. Williams in Bot. Mus. Leafl. 5: 131, p. p. 1938; Yuncker in Bishop Mus. Bull. 184: 31. 1945; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 28. 1953; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 378. 1972; Kores in Allertonia 5: 122. 1989; Lewis & Cribb, Orch. Vanuatu, 82, quoad spec. vit. 1989. FIGURE 631-K.

Appendicula Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Appendicula pendula sensu Kraenzl. in Bot. Jahrb. 25: 601. 1898; H. Fleischm. & Rechner in Denkschr. Akad. Wiss. Wien 85: 256. 1910; L. O. Williams in Bot. Mus. Leafl. 5: 132, p. p. 1938; non Bl.

Lobogyne bracteosa Schlechter in Mém. Herb. Boissier 21: 65. 1900, in Repert. Sp. Nov. 9: 96. 1910.

Epiphytic, erect plants, the stems few, usually congested, slender, unbranched, (20-) 30-50 cm. long; leaves prominently distichous, articulate, the sheaths tubular, hardly or not inflated distally, 6-11 mm. long, the blades ascending, narrowly elliptic to elliptic-lanceolate, (2-) 2.5-5 cm. long, 0.6-1.5 cm. broad, chartaceous, gradually angustate with sheaths proximally, obtuse at apex; inflorescences terminal or rarely both terminal and axillary, pendulous, racemose or sometimes laxly branched near base, 5-15 cm. long, laxly many-flowered, the bracts becoming prominently reflexed with age, ovate to ovate-elliptic, 2-6 mm. long, 2-3 mm. broad, chartaceous; flowers more or less patent, pale green to greenish white; sepals slightly dissimilar, erect, ovate-attenuate, 3-3.5 mm. long, 1.2-1.6 mm. broad, narrowly subacute at apex; petals erect, oblong, slightly oblique, 2.8-3.2 mm. long, about 1.4 mm. broad, obtuse at apex; labellum sessile, erect, oblong to oblong-pandurate, 2.8-3 mm. long, 1.3-2 mm. broad, membranous, the lateral margins slightly turned inward near base, the apex obtuse to broadly acute, the disk naked; column short, semiterete, about 1.5 mm. long, prominently bicornute at apex and with a third, somewhat smaller, ascending, hornlike appendage at base of stigma; column foot absent; clinandrium small, hardly or not excavate; anther terminal, incumbent, somewhat reduced, transversely elliptic, about 0.6 mm. long and 0.8 mm. broad, broadly rounded to slightly retuse at apex; rostellum greatly reduced, short-transverse, with a small subdeltoid tooth about 0.2 mm. long at apex; stigma directly below rostellum, subapical, large, gaping, deeply recessed; capsules cylindrical, 1.2-1.4 cm. long, about 3 mm. in diameter, rather prominently 6-ribbed.

TIPIFICATION: The species is based on *Seemann 592* (w 38854 HOLOTYPE; ISOTYPES at AMES 74839, K), collected in August or September, 1860, in the vicinity of Namosi Village, Namosi Province, Viti Levu.

DISTRIBUTION: Fiji and Samoa; possibly also the New Hebrides. In Fiji the species is known only from the type collection, probably obtained at an elevation of not more than 200 m., but in Samoa it is frequent and widely distributed. An explanation of this curious distribution is not obvious (Kores, 1989).

Appendicula bracteosa has recently been reported from the New Hebrides by Lewis and Cribb (1989) on the basis of a single collection from Pentecost, *Wheatly 117B*, but the provided description seems more indicative of *A. pendula*; extension of the geographic range of *A. bracteosa* to the New Hebrides should probably be regarded as tentative.

39. CALANTHE R. Br. in Ker-Gawler in Bot. Reg. 7 (a): sub t. 573 (err. 578). 1821; Lindl. Fol. Orchid., Calanthe, 1. 1855; Reichenb. f. in Seem. Fl. Vit. 298. 1868; Schlechter in Repert. Sp. Nov. Beih. 1: 376. 1912; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 229. 1977; Kores in Allertonia 5: 122. 1989; Lewis & Cribb, Orch. Vanuatu, 51. 1989. Nom. cons.

Generally large, terrestrial or rarely epiphytic plants with compacted rhizomes and erect, pluriarticulate stems, these short or sometimes elongated, either nonpseudobulbous, terete, or modified into small to large, homoblastic, plurifoliate pseudobulbs; leaves usually large, nonarticulate or rarely articulate, convolutive in bud, petiolate, chartaceous, often plicate; inflorescences either axillary in the forms lacking pseudobulbs or lateral in those with pseudobulbs, erect, racemose, few-many-flowered,¹ the bracts persistent or caducous; flowers usually relatively large, showy, resupinate; sepals and petals similar, free, weakly spreading to patent or sometimes reflexed; labellum with a distinct claw adnate with lateral margins of column throughout its entire length, forming a tube, the base with a short to long, saccate or filiform spur, the blade 3- or 4-lobed or rarely entire, the disk usually with thickenings or calli near base of blade; column short, stout; column foot absent; clinandrium often deeply excavate, with more or less thin margins; anther terminal, decumbent, operculate, 2-celled; pollinia 8, waxy, slender and somewhat compressed laterally, caudiculate, usually with a conspicuous viscidium; rostellum 2-lobed, 2-dentate, or rarely entire; stigma directly beneath rostellum, transverse, deeply recessed.

TYPE SPECIES: *Calanthe veratrifolia* Ker-Gawler, nom. illeg. (*Limodorum veratrifolium* Willd., nom. illeg., *Orchis triplicata* Willemet) = *Calanthe triplicata* (Willemet) Ames (vide Taxon 31: 543. 1982). For a discussion of the complex nomenclatural problems involved in the original publication of *Calanthe* and the correct citation of its type species, cf. Kores (1989).

DISTRIBUTION: Paleotropical, with approximately 260 species distributed in Africa, southeastern Asia (from Japan, southern China, India, and Ceylon) through Malesia to northern Australia, and throughout the southern Pacific as far east as the Marquesas. Five species are indigenous in Fiji, all falling into subgen. *Calanthe*.

USEFUL TREATMENT OF GENUS: SEIDENFADEN, G. Orchid genera in Thailand I. Calanthe R. Br. Dansk Bot. Arkiv 29 (2): 9-50. 1975.

KEY TO SPECIES

- Bracts persistent; sepals and petals broadly spreading or reflexed (sect. *Calanthe*).
 Apex of spur slightly or not inflated, not bulbous.
 Sepals and petals patent; midlobe of labellum with the segments widely diverging laterally; spur 15-50 mm. long. 1. *C. triplicata*
 Sepals and petals reflexed; midlobe of labellum with the segments more or less parallel, not diverging laterally; spur 8-12 mm. long. 2. *C. alta*
 Apex of spur conspicuously inflated, bulbous. 3. *C. imthurnii*
 Bracts caducous (falling as flowers open); sepals and petals not broadly spreading (sect. *Styloglossum*).
 Flowers white; spur as long as or slightly longer than lateral sepals, cylindrical or slightly clavate; labellum without calli. 4. *C. hololeuca*
 Flowers yellow, golden-yellow, or yellowish orange; spur about 2/3 the length of lateral sepals or less, more or less saccate; labellum with 2 or 4 longitudinal carinae. 5. *C. ventilabrum*

¹Plants with large, fat pseudobulbs, articulate leaves, and lateral inflorescences do not occur in the Fijian Region; these characters are found only in subgen. *Preptanthe* Schlechter, which for the most part occurs in southeastern Asia.

1. *Calanthe triplicata* (Willemet) Ames in Philipp. J. Sci. 2: 326. 1907; Holttum, Fl. Malaya 1: 154. fig. 26, a-e. 1953; Garay & Sweet, Orch. S. Ryukyu Isl. 119. fig. 14, c. 1974; Seidenfaden in Dansk Bot. Arkiv 29 (2): 15. fig. 3. 1975; Bechtel et al. Man. Cult. Orch. Sp. 73. 1981; Kores in Allertonia 5: 124. 1989; Lewis & Cribb, Orch. Vanuatu, 52. pl. 2, B. 1989. FIGURE 64.

Orchis triplicata Willemet in Ann. Bot. (Usteri) 18: 52. 1796.

Limodorum veratrifolium Willd. Sp. Pl. 4: 122, nom. illeg. 1805.

Calanthe veratrifolia Ker-Gawler in Bot. Reg. 9: t. 720. 1823; Lindl. Gen. Sp. Orchid. Pl. 249. 1833, Fol. Orchid., Calanthe, 8. 1855; Reichenb. f. in Seem. Fl. Vit. 298, in adnot. 1868; Kraenzl. in Bot. Jahrb. 25: 602. 1898; Schlechter in Repert. Sp. Nov. 9: 101. 1911.

Calanthe furcata Bateman ex Lindl. in Bot. Reg. 24: Misc. 28. 1838; Lindl. Fol. Orchid., Calanthe, 7. 1855; L. O. Williams in Bot. Mus. Leaf. 5: 132. 1938; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972.

Calanthe gracillima Lindl. Fol. Orchid., Calanthe, 8. 1855; Reichenb. f. in Seem. Fl. Vit. 298, in adnot. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 309. 1892; L. O. Williams in Bot. Mus. Leaf. 5: 132. 1938; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972.

Calanthe angraeciflora Reichenb. f. in Linnæa 41: 75. 1877.

Calanthe bracteosa Reichenb. f. in Gard. Chron. II. 18: 712. 1882; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972.

Calanthe veratrifolia var. *angraeciflora* Schlechter in Bot. Jahrb. 39: 64. 1906; Guillaumin in Notul. Syst. (Paris) 10: 72. 1941, Fl. Nouv.-Caléd. 68. 1948.

Calanthe triplicata var. *angraeciflora* Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 230. pl. 99. 1977.

Erect terrestrial plant up to 1.25 m. tall, the stems nonpseudobulbous, 1.5–3 (–5) cm. long, 3–6-leaved; leaves erect or ascending, up to 75 cm. long, nonarticulate, the petioles slender, channelled, 12–25 cm. long, the blades lanceolate to elliptic-lanceolate, 45–60 cm. long, (7–) 10–16 cm. broad, strongly ribbed, frequently laxly puberulent beneath, attenuate at base, narrowly acute to attenuate at apex; inflorescences axillary, 0.6–1.25 m. tall, laxly puberulent, the peduncle well developed, terete, the rachis 1/2–1/4 the length of peduncle, subdensely many-flowered, the bracts ovate to lanceolate, (10–) 15–29 mm. long, 4–7 mm. broad, subdensely puberulent, persistent; flowers patent, showy, pure white or white faintly tinged with yellow, with the tuberculae of the labellum yellow to orange; sepals patent, elliptic-obovate, 12–20 mm. long, 6–9 mm. broad, abruptly acuminate and ultimately briefly apiculate at apex; petals patent, narrowly elliptic-oblong to oblong, 10–18 mm. long, 4–7 mm. broad, broadly acute to abruptly acuminate at apex; labellum erect, the spur well developed, slender, arcuate, 15–27 (–50) mm. long, about 2 mm. in diameter, hardly or not dilated distally, the blade 3-lobed, 13–20 mm. long, about 13 mm. broad, the lateral lobes spreading, more or less oblong, often slightly dilated distally, 8–12 mm. long, 4–6 mm. broad, with the tips obtuse, the midlobe deeply divided distally into 2 broadly divergent oblong-falcate segments, these similar in size to lateral lobes or somewhat smaller, with the tips obtuse, the disk tuberculate near base of blade; column much dilated distally, 5–7 mm. long, often pubescent; clinandrium very deeply excavate; anther ovate, about 4.5 mm. long and 3 mm. broad; pollinia clavate, about 3.5 mm. long and 0.3 mm. in diameter, the viscidium lanceolate, about 1.5 mm. long and 0.3 mm. broad; rostellum 2-lobed, with the tips of the lobes truncate.

TYPIFICATION AND NOMENCLATURE: *Orchis triplicata*, the basionym of the correct name for the type species of *Calanthe*, is based upon "Flos triplicatus" of Rumphius (Herb. Amb. 6: 115. t. 52, fig. 2. 1750), from Amboina. *Limodorum veratrifolium* Willd. is a nomenclaturally superfluous name because *Orchis triplicata* was cited as a synonym. The type of *C. furcata* is *Cuming s. n.* (K HOLOTYPE and ISOTYPE in Lindley Orchid Herbarium), from Luzon, Philippine Islands. *Calanthe gracillima* is based on *Beechey s. n.* (K HOLOTYPE), presumably from the Society Islands ("Coral Island"). *Calanthe angraeciflora* is typified by *Deplanche 114* (P HOLOTYPE; ISOTYPES at K, W 21983), collected at Canala, New Caledonia. *Calanthe bracteosa* is based upon mate-



FIGURE 64. *Calanthe triplicata*; apical portion of inflorescence, with buds and a flower, from the vicinity of Nandarivatu, Mba Province, Viti Levu (Kores & Molvray F29), about life-size.

rial that originally may have come from Samoa, sent to Reichenbach from Ghent by representatives of the Compagnie Continentale d'Horticulture and perhaps deposited at w (not seen). These collections and the reasons for combining them into a single taxon have been discussed (Kores, 1989).

DISTRIBUTION: Southern China and India throughout Malesia to northern Australia, and eastward in the Pacific to the Marquesas. The species is a frequent terrestrial herb in Fiji, found from near sea level to about 1,100 m. in dense forest, in thickets, and on moderately shaded hillsides. About 40 collections are available from six islands. Flowers have been noted in most months, fruits between February and August.

LOCAL NAME: *Varavara* (the name commonly used for any broad-leaved terrestrial orchid).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 114*; vicinity of Nandarivatu, *in Thurn 65*, Kores & Molvray *F29*; near summit of Mt. Nanggaranambuluta, *DA 13951*; Mt. Matomba, Nandala, *Degener 14635*. NANDRONGA & NAVOSA: Mbelo, near Vatukarasa, *Tabulewa 13038*. SERUA: Vatuvilakia, vicinity of Ngaloa, *Degener 15085*. NAMOSI: Mborutu, *DA 11619*. RA: Vicinity of Rewasa, near Vaileka, *Degener 15409*. NAITASIRI: Near Tholo-i-suva, *Vaughan 3353*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7015*. REWA: Mt. Korombamba, *DA 16337*. KORO: Eastern slope of main ridge, *Smith 961*. NGAU: Hills east of Herald Bay, inland from Savawaieka, *Smith 7856*. VANUA LEVU: MBUA: Southern portion of Seatovo Range, *Smith 1546*. MATHUATA: Nana, *DA 13912*. THAKAUNDOVE: Hills east of Mbalanga, Savusavu Bay, *Degener & Ordonez 13957*. TAVEUNI: Western slope between Somosomo and Wairiki, *Smith 737*; slopes of Mt. Manuka, east of Wairiki, *Smith 8317*. VANUA MBALAVU: Northern limestone section, *Smith 1487*. FIJI without further locality, *Seemann 605*.

Two specimens from the vicinity of Nandarivatu (*Degener 14290* and *14463*) have flowers with the labellum somewhat intermediate in shape between that of *Calanthe triplicata* and the comparatively infrequent (but sometimes sympatric) *C. alta*, the next species here treated, suggesting the possibility of natural hybridization between these species (Kores, 1989).

2. *Calanthe alta* Reichenb. f. *Otia Bot. Hamb. 53*. 1878 (repr. *Xenia Orchid. 3: 30*. 1881); Drake, *Ill. Fl. Ins. Mar. Pac. 309*. 1892; L. O. Williams in *Bot. Mus. Leaflet 5: 132*. 1953; B. E. V. Parham in *Trans. & Proc. Fiji Soc. 2: 30*. 1953; J. W. Parham, *Pl. Fiji Isl. 284*. 1964, ed. 2. 379. 1972; Kores in *Allertonia 5: 125*. 1989.

FIGURE 65A-E.

Calanthe lutescens H. Fleischm. & Rechinger in *Denkschr. Akad. Wiss. Wien 85: 257. t. 1, fig. 2*. 1910; Schlechter in *Repert. Sp. Nov. 9: 99*. 1911.

Calanthe anocentrum Schlechter in *Repert. Sp. Nov. 9: 98*. 1911.

Erect terrestrial plant up to 1.2 m. tall, the stems nonpseudobulbous, short, 3-6-leaved; leaves erect or ascending, 50-80 cm. long, nonarticulate, the petioles slender, channelled, 15-25 cm. long, the blades narrowly elliptic to elliptic-oblancoate, 35-55 cm. long, 7-13 cm. broad, strongly ribbed, glabrous, attenuate at base, acuminate at apex; inflorescences axillary, 60-80 cm. tall, gradually becoming somewhat puberulent distally, the peduncle well developed, slender, terete, the rachis about 1/3 the length of peduncle, subdensely many-flowered, the bracts lanceolate, 10-15 (-20) mm. long, 3-5 mm. broad, more or less puberulent, persistent; flowers patent, pure white or white tinged with yellow, with yellow markings at base of labellum; sepals reflexed, elliptic-ovate, (6-) 8-10 mm. long, (4-) 6-7 mm. broad, glabrous or more commonly laxly puberulent without, abruptly acuminate at apex; petals reflexed, oblong-elliptic to -spatulate, (6-) 7-9 mm. long, 3-4 mm. broad, glabrous, broadly subacute to obtuse at apex; labellum geniculately reflexed distally, the spur slender, cylindrical, 8-12 mm. long, about 2 mm. in diameter, frequently laxly puberulent distally, the blade 3-lobed, 7-11 mm. long overall, 8-13 mm. broad, the lateral lobes porrect, usually somewhat spreading distally, oblong, oblong-elliptic, or broadly ovate, 5-6 mm. long, 3-4 mm. broad, broadly subacute to rounded at apex, the midlobe oblong to oblong-spatulate, 4-6 mm. long, 3-6 mm. broad, with the distal 1/2-1/4 bifid, the segments parallel or connivent, oblong to oblong-falcate, much smaller than lateral lobes, with the tips obtuse, the disk with numerous, prominently raised tubercles oriented in a series of transverse rows at base of blade; column short, prominently dilated distally, glabrous; clinandrium deeply excavate; anther broadly ovate, about 2 mm. across; pollinia clavate, about 1 mm. long and 0.3 mm. in diameter, the viscidium small; rostellum briefly bifid, with the tips of the lobes obtuse.

TYPEFICTION AND NOMENCLATURE: *Calanthe alta* is typified by *U. S. Expl. Exped. (AMES 74946 HOLOTYPE; ISOTYPES at w 22957, p. p.)*, collected on Upolu, Samoa. It may be noted that the w sheet bears only a fragment packet of flowers representing type material, together with a large plant in fruit apparently collected by Rechinger. The type of *C. lutescens* is *Rechinger 1826 (w 3081 HOLOTYPE)*, collected near Lanuto'o, Upolu, Samoa, and that of *C. anocentrum* is *Vaupel 89 (B HOLOTYPE, destroyed; ISOTYPES at AMES 35367 & 105755, BISH, K, US, w 12722)*, obtained Dec. 3, 1905, on the

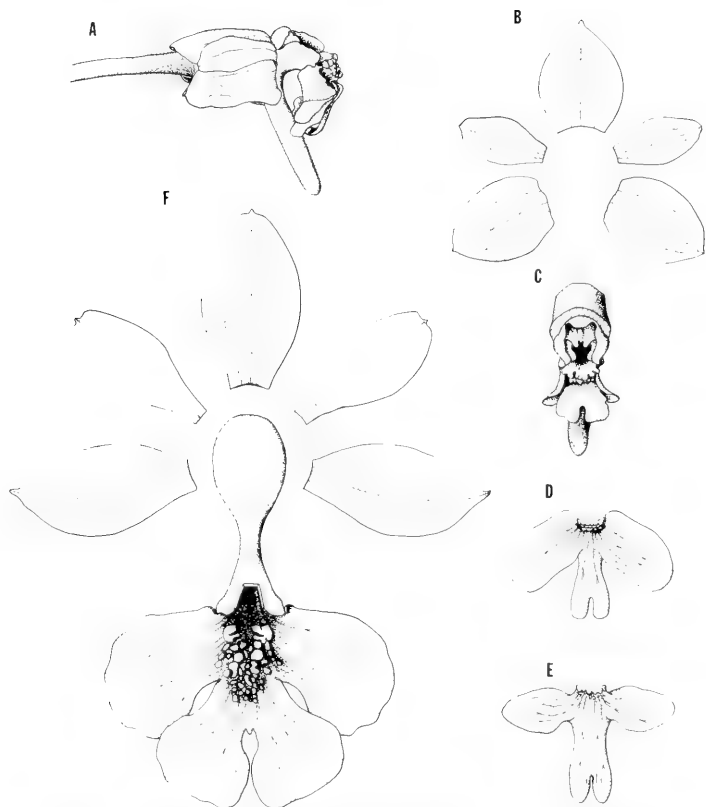


FIGURE 65. A-E, *Calanthe alta*; A, complete flower viewed from side, $\times 3$; B, sepals and petals, $\times 3$; C, dorsal view of column and attached labellum, the anther cap removed, showing clinandrium and rostellum, $\times 3$; D & E, variation in the form of the blade of the labellum in two different populations, $\times 3$. F, *Calanthe imthurnii*, perianth segments, $\times 3$. A-C from *McLoughlin 910*, D from *Degener 15278*, E from *im Thurn 340*, F from *im Thurn 312*.

lower slopes of Maugaloa, Savai'i, Samoa. These three type collections from Samoa show slight differences among themselves, but when all the available material is considered the differences are too slight to be significant (Kores, 1989).

DISTRIBUTION: Samoa (Upolu and Savai'i) and Fiji (Viti Levu only, as far as presently known). On Viti Levu the species is infrequent at elevations of about 100–850 m., found as a terrestrial herb in dense forest and on open summits. Flowers have been collected between May and July and also in January, fruits only in February.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *McLoughlin 910* (κ spirit coll. 2907a). NANDRONGA & NAVOSA: Vicinity of Mbelo, near Vatukarasa, *Degener 15278*, *Tabualewa 13038*. NAITASIRI: Tholo-i-suva, *im Thurn 340*.

3. *Calanthe imthurnii* Kores in *Allertonia* 5: 126. 1989.

FIGURE 65F.

Terrestrial plant up to 80 cm. tall, with nonpseudobulbous, 2-4-leaved stems and with white flowers, readily distinguished from the other two species of sect. *Calanthe* occurring in Fiji by having the apex of the spur conspicuously inflated and bulbous.

TYPEFICTION: This recently described species is based on *im Thurn 312* (κ HOLOTYPE), collected Dec. 5, 1906, south of Navai along the road to Nandrau, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known from only two collections, both obtained in Mba Province, Viti Levu, at elevations of approximately 800-1,100 m.

AVAILABLE COLLECTION: VITI LEVU: MBA: Vicinity of Nandarivatu at about 1,100 m., DA 9799 (coll. H. W. Simmonds) (SUVA, vicinate), December, 1955.

Not closely related to other known Fijian species, *Calanthe imthurnii* is suggestive of *C. conspicua* Lindl., of the Philippine Islands, a species with much larger flowers (4-4.5 cm. long) with the lateral lobes of the labellum ovate-attenuate and acute at apex, the midlobe ending in a transversely expanded obcordate blade with an emarginate apex. The Fijian endemic, in contrast, has the flowers only 1.4-1.6 cm. long with the lateral lobes of the labellum oblong to oblong-obovate and truncate at apex, the midlobe being deeply cleft into two obovate-falcate lobules.

4. *Calanthe hololeuca* Reichenb. f. in Seem. *Fl. Vit.* 298. 1868; Drake, *Ill. Fl. Ins. Mar. Pac.* 310. 1892; L. O. Williams in *Bot. Mus. Leafl.* 5: 133. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 30. 1953; H. B. R. Parham in op. cit. 2: 70. 1953; Hotta in *Acta Phytotax. Geobot.* 19: 155. 1963; J. W. Parham, *Pl. Fiji Isl.* 285. 1964, ed. 2. 379. 1972; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 232, in obs. 1977; Kores in *Allertonia* 5: 127. 1989; Lewis & Cribb, *Orch. Vanuatu*, 51. 1989.

FIGURES 66A-C, 89 (lower right).

Calanthe veratrifolia sensu Seem. in *Bonplandia* 9: 260. 1861, Viti, 443. 1862; non Ker-Gawler.

Calanthe clavata sensu Kraenzl. in *Bot. Jahrb.* 25: 603. 1898; H. Fleischm. & Reching in *Denkschr. Akad. Wiss. Wien* 85: 257. 1910; non Lindl.

Calanthe vaupeliana Kraenzl. in *Notizbl. Bot. Gart. Berlin* 5: 111. 1909; Schlechter in *Repert. Sp. Nov.* 9: 100. 1911; Ames in *J. Arnold Arb.* 13: 139, p. p. 1932; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 232, in obs. 1977.

Calanthe neocaledonica Rendle in *J. Linn. Soc. Bot.* 45: 251. t. 13, fig. 8. 1921; Guillaumin in *Notul. Syst. (Paris)* 10: 72. 1941, *Fl. Nouv.-Caléd.* 68. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 232. pl. 100. 1977.

Erect terrestrial plant up to 90 cm. tall, the stems nonpseudobulbous, 2-6 cm. long, 4-6-leaved; leaves erect or ascending, up to 85 cm. long, nonarticulate, the petioles slender, channelled, 11-20 (-26) cm. long, the blades lanceolate, (15-) 30-50 (-65) cm. long, (2.2-) 3-6.8 cm. broad, strongly ribbed, glabrous, narrowly attenuate at base, narrowly acute at apex; inflorescences axillary, 27-50 cm. tall, glabrous, the peduncle well developed, terete, the rachis 6-15 (-22) cm. long, subdensely many-flowered, the bracts ovate-lanceolate, 15-28 mm. long, 4-7 mm. broad, glabrous, caducous; flowers patent, pure white; sepals weakly spreading, slightly dissimilar, elliptic- to oblong-ovate, 11-14 mm. long, 4-6 mm. broad, glabrous, abruptly acuminate or short-apiculate at apex; petals erect, elliptic to elliptic-obovate, 10-13 mm. long, 4.5-8 mm. broad, abruptly acuminate at apex; labellum erect, the spur retrorse, slightly arcuate distally, cylindrical or slightly clavate, 12-14 mm. long, about 2 mm. in diameter, glabrous, obtuse at apex, the blade 3-lobed, 6-7 mm. long overall, 4-5 mm. broad, the lateral lobes turned upward, small, oblong-quadrate, 1.2-1.6 mm. long, 1.6-2.2 mm. broad, obtuse to broadly rounded at apex, the midlobe oblong to oblong-cuneate, 4-4.5 mm. long, 2.5-3.5 mm. broad, truncate with a minute acumen at apex, the disk naked; column short, slightly dilated at apex; clinandrium moderately deeply excavate, the lateral margins minutely denticulate; anther ovate-galeate, 2.5-3.2 mm. long,

about 2 mm. broad, acute at apex; pollinia clavate, slightly compressed laterally, about 2 mm. long and 0.5 mm. broad, the viscidium ovate, about 1.2 mm. long and 0.7 mm. broad; rostellum erect, large, linear-ligulate, 1.5–2 mm. long, subacute to obtuse at apex.

TIPIFICATION AND NOMENCLATURE: *Calanthe hololeuca* is based on *Seemann 607* (w 42047 HOLOTYPE; ISOTYPE at κ), collected in August or September, 1860, in the vicinity of Namosi Village, Namosi Province, Viti Levu. The type of *C. vaupeliana* is *Vaupel 358* (B HOLOTYPE, destroyed; ISOTYPES at AMES, κ), obtained June 30, 1906, at an altitude of 1,200 m. south of Maugaloa, Savai'i, Samoa. *Calanthe neocaledonica* is typified by two New Caledonian collections: *Compton 1409* (BM SYNTYPE), obtained July 14, 1914, at about 300 m. on the slopes of Mt. Arago, and *Compton 1609* (BM SYNTYPE), collected Aug. 3, 1914, at Ignambi at an elevation between 300 and 1,000 m. The similarity of this type material was noted by Hallé (1977), who nevertheless retained *C. neocaledonica* as a New Caledonian endemic. With ample material now at hand, it seems that the taxa may be combined into a single species (Kores, 1989).

DISTRIBUTION: New Ireland, Solomon Islands, Santa Cruz Islands, New Hebrides, New Caledonia, Fiji, Tonga, Horne Islands, and Samoa. From Fiji more than 30 collections are now known from four of the high islands; the species there is found at elevations of about 50–600 m. (or possibly higher), usually in dense forest but sometimes on open hillsides. Flowers have been obtained between March and December, fruits between August and November.

LOCAL NAMES: *Vavara*, *varavara*, *se ni varavara*.

REPRESENTATIVE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Mbelo, near Vatukarasa, *Tabua-lewa 13032*. SERUA: Mbuyombuyo, near Namboutini, *Tabulewa 15567*; hills east of Navua River, near Nukusere, *Smith 9092*. NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8540*; trail from Namosi up Mt. Voma, *Gillespie 2478*. NAITASIRI: Taunaisali, Wainisavulevu–Numbulolo divide, central plateau between Wainimala and Singatoka Rivers, *St. John 18314*; Tamavua–Sawani road, *Setchell & Parks 15078*; Tholo-i-suva, *Kores & Molvray F8*. NAITASIRI–REWA boundary: Mt. Kombalevu, *Vaughan 3448*. REWA: Foot of Mt. Korombamba, *Vaughan 3174*. OVALAU: Lovoni Valley, *Horne 285*. VANUA LEVU: THAKAUNDROVE: Southern slopes of Mt. Mariko, *Smith 403*. MOALA: Ndelaimoala, *Smith 1376*. FIJI without further locality, *U. S. Expl. Exped.* (AMES 74971, w 42046).

5. *Calanthe ventilabrum* Reichenb. f. in Seem. Fl. Vit. 298. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 310. 1892; L. O. Williams in Bot. Mus. Leaflet 5: 133. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 30. 1953; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 380. 1972; Kores in Allertonia 5: 128. 1989. FIGURE 66D–F.

Calanthe sp. florib. pallide aurantiacis Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Calanthe langei F. v. Muell. in S. Sci. Rec. n. s. 1. 1885, in Bot. Centralbl. 24: 212. 1885; Schlechter in Bot. Jahrb. 39: 64, in obs. 1906, in Repert. Sp. Nov. Beih. 1: 385, in obs. 1912; Guillaumin in Notul. Syst. (Paris) 10: 72. 1941, Fl. Nouv.-Caléd. 69. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 240. pl. 103. 1977; Lewis & Cribb, Orch. Vanuatu, 51. pl. 2. D. 1989.

Calanthe bigibba Schlechter in Repert. Sp. Nov. 9: 99. 1911; Christophersen in Bishop Mus. Bull. 128: 65. 1935.

Calanthe lyroglossa sensu Guillaumin in Notul. Syst. (Paris) 10: 72. 1941; non Reichenb. f.

Erect terrestrial plant up to 60 cm. tall, the stems nonpseudobulbous, 1–3 cm. long, 4–6-leaved; leaves erect, arcuate, up to 90 cm. long, nonarticulate, the petioles slender, channelled, (12–) 15–30 cm. long, the blades lanceolate, 25–60 cm. long, (3.5–) 6–10 cm. broad, strongly ribbed, glabrous, gradually angustate at base, narrowly attenuate at apex; inflorescences axillary, (20–) 35–65 cm. tall, glabrous, the peduncle well developed, terete, 15–55 cm. long, the rachis 1/3 the length of peduncle or less, densely many-flowered, the bracts lanceolate-attenuate, 15–30 (–45) mm. long, 3–7 mm. broad, glabrous, caducous; flowers initially ascending but becoming somewhat pendent with age, bright yellow to golden-yellow or yellowish orange; sepals weakly

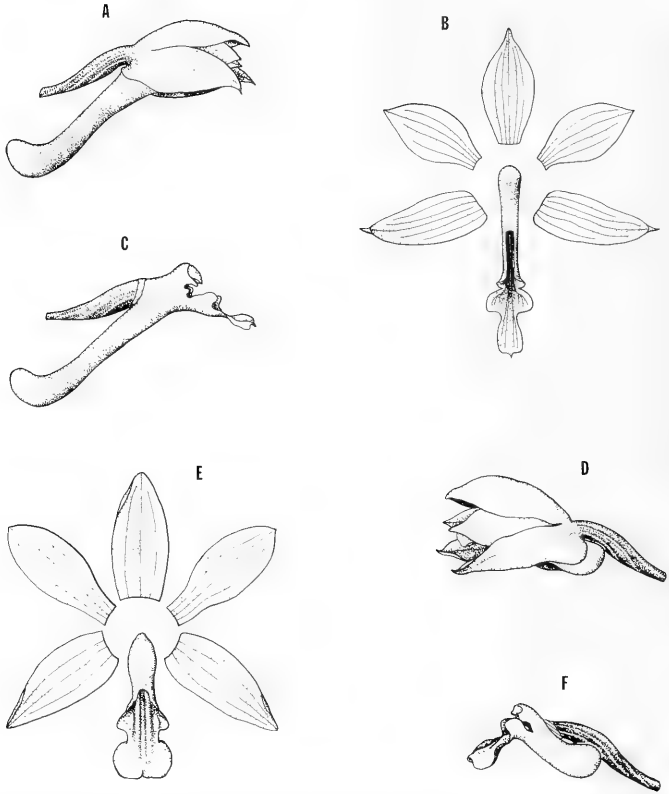


FIGURE 66. A-C, *Calanthe hololeuca*; A, complete flower, $\times 3$; B, perianth segments, $\times 3$; C, column with labellum attached, viewed from side, $\times 3$. D-F, *Calanthe ventilabrum*; D, complete flower, $\times 3$; E, perianth segments, $\times 3$; F, column with labellum attached, viewed from side, $\times 3$. A-C from Seemann 607, D-F from Smith 7607.

spreading, slightly dissimilar, elliptic- to oblong-ovate, 8-13 mm. long, 4.5-5.5 mm. broad, glabrous, acuminate at apex; petals erect, ovate to elliptic-ovate, 7-10.5 mm. long, 5.5-6.5 mm. broad, broadly subacute at apex; labellum erect, the spur retrorse, more or less saccate, somewhat dilated distally, 4.5-7.5 mm. long, about 3.5 mm. in diameter, glabrous, broadly rounded at apex, the blade weakly 3-lobed, 5-7.5 mm. long overall, the lateral lobes turned upward, small, more or less oblong, 1-1.5 mm. long, 1.2-1.7 mm. broad, obtuse at apex, the midlobe oblong-ovate, 3.5-5.5 mm. long, 4-5 mm. broad, broadly rounded to truncate at apex, the disk with 2 or rarely 4 parallel, lamellate carinae extending from base of blade to lower portion of midlobe; column short, a little dilated at apex, glabrous; clinandrium deeply excavate, the margins weakly 3-lobed; anther transversely ovate-galeate, about 2.2 mm. across,

abruptly acuminate and ultimately briefly retuse at apex; pollinia clavate, about 1.5 mm. long and 0.5 mm. in diameter, the viscidium peltate, about 0.4 mm. across; rostellum slightly reflexed, broadly obtuse, apparently nonfunctional.

TIPIFICATION AND NOMENCLATURE: *Calanthe ventilabrum* is based on *Seemann 606* (W HOLOTYPE, apparently lost; ISOTYPE at K; drawing of holotype at AMES 42470), collected in 1860 near Somosomo, Taveuni. The type of *C. langei* is *E. L. Layard s. n.* (MEL HOLOTYPE), from New Caledonia, and that of *C. bigibba* is *Vaupel 359* (B HOLOTYPE, destroyed; ISOTYPE at AMES 35388), collected Nov. 4, 1905, at Mataana, Savai'i, Samoa. Although the type specimen of *C. langei* is inadequate (Hallé, 1977), material throughout the range of *C. ventilabrum* seems reasonably uniform, and I find recognition of more than one species inadvisable (Kores, 1989).

DISTRIBUTION: New Guinea, Solomon Islands, New Caledonia, New Hebrides, Fiji, and Samoa. In Fiji the species is known from four of the high islands at elevations of 200–1,323 m., occurring in dense, often mossy forest and in crest thickets. Flowers have been noted between May and August and in November, fruits in June and July.

LOCAL NAMES: *Vavara, varavara*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Parks 20635*; upper slopes and summit of Mt. Tomanivi, *Parks 20835, Smith 5152, Webster & Hildreth 14183*. NAMOSI: Mt. Voma, *Horne 876*. REWA: Mt. Korombamba, *Gillespie 2388, Meebold 16803*; vicinity of Suva (possibly Mt. Korombamba?), *H. B. R. Parham* (AMES). VITI LEVU without provincial indication, *Parks 20835*; central mountains, *Morrison & Cribb 5228* (K spirit coll. 41925). OVALAU: Summit of Mt. Ndelaiovalau and adjacent ridge, *Smith 7607*. VANUA LEVU: THAKAUNDROVE: Hills between Vatukawa and Wainigio Rivers, Ndrekeniwai Valley, *Smith 591*; southwestern slope of Mt. Mbatini, *Smith 667*; eastern buttress of Mt. Ndikeya, *Smith 1886*.

40. PHAIUS Lour. Fl. Cochinch. 517, 529. 1790; Kores in *Allertonia* 5: 130. 1989; Lewis & Cribb, *Orch. Vanuatu*, 53. 1989.

Phajus Lindl. Gen. Sp. Orchid. Pl. 126, orth. var. 1831; Bl. Fl. Javae Nov. Ser. 3. 1858 or 1859, Coll. Orchid. 1. 1858; Reichenb. f. in Seem. Fl. Vit. 299. 1868; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 152. 1889; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 218. 1977.

Large terrestrial plants with compact rhizomes and erect, short to elongated, pluriarticulate stems, these either modified into homoblastic, plurifoliate pseudobulbs or slender and terete; leaves relatively large, not articulate, petiolate, chartaceous, plicate, convolute in bud; inflorescences axillary from upper portion of stem or sometimes lateral, racemose, few-many-flowered; flowers often large, showy, resupinate; sepals and petals slightly differing, free, spreading, frequently somewhat fleshy; labellum shortly adnate with face of column at base, erect, entire or 3-lobed, slightly gibbous or more commonly with a small spur at base, the lateral margins incurved and more or less embracing column, the disk frequently with 1 or more longitudinal carinae; column slender; column foot absent or very short and inflexed; clinandrium deeply excavate, usually rather conspicuously marginate; anther terminal, incumbent, operculate, 2-celled; pollinia 8, waxy, caudiculate, in 2 groups of 4, the viscidium absent; stigma directly beneath rostellum, transverse, deeply recessed.

TYPE SPECIES: *Phaius grandifolius* Lour. (= *P. tankervilleae* (Banks ex L'Hér.) Bl.), the only original species.

DISTRIBUTION: Paleotropical, with about 40 species distributed from the Himalayan foothills to Madagascar and eastern Africa, extending eastward throughout Malasia to northern Australia and the Society Islands. Two indigenous species occur in Fiji.

KEY TO SPECIES

- Stems short, thickened, pseudobulbous; inflorescences lateral; petals acuminate at apex; labellum shortly spurred. 1. *P. tankervilleae*
 Stems elongated, nonpseudobulbous; inflorescences axillary; petals obtuse at apex; labellum spurless. 2. *P. graeffei*

1. *Phaius tankervilleae* (Banks ex L'Hér.) Bl. Mus. Bot. Lugd.-Bat. 2: 177, as *P. tankervillii*. 1856; L. O. Williams in Bot. Mus. Leaflet. 5: 133, as *P. tankervilleae*. 1938; Yuncker in Bishop Mus. Bull. 184: 31, as *P. tankervilliae*. 1945; Guillaumin, Fl. Nouv.-Caléd. 68, as *P. tankervillei*. 1948; Yuncker in Bishop Mus. Bull. 220: 89, as *P. tankervilleae*. 1959; Hotta in Acta Phytotax. Geobot. 19: 155, as *P. tankervilliae*. 1963; J. W. Parham, Pl. Fiji Isl. 293, as *P. tankervilleae*. 1964, ed. 2. 387. pl. IV, as *P. tankervilliae*. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 262, as *P. tankervilliae*. 1970; Garay & Sweet, Orch. S. Ryukyu Isl. 126, as *P. tankervilleae*. 1974; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 226. pl. 98, 218, as *P. tankervilleae*. 1977; Seidenfaden in Opera Bot. 89: 43. fig. 19, as *P. tankervilleae*. 1986; Kores in Allertonia 5: 130. 1989; Lewis & Cribb, Orch. Vanuatu, 54. fig. 6, L, pl. 2, A. 1989.

Limodorum tankervilleae Banks ex L'Hér. Sert. Angl. 28, as *L. tankervilleae*, orth. err. 1789, corr. in op. cit. ed. 2. 17. post 1800; Dryander in Ait. Hort. Kew. 3: 302. t. 12. 1789.

Phaius grandifolius Lour. Fl. Cochinch. 529. 1790; Burkill in J. Linn. Soc. Bot. 35: 56. 1901.

Limodorum incarvillei Banks ex Pers. Syn. Pl. 2: 520, orth. var. 1807; Bl. Bijdr. Fl. Ned. Ind. 374. 1825. *Bletia tankervilliae* R. Br. in Ait. f. Hort. Kew. ed. 2. 5: 205. 1813; Seem. in Bonplandia 9: 260. 1861, Viti, 442. 1862.

Phaius blumei Lindl. Gen. Sp. Orchid. Pl. 127. 1831; Reichenb. f. in Seem. Fl. Vit. 299. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 309. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 29. pl. 7. 1953.

Phaius incarvillei Kuntze, Rev. Gen. Pl. 2: 675, orth. var. 1891; Guillaumin in Notul. Syst. (Paris) 10: 70. 72. 1941.

Erect terrestrial plant to 2 m. tall, the stems short, pseudobulbous; pseudobulbs conical to ovoid, 2.5–6 cm. long, 2–5 cm. in diameter, completely ensheathed by leaf bases; leaves erect or ascending, up to 1.2 m. long, the petioles slender, channelled, 15–25 cm. long, the blades narrowly elliptic to elliptic-lanceolate, 15–95 cm. long, 4–20 cm. broad, broadly attenuate at base, broadly acute to acuminate at apex; inflorescences lateral, 0.6–2 m. tall, the scape well developed, stout, terete, the rachis rather laxly 10–20-flowered, the bracts large, lanceolate to narrowly obovate, 3–5 cm. long, 1–1.5 cm. broad, caducous; flowers initially ascending to patent, gradually becoming somewhat pendent with age, large, showy, 10–12.5 cm. across, the perianth segments white, greenish white, or rose-colored on outer surface, reddish brown to yellow-brown on inner surface, the labellum white without, rose-pink to deep reddish purple with yellow markings within; sepals and petals broadly spreading, lanceolate to oblanceolate, 4.5–6.5 cm. long, 0.7–1.5 cm. broad, acuminate at apex; labellum salverform, broadly obovate when flattened, weakly 3-lobed, shortly spurred, 4–5.5 cm. long overall, the spur somewhat retrorse, slender, 6–8 mm. long, shortly forked at apex, the lateral lobes inrolled and embracing column, oblong, 2–4 cm. long, 1–1.2 cm. broad, broadly rounded at apex, the midlobe semiorbicular, 1.5–2 cm. across, with a recurved, conspicuously crisped-undulate anterior margin, the carina platelike, oblong-obovate, somewhat hirsute distally, acuminate at apex; column semiterete, slightly clavate, 1.5–2 cm. long; column foot much abbreviated; anther transverse-ovate, about 5 mm. across, frequently laxly puberulent externally, briefly tridentate at apex; pollinia ovate, somewhat compressed laterally, shortly caudiculate; rostellum brief, transverse; stigma large, scutiform, deeply recessed.

TIPIFICATION AND NOMENCLATURE: *Limodorum tankervilleae* may be considered (Hallé, 1977) typified by a drawing by Banks (BM) based on a specimen cultivated in London prior to 1788; the original collector and provenance (supposedly China) are not indicated in the protologue. *Phaius grandifolius* is based on specimens observed in cultivation in Cochinchina; *P. blumei* on a series of collections, *Blume s. n.* (L HOLOTYPE), from Java. For more detailed comments on these collections, as well as on the many variant spellings that have been used for the specific epithet, cf. Kores (1989).

DISTRIBUTION: Widespread from southern China through Malesia to Australia and eastward to Samoa; cultivated and sometimes naturalized elsewhere. In Fiji *Phaius tankarvilleae* occurs from near sea level to an elevation of about 1,150 m. in primary and secondary forest, thickets, and sometimes in open grassy places and established in plantations. About 25 collections from three of the high islands are at hand, but doubtless the species is to be found on other Fijian islands. Flowers have been obtained between May and November, fruits between June and October.

LOCAL NAMES AND USES: Recorded names are *vavara*, *vavara sa*, *vavara sere*, *varavara*, and *varavara sa*. The species has been brought into garden cultivation at least in Suva, and in upper Naitasiri the gum from split pseudobulbs has been used for pasting pieces of tapa together.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *in Thurn 20*; western and southern slopes of Mt. Tomanivi, *Smith 5224*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, *Smith 5432*. NAMOSI: Namosi and vicinity, *Seemann 586*, *Parks 20270*; between Nangarawai and Namuamua, *Gillespie 3212*. NAITASIRI: Wainamo Creek, near Matawailevu, Wainimala Valley, *St. John 18243*. REWA: Veisari Swamp, *in Thurn 43*; Suva (cultivated?), *in Thurn 357*. NGAU: *Tothill 881*. VANUA LEVU: MATHUATA: Mt. Uluimbau, *DA 15178*. THAKAUNDRUVE: Southern slope of Valanga Range, *Smith 398*.

2. *Phaius graeffei* Reichenb. f. in Seem. Fl. Vit. 299. 1868 (repr. *Xenia Orchid.* 3: 30. 1881); Drake, Ill. Fl. Ins. Mar. Pac. 309. 1892; Kraenzl. in Bot. Jahrb. 25: 602. 1898; H. Fleischm. & Rechinger in Denkschr. Akad. Wiss. Wien 85: 257. t. 1, fig. 8, 9. 1910; Schlechter in Repert. Sp. Nov. 9: 98. 1911, in Repert. Sp. Nov. Beih. 1: 373, in obs. 1912; Christophersen in Bishop Mus. Bull. 128: 65. 1935; L. O. Williams in Bot. Mus. Leaflet. 5: 133. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 29. pl. 8. 1953; H. B. R. Parham in op. cit. 2: 71. 1953; J. W. Parham, Pl. Fiji Isl. 293. 1964, ed. 2. 386. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 226, in obs. 1977; Kores in Allertonia 5: 131. 1989.

Phaius blumei sensu Kraenzl. in Bot. Jahrb. 25: 602. 1898; non Lindl.

Phaius papuanus Schlechter in K. Schum. & Lauterb. Nachr. Fl. Deutsch. Schutzgeb. Südsee, 139. 1905.

Phaius amboinensis var. *papuanus* Schlechter in Repert. Sp. Nov. Beih. 1: 375. 1912; Lewis & Cribb, Orch. Vanuatu, 53. fig. 6, A-K. 1989.

Erect terrestrial plant to 1 m. tall, the stems elongated, nonpseudobulbous, terete, up to 30 cm. long; leaves erect, up to 65 cm. long, the petioles slender, channelled, 8–15 cm. long, the blades elliptic-lanceolate, 25–55 cm. long, 4–9 cm. broad, gradually attenuate at base, narrowly acuminate at apex; inflorescences axillary, 30–70 cm. long, the peduncle well developed, stout, terete, the rachis laxly 5–15-flowered, the bracts obovate, 2.5–3.5 cm. long, 1.4–2 cm. broad, caducous; flowers somewhat pendent, large, the perianth segments white or pale yellowish, sometimes marked with irregular reddish brown streaks on inner surface, the labellum pale yellow; sepals weakly spreading, slightly dissimilar, oblong-obovate, 2.8–3.5 cm. long, 1–1.3 cm. broad, broadly subacute at apex; petals weakly spreading, oblanceolate, slightly falcate, 2.8–3.2 cm. long, 0.7–0.8 cm. broad, broadly rounded at apex; labellum embracing column, flabellate when flattened, 3-lobed distally, ecalcarate, 2.5–3 cm. long and broad, the base slightly gibbous, the apex prominently 3-lobed with the tips of lobes broadly rounded, the anterior margin of lobes subentire to weakly and irregularly crenulate, the carina slightly raised, more or less ligulate, mealy-tomentose throughout; column semiterete, clavate, 2–2.5 cm. long, usually laxly puberulent distally; column foot absent; clinandrium rather deeply excavate, the anterior margin broadly 3-lobed; anther transverse-ovate, about 4 mm. across, laxly strigose externally, broadly subacute at apex; pollinia broadly obovate, slightly compressed laterally, about 1 mm. across, the caudicles about 1 mm. long; rostellum more or less subquadrate, hyaline; stigma large, semicircular, deeply recessed.

TYPIIFICATION AND NOMENCLATURE: The type of *Phaius graeffei* is *Graeffe s. n.* (w 28396, p. p., HOLOTYPE), from Lanuto'o, Upolu, Samoa. The sheet also includes a fragment packet with flowers collected by the U. S. Exploring Expedition in Fiji, but that material is not cited in the protologue. *Phaius papuanus* is based on *Schlechter 14595* (B HOLOTYPE, destroyed), from New Guinea. This taxon was later reduced to a variety of *Phaius amboinensis* Bl. by Schlechter, and *Phaius graeffei* was considered a synonym of it by Lewis and Cribb (1989). However, since the last authors feel that the Papuanian and Pacific material is sufficiently distinct from *P. amboinensis* to warrant recognition, I prefer to treat it at specific rank, thereby preserving Reichenbach's (1868) binomial, which is well established in the literature of the Fijian Region.

DISTRIBUTION: New Guinea, Solomon Islands, New Hebrides, Fiji, Samoa, and Cook Islands (as here interpreted, but cf. Kores (1989) for a discussion of related species from Malesia and New Caledonia). In Fiji *Phaius graeffei* appears less frequent than *P. tankarvilleae*, being known from dense, wet forest at elevations from near sea level to about 450 m. Dated collections bear flowers in May, June, and December.

LOCAL NAMES AND USE: The only recorded names are *mbeta* (Nandronga & Navosa) and *varavara* (Mathuata). A decoction of leaves has been noted as used for stomach-ache in Nandronga & Navosa.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Loloti, in mountains inland from Lautoka, *Greenwood 287*. NANDRONGA & NAVOSA: North of Komave, *St. John 18957*. SERUA: Waimbale Creek, east of Namboutini, *Degener 15481*. NAMOSI: Hills east of Wainikoroiuva River, near Namuamua, *Smith 8950* (US unicate). NAITASIRE: Forest Reserve, *Vaughan 3176*; Prince's Road, *Vaughan 3186*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7104* (US unicate). REWA: Vicinity of Suva, *Meebold 26558*. NGAU: Hills east of Herald Bay, inland from Sawaieke, *Smith 7860*. VANUA LEVU: MATHUATA: Wainunu-Ndreketi divide, *Smith 1848*. FIJI without further locality, *U. S. Expl. Exped. (AMES 75022, w 28396, p. p.); H. B. R. Parham 2 (AMES)*.

41. SPATHOGLOTTIS Bl. *Bijdr. Fl. Ned. Ind.* 400. 1825, Tab. Pl. Jav. Orchid. t. II, fig. 76. 1825; Reichenb. f. in Seem. *Fl. Vit.* 300. 1868; Holttum, *Fl. Malaya* 1: 161. 1953; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 30. 1953; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 206. 1977; Kores in *Allertonia* 5: 132. 1989; Lewis & Cribb, *Orch. Vanuatu*, 56. 1989.

Large terrestrial plants with compact rhizomes and erect pseudobulbous stems; pseudobulbs homoblastic, with relatively few leaves; leaves articulate or not, convolute in bud, petiolate, chartaceous, plicate; inflorescences lateral, arising from base of pseudobulbs, erect, racemose, many-flowered; flowers relatively large, showy, resupinate; sepals and petals slightly differing, free, spreading; labellum sessile or very shortly unguiculate, immobile, ecalcarate, 3-lobed, the lateral lobes erect, the midlobe porrect, usually clawed, more or less spatulate, the disk at base of midlobe tuberculate or cristate; column long, slender, slightly curved, more or less clavate, slightly winged along lateral margins; column foot absent; clinandrium moderately deeply excavate; anther terminal, incumbent, operculate, 2-celled; pollinia 8, waxy, somewhat clavate, caudiculate, loosely joined into 2 fascicles, the viscidium absent; rostellum transverse, frequently somewhat retrorsely reflexed; stigma directly below rostellum, deeply recessed.

TYPE SPECIES: *Spathoglottis plicata* Bl., the sole species originally included by Blume.

DISTRIBUTION: A genus of about 45 species occurring from India and Ceylon through southeastern Asia and throughout Malesia (especially in New Guinea) to Australia and the Caroline Islands, eastward to Samoa and Niue. Three species occur

in Fiji, one of them endemic and one of the others questionably indigenous (cf. *Spathoglottis plicata*, below).

USEFUL TREATMENT OF GENUS: CRIBB, P. J., & C. Z. TANG. *Spathoglottis* (Orchidaceae) in Australia and the Pacific Islands. Kew Bull. 36: 721-729. 1982.

KEY TO SPECIES

- Lateral lobes of labellum perpendicularly oriented to its main axis, the midlobe with the distal end prominently expanded laterally to form a transverse blade, this large, much broader than long.
 Callus at base of midlobe of labellum not bipartite, much longer than tall, extending to middle of apical blade, densely covered with short white hairs. 1. *S. pacifica*
 Callus at base of midlobe of labellum bipartite, much taller than long, hardly or not extending beyond base of claw, glabrous or very laxly villous. 2. *S. plicata*
 Lateral lobes of labellum acutely oriented to its main axis, the midlobe with the distal end hardly expanded laterally, the blade small, about as long as broad. 3. *S. smithii*

1. *Spathoglottis pacifica* Reichenb. f. in Seem. Fl. Vit. 300. 1868, in Gard. Chron. n. s. 19: 340. 1883; Drake, Ill. Fl. Ins. Mar. Pac. 308, p. p. 1892; Kraenzl. in Bot. Jahrb. 25: 603. 1898; Schlechter in Repert. Sp. Nov. 11: 101, p. p. 1911, in Repert. Sp. Nov. Beih. 1: 394, in obs. 1912; L. O. Williams in Bot. Mus. Leaflet 5: 134. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 30. pl. 9. 1953; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 388. 1972; Cribb & Tang in Kew Bull. 36: 722. fig. 1, e. 1982; Kores in Allertonia 5: 132. 1989; Lewis & Cribb, Orch. Vanuatu, 56. fig. 7, J, K [excl. pl. 2, E]. 1989.

FIGURES 67, 68A, 69H-L.

Limodorum unguiculatum sensu Seem. in Bonplandia 9: 260. 1861, Viti, 442. 1862; Reichenb. f. in Seem. Fl. Vit. 300, pro syn. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 309, pro syn. 1892; non Labill.

Erect terrestrial plant to 1 m. tall, the rhizome much abbreviated; pseudobulbs ovoid, 1.8-4 cm. long, 1.5-2.5 cm. in diameter, completely obscured by the persistent, fibrous leaf bases, 3-6-foliolate; leaves erect or ascending, up to 1 m. long, articulate, the petioles slender, channelled, 6-25 cm. long, the blades lanceolate to narrowly elliptic-lanceolate, (19-) 30-75 cm. long, (1.5-) 2.5-5 cm. broad, plicate, with (5-) 7-9 main nerves, gradually angustate at base, narrowly acuminate at apex; inflorescences lateral, erect, up to 1 m. tall, the scape slender, terete, up to 80 cm. long, with 4-6 widely spaced, tubular cataphylls, the rachis slender, 15-30 cm. long, gradually increasing in length with age, laxly to subdensely puberulent, 10-many-flowered, the bracts initially ascending but gradually becoming reflexed, ovate, 10-15 mm. long, 4.5-7 mm. broad; flowers more or less patent, usually deep pink to mauve or rarely almost white, with yellow markings on labellum; sepals slightly dissimilar, broadly spreading, elliptic-ovate to -obovate, (1.4-) 1.6-2.2 cm. long, 0.7-1 cm. broad, laxly puberulent externally, broadly subacute at apex; petals spreading, broadly elliptic to elliptic-ovate, 1.5-2 (-2.2) cm. long, 0.9-1.4 cm. broad, obtuse at apex; labellum 3-lobed, T-shaped in outline when flattened, 1.3-1.5 cm. long, the base truncate, the lateral lobes nearly perpendicular to main axis of labellum, with distal portions slightly inflexed and embracing column, obliquely oblong-ovate, 6-7 mm. long and 4-5 mm. broad, slightly rugose distally on inner surface, the apex obtuse, the midlobe porrect, unguiculate, 9-11 mm. long, with the distal end prominently expanded laterally, the claw ligulate, 4-5 mm. long and 2.5-3 mm. broad, somewhat constricted at base, the apical blade well developed, transversely oblong-obreniform, 5-6 mm. long and 10-12 mm. broad, irregularly curled at margins, broadly retuse at apex, the callus extending from base of claw to middle of apical blade, ovate-attenuate, about 1 mm. tall and 5-6 mm. long, weakly furrowed longitudinally, densely covered with fine white hairs; column semiterete, slightly clavate, 0.8-1 cm. long, moderately winged along lateral margins; clinandrium very deeply excavate, with margins broadly 3-lobed and laxly and irregularly denticulate; anther broadly ovate-galeate, about 1.8 mm. across, obtuse at apex; pollinia 8, waxy, clavate, somewhat compressed laterally, about 1.8 x 0.6 x 0.4 mm.; rostellum porrect, transverse, broadly rounded at apex; stigma transversely oblong; capsules prominently pedicellate, cylindrical, 3-4.5 cm. long, 0.6-0.8 cm. in diameter, laxly puberulent, weakly 6-ribbed.



FIGURE 67. *Spathoglottis pacifica*; flowering plant about 80 cm. tall along a roadside, in Naitasiri Province, Viti Levu (Kores & Molvray F3).

TYPIFICATION: Four flowering collections, here taken to compose a suite of syntypes, were cited by Reichenbach: (1) *Seemann* 585 (w 20710 or 20711 SYNTYPE; ISOSYNTYPES at AMES 75125, BM, K), with pink flowers, from Vanua Levu; (2) *Seemann* s. n. (w 20709 SYNTYPE, also labelled as 585), from Moturiki; (3) *Harvey* s. n. (w 20707 SYNTYPE; ISOSYNTYPES at AMES 75078, K), from Lakemba, and (4) *Graeffe* s. n. (w 20708 SYNTYPE), from Uvea, Wallis Islands.

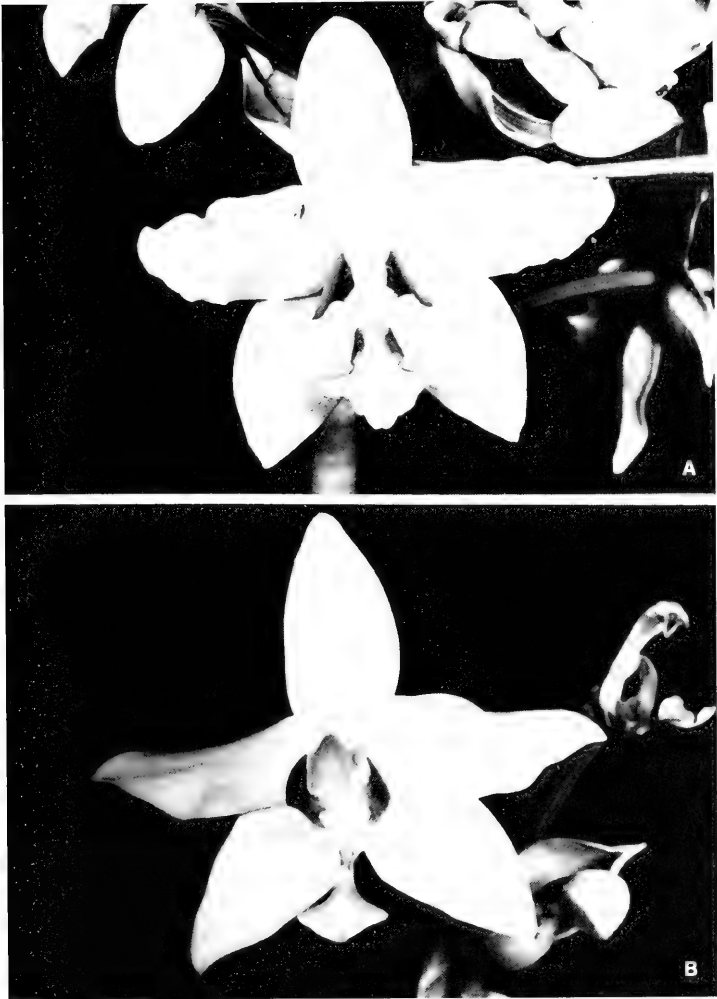


FIGURE 68. A, *Spathoglottis pacifica*; flower, from Naitasiri Province, Viti Levu (Kores & Molvray F3), \times about 1 1/2. B, *Spathoglottis plicata*; flower, from Rewa Province, Viti Levu (Kores & Molvray F32), \times about 2.

DISTRIBUTION: *Spathoglottis pacifica* has a relatively narrow distribution, being currently known from the New Hebrides, Fiji, the Wallis Islands, and Samoa. It is the most abundant species of the genus in Fiji, more than 50 collections now being available from eight or nine islands. It is sometimes locally abundant in open places among reeds and ferns, along roadsides and forest edges, and in openings in primary and secondary forest from near sea level to about 1,000 m. Flowers and fruits do not seem seasonal.

LOCAL NAMES AND USE: Like many other ground orchids, *Spathoglottis pacifica* is known as *varavara* or *vavara*. In the Yasawas it has been noted as having a medicinal use for "pain in joints."

REPRESENTATIVE COLLECTIONS: YASAWAS: WAYA: Woods along Wailevu Creek, *St. John 18069*. VITI LEVU: MBA: Lautoka, *Greenwood 432*; vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4252*; Nandarivatu, *Degener & Ordenez 13563*; western slopes of Mt. Nanggaranambuluta, *Smith 4829*. NAMOSI or REWA: Between Wainandoi River and Wainamboro Creek, *Vaughan 3367*. NAITASIRE: Waindina River basin, *MacDaniels 1061*: Tholo-i-suva, trail to Waisila Falls, *Kores & Molvray F3*; vicinity of Tamavua, *Gillespie 2081*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7230*. REWA: Queen's Road 10 miles west of Suva, *Vaughan 3145*. KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith 65*. VANUA LEVU: MATHUATA: *U. S. Expl. Exped.* (AMES 75079, 75126, US 37866); Seanggangga Plateau, in drainage of Korovuli River, *Smith 6672*. THAKAUNDROVE: Southern slope of Valanga Range, *Smith 378*; Savuthuru Mt., northeast of Valethi, *Degener 13825*. MATUKU: *Moseley, Bryan 229*.

2. *Spathoglottis plicata* Bl. *Bijdr. Fl. Ned. Ind.* 401. 1825, Tab. Pl. Jav. Orchid. *fig. 76*. 1825; Lindl. *Gen. Sp. Orchid. Pl.* 118. 1831; Reichenb. f. in *Seem. Fl. Vit.* 300. 1868; Kraenzl. in *Bot. Jahrb.* 25: 603. 1898; J. J. Sm. *Orchid. Java*, 219. 1905, *Orchid. Java Fig.-Atlas, fig. 162*. 1909; L. O. Williams in *Bot. Mus. Leaflet*. 5: 134. 1938; Yuncker in *Bishop Mus. Bull.* 178: 41. 1943, in op. cit. 184: 32. 1945; Holttum, *Fl. Malaya* 1: 166. 1953; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 30. 1953; Yuncker in *Bishop Mus. Bull.* 220: 90. 1959; J. W. Parham, *Pl. Fiji Isl.* 294. 1964, ed. 2. 388. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 263. 1970; Garay & Sweet, *Orch. S. Ryukyu Isl.* 128. 1974; Cribb & Tang in *Kew Bull.* 36: 722. *fig. 1, a*. 1982; Seidenfaden in *Opera Bot.* 89: 58. *fig. 27*. 1986; Kores in *Allertonia* 5: 133. 1989; Lewis & Cribb, *Orch. Vanuatu*, 57. *fig. 7, A-H, pl. 2, E* [non *S. pacifica*]. 1989. FIGURES 68B, 69M & N.

Bletia angustifolia Gaud. *Voy. Uranie et Physicienne, Freycinet, Bot. Atlas, pl. 32*. 1827, op. cit. 421, as *B. angustata*. 1829.

Spathoglottis vieillardii Reichenb. f. in *Linnaea* 41: 85. 1877; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 209. *pl. 92*. 1977.

Spathoglottis pacifica sensu Hemsl. in *J. Linn. Soc. Bot.* 30: 194. 1894; Burkill in op. cit. 35: 56. 1901; H. Fleischm. & Rechanger in *Denkschr. Akad. Wiss. Wien* 85: 258. *t. 2, fig. 2*. 1910; Schlechter in *Repert. Sp. Nov.* 11: 101, p. p. 1911; Christophersen in *Bishop Mus. Bull.* 128: 66. 1935; Yuncker in op. cit. 220: 89. 1959; non Reichenb. f.

Spathoglottis daenikeri Kraenzl. in *Viert. Naturf. Ges. Zürich* 74: 80. 1929.

Erect terrestrial plant (0.25-) 0.7-1 m. tall, the rhizome much abbreviated; pseudo-bulbs ovoid, 2-4 (-6) cm. long, 1.5-4 cm. in diameter, completely enclosed by the persistent, fibrous leaf bases, (2-)4-6-foliolate; leaves ascending, up to 1.5 m. long, articulate, the petioles slender, channelled, 10-35 cm. long, the blades linear-lanceolate to lanceolate, 22-70 (-115) cm. long, (0.8-) 2.5-8 cm. broad, plicate, with 5-9 main nerves, gradually angustate at base, narrowly acuminate at apex; inflorescences lateral, erect, up to 1.5 m. tall, the scape terete, 0.3-1.2 m. tall, with 4-6 widely spaced, sheathlike cataphylls, the rachis slender, (5-) 10-30 cm. long, gradually

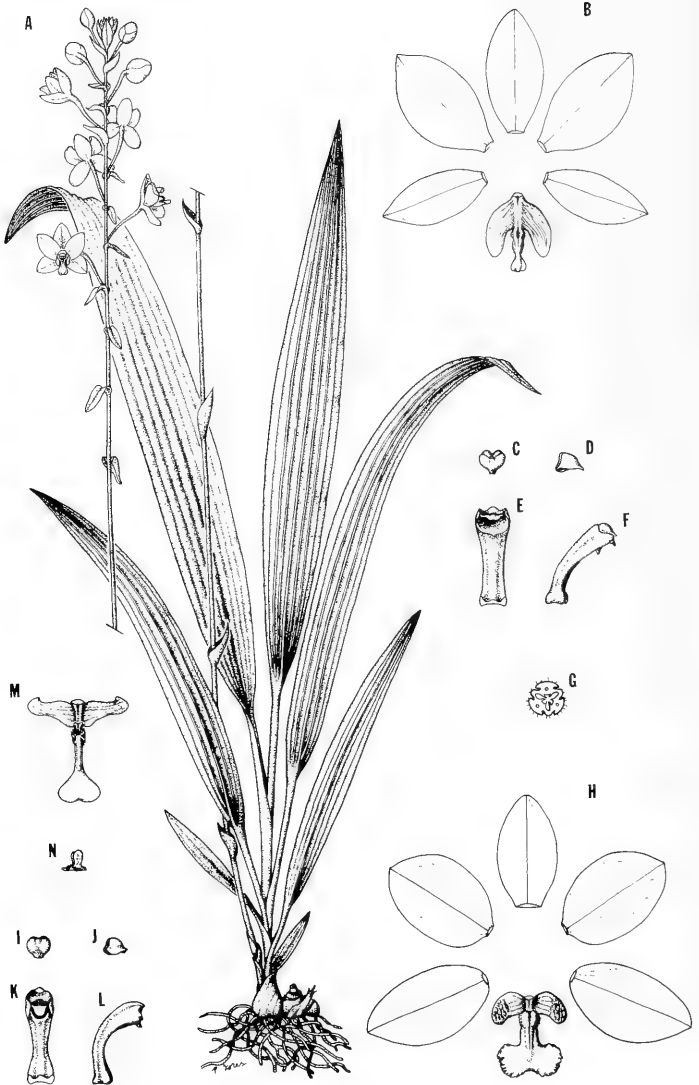
increasing in length with age, glabrous or sometimes sparsely pubescent, densely 3-many-flowered, the bracts initially ascending but gradually becoming pendent with age, oblong-ovate to -obovate, 8–15 mm. long, 3–9 mm. broad; flowers more or less patent, mauve to pale pink or rarely white, with the callus yellow; sepals slightly dissimilar, broadly spreading, elliptic- to oblong-ovate, 1.4–1.7 (–2) cm. long, 0.7–1 cm. broad, laxly puberulent externally, acute at apex; petals spreading, broadly ovate, slightly oblique, 1.3–1.6 (–1.8) cm. long, 0.9–1.2 cm. broad, broadly subacute at apex; labellum 3-lobed, T-shaped in outline when flattened, 1.4–1.8 cm. long overall, the base truncate, the lateral lobes perpendicular to main axis of labellum, erect, oblong, 7–8 mm. long and 2–3.5 mm. broad, slightly dilated distally, truncate to broadly rounded at apex, the midlobe porrect, prominently unguiculate, 9–11 (–15) mm. long, with the distal end conspicuously expanded laterally, the claw linear-ligulate, 5–6 mm. long and 1–1.5 mm. broad, at base on either side of callus with a deflexed, deltoid, glabrous or laxly villous tooth, sometimes also provided with a small, dorsal, toothlike appendage about midway, the apical blade well developed, broadly to transversely obovate, about 5 mm. long and 6.5–9 (–12) mm. broad, broadly retuse at apex, the callus at base of claw erect, bipartite, the 2 halves oblong-ovate, 1.5–2.5 mm. tall and about 1.25 mm. long, glabrous or very laxly villous, rounded at apices; column semiterete, 13–15 mm. long, gradually dilated distally and slightly winged along lateral margins; clinandrium deeply excavate, more or less truncate at margin; anther ovate, about 2.3 mm. long and 1.8 mm. broad, acuminate at apex; pollinia 8, waxy, clavate, slightly compressed laterally, about $1.2 \times 0.7 \times 0.3$ mm.; rostellum porrect, liguliform, obtuse at apex; capsules prominently pedicellate, cylindric, 3–4 cm. long, 0.8–2 cm. in diameter, weakly 6-ribbed.

TYPEIFICATION AND NOMENCLATURE: *Spathoglottis plicata* is typified by *Blume s. n.* (BO HOLOTYPE), collected near Buitenzorg, Java; *Bletia angustifolia* by *Freyinet s. n.* (P HOLOTYPE), from Rawak, Moluccas. The type of *S. vieillardii* is *Vieillard 1302* (P HOLOTYPE and ISOTYPE), collected near Balade, New Caledonia, and that of *S. daenikeri* is *Däniker 1622* (Z HOLOTYPE), from Poume, New Caledonia. The inclusion of the three latter names in *S. plicata* has been recently discussed (Kores, 1989, following Cribb and Tang, 1982).

DISTRIBUTION: This widespread species is believed to occur naturally from India and southeastern Asia throughout Malesia to the Solomon Islands and New Caledonia, and also in Tonga, Niue, and Samoa. Since it is commonly cultivated as a garden ornamental elsewhere, its status in Fiji (whether escaped from cultivation or indigenous) is not entirely clear. I recently (1989) concluded, somewhat diffidently, that it is probably infrequently indigenous in Fiji as well as introduced for garden purposes. (Reichenbach's mention of the species in *Flora Vitiensis* (1868) was for comparative purposes, and he listed only Malesian specimens.) As found in apparently natural habitats in Fiji, *Spathoglottis plicata* occurs along roads, in open hillside thickets, and in forest openings from near sea level to about 800 m. Flowers have been reported in scattered months between January and September.

LOCAL NAME AND USE: When grown as a garden ornamental in Fiji, *Spathoglottis plicata* is usually called *Solomon Islands orchid*.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of escarpment north of Nandarivatu, *Smith 6035*. SERUA: Vicinity of Ngaloa, *Degener 15212*: hills between Wainiggere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith 9352*. NAITASIRE: Toninaiwau, Tholo-i-suva, *DA 16948* (cult.). REWA: Slopes of Mt. Korombamba, *Kores & Molvray F32*; Suva, near Vatuwangga School, *H. B. R. & B. F. H. Parham 1* (cult.); near Suva, *H. B. R. Parham 1a*. VANUA LEVU: THAKAUNDOVE: Mt. Kasi, Yanawai River region, *Smith 1823*.



3. *Spathoglottis smithii* Kores in Allertonia 5: 134. 1989. FIGURE 69A-G.

Erect terrestrial plant about 0.6 m. tall, with leaf blades 40-60 × (2-) 4-5.5 cm. and with white flowers (labellum yellowish white, the column faint pink), readily differentiated from other Fijian species of *Spathoglottis* by having the labellum of its flowers subcruciform, with acutely oriented lateral lobes, with a long, narrowly oblong callus extending from its base nearly to its apex, and with the apical blade of the midlobe small and relatively poorly developed.

TIPIFICATION: This recently described species is based on *Smith 448* (BISH 114732 HOLOTYPE; ISOTYPE at NY), collected Nov. 14, 1933, on a cliff in dense forest on Mt. Mariko, Thakaundrove Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the type collection, obtained at an elevation of 600-866 m.

Spathoglottis smithii appears to be most closely related to *S. albida* Kraenzl., from the Bismarck Archipelago, from which it sharply differs in having six or seven prominently raised nerves on the dorsal surface of each lateral lobe of the labellum, while the callus is more extended (rather than being restricted to the immediate area between the bases of the lateral lobes) and is clearly not bipartite.

42. ACANTHEPHIPIUM Bl. Bijdr. Fl. Ned. Ind. 353, as *Acanthophippium*. 1825, Tab. Pl. Jav. Orchid. t. V. fig. 47, as *Acanthophippium*. 1825, corr. Fl. Javae, pref. VI, in adnot. 1828, Fl. Javae Nov. Ser. 132. 1858 or 1859, Coll. Orchid. 156. 1859; A. C. Sm. in J. Arnold Arb. 36: 276, as *Acanthophippium*. 1955; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 216. 1977; Kores in Allertonia 5: 135. 1989; Lewis & Cribb, Orch. Vanuatu, 50. 1989.

Large terrestrial plants with a compacted rhizome and closely spaced, erect, pseudobulbous stems; pseudobulbs homoblastic, more or less conical, each with 2 or more leaves; leaves large, articulate, convolutive in bud, petiolate, plicate; inflorescences lateral, borne on the younger pseudobulbs, erect, relatively short, racemose, 2-6-flowered; flowers large, showy, resupinate, often marked with dull red or reddish pink; sepals connate throughout most of their length, forming a large, obliquely ventricose tube, free at top, dissimilar, fleshy, the lateral sepals much broader than the dorsal sepal, with the bases decurrent along column foot, forming a mentum; petals included within sepals, free, erect, much narrower than lateral sepals, unguiculate, more or less trullate or spatulate, shortly decurrent along column foot at base; labellum articulate with apex of column foot, mobile, 3-lobed, somewhat saddle-shaped, the lateral segments erect, the disk with a series of longitudinal carinae; column long, rather stout, fleshy; column foot well developed, incurved, very long, slender; clinandrium relatively small, narrow, shallowly excavate; anther terminal, incumbent, operculate, 2-celled; pollinia 8, waxy, unequal in size, loosely joined in a fascicle by a granular mass, the viscidium absent; stigma directly below rostellum, shallowly recessed.

TYPE SPECIES: *Acanthephippium javanicum* Bl., the only original species.

FIGURE 69. A-G, *Spathoglottis smithii*; A, flowering plant, × 1/4; B, perianth segments, × 1; C, anther cap viewed from above, × 2; D, anther cap viewed from side, × 2; E, column viewed from front, showing clinandrium, rostellum, and stigma, × 2; F, column with anther cap and pollinarium in place, viewed from side, × 2; G, cross section of ovary, × 3. H-L, *Spathoglottis pacifica*; H, perianth segments, × 1; I, anther cap viewed from above, × 2; J, anther cap viewed from side, × 2; K, column viewed from front, with anther cap and pollinarium removed, showing clinandrium, rostellum, and stigma, × 2; L, column viewed from side, with anther cap and pollinarium removed, × 2. M & N, *Spathoglottis plicata*; M, labellum, × 1; N, callus, × 1. A-G from *Smith 448*, H-L from *MacDaniels 1061*, M & N from *Smith 1823*.

DISTRIBUTION: A genus of about 15 species, found from tropical Asia (India and Ceylon) eastward throughout Malesia including the Bismarck Archipelago to the Solomon Islands, New Hebrides, Fiji, Tonga, and the Horne Islands. A single indigenous species represents the genus in Fiji, but it may be noted that this same species is now known to occur in Tonga and the Horne Islands; therefore the eastern limit of the generic range (Smith, 1955) is to be amended.

1. *Acanthephippium papuanum* Schlechter in Repert. Sp. Nov. Beih. 1: 371. 1912, in op. cit. 21: t. 131, no. 494. 1928; Kores in Allertonia 5: 136. 1989; Lewis & Cribb, Orch. Vanuatu, 50. 1989.

Acanthephippium vitiense L. O. Williams in Amer. Orchid Soc. Bull. 10: 169. pl. 6. 1941, in Sargentia 1: 9. 1942; A. C. Sm. in J. Arnold Arb. 36: 276. 1955.

Acanthephippium vitiense L. O. Williams ex J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 378. *frontisp.* 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 216. pl. 95, 217 (4). 1977.

Acanthephippium sp. Hürliemann in Bauhinia 3: 194. 1967.

Large terrestrial plant up to 80 cm. tall, the rhizome much abbreviated; pseudobulbs fleshy, narrowly conical to cylindrical-attenuate, (3.5-) 6-12 (-20) cm. long, (1-) 2.5-5 cm. in diameter, 2- or 3-foliate, initially completely surrounded by a few large, membranous sheaths, gradually becoming somewhat more exposed with age; leaves erect or ascending, up to 60 cm. long, the petioles slender, channelled, 15-25 cm. long, the blades elliptic to elliptic-obovate, 25-45 cm. long, (7.5-) 10-15 cm. broad, chartaceous, gradually angustate at base, acuminate at apex; inflorescence lateral, arising from one of the suprabasal nodes of a developing pseudobulb, erect, 15-20 cm. long, the peduncle well developed, terete, 10-15 cm. long, the rachis short, terete, 2-4(-6)-flowered, the bracts broadly ovate, 2-3 cm. long, acuminate at apex; flowers erect, showy, the outer perianth segments yellowish white to cream-colored, with light pink to reddish brown streaks, the inner segments pale yellow, with a few irregular pink markings; sepals with their lateral margins connate throughout lower half or two-thirds to form an obliquely urceolate tube, dissimilar, the distal portions free, broadly spreading to slightly reflexed, the dorsal sepal oblong-lanceolate, (3-) 3.5-4 cm. long, 1-1.2 cm. broad, subacute to obtuse at apex, the lateral sepals obliquely oblong-ovate, slightly falcate distally, (3-) 3.5-4 cm. long, 1.2-1.5 cm. broad, the anterior margin prominently dilated near base and decurrent with column foot to form a mentum, subacute to obtuse at apex; mentum large, broad, 0.7-1.4 cm. across, a little compressed laterally, with a rounded, slightly bigibbous apex; petals erect, unguiculate, 2.8-3.5 cm. long, 1.2-1.5 cm. broad, the blade trullate, sometimes slightly oblique, subacute to obtuse at apex; labellum conspicuously arcuate, 3-lobed, 1.5-1.8 cm. long, 1.2-1.6 cm. broad between lateral lobes, these erect, subquadrate, 0.5-0.8 cm. long, 0.4-0.6 cm. broad, the upper margins slightly incurved, the midlobe oblong to oblong-spathulate, about 0.8 cm. long and 0.5 cm. broad, somewhat fleshy, the lateral margins subcrenulate, obtuse or slightly retuse and with a small, blunt acumen at apex, the disk with 3-5 longitudinal carinae and sometimes also slightly rugose distally; column semiterete, about 1.5 cm. long, the apex slightly dilated; column foot broadly incurved, very long and slender, about 2.8 cm. long and 0.3 cm. broad; clinandrium small, shallowly excavate; anther terminal, incumbent, galeate-cucullate, weakly tridentate at apex; pollina 8, obliquely clavate, unequal in size; rostellum short, transverse; stigma large, shallowly recessed.

TYPIFICATION AND NOMENCLATURE: *Acanthephippium papuanum* is based on Schlechter 16864 (B HOLOTYPE, destroyed; ISOTYPES at AMES 75149, L, NSW), collected Nov. 21, 1907, on the slopes of the Gatisberges, in the present Papua New Guinea. The type of *A. vitiense* is Degener 14605 (AMES 61153 HOLOTYPE), from the vicinity of Nauwanga, south of Nandarivatu, Mba Province, Viti Levu, March 1, 1941. Hürliemann's record of the genus in Tonga has been verified as belonging to the present species. The spelling *Acanthephippium* for the generic name, corrected by Blume

himself shortly after he proposed it as *Acanthophippium*, is now generally accepted (Kores, 1989). Reference of *A. vitiense* to *A. papuanum* and the relationship of that species to *A. javanicum* Bl. and *A. splendidum* J. J. Sm. have recently been discussed (Kores, 1989).

DISTRIBUTION: *Acanthophippium papuanum* is moderately widely distributed, occurring throughout the eastern half of New Guinea as well as in the Solomon Islands, New Caledonia, New Hebrides, Fiji, Tonga, and the Horn Islands. In Fiji it is found on the two largest islands at elevations from near sea level to about 900 m., as a terrestrial herb or on humus-covered logs in dense to open forest, hillside thickets, and dense crest thickets. Flowers have been observed between October and March, fruits between August and May.

USE: As a very ornamental orchid, *Acanthophippium papuanum* is sometimes seen in gardens, at least in Suva, to which it has been transplanted from nearby forested areas.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Navai, *in Thurn 128*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5469*. NAMOSI: Hills north of Wainavindrau Creek, between Korombasambasanga Range and Mt. Naitarandamu, *Smith 8473*. NAMOSI or REWA: Between Wainandoi River and Wainaboro Creek, *Vaughan 3332*. NAITASIRE: Between Nakavika and Muamua, *DA 11636*; Waimbau Creek, Sawani-Serea road, *DA 11218*; Suva Pumping Station, *Degener & Ordenez 13779*. TAILEVU: Ndakuivuna, east of Wainimbuka River, *DA 11017*. REWA: Nasoia, near Suva, *Tothill 872*; Suva (presumably cult.), *DA 11565*. VANUA LEVU: MATHUATA: Southern slopes of Mt. Numbuiloa, east of Lambasa, *Smith 6573*. THAKAUNDOVE: Savusavu Bay region, *Degener & Ordenez 13956*.

43. *BULBOPHYLLUM* Thou. Hist. Orchid. Trois. Tabl. Esp. sub u. 1822; Lindl. Gen. Sp. Orchid. Pl. 47. 1830; Reichenb. f. in Walp. Ann. Bot. Syst. 6: 243. 1861, in Seem. Fl. Vit. 302. 1868; Benth. in Benth. & Hook. f. Gen. Pl. 3: 501. 1883; Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. I. 2 (6): 178. 1888; Hook. f. Fl. Brit. Ind. 5: 752. 1890; Ridley in J. Linn. Soc. Bot. 31: 261. 1896; J. J. Sm. Orchid. Java, 414. 1905; Schlechter in Repert. Sp. Nov. Beih. 1: 693. 1912; Holtum, Fl. Malaya 1: 397. 1953; Backer & Bakh. f. Fl. Java 3: 375. 1968; Dockrill, Austr. Indig. Orchids, 525. 1969; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 164. 1977; van Royen, Alpine Fl. New Guinea 2: 156. 1979; Kores in Allertonia 5: 137. 1989; Lewis & Cribb, Orch. Vanuatu, 123. 1989. Nom. cons.

Cirrhopetalum Lindl. in Bot. Reg. 10: sub t. 832. 1824, Gen. Sp. Orchid. Pl. 45, 58. 1830; Schlechter in Repert. Sp. Nov. Beih. 1: 888. 1913. Nom. cons.

Erect or pendulous, small to large, epiphytic or rarely terrestrial plants with a short to long rhizome, the stems short, usually pseudobulbous, the pseudobulbs when present small (or sometimes minute) to large, heteroblastic, unifoliate¹; leaves articulate, conduplicate in bud, flat, coriaceous to chartaceous, rarely deciduous; inflorescences lateral from base of pseudobulbs or from rhizome, solitary or fasciculate, short to long, 1-flowered, racemose, umbellate, or capitate; flowers somewhat variable, ephemeral to relatively long-lived, small to large, mostly not showy, resupinate or not; sepals similar or markedly dissimilar, the medial sepal free, the lateral sepals more or less decurrent along column foot at base, free or partially connate distally; petals free, smaller than lateral sepals or rarely subequal to them in length, sometimes ciliate; labellum articulate with apex of column foot, usually very mobile, very rarely immobile, often arcuate, entire or 3-lobed, polymorphic, generally fleshy, often ciliate or pubescent, the

¹Species with bi- or trifoliate pseudobulbs do occur in the genus, but they are all representatives of subgen. *Bulbophyllum*, or in a few instances of subgen. *Cirrhopetalum*, and are found almost exclusively in tropical Africa. None of the species in the Fijian Region have bi- or trifoliate pseudobulbs or stems.

disk often with some form of carinae or appendages; column usually short, sometimes winged, often bearing brachia at apex; column foot distinct; clinandrium short; anther terminal, incumbent, operculate, 2-celled; pollinia 4, waxy, usually cohering in 2 pairs, unappendaged or rarely weakly attached to a thick viscid body; rostellum usually small, transverse; stigma directly beneath rostellum, usually deeply recessed.

TYPE SPECIES: *Bulbophyllum nutans* Thou. (typ. cons.). The type species of *Cirrhopetalum* is *C. thouarsii* Lindl., nom. illeg. (= *C. umbellatum* (Forst. f.) Reinw. ex Hook. & Arn. (*Epidendrum umbellatum* Forst. f.)). The two genera are now combined by practically all students of the group (cf. Kores, 1989).

DISTRIBUTION: *Bulbophyllum* is one of the largest genera of orchids, estimated to include about 1,500 species. It is widely distributed in the Old World, extending from Africa and Indian Ocean islands to the Indian subcontinent, southeastern Asia, Malesia, Australia, and eastward to the Society Islands. Twenty species represent the genus in Fiji (including one described as new in the supplement at end of family), seven being endemic; *Bulbophyllum* is therefore second only to *Dendrobium* in size among Fijian orchids.

Problems associated with attempts to divide *Bulbophyllum* into subgenera and sections have recently been briefly summarized (Kores, 1989). The Fijian species may be placed in at least three subgenera, one of which, *Schlechteria* van Royen, is very large and is represented in Fiji by eleven sections. The last two species in the present treatment cannot be firmly placed in a section. In dealing with *Bulbophyllum* in Fiji, I have relied heavily upon inflorescence structure and vegetative habit in the following key in order to delimit the larger assemblages of species, and to separate individual species I have utilized floral and foliar characters. As is the case for many of the small-flowered genera of Fijian orchids, color notes and ecological information for many species of *Bulbophyllum* are scanty.

USEFUL TREATMENTS OF GENUS: Although there has never been a monographic treatment of the entire genus *Bulbophyllum*, there are a number of regional floristic works (indicated under the generic name above) which provide useful background information on the taxonomic history of this difficult genus. Two of these works merit additional discussion.

ROYEN, P. VAN. *Bulbophyllum*, in *Alpine Fl. New Guinea* 2: 156-237. 1979. In his *Flora van Royen* provides a brief key to all the subgenera and sections recognized by Schlechter in his treatment of the genus for German New Guinea. A brief description is provided for the sections that are represented in the alpine region, and the type species for each section is indicated. The treatment provides a comprehensible view of Schlechter's infrageneric system of classification of the genus in New Guinea and also resolves a number of nomenclatural problems associated with some of Schlechter's subgeneric and sectional names.

SEIDENFADEN, G. Orchid genera in Thailand. VIII. *Bulbophyllum* Thou. *Dansk Bot. Arkiv* 33 (3): 1-228. 1979. This treatment provides a good summary of the taxonomic history of the genus and does much to clarify the circumscription and nomenclatural problems associated with the 14 sections of the genus that occur in Thailand; regrettably, only a few of these sections occur in Fiji.

KEY TO SPECIES

Inflorescences racemose or umbellate, the flowers developing simultaneously or sequentially over a relatively long interval.

Sepals very dissimilar; petals ciliate; inflorescences umbellate.

Lateral sepals not connate along upper margins, manifestly elongated and filiform-attenuate at apex; flowers dark reddish purple. 1. *B. gracillimum*

Lateral sepals connate along upper margins distally, narrowly acute at apex; flowers greenish yellow to yellow, with or without dark red markings. 2. *B. longiflorum*

Sepals similar or only weakly dissimilar; petals glabrous; inflorescences racemose.

Flowers relatively large, somewhat showy, 15-35 mm. long, developing sequentially over a relatively long interval; pseudobulbs (2-) 3-5 cm. long.

Roots smooth; petals much reduced, ovate-acuminate, about 2 mm. long; labellum with 2 erect, hornlike appendages near base. 3. *B. longiscapum*

Roots scaly-papillate; petals ovate, 8-12 mm. long; labellum without hornlike appendages near base. 4. *B. pachyanthum*

Flowers small, not showy, 1–6 mm. long, developing more or less simultaneously; pseudobulbs less than 1.5 cm. long or absent.

Leaves 0.6–2.5 cm. long; racemes 2–5.5 cm. long; flowers about 1 mm. long; pseudobulbs present (although small). 5. *B. savaïense*

Leaves 5.7–16 cm. long; racemes 9–14 cm. long; flowers 5–6 mm. long; pseudobulbs absent.

6. *B. polypodioides*

Inflorescences not racemose or umbellate, strictly 1-flowered.

Plants caespitose, weakly spreading or creeping; rhizomes rooted to substrate along all or most of their length; pseudobulbs not closely appressed to rhizome, erect or ascending.

Leaves manifestly petiolate, (7–) 8.5–18 cm. long.

Petals with the apex prolonged as a conspicuous, elongate, filiform-cylindric appendage; brachia subquadrate, about 1/2 the length of anther. 7. *B. trachyanthum*

Petals reduced, not appendaged at apex; brachia attenuate or subulate, about as long as anther or somewhat longer.

Pedicle much longer than scape; lateral sepals oblong to oblong-elliptic, not at all falcate; labellum weakly curved; apex of leaves broadly subacute to obtuse. 8. *B. samoanum*

Pedicle about same length as scape; lateral sepals ovate, slightly falcate; labellum strongly curved; apex of leaves acute. 9. *B. simmondsii*

Leaves very briefly petiolate or sessile, 0.4–5.6 (–6.2) cm. long.

Pseudobulbs depressed-ovoid to subglobose, prominently 4–6-angled when old.

Rhizome only slightly elongated; pseudobulbs closely spaced, 2–4 mm. apart, 4.5–7 mm. in diameter; labellum prominently auriculate at base.

Labellum sigmoid-curved, much longer than broad, subdensely pubescent; petals with 1–3 filiform-aristate appendages at apex. 10. *B. aristopetalum*

Labellum geniculately reflexed, only slightly longer than broad, glabrous; petals not appendaged, briefly aristate at apex. 11. *B. hassallii*

Rhizome prominently elongated; pseudobulbs widely separated from one another, 15–35 mm. apart, 1–2 mm. in diameter; labellum not prominently auriculate at base.

12. *B. amplistigmaticum*

Pseudobulbs ovoid, distinctly longer than broad, irregularly wrinkled when old.

Flowers greenish yellow, not tinged with red or maroon; rhizome hardly or not elongated; pseudobulbs crowded or closely spaced, 0–2 mm. apart; petals transversely ovate.

13. *B. aphanopetalum*

Flowers maroon or mostly maroon; rhizome much elongated; pseudobulbs widely separated from one another, 15–95 mm. apart; petals obovate to elliptic-obovate. 14. *B. rostriceps*

Plants dependent; rhizomes rooted to substrate only near base; pseudobulbs closely appressed to rhizome or weakly ascending.

Inflorescences solitary, very short, the scape hardly or not elongated, generally shorter than the pedicellate ovary.

Leaf blades 0.4–0.9 cm. broad, not ovate or elliptic-ovate; petals entire, not appendaged.

Rhizome completely obscured by persistent sheaths; leaves dark olive-green; labellum subdensely puberulus beneath; sepals usually yellow with reddish purple stripes. 15. *B. betchei*

Rhizome not obscured by persistent sheaths; leaves light green; labellum glabrous; sepals pale yellow to yellowish white. 16. *B. sessile*

Leaf blades 1.2–2 cm. broad, ovate to elliptic-ovate; petals divided into several conspicuous, cylindrical appendages. 17. *B. hexarhopalos*

Inflorescences fasciculate, moderately elongated, the scape well developed, much longer than pedicel, the pedicel articulate with ovary.

Pseudobulbs closely spaced, 2–5 mm. apart; flowers greenish yellow with base of labellum marked with red; labellum more or less obclaviform, very fleshy. 18. *B. quadricarinum*

Pseudobulbs widely spaced, 25–60 mm. apart; flowers dark red; labellum linguiform, slightly fleshy.

19. *B. incommodum*

1. ***Bulbophyllum gracillimum*** (Rolfe) Rolfe in Kew Bull. 1907: 412. 1907; Holttum, Fl. Malaya 1: 408. 1953; Seidenfaden in Dansk Bot. Arkiv 29 (1): 35. 1973; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 199. pl. 89. 1977; Seidenfaden in Dansk Bot. Arkiv 33 (3): 154. fig. 103. 1979; Kores in Allertonia 5: 140. 1989; non Hayata (1912).

Cirrhopetalum gracillimum Rolfe in Kew Bull. 1895: 34. 1895, in Orchid Rev. 23: 356. 1915.

Cirrhopetalum leratii Schlechter in Repert. Sp. Nov. 9: 216. 1911; Guillaumin in Notul. Syst. (Paris) 10: 68. 1941, Fl. Nouv.-Caléd. 65. 1948; non *Cirrhopetalum leratae* Kraenzl. (1920).

Epiphytic, creeping plants 5–10 (–20) cm. tall, the roots spreading, slender, flexuose, smooth, the rhizome elongated, terete, about 2 mm. in diameter, the pseudobulbs widely spaced, (1–) 1.5–2.5 cm. apart, erect or ascending, ovoid, 0.7–1.7 cm. long, 0.4–1.3 cm. in diameter, weakly 4-angled, unifoliate; leaves erect, petiolate, the petioles relatively stout, 0.5–1.5 cm. long, channelled, the blades elliptic to oblong-elliptic, 3.5–12 cm. long, 1.4–3 cm. broad, coriaceous, gradually angustate at base, obtuse to briefly retuse at apex; inflorescences solitary, erect, umbellate, 22–35 cm. tall, 8- or 9(–15)-flowered, the scape very slender, with 4 or 5 widely spaced, tubular, sheathlike cataphylls, the bracts small, ovate-acuminate, about 1 mm. long; flowers developing simultaneously in an ascending whorl, resupinate, dark reddish purple; dorsal sepal free, erect, ovate-acuminate, 6–11 mm. long, about 2 mm. broad, laxly ciliate, prominently piliferous at apex; lateral sepals connate along lower margins for a short distance above base, more or less porrect, obliquely ovate-attenuate, 30–45 mm. long, about 4 mm. broad, manifestly elongate and filiform-attenuate at apex; petals erect, lanceolate-falcate, 5–6 mm. long, about 1 mm. broad, laxly long-ciliate, narrowly filiform-attenuate at apex; labellum porrect, arcuate, more or less ovate-linguiform in outline, 1.6–2 mm. long, about 0.7 mm. broad, the base briefly cordate, somewhat channelled, the apex narrowly subacute, the disk naked or laxly transversely rugose; column stout, semiterete, about 1.4 mm. long, the brachia subdentiform, much abbreviated; column foot incurved, slender, about as long as column; clinandrium shallowly excavate, the dorsal margin broadly lobed; anther transversely oblong-galeate, about 0.6 mm. across, briefly rostrate, broadly rounded at apex; pollinia more or less hemispherical, slightly compressed laterally, about 0.4 mm. across; rostellum short, transverse; stigma large, transverse; ovary pedicellate, cylindrical-clavate, about 6 mm. long overall, weakly 6-ribbed distally, glabrous.

TYPIFICATION AND NOMENCLATURE: The type of *Cirrhopetalum gracillimum* is a specimen (K HOLOTYPE) made from a plant cultivated at Kew; although the original collector and type locality are uncertain, Rolfe speculated that the source was Burma. The type of *C. leratii* is *Le Rat s. n.* (B HOLOTYPE, destroyed), from Mt. Dzumac, New Caledonia; no isotypes are known.

DISTRIBUTION: This widespread species is known from southeastern Asia, Malesia, the Solomon Islands, New Caledonia, and Fiji. In Fiji it is known only from Viti Levu, occurring in forest from near sea level to approximately 900 m. Flowers have been noted in January, February, and August, fruits only in July.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *Simmonds L. 8880*. NAITASIRI: Prince's Road, *Vaughan 3274*; vicinity of Nasinu, *Gillespie s. n.* REWA: Veisari River, west of Suva Harbor, *im Thurn*, Aug. 28, 1907; Mt. Korombamba, *Vaughan 3451*; vicinity of Suva, *Meebold 16809*. FIJI without locality (probably Viti Levu), *Simmonds*, Feb. 22, 1960.

2. ***Bulbophyllum longiflorum*** Thou. Hist. Orchid. Trois. Tabl. Esp. & pl. 98. 1822; Reichenb. f. in Seem. Fl. Vit. 302. 1868; L. O. Williams in Bot. Mus. Leaf. 5: 134. 1938; Seidenfaden in Dansk Bot. Arkiv 29 (1): 126. fig. 64. 1973; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 196. pl. 88, 217 (6). 1977; Whistler in Bull. Pacific Trop. Bot. Gard. 9: 36. 1979; Kores in Allertonia 5: 141. 1989; Lewis & Cribb, Orch. Vanuatu, 134. 1989; non Reichenb. f. (1880) nec Ridley (1896).

Epidendrum umbellatum Forst. f. Fl. Ins. Austr. Prodr. 60. 1786; non Sw. (1800) nec *Bulbophyllum umbellatum* Lindl. (1830).

Cirrhopetalum thouarsii Lindl. in Bot. Reg. 10: sub pl. 832, nom. illeg. 1824; Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862; Hook. f. in Bot. Mag. 118: pl. 7214. 1892; Drake, Ill. Fl. Ins. Mar. Pac. 307. 1892; Rendle in J. Linn. Soc. Bot. 45: 248. 1921; F. Br. in Occas. Pap. Bishop Mus. 9(4): 4. 1930; Guillaumin in Notul. Syst. (Paris) 10: 68. 1941, Fl. Nouv.-Caléd. 65. 1948; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 34. pl. 12. 1953.

Cirrhopetalum umbellatum Reinw. ex Hook. & Arn. Bot. Beechey Voy. 71. 1832; J. W. Parham, Pl. Fiji Isl. 285. 1964, ed. 2. 380. 1972; P. Hunt & Summerhayes in Kew Bull 20: 60. 1966.

Cirrhopetalum layardii F. v. Muell. in Oesterr. Bot. Z. 44: 210. 1894; Schlechter in Bot. Jahrb. 39: 81. 1906, in op. cit. 61: 383. 1927.

Epiphytic, creeping plants 10–20 cm. tall, the roots spreading, slender, flexuose, smooth, the rhizome much elongated, terete, 0.3–0.5 mm. in diameter, the pseudobulbs very widely spaced, 2.5–7.5 cm. apart, erect or ascending, obliquely ovoid, 1.7–3.5 cm. long, 0.8–1.5 cm. in diameter, 4-angled, unifoliate; leaves erect, petiolate, the petioles slender, 0.8–2.5 cm. long, channelled, the blades oblong-lanceolate to -elliptic, 6.2–19 cm. long, 1.7–4 cm. broad, coriaceous, gradually angustate at base, obtuse at apex; inflorescences solitary, erect, umbellate, (9–) 15–30 cm. tall, 3–7-flowered, the scape slender, with 3 widely spaced, obliquely tubular-infundibular cataphylls, the bracts lanceolate-acuminate, 6–10 mm. long, 1.5–2.5 mm. broad; flowers developing simultaneously, borne in an ascending or subpatent arc, resupinate, dull greenish yellow to pale yellow, with or rarely without copious, dull reddish purple blotches; dorsal sepal free, broadly elliptic-ovate, 5–8 mm. long, 4–5 mm. broad, glabrous, with a much elongated, antennalike appendage at apex; lateral sepals partially connate along upper margins medially, porrect, ligulate, slightly oblique, 25–44 mm. long, 3–5 mm. broad, glabrous, narrowly acute at apex; petals erect or ascending, weakly spreading, elliptic-oblong, slightly falcate, 3–5 mm. long, 1–2.5 mm. broad, laxly long-ciliate distally, filiform-attenuate at apex; labellum porrect or slightly dependent, arcuate, sublinguiform-attenuate in outline, about 5 mm. long and 1.5 mm. broad, fleshy, the base truncate, channelled, weakly auriculate, the lateral margins becoming revolute distally, entire, the apex obtuse, the disk naked, the lower surface with 2 prominently raised, parallel lamellae throughout basal half; column stout, semiterete, about 3 mm. long overall, with the lateral margins winged ventrally, the brachia subulate, 2–3-times longer than anther; column foot incurved, slender, about 3.5 mm. long; clinandrium rather deeply excavate, the dorsal margin obtusely lobed; anther more or less ovate-cucullate, about 1.5 mm. across, truncate to broadly rounded at apex, the margin irregularly dentate; pollinia very unequal, obliquely ovoid, somewhat compressed laterally, about 1 mm. long and 0.5 mm. broad; rostellum short, subdeltoïd; stigma large, obovate; ovary pedicellate, narrowly cylindrical-clavate, 1.2–2 cm. long overall, weakly 6-ribbed distally, glabrous.

TYPIFICATION AND NOMENCLATURE: *Bulbophyllum longiflorum* is typified by Du Petit-Thouars's illustration, prepared from material collected by him in Mauritius. The type of *Epidendrum umbellatum* is *J. R. & G. Forster (Forster 171, ISOTYPES at K, P)*, collected in the Society Islands during the second Cook voyage. In combining these two taxa, Lindley (1824) unfortunately rejected them both and used the illegitimate epithet *thouarsii*, which has been widely utilized when the taxon is retained in *Cirrhopetalum*. *Cirrhopetalum layardii* was based on living material sent by Layard from New Caledonia; although no type material may be extant, Hallé (1977) refers the binomial to the present species.

DISTRIBUTION: A widespread species, known to occur in Africa, Mauritius, Malaysia, Australia, Guam, New Caledonia, and eastward to the Society and Austral Islands. In Fiji it is known from at least four islands and is found as an epiphyte or on steep rocky slopes or along streams from near sea level to approximately 1,150 m. Flowers and fruits have been observed between April and December.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nalotawa, eastern base of Mt. Evans Range, *Smith 4432*; slopes of escarpment north of Nandarivatu, *Smith 6267, 6278*; vicinity of Nandarivatu, *Gillespie 3180, Degener 14844*; Sovutawambu, near Nandarivatu, *Degener 14720*; Nandala, south of Nandarivatu, *Degener 14497*; north of Navai, *Jonsson 2365*; western and southern slopes of Mt. Tomanivi, *Smith 5217*. NAMOSI: Wayauyau Creek, near Saliandrau, Wainikoroiluva River, *DA 14593*; valley of Waindina River, near Namosi, *Gillespie 2550*. RA: Vicinity of Nasukamai Village, *Gillespie 4385*. OVALAU: *U. S. Expl. Exped.* (W); hills southeast of valley of Mbureta River, *Smith 7433*. NGAU: *Jonsson* (photograph only). VANUA LEVU: THAKAUNDOVE: Maravu, near Salt Lake, *Degener 14162*. FIJI without further locality, *U. S. Expl. Exped.* (AMES, US), *Seemann 598, im Thurn 16* (AMES).

This species and the preceding, both widespread, are the only members of subgen. *Cirrhopetalum* known from Fiji; they are readily separable from one another as noted in the above key, as well as in many obvious dimensional characters.



FIGURE 70. *Bulbophyllum longiscapum*; flowering plant in Naitasiri Province, Viti Levu (Kores & Molvray F6), \times about 1/5.

3. *Bulbophyllum longiscapum* Rolfe in Kew Bull. 1896: 45. 1896; Schlechter in Repert. Sp. Nov. Beih. 1: 754, in obs. 1913; L. O. Williams in Bot. Mus. Leaflet. 5: 134. 1938; Yunker in Bishop Mus. Bull. 184: 33. 1945; J. W. Parham, Pl. Fiji Isl. 284. 1964, ed. 2. 379. 1972; Kores in Allertonia 5: 142. 1989; Lewis & Cribb, Orch. Vanuatu, 125. fig. 25, pl. 7, A. 1989; non *Cirrhopetalum longescapum* Teijs. & Binnend. (1862). FIGURES 70, 90 (upper left).

Bulbophyllum praealtum Kraenzl. in Notizbl. Bot. Gart. Berlin 5: 109. 1909; Schlechter in Repert. Sp. Nov. 9: 107. 1911, in Repert. Sp. Nov. Beih. 1: 754, in obs. 1913; Christophersen in Bishop Mus. Bull. 128: 68. 1935.

Large, epiphytic, creeping plants 20–30 cm. tall, the roots spreading, flexuose, smooth, the rhizome elongated, terete, (2–) 3–4.5 mm. in diameter, the pseudobulbs widely spaced, 1.5–4 cm. apart, erect, narrowly conical-ovoid, 2–4.5 cm. long, 0.8–1.8 cm. in diameter, unifoliate; leaves erect, petiolate, the petioles slender, (1.7–) 2.5–5.5 cm. long, channelled, the blades oblong-elliptic, 11.5–23 cm. long, 2–3.5 cm. broad, coriaceous, attenuate at base, broadly acute at apex; inflorescences solitary, erect, racemose, 25–79 cm. tall, the scape 1.5–2.5-times the length of foliage, slender, terete, with 3–5 widely spaced, tubular cataphylls, the rachis initially short but gradually increasing in length with age, weakly fractiflex, subdensely few-many-flowered, the bracts clasping, broadly ovate-acuminate, 8–12 mm. long, about 9 mm. broad; flowers developing sequentially over a long interval, erect or ascending, resupinate, somewhat showy, greenish yellow to yellow with numerous dull reddish purple spots near base of segments, glabrous; dorsal sepal erect, elliptic-lanceolate, (20–) 25–30 mm. long, about 5 mm. broad, gradually acuminate at apex; lateral sepals weakly spreading, lanceolate-attenuate, somewhat dilated on anterior margins near base, (25–) 30–35 mm. long, about 7 mm. broad, narrowly acute at apex; petals erect, much reduced, broadly ovate-acuminate, about 2 mm. long and 1.5 mm. broad, briefly setiform at apex; labellum porrect, slightly sigmoid, more or less oblong-lanceolate in outline, (16–) 26–32 mm. long, about 9 mm. broad, the base channelled, prominently auriculate with a hornlike appendage at summit of each auricle, the lateral margins revolute and prominently crenulate-undulate distally, the apex fleshy, narrowly obtuse, the disk with 2 prominently raised subparallel lamellae, these becoming confluent and gradually diminishing in height distally; column stout, semiterete, about 5 mm. long, the brachia small, shortly 2-lobed, the lobes subdeltoid to briefly subulate; column foot more or less perpendicular to column, broad, 7–8 mm. long, moderately incurved distally; clinandrium shallowly excavate, broad, the lateral margins obtusely lobed; anther transversely ovate-cucullate, about 2.4 mm. long and 2.8 mm. broad, broadly rounded at apex; pollinia hemiovoid, about 2.2 mm. long and 1.2 mm. broad; rostellum short, transverse; stigma transversely elliptic; ovary briefly pedicellate, clavate, 10–15 mm. long, weakly 6-ribbed, glabrous.

TIPIFICATION AND NOMENCLATURE: *Bulbophyllum longiscapum* is based on *Yeowards s. n.* (K HOLOTYPE), from Fiji without definite locality; it was collected in 1891 and was then cultivated at Kew, flowering the following year. The locality was probably in southeastern Viti Levu, the only area in Fiji from which it has been obtained. *Bulbophyllum praealtum* is typified by *Vaupel 322* (B HOLOTYPE, destroyed; ISOTYPE at AMES 35392), obtained from a mangrove swamp near Melantha, Savai'i, Samoa.

DISTRIBUTION: Solomon Islands to Tonga, Niue, Wallis Island, and Samoa. In Fiji it is known to occur in open forest or in mangrove swamps at elevations not exceeding 150 m. Flowers and fruits have been observed in Fiji and Samoa between July and November.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Vatuvula, Waimanu River, *im Thurn 253*; Tholo-i-suva, *Kores & Molvray F6*; vicinity of Tamavua, *Gillespie 2429*. REWA: Veisari swamp, west of Suva Harbor, *im Thurn 350, 356*; along Queen's Road about 5 miles west of Suva, *Vaughan 3268*.

Bulbophyllum longiscapum and the 13 following species in the present treatment are all referable to the large subgenus *Schlechteria*, but I believe at least eleven sections of the subgenus to be represented. The present species is the only Fijian representative of the genus referable to sect. *Dialeipanthæ*.

4. ***Bulbophyllum pachyanthum*** Schlechter in Bot. Jahrb. 39: 85. 1906, in Repert. Sp. Nov. Beih. 1: 746, in obs. 1913; Christophersen in Bishop Mus. Bull. 128: 68. 1953; Guillaumin in Notul. Syst. (Paris) 10: 67. 1941, Fl. Nouv.-Caléd. 65. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 190. pl. 86. 1977; Kores in Allertonia 5: 143. 1989.

Bulbophyllum longiscapum sensu B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: pl. 11, as *B. longiscapum*. 1953; non Rolfe.

Large, erect, epiphytic plants 20–40 cm. tall, caespitose or weakly spreading, the roots flexuose, densely scaly-papillose throughout, the rhizome somewhat elongated, stout, 4–6 mm. in diameter, the pseudobulbs closely spaced or a little distant from one another, erect, obliquely ovoid, 1.8–3.5 cm. long, 1–1.7 cm. in diameter, unifoliate; leaves erect, petiolate, the petioles slender, 1.8–4.5 cm. long, channelled, the blades oblong-elliptic, 8.3–22 cm. long, 3–5.2 cm. broad, coriaceous, briefly to gradually attenuate at base, broadly acute at apex; inflorescences solitary, erect, racemose, 22–40 cm. tall, the scape about as long as or slightly longer than foliage, slender, terete, with 3 or 4 widely spaced, obliquely tubular-attenuate cataphylls, the rachis short, rather laxly 2–4-flowered, the bracts clasping, broadly ovate-acuminate, about 12 mm. long and 10 mm. broad; flowers developing sequentially, erect or ascending, resupinate, somewhat showy, green or greenish yellow, glabrous; dorsal sepal erect, narrowly ovate-acuminate, 2.2–2.8 cm. long, 1.2–1.4 cm. broad, slightly thickened and weakly carinate distally, narrowly acute at apex; lateral sepals perrect or weakly spreading, obliquely lanceolate, 3.3–3.8 cm. long, 0.8–1.2 cm. broad, somewhat conduplicate, prominently carinate externally, narrowly acute at apex; petals erect, ovate, slightly oblique, 1.2–1.6 cm. long, about 0.85 cm. broad, acute at apex; labellum perrect or slightly dependent, arcuate, more or less oblong-angustate in outline, 1.2–1.4 cm. long, about 0.5 cm. broad, slightly fleshy, the base channelled, prominently auriculate, the apex narrowly subacute, the disk with 2 prominently raised, somewhat papillate longitudinal carinae, these continuous with auricles below and gradually diminishing in height distally; column short, moderately stout, semiterete, about 1 cm. long, the brachia subulate, much longer than anther, with a small obtuse lobe at base; column foot more or less perpendicular to column, well developed, about 0.8 cm. long, abruptly incurved distally; clinandrium moderately shallowly excavate, small; anther transversely ovate-cucullate, about 2.7 mm. long and 3 mm. broad, with a small dorsal crest, briefly emarginate at apex; pollinia hemiovoid, about 2.5 mm. long and 0.6 mm. broad; rostellum transverse; stigma transversely obovate; ovary pedicellate, clavate, 1.5–2.5 cm. long, rather prominently 6-ribbed, glabrous.

TIPIFYKATION: The type, perhaps a unicate collection, is *Schlechter 15678* (B HOLOTYPE, destroyed), collected in January, 1903, on the slopes of Mt. Ou-Hinna, New Caledonia.

DISTRIBUTION: *Bulbophyllum pachyanthum* is now known from New Caledonia, Fiji, Tonga, and Samoa. In Fiji the species is known definitely only from Viti Levu and Moala, occurring as an epiphyte on tree branches in forest at elevations of 100–1,100 m. Flowers have been noted in March, August, and October, fruits in August and September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 1196*; upper slopes of Mt. Koromba, *Smith 4680*; Nandarivatu, *in Thurn 84, 88*. NAMOSI: Mt. Voma, *Gillespie 2788*. NAITASIRI: Wainisavulevu Creek, upper Wainimala River basin, *Hassall 108153* (K spirit); vicinity of Tamavua, *Gillespie 2098*. MOALA: Ndelaimoala, *Smith 1367*. FIJI without further locality (but possibly all from vicinity of Nandarivatu), *Simmonds s. n.* (K spirit 3079), *s. n.* (K spirit 12707), *s. n.* (K spirit 14855).

Bulbophyllum pachyanthum, referable to sect. *Lepidorhiza*, is sometimes locally confused with *B. longiscapum*, although the two species are best placed in different sections of subgen. *Schlechteria*; they are readily distinguished by characters referring to the roots, petals, and labellum.

5. ***Bulbophyllum savaiense*** Schlechter in Repert. Sp. Nov. 9: 106. 1911; Kores in Allertonia 5: 143. 1989; Lewis & Cribb, Orch. Vanuatu, 132. 1989.

FIGURE 71A-C.

Very small epiphytic plants 2.5–6.5 cm. long, dependent or sometimes erect, the roots appressed to distal portion of rhizome, long, filiform, flexuose, the rhizome much abbreviated, slender, the pseudobulbs closely spaced, small, weakly ascending, narrowly ovoid, 4–11 mm. long, 2–3.5 mm. in diameter, initially completely surrounded by a thin, ephemeral sheath, gradually becoming exposed and longitudinally sulcate with age, unifoliate; leaves erect, sessile, elliptic to oblong-elliptic, (6–) 10–25 mm. long, (2–) 4–5.5 mm. broad, subcoriaceous, briefly angustate at base, obliquely acute and frequently minutely apiculate at apex; inflorescences solitary, erect, racemose, 2–5.5 cm. tall, glabrous, the scape usually slightly longer than foliage, filiform, with 2 or 3 widely spaced, obliquely tubular-infundibular cataphylls, the rachis about 1/2–2/3 as long as scape, filiform, weakly fractiflex, laxly 3–6-flowered, the bracts minute, clasping, transversely ovate-acuminate, about 1.3 mm. long and 1.5 mm. broad; flowers developing more or less simultaneously, ascending, nonresupinate, white, glabrous; sepals broadly spreading, slightly dissimilar, the medial sepal ovate-attenuate, about 0.9 mm. long and 0.3 mm. broad, narrowly acute at apex, the lateral sepals elliptic-ovate, slightly oblique, about 1 mm. long and 0.3 mm. broad, narrowly acute at apex; petals weakly spreading, oblanceolate-spathulate, slightly oblique, about 0.5 mm. long and 0.2 mm. broad, broadly rounded at apex; labellum erect, ovate-subrhombic in outline, about 0.4 mm. across, somewhat channelled, slightly fleshy, the base broadly rounded, the apex obtuse, the disk naked; column very small, about 0.3 mm. long, terete, the brachia toothlike, short; column foot small, somewhat incurved and a little expanded distally, about 0.2 mm. long; clinandrium shallowly excavate, small, entire at margin; anther reniform-cucullate, about 0.15 mm. across, briefly emarginate at apex; pollinia ovoid, about 0.1 mm. long and 0.03 mm. in diameter; rostellum brief, transverse, lamellate; stigma large, elliptic; ovary briefly pedicellate, clavate, about 1 mm. long overall, 6-winged, glabrous.

TIPIFICATION: The type, perhaps a unicate collection, is *Vaupel 596* (B HOLOTYPE, destroyed), collected Nov. 8, 1906, above Tapuelele, Savai'i, Samoa.

DISTRIBUTION: The New Hebrides, Fiji, and Samoa (occasional in Samoa, rare in Fiji and the New Hebrides). In Fiji it has been recorded as an epiphyte on moss-covered tree branches in open forest at elevations of about 400–700 m. Flowers have been obtained in November.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Summit of Mt. Korombamba, *Hassall 118155* (κ spirit coll.). VANUA LEVU: MBUA: Mbua Bay (or inland from?), *U. S. Expl. Exped.* (AMES 75242). TAVEUNI: Valley between Mt. Manuka and main ridge of island, *Smith 8266*, p. p. (mixed with *B. betchei*) (AMES p. p., BISH p. p., K p. p., NY p. p.).

The only species of sect. *Macrouris* found in Fiji, *Bulbophyllum savaiense* is the smallest-flowered species of the genus from the area.

6. ***Bulbophyllum polyodioides*** Schlechter in Bot. Jahrb. 39: 86. 1906, in Repert. Sp. Nov. Beih. 1: 874, in obs. 1913; Guillaumin in Notul. Syst. (Paris) 10: 67. 1941, Fl. Nouv.-Caléd. 65. 1948; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 188. pl. 85. 1977; Kores in Allertonia 5: 144. 1989; Lewis & Cribb, Orch. Vanuatu, 133. 1989.

Bulbophyllum nigroscapum Ames, Orchidaceae 7: 86. 1922.

Bulbophyllum species (cf. *nigroscapum* Ames) Christophersen in Bishop Mus. Bull. 128: 68. 1935.

Bulbophyllum species (cf. *nigroscapum* Ames) Christophersen in Bishop Mus. Bull. 128: 68. 1935.

Epiphytic creeping plants 8–18 cm. tall, the roots spreading, long, flexuose, the rhizome prominently elongated, terete, thick, 2–4 mm. in diameter, the stems nonpseudobulbous, widely spaced, 1.2–4 cm. apart, erect, terete, 0.2–0.7 cm. long, 2–3 mm. in diameter, unifoliolate; leaves erect, petiolate, the petioles slender, 0.7–3.5 (–5) cm. long, channelled, the blades oblong-ligulate, 5–12.5 cm. long, 1–2.3 cm. broad, coriaceous, gradually angustate at base, obtuse to briefly and unequally retuse at apex; inflorescences solitary, erect, racemose, 9–14 cm. tall, glabrous, usually dark blue-black in color, the scape $1/3$ – $1/2$ as long as foliage, slender, terete, with 2 or 3 widely spaced, obliquely tubular-infundibular cataphylls, the rachis about 1.5–2-times as long as scape, slender, terete, subdensely 15–20-flowered; the bracts patent, lanceolate-acuminate, 5–6 mm. long, about 1 mm. broad; flowers developing more or less simultaneously, broadly ascending, nonresupinate, white, glabrous; medial sepal erect, oblong-lanceolate, 4–5 mm. long, about 1.2 mm. broad, narrowly acute at apex; lateral sepals weakly spreading, obliquely ovate, somewhat dilated near base on anterior margin, 5–6 mm. long, about 2.8 mm. broad, narrowly acute at apex; petals erect, narrowly elliptic-lanceolate, slightly oblique, 2.4–3 mm. long, 0.8–1 mm. broad, subentire or irregularly denticulate on margins, obtuse to subacute at apex; labellum erect, arcuate, ligulate in outline, 2.5–4 mm. long, about 0.9 mm. broad, prominently channelled proximally, the base briefly cordate, the apex subacute to obtuse, the disk naked; column very short, terete, about 1.5 mm. long, the brachia subulate, about as long as anther; column foot somewhat fleshy, slightly incurved, about 1.2 mm. long; clinandrium shallowly excavate, weakly dentate on dorsal margin; anther ovate-galeate, slightly compressed laterally, about 0.5 mm. long and 0.4 mm. broad, briefly subacute-rostrate at apex; pollinia more or less hemispherical, about 0.2 mm. thick and 0.4 mm. in diameter; rostellum transversely subdeltoïd; stigma large, orbicular, very deeply recessed; ovary briefly pedicellate, subclavate, 3–4 mm. long, weakly 6-ribbed, glabrous.

TIPIFICATION AND NOMENCLATURE: The type of *Bulbophyllum polypodioides* is *Schlechter 15422* (B HOLOTYPE, destroyed; ISOTYPES at AMES, K, P, Z), collected in December, 1902, on the slopes of Mt. Ignambe, near Oubatche, New Caledonia; that of *B. nigroscapum* is *Setchell 383* (AMES 22317 HOLOTYPE), collected July 19, 1920, along trail to the top of Matafao, Tutuila, Samoa. There appear to be no significant differences between these taxa (Kores, 1989).

DISTRIBUTION: *Bulbophyllum polypodioides* is now known from the Solomon Islands, New Caledonia, New Hebrides, Fiji, and Samoa. It is apparently very rare in Fiji, known from a single collection.

AVAILABLE COLLECTION: Fiji without further locality, *Simmonds s. n.* (K 567-52).

The only member of sect. *Aphanobulbon* known from our area, *Bulbophyllum polypodioides* is distinguished by its lack of pseudobulbs and its dark blue-black scape and rachis.

7. *Bulbophyllum trachyanthum* Kraenzl. in Oesterr. Bot. Z. 44: 336. 1894; K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 249. 1905; Schlechter in Repert. Sp. Nov. Beih. 1: 740. 1913; Kores in Allertonia 5: 145. 1989; non sensu J. J. Sm. (1913). FIGURE 71D-F.

FIGURE 71. A-C, *Bulbophyllum savaiense*; A, portion of a flowering plant, $\times 1 1/2$; B, perianth segments, $\times 20$; C, column with labellum attached, viewed from side, $\times 30$. D-F, *Bulbophyllum trachyanthum*; D, portion of a flowering plant, $\times 3/4$; E, right petal, $\times 3$; F, column with labellum attached, viewed from side, $\times 6$. G-I, *Bulbophyllum samoanum*; G, portion of a flowering plant, $\times 3/4$; H, perianth segments, $\times 2$; I, column with labellum attached, viewed from side, $\times 6$. A-C from *Christophersen & Hume 2244* (Savai'i, Samoa), D-F from *Simmonds s. n.* (K spirit 14859), G-I from *im Thurn s. n.*



Epiphytic, caespitose or weakly spreading plants 12–25 cm. tall, the roots spreading, filiform, flexuose, smooth, the rhizome slightly elongated, stout, subflexuose, about 3 mm. in diameter, the pseudobulbs closely spaced or slightly distant from one another, 0.3–1 cm. apart, erect, narrowly conical to conical-ovoid, (1–) 1.8–3 cm. long, (0.5–) 0.7–1.5 cm. in diameter, weakly 4-angled, unifoliate; leaves erect, petiolate, the petioles slender, 0.8–1.8 cm. long, channelled, the blades oblong-lanceolate to elliptic, 7.5–13 cm. long, 1.2–2.2 cm. broad, subcoriaceous, gradually attenuate at base, broadly subacute to acute at apex; inflorescences solitary, erect, 1-flowered, up to 20 cm. tall, the scape usually about as long as foliage, slender, terete, with 4 or 5 widely spaced, obliquely tubular-infundibular cataphylls, the bract clasping, ovate-acuminate, much shorter than ovary; flowers ascending, resupinate, somewhat showy, glabrous, the sepals green to greenish brown with numerous purple blotches, the petals greenish yellow with reddish purple appendages, the labellum greenish yellow; dorsal sepal erect, lanceolate, about 0.5 cm. broad, slightly thickened and weakly carinate distally, linear-acuminate at apex; lateral sepals porrect or slightly dependent, lanceolate-falcate, about 2.8 cm. long and 0.4 cm. broad, weakly channelled distally, gradually attenuate at apex; petals more or less porrect, broadly obtuse, about 0.3 cm. long and 0.4 cm. broad, with a prominently elongated antennalike appendage at apex, the appendage filiform-cylindric throughout and about 1 cm. long; labellum slightly dependent, arcuate, oblong-sublinguiform in outline, about 0.5 cm. long and 0.3 cm. broad, very fleshy, the base truncate, the apex narrowly obtuse, the disk weakly sulcate medially, glabrous, prominently carinate on lower surface; column very stout, semiterete, about 3.5 mm. long overall, the brachia small, subquadrate, about half as long as anther; column foot more or less perpendicular to column, slightly incurved distally, relatively broad, about 3 mm. long; clinandrium rather deeply excavate, prominently lobed on dorsal margin; anther more or less oblong-cucullate, about 1.2 mm. long and 0.8 mm. broad, slightly rostrate, rounded at apex; pollinia subequal, slightly compressed laterally, obliquely ovate, about 0.8 mm. long and 0.2 mm. broad; rostellum brief, transverse; stigma elliptic; ovary manifestly pedicellate, cylindric-clavate, up to 4 cm. long overall, weakly 6-ribbed distally, glabrous.

TYPEFICTION: The type is *Micholitz s. n.* (B HOLOTYPE, destroyed), possibly a unicate collection obtained in January, 1884, between Port Praslin and Port Carteret, New Ireland.

DISTRIBUTION: The species is now known from New Guinea, New Ireland, and Fiji, but sterile collections from Samoa seem very similar and may be found to extend the range eastward. In Fiji the species is rare, occurring as an epiphyte in open or dense forest at an elevation of about 400 m., but possibly from sea level to about 850 m. Flowers have been obtained in September, fruits in May.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Suva, *Simmonds s. n.* (κ spirit 14859) (conceivably originally from north-central Viti Levu and brought into cultivation in Suva). VANUA LEVU: THAKAUNDROVE: Mt. Kasi, Yanawai River region, *Smith 1817*.

Bulbophyllum trachyanthum is the only species of sect. *Hyalosema* known from Fiji; it is readily distinguished from other species in Fiji by its glabrous petals ending in a single, prolonged, filiform-cylindric, antennalike appendage.

8. *Bulbophyllum samoanum* Schlechter in *Repert. Sp. Nov.* 9: 107. 1911; Kores in *Allertonia* 5: 145. 1989; Lewis & Cribb, *Orch. Vanuatu*, 128. *fig. 27, L-U*. 1989.

FIGURE 71G-I.

Bulbophyllum sp. Christophersen in *Bishop Mus. Bull.* 128: 68. 1935.

Bulbophyllum christophersenii L. O. Williams in *Bot. Mus. Leaf.* 7: 143. 1939; Yuncker in *Bishop Mus. Bull.* 184: 33. 1945; Hallé in *Adansonia* II. 20: 357. *pl. 3*. 1981.

Epiphytic, caespitose or sometimes weakly spreading plants 10–18 cm. tall, the roots spreading, filiform, flexuose, smooth, the rhizome much abbreviated, terete,

about 2 mm. in diameter, the pseudobulbs crowded, erect or ascending, pyriform, 1.2–1.5 cm. long, 0.7–0.8 cm. in diameter, unifoliate; leaves erect, petiolate, the petioles very slender, 1.5–4 cm. long, channelled, the blades oblong-oblancoate, 6.5–14 cm. long, 1–2.2 cm. broad, coriaceous, gradually angustate at base, obtuse or broadly subacute at apex; inflorescences solitary, erect, 1-flowered, 6–12 cm. tall, the true scape relatively short, slender, terete, 1–3.5 cm. long, with 2 or 3 minute sheathlike cataphylls at base, the bract clasping, minute, ovate-apiculate, the pedicel much elongated, slender, scapelike in appearance; flowers subpatent, resupinate, greenish yellow with reddish purple markings; dorsal sepal erect, lanceolate, 11–12 mm. long, 3–4.8 mm. broad, narrowly acute at apex; lateral sepals erect or weakly spreading, oblong to oblong-elliptic, slightly oblique, 13.5–15 mm. long, 4–5.5 mm. broad, abruptly acuminate at apex; petals erect, much reduced, linear-ligulate, slightly oblique, 2.5–4 mm. long, 0.5–1 mm. broad, laxly papillate distally, obliquely subacute or obtuse at apex; labellum porrect, slightly arcuate, ovate-sublinguiform in outline, 2.5–4 mm. long, 1.5–2 mm. broad, very fleshy, the base cordate, prominently auriculate, the apex narrowly obtuse, the disk sulcate, glabrous, the lower surface prominently carinate; column semiterete, 3–4 mm. long, the brachia subulate to cylindrical-subclavate, slightly longer than anther; column foot somewhat incurved, slender, about 2 mm. long; clinandrium relatively shallowly excavate, weakly 3-lobed on dorsal margin; anther ovate-cucullate, 1–1.2 mm. long, about 0.8 mm. broad, subacute to obtuse at apex; pollinia strongly compressed laterally, broadly obovoid, about 0.8 mm. across and 0.2 mm. thick; rostellum very brief, transverse; stigma oblong; ovary manifestly pedicellate, slender, slightly thickened distally, 5–8.5 cm. long overall, weakly 6-ribbed, glabrous.

TYPIFICATION AND NOMENCLATURE: *Bulbophyllum samoanum* was described on the basis of two collections from Upolu, Samoa: *Betche s. n.* (B SYNTYPE, destroyed), without further locality, and *Vaupel 546* (B SYNTYPE, destroyed), collected July 26, 1905, at Lanuto'o. The type of *B. christophersenii* is *Christophersen & Hume 2297* (BISH HOLOTYPE; ISOTYPES at AMES 59298 & 68324, K, P), obtained Aug. 8, 1931, east of Olo, Savai'i, Samoa. Specimens of the latter taxon agree excellently with Schlechter's very detailed description.

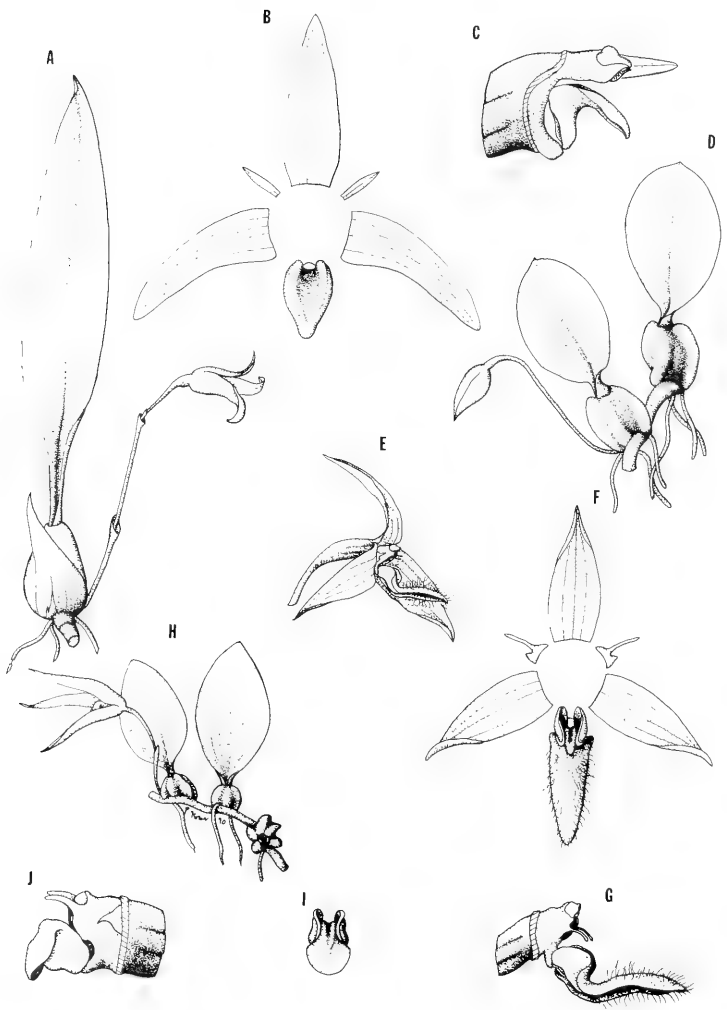
DISTRIBUTION: New Caledonia (rare), the New Hebrides (occasional), Fiji (rare), and Samoa (frequent). In Fiji the species occurs in forest at probable elevations of 300–900 m.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *im Thurn 342*. NAMOSI: Vicinity of Namosi, *im Thurn s. n.*

Although *Bulbophyllum samoanum* was assigned to sect. *Micromonanthe* in my 1989 account of the genus, Lewis and Cribb (1989) indicate that the species is better placed in sect. *Papulipetalum*, being the only representative of that section in Fiji or the New Hebrides.

9. *Bulbophyllum simmondsii* Kores in *Allertonia* 5: 146. 1989. FIGURE 72A–C.

This recently described species is a small epiphytic herb up to 15 cm. tall, with the rhizome repent and relatively short, the pseudobulbs 0.5–1 cm. apart, ovoid, 1.3–2 cm. long, 0.6–1.3 cm. in diameter, unifoliate; leaves erect, petiolate, the petioles 1.5–2.5 cm. long, the blades oblong-lanceolate, 5.5–12 cm. long, 1–1.8 cm. broad, acute at apex; inflorescences solitary, erect, 1-flowered, 2.5–5.5 cm. tall, the scape 1.5–3 cm. long, the pedicel slender, 1.5–2.5 cm. long; flowers greenish white, the bases of segments tinged with reddish purple; sepals slightly dissimilar, ovate to ovate-falcate, 1.3–1.8 cm. long, 0.4–0.8 cm. broad, acute at apex; petals elliptic, 3.25–3.75 mm. long, 0.75–1.25 mm. broad; labellum arcuate, oblong-ovate, 2.75–3.75 mm. long, 1.75–3 mm. broad, fleshy, oblong-angustate at base, subacute at apex, the disk with 2 small carinae near base; column 2.5–3.5 mm. long, the brachia somewhat fleshy, attenuate, about as long as anther.



TYPIFICATION: The type is *Simmonds s. n.* (K HOLOTYPE spirit 12708), collected in Fiji without precise locality, and flowering in cultivation at Kew Nov. 23, 1953. Many of Simmonds's orchid collections originally came from the vicinity of Nandarivatu, Mba Province, Viti Levu, but the provenance of the present collection is speculative.

DISTRIBUTION: Endemic to Fiji and known, insofar as data are available, from forest at elevations of approximately 300–850 m. Flowers have been noted in the field in July, fruits in May.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Wainisavulevu Creek, upper Wainimala River Valley, *Hassall 117917* (K spirit). VANUA LEVU: THAKAUNDRÖVE: Mt. Kasi, Yanawai River region, *Smith 1817*. FIJI without further locality, *Simmonds s. n.* (K spirit 8814).

Bulbophyllum simmondsii and the two following species represent sect. *Micromonanthe* in Fiji.

10. ***Bulbophyllum aristopetalum*** Kores in *Allertonia* 5: 147. 1989. FIGURE 72D–G.

A recently described very small, epiphytic herb, up to 5 cm. tall, the rhizome repent, relatively short, the pseudobulbs about 4 mm. apart, ascending, subglobose, prominently 4-angled, 4–6 mm. long, 4.5–6 mm. in diameter, unifoliate; leaves erect, briefly petiolate, the petioles 1–2 mm. long, the blades elliptic to elliptic-obovate, 1.5–3.2 cm. long, 1.2–1.8 cm. broad, subacute to obtuse at apex; inflorescences solitary, erect, 1-flowered, up to 7.5 cm. tall, the scape to 4 cm. long, the pedicel very short, 1–2 mm. long, articulate with ovary; flowers with sepals yellow with maroon spots, petals green and tinged at apex with maroon, and labellum green with red indument; sepals similar, ovate, 5.5–8.5 mm. long, 2–2.5 mm. broad, narrowly acuminate at apex; petals reduced, with 1–3 filiform-aristate appendages at apex; labellum sigmoid-curved, linguiform, 4–4.5 mm. long, 0.8–1.2 mm. broad, fleshy, subdensely pubescent, prominently auriculate at base; column prominently winged, 1–1.5 mm. long, the brachia linear-filiform, slightly shorter than anther.

TYPIFICATION: The type is *Simmonds s. n.* (K HOLOTYPE spirit 10785) (Kew EN 359-1952), collected in Fiji without precise locality, and flowering in cultivation at Kew April 13, 1953.

DISTRIBUTION: Endemic to Fiji and known with certainty only from the vicinity of Nandarivatu, Mba Province, Viti Levu, at an elevation of approximately 900 m.; the two available Simmonds collections could well also have come from that general area. Flowers were noted in the field in November.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Gillespie 3729*. FIJI without further locality, *Simmonds s. n.* (K spirit 607) (Kew EN 512-1960).

11. ***Bulbophyllum hassallii*** Kores in *Allertonia* 5: 148. 1989. FIGURE 72H–J.

A recently described, infrequent, small epiphytic herb, the rhizome repent, the pseudobulbs 2–4 mm. apart, depressed-ovoid, strongly 3–5-angled, 4–6 mm. long, 5–7 mm. in diameter, unifoliate; leaves short-petiolate, the petioles 0.5–1 mm. long, the blades elliptic-oblong, (1–) 1.5–3.7 cm. long, 0.8–1.9 cm. broad, broadly acute to subacute at apex; inflorescences solitary, 1-flowered, up to 2.5 cm. tall, the scape 0.7–1 cm. long, the pedicel articulate with ovary, short; flowers with outer segments greenish

FIGURE 72. A–C, *Bulbophyllum simmondsii*; A, portion of a flowering plant, $\times 3/4$; B, perianth segments, $\times 3$; C, column with labellum and one petal attached, viewed from side, $\times 6$. D–G, *Bulbophyllum aristopetalum*; D, portion of a flowering plant, $\times 3/4$; E, complete flower, $\times 2$; F, perianth segments, $\times 3$; G, column with labellum attached, viewed from side, $\times 6$. H–J, *Bulbophyllum hassallii*; H, portion of a flowering plant, $\times 3/4$; I, labellum viewed from front, $\times 3$; J, column with labellum and petals attached, viewed from side, $\times 6$. A–C from *Simmonds s. n.* (K spirit 12708), D–G from *Simmonds s. n.* (K spirit 607), H–J from *McLoughlin 903*.

yellow with reddish spots, the labellum red; sepals slightly dissimilar, sub lanceolate, 12–16.5 mm. long, 2.5–4 mm. broad, attenuate at apex; petals ovate-aristate, 0.75–1 mm. long; labellum geniculate reflexed, more or less oblong, 2.25–2.5 mm. long, about 1.5 mm. broad, fleshy, glabrous, briefly cordate and prominently auriculate at base; column prominently winged distally, 1.5–2 mm. long, the brachia somewhat fleshy, attenuate, about 2/3 as long as anther.

TIPIFICATION: The type is *Hassall 108154* (K HOLOTYPE), collected Sept. 15, 1981, near Namosi Village, Namosi Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from Viti Levu, occurring in forest at approximate elevations of 15–1,100 m. Flowers have been collected from wild material in September and January.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Nanggaranambuluta, east of Nandarivatu, *Jonsson 2313*. SERUA or NAMOSI: Along Queen's Road about 22 miles west of Suva, *McLoughlin 903* (K spirit 29064). FIJI without further locality, *Simmonds s. n.* (K spirit 32254) (Kew EN 645-64).

12. *Bulbophyllum amplistigmaticum* Kores in *Allertonia* 5: 150. 1989.

FIGURE 73A–C.

A very small epiphytic herb up to 30 cm. long, recently described, the rhizome repent, much elongated, slender, the pseudobulbs 1.5–3.5 cm. apart, very small, depressed-ovoid, 1–2 mm. across, unifoliate; leaves minutely petiolate, the petioles 0.25–1 mm. long, the blades oblong to oblong-elliptic, 0.5–1.5 cm. long, 0.4–0.6 cm. broad, obtuse to slightly retuse at apex; inflorescences solitary, 1-flowered, 0.6–1.3 cm. tall, the scape well developed; flowers white, the distal portions of segments tinged with purple; dorsal sepal elliptic to ovate-elliptic, 4–5 mm. long, 1.75–2 mm. broad, subacute to obtuse at apex; lateral sepals ovate-elliptic, slightly oblique, 4–5 mm. long, 2.25–2.5 mm. broad, subacute at apex; petals obovate, slightly oblique, 1.75–2 mm. long, 0.75–1 mm. broad, subacute at apex; labellum sigmoid-arcuate, somewhat compressed laterally, more or less ovate, 1.8–2.2 mm. long, somewhat fleshy, glabrous, briefly cordate and weakly channelled at base; column about 0.6 mm. long, the brachia obtuse, about half as long as anther.

TIPIFICATION: The species is typified by *Smith 5958* (AMES HOLOTYPE; ISOTYPES at BISH, K, NY, US), collected Sept. 11. 1947, in the immediate vicinity of Nandarivatu, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and known only from the type collection, obtained in open forest at 800–900 m. elevation, forming loose mats on the trunks and branches of trees.

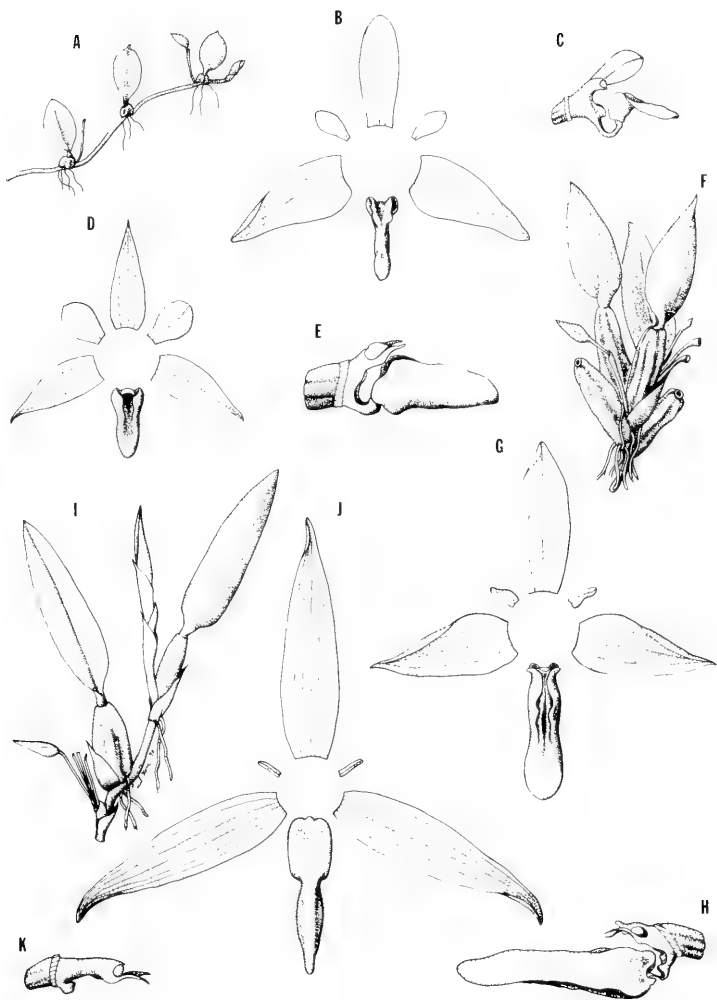
Very unlike other Fijian taxa of *Bulbophyllum*, this diminutive species is the only member of sect. *Nematorhizis* known to occur in the area.

13. *Bulbophyllum aphanopetalum* Schlechter in *Bot. Jahrb.* 39: 82. 1906; Guillaumin in *Notul. Syst.* (Paris) 10: 66. 1941, *Fl. Nouv.-Caléd.* 65. 1948; Seidenfaden in *Dansk Bot. Arkiv* 29 (1): 229. 1973; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 179. *pl.* 81. 1977; Kores in *Allertonia* 5: 151. 1989.

Cirrhopetalum capillipes Guillaumin in *Notul. Syst.* (Paris) 10: 67. 1941.

Bulbophyllum capillipes Hallé in *Bull. Mus. Nat. Hist. Nat. Paris III.* 127: 23. *t.* 2, nom. illeg. 1973; non Par. & Reichenb. f. (1874).

FIGURE 73. A–C, *Bulbophyllum amplistigmaticum*; A, portion of a flowering plant, $\times 3/4$; B, perianth segments, $\times 4$; C, column with one petal and labellum attached, viewed from side, $\times 6$. D & E, *Bulbophyllum rostriceps*; D, perianth segments, $\times 4$; E, column with labellum attached, viewed from side, $\times 6$. F–H, *Bulbophyllum quadricarinum*; F, apical portion of a flowering plant, $\times 1/2$; G, perianth segments, $\times 4$; H, column with labellum attached, viewed from side, $\times 6$. I–K, *Bulbophyllum incommodum*; I, apical portion of a flowering plant, $\times 1/2$; J, perianth segments, $\times 4$; K, column viewed from side, $\times 6$. A–C from *Smith 5958*, D & E from *Tohill 504*, F–H from *Smith 5325*, I–K from *in Thurn 317*.



Epiphytic, caespitose or sometimes weakly spreading plants 6–9 cm. tall, the roots spreading, filiform, flexuose, smooth, the rhizome much abbreviated, the pseudobulbs crowded, 0–2 mm. apart, erect, narrowly ovoid, 1–2 cm. long, 0.3–0.9 cm. in diameter, smooth, unifoliate; leaves erect, sessile, oblong-elliptic to -lanceolate, 3.5–5.2 cm. long, 0.8–1.4 cm. broad, coriaceous, gradually angustate at base, obliquely subacute or briefly and unequally bilobed at apex; inflorescences solitary, erect, 1-flowered, 4.5–10 cm. tall, the scape well developed, slender, terete, up to 9 cm. long, with 2 or 3 widely spaced, small, tubular-infundibular, sheathlike cataphylls, the bract clasping, small, ovate-acuminate, about 3 mm. long; flowers ascending to patent, resupinate, pale yellow, the distal portions of inner segments tinged with green; dorsal sepal erect or weakly spreading, elliptic- to oblong-ovate, 8–9 mm. long, about 3 mm. broad, acuminate at apex; lateral sepals weakly spreading, oblong-ovate, slightly oblique, 8–9 mm. long, 3–3.5 mm. broad, gradually acuminate at apex; petals weakly spreading, much reduced, transversely ovate, about 0.5 mm. across, abruptly acuminate at apex; labellum porrect, more or less oblong-ovate in outline, 3–4 mm. long, 2.2–3 mm. broad, very fleshy, glabrous, the base briefly cordate, somewhat concave, weakly auriculate, the apex broadly subacute, the lateral margins somewhat incurved in proximal half, the disk with a pulvinate thickening medially, weakly carinate on lower surface; column short, stout, semiterete, about 1.8 mm. long, the brachia much reduced, subdeltoid, much shorter than anther; column foot well developed, somewhat incurved, slender, about 2.2 mm. long, abruptly dilated at apex; clinandrium relatively shallowly excavate, weakly lobed on dorsal margin; anther more or less transversely elliptic-cucullate, about 0.5 mm. long and 0.75 mm. broad, rather prominently umbonate and weakly papillate dorsally, broadly rounded at apex; pollinia more or less equal in size, hemiellipsoid, about 0.4 mm. long; rostellum transverse; stigma large, transverse, deeply recessed; ovary pedicellate, cylindrical-clavate, 0.7–1 cm. long, weakly 6-ribbed distally, glabrous.

TYPIFICATION AND NOMENCLATURE: The type of *Bulbophyllum aphanopetalum* is *Schlechter 15598* (B HOLOTYPE, destroyed), collected in January, 1903, on Mt. Ou-Hinna, New Caledonia; that of *Cirrhopetalum capillipes* is *Pancher s. n.* (P HOLOTYPE), from Mt. Koghi, New Caledonia.

DISTRIBUTION: New Caledonia, and otherwise known from a single Fijian collection, unfortunately without further provenance but perhaps from Viti Levu, flowering in February.

AVAILABLE COLLECTION: FIJI without further locality, *Simmonds s. n.*, Feb. 29, 1956 (K spirit 10784) (Kew EN 411-1951).

The only member of sect. *Pelma* to extend eastward to Fiji, *Bulbophyllum aphanopetalum* is distinguished from other Fijian members of the genus by its caespitose habit, small, ovoid pseudobulbs, and diminutive yellowish green flowers.

14. *Bulbophyllum rostriceps* Reichenb. f. *Otia Bot. Hamb.* 55. 1878 (repr. *Xenia Orchid.* 3: 31. 1881); *Drake, Ill. Fl. Ins. Mar. Pac.* 307. 1892; L. O. Williams in *Bot. Mus. Leafl.* 5: 135. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 34. 1953; J. W. Parham, *Pl. Fiji Isl.* 284. 1964, ed. 2. 379. 1972; Kores in *Allertonia* 5: 151. 1989.

FIGURES 73D & E, 90 (upper right).

Epiphytic, creeping plants (3.5–) 6–9.5 cm. tall, the roots spreading, filiform, flexuose, smooth, the rhizome much elongated, terete, 1–2 mm. in diameter, the pseudobulbs very widely spaced, (1.5–) 2.5–9.5 cm. apart, erect, cylindrical-ovoid, 1–1.8 cm. long, 0.3–0.5 cm. in diameter, weakly ribbed, unifoliate; leaves erect, short-petiolate, the petioles slender, 0.2–0.5 (–0.7) cm. long, weakly sulcate dorsally, the blades elliptic-ligulate, 2.6–5.6 cm. long, 0.6–1.3 cm. broad, coriaceous, narrowly cuneate at base, subacute at apex; inflorescences solitary, erect, 1-flowered, 2–5.5 cm. tall, the scape well developed, filiform, up to 4.5 cm. long, with 2 widely spaced, small,

tubular-infundibular cataphylls, the bract clasping, small, ovate-cucullate, about 1 mm. long; flowers erect or ascending, resupinate, dark maroon, sometimes dull yellow at base of lateral sepals; dorsal sepal weakly spreading, narrowly elliptic-ovate to ovate-acuminate, 4–5 mm. long, 1.5–2 mm. broad, narrowly acute at apex; lateral sepals weakly spreading, oblong-ovate to ovate-acuminate, slightly oblique, 4.5–5.5 mm. long, 2–2.4 mm. broad, subacute to acute at apex; petals erect, obovate to elliptic-obovate, slightly oblique, 2–2.4 mm. long, 1.2–1.6 mm. broad, broadly subacute to obtuse at apex; labellum porrect, very slightly arcuate, oblong-sublinguiform, 4–5.5 mm. long, 1.6–2.2 mm. broad, fleshy, glabrous or rarely with a few scattered hairs distally, the base briefly cordate, weakly auriculate, the apex obtuse, the disk somewhat channelled throughout proximal half, gradually becoming less so distally; column short, stout, semiterete, about 1.8 mm. long, the brachia narrowly attenuate to subulate, 1.5–2-times as long as anther; column foot small, somewhat incurved, relatively stout, about 1 mm. long, somewhat thickened and weakly channelled distally; clinandrium deeply excavate, with a prominent, narrowly attenuate lobe on dorsal margin; anther broadly cordate-cucullate, about 0.5 mm. across, subacute at apex; pollinia very unequal, more or less hemiellipsoid, about 0.3 mm. long and 0.15 mm. broad; rostellum slightly incurved, transversely oblong; stigma large, transverse; ovary moderately pedicellate, cylindrical-clavate, about 0.8 cm. long, weakly 6-ribbed distally, glabrous.

TYPE: The type is *U. S. Expl. Exped.* (w 52451 HOLOTYPE; ISOTYPE at AMES 75214), collected in 1840 in Fiji without precise locality.

DISTRIBUTION: The New Hebrides, Fiji, Tonga, and Samoa. In Fiji it is found as an epiphyte in dense forest, or sometimes on moss-covered rocks, at elevations of about 200–1,100 m. Flowers have been noted (insofar as dated) in March and July, fruit between July and November.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 430, 967*; Mt. Nandendevu, Mt. Evans Range, *DA 14841*; vicinity of Nandarivatu, *Degener 14310*; valley of Nggaliwana Creek, north of the sawmill at Navai, *Smith 5372*. NAMOSI: Northern base of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith 8663* (US only). NAITASIRE: Tholo-i-suva, *Kores & Molyray F10*: Central road, 7 miles from Suva, *Tothill 504*. VANUA LEVU: MATHU'ATA: Summit ridge of Mt. Numbuloa, east of Lambasa, *Smith 6424*. FIJI without further locality (but probably from Viti Levu), *Simmonds s. n.* (K spirit 8809).

The only member of sect. *Ephippium* in Fiji, *Bulbophyllum rostriceps* is characterized by long creeping rhizomes, widely spaced, erect pseudobulbs, solitary inflorescences, and small, dark maroon flowers.

15. *Bulbophyllum betchei* F. v. Muell. in S. Sci. Rec. **1**: 173. 1881; Kraenzl. in Bot. Jahrb. **25**: 607. 1898; Schlechter in Repert. Sp. Nov. **9**: 106. 1911, in Repert. Sp. Nov. Beih. **1**: 833, in obs. 1913; Christophersen in Bishop Mus. Bull. **128**: 68. 1935; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 168. pl. 76. 1977; Kores in Allertonia **5**: 152. 1989; Lewis & Cribb, Orch. Vanuatu, **131**. fig. 27, A–K. 1989.

Bulbophyllum finetianum Schlechter in Bot. Jahrb. **39**: 83. 1906.

Bulbophyllum atrovioleaceum H. Fleisch. & Reehinger in Denkschr. Akad. Wiss. Wien **85**: 261. t. 2, fig. 8. 1910.

Epiphytic, dependent plants up to 18 cm. long, the roots closely appressed to rhizome above base of plant, filiform, flexuose, smooth, the rhizome slightly elongated, simple or laxly branched, terete, 1–1.5 mm. in diameter, completely obscured by persistent sheaths, the pseudobulbs closely spaced, 2–4 mm. apart, weakly ascending, ovoid, 0.4–0.7 cm. long, 0.15–0.3 cm. in diameter, unifoliate; leaves erect or ascending, short-petiolate, the petioles slender, 1.5–4 mm. long, sulcate dorsally, the blades oblong to oblong-elliptic or -obovate, 2–4.6 cm. long, 0.4–0.9 cm. broad, coriaceous, dark olive-green, angustate at base, broadly acute to obliquely subacute at apex; inflorescences solitary, ascending, short, 1-flowered, 0.8–1.5 cm. long, the scape

slender, terete, 3–7 mm. long, with 2 or 3 closely spaced, sheathlike cataphylls, the bract small, clasping, obliquely tubular-infundibular, about 2 mm. long; flowers patent, resupinate, the sepals and petals bright yellow with dull maroon stripes, the labellum yellowish green; dorsal sepal weakly spreading, lanceolate to elliptic-lanceolate, 3.5–5 mm. long, 1–1.5 mm. broad, narrowly acuminate at apex; lateral sepals broadly spreading, lanceolate, slightly falcate, 3.8–5.3 mm. long, 1.5–2 mm. broad, narrowly acute at apex; petals erect, oblong, slightly oblique, about 1.5 mm. long and 0.6 mm. broad, subacute to obtuse at apex; labellum porrect, slightly arcuate, more or less oblong-ligulate, 2.2–2.6 mm. long, about 1 mm. broad, very fleshy, the base briefly cordate, auriculate, the apex obtuse, the disk somewhat sulcate near base, glabrous, with 2 raised longitudinal carinae on lower surface, these subdensely puberulent; column semiterete, 1.5–1.9 mm. long, the brachia subulate, about twice as long as anther; column foot small, somewhat incurved, relatively stout, about 1.2 mm. long, channelled; clinandrium deeply excavate, with a brief truncate lobe on dorsal margin; anther more or less elliptic-galeate, somewhat compressed laterally, about 0.5 mm. long and 0.35 mm. broad, retuse at apex; pollinia very unequal, obliquely hemiellipsoid, about 0.35 mm. long and 0.1 mm. broad; rostellum brief, obtuse; stigma large, elliptic; ovary pedicellate, cylindrical-clavate, 4–6 mm. long overall, weakly 6-ribbed distally, glabrous.

TYPIFICATION AND NOMENCLATURE: The type of *Bulbophyllum betchei* is *Betche s. n.* (MEL HOLOTYPE), collected in 1880 on Upolu, Samoa. *Bulbophyllum finetianum* is typified by *Schlechter 15416* (B HOLOTYPE, destroyed; ISOTYPES at K, P, Z), obtained Dec. 13, 1902, near Oubatche, New Caledonia; *B. atrovioleaceum* by four Samoan syntypes, *Rechinger 1824* (W SYNTYPE), from the vicinity of Lanuto'o, Upolu, *Rechinger 441* (W SYNTYPE), from Tiavi, Upolu, *Rechinger 105* (W SYNTYPE), from above Utumapu, Upolu, and *Rechinger 1617* (W SYNTYPE), from the vicinity of Maungaafi, Savai'i.

DISTRIBUTION: Now known from the Solomon Islands, New Caledonia, the New Hebrides, Fiji, and Samoa. In Fiji it occurs infrequently in dense forest at elevations of 600–1,150 m. Flowers have been observed in July and August, fruits between February and September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *Degener 14372a* (AMES); western and southern slopes of Mt. Tomanivi, *Smith 5143*. NAITASIRI: Wainisavulevu Creek, upper Wainimala River Valley, *Hassall 117918* (K spirit coll.). TAVEUNI: Valley between Mt. Manuka and main ridge of island, *Smith 8266*, p. p. (mixed with *B. savaiense*) (AMES p. p., BISH p. p., K p. p., NY p. p., US p. p.).

One of only two species of sect. *Fruticicola* to extend eastward into the Fijian Region, *Bulbophyllum betchei* is distinguished by its closely spaced, ligulate, olive-green leaves, its prominently sheathed rhizome, and its small, maroon-striped yellow flowers.

16. *Bulbophyllum sessile* (Koen.) J. J. Sm. *Orchid Java*, 448. 1905, *Orchid. Java Fig.-Atlas, fig. 340*. 1909; *Schlechter in Repert. Sp. Nov. Beih. 1:850*, in obs. 1913; *Holtum, Fl. Malaya 1:451, fig. 130*. 1953; *Backer & Bakh. f. Fl. Java 3:387*. 1968; *Seidenfaden in Dansk Bot. Arkiv 33 (3): 38, fig. 18*. 1979; *Kores in Allertonia 5: 153*. 1989.

Epidendrum sessile Koen. in *Retz. Obs. Bot. 6: 60*. 1791.

Phyllorchis sessile Kuntze, *Rev. Gen. Pl. 2: 676*. 1891.

Epiphytic, dependent plants up to 40 cm. long, the roots arising near base of rhizome, spreading, filiform, flexuose, smooth, the rhizome much branched, slender, terete, about 1 mm. in diameter, the pseudobulbs widely spaced, 0.8–1.5 (–2) cm. apart, appressed to rhizome or weakly ascending, very small, ovoid, 1.5–3 mm. long, 1–1.5

mm. in diameter, unifoliate; leaves erect, short-petiolate, the petioles slender, 1–3 mm. long, weakly sulcate dorsally, the blades oblanceolate to oblong-lanceolate, 0.9–2.4 cm. long, 0.3–0.7 cm. broad, coriaceous, light green, gradually angustate at base, obtuse or briefly retuse and minutely apiculate at apex; inflorescences solitary, subsessile, 1-flowered, the scape terete, about 1 mm. long, the bract minute, ovate-acuminate, about 0.75 mm. long; flowers subpatent, nonresupinate, the outer perianth segments yellowish white to dull yellow, the labellum yellowish green; sepals weakly spreading, slightly dissimilar, narrowly lanceolate-attenuate, 3.5–5 mm. long, about 1.3 mm. broad, membranous, filiform-attenuate at apex; petals erect, small, elliptic to oblong-ovate, 1.2–1.4 mm. long, 0.5–0.9 mm. broad, broadly subacute at apex; labellum porrect, arcuate, narrowly ovate to elliptic-ovate, 1–1.5 mm. long, 0.5–0.7 mm. broad, slightly fleshy, weakly channelled, glabrous, broadly cuneate at base, narrowly subacute at apex, the disk naked; column short, stout, semiterete, about 1 mm. long, the brachia very small, subdeltoid, slightly longer than anther; column foot more or less perpendicular to column, stout, about 1.2 mm. long; clinandrium shallowly excavate, briefly lobed on dorsal margin; anther ovate-operculate, about 0.4 mm. across, abruptly acuminate at apex; pollinia very unequal, obliquely hemiellipsoid, about 0.3 mm. long and 0.1 mm. broad; rostellum brief, transverse; stigma large, broadly elliptic; ovary briefly pedicellate, cylindric, 2–3 mm. long overall, weakly 6-ribbed, glabrous.

TYPIIFICATION: The type is *Koenig s. n.* (K HOLOTYPE, ex Herb. Rottlerianum), of uncertain provenance but possibly from southern Thailand (Seidenfaden, 1979).

DISTRIBUTION: Widespread in the Old World tropics, extending from southeastern Asia to Fiji, but there apparently rare, occurring from near sea level to about 200 m. in open or dense forest. Flowers and fruits have been noted in July and December.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Near Suva, *Simmonds s. n.* (K spirit 10766). VANUA LEVU: MATHUATA: Seangangga Plateau, in drainage of Korovuli River, vicinity of Natua, *Smith 6746*.

Bulbophyllum sessile, the only member of sect. *Oxysepala* to extend eastward as far as Fiji, is characterized by relatively small and light green leaves, subsessile inflorescences, and very small, light yellow flowers with narrowly attenuate sepals.

17. ***Bulbophyllum hexarhopalos*** Schlechter in Bot. Jahrb. **39**: 83. 1906, in Repert. Sp. Nov. Beih. **1**: 880, in obs. 1913; Guillaumin in Notul. Syst. (Paris) **10**: 66. 1941, Fl. Nouv.-Caléd. **65**. 1948; Hallé in Bull. Mus. Nat. Hist. Nat. Paris III. **127**: 21. *t. 1*. 1973; Seidenfaden in Bot. Tidsskr. **70**: 88. 1975; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 166. *pl. 75, 217 (5)*. 1977; Vermeulen in Selbyana **7**: 22. 1982; Kores in Allertonia **5**: 154. 1989.

Epiphytic, dependent plants up to 30 cm. long, the roots arising near base of rhizome, spreading, filiform, flexuose, smooth, the rhizome elongated, laxly branched, slender, terete, completely obscured by membranous sheaths, the pseudobulbs widely spaced, 1–1.5 cm. apart, appressed to rhizome, small, subcylindric to weakly 4-angled, 6–9 mm. long, 2.5–5 mm. in diameter, unifoliate; leaves erect, subsessile, ovate to elliptic-ovate, 2.5–4 cm. long, 1.2–2 cm. broad, somewhat fleshy, slightly convex, broadly cuneate at base, acute at apex; inflorescences solitary, much abbreviated, 1-flowered, the scape closely appressed to pseudobulb, about 9 mm. long, the bract broadly ovate, about 1 mm. long; flowers subpatent, resupinate, the sepals yellow, the petals yellow with bluish gray appendages, the labellum red; sepals similar, spreading, ovate to oblong-ovate, 7.5–10 mm. long, 3–4 mm. broad, slightly incurved distally on lateral margins, acute at apex; petals erect, reduced, 2-lobed, the lobes with 3–6 conspicuous, somewhat inflated, more or less linguiform-attenuate appendages, the sinus between lobes with 3 much smaller, cylindric-fusiform appendages, these stalked, minutely stipitate-papillose throughout; labellum porrect, obliquely ovoid, somewhat compressed laterally, 3–3.5 mm. long, 2–2.5 mm. broad, fleshy, the base briefly cordate and prominently auriculate, the apex acute, the disk with a deep longi-

tudinal furrow bordered by 2 raised carinae (these gradually becoming densely pilose distally), the lower surface (except auricles) densely covered with translucent, globose vesicles; column stout, semiterete, 1.5–2 mm. long, slightly winged, the brachia subdeltoid, inconspicuous; column foot slender, slightly incurved distally, about as long as column; clinandrium deeply excavate, irregularly dentate on margin; anther subquadrate-galeate, 0.6–0.75 mm. long, about 0.6 mm. broad, with a short, slightly thickened, lunate rostrum at apex; pollinia more or less elliptic-lenticulate, 0.5–0.7 mm. long, 0.15–0.2 mm. broad; stigma transverse; ovary pedicellate, about 4.5–9 mm. long overall, weakly 6-ribbed distally, glabrous.

TYPIFICATION: The type is *Schlechter 15620* (B HOLOTYPE, destroyed; ISOTYPES at K, P), a flowering specimen collected Jan. 3, 1903, near Ou-Hinna, New Caledonia.

DISTRIBUTION: Currently known from New Guinea, New Ireland, and New Caledonia, with a single specimen from Fiji; this was obtained from low elevation in forest and was flowering in March.

AVAILABLE COLLECTION: VITI LEVU: SERUA or NAMOSI: Along Queen's Road about 22 miles east of Suva, *McLoughlin 914* (K spirit 29876).

The only species of subgen. *Epicranthes* sect. *Epicranthes* to extend into the oceanic Pacific, *Bulbophyllum hexarhopalos* is a very distinctive species, readily distinguished from other species of the genus in Fiji by its prominently appendaged petals.

18. *Bulbophyllum quadricarinum* Kores in *Allertonia* 5: 154. 1989.

FIGURES 73F–H, 74.

A recently described, small, dependent, epiphytic herb, the roots closely appressed to rhizome, the rhizome somewhat elongated, the pseudobulbs 2–5 mm. apart, usually subparallel to rhizome, subcylindric, often slightly 4-angled, 1.2–2.3 cm. long, 0.4–0.6 cm. broad, unifoliate; leaves short-petiolate, the petioles 0.5–2 mm. long, the blades oblong-ovate, (2.3–) 3–5.5 cm. long, 0.8–1.5 cm. broad, subacute at apex; inflorescences fasciculate, 2–3.7 cm. long, the scape 1.5–3 cm. long, the pedicel articulate with ovary, short, the flowers greenish yellow with base of labellum tinged with red; sepals slightly dissimilar, oblong- to elliptic-ovate, 5.5–7.5 mm. long, (1.75–) 2.25–3 mm. broad, abruptly acuminate at apex; petals more or less oblong, 1.5–2 mm. long, 0.3–0.5 mm. broad, subacute to obtuse at apex; labellum porrect, more or less obclaviform, slightly compressed laterally, 4.75–5.5 mm. long, 0.75–1.25 mm. broad, very fleshy, briefly cordate and auriculate at base, obtuse at apex, the disk with 4 raised, longitudinal carinae near base, the lower surface laxly pilose basally and minutely papillate throughout; column about 2 mm. long, the brachia filiform-subulate, about 1 mm. long.

TYPIFICATION: The type is *Smith 5325* (AMES 106475 HOLOTYPE; ISOTYPES at BISH 113758, K, US), collected July 17, 1947, on the western and southern slopes of Mt. Tomanivi, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from north-central Viti Levu at elevations of 850–1,150 m. Flowers have been obtained in July and fruits in September.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills east of Nandala Creek, about 3 miles south of Nandarivatu, *Smith 6235*; Mt. Tomanivi, *Greenwood 1169*.

Although *Bulbophyllum quadricarinum* clearly belongs in subgen. *Schlechteria*, I hesitate to refer it to a section. It is characterized by its dependent habit, relatively large and closely spaced pseudobulbs, and fasciculate inflorescences.



FIGURE 74. A mature (but sterile) plant of *Bulbophyllum quadricarinum*, showing the dependent habit, growing in cutover forest near the rest house, Nandarivatu, Mba Province, Viti Levu (photographed May 21, 1989, no voucher collected), about life-size.

19. **Bulbophyllum incommodum** Kores in *Allertonia* 5: 156. 1989. FIGURE 73I-K.

A moderately large, dependent, epiphytic herb, the roots closely appressed to rhizome, the rhizome much elongated, completely obscured by persistent tubular sheaths, the pseudobulbs 25–60 mm. apart, appressed to rhizome basally, slightly curved, ovoid-cylindric, 1.8–2.5 cm. long, 0.5–0.7 cm. in diameter, unifoliate; leaves erect, short-petiolate, the petioles 1–2 mm. long, the blades oblong-lanceolate, 5.5–10 cm. long, 1.1–1.9 cm. broad, acute at apex; inflorescences fasciculate, 1.2–1.8 cm. long, the scape 0.7–1.2 cm. long, the pedicel articulate with ovary, short, the flowers dark red; sepals similar, narrowly oblong-ovate, 8–9 mm. long, 2.5–3 mm. broad, laxly ciliate basally, narrowly acute at apex; petals ovate-falcate, 1–1.5 mm. long, 0.3–0.5 mm. broad, laxly ciliate basally, subacute at apex; labellum porrect, linguiform, 6–7 mm. long, 1–1.5 mm. broad, slightly fleshy, briefly cordate at base, subacute at apex, the disk with a concave depression near base, gradually becoming somewhat carinate and subdensely papillate distally; column about 1 mm. long, the brachia subulate, 0.75–1 mm. long.

TIPIFICATION: The type is *im Thurn 39* (coll. *Yeoward*) (K HOLOTYPE), collected May 13, 1905, in Tamavua swamp, near Suva Harbor, Rewa or Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from Viti Levu, apparently with a considerable range of elevation from near sea level to about 900 m. Flowers have been noted in January, May, and December, fruits in May.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Tomanivi, *DA 14666*. NANDRONGA & NAVOSA: Vicinity of Nandrau, *im Thurn 317*. NAMOSI: Track to Wainimala (Valley), *DA 14224*.

Although *Bulbophyllum incommodum* is clearly distinguished from other species in the present treatment by its prominently elongated, pendent rhizome, widely spaced pseudobulbs, fasciculate inflorescences, and small, dark red flowers, I am unable to assign it with certainty to a section or even to a subgenus. Vegetatively it suggests the preceding species, also endemic to Fiji, but in respect to the labellum and other characters it may be of quite a different relationship. Monographic study of *Bulbophyllum* throughout its entire range is urgently required before a final grouping of taxa into subgenera and sections can be accepted with confidence.

44. **GEODORUM** Jackson in *Bot. Repos.* 10: *pl.* 626. 1811; Kraenzl. in *Bot. Jahrb.* 25: 603. 1898; L. O. Williams in *Bot. Mus. Leafl.* 5: 135. 1938; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 248. 1977; Kores in *Allertonia* 5: 157. 1989; Lewis & Cribb, *Orch. Vanuatu*, 152. 1989.

Terrestrial plants with short subterranean rhizomes, these sequentially giving rise to a succession of erect, pseudobulbous leafy stems; pseudobulbs often partially or entirely below ground, crowded, homoblastic, subglobose, with only the most recent pseudobulb foliate; leaves relatively few, erect, articulate, petiolate, weakly plicate, convolutive in bud; inflorescences lateral, racemose, the peduncle well developed, erect, the rachis much shorter than peduncle, its apex nodding during anthesis, densely to subdensely several-many-flowered; flowers small to moderately large, nonresupinate; sepals and petals slightly dissimilar, more or less connivent; labellum sessile, continuous with column foot, erect, subentire, the base slightly ventricose or saccate, the disk with or without longitudinal thickenings; column short, broad; column foot short; anther terminal, incumbent, operculate, 1- or imperfectly 2-celled, with 2 small basal appendages becoming visible only after removal of pollinia; pollinia 2, waxy, distinctly sulcate, ecaudiculate, borne on a short stipe, the viscidium distinct; stigma directly below rostellum, shallowly recessed.

TYPE SPECIES: *Geodorum citrinum* Jackson, the only original species.

DISTRIBUTION: A genus currently believed to include about five species distributed from tropical Asia southward and eastward through Malesia to tropical Australia and portions of Micronesia, and eastward in the Pacific to Tonga, Niue, and Samoa. It is represented in Fiji by a single widespread species.

USEFUL TREATMENT OF GENUS: SEIDENFADEN, G. Orchid genera in Thailand XI. Cymbidieae Pflzt. Opera Bot. 72: 1-124 (*Geodorum*, pp. 47-64). 1983.

1. *Geodorum densiflorum* (Lam.) Schlechter in Repert. Sp. Nov. Beih. 4: 259. 1919; Garay & Sweet, Orch. S. Ryukyu Isl. 131. fig. 16, c. 1974; Seidenfaden in Opera Bot. 72: 61. 1983; Kores in Allertonia 5: 157. 1989.

Limodorum densiflorum Lam. Encycl. Méth. Bot. 3: 516. 1792.

Cymbidium pictum R. Br. Prodr. Fl. Nov. Holl. 331. 1810.

Geodorum pictum Lindl. Gen. Sp. Orchid. Pl. 175, nom. illeg. 1833; Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeg. Südsee, 147. 1905; Rendle in J. Linn. Soc. Bot. 45: 251. 1911; Schlechter in Denkschr. Akad. Wiss. Wien 89: 523. 1913; L. O. Williams in Bot. Mus. Leaf. 5: 135. 1938; Guillaumin in Notul. Syst. (Paris) 10: 74. 1941; Yuncker in Bishop Mus. Bull. 178: 41. 1943; Guillaumin, Fl. Nouv.-Caléd. 69. 1948; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 70. 1953; Guillaumin in Bull. Soc. Bot. France 103: 281. 1956; Yuncker in Bishop Mus. Bull. 220: 90. 1959; J. W. Parham, Pl. Fiji Isl. 290. 1964, ed. 2. 383. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. 200: 259. 1970; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 248. pl. 106. 1977; Seidenfaden in Opera Bot. 72: 50, in obs. 1983; non Link & Otto (1821).

Geodorum furcatum sensu Kraenzl. in Bot. Jahrb. 25: 603. 1898; non Lindl.

Geodorum sp. Burkill in J. Linn. Soc. Bot. 20: 56. 1901.

Geodorum pacificum Rolfe in Kew Bull. 1908: 71. 1908; Seidenfaden in Opera Bot. 72: 52, in obs. 1983; Lewis & Cribb, Orch. Vanuatu, 152. 1989.

Geodorum tricarinarum Schlechter in Repert. Sp. Nov. 9: 101. 1911; Seidenfaden in Opera Bot. 72: 53, in obs. 1983.

Geodorum neocaledonicum Kraenzl. in Viert. Naturf. Ges. Zurich 74: 82. 1929; Seidenfaden in Opera Bot. 72: 53, in obs. 1983.

Geodorum vitiensis (sic) Lindl. ex B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 31, nom. nud. 1953.

Terrestrial plants 20-30 (-50) cm. tall, the rhizome much abbreviated; pseudobulbs almost entirely below ground, crowded, completely enclosed by scarios sheaths, subglobose, 1.3-2.6 cm. in diameter, with only the most recent pseudobulb 2-4-foliolate; leaves ascending, articulate, petiolate, the petiole sheathlike in lower 1/2-2/3, gradually becoming channelled distally, 6-12 cm. long, the blade ovate to elliptic-ovate, 9-20 cm. long, 4.5-7 (-10) cm. broad, weakly plicate, chartaceous, gradually angustate at base, acute or acuminate at apex; inflorescences borne at base of pseudobulbs, about as long as or somewhat shorter than leaves, the peduncle well developed, many times longer than rachis, terete, with 2 or 3 widely spaced, tubular, sheathing cataphylls, the rachis recurved or nodding during anthesis, somewhat congested, many-flowered, the bracts linear-lanceolate, 10-13 mm. long, about 1 mm. broad, membranous; flowers more or less patent, faintly pinkish white to rose or pale purple, with reddish purple streaks and irregular yellow blotches on labellum; sepals weakly spreading, oblong-obovate, 10-12 mm. long, 3-3.5 mm. broad, abruptly acuminate at apex; petals weakly spreading, oblong to oblong-elliptic, 9.5-11 mm. long, 3.5-4.5 mm. broad, subacute to obtuse at apex; labellum cymbiform, slightly constricted about middle, 11-13 mm. long, 10-12 mm. broad, the base saccate, the apical portion slightly recurved, weakly bilobed at apex with the apex of lobules broadly rounded, the lateral margins turned upward throughout basal half, gradually becoming less so distally, ultimately slightly reflexed near apex, the disk with a small transverse callus near base and a series of verruciform tubercles or carinae on apical portion; column broad, slightly arcuate, about 3 mm. long; column foot perpendicular to column, broad, about 3 mm. long; clinandrium small, shallowly excavate, the dorsal margin prominently raised; anther terminal, incumbent, transversely elliptic-ovate, about 1.8 mm. across, broadly rounded at apex; pollinia 2, oblong-ovoid, sulcate, about 1.2 mm. long and 0.8 mm. in diameter, the stipe spatulate, about 0.7 mm. long and 0.3 mm. broad, the viscidium peltate, about 0.3 mm. in diameter; rostellum short, transverse, slightly retuse at apex; stigma large, transversely oblong-obovate.

TIPIFICATION AND NOMENCLATURE: *Limodorum densiflorum* is based on Rheede, Hort. Ind. Malabar. 11: 69. t. 35. 1692, the original material, known as "Bola-pola," having come from east Malabar, India. The type of *Cymbidium pictum* is *R. Brown 5507* (BM HOLOTYPE), from tropical Australia but without detailed locality. Syntypes of *Geodorum pacificum* are *Crosby 246* (K), collected on Vava'u, Tonga, and *Woodford s. n.* (K), from the Solomon Islands but without locality or date. The type of *G. tricarinatum* is *Vaupel 285* (B HOLOTYPE, presumably destroyed; no isotype located), obtained Jan. 28, 1905, near Vaipouli, Savai'i, Samoa. *Geodorum neocaledonicum* is typified by *Däniker 1384* (Z HOLOTYPE), collected Dec. 3, 1925, on the slopes of Tiebaghi, Paagoumene, New Caledonia. These taxa have been recently discussed (Kores, 1989) and their reduction to *G. densiflorum* justified; this species has in our area been most often known as *G. pictum* (R. Br.) Lindl., an illegitimate name which, at any rate, is based on a later epithet than that of *G. densiflorum* (Lam.) Schlechter.

DISTRIBUTION: *Geodorum densiflorum* has a range approximating that of the genus, being known from southern China, Burma, India, Ceylon, the southern Ryukyu Islands, New Guinea, northern Australia, the Bismarck and Solomon Islands, New Caledonia, the New Hebrides, Fiji, Tonga, Niue, and Samoa. In Fiji it is found from near sea level to an elevation of about 450 m., occurring in dense forest, thickets, and clearings, on grassy slopes, and in pockets of soil on limestone. Flowers have been obtained between December and April, fruits in May and June.

LOCAL NAMES: *Mendra suthu na ruve*, *kendra suthu ni ruve*, *suthu ni ruve*, *vavara*.

AVAILABLE COLLECTIONS: VITI LEVU: NANDRONGA & NAVOSA: Mbulu, near Sovi Bay, *Degener 15086*; vicinity of Mbalo, near Vatukarasa, *Degener 15244*. NAITASIRI: Prince's Road, *Vaughan 3361*. REWA: Suva, *in Thurn 339*. VITI LEVU without further locality, *Graeffe s. n.* (W). VANUA LEVU: MBUA: Naivakasinga, *H. B. R. Parham 11* (AMES). VANUA LEVU without further locality, *U. S. Expl. Exped.* (AMES 75277). FULANGA: On limestone formation, *Smith 1183*.

45. EULOPHIA R. Br. ex Lindl. in Bot. Reg. 8: t. 686. 1823; L. O. Williams in Bot. Mus. Leaf. 5: 135. 1938; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; Hallé in Fl. Nouv.-Caléd. et Dépend 8: 243. 1977; Seidenfaden in Opera Bot. 72: 28. 1983; Kores in Allertonia 5: 159. 1989; Lewis & Cribb, Orch. Vanuatu, 151. 1989. Nom. cons.

Eulophidium sensu Summerhayes in Bull. Jard. Bot. Brux. 27: 393, p. p. 1927; non Pfitzer, nom. superfl. *Oeceoclades* sensu Lewis & Cribb, Orch. Vanuatu, 153. 1989; non Lindl.

Terrestrial (rarely epiphytic) plants with short rhizomes and crowded pseudobulbs or cormlike, leafy stems, or rarely saphrophytes with tuberous, subterranean rhizomes (but the saphrophytic habit absent from Fiji and nearby archipelagoes); pseudobulbs or cormlike stems partially below ground or not, homoblastic, subglobose or elongated; leaves erect with apices often nodding, articulate, petiolate, slightly to moderately plicate, convolutive in bud; inflorescences lateral, erect, racemose; flowers variable in size, often showy, resupinate; sepals and petals similar, free, more or less spreading, or the petals somewhat broader and decurrent along column foot; labellum immobile, erect, entire or lobed, the base with a short spur or rarely saccate, the disk either with longitudinal carinae or thickenings or rarely naked; column mostly long or sometimes rather short, often winged; column foot usually distinct, short; clinandrium oblique, entire; anther terminal, incumbent, operculate, often dorsally appendaged, imperfectly 2-celled; pollinia 2, waxy, more or less cleft, ecaudiculate, attached to a short, broad stipe, the viscidium disklike; stigma directly below rostellum.

TYPE SPECIES: *Eulophia guineensis* Lindl.; cf. Kores (1989) for a discussion of the many nomenclatural problems associated with *Eulophia*.

DISTRIBUTION: A genus of more than 200 species, pantropical but particularly abundant in southern Africa. Two relatively widespread species occur in Fiji. The Pacific range of the genus does not terminate in Fiji (as stated by Smith, 1955); both species here treated reach Tonga and one of them extends to Niue.

KEY TO SPECIES

- Pseudobulbs almost entirely above ground, narrowly conical or terete; flowers light green or greenish yellow with purple markings; sepals 11–13 mm. long; labellum 3-lobed, about 11 mm. long overall, the apex deeply 2-lobed. 1. *E. pulchra*
 Pseudobulbs almost entirely below ground, globose or irregularly ellipsoid; flowers white or cream-colored; sepals 18–28 mm. long; labellum subentire, 18–26 mm. long overall, the apex obtuse. 2. *E. nuda*

1. ***Eulophia pulchra*** (Thou.) Lindl. Gen. Sp. Orchid. Pl. 182. 1833; Garay & Taylor in Bot. Mus. Leaflet. **24**: 253, 274. 1976; Hallé in Fl. Nouv.-Caléd. et Dépend. **8**: 244. pl. 104. 1977; Kores in Allertonia **5**: 161. 1989. FIGURES 75, 91 (upper left).

Limodorum pulchrum Thou. Hist. Orchid. pl. 43, 44. 1822.

Eulophia macrostachya Lindl. Gen. Sp. Orchid. Pl. 182. 1833, in Bot. Reg. **23**: pl. 1972. 1837; Seem. in Bonplandia **9**: 260. 1861, Viti, 443. 1862; Hook. f. in Bot. Mag. **102**: pl. 6246. 1876; J. J. Sm. Orchid. Java, **224**. 1905, Orchid. Java Fig.-Atlas **2**: pl. 164. 1909; Fukuyama in Bot. Mag. Tokyo **48**: 304. 1934; L. O. Williams in Bot. Mus. Leaflet. **5**: 136. 1938; Hosokawa in Trans. Nat. Hist. Soc. Formosa **32**: 8. 1942; Holttum, Fl. Malaya **1**: 537. 1953; Backer & Bakh. f. Fl. Java **3**: 392. 1968; Stone in Micronesica **6**: 159. 1970; Garay & Taylor in Bot. Mus. Leaflet. **24**: 274. 1976; Jayaweera in Rev. Handb. Fl. Ceylon **2**: 173. 1981.

Eulophia emarginata Bl. Fl. Javae Nov. Ser. 152. 1858 or 1859, Coll. Orchid. 180. 1859; Schlechter in Denkschr. Akad. Wiss. Wien **89**: 523. t. 8, fig. 7. 1913, in Bot. Jahrb. **56**: 490. 1921; Garay & Taylor in Bot. Mus. Leaflet. **24**: 274. 1976.

Graphorchis (sic) *pulchra* Kuntze, Rev. Gen. Pl. **2**: 662. 1891.

Eulophia guamensis Ames in Philipp. J. Sci. Bot. **9**: 12. 1914; Garay & Taylor in Bot. Mus. Leaflet. **24**: 274. 1976.

Eulophia rouxii Kraenzl. in Sarasin & Roux, Nova Caledonia Bot. **1**: 82. 1914; Guillaumin in Notul. Syst. (Paris) **10**: 74. 1914, Fl. Nouv.-Caléd. 69. 1948; Garay & Taylor in Bot. Mus. Leaflet. **24**: 274. 1976.

Eulophidium pulchrum Summerhayes in Bull. Jard. Bot. Brux. **27**: 400. 1957; J. W. Parham, Pl. Fiji Isl. **290**. 1964, ed. 2. 383. 1972; Sykes in New Zealand Dept. Sci. Indust. Res. Bull. **200**: 259. 1970.

Oeceoclades pulchra Clements & Cribb ex Lewis & Cribb, Orch. Vanuatu, 153. 1989.

Terrestrial (rarely epiphytic) plants, erect, caespitose, up to 70 cm. tall, the rhizome much abbreviated; pseudobulbs almost entirely above ground, crowded, narrowly conical or terete, (5–) 7–12 cm. long, 1.5–2.5 cm. in diameter, 2–4-foliolate; leaves ascending, articulate, prominently petiolate, the petioles channelled, 10–20 cm. long, the blades oblong-lanceolate to narrowly elliptic, 15–30 cm. long, 3.5–8 cm. broad, plicate, chartaceous, gradually angustate at base, narrowly acuminate at apex; inflorescences borne at base of pseudobulbs, erect, 40–70 cm. tall, the peduncle terete, 30–55 cm. long, the rachis 1/2–1/4 the length of peduncle, rather laxly many-flowered, the bracts linear-lanceolate, 5.5–10 mm. long, 2–4 mm. broad, membranous; flowers patent, light green to greenish yellow with purple markings on labellum; dorsal sepal broadly spreading, oblong-lanceolate, about 13 mm. long and 3 mm. broad, narrowly acuminate at apex; lateral sepals spreading, narrowly oblong-ovate, falcate, about 11 mm. long and 4.5 mm. broad, narrowly acuminate at apex; petals free, closely appressed to dorsal sepal, narrowly elliptic to elliptic-obovate, about 11 mm. long and 4.5 mm. broad, abruptly acuminate at apex; labellum prominently 3-lobed, shortly spurred, about 11 mm. long and 14 mm. broad overall, the spur scrotiform, 2.5–3 mm. in diameter, the base broadly cuneate, the lateral lobes erect, semiorbicular, the midlobe recurved, deeply 2-lobed at apex, with the lobules semiorbicular, the disk with a moderately large, transverse, weakly bilobulate callus at base, more distally with 2 small, short, longitudinal carinae; column short, stout, semiterete, about 5 mm. long, weakly winged; column foot perpendicular to column, short and broad, about 1 mm. long; clinandrium small, hardly or not excavate; anther terminal, operculate, transversely obovate, about 1.8 mm. across, umbonate, minutely bilobed at apex; pollinia 2, broadly obovoid, about 0.9 mm. in diameter, the stipe short, ligulate, the viscidium relatively large, peltate; rostellum short, broad, transverse; stigma large, transverse.



FIGURE 75. A flowering plant of *Eulophia pulchra* in Naitasiri Province, Viti Levu (Kores & Molvray F7), × about 1/4.

TIPIFICATION AND NOMENCLATURE: *Limodorum pulchrum* was based on material collected by Du Petit-Thouars on La Réunion prior to 1802, and his illustrations published in 1822 may be taken as the holotype. The type of *Eulophia macrostachya* is *Macrae 27* (K HOLOTYPE), collected in Ceylon in 1829. *Eulophia emarginata* is typified by material collected in Java by Blume; this has not been seen but the holotype may be at L. The type of *E. guamensis* is *R. C. MacGregor 376* (AMES 12735 HOLOTYPE), obtained on Guam in October, 1911, and that of *E. rouxii* is *Roux 816* (B HOLOTYPE, probably destroyed), collected in April, 1912, on Lifou, Loyalty Islands. These collections have recently been further discussed, together with the checkered history of nomenclatural usages (Kores, 1989).

DISTRIBUTION: Madagascar, the Mascarene Islands, Ceylon, and southern India eastward through Malesia to the Marianas Islands, New Hebrides, Fiji, Tonga, and Niue. In Fiji the species occurs at low elevations, infrequently up to 400 m., in wooded areas. Although known from only five Fijian islands, it doubtless is to be found on many others. Flowers have been found in scattered months between February and October, fruits in April and May.

LOCAL NAME: The only recorded local name is *parapara*, a variant of *varavara*, often applied to large terrestrial orchids.

AVAILABLE COLLECTIONS: YASAWAS: WAYA: North of Yalombi, Olo Creek, *St. John 18024*. VITI LEVU: SERUA: Vatutavathe, vicinity of Ngaloa, *Degener 15211*; Vatuvilakia, vicinity of Ngaloa, *Degener 15151, 15323*. NAMOSI: Hills east of Navua River, *Greenwood 997*. NAITASIRI: Tholo-i-suva, *im Thurn 336*, *Kores & Molvray F7*; Tamavua Ridge, *Vaughan 3182*; vicinity of Nasinu, *Gillespie 3644*. REWA: Veisari River swamp, *im Thurn 41*; Mt. Korombamba, *Vaughan 3148*; "Quarry, Suva," (Lami?), *Livingston, Aug. 1945*. VITI LEVU without further locality, *Parks s. n.* TAVEUNI: Vicinity of Waivevo, *Gillespie 4702*. KAMBARA: *Tothill, Feb. 1927*. NAMUKA-I-LAU: Central flat, *Beck, Sept. 12, 1924*. FIJI without further locality, *Seemann 596, Simmonds* (K spirit 6178/4).

2. *Eulophia nuda* Lindl. ex Wallich, Num. List, no. 7371, nom. nud. 1832, Gen. Sp. Orchid. Pl. 180. 1833; Hook. f. Fl. Brit. Ind. 6: 5. 1890; Seidenfaden in Opera Bot. 72: 40. fig. 26. 1983; Lewis & Cribb, Orch. Vanuatu, 152. 1989.

Eulophia macgregorii Ames in Philipp. J. Sci. Bot. 9: 12. 1914; Schlechter in Bot. Jahrb. 56: 490. 1921; L. O. Williams in Bot. Mus. Leaf. 5: 135. 1938; Hosokawa in Trans. Nat. Hist. Soc. Formosa 32: 8. 1942; J. W. Parham, Pl. Fiji Isl. 290, as *E. macgregori*. 1964, ed. 2. 383, as *E. macgregori*. 1972; Stone in Micronesica 6: 159. 1970; Kores in Allertonia 5: 163. 1989.

Terrestrial, erect plants to 75 cm. tall, the rhizome much abbreviated; pseudobulbs subterranean or with only the apical portion above ground, closely approximate, globose or irregularly ellipsoid, 2-3 cm. in diameter, (2 or) 3- or 4-foliate; leaves ascending, articulate, petiolate, the petioles 15-25 cm. long, sheathlike throughout basal half, gradually becoming channelled distally, the blades linear-lanceolate, 20-40 cm. long, 1-2 (-2.5) cm. broad, plicate, chartaceous, gradually angustate with petiole proximally, narrowly acute at apex; inflorescences borne at base of pseudobulbs, erect, (30-) 40-75 cm. tall, the peduncle rather stout, terete, 20-45 cm. long, the rachis as long as to half the length of peduncle, laxly few-flowered, the bracts linear-lanceolate, 2-3 cm. long, 3-4 mm. broad, membranous; flowers patent, showy, pure white or cream-colored; dorsal sepal slightly spreading, oblong-lanceolate, (2-) 2.4-2.8 cm. long, 4-5.5 mm. broad, narrowly acute at apex; lateral sepals partially inserted on column foot, spreading, oblong-lanceolate, somewhat falcate, 1.8-2.5 cm. long, 5.5-6.5 mm. broad, acute at apex; petals partially inserted on column foot, spreading, oblong-ovate, slightly oblique, 1.8-2.3 cm. long, 7-8.5 mm. broad, subacute to acute at apex; labellum obtuse, shortly spurred, ovate to elliptic-ovate, (1.8-) 2.2-2.6 cm. long, 9.5-11 mm. broad, the spur projecting between halves of column foot, retrorse, broadly subconical, laterally compressed, about 3 mm. long, the base broadly cuneate,

the lateral margins slightly turned upward throughout proximal half, the apex obtuse, the disk naked; column stout, clavate, 9–11 mm. long, prominently winged near base, the wings decurrent with column foot; column foot slightly retrorse, broad, about 5 mm. long; clinandrium broad, hardly or not excavate, with a small subdeltoid tooth on dorsal margin; anther terminal, operculate, transversely obovate, about 2 mm. long and 3.5 mm. broad, with a prominent, dorsal, inflexed, fleshy, dactyliform appendage, broadly retuse at apex; pollinarium not seen; rostellum short, broad, transverse; stigma large, semiorbicular, deeply recessed.

TYPIIFICATION AND NOMENCLATURE: *Eulophia nuda* is based on *Hamilton* (Wallich no. 7371, K HOLOTYPE), from Morang, Nepal (vide Seidenfaden, 1983); *E. macgregorii* on *R. C. MacGregor 631* (AMES 12721 HOLOTYPE), collected in October, 1911, from hills southeast of Piti, Guam.

DISTRIBUTION: Scattered but widespread in southeastern Asia (from India and Ceylon), Sumatra, the Philippines, Guam, Yap, Palau, the Solomon Islands, New Hebrides, Fiji, and Tonga. The similarity between the two taxa was noted in my 1989 treatment, and they were formally combined by Lewis and Cribb (1989). In Fiji the species is infrequent on two (or perhaps three) of the high islands at elevations up to about 850 m., found on open grassy slopes and along forest trails or in native gardens. Flowers have been noted between December and March.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 175*; Navai, *im Thurn 19*. NAMOSI: Nakavika, Wainikoroiluva River, *DA 11630*. NAITASIRE: Near Pumping Station, *Vaughan 3153*; Forest Reserve, *Vaughan 3164*. REWA: Suva, behind Government House, *im Thurn 338*. TAVEUNI: Vicinity of Somosomo, *Gillespie 4769*. FIJI without further locality, *H. B. R. Parham*, Jan. 1941.

A more extensive treatment of the synonymy of this species is provided by Seidenfaden (1983).

46. GRAMMATOPHYLLUM Bl. *Bijdr. Fl. Ned. Ind.* 377. 1825, Tab. Pl. Jav. Orchid. t. II. *fig. 20*. 1825; Schlechter in *Orchis* 9: 100. 1915; Holttum, *Fl. Malaya* 1: 526. 1953; A. C. Sm. in *J. Arnold Arb.* 36: 276. 1955; Kores in *Allertonia* 5: 163. 1989.

Very large or moderately large epiphytic plants with abbreviated rhizomes and crowded, pseudobulbous stems, the roots usually growing upward or outward, stiff, white, many-branched; pseudobulbs homoblastic, either much elongated, cylindrical, multifoliate, and completely covered by persistent leaf bases, or short, much thickened, more or less naked, and with a few leaves at apex; leaves distichous, articulate, conduplicate in bud, large, ligulate or lanceolate, coriaceous; inflorescences lateral, erect or somewhat pendulous, racemose, few-many-flowered; flowers more or less fleshy, usually large and showy, resupinate, the sepals and petals slightly dissimilar, free, spreading; labellum subelastically adnate to a sometimes concave thickening at base of column, erect, smaller than other floral segments, 3-lobed, often somewhat concave, the disk with longitudinal carinae; column slightly curved, semiterete; column foot indistinct; clinandrium relatively shallowly excavate, with entire margins; anther terminal, proclined, operculate, incompletely 2-celled; pollinia 2, waxy, more or less globose, each deeply cleft or sometimes completely divided into 2 closely appressed unequal halves, borne on a process of a common stipe, this short, broad, distally bifid, the viscidium relatively large, broad, somewhat crescent-shaped; rostellum transverse; stigma directly beneath rostellum, large, transverse, deeply recessed.

TYPE SPECIES: *Grammatophyllum speciosum* Bl., the only original species.

DISTRIBUTION: Southeastern Asia throughout Malesia to the Admiralty Islands, the Bismarck Archipelago, and the Solomon Islands, with a reputedly disjunct species in Fiji. In addition to the last, one cultivated (and naturalizing) species is known to occur in Fiji.

USEFUL TREATMENTS OF GENUS: SCHLECHTER, R. Die Gattungen *Grammatophyllum* Bl. und *Grammangis* Rehb. f. *Orchis* 9: 99-109, 115-122. 1915. WOOD, J. J. *Grammatophyllum scriptum* (Rumph.) Bl. sensu lato and its var. *boweri* (F. v. Muell.) Schltr. *Orchid Rev.* 95: 323-327. 1977.

KEY TO SPECIES

Plants with much elongated, terete, multifoliate pseudobulbs (sect. *Grammatophyllum*); sepals and petals pale greenish yellow, with large, dull, orange-brown spots. 1. *G. speciosum*
Plants with relatively short, stout, few-foliate pseudobulbs (sect. *Gabertia*); sepals and petals sepia-brown or brownish green, with light yellow margins. 2. *G. elegans*

1. ***Grammatophyllum speciosum*** Bl. *Bijdr. Fl. Ned. Ind.* 378. 1825, Tab. Pl. Jav. *Orchid. fig.* 20. 1825; Schlechter in *Orchis* 9: 101. 1915; J. W. Parham in *Agr. J. Dept. Agr. Fiji* 19: 104. 1948; Holttum, *Fl. Malaya* 1: 527. *fig.* 153. 1953; Seidenfaden in *Opera Bot.* 72: 96. *fig.* 54. 1983; Kores in *Allertonia* 5: 164. 1989.

Epiphytic plants up to 4 m. tall; pseudobulbs erect or ascending, much elongated, cylindrical, 1.5-3 (-8.3) m. long, about 5 cm. in diameter, multifoliate, gradually becoming somewhat yellowed and many-ribbed with age; leaves ascending and somewhat decurved distally, linear-ligulate, (40-) 50-60 cm. long, about 3 cm. broad, subcoriaceous, gradually angustate at base, acute to obtuse at apex; inflorescences erect, 1.6-2.6 m. tall, many-flowered; flowers patent, conspicuously dimorphic, the lower ones distant, abnormal, often lacking a labellum, the upper ones closely spaced, normal, about 10 cm. across, the outer perianth segments pale greenish yellow with dull orange-brown spots, the labellum yellow with brown stripes and with the disk marked with red, the column pale greenish above, white with purple spots below; sepals and petals oblong-elliptic, about 5.5 cm. long, 2.5-3 cm. broad, broadly subacute to obtuse at apex; labellum 3-lobed, about 3 cm. long overall and 2.5 cm. broad, the side lobes more or less embracing column, oblong, about 2.2 cm. long and 0.7 cm. broad and subacute at apex, the midlobe ovate, about 1.7 cm. long and 1 cm. broad and broadly acute at apex, the disk with 3 carinae extending from base of labellum to lower portion of midlobe and subdensely pilose throughout; column clavate, about 2.2 cm. long, with 2 outgrowths at base joining to form a concave depression at base of labellum; clinandrium shallowly excavate; anther transversely oblong, about 3 mm. long and 4 mm. broad, truncate to slightly retuse at apex; pollinia subglobose, about 1.3 mm. in diameter, the stipe almost entirely bifid, with ligulate segments, the viscidium somewhat hippocrepiform, about 2 mm. across; rostellum short, transverse; stigma large, subquadrate, very deeply recessed.

TYPIFICATION: The species is based on a collection made by Blume in the vicinity of Buitenzorg, Java.

DISTRIBUTION: Widespread from southeastern Asia through Malesia to New Guinea and the Solomon Islands. The species is widely cultivated in the Old World tropics and has sometimes become naturalized, occurring on large, somewhat isolated trees at low elevation. This is the case in Fiji (J. W. Parham, 1948), where it has been cultivated in the Suva Botanical Gardens and has become established in the area. Although no herbarium specimens from Fiji are available, this is presumably because of the difficulty of preparing them from the extremely large plants, reputedly the largest individual plants of all orchids.

2. ***Grammatophyllum elegans*** Reichenb. f. in *Gard. Chron.* n. s. 18: 776. 1882; Schlechter in *Orchis* 9: 107. 1915; L. O. Williams in *Bot. Mus. Leafl.* 6: 139. 1938; A. C. Sm. in *J. Arnold Arb.* 36: 276. 1955; J. W. Parham, *Pl. Fiji Isl.* 291. 1964, ed. 2. 384. 1972; Kores in *Allertonia* 5: 165. 1989. FIGURE 76.

Epiphytic, erect plants 0.5-1 m. tall; pseudobulbs erect, relatively short, stout, ovoid, somewhat flattened laterally, about 12 cm. long and 6 cm. broad, almost completely naked and weakly grooved longitudinally, distally 2-5-foliate; leaves erect



FIGURE 76. *Grammatophyllum elegans* cultivated in a hanging basket in an orchid collection in Suva; note the presence of erect roots, characteristic of this genus. The specimen originated from the south coast of Viti Levu; \times about 1/6.

or ascending, narrowly elliptic to elliptic-oblongate, about 28 cm. long and 5.5 cm. broad, subcoriaceous, gradually angustate and channelled at base, acute at apex; inflorescences erect, 50–60 cm. tall, rather laxly to subdensely 5–15-flowered; flowers patent, the outer perianth segments sepia-brown or brownish green with light yellow margins, the labellum pale ochre with the anterior margin brown, the column whitish with brown markings; sepals obovate to elliptic-obovate, about 3 cm. long, 1.5–1.7 cm. broad, broadly subacute to abruptly acuminate at apex; petals oblong-obovate, about 2.7 cm. long and 1.3 cm. broad, obtuse at apex; labellum 3-lobed, about 1.8 cm. long and 2 cm. broad, the side lobes embracing column, more or less ovate, about 1.5 cm. long and 0.8 cm. broad and obtuse at apex, the midlobe transversely ovate, about 0.6 cm. long and 1 cm. broad and broadly rounded at apex, the disk with a single callus extending throughout proximal half of labellum and laxly villous throughout, the callus prominently raised near base, gradually becoming less obviously so distally, oblong, with the upper surface weakly 3-carinate; column clavate, somewhat arcuate distally, about 1 cm. long, with 2 irregularly bullate outgrowths along lateral margins near base joining to form a small pitlike depression near base of labellum; clinandrium relatively small, shallowly excavate; anther and pollinarium not observed; rostellum short, transverse; stigma large, transverse, deeply recessed.

TYPIFICATION: The actual collector and the precise locality were not divulged in the protologue, the type material having been imported from the "South Sea Islands" by Mr. B. S. Williams, cultivated by him somewhere in Europe, and an inflorescence with a few flowers sent to Reichenbach for identification; this material provides the HOLOTYPE (W 18929).

DISTRIBUTION: Subsequent to its description the species has been considered indigenous in Fiji, although there is indeed no certainty that the archipelago was the source of the type material. The species does indeed occur in Fiji, probably indigenously, and is a common colonizer of isolated trees in pastures along the southeast coast of Viti Levu, but it is also known to be in cultivation in Suva. Fijian material appears very similar to collections of *Grammatophyllum scriptum* (Rumph.) Bl. var. *boweri* (F. v. Muell.) Schlechter (for discussion of which cf. Wood, 1977, and Kores, 1989), of the Solomon Islands and Admiralty Islands.

AVAILABLE COLLECTIONS: VITI LEVU: REWA: Vicinity of Suva, *Meebold 21954* (BISH), flowering in Jan. 1937, and also observed near Lami (Rewa Province) and in southern Naitasiri Province; Suva Botanical Gardens, *DA 7175* (K, SUVA).

Although *Grammatophyllum elegans* is represented only by two herbarium collections definitely from Fiji, in 1989 I observed numerous colonies of it in the canopies of trees along Queen's Road between Navua and Suva and also within Suva in the vicinity of the Botanical Gardens, the Governor General's residence, and the coastal road leading to the University of the South Pacific. If this species should indeed prove to be a Fijian indigene (or even an endemic), the genus would have a disjunction in its range between the Solomon Islands and Fiji. Possibly further field studies will indicate that it is identical with *G. scriptum* var. *boweri*, and, like *G. speciosum*, has become established near Suva from introduced plants. However, this seems doubtful, given its relative abundance in southeastern Viti Levu, and for the time being the species is considered to be a disjunct indigenous (possibly endemic) species.

47. OCTARRHENA Thw. Enum. Pl. Zeyl. 305. 1861; Schlechter in Repert. Sp. Nov. Beih. 1: 901. 1913; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 336. 1977; Kores in Allertonia 5: 166. 1989; Lewis & Cribb, Orch. Vanuatu, 85. 1989.

Phreatia sect. *Octarrhena* J. J. Sm. Orchid. Java, 500. 1905; Schlechter in Bot. Jahrb. 39: 77. 1906; Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 23): 6, p. 1911.

Small, erect, epiphytic or rarely terrestrial plants with slender, elongated, leafy stems, these caespitose or sometimes matted, short to long, unbranched or laxly branched near base, often slightly complanate; leaves equitant, articulate, with overlapping, tubular, sheathing bases, the blades erect or ascending, laterally compressed, linear to ligulate, conduplicate in bud; inflorescences axillary, erect or ascending, usually as long as or longer than leaves, racemose, laxly or densely few-many-flowered, the bracts minute; flowers very small, more or less fleshy, green or greenish yellow or dull orange, glabrous or sometimes laxly minutely pubescent, resupinate; sepals free, spreading or patent, slightly dissimilar; petals free, spreading, much smaller than sepals, often somewhat fleshy; labellum sessile, immobile, small, entire, often somewhat concave, the disk naked or with 2 large, longitudinal calli near base; column very short, glabrous, frequently ventricose at base, sometimes with 2 slight or well-developed steldia on either side of anther; column foot absent; clinandrium small to large, usually deeply excavate; anther dorsal, erect, short, subcordate or reniform, more or less obtuse at apex; pollinia 8, waxy, often very unequal in size, ellipsoid or pyriform, borne on a common caudicle, this short to long, linear, the viscidium small; rostellum usually well developed, erect, often bidentate at apex; stigma transverse, often partially obscured by the ventricose base of column.

TYPE SPECIES: *Octarrhena parvula* Thw., the only original species.

DISTRIBUTION: Ceylon eastward throughout Malasia and to New Caledonia, the New Hebrides, and Fiji, where a single species occurs and terminates the generic range.

1. *Octarrhena oberonioides* (Schlechter) Schlechter in Repert. Sp. Nov. 9: 217. 1911; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 338. pl. 139. 1977; Kores in Allertonia 5: 167. 1989.

Phreatia oberonioides Schlechter in Bot. Jahrb. 39: 77. 1906; Kraenzl. in Pflanzenz. 50 (IV. 50. II. B. 23): 14. 1911; Guillaumin in Notul. Syst. (Paris) 10: 65. 1941, Fl. Nouv.-Caléd. 64. 1948.

Small, slender, epiphytic plants 2–8 cm. tall, the stem terete, weakly fractiflex, 1.5–7.5 cm. long, about 2 mm. in diameter, completely obscured by persistent leaf sheaths, laxly foliate distally; leaves equitant, the blades erecto-patent, articulate, linear, 1.3–2.5 cm. long, 1–3 mm. broad, subcoriaceous, acute at apex; inflorescences axillary, erect or ascending, racemose, slender, 1–3 cm. long, laxly many-flowered, the bracts small, broadly ovate, about 1.8 mm. long and 1.6 mm. broad, acute at apex; flowers ascending, very small, pale green to greenish yellow, glabrous; dorsal sepal broadly ovate, 0.9–1.2 mm. across, subacute at apex; lateral sepals obliquely ovate, about equal in size to dorsal sepal, often slightly carinate distally, broadly subacute to obtuse at apex; petals oblong-elliptic, slightly oblique, 0.4–0.6 mm. long, 0.25–0.3 mm. broad, obtuse to broadly acute at apex; labellum suberect, oblong to oblong-ovate, 0.7–0.8 mm. long, 0.3–0.5 mm. broad, slightly cuneate at base, obtuse to broadly acute at apex, the disk naked; column about 0.5 mm. long, conspicuously ventricose at base, without steldia; clinandrium overtopping column, relatively large, deeply excavate; anther transverse-cordate, 0.4–0.5 mm. across, slightly umbonate dorsally, weakly emarginate at apex; pollinia 8, obliquely pyriform, slightly unequal, 0.1–0.15 mm. in diameter, the caudicle very short, linear, the viscidium small, about 0.1 mm. across, suborbicular; rostellum broadly subacute, with a small, shallow sinus at apex; stigma transverse, almost completely obscured by the swollen base of column; ovary shortly stalked, clavate, about 0.2 mm. long.

TYPIFICATION: The type was *Schlechter 15394* (B HOLOTYPE, destroyed), collected in December, 1902, at about 600 m. on the slopes of Mt. Ignambi, near Oubatche, New Caledonia; no duplicates of this number have been found.

DISTRIBUTION: Infrequent in New Caledonia and known from only a single collection in Fiji, this flowering in July at an elevation of approximately 300 m.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI-REWA boundary: Slopes of Mt. Korombalevu, *Vaughan 3198* (K).

48. *PHREATIA* Lindl. Gen. Sp. Orchid. Pl. 63. 1830; Benth. in Benth. & Hook. f. Gen. Pl. 3: 510. 1883; J. J. Sm. Orchid. Java, 499, p. p. 1905; Schlechter in Bot. Jahrb. 39: 76, p. p. 1906; Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 23): 5, p. p. 1911; Schlechter in Repert. Sp. Nov. Beih. 1: 908, p. p. 1913; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 320. 1977; van Royen, Alpine Fl. New Guinea 2: 759. 1979; Kores in Allertonia 5: 167. 1989; Lewis & Cribb, Orch. Vanuatu, 85. 1989.

Eria sensu Reichenb. f. in Seem. Fl. Vit. 300, p. p. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 308, p. p. 1892; non Lindl.

Octarrhena sensu P. F. Hunt in Kew Bull. 24: 95, p. p. 1970; non Thw.

Rhynchophreatia sensu Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 341. 1977; non Schlechter.

Small to occasionally large, erect, epiphytic or rarely terrestrial plants, the stems either with short, heteroblastic pseudobulbs which are surrounded by 1 or more sometimes foliaceous sheaths and bear 1-3 leaves at apex, or not producing pseudobulbs and then short to slightly elongated and completely obscured by the persistent leaf bases and densely foliate distally; leaves closely approximate, clustered or sometimes equitant, articulate, the blades usually erect or ascending, ligulate, flat or sometimes channelled, thin or fleshy, conduplicate in bud; inflorescences either axillary in plants without pseudobulbs or lateral in plants with pseudobulbs, arising from axils of sheaths which subtend pseudobulbs, erect, racemose, usually rather densely many-flowered, the bracts small, often ovate-attenuate; flowers small, usually white, rarely pale green or greenish yellow, resupinate; sepals free, more or less patent, subequal, the lateral sepals decurrent along the column foot forming a mentum; petals free, a little smaller than sepals, spreading; labellum adnate to column foot, immobile, often clawed, the base concave or sometimes saccate, rarely prolonged into a short porrect spur, usually with 2 small, shallow, pitlike nectaries, the disk naked or rarely with minute hairs or a small callus near base; column very short, stout; column foot short; clinandrium fairly prominent, deeply excavate; anther terminal, proclined, short, often somewhat umbonate dorsally, usually obtuse at apex; pollinia 8, more or less equal in size, frequently obovoid, borne on a common caudicle, this linear, the viscidium small; rostellum erect, short, more or less 2-dentate; stigma large, transverse, deeply recessed; ovary short-pedicellate, usually clavate.

LECTOTYPE SPECIES: *Phreatia elegans* Lindl. (vide Benth. in Benth. & Hook. f. Gen. Pl. 3: 511. 1883); for a discussion cf. Kores (1989).

DISTRIBUTION: India and Ceylon throughout southeastern Asia and Malesia to the Cape York Peninsula of Australia and New Zealand, and eastward in the Pacific to the Society Islands. It is one of the largest genera of orchids in Fiji, represented by eleven indigenous species, five of them endemic.

USEFUL TREATMENT OF GENUS: KRAENZLIN, F. Orchidaceae-Monandreae-Thelasiniae. Pflanzenr. 50 (IV. 50. II. B. 23): 1-46. 1911. Pages 5-37 of this treatment provide the only monograph of the genus yet undertaken, but it is no longer up to date and contains some serious errors and omissions. *Caveat lector*.

Four sections are recognized in *Phreatia* (cf. Kores, 1989), all of them represented in Fiji. Of the species that follow, only the first belongs in sect. *Saccophreatia*; the second and third are referable to sect. *Phreatia*; the fifth represents sect. *Plexaure*, and the remaining species sect. *Ebulbosae*. In fact, however, the distinctions between the two last sections are not very pronounced in Fiji, depending primarily upon whether the stems are somewhat elongate or abbreviated.

KEY TO SPECIES

- Pseudobulbs present; inflorescences lateral, arising from axils of sheaths which subtend pseudobulbs.
 Base of labellum with a small, porrect spur; leaves 16–25 cm. long. 1. *P. obtusa*
 Base of labellum not spurred; leaves 0.8–9 cm. long.
 Rachis not winged; leaves 2.5–9 cm. long, chartaceous. 2. *P. hypsorhynchos*
 Rachis winged; leaves 0.6–1.3 cm. long, somewhat fleshy. 3. *P. gillespiei*
 Pseudobulbs absent; inflorescences axillary.
 Plants without a conspicuously enlarged, laterally compressed base; leaves 0.3–0.8 (–1.2) cm. broad, 1.5–15 cm. long.
 Column foot well developed, slender, much longer than broad.
 Labellum continuous with column foot, not pentagonal in outline, the column foot not laterally flattened.
 Claw of labellum rather prominently bigibbous along lateral margins distally; peduncle less than 1/4 the length of rachis. 4. *P. bigibbula*
 Claw of labellum slightly concave or not, not bigibbous along lateral margins distally; peduncle slightly longer than rachis. 5. *P. stenostachya*
 Labellum perpendicular to column foot, pentagonal in outline, the column foot laterally flattened. 6. *P. pentagona*
 Column foot hardly developed, relatively broad, not appreciably longer than broad.
 Leaves chartaceous, flat or slightly convolute when mature.
 Peduncle 1/5–1/3 the length of rachis; flowers greenish white; apex of labellum slightly retuse or weakly tridentate. 7. *P. neocaledonia*
 Peduncle 3–5-times the length of rachis; flowers greenish yellow to yellow; apex of labellum acute. 8. *P. flavovirens*
 Leaves somewhat fleshy, more or less conduplicate or laterally compressed when mature.
 Peduncle terete; labellum elliptic to elliptic-obovate, the disk with a small callus at base; leaves somewhat conduplicate. 9. *P. oreophylax*
 Peduncle somewhat complanate; labellum subrhombic to obovate, the disk naked; leaves prominently compressed laterally at maturity. 10. *P. pachyphylla*
 Plants with a conspicuously enlarged, laterally compressed base; leaves 1.5–2.2 cm. broad, (7–) 10–30 cm. long. 11. *P. micrantha*

1. *Phreatia obtusa* Schlechter in Repert. Sp. Nov. 9: 108. 1911; Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 23): 36. 1911; Kores in Allertonia 5: 170. 1989. FIGURE 77A–G.

Epiphytic plants (20–) 30–40 cm. tall, the rhizome much abbreviated, densely occupied by pseudobulbs, these globose, 1.2–2 cm. in diameter, commonly 2-foliolate; leaves erect, lorate to ensiform, 16–25 cm. long, 1.1–2.2 cm. broad, chartaceous, gradually angustate at base, obliquely subacute at apex; inflorescences lateral, 17–35 cm. tall, the scape about as long as or slightly longer than leaves, slender, terete, with 5–7 widely spaced, clasping, ovate-attenuate cataphylls, the rachis 5–10 cm. long, densely many-flowered, the bracts partially surrounding ovaries, oblong-obtuse, slightly shorter than flowers; flowers patent, white; dorsal sepal erect, ovate, 2.5–3 mm. long, about 2 mm. broad, obtuse at apex; lateral sepals weakly spreading, obliquely ovate, about 3 mm. long, 1.5–1.8 mm. broad, somewhat dilated near base on lower margin, rather narrowly subacute at apex; mentum short, obtuse; petals weakly spreading, ovate to elliptic-ovate, slightly oblique, about 1.75 mm. long and 1 mm.

FIGURE 77. A–G, *Phreatia obtusa*; A, flowering plant, $\times 1/2$; B, individual flower, $\times 5$; C, perianth segments, $\times 5$; D, column with labellum attached, viewed from side, $\times 5$; E, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; F, anther cap viewed from front, $\times 15$; G, anther cap viewed from below, $\times 15$. H–N, *Phreatia hypsorhynchos*; H, flowering plant, $\times 1$; I, individual flower, $\times 5$; J, perianth segments, $\times 5$; K, column with labellum attached, viewed from side, $\times 5$; L, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; M, anther cap viewed from above, $\times 15$; N, anther cap viewed from below, $\times 15$. O–V, *Phreatia gillespiei*; O, flowering plant, $\times 1 1/2$; P, distal portion of inflorescence with flowers removed, $\times 4$; Q, individual flower, $\times 5$; R, perianth segments, $\times 7 1/2$; S, column with labellum attached, viewed from side, $\times 7 1/2$; T, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; U, anther cap viewed from above, $\times 15$; V, anther cap viewed from below, $\times 15$. A–G from DA 17390, H–N from Smith 5209, p. p., O–V from *Gillespie s. n.* (BISH 442764).



broad, broadly subacute to obtuse at apex; labellum unguiculate, shortly spurred, about 2.3 mm. long overall, the spur originating near base of claw, porrect, small, subglobose, about 1/3 the length of blade, the claw partially adnate to column foot for a short distance above base, relatively short, slightly channelled, the blade broadly ovate, 1.5–2 mm. long, 1.3–1.5 mm. broad, broadly cuneate to truncate at base, obtuse at apex, the disk naked or minutely pubescent medially near base of blade; column short; column foot well developed, slender; clinandrium broad, with the ventral margin minutely lobed on either side of rostellum; anther oblong-cucullate, about 0.8 mm. long and 0.6 mm. broad, obtuse at apex; pollinia subglobose, about 0.2 mm. in diameter, the caudicle slender, linear, the viscidium small; rostellum erect, 2-lobed, the lobes subulate; stigma transverse, slitlike; ovary about 3.5 mm. long.

TYPE: The type is *Vaupeul* 527 (B presumed HOLOTYPE, probably destroyed; ISOTYPE at AMES 35394), collected Nov. 10, 1906, near Fatugase, Savai'i, Samoa.

DISTRIBUTION: Samoa (Savai'i and Upolu) and Fiji; a single recent collection is known from Fiji, obtained at an elevation of not more than 460 m. and flowering in September.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI-REWA boundary: Mt. Kombalevu, DA 17390 (coll. F. M. Gray) (MASS, SUVA), Sept. 13, 1970.

2. *Phreatia hypsorhynchos* Schlechter in Bot. Jahrb. 39: 77. 1906; Hallé in Fl. Nouv.-Caléd. et Dépênd. 8: 335. pl. 138. 1977; Kores in Allertonia 5: 171. 1989; Lewis & Cribb, Orch. Vanuatu, 86. 1989. FIGURE 77H-N.

Phreatia neocaledonica Kraenzl. in Pflanzenr. 50 (IV. 50. II. B. 23): 33, nom. illeg. 1911; Guillaumin in Notul. Syst. (Paris) 10: 66. 1941, Fl. Nouv.-Caléd. 64. 1948; non Schlechter (1906).

Phreatia comptonii Rendle in J. Linn. Soc. Bot. 45: 249. t. 13, fig. 10-12. 1921.

Phreatia rhomboglossa sensu Guillaumin in Notul. Syst. (Paris) 10: 66. 1941, Fl. Nouv.-Caléd. 64. 1948; non Schlechter.

Erect epiphytic plants 9–15 cm. tall, the rhizome much abbreviated, densely occupied by pseudobulbs, these conical-ovoid, 4–8 mm. long and 4–5 mm. in diameter, uni- or bifoliate; leaves erect or ascending, ligulate to ligulate-lanceolate, 2.5–7.5 (–9) cm. long, 3–8 mm. broad, chartaceous, gradually angustate at base, briefly and unequally bilobed at apex, the tips of lobes obtuse; inflorescences lateral, 3–10 (–15) cm. tall, the scape well developed, slender, terete, with 5 or 6 widely spaced, sheathlike, ovate-attenuate cataphylls, the rachis 1/2–1/3 the length of scape, terete, subdensely many-flowered, the bracts small, lanceolate-attenuate, about 2.7 mm. long and 0.8 mm. broad; flowers patent or ascending, pale greenish white to white; dorsal sepal erect, ovate, 1.2–1.6 mm. long, about 1 mm. broad, narrowly acuminate at apex; lateral sepals weakly spreading, obliquely ovate, 1.2–1.6 mm. long, about 1.5 mm. broad, noticeably dilated near base on lower margin, narrowly acuminate at apex; mentum well developed, obtuse; petals erect, ovate to elliptic-ovate, slightly oblique, about 1.3 mm. long, 0.5–0.8 mm. broad, subacute to acute at apex; labellum unguiculate, ecalcarate, (1.2–) 1.5–2 mm. long overall, the claw relatively short, weakly channelled, the blade broadly obovate to elliptic-obovate, (1–) 1.3–1.7 mm. long, 1–1.6 mm. broad, broadly rounded to subtruncate at base, abruptly acuminate at apex, the disk with 2 shallow, pitlike depressions near base of claw, glabrous; column about 0.8 mm. long; column foot distinct, short, slender; clinandrium somewhat dilated dorsally, the dorsal margin broadly lobed; anther broadly ovate-cordate, 0.4–0.5 mm. across, abruptly acuminate at apex; pollinia subglobose, 0.1–0.2 mm. in diameter, the caudicle linear, about 0.3 mm. long, the viscidium small, peltate, about 0.2 mm. across; rostellum small, erect, 2-lobed, the lobes subdeltoïd; stigma transverse, slitlike; ovary about 2 mm. long.

TYPIFICATION AND NOMENCLATURE: The type is *Schlechter 15427* (B HOLOTYPE, presumably destroyed; ISOTYPES at AMES, K, P, Z), collected Dec. 15, 1902, at about 700 m. near Oubatche, New Caledonia. Kraenzlin's 1911 usage of the name *Phreatia neocaledonica* explicitly excluded Schlechter's (1906) syntypes upon which that name was based and is therefore considered an illegitimate later homonym. *Phreatia comptonii* is based on *Compton 580* (BM HOLOTYPE), collected March 15, 1914, at about 1,000 m. on the slopes of Mt. Mou, New Caledonia. The synonymy here stated was suggested by Hallé (1977).

DISTRIBUTION: New Caledonia, Solomon Islands, New Hebrides, and represented by a single Fijian collection, the latter obtained in dense mossy forest at an elevation of about 1,200 m. and flowering in July.

AVAILABLE COLLECTION: VITI LEVU: MBA: Upper western slope of Mt. Tomanivi, *Smith 5209*, p. p. (AMES 106559, US 1965789); both sheets are mixtures of the present species and *P. pentagona*.

3. *Phreatia gillespiei* Kores in *Allertonia* 5: 172. 1989. FIGURE 770-V.

An apparently rare, recently described species, not closely related to other representatives of the genus known from Fiji or nearby archipelagoes but comparable to *Phreatia pumilio* Schlechter, of New Guinea, differing in its crowded pseudobulbs, the completely overlapping cataphylls ensheathing the inflorescence scape, the thickened and winged rachis, and the labellum with a transverse, obtrullate blade. This species is probably the smallest representative of sect. *Phreatia* thus far known.

TYPIFICATION: *Phreatia gillespiei* is typified by *Gillespie s. n.* (BISH 442764 HOLOTYPE), collected Nov. 17, 1927, in the vicinity of Nandarivatu, Mba Province, Viti Levu, probably at an elevation of about 850-900 m.

DISTRIBUTION: Endemic to Fiji and known only from the type specimen, which was obtained as an epiphyte growing on the branches of the conifer *Agathis vitiensis*.

4. *Phreatia bigibbula* Kores in *Allertonia* 5: 173. 1989. FIGURE 78A-I.

The recently described *Phreatia bigibbula*, of sect. *Ebulbosae*, is not closely related to other species of the genus known from Fiji, appearing to be of the affinity of *P. oubatchensis* Schlechter, of New Caledonia, from which it is distinguished by its very densely flowered inflorescence, its labellum with a characteristically oblong-angustate claw which is prominently bigibbous along the lateral margins distally, its broadly ovate-cucullate anther, and its somewhat marginate stigma.

TYPIFICATION: The type is *im Thurn 118* (K HOLOTYPE), collected Feb. 25, 1906, a short distance south along the road toward Suva from Nandarivatu, Mba Province, Viti Levu. A second date, March 13, 1906, indicates that part of im Thurn's material, probably three fairly young inflorescences with numerous flowers, accompanying the single mature plant with several old inflorescences, was obtained near Nandarivatu.

DISTRIBUTION: Endemic to Fiji and apparently rare, known with certainty only from north-central Viti Levu, where it occurs as an epiphyte in dense forest at elevations of 850-970 m. Flowers from this area have been obtained in February, March, and September. Possible occurrence of the species on Taveuni is noted below.

AVAILABLE COLLECTION: VITI LEVU: MBA: Hills east of Nandala Creek, about 3 miles south of Nandarivatu, *Smith 6234* (AMES). Another collection which may also represent the species, although its flowers are too old to make detailed analysis possible, is: TAVEUNI: Western slope between Somosomo and Wairiki, alt. about 600 m., *Smith 801* (AMES, BISH), Dec. 18, 1933.

5. *Phreatia stenostachya* (Reichenb. f.) Kraenzl. in Pflanzentr. 50 (IV. 50. II. B. 23): 29. 1911; Setchell in Carnegie Inst. Wash. Publ. 341: 103. 1924; L. O. Williams in Bot. Mus. Leaflet. 5: 137, p. p. 1938; J. W. Parham, Pl. Fiji Isl. 293. 1964, ed. 2. 387. 1972; Kores in Allertonia 5: 174. 1989; Lewis & Cribb, Orch. Vanuatu, 88. 1989.

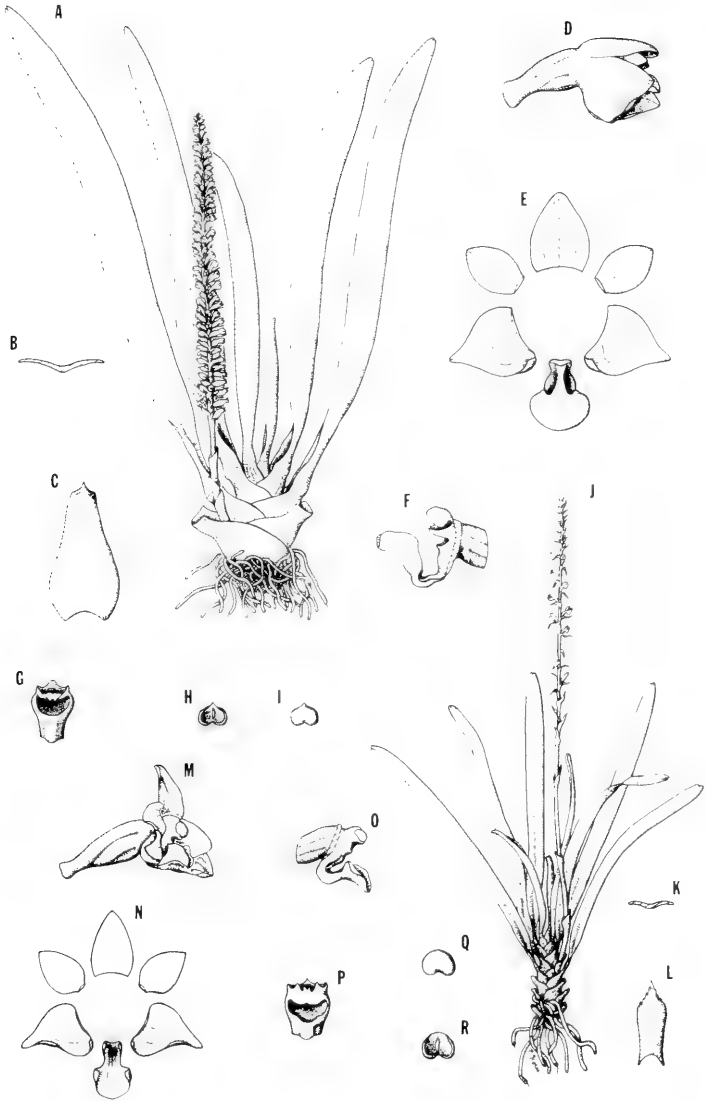
FIGURES 78J-R, 91 (upper right).

- Oberonia myosurus* sensu Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862; non Lindl.
Eria stenostachya Reichenb. f. in Seem. Fl. Vit. 301. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 308. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33. 1953.
Phreatia cauligera Reichenb. f. Otia Bot. Hamb. 55. 1878 (repr. Xenia Orchid. 3: 31. 1881); Kraenzl. in Pflanzentr. 50 (IV. 50. II. B. 23): 12. 1911; L. O. Williams in Bot. Mus. Leaflet. 5: 136. 1938; J. W. Parham, Pl. Fiji Isl. 293. 1964, ed. 2. 387. 1972.
Eria cauligera Reichenb. f. Otia Bot. Hamb. 55, nom. alt. 1878 (repr. Xenia Orchid. 3: 31. 1881); Drake, Ill. Fl. Ins. Mar. Pac. 308. 1892; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33. 1953.
Phreatia upoluensis Schlechter in Repert. Sp. Nov. 3: 319. 1907, in op. cit. 9: 110. 1911; Kraenzl. in Pflanzentr. 50 (IV. 50. II. B. 23): 15. 1911; Yuncker in Bishop Mus. Bull. 184: 33. 1945.
Phreatia myosurus sensu Kraenzl. in Pflanzentr. 50 (IV. 50. II. B. 23): 15, quoad spec. vit. 1911; non Ames.
Ocarrhena cauligera P. F. Hunt in Kew Bull. 24: 95. 1970.

Epiphytic plants 7-21 cm. tall, the stem usually somewhat elongated, 0.9-4 (-6.5) cm. long; leaves 4(-) 6-10, distichous or very weakly spiralled, erect or ascending, linear-ligulate, 4-10.5 cm. long, 3.5-6 mm. broad, subcoriaceous, very gradually angustate and frequently somewhat channelled at base, briefly unequally bilobed at apex; inflorescences axillary, (6-) 8-15 cm. tall, the peduncle well developed, slender, terete or slightly complanate near base, with 4-6 widely spaced, obliquely tubular cataphylls, the rachis about 2/3 the length of peduncle, slender, subsensely many-flowered, the bracts patent, ovate to ovate-attenuate, about 1.6 mm. long and 0.8 mm. broad; flowers patent, white or whitish yellow; dorsal sepal spreading to patent, ovate, 0.8-1.2 mm. long, 0.6-0.8 mm. broad, subacute at apex; lateral sepals broadly spreading, obliquely ovate, 1-1.4 mm. long, 0.9-1.2 mm. broad, prominently dilated near base on lower margin, acute at apex; mentum well developed, subconical; petals weakly spreading, elliptic-ovate, 0.8-1.2 mm. long, 0.6-0.8 mm. broad, broadly subacute to obtuse at apex; labellum unguiculate, ecalcarate, 0.9-1.2 mm. long overall, slightly arcuate, the claw oblong-cuneate, 0.4-0.6 mm. long, 0.2-0.4 mm. broad, slightly dilated at base, the blade transversely ovate, 0.5-0.7 mm. long, 0.7-0.9 mm. broad, with the lateral margins turned upward throughout the basal 2/3, more or less truncate at base, obtuse at apex, the disk with a single relatively large, circular depression near base of claw, glabrous; column short; column foot well developed, slightly retrorse, a little inflexed distally, slender, about 0.3 mm. long; clinandrium briefly tridentate at margins; anther reniform-cucullate, about 0.3 mm. long and 0.4 mm. broad, broadly subacute at apex; pollinia obliquely pyriform, about 0.1 mm. in diameter, the caudicle linear, about 0.1 mm. long, the viscidium small, elliptic; rostellum erect, overtopping clinandrium, broad, rather prominently 4-dentate at apex, the teeth unequal in size, the lateral pair relatively large, subdeltoïd, the medial pair much smaller, narrowly attenuate; stigma large, transversely elliptic; ovary about 1 mm. long.

TYPIFICATION AND NOMENCLATURE: *Eria stenostachya* is typified by *Seemann 589* (W 31514, p. p., HOLOTYPE; ISOTYPES at AMES, BM, K, P), collected Sept. 6, 1860, on Mt. Mbuke Levu, Kandavu. *Phreatia cauligera* and its alternate name *Eria cauligera* are

FIGURE 78. A-I, *Phreatia bigibbula*; A, flowering plant, $\times 3/4$; B, cross section of leaf blade, $\times 1 1/2$; C, floral bract, $\times 15$; D, individual flower, $\times 10$; E, perianth segments, $\times 10$; F, column with labellum attached, viewed from side, $\times 10$; G, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; H, anther cap viewed from below, $\times 15$; I, anther cap viewed from above, $\times 15$. J-R, *Phreatia stenostachya*; J, flowering plant, $\times 1$; K, cross section of leaf blade, $\times 1 1/2$; L, floral bract, $\times 15$; M, individual flower, $\times 10$; N, perianth segments, $\times 10$; O, column with labellum attached, viewed from side, $\times 10$; P, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; Q, anther cap viewed from above, $\times 15$; R, anther cap viewed from below, $\times 15$. A-I from *im Thurn 118*, J-R from *Smith 6321*.



based on *U. S. Expl. Exped.* (w 31515 HOLOTYPE; ISOTYPE at AMES 75515), obtained in 1840 on Ovalau. The type of *Phreatia upoluensis* is *Betche 36* (B HOLOTYPE, presumably destroyed), collected in 1860 on Upolu, Samoa. For further remarks on these taxa, cf. Kores (1989).

DISTRIBUTION: Solomon Islands, New Caledonia, New Hebrides, Fiji, and Samoa. From Fiji some 24 collections have been studied, all but two of them (above-cited types from Kandavu and Ovalau) from Viti Levu, the species occurring at elevations of 300–1,120 m. (or perhaps higher) on trees or on cliff faces in dense forest or in the thickets of crests and ridges. Flowers have been noted in most months, fruits between March and November.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Mt. Evans Range, *Greenwood 318, 456*; vicinity of Nandarivatu, *Parks 20650, Degener 14725*; western slopes of Mt. Nanggaranambuluta, east of Nandarivatu, *Smith 6321*; ridge between Mt. Nanggaranambuluta and Mt. Namama, *Smith 4956*; Sovutawambu, south of Nandarivatu, *Degener 14650*; Navai, *im Thurn 320*; Mt. Tomanivi, *Vaughan 3414, Smith 5209, Kores & Molvray F18*. NAMOSI: Above Wainaka (Creek?), *DA 1818, 1819*. NAITASIRI: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi and Nasonggo, *Smith 6115*.

6. *Phreatia pentagona* Kores in Allertonia 5: 176. 1989. FIGURE 79A–H.

Phreatia stenostachya sensu L. O. Williams in Bot. Mus. Leaflet. 5: 137, p. p. 1938; non Kraenzl.

Epiphyte 4–13 cm. tall, a recently described representative of sect. *Ebulbosae*, similar in general appearance to *Phreatia stenostachya* but readily distinguished by having the labellum of its flower larger, distinctly pentagonal, and perpendicular to the laterally flattened column foot, and by having its rostellum minutely bicuspidate rather than with 4 teeth.

TIPIFICATION: The type is *Smith 1896* (K HOLOTYPE; ISOTYPES at AMES, BISH, US), collected June 5, 1934, on the eastern buttress of Mt. Ndikeya, Thakaundrove, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and now known from three of the high islands at elevations of 700–1,200 m., occurring in dense forest or in the mossy forest and thickets of summits or crests. Flowers have been obtained between June and August and in December, fruits in June.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mt. Nanggaranambuluta, east of Nandarivatu, *Vaughan 3255*; Mt. Tomanivi, *Smith 5209*, p. p. (AMES, US, both mixed with *P. hypsorhynchos*). RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, *Smith 5689*. TAVEUNI: Borders of lake east of Somosomo, *Smith 879*.

7. *Phreatia neocaledonica* Schlechter in Bot. Jahrb. 39: 78. 1906; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 330. pl. 136. 1977; Kores in Allertonia 5: 177. 1989.

FIGURE 79I–K.

Phreatia minutifolia sensu Kraenzl. in Bot. Jahrb. 25: 607. 1898; H. Fleischm. & Rechinger in Denkschr. Akad. Wiss. Wien 85: 260, p. p. 1910; Kraenzl. in Pflanzn. 50 (IV. 50. II. B. 23): 23, quoad spec. sam. 1911; non Lindl.

Phreatia vitiensis Rolfe in J. Linn. Soc. Bot. 39: 175. 1909; L. O. Williams in Bot. Mus. Leaflet. 5: 137. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 33. 1953; J. W. Parham, Pl. Fiji Isl. 293. 1964, ed. 2. 387. 1972.

Phreatia reineckeae Schlechter in Repert. Sp. Nov. 9: 109. 1911; Christophersen in Bishop Mus. Bull. 128: 69. 1935; Yuncker in op. cit. 184: 33. 1945.

Phreatia hypsorhynchos Kraenzl. in Pflanzn. 50 (IV. 50. II. B. 23): 23, nom. illeg. 1911; Guillaumin in Notul. Syst. (Paris) 10: 66. 1941, Fl. Nouv.-Caléd. 64. 1948; non Schlechter (1906).

Phreatia richardiana sensu Guillaumin in Notul. Syst. (Paris) 10: 65. 1941, Fl. Nouv.-Caléd. 64. 1948; non Kraenzl.

Phreatia yunckeri L. O. Williams in Bishop Mus. Bull. 178: 42. fig. 2. 1943; Sykes in New Zealand Dept. Sci. Indust. Bull. 200: 263. 1970.

Phreatia matthewsii sensu Lewis & Cribb, Orch. Vanuatu, 87. 1989; non Reichenb. f.

Epiphytic plants (4.5-) 6-15 cm. tall, the stem abbreviated; leaves 6-10, distichous, erect or ascending, linear to linear-ligulate, (3-) 5-10 cm. long, 1-4 mm. broad, chartaceous, very gradually angustate at base, briefly unequally bilobed at apex, the tips of lobes obtuse; inflorescences axillary, 2.5-6 cm. long, the peduncle very short, about 1/5-1/3 the length of rachis, terete, with 2 or 3 closely spaced, tubular, sheathing cataphylls, the rachis long, slender, subdensely many-flowered, the bracts spreading, lanceolate-acuminate, about 1.6 mm. long and 0.8 mm. broad; flowers patent, pale greenish white; dorsal sepal erect or weakly spreading, ovate, 0.8-1 mm. long, 0.5-0.7 mm. broad, acute at apex; lateral sepals weakly spreading, ovate, slightly oblique, 0.9-1.2 mm. long, 0.6-0.7 mm. broad, somewhat dilated near base on lower margin, acuminate at apex; mentum hardly or not apparent; petals erect, elliptic to elliptic-ovate, 0.6-0.9 mm. long, 0.25-0.4 mm. broad, acute at apex; labellum not unguiculate, ecalcarate, oblong-obovate to oblong-elliptic, 0.75-1 mm. long, 0.5-0.8 mm. broad, weakly channelled, cuneate at base, slightly retuse or weakly tridentate at apex, the disk naked; column about 0.6 mm. long; column foot hardly developed, very short, broad; clinandrium with a broad, subdeltoid tooth on dorsal margin; anther transversely subreniform, about 0.3 mm. long and 0.4 mm. broad, broadly rounded at apex; pollinia subovoid, about 0.1 mm. in diameter, the caudicle short, linear, the viscidium small, orbicular; rostellum erect, moderately tall, overtopping clinandrium, broad, more or less prominently tridentate at apex, the lateral teeth broadly subdeltoid, the medium tooth slightly longer and narrower, emarginate at apex; stigma large, transversely elliptic; ovary 1.2-1.5 mm. long.

TIPIFICATION AND NOMENCLATURE: Two New Caledonian collections typify *Phreatia neocaledonica*: *Schlechter 14755* (B SYNTYPE, destroyed; ISOSYNTYPE at BM), collected Sept. 22, 1905, near Yaouhé, and *Schlechter 15228* (B SYNTYPE, destroyed; ISOSYNTYPES at BM, K, L, NSW, P, Z), collected Nov. 5, 1902, in the vicinity of Ngoye. *Phreatia vitiensis* is typified by *Gibbs 619* (BM HOLOTYPE; ISOTYPE at K), collected in September, 1907, in the vicinity of Nandarivatu, Mba Province, Viti Levu. *Phreatia reinecke* is based on four collections from Savai'i, Samoa: *Reinecke 239* (B SYNTYPE, destroyed), *Reinecke 292* (B SYNTYPE, destroyed), *Reinecke 587* (B SYNTYPE, destroyed), and *Vaupel 658* (B SYNTYPE, destroyed; ISOSYNTYPE at K). Kraenzlin reversed the typification of *P. hypsorhynchos* and *P. neocaledonica*, thereby creating later and illegitimate homonyms. The type of *P. yunckeri* is *Yuncker 9928* (AMES 59202 HOLOTYPE), collected Jan. 27, 1940, southwest of Lakepa Village, Niue. None of these taxa appear to be specifically distinct and they are combined under *P. neocaledonica* (Kores, 1989).

DISTRIBUTION: *Phreatia neocaledonica* is a comparatively widespread species, now known from the Solomon Islands (Bougainville and San Cristobal), New Caledonia, New Hebrides, Fiji, Niue, and Samoa. Although it is fairly common in other parts of this range, it appears very rare in Fiji and is known only from the type material of *P. vitiensis*, *Gibbs 619*, from an elevation of approximately 825 m. in the vicinity of Nandarivatu, Mba Province, Viti Levu, where it was flowering in September. In other parts of the range the species has been collected from near sea level to about 1,000 m. and seems most often to flower between September and January.

Lewis and Cribb (1989) consider *Phreatia neocaledonica* to be conspecific with *P. matthewsii* Reichenb. f., typified by a collection from the Society Islands. However, the few collections of that from Tahiti that I have examined seem to differ from Fijian material in the structure of the rostellum. Consequently I have maintained *P. neocaledonica* in the present treatment; however, should further studies prove the two taxa conspecific, Reichenbach's epithet (1878) would have priority.

8. *Phreatia flavovirens* Kores in Allertonia 5: 178. 1989.

FIGURE 79L-S.

Epiphytic herb 3.5–7 cm. high, recently described and readily distinguished from other species of *Phreatia* in Fiji by its short, laxly flowered rachis and its yellowish green flowers with a fleshy, rhomboid labellum. Its closest relative seems to be *P. beiningiana* Schlechter, described from New Britain in the Bismarck Archipelago, from which the Fijian species differs in its ovate-elliptic petals, rhomboid labellum, and vestigial, crestlike rostellum.

TYPEFICTION: The type is *Smith 1807* (K HOLOTYPE; ISOTYPES at AMES, BISH, NY, P), collected May 10, 1934, on Mt. Kasi, Yanawai River region, Thakaundrove Province, Vanua Levu.

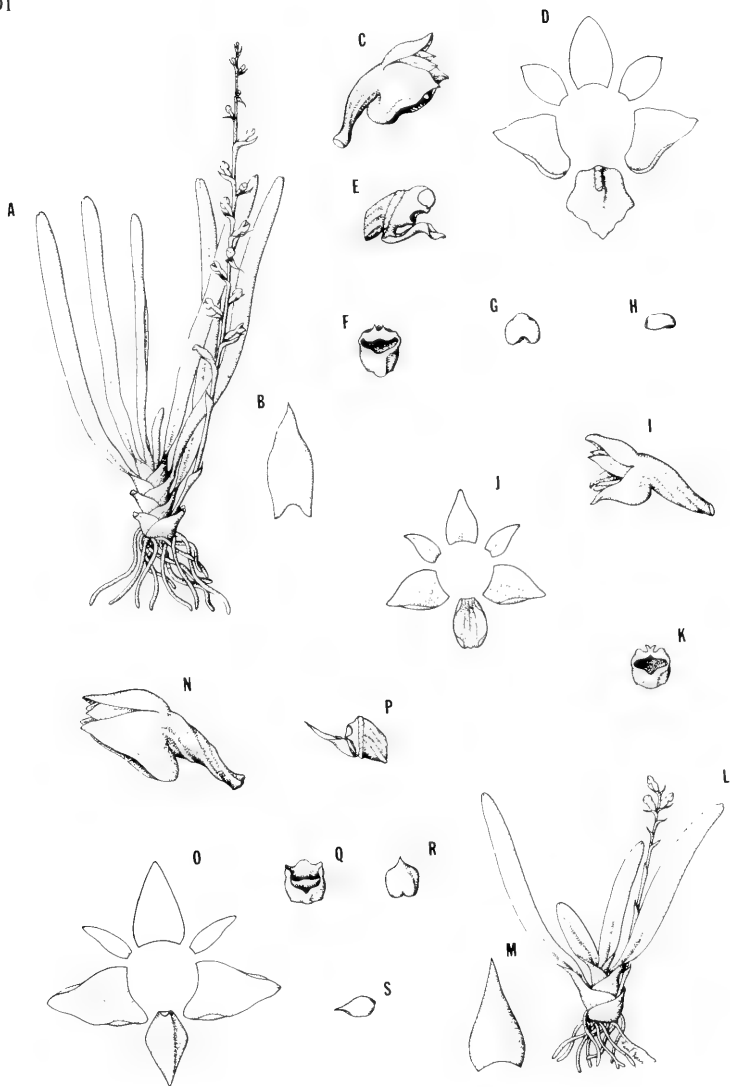
DISTRIBUTION: Endemic to Fiji and at present known only from the type collection, obtained in dense forest at an elevation of 300–430 m.

9. *Phreatia oreophylax* Reichenb. f. *Otia* Bot. Hamb. 55. 1878 (repr. *Xenia* Orchid. 3: 31. 1881); Kraenzl. in *Pflanzenr.* 50 (IV. 50. II. B. 23): 13. 1911; L. O. Williams in *Bot. Mus. Leafl.* 5: 136. 1938; J. W. Parham, *Pl. Fiji Isl.* 293. 1964, ed. 2. 387. 1972; Kores in *Allertonia* 5: 179. 1989.

Epiphytic or lithophytic plants (3.5–) 6–12 cm. tall, the stem abbreviated; leaves 4–8, distichous, ascending, frequently somewhat arcuate in drying, linear-ligulate, conduplicate, 3–7 cm. long, 4–6 mm. broad, somewhat fleshy, prominently carinate abaxially, slightly angustate at base, unequally bilobed at apex, the tips of lobes obtuse; inflorescences axillary, (2.5–) 5–12 cm. long, the peduncle $1/2$ – $2/3$ the length of rachis, slender, terete, with 3–5 widely spaced, obliquely tubular-infundibular cataphylls, the rachis long, slender, subdensely many-flowered, the bracts narrowly ovate-attenuate, 0.9–1.2 mm. long, about 0.3 mm. broad; flowers patent, pale yellow to yellowish white; dorsal sepal weakly spreading, elliptic-obovate, about 1.3 mm. long and 0.6 mm. broad, narrowly acuminate at apex; lateral sepals weakly spreading, obliquely ovate-attenuate, about 1.4 mm. long and 1 mm. broad, somewhat dilated near base on lower margin, narrowly acute at apex; mentum short, obtuse; petals erect, lanceolate to elliptic-lanceolate, about 1 mm. long and 0.3 mm. broad, narrowly acute at apex; labellum not unguiculate, ecalcarate, elliptic to elliptic-obovate, about 1 mm. long and 0.6 mm. broad, cuneate at base, obtuse with a short subacute point at apex, the disk with a small callus at base; column about 0.5 mm. long; column foot short, relatively broad; clinandrium with dorsal margin prominently raised; anther broadly ovate-elliptic, about 0.3 mm. across, obtuse at apex; pollinarium not seen; rostellum erect, moderately large, obtuse, briefly bidentate at apex; stigma transverse, slitlike; ovary about 1.3 mm. long; capsules ellipsoid to ellipsoid-ovoid, 2.5–3.5 mm. long, about 1.5 mm. in diameter.

TYPEFICTION: The type is *U. S. Expl. Exped.* (W HOLOTYPE; ISOTYPE at AMES 75522; drawing of holotype at AMES), collected in 1840 in the mountains of Mathuata Province, Vanua Levu.

FIGURE 79. A–H, *Phreatia pentagona*; A, flowering plant, $\times 1$; B, floral bract, $\times 15$; C, individual flower, $\times 10$; D, perianth segments, $\times 10$; E, column with labellum attached, viewed from side, $\times 5$; F, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; G, anther cap viewed from above, $\times 15$; H, anther cap viewed from side, $\times 15$. I–K, *Phreatia neocaledonica*; I, individual flower, $\times 10$; J, perianth segments, $\times 10$; K, apical portion of column viewed from front, showing rostellum and stigma, $\times 15$. L–S, *Phreatia flavovirens*; L, flowering plant, $\times 1$; M, floral bract, $\times 15$; N, individual flower, $\times 10$; O, perianth segments, $\times 10$; P, column with labellum attached, viewed from side, $\times 10$; Q, apical portion of column viewed from front, showing clinandrium, rostellum, and stigma, $\times 15$; R, anther cap viewed from above, $\times 15$; S, anther cap viewed from side, $\times 15$. A–H from *Smith 1896*, I–K from *Yuncker 9928* (Niue), L–S from *Smith 1807*.



DISTRIBUTION: Endemic to Fiji and thus far known only from northern Vanua Levu, where it occurs sparingly on cliff faces and probably also as an epiphyte in forest at elevations of 350–500 m. Flowers have been obtained in October and also (those of the type material) between May and August.

AVAILABLE COLLECTION: VANUA LEVU: MATHUATA: Southern slopes of Mt. Numbuiloa, east of Lambasa, *Smith 6408*.

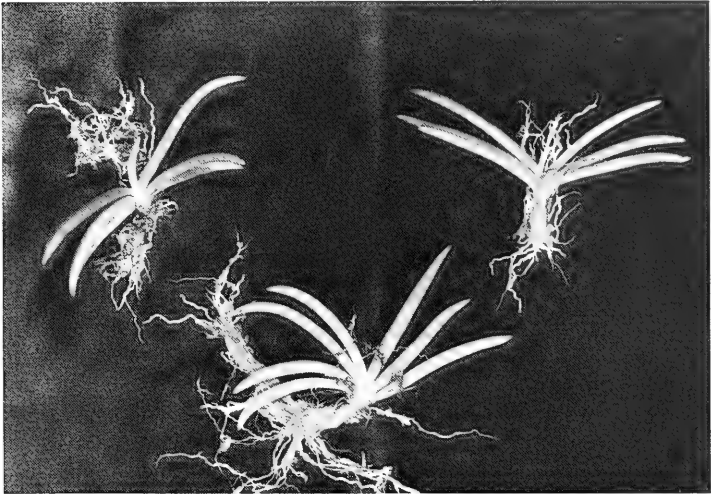


FIGURE 80. Mature plants of *Phreatia pachyphylla* from Mba Province, Viti Levu (*Kores & Molvray F31*); note brief inflorescences on plant at the right and laterally compressed leaves; × about 2/3.

10. *Phreatia pachyphylla* Schlechter in *Bot. Jahrb.* 39: 79. 1906; Kraenzl. in *Pflanzenr.* 50 (IV. 50. II. B. 23): 23. 1911; Guillaumin in *Notul. Syst. (Paris)* 10: 65. 1941, *Fl. Nouv.-Caléd.* 64. 1948; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 328. *pl. 135*. 1977; Kores in *Allertonia* 5: 180. 1989.

FIGURE 80.

Sarcochilus microphyton Kraenzl. in *Viert. Naturf. Ges. Zürich* 74: 95. 1929.

Usually very small epiphytic plants 2.5–5 (–7.5) cm. tall, the stem much abbreviated; leaves (3–) 6–10, ascending, linear-ligulate, equitant, prominently compressed laterally, 1.5–4.5 (–7) cm. long, 3–5 mm. broad from adaxial to abaxial surface, 2–4 mm. thick laterally, very fleshy, somewhat sulcate on adaxial surface throughout entire length, slightly angustate at base, acute at apex; inflorescences axillary, about as long as or somewhat shorter than leaves, the peduncle usually about 1/2–1/4 the length of rachis, somewhat complanate below, with 2 or 3 widely spaced, ovate-conduplicate cataphylls, the rachis long, slender, terete, somewhat laxly 10–20-flowered, the bracts lanceolate-acuminate, 1.5–2 mm. long, about 0.4 mm. broad; flowers ascending, pale green to greenish white; dorsal sepal weakly spreading, broadly ovate, about 1 mm. long and 0.6 mm. broad, acuminate at apex; lateral sepals weakly spreading, broadly ovate, slightly oblique, 0.9–1.1 mm. long, 0.7–0.9 mm. broad,

slightly dilated near base on lower margin, acuminate at apex; mentum very short, obtuse; petals erect, elliptic to oblong-elliptic, about 0.75 mm. long and 0.25 mm. broad, obtusely apiculate at apex; labellum not unguiculate, ealcarate, oblong-obovate to subrhombic, 0.6–0.8 mm. long, 0.6–0.7 mm. broad, cuneate and slightly concave at base, broadly rounded with a very brief subacute point or sometimes weakly trilobulate at apex, the lateral margins a little thickened near base and slightly turned upward approximately midway to apex, the disk with 2 small, shallow, pitlike depressions near base; column about 0.4 mm. long; column foot short, broad; clinandrium shallowly excavate, somewhat dilated dorsally, semiorbicular; anther ovate-subquadrate, about 0.4 mm. across, broadly subacute at apex; pollinia obliquely pyriform, about 0.2 mm. in diameter, the caudicle linear, about 0.25 mm. long, the viscidium minute, peltate; rostellum erect, very short, transversely triangular, the apex briefly excised; stigma large, suborbicular; ovary about 1 mm. long.

TIPIFICATION AND NOMENCLATURE: *Phreatia pachyphylla* is typified by *Schlechter 15471* (B HOLOTYPE, destroyed; ISOTYPES at K, P), collected Dec. 17, 1902, near Oubatche, New Caledonia; *Sarcochilus microphyton* by *Däniker 2747* (Z HOLOTYPE), obtained Feb. 1, 1926, on Mt. Koghi, New Caledonia. These taxa were combined by Hallé (1977).

DISTRIBUTION: The species is well distributed in New Caledonia and is otherwise known from two Fijian collections, obtained at an elevation of approximately 850 m. In New Caledonia this epiphyte occurs in humid forest at elevations of 100–1,000 m. One of the Fijian collections was flowering in February; the other was in capsule in May.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *in Thurn 89*(K), *Kores & Molvray 531*.

11. *Phreatia micrantha* (A. Rich.) Schlechter in *Repert. Sp. Nov. Beih.* 1: 919, in obs. 1913; Kores in *Allertonia* 5: 180. 1989; Lewis & Cribb, *Orch. Vanuatu*, 87. 1989.

FIGURE 91 (lower).

Oberonia micrantha A. Rich. in Dumont d'Urville, *Sert. Astrolab.* 7. 1834, Atlas, pl. 3. 1833.

Eria richardiana Reichenb. f. in Seem. *Fl. Vit.* 300. 1868.

Eria sphaerocarpa Reichenb. f. in Seem. *Fl. Vit.* 301. 1868; Drake, *Ill. Fl. Ins. Mar. Pac.* 308. 1892; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 33. 1953; non *Phreatia sphaerocarpa* Schlechter (1905).

Thelasis samoensis Kraenzl. in *Bot. Jahrb.* 25: 607. 1898.

Phreatia samoensis Schlechter in *Mém. Herb. Boissier* 21: 75. 1900, in *Repert. Sp. Nov.* 3: 320. 1907, in op. cit. 9: 109. 1911; Kraenzl. in *Pflanzenr.* 50 (IV. 50. II. B. 23): 19. 1911; Christophersen in *Bishop Mus. Bull.* 128: 69. 1935; Yuncker in op. cit. 184: 33. 1945.

Phreatia macrophylla Schlechter in *Bot. Jahrb.* 39: 78. 1906; H. Fleischm. & Rechingen in *Denkschr. Akad. Wiss. Wien* 85: 260. 1910; Guillaumin in *Notul. Syst. (Paris)* 10: 66. 1941, *Fl. Nouv.-Caléd.* 64. 1948.

Phreatia richardiana Kraenzl. in *Pflanzenr.* 50 (IV. 50. II. B. 23): 26, nom. illeg. 1911.

Phreatia graeffei Kraenzl. in *Pflanzenr.* 50 (IV. 50. II. B. 23): 26. 1911; Setchell in *Publ. Carnegie Inst. Wash.* 341: 103. 1924; L. O. Williams in *Bot. Mus. Leaflet* 5: 136. 1938; Yuncker in *Bishop Mus. Bull.* 178: 42. 1943, in op. cit. 220: 91. 1959; J. W. Parham, *Pl. Fiji Isl.* 293. 1964, ed. 2. 387. 1972; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* 200: 262. 1970.

Phreatia macrophyloides Kraenzl. in *Viert. Naturf. Ges. Zürich* 74: 93. 1929; Guillaumin in *Notul. Syst. (Paris)* 10: 65. 1941, *Fl. Nouv.-Caléd.* 64. 1948.

Rhynchophreatia micrantha Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 341. pl. 140. 1977.

Large epiphytic or less commonly lithophytic plants 18–35 cm. tall, acaulescent, with a conspicuously enlarged, laterally compressed base; leaves 5–10, closely approximate, equitant, erect or ascending, the persistent base conduplicate, 3–5 cm. long and about 2 cm. broad when flattened, the blade ligulate, (7–) 11–30 cm. long, 1.2–2.2 cm. broad, subcoriaceous, toward base conduplicate and more or less continuous with leaf base, at apex unequally obtusely bilobed; inflorescences axillary, usually slightly longer than leaves, the peduncle about as long as to twice the length of rachis, slender,

terete, with 3-5 widely spaced, clasping, ovate-attenuate cataphylls, the rachis long, slender, terete, subdensely many-flowered, the bracts ovate-subulate, 2.8-3.8 mm. long, 0.8-1.3 mm. broad; flowers more or less patent, white; dorsal sepal broadly spreading, broadly ovate, 1.2-1.5 mm. long, 1-1.4 mm. broad, obtuse at apex; lateral sepals broadly spreading to patent, broadly ovate, oblique, 1-1.4 mm. long, 0.9-1.2 mm. broad, rather prominently dilated near base on lower margin, obtuse and slightly cucullate at apex; mentum short, obtuse; petals spreading, broadly ovate, slightly oblique, 0.8-1.1 mm. long, 0.7-1 mm. broad, subacute at apex; labellum acutely joined to column foot, inflexed, not unguiculate, ecalcarate, broadly subrhombic to transversely subtrullate, 1-1.7 mm. long, 1.3-1.6 mm. broad, shortly attenuate at base, broadly subtrullate to obtuse at apex, the lateral margins slightly turned upward approximately midway to apex, the disk with 2 pitlike depressions near base; column about 0.4 mm. long; column foot moderately well developed, slightly retroflexed, somewhat fleshy, about 0.7 mm. long; clinandrium weakly 3-lobed on dorsal margin; anther suborbicular, about 0.6 mm. across, obtuse at apex; pollinia obliquely pyriform to ellipsoid, about 0.15 mm. in diameter, the caudicle very short, linear, about 0.15 mm. long, the viscidium small, suborbicular, about 0.15 mm. across; rostellum short, erect, broadly subdeltoid, weakly denticulate along upper margin, briefly excised at apex; stigma suborbicular; ovary about 1.8 mm. long.

TIPIFICATION AND NOMENCLATURE: *Oberonia micrantha* is based on Lesson, collected in February or March, 1828, on Vanikoro, Santa Cruz Islands, during the first voyage of the *Astrolabe* under the command of Dumont d'Urville. The herbarium material has been lost (Hallé, 1977) and therefore the illustration published in 1833 may be taken as the lectotype (Kores, 1989). *Eria richardiana* was proposed by Reichenbach as a new name for *Oberonia micrantha* (Richard's epithet not being available in *Eria*), but the transfer of the epithet *richardiana* to *Phreatia* by Kraenzlin (1911) created an illegitimate name. *Eria sphaerocarpa* is based on Graeffe s. n. (w 31342 HOLOTYPE; probable ISOTYPE at w 31340), collected in Fiji without locality or date. *Phreatia graeffei* (the name under which this species has frequently passed in the Fijian Region) was a new name for *Eria sphaerocarpa*, that epithet not being available in *Phreatia*. *Thelasis samoensis* (the basionym of *Phreatia samoensis*) is based on two collections from Upolu, Samoa, both collected in May, 1895: *Reinecke 606* (B SYNTYPE, probably destroyed; ISOSYNTYPE at AMES 17962 lacking flowers), collected near Lepu, and *Reinecke 652* (B SYNTYPE, probably destroyed), from west of Lepu. The type of *P. macrophylla* is Schlechter 15465 (B HOLOTYPE, destroyed; ISOTYPES at BM, K, P, W, Z), obtained Jan. 17, 1902, at Oubatche, New Caledonia. The type of *P. macrophyloides* is Däniker 2483 (Z HOLOTYPE), collected Nov. 26, 1925, at Képénéhé, Lifou, Loyalty Islands. These synonyms were discussed by Kores (1989), as was the undesirability of transferring the taxon to *Rhynchophreatia* as proposed by Hallé (1977).

DISTRIBUTION: Widely distributed from northern Australia and New Guinea into the southern Pacific from the Solomon Islands and New Caledonia to Samoa. Material from the Fijian Region has been examined from the New Hebrides, Fiji, Tonga, Niue, the Horne and Wallis Islands, and Samoa. In Fiji the species occurs at elevations of approximately 200-1,140 m. as an epiphyte or lithophyte in dense or open forest. Flowers and fruits in Fiji have been noted between October and February.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Nandarivatu, *im Thurn 22*, Gillespie 4264; Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14498*; Mt. Tomanivi, *Vaughan 3413*, *DA 14657*, *Kores & Molvray F23*. VITI LEVU without further locality, *Horne 116*. KANDAVU: Hills above Namalata and Ngaloa Bays, *Smith 89*. VATU VARA: Upper slope of center peak, *Bryan 596*. A few other collections (SUVA) from Viti Levu (Mba, Namosi, and Naitasiri Provinces) have not been studied in the course of this review but are probably correctly placed in this readily recognized species.

49. *CALYMMANTHERA* Schlechter in Repert. Sp. Nov. Beih. 1: 955. 1913; Kores in Allertonia 5: 182. 1989.

Small to medium-sized, slender, epiphytic plants with somewhat elongated, densely to subdensely foliate, unbranched stems; leaves distichous, articulate, with overlapping, sheathing bases, the blades ascending or patent, linear to ligulate, conduplicate in bud; inflorescences lateral, small to very large, erect or erecto-patent, weakly to strongly paniculate, laxly many-flowered, the bracts minute; flowers very small, membranous, glabrous, pale yellow to yellowish orange; sepals free, erect or weakly spreading, slightly dissimilar, the medial sepal lanceolate, the lateral sepals usually a little broader than medial one, obliquely lanceolate; petals free, erect or weakly spreading, slightly shorter than sepals, lanceolate, somewhat oblique; labellum articulate with apex of column foot, mobile, weakly to strongly 3-lobed, noticeably shorter than sepals, ecalcarate, the lateral lobes basal, erect or ascending, small, the midlobe much longer than lateral lobes, linguiform-attenuate, slightly fleshy, the disk with a small, concave depression or longitudinal furrow near base; column short, stout, glabrous; column foot short; clinandrium small, shallowly excavate; anther terminal, prominently cucullate, the dorsal portion expanded into a calyptra that conceals the upper surface of column; pollinia 2, waxy, more or less globose, each entirely cleft to form 2 unequal halves, borne on a common stipe; this linear, ligulate or spatulate, the viscidium moderately large; rostellum small, briefly bidentate; stigma large, suborbicular, deeply recessed.

LECTOTYPE SPECIES: *Calymmanthera tenuis* Schlechter (vide Kores in Allertonia 5: 183. 1989).

DISTRIBUTION: New Guinea, the Solomon Islands, and Fiji, with five species, one of which extends to Fiji and terminates the generic range to the east.

1. *Calymmanthera major* Schlechter in Repert. Sp. Nov. Beih. 1: 957. 1913, in op. cit. 21: t. 337, no. 1299. 1928; Kores in Allertonia 5: 183. 1989.

Genus? L. O. Williams in Bot. Mus. Leaflet 5: 137. 1938.

Epiphytic plants, the stem stout, 7–20 cm. long, 0.4–0.6 cm. in diameter, completely obscured by the persistent, overlapping leaf sheaths, densely foliate near apex; leaves distichous, the sheaths 0.7–1.2 cm. long, slightly inflated distally, weakly striate, the blades patent, articulate, ligulate, sometimes slightly falcate, 7–15.5 cm. long, (0.8–) 1.2–2 cm. broad, fleshy, gradually angustate with leaf sheaths, obliquely subacute at apex; inflorescences lateral, patent or ascending, very large, strongly once- or twice-branched, 15–30 cm. long, dull yellow throughout, the peduncle slender, terete, 6–10 cm. long, with 1 or 2 widely spaced, obliquely funnel-shaped cataphylls, the flowering branches patent or widely spreading, very slender, up to 10 cm. long, laxly many-flowered, the bracts small, ovate-attenuate, 2–2.5 mm. long, about 1 mm. broad; flowers patent, pale yellow; medial sepal lanceolate, 4–4.3 mm. long, about 1 mm. broad, narrowly attenuate at apex; lateral sepals partially inserted along column foot, obliquely lanceolate, slightly falcate, 4–4.3 mm. long, 1–1.2 mm. broad, narrowly attenuate at apex; petals lanceolate, slightly oblique, 3.8–4 mm. long, 0.9–1.1 mm. broad, narrowly attenuate at apex; labellum erect, 3-lobed, 3.2–3.8 mm. long overall, the side lobes ascending, arcuate, broadly subquadrate, about 0.6 mm. long, 0.8–1.2 mm. broad, with the upper margin slightly convex, the midlobe linguiform-attenuate, somewhat fleshy, 2–2.4 mm. long, 0.4–0.5 mm. broad at base, more or less sulcate within, sometimes slightly to moderately keeled externally, subacute at apex, the disk naked; column short, semiterete, 1–1.2 mm. long; column foot slender, more or less perpendicular to column, gradually becoming inflexed distally, 1.3–1.5 mm. long; clinandrium small, very shallowly excavate; anther cucullate-calyptrate, about 0.7 mm. long and 0.6 mm. broad, with a small, external, subapical boss; pollinia 2, globose, about 0.2 mm. in diameter, each entirely cleft into 2 very unequal halves, the stipe broadly ligulate, about 0.2 mm. across, the viscidium suborbicular, about 0.3

mm. in diameter; rostellum short, beaklike, the apex slightly retuse; stigma large, elliptic, deeply recessed; capsule cylindrical, 1.8–2.3 cm. long, 1.5–3 mm. in diameter.

TYPIFICATION: The type, *Schlechter 16333* (B HOLOTYPE, destroyed), was collected in July, 1907, near Djamu in the present Papua New Guinea; no duplicates of this number have been located.

DISTRIBUTION: New Guinea, the Solomon Islands, and Fiji. In Fiji the species is known only from central and northern Viti Levu, where it is found as an epiphyte in dense forest at elevations of 725–900 m. Flowers have been noted in August, September, and February, fruits in March and April.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Hills between Nandala and Nukunuku Creeks, along trail from Nandarivatu toward Lewa, *Smith 6203*; Nandala, south of Nandarivatu, *Degener 14371*; Navai, *im Thurn 201, 207, 375*; hills between Nggaliwana and Tumbeindreketi Creeks, east of the sawmill at Navai, *Smith 5883*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5537*. NAMOSI: Mt. Naitarandamu, *Gillespie 3307*.

As earlier noted (Kores, 1989), the Fijian collections have flowers somewhat larger than those originally described by Schlechter for his type (and presumably unicate) specimen. Until further material from New Guinea and the Solomon Islands becomes available, the full variation of the species and the advisability of dividing it must remain questionable.

50. *THRIXSPERMUM* Lour. Fl. Cochinch. 516, 519. 1790; Reichenb. f. in Seem. Fl. Vit. 297, p. 1868; J. J. Sm. Orchid. Java, 567. 1905; Schlechter in Repert. Sp. Nov. Beih. 1: 958. 1913; Garay in Bot. Mus. Leaflet. 23: 206. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 355. 1977; Seidenfaden in Opera Bot. 95: 148. 1988; Kores in Allertonia 5: 184. 1989; Lewis & Cribb, Orch. Vanuatu, 139. 1989.

Dendrocolla Bl. Bijdr. Fl. Ned. Ind. 286, excl. sect. *Tubera* Bl. 1825, Tab. Pl. Jav. Orchid. t. V, excl. sect. *Tubera* Bl. 1825.

Erect or sometimes pendulous epiphytic plants with short to long, unbranched, leafy stems; leaves few to many, distichous, articulate, with tubular sheathing bases, the blades flat, conduplicate in bud, coriaceous or fleshy; inflorescences lateral, borne on or between the nodes of stem, perforating the leaf sheaths, erect or ascending, racemose, few- or rarely many-flowered, the rachis either somewhat fractiflex with the flowers 2-seriate or straight and congested with the flowers omnilateral, the bracts small, laterally compressed or not; flowers mostly developing sequentially with 1–3 undergoing anthesis at a time, ascending, small, fugacious, membranous, resupinate; sepals and petals free, slightly dissimilar, spreading, the lateral sepals more or less decurrent along column foot; labellum adnate to column foot by a broad base, immobile, concave, 3-lobed, the base saccate, the lateral lobes more or less turned upward, the midlobe short to long, frequently somewhat fleshy distally, the disk often with a single large callus near apex or with 1 or more smaller thickenings at various locations; column short, stout, not dilated distally; column foot well developed, usually broad, frequently somewhat concave, not sharply differentiated from base of labellum; clinandrium shallowly excavate; anther terminal, operculate, hardly or not rostrate; pollinia 2, waxy, more or less linear-oblong, each deeply cleft to form 2 very unequal halves (the posterior half much smaller than the anterior one), borne on a common stipe, this short, broad, the viscidium small, often peltate; rostellum shortly bidentate; stigma directly below rostellum, small to large, deeply recessed.

TYPE SPECIES: *Thrixspermum centipeda* Lour., the sole original species. *Dendrocolla*, now generally treated as a section of *Thrixspermum*, is lectotypified by *D. hystrix* Bl. (vide J. J. Sm. in Bull. Jard. Bot. Buitenzorg III. 3: 303. 1921) (cf. Kores, 1989).

DISTRIBUTION: Southeastern Asia including Formosa southward and eastward throughout Malesia to the Caroline Islands, northern Australia, and Samoa, with

more than 120 species. Two species are known from Fiji, but one of them remains undescribed.

USEFUL TREATMENT OF GENUS: SCHLECHTER, R. Die Gattung *Thrixspermum* Lour. *Orchis* 5: 46-48, 54-58. 1911.

KEY TO SPECIES

Flowers arranged in 2 rows, the rachis usually fractiflex, the bracts laterally compressed (sect. *Thrixspermum*) 1. *T. graeffei*
 Flowers arranged omnilaterally, the rachis not fractiflex, the bracts not laterally compressed (sect. *Dendrocolla*) 2. *T. sp.*

1. ***Thrixspermum graeffei*** Reichenb. f. in Seem. Fl. Vit. 297. 1868; H. Fleischm. & Rechingner in Denkschr. Akad. Wiss. Wien 85: 262. t. 1, fig. 1, 10. 1910; Schlechter in Repert. Sp. Nov. 9: 111. 1911, in *Orchis* 5: 55. 1911, in Repert. Sp. Nov. Beih. 1: 962, in adnot. 1913; Christophersen in Bishop Mus. Bull. 128: 70. 1935; L. O. Williams in Bot. Mus. Leafl. 5: 137, p. p. 1938; Kores in *Allertonia* 5: 185. 1989; Lewis & Cribb, *Orch. Vanuatu*, 141. 1989.

Sarcochilus graeffei Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 310. 1892; Kraenzl. in Bot. Jahrb. 25: 608. 1898.

Sarcochilus sp. nov. Kraenzl. in Bot. Jahrb. 25: 608. 1898.

Thrixspermum sp. Yuncker in Bishop Mus. Bull. 184: 33. 1945.

Epiphytic plants, usually suspended from tree branches, (4-) 6-12 cm. long, the stem short, terete, 3-4 mm. in diameter, completely obscured by the persistent leaf sheaths; leaves several to many, closely spaced, the sheaths tubular, 5-9 mm. long, conspicuously dilated distally and prominently striate, the blades patent, articulate, ligulate to ligulate-lanceolate, 5.5-11 cm. long, 0.8-1.3 cm. broad, coriaceous, gradually angustate at base, obliquely subacute to acute at apex; inflorescences lateral, erect or ascending, 7-14 cm. long, the peduncle well developed, slender, terete, with 2 or 3 widely spaced, ovate cataphylls, the rachis 1/2-1/4 the length of peduncle, slightly fractiflex, 2-seriate, many-flowered, the flowers developing sequentially near apex, the bracts slightly equitant, 1.5-2 mm. long, tubular at base, free in distal portion, laterally compressed, subdeltoid; flowers ascending to patent, fugacious, pale yellow; sepals free, spreading, slightly dissimilar, the dorsal sepal oblong-elliptic, 5-5.5 mm. long, 2.5-3 mm. broad, obtuse at apex, the lateral sepals slightly oblique; petals free, spreading, elliptic, 4.8-5.2 mm. long, about 2.5 mm. broad, obtuse at apex; labellum erect, weakly 3-lobed, roughly subcordate in outline, somewhat compressed laterally, concave, 3.5-4 mm. long overall, about 4.5 mm. broad when flattened, the base briefly cordate, the lateral lobes turned upward, entire, broadly rounded, about 1.5 mm. long, 3-3.5 mm. broad, with margins weakly undulate, the midlobe inflexed, small, fleshy, subquadrate to broadly spatulate, about 0.5 mm. long and 0.3 mm. broad, the disk with a minutely pubescent, pulvinate thickening on the underside of the inflexed midlobe; column short, stout, about 1 mm. long; column foot well developed, about 0.5 mm. long; anther terminal, transversely ovate, cucullate; pollinarium and rostellum not seen; stigma small, deeply recessed; capsules cylindrical, 4-5 cm. long, about 3 mm. in diameter, glabrous, weakly 6-ribbed.

TYPE: The type is *Graeffe s. n.* (w 41525 HOLOTYPE; AMES 43596 drawing of holotype), collected on Upolu, Samoa, without detailed locality or date. It may be noted (cf. Kores, 1989) that *Graeffe* 40 (BM, w), also from Upolu, may conceivably represent parts of the original gathering.

DISTRIBUTION: New Guinea, Solomon Islands, New Hebrides, Fiji, and Samoa. Frequent on most of the Samoan islands, but very rare in Fiji; possibly also occurring on Niue (cf. Kores, 1989).

AVAILABLE COLLECTION: VANUA LEVU: THAKAUNDROVE: Mt. Kasi, Yanawai River region, 300-400 m., May 10, 1934, *Smith 1808* (BISH). A possible second Fijian collection is *U. S. Expl. Exped.* (AMES 76428), without detailed locality; this lacks flowers but its other inflorescence characters suggest the present species.

2. *Thrixspermum* sp.; Kores in *Allertonia* 5: 186. 1989.

Small epiphytic plants 1.5–4 cm. tall, the stem very short, terete, 0.7–1.5 cm. long, 1.5–2 mm. in diameter, completely obscured by the persistent, overlapping leaf sheaths, densely foliate near apex; leaves few, the sheaths 2–5 mm. long, somewhat inflated distally, the blades ascending, articulate, narrowly ligulate, 1.2–2.3 cm. long, 2–3.5 mm. broad, subcoriaceous, gradually angustate with leaf sheaths proximally, minutely and unequally bilobed at apex, the tips of lobes obtuse; inflorescences lateral, ascending, 2–4 cm. long, the peduncle filiform, with 2 minute, widely spaced, ovate-attenuate cataphylls, the rachis much abbreviated, omnilaterally and densely few-several-flowered, the bracts congested, ovate-subulate, 2–3 mm. long, about 1 mm. broad near base; flowers not seen; capsules cylindric, 2–4 cm. long, about 2.5 mm. in diameter, glabrous, weakly 6-ribbed.

DISTRIBUTION: Known from Fiji with certainty only from Vanua Levu, from a single collection, occurring in dense forest at 100–250 m.

AVAILABLE COLLECTION: VANUA LEVU: MATHUATA: Southern base of Mathuata Range, north of Natua, *Smith 6839*, Dec. 4, 1947, with immature buds and nearly mature capsules.

The cited collection, with the bracts and flowers oriented omnilaterally, represents the only Fijian material of sect. *Dendrocolla* thus far known. Although the material is inadequate for description, it may represent the unnamed species of this section in New Caledonia and the New Hebrides (cf. Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 355. *pl.* 144. 1977), or collections from the three archipelagoes may represent a small group of related species (cf. Kores, 1989). Lewis and Cribb (*Orch. Vanuatu*, 141. 1989) have referred to a species of this section collected in the New Hebrides as *Thrixspermum adenotrichum* Schlechter, but their application of the name is based on flowering material from the Solomon Islands (the sole New Hebridean collection mentioned being in fruit), and the presence of *T. adenotrichum* in the New Hebrides or Fiji remains questionable.

51. *SARCOCHILUS* R. Br. *Prodr. Fl. Nov. Holl.* 332. 1810; Lindl. *Gen. Sp. Orchid. Pl.* 142. 1832; Dockrill, *Australasian Sarcanth.* 14. 1967, *Austral. Indig. Orchid.* 1: 715. 1969; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 368. 1977; Kores in *Allertonia* 5: 186. 1989.

Ascending or pendulous epiphytic or rarely lithophytic plants with terete roots and short, unbranched, leafy stems; leaves usually few, distichous, broadly ascending to subpatent, articulate, with tubular sheathing bases, the blades flat or somewhat channelled, conduplicate in bud, coriaceous or fleshy, usually unequally 2-lobed at apex; inflorescences lateral, erect, ascending, or sometimes pendulous, racemose, the peduncle well developed, slender, terete, the rachis fractiflex or not, few-many-flowered, with the flowers omnilateral or occasionally 2-seriate, the bracts small; flowers developing sequentially with 1–3 undergoing anthesis at a time, ascending to patent, small to moderately large, sometimes showy, often fragrant, generally lasting several days, resupinate; sepals and petals free, slightly dissimilar, broadly spreading or patent, the lateral sepals more or less decurrent along column foot; labellum articulate with apex of column foot, somewhat mobile, shallowly saccate, 3-lobed, the lateral lobes erect, large, usually somewhat falcate, the midlobe small, fleshy, subentire or weakly 3-lobulate, the disk with a large, fleshy callus attached along the midline of the anterior wall of the basal sac and often with a single, much smaller callus at the base of each lateral lobe, the major callus nearly filling the concave portion of labellum, frequently with the upper surface longitudinally sulcate; column short, stout; column foot usually well developed; clinandrium shallowly excavate; anther terminal, operculate; pollinia 2, waxy, subglobose or obliquely obovoid, each deeply cleft to form 2

unequal halves, borne on a common stipe, this short, slender, the viscidium small, circular or elliptic; rostellum brief, weakly bidentate or retuse at apex; stigma directly below rostellum, large, deeply recessed.

TYPE SPECIES: *Sarcochilus falcatus* R. Br., the only original species.

DISTRIBUTION: As currently circumscribed, *Sarcochilus* is a genus of about 16 species found for the most part in northern and eastern Australia, but with a few outlying species in New Guinea, the Solomon Islands, New Caledonia, and Fiji. A single recently described Fijian species terminates the generic range to the east.

USEFUL TREATMENTS OF GENUS: HOLTUM, R. E. The genera *Sarcochilus* R. Br. and *Pteroceras* Hassk. (Orchidaceae) with notes on other genera which have been included in *Sarcochilus*. Kew Bull. 14: 263-276. 1960. DOCKRILL, A. W. *Sarcochilus*, in Australasian Sarcanthinae, 14-21. pl. 22-30, 39. 1967.

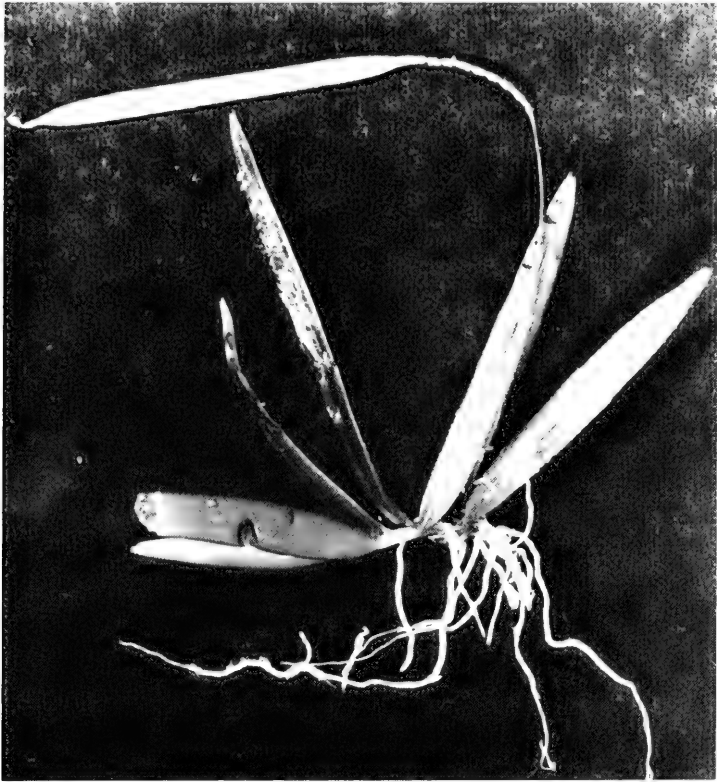


FIGURE 81. *Sarcochilus williamsianus*; fully grown plant with a mature capsule, from Naitasiri Province, Viti Levu (Kores & Molray F11), \times about 2.

1. *Sarcochilus williamsianus* Kores in Allertonia 5: 187. 1989.

FIGURE 81.

Thrixspermum graeffei sensu L. O. Williams in Bot. Mus. Leaf. 5: 137, p. p. 1938; non Reichenb. f.

Epiphytic plants with the stem 1–3 cm. long and 2–3 mm. in diameter; leaves few, the blades 2.5–6.5 × 0.5–1.1 cm., cuneate at base; inflorescences (3–) 6–12.5 cm. long, the rachis becoming about as long as peduncle in older inflorescences, obviously fractiflex, the bracts 3–4.5 mm. long; flowers pale yellow to white with red blotches at bases of segments; sepals elliptic to oblong-ovate, 4.5–5.5 × 2.5–3 mm.; petals elliptic-obovate, 3.8–4.4 × 2.2–2.5 mm.; labellum articulate with apex of column foot, somewhat mobile, saccate, 3-lobed, about 4.7 mm. long overall, the lateral lobes porrect, deeply cleft to form 4 winglike appendages, each of the posterior pair about 4.2 × 2 mm., each of the anterior pair much smaller, lorate, the midlobe about 1 mm. across, the disk with a large, fleshy callus along the medial anterior wall of labellum, the callus oblong, prominently dilated distally and confluent with bases of anterior pair of winglike appendages, minutely papillate throughout, with the upper margin weakly sulcate distally; column semiterete, about 1.3 mm. long; pollinia 2, obovoid, about 0.4 × 0.3 mm., each cleft into 2 very unequal parts, the stipe dilated near apex, about 0.9 mm. long; capsules 3–3.5 cm. long.

TYPIFICATION: The type is *Simmonds s. n.* (K spirit 8450 HOLOTYPE), collected July 29, 1954, in Suva, Rewa Province, Viti Levu, very probably from a cultivated plant originally from inland Viti Levu, possibly from the vicinity of Nandarivatu, Mba Province (cf. Kores, 1989).

DISTRIBUTION: Endemic to Fiji and thus far known only from Viti Levu and Vanua Levu, found as an epiphyte in dense forest at elevations of about 50–900 m. Flowering material has been noted between May and November, fruits between September and November.

LOCAL NAME: *Mbak* (from *Gillespie 3071*, although this seems an unlikely Fijian word).

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 191, 911*; Mt. Evans Range, *Greenwood 1154*. NANDRONGA & NAVOSA: Vicinity of Nandrau, *im Thurn 308*; northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5456*. NAMOSI: Vicinity of Namuamua, near trail to Namosi, *Gillespie 3003*, p. p., *3071*. NAITASIRI: Tholo-i-suva, *Kores & Molvray F11*; old Suva Pumping Station, *Vaughan 3195*. REWA: 2 miles west of Veisari, *Vaughan 3308*. VITI LEVU without further locality, *Parks 20957*. VANUA LEVU: MATHUATA: Seanggangga Plateau, near Natua, along Korovuli River, *Jonsson 2391*.

This recently described species is readily distinguished from all other species of *Sarcochilus* by the deeply cleft lateral lobes of its labellum and by the broad, oblong callus on the anterior wall of the sac. Vegetatively the species has a superficial resemblance to *Thrixspermum graeffei*, and the two taxa were confused with one another by L. O. Williams (1938). However, *S. williamsianus* differs from *T. graeffei* in its much more elongated and laxly flowered rachis, as well as in details of its labellum.

52. *CHILOSCHISTA* Lindl. in Edward's Bot. Reg. 18: ad t. 1522. 1832; Diels & Mansf. in Notizbl. Bot. Gart. Berlin 11: 497. 1932; Garay in Bot. Mus. Leaf. 23: 165. 1972; Seidenfaden in Opera Bot. 95: 168. 1988; Kores in Allertonia 5: 189. 1989.*Thrixspermum* sensu Reichenb. f. in Seem. Fl. Vit. 297, p. p. 1868; non Lour.*Chroniochilus* sensu L. O. Williams in Bot. Mus. Leaf. 5: 138. 1938; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; non J. J. Sm.

Small epiphytic plants with long, strongly flattened, ribbonlike or subcylindric, photosynthetic roots, the stems much abbreviated, aphyllous or occasionally with a few leaves clustered at apex; leaves deciduous, often absent during most of the growing season (but in our species more or less persistent), articulate, the blades erect or ascending, oblong-elliptic to ligulate, sometimes slightly falcate, conduplicate in bud,

obliquely subacute or unequally bilobed at apex; inflorescences lateral, erect, racemose, several-many-flowered, glabrous or laxly pilose, the bracts small, ovate-lanceolate; flowers rather small, nonresupinate, fragrant, white to yellow, with or without reddish or purple spots; sepals and petals free, spreading, slightly dissimilar, oblong-ovate or oblong-elliptic, the lateral sepals and petals usually inserted on column foot by a broad base; labellum articulate with apex of column foot, mobile, 3-lobed, the basal portion concave or saccate, with an erect or ascending, large, entire or weakly 2-lobed, pilose callus on inner surface of posterior wall, the lateral lobes erect, large, the midlobe commonly very short, transverse, entire or rarely 2-lobed, the disk often pilose; column short, semiterete; column foot more or less perpendicular to column, broad, long, straight; clinandrium shallowly excavate, with the posterior margin membranous; anther terminal, shortly rostrate, usually provided on both sides with a short to long, filiform, gland-tipped appendage; pollinia 2, waxy, globose, each entirely cleft into 2 unequal halves borne on a common stipe, this linear, the viscidium small; rostellum large, somewhat retroflex, briefly bifid at apex; stigma transverse, deeply recessed.

TYPE SPECIES: *Chiloschista usneoides* (D. Don) Lindl. (*Epidendrum usneoides* D. Don), the only original species.

DISTRIBUTION: From India and southern China southeastward to Malesia, northern Australia, Palau, and Fiji, where the generic range is terminated by a single endemic species.

USEFUL TREATMENTS OF GENUS: DIELS, L., & R. MANSFELD. Die Orchideen-Gattung *Chiloschista* Lindl. Notizbl. Bot. Gart. Berlin 11: 491-498. 1932. SEIDENFADEN, G. Orchid genera in Thailand XIV. Fifty-nine vandoid genera. Opera Bot. 95: 1-398. 1988. (The genus *Chiloschista* is discussed in pp. 168-181.) In addition to the detailed treatment of all the Thai species, this account provides an enumeration of all the species currently recognized in the genus, with a brief discussion of their types.

1. ***Chiloschista godeffroyana*** (Reichenb. f.) Schlechter in Repert. Sp. Nov. Beih. 4: 275, in obs. 1919; Diels & Mansf. in Notizbl. Bot. Gart. Berlin 11: 497. 1932; Garay in Bot. Mus. Leafl. 23: 166, in obs. 1972; Kores in Allertonia 5: 189. 1989.

Sarcochilus Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Thrixspermum godeffroyanum Reichenb. f. Xenia Orchid. 2: 122. (April) 1868, in Seem. Fl. Vit. 297. t. 90. (July) 1868; Seidenfaden in Opera Bot. 95: 168, in obs. 1988.

Sarcochilus godeffroyanus Benth. & Hook. f. ex Drake, Ill. Fl. Ins. Mar. Pac. 310. 1892.

Chromochilus godeffroyanus L. O. Williams in Bot. Mus. Leafl. 5: 138, as *C. godeffroyanum*. 1938, in op. cit. 6: 140. 1938; A. C. Sm. in J. Arnold Arb. 36: 276. 1955; J. W. Parham, Pl. Fiji Isl. 285. fig. 101. 1964, ed. 2. 380. 1972.

Small, epiphytic, sometimes aphyllous plants, the roots spreading, ribbonlike, up to 22 cm. long and 6-8 mm. broad, dark green, the stem abbreviated, stout, 0.5-1 (-3) cm. long, 3-4 mm. in diameter; leaves often present throughout most of growing season, erect or ascending, articulate, sheathlike and striate at base, the blades oblong-elliptic to ligulate, often slightly falcate, (3-) 5-15 cm. long, 0.8-1.8 cm. broad, gradually angustate proximally with the sheathlike base, obliquely subacute at apex; inflorescences lateral, erect, (9-) 13-27 cm. long, glabrous, the peduncle slender, terete, with 2 or 3 widely spaced, tubular cataphylls, the rachis about as long as peduncle, laxly few-many-flowered, the bracts small, scalelike, 1-1.5 mm. long; flowers patent, the perianth segments white to bright yellow; sepals and petals slightly dissimilar, oblong-elliptic, 5.5-7 mm. long, 2.5-3 mm. broad, subacute to obtuse at apex; labellum about 2.5 mm. long overall, 3-lobed, the basal portion somewhat fleshy, saccate, with a large, erect, clavate callus on the posterior wall, the side lobes erect, distally somewhat inflexed, subquadrate, about 0.6 mm. across, broadly rounded at apex, the midlobe small, transverse, broadly rounded at apex, the disk laxly pilose distally; column semiterete, about 2 mm. long; column foot somewhat inflexed distally, slightly longer than column; clinandrium with the posterior margin raised; anther provided with 2 small, setiform appendages decurrent with lateral margins; pollinia 2, globose, about 0.5 mm. in diameter, cleft, the stipe linear-ligulate, about 1.4 mm. long and 0.25 mm. broad, the viscidium small, oblong.

TYPIFICATION: The type is *Seemann 600* (K LECTOTYPE; ISOLECTOTYPES at AMES, P, w), collected Oct. 14, 1860, on Mathuata-i-wai Island, Mathuata Province, Vanua Levu (cf. Kores, 1989, for the rationale of indicating this lectotype among the three collections originally listed by Reichenbach).

DISTRIBUTION: Endemic to Fiji, infrequent and dispersed throughout the archipelago but usually occurring on limestone or in coastal areas (and on offshore islands), up to an elevation of about 30 m. Flowers have been noted between May and November, fruits only in March.

LOCAL NAME: *Turulakaka* or *turulakalaka* (noted by J. W. Parham, 1964, 1972). This seems unlikely; *turulakaka* has otherwise been reported by B. E. V. Parham (Fijian Plant Names, 35, 1942) for an introduced weed of the genus *Stachytarpheta* (Verbenaceae).

AVAILABLE COLLECTIONS: VANUA LEVU: MBUA: Mbua Bay, *U. S. Expl. Exped.* (AMES 76448). MATHUATA: Mathuata coast, *Greenwood 651* (K). VANUA LEVU without further locality, *Harvey s. n.* (AMES, K), *Graeffe s. n.* (w 41528). VANUA MBALAVU: Southern limestone section, *Smith 1448* (BISH, NY). NAVUTU-I-LOMA: Central forest, *Bryan 458* (AMES, BISH).

53. *LUISIA* Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. pl. 37. 1827, op. cit. 426. 1829; Holttum, Fl. Malaya 1: 695. 1953; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 348. 1977; Seidenfaden in Opera Bot. 95: 270. 1988; Kores in Allertonia 5: 190. 1989; Lewis & Cribb, Orch. Vanuatu, 142. 1989.

Epiphytic plants with long, unbranched, laxly foliate stems, these usually erect, with long, somewhat flattened roots at lower nodes; leaves distichous, articulate, with tubular, sheathing bases, the blades suberect or ascending, terete, fleshy, dull green; inflorescences lateral, erect or ascending, short, racemose, densely few-many-flowered, with few to several flowers maturing simultaneously, the peduncle abbreviated, the rachis thickened, congested; flowers small to medium-sized, resupinate, fleshy, not ephemeral; sepals free, spreading, slightly dissimilar, often with the apical portions of lateral sepals cymbiform and externally keeled; petals free, erect or slightly spreading, similar to dorsal sepal or somewhat longer and narrower; labellum immobile, ecalcarate, partially divided into 2 distinct portions by a transverse, curved furrow, the proximal portion narrower than distal portion, concave, often with distinct lateral lobes on either side near base, the distal portion somewhat expanded transversely into a fleshy blade with an entire, emarginate, or shortly 2-lobed apex, the upper surface of blade frequently with 1 or more shallow, longitudinal furrows, glabrous or tuberculate-rugose; column short, straight; column foot absent; clinandrium shallowly excavate; anther terminal, operculate; pollinia 2, waxy, entire or slightly sulcate, borne on a common stipe, this short and broad, the viscidium large; rostellum short, broad, entire or slightly emarginate at apex; stigma large, transverse; ovary triangular.

TYPE SPECIES: *Luisia teretifolia* Gaud., the only species illustrated in 1827. The generic name commemorates the Portuguese botanist Luis de Torres.

DISTRIBUTION: Tropical Asia (from India, Korea, and Japan) through Malesia to the Cape York Peninsula of Australia and the Marianas Islands, eastward to the Solomon Islands, New Caledonia, the New Hebrides, Fiji, and Samoa, with about 36 species. In Fiji and nearby archipelagoes the genus is represented by a single widely distributed species.

USEFUL TREATMENT OF GENUS: SEIDENFADEN, G. Notes on the genus *Luisia*. Dansk Bot. Arkiv 27 (4): 1-101. 1971.

Luisia is somewhat unique in that the flowers continue to increase in size for some days after they open. In some cases the size increase appears to be uniform throughout

the flower, while in other instances some structure may increase in size disproportionately in respect to others. According to Holttum (1953) this is particularly true of the petals in some taxa. As a result, accurate dimensions of floral parts are difficult to provide and should be treated with caution.

1. *Luisia teretifolia* Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. pl. 37. 1827, op. cit. 426. 1829; Guillaumin in Notul. Syst. (Paris) 10: 69. 1941, Fl. Nouv.-Caléd. 66. 1948; Seidenfaden in Dansk Bot. Arkiv 27 (4): 56. fig. 28-30. 1971; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 348. pl. 142. 1977; Seidenfaden in Opera Bot. 95: 270, in obs. 1988; Kores in Allertonia 5: 191. 1989; Lewis & Cribb, Orch. Vanuatu, 142. 1989.

Luisia sp. Schlechter in Repert. Sp. Nov. 9: 110. 1911.

Epiphytic plants 15-30 cm. long, the stem stout, rigid, about 4 mm. in diameter, with internodes 1.2-1.8 cm. long; leaves suberect, the sheaths tubular, not inflated distally, with prominent longitudinal striations, the blades terete, 4-20 cm. long, about 3 mm. in diameter, obtuse at apex; inflorescences lateral, short, few-flowered, the peduncle abbreviated, the rachis 4-8 mm. long, congested; flowers small, the outer perianth segments green or greenish yellow, sometimes also faintly purple-tinged, the labellum reddish brown or purple; dorsal sepal elliptic, about 5.5 × 3 mm., subacute to obtuse at apex; lateral sepals lanceolate, about 8 × 2.5 mm., slightly keeled externally, with a fleshy apical portion; petals linear-oblong, 3-7 mm. long, about 4 mm. broad, obtuse at apex; labellum up to 7.5 mm. long, 3-lobed, the proximal portion subquadrate, slightly gibbous at base, with small, elliptic-falcate side lobes, the distal portion broadly cordate, with entire or weakly undulate margins; column semiterete, about 2 mm. long; anther subquadrate, truncate at apex; pollinia globose, slightly sulcate, 0.2-0.3 mm. in diameter, the stipe oblong, 0.2-0.3 mm. long and about 0.15 mm. broad, the viscidium large, transversely obovate, about 0.3 mm. across; rostellum short, transverse.

TYPIFICATION: The type is *Gaudichaud 37* (P HOLOTYPE), collected on the island of Guam. Although I have not seen this, it apparently lacks flowers, and Seidenfaden (1971) suggests that the original figure of the flowers (Gaudichaud, 1827) should also be considered part of the type.

DISTRIBUTION: Southeastern Asia (from Himalayan foothills southeastward) through Malesia to northern Australia and Guam, and eastward in the Pacific to Samoa. In Fiji it is an infrequent epiphyte in forest at elevations of about 100-300 m., known only from Viti Levu. Fruits have been obtained in October.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Mountains near Lautoka, *Greenwood 298* (K). TALEVU: Vicinity of Raralevu, *DA 2666* (coll. B. E. V. Parham) (AMES, SUVA). REWA: Along Queen's Road 8 miles west of Suva and 1 mile from coast, *Marcia Gray s. n.* (K).

54. *PAPILIONANTHE* Schlechter in Orchis 9: 78. 1915; Garay in Bot. Mus. Leaflet. 23: 369. 1974; Seidenfaden in Opera Bot. 95: 230. 1988; Kores in Allertonia 5: 191. 1989.

Vanda sect. *Teretifoliae* Pfitzer in Engl. & Prantl, Nat. Pflanzenfam. II. 6: 214. 1889.

Large, epiphytic or rarely terrestrial plants with long, leafy, unbranched stems, these erect, slender, with long, fleshy roots at lower nodes; leaves distichous, articulate, with tubular, sheathing bases, these not inflated distally, the blades suberect, terete, fleshy; inflorescences lateral, erect, racemose, few-flowered, the bracts small, abbreviated; flowers large, showy, resupinate; sepals free, patent or spreading, slightly dissimilar, shortly clawed, obovate, the lateral margins undulate; petals free, patent, much broader than sepals, suborbicular from a narrow base, undulate at margins; labellum adnate to column foot, immobile, 3-lobed, spurred, the spur conical, without internal appendages or calli, gradually merging with the basal portion of labellum at

opening, the lateral lobes either erect and parallel with or embracing column, smaller than midlobe, this broadly cuneate, cleft at apex, the disk usually with 1 or more carinae or small calli, sometimes also minutely pubescent; column short, stout, semiterete; column foot prominently developed, long; clinandrium shallowly excavate; anther terminal, cucullate, with an apiculate rostrum; pollinia 2, waxy, sulcate, borne on a common stipe, this broadly triangular to subquadrate, the viscidium large; rostellum perpendicular to column or somewhat retroflexed, elongated, deltoid; stigma large, transverse, deeply recessed.

TYPE SPECIES: *Papilionanthes teres* (Roxb.) Schlechter (*Dendrobium teres* Roxb.).

DISTRIBUTION: Tropical Asia and Malesia, excluding Papuasia, with eleven species. The genus includes a number of species of horticultural importance that are widely cultivated in both the Old and New World tropics. Members of the genus are also frequently found in living collections at botanical gardens and among the stocks of many commercial orchid growers. The genus is known to be represented in Fiji by an exotic species and an interspecific hybrid, both of which are freely cultivated and which may be anticipated as escapes.

USEFUL TREATMENT OF GENUS: GARAY, L. A. *Papilionanthe*. Bot. Mus. Leaflet. 23: 369-372. 1974.

KEY TO TAXA

Lateral lobes of labellum embracing column, the midlobe about as broad as long, with a long, broadly ligulate claw, the distal portion flabellately obcordate, the spur about 2.5 cm. long. 1. *P. teres*
Lateral lobes of labellum erect, not embracing column, the midlobe about 1.5-2-times as broad as long, with a very short, fleshy claw, the distal portion broadly flabellate, the spur about 1.2 cm. long.

2. *P. 'Miss Joaquim'*

1. ***Papilionanthes teres* (Roxb.) Schlechter** in *Orchis* 9: 78. fig. 5-8. 1915; Garay in Bot. Mus. Leaflet. 23: 372. 1974; Seidenfaden in *Opera Bot.* 95: 230. fig. 143. 1988; Kores in *Allertonia* 5: 192. 1989.

Vanda teres Lindl. in Wall. Num. List, 7324, nom. nud. 1832, Gen. Sp. Orchid. Pl. 217. 1833; Hook. f. Fl. Brit. Ind. 6: 49. 1894; Holttum, Fl. Malaya 1: 719. fig. 224. 1953; J.W. Parham, Pl. Fiji Isl. 295. 1964, ed. 2. 389. 1972.

Dendrobium teres Roxb. Fl. Ind. ed. 2. 3: 485. 1832.

Epiphytic, climbing plants up to 3 m. long, the stem slender, subdensely foliate; leaves suberect, the blades straight or slightly curved, terete, 15-20 cm. long, about 4 mm. in diameter; inflorescences lateral, erect, racemose, 15-30 cm. long, 3-6-flowered, the bracts short, ovate; flowers patent, showy, 5-10 cm. across, the outer perianth segments white or rose-colored, the labellum deeply rose-colored with red and yellow markings, the column white; dorsal sepal ovate to elliptic-ovate, up to 3.8 × 3 cm.; lateral sepals subrhomboid, similar in size to dorsal sepal; petals twisted at base, ovate-orbicular, up to 4.5 × 3.8 cm., undulate at margin; labellum perpendicular to column, up to 3.8 cm. long and 3.2 cm. broad, 3-lobed, spurred, the spur about 2.5 cm. long, funnel-shaped, somewhat compressed laterally, the lateral lobes embracing the column, small, triangular, obtuse at apex, the midlobe about as broad as long, with a long, broadly ligulate claw, distally flabellately obcordate, deeply cleft at apex, the disk minutely pubescent; column about 9 mm. long, laxly pubescent along ventral surface.

TYPIFICATION: The type is *Wallich s. n.* (K Wallich Herbarium HOLOTYPE; ISOTYPE at K in Herb. Hooker), collected in 1825 from Sylhet, now in northern Bangladesh.

DISTRIBUTION: Southeastern Asia, including Bangladesh, Thailand, Burma, Laos, and the foothills of the Himalayas; widely cultivated elsewhere.

No Fijian herbarium vouchers are at hand, but Parham (1964, 1972) reports the species to have been well established in gardens throughout Fiji prior to 1964.

2. *Papilionanthe* 'Miss Joaquim' (*P. teres* (Roxb.) Schlechter \times *P. hookeriana* (Reichenb. f.) Schlechter); Kores in *Allertonia* 5: 193. 1989.

Vanda 'Miss Joaquim' Hort. ex Ridley in *Gard. Chron.* III. 13: 740. 1893; Holttum in *Malayan Nat. J.* 2 (1): 24. 1928, *Fl. Malaya* 1: 9, 720. *fig. 4, 7*. 1953; J. W. Parham, *Pl. Fiji Isl. ed.* 2. 389. 1972.

Vanda \times *joaquimiae* Hort. in *Orchid Rev.* 19: 297. 1911.

Epiphytic, climbing plants up to 3 m. long, the stem slender, laxly foliate; leaves ascending, the blades straight, terete, 7–12 cm. long, about 3 mm. in diameter; inflorescences 10–20 cm. long, few-flowered; flowers patent, showy, 7–10 cm. across, the outer perianth segments pale pink or mauve, the labellum frequently a little darker in color and with faint yellow markings; dorsal sepal elliptic, up to 2.5 \times 2 cm.; lateral sepals obliquely elliptic, similar in size to dorsal sepal; petals twisted at base, suborbicular, up to 3 \times 2.5 cm., weakly undulate at margin; labellum perpendicular to column, up to 3.5 cm. long and 5.5 cm. broad, 3-lobed, spurred, the spur about 1.5 cm. long, broadly funnel-shaped, prominently compressed laterally, the lateral lobes erect, oblong, the midlobe about 1.5–2-times as broad as long, with a very short, fleshy claw, distally broadly flabellate, slightly cleft at apex, the disk with 2 small, minutely pubescent calli at base of midlobe; column about 1 cm. long, laxly pubescent along proximal half of ventral surface.

TYPIFICATION: Presumably lacking a formal nomenclatural type, this hybrid appeared spontaneously in Singapore in 1893, in the garden of Miss Agnes Joaquim, where both parent species had long been cultivated.

DISTRIBUTION: Widely cultivated in tropical and subtropical areas, as well as in temperate greenhouses. In Fiji it is very common in gardens and probably was established some time ago.

AVAILABLE COLLECTION: VITI LEVU: NAITASIRI: Toninaiwau, Tholo-i-suva, *DA 16714*.

The vicissitudes of the well-known cultivar name *Vanda* 'Miss Joaquim' have been briefly discussed by the present writer (Kores, 1989).

55. *SARCANTHOPSIS* Garay in *Bot. Mus. Leafl.* 23: 198. 1972; Kores in *Allertonia* 5: 193. 1989; Lewis & Cribb, *Orch. Vanuatu*, 137. 1989.

Sarcanthus sensu Reichenb. f. in *Seem. Fl. Vit.* 298. 1868; A. C. Sm. in *J. Arnold Arb.* 36: 276. 1955; non Lindl.

Very large, epiphytic or rarely terrestrial plants with long, leafy, unbranched stems, these erect, stout, with long, funiform roots at lower nodes; leaves distichous, articulate, with overlapping, tubular, sheathing bases, the blades ascending or patent, broadly ligulate, usually very fleshy, conduplicate in bud; inflorescences robust, lateral, erect, paniculate, many-flowered; flowers moderately large, showy, resupinate; sepals and petals free, spreading or patent, slightly dissimilar, broadly obovate to oblong-obovate or suborbicular; labellum firmly adnate to base of column, immobile, shorter than other floral segments, 3-lobed, the basal portion saccate, with a large, fleshy, pulvinate appendage on inner surface of posterior wall, the lateral lobes erect, small, the midlobe ascending, often linguiform, the disk with a prominent longitudinal crest extending from anterior margin of the pulvinate appendage to apex of labellum; column short, stout; column foot absent; clinandrium shallowly excavate, broad; anther terminal, operculate; pollinia 2, waxy, globose, each cleft to form 2 unequal halves borne on a common stipe, this linear-ligulate, the viscidium large; rostellum erect, small, short, bilobed; stigma small, suborbicular.

TYPE SPECIES: *Sarcanthopsis nagarensis* (Reichenb. f.) Garay (*Sarcanthus nagarensis* Reichenb. f.).

DISTRIBUTION: New Guinea, Bismarck Archipelago, the Solomon Islands, New Hebrides, Fiji, and the Horne Islands, with seven species. One indigenous species terminates the generic range in Fiji and the Horne Islands. The latter locality is listed by Lewis and Cribb (1989).

1. *Sarcanthopsis nagarensis* (Reichenb.f.) Garay in Bot. Mus. Leaflet. **23**: 199. 1972;

Kores in Allertonia **5**: 194. 1989; Lewis & Cribb, Orch. Vanuatu, 137, fig. 30. 1989.

Saccolabium sp. Seem. in Bonplandia **9**: 260. 1861, Viti, 443. 1862.

Sarcanthus nagarensis Reichenb. f. in Seem. Fl. Viti. 298. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 310. 1892; L. O. Williams in Bot. Mus. Leaflet. **5**: 140. 1938, in op. cit. **6**: 141. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. **2**: 35. 1953; A. C. Sm. in J. Arnold Arb. **36**: 276. 1955; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. **2**: 388. 1972.

Stauroopsis nagarensis Rolfe in Kew Bull. **1909**: 64, in adnot. 1909.

Stauroopsis quaifei Rolfe in Kew Bull. **1909**: 64. 1909.

Vandopsis quaifei Schlechter in Repert. Sp. Nov. Beih. **1**: 196. 1911.

Vandopsis nagarensis Schlechter in Repert. Sp. Nov. Beih. **1**: 972, in adnot. 1913.

Sarcanthopsis quaifei Garay in Bot. Mus. Leaflet. **23**: 199. 1972.

Epiphytic plants, erect or sometimes climbing, up to 3 m. long, the stems very fleshy, about 2 cm. in diameter, completely obscured by the persistent, overlapping leaf sheaths, densely foliate near apex; leaves ascending, the sheaths 2.5–3.5 cm. long, somewhat inflated distally, the blades articulate, ligulate, 20–26 cm. long, 4–5 cm. broad, fleshy, gradually angustate with leaf sheaths proximally, obtuse at apex; inflorescences erect, laxly branched, 25–30 cm. long, many-flowered, the peduncle stout, terete, 10–15 cm. long, with 2 or 3 widely spaced, obliquely funnel-shaped cataphylls, the flowering branches up to 10 cm. long, subdensely many-flowered, the bracts ovate, 5–6 × 3–4 mm.; flowers patent, fleshy, the outer perianth segments pale green to greenish yellow with pale brown spots, the labellum and column white; dorsal sepal broadly obovate, 8–10 × 5–7 mm., rounded at apex; lateral sepals oblong-obovate, somewhat falcate, 7–10 × 4–5 mm., obtuse at apex; petals suborbicular from a narrow base, 5.5–7.5 × 4–5 mm.; labellum perpendicular to column throughout proximal half, distally inflexed, somewhat compressed laterally, 4.5–5.5 mm. long overall, 3-lobed, the basal portion saccate, with a prominent appendage on posterior wall near base, the appendage fleshy, oblong-ovoid, weakly 3-sulcate distally, the side lobes erect, broadly subquadrate, 1.5–2 mm. long, 1.75–2.2 mm. broad, irregularly crenulate on upper margins, with a low transverse carina shortly below apex within, the midlobe ascending, triangular, 3–3.5 mm. long, 1.5–2 mm. broad at base, subacute at apex, the disk with a prominent, raised crest extending from anterior margin of basal appendage to apex, the crest becoming noticeably enlarged and oblong-pulvinate distally; column semiterete, 2–2.5 mm. long; clinandrium hardly excavate, with entire margins; anther transversely ovate-operculate, about 1.5 mm. long and 2 mm. broad; pollinia 2, globose, about 0.7 mm. in diameter, the stipe slender, ligulate, about 1 mm. long and 0.25 mm. broad, the viscidium subdeltoid, about 0.4 mm. across; ovary prominently 3-winged.

TYPEIFICATION AND NOMENCLATURE: The type of *Sarcanthus nagarensis* is *Seemann 594* (W 53491 HOLOTYPE; ISOTYPE at K; drawing of holotype at AMES), collected in July, 1860, on Nanggara Island, off the mouth of Nambukavesi Creek, Namosi Province, Viti Levu. *Stauroopsis quaifei* is based on *Quaife 265* (K HOLOTYPE), from Espiritu Santo, New Hebrides. Although the latter taxon was considered a distinct but closely related species in my precursory study (1989), Lewis and Cribb (1989) place it in the synonymy of *Sarcanthopsis nagarensis*.

DISTRIBUTION: Eastern New Guinea, the Solomon Islands, Caroline Islands, New Hebrides, Fiji, and Horne Islands. In Fiji the species is thus far known only from southeastern Viti Levu (and offshore islands), Yathata, and probably Rotuma, from near sea level to about 80 m. elevation. Flowers have been noted in February, April, July, October, and December, fruits in July and October.

LOCAL NAME: *Okeoke* (Yathata).

AVAILABLE COLLECTIONS: VITI LEVU: REWA: "Suva Harbour near Namuka Island," in *Thurn* 345: "Rewa," *Horne* 115. YATHATA: Summit of Korolevu, *Bryan* 594. Probably also: ROTUMA: *Jonsson* 2499 (UPS) (cf. Kores, 1989).

Recent collections from the Solomon Islands and New Hebrides demonstrate that the characters utilized to distinguish *Sarcanthopsis nazarensis* from other closely related species in other geographic regions are unreliable, and that species, formerly considered a Fijian endemic, must be more broadly construed. For a more extensive listing of conspecific taxa from areas outside the Fijian Region, see Lewis and Cribb (1989).

56. *SACCOLABIOPSIS* J. J. Sm. in Bull. Jard. Bot. Buitenzorg II. 26: 93. 1918; Backer & Bakh. f. Fl. Java 3: 415. 1968; Garay in Bot. Mus. Leaflet. 23: 197. 1972; Seidenfaden in Opera Bot. 95: 228. 1988; Kores in Allertonia 5: 195. 1989.

Small epiphytic plants with short, unbranched, leafy stems; leaves relatively few, more or less distichous, articulate, with very short, tubular, sheathing bases, the blades ligulate to narrowly elliptic-ligulate, conduplicate in bud, subcoriaceous, obliquely 2-lobed at apex, the tips of lobes obtuse; inflorescences lateral, perforating 2 leaf sheaths, erect or pendulous, slender, racemose or rarely subpaniculate, the rachis laxly many-flowered; flowers very small, membranous, resupinate; sepals and petals free, subequal or the petals slightly shorter than sepals, weakly spreading, oblong to oblong-lanceolate; labellum firmly adnate to base of column, immobile, weakly 3-lobed, spurred, the spur somewhat retrorse, relatively short, conical or cylindrical, lacking appendages or thickenings within, obtuse to subacute at apex, the lateral lobes hardly separated from midlobe, very short, broad, the midlobe somewhat larger, shallowly saccate, frequently with a fleshy, transverse ridge at base, the disk unappendaged; column short, cylindrical; column foot absent; clinandrium shallowly excavate; anther terminal, operculate, with a distinct, triangular rostrum; pollinia 2, waxy, each entirely cleft to form 2 very unequal halves, borne on a common stipe, this linear or linear-spathulate, the viscidium medium-sized; rostellum more or less porrect, relatively long, shortly 2-lobed at apex; stigma large, deeply recessed.

TYPE SPECIES: *Saccolabiopsis bakhuizenii* J. J. Sm., the sole original species.

DISTRIBUTION: India and southeastern Asia, the Philippines, Java, eastern tropical Australia, and Fiji, with about seven species. The range terminates in Fiji with a single endemic species.

All species of *Saccolabiopsis* are diminutive plants with very small and fairly short-lived flowers. This combination of characters probably makes representatives of the genus difficult to spot in the wild, resulting in a paucity of herbarium specimens. At present *Saccolabiopsis* has not been reported from New Guinea or archipelagoes between it and Fiji, although it may be there anticipated. Perhaps this absence of Papuan records is due to the inconspicuous nature of representatives of the genus.

1. *Saccolabiopsis gillespiei* (L. O. Williams) Garay in Bot. Mus. Leaflet. 23: 198. 1972; Kores in Allertonia 5: 195. 1989.

Saccolabium gillespiei L. O. Williams in Bot. Mus. Leaflet. 5: 139. 1938; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 388. 1972.

Epiphytic plants 3-7 cm. tall, the stems short, terete, completely obscured by the persistent leaf sheaths; leaves distichous, ascending, the blades ligulate to narrowly elliptic-ligulate, (1.5-) 3-5 cm. long, 0.3-0.7 cm. broad, gradually angustate with leaf sheaths proximally, the apex unequally bilobed or rarely obliquely subacute; inflorescences slender, (3-) 5-9 cm. long, the peduncle about as long as rachis, terete, the rachis somewhat thickened, slightly winged, laxly 9-20-flowered, the bracts reflexed, closely

appressed to rachis, lanceolate, about 1 mm. long and 0.2 mm. broad; flowers patent, the outer perianth segments dull yellow with purple markings, the labellum and column white or white tinged with purple; dorsal sepal oblong-lanceolate, 1.5–1.8 mm. long, about 0.5 mm. broad, obtuse at apex; lateral sepals oblong, slightly falcate, 1.5–2 mm. long, 0.5–0.7 mm. broad, subacute to obtuse at apex; petals oblong-lanceolate, slightly oblique, 1.3–1.6 mm. long, 0.5–0.7 mm. broad, obliquely subacute at apex; labellum prominently spurred, 3-lobed, 2–2.4 mm. long overall, the spur retrorse, conical, about 1 mm. long, with the apex obtuse, the lateral lobes ascending, small, broadly triangular, about 0.3 mm. long and 0.5 mm. broad, the midlobe porrect, more or less ovate in outline, with the upper surface distinctly concave, about 0.75 mm. long and 0.6 mm. broad, obtuse at apex; column about 1 mm. long; clinandrium shallowly excavate, broad, the margins truncate; capsules cylindrical, 1.3–1.6 cm. long, about 5 mm. in diameter.

TYPIIFICATION: The type is *Gillespie 2991* (AMES 47526 HOLOTYPE), obtained Sept. 23, 1927, at a waterfall in the vicinity of Namuamua, Namosi Province, Viti Levu. No duplicates of the collection have been located at other institutions.

DISTRIBUTION: Endemic to Fiji, known only from south-central Viti Levu. It has been obtained in forest at elevations between 150 and 400 m., flowers and fruits having been noted in September and October.

AVAILABLE COLLECTIONS: VITI LEVU: NAMOSI: Hills bordering Wainavindrau Creek, vicinity of Wainimakutu, *Smith 8854* (US 2191485, unicate); vicinity of Namosi Village, *Gillespie 2594* (BISH); 2 miles from Namuamua, near trail to Namosi, *Gillespie 3003*, p. p. (AMES).

57. *TRACHOMA* Garay in Bot. Mus. Leaf. 23: 207. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 356. 1977; Seidenfaden in Opera Bot. 95: 328. 1988; Kores in Allertonia 5: 196. 1989.

Tuberolabium sensu Lewis & Cribb, Orch. Vanuatu, 150. 1989; non Yamamoto (1924).

Small epiphytic plants with short, unbranched stems; leaves distichous, articulate, with sheathing bases, the blades ligulate to elliptic-ligulate, sometimes slightly falcate, conduplicate in bud, moderately coriaceous; inflorescences patent or pendulous, racemose, much abbreviated, the peduncle very short, the rachis moderately thickened, congested, few-flowered, the bracts small, scalelike; flowers small, membranous, more or less ephemeral, resupinate; sepals free, slightly dissimilar and spreading, oblong to oblong-ovate; petals free, erect or slightly spreading, about as long as sepals and usually somewhat narrower; labellum immobile, weakly 3-lobed, fleshy, somewhat compressed laterally, calceiform, often shortly spurred or somewhat saccate, the apex minutely tuberculate or somewhat thickened and pulvinate, the disk naked; column short, stout; column foot absent; clinandrium small, shallowly excavate; anther terminal, operculate; pollinia 2, waxy, globose, entire, frequently partially cleft or grooved, borne on a common stipe, the stipe slender, the viscidium well developed; rostellum erect, short, 2-lobed; stigma large, deeply recessed.

TYPE SPECIES: *Trachoma rhopalorrhachis* (Reichenb. f.) Garay (*Dendrocolla rhopalorrhachis* Reichenb. f.).

DISTRIBUTION: India and southeastern Asia southeastward to northern Australia and eastward to portions of Micronesia and to Rapa in the Austral Islands, with seven species. The genus is represented in Fiji by a single widely distributed species.

Use of the generic name *Tuberolabium* by Lewis and Cribb (1989) for the sole representative of the genus *Trachoma* which occurs in Fiji is puzzling and is not justified in their text. These two genera are obviously closely allied, but they are regarded as distinct by Garay (1972), Hallé (1977), and Seidenfaden (1988), and I am

not aware of any more recent publications suggesting that the two genera be combined. The sole Fijian representative clearly falls within the generic limits of *Trachoma* and has been so treated in previous publications.

1. ***Trachoma papuanum*** (Schlechter) M. Clements, J. J. Wood, & D. Jones in M. Clements, *Cat. Austral. Orch.* 145. 1989.

Saccolabium papuanum Schlechter in *Repert. Sp. Nov. Beih.* 1: 978. 1913, in op. cit. 21: t. 344, no. 1327. 1928.

Saccolabium subluteum Rupp in *N. Queensland Naturalist* 21 (105): 1. 1953.

Trachoma subluteum Garay in *Bot. Mus. Leaflet* 23: 208. 1972; Hallé in *Fl. Nouv.-Calédo. et Dépend.* 8: 356, pl. 145. 1977; Kores in *Allertonia* 5: 196. 1989.

Tuberolabium papuanum J. J. Wood ex Lewis & Cribb, *Orch. Vanuatu*, 150. 1989.

Epiphytic plants 2–5 cm. tall, the stems abbreviated, terete, about 2 mm. in diameter, completely obscured by the persistent leaf sheaths, the internodes 2–4 mm. long; leaves distichous, patent or ascending, the sheaths tubular, prominently inflated distally, striate, the blades ligulate to elliptic-ligulate, sometimes slightly falcate, (1.5–) 2.5–6 cm. long, (0.4–) 0.9–1.6 cm. broad, gradually angustate with leaf sheaths proximally, obliquely subacute or slightly unequally bilobed at apex; inflorescences more or less patent, 0.8–1.5 cm. long, the peduncle much abbreviated, 1–2 mm. long, the rachis weakly 4-angled, subsdensely few-flowered, the bracts ascending, deltoid, about 1.5 mm. long and 1 mm. broad, conduplicate; flowers ascending or patent, pale yellow; dorsal sepal oblong-ovate to oblong-elliptic, 4.5–5.5 mm. long, 1.5–2.2 mm. broad, the apex subacute; lateral sepals obliquely oblong-ovate, 4.5–5.5 mm. long, 2.5–3 mm. broad, the apex obtuse and frequently minutely subapiculate; petals oblong-ligulate, 4–5 mm. long, 1.5–2.2 mm. broad, the apex obliquely subacute; labellum closely appressed to column, shortly spurred, somewhat cup-shaped, laterally compressed, 3.5–4 mm. long, fleshy, the spur arising about midway to apex of labellum, short, subcylindric, about 1.5 mm. long and obtuse at apex, the lateral lobes ascending, much broader than long and with upper margins convex, the midlobe porrect, short, transverse, ovate, very fleshy, subacute at apex; column 1.2–2 mm. long; clinandrium very shallowly excavate, the margins truncate; anther transversely ovate-operculate, about 1 mm. long and 1.5 mm. broad; pollinia 2, globose, 0.4–0.6 mm. in diameter, the stipe linear-ligulate, medially slightly dilated, 0.8–1.2 mm. long, the viscidium small, suborbicular, about 0.3 mm. across; stigma elliptic, deeply recessed; capsule cylindric, 1.5–1.8 cm. long, about 0.4 cm. in diameter, weakly 6-angled and prominently 3-winged.

TYPIFICATION AND NOMENCLATURE: *Saccolabium papuanum* is based on two collections, *Schlechter 17166* (B SYNTYPE, probably destroyed), collected in January, 1908, from the Kanigebirges, and *Schlechter 18975* (B SYNTYPE, probably destroyed), obtained in December, 1908, from the Ibogebirges, New Guinea. *Saccolabium subluteum* was described from a cultivated specimen that flowered in April, 1953, in West Cairns, Queensland, Australia; the material had originally been collected by Mr. Goessling-St. Cloud along the Johnstone River near upper Daradgee, Queensland, in October, 1952; for further remarks justifying the selection of *J. Wrigley & I. Telford NQ 784A* as the NEOTYPE (CBG), see M. Clements (1989).

DISTRIBUTION: A widespread species known from Queensland, New Guinea, and the Solomon Islands through scattered archipelagoes eastward to the Austral Islands. In Fiji it appears very rare, known from a single collection, in fruit in August, obtained in dense forest at an elevation of 725–825 m.

AVAILABLE COLLECTION: VITI LEVU: NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5479*.

58. *ROBIQUETIA* Gaud. Voy. Uranie et Physicienne, Freycinet, Bot. 426. 1829; J. J. Sm. in Natuurk. Tijdschr. Ned.-Indië 72: 112. 1912; Holttum, Fl. Malaya 1: 714. 1953; Backer & Bakh. f. Fl. Java 3: 442. 1968; Garay in Bot. Mus. Leaflet. 23: 196. 1972; Seidenfaden in Opera Bot. 95: 223. 1988; Kores in Allertonia 5: 197. 1989; Lewis & Cribb, Orch. Vanuatu, 147. 1989.

Saccolabium sensu Reichenb. f. in Seem. Fl. Vit. 297. 1868; non Bl.

Epiphytic plants, generally pendulous, with short to long, unbranched, leafy stems, these relatively stout and firm; leaves distichous, articulate, with sheathing bases, the blades lorate or narrowly elliptic, coriaceous, conduplicate in bud, frequently unequally bilobed at apex; inflorescences lateral, borne at nodes, perforating leaf sheaths, usually pendulous, racemose, moderately long, the rachis usually densely and omnilaterally many-flowered; flowers relatively small, resupinate; sepals free, slightly dissimilar, the dorsal sepal somewhat arched over column, the lateral sepals spreading or patent; petals free, usually slightly smaller than sepals, spreading or patent; labellum joined to column, immobile, 3-lobed, spurred, the spur frequently retrorse, rather long, often curved, more or less cylindrical, frequently slightly to moderately constricted near middle, unappendaged within, obtuse at apex, the lateral lobes joined to column at posterior margin, small, ascending, fleshy, often somewhat thickened anteriorly within, the midlobe rather small, porrect, linear or attenuate, with the basal portion concave, gradually becoming fleshy and somewhat convex distally and subacute at apex; column short, somewhat dilated toward apex; column foot absent; clinandrium somewhat reclined anteriorly, rather broad, shallowly excavate; anther terminal, operculate, rather prominently rostrate; pollinia 2, waxy, subglobose, partially cleft, borne on a common stipe, this long, more or less spatulate, often uncinatate, the viscidium large; rostellum well developed, broad, bifid at apex; stigma transverse, deeply recessed.

TYPE SPECIES: *Robiquetia ascendens* Gaud., the only original species.

DISTRIBUTION: A small genus of about 24 species occurring from India and southeastern Asia to Malesia and northern Australia, and eastward to portions of Micronesia, the Solomon Islands, the Santa Cruz Islands, the New Hebrides, Fiji, and Tonga. The genus is represented in Fiji by a single species.

USEFUL TREATMENT OF GENUS: SMITH, J. J. *Sarcanthus* Lindl. und die nächstverwandten Gattungen. Natuurk. Tijdschr. Ned.-Indië 72: 80-115. 1912.

1. *Robiquetia bertholdii* (Reichenb. f.) Schlechter in Repert. Sp. Nov. Beih. 1: 983. 1913; Kores in Allertonia 5: 197. 1989; Lewis & Cribb, Orch. Vanuatu, 147. fig. 33. 1989.

Saccolabium sp. Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862.

Saccolabium bertholdii Reichenb. f. in Seem. Fl. Vit. 297, as *S. bertholdii*. 1868, in Gard. Chron. n. s. 9: 266, in obs., as *S. bertholdii*. 1878; Drake, Ill. Fl. Ins. Mar. Pac. 310, as *S. bertholdii*. 1892; L. O. Williams in Bot. Mus. Leaflet. 5: 139. 1938; B. E. V. Parham in Trans. & Proc. Fiji Soc. 2: 35. 1953; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 387. 1972.

Saccolabium constrictum Reichenb. f. Otia Bot. Hamb. 52. 1878 (repr. Xenia Orchid. 3: 29. 1881), in Gard. Chron. n. s. 9: 266, in obs. 1878; Drake, Ill. Fl. Ins. Mar. Pac. 310. 1892; L. O. Williams in Bot. Mus. Leaflet. 5: 139. 1938; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 388. 1972.

Saccolabium mimus Reichenb. f. in Gard. Chron. n. s. 9: 266. 1878; L. O. Williams in Bot. Mus. Leaflet. 5: 140, as *S. minus*. 1938; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 388. 1972.

Saccolabium graeffei Reichenb. f. in Gard. Chron. n. s. 9: 266, nom. nud. in obs. 1878, in op. cit. 16: 716. 1881; L. O. Williams in Bot. Mus. Leaflet. 5: 140. 1938; J. W. Parham, Pl. Fiji Isl. 294. 1964, ed. 2. 388. 1972.

Saccolabium kajewskii Ames in J. Arnold Arb. 13: 141. 1932; Guillaumin in op. cit. 13: 110. 1932.

Malleola mimus P. F. Hunt in Kew Bull. 24: 98. 1970.

Malleola graeffei P. F. Hunt in Kew Bull. 24: 99. 1970.

Robiquetia constricta Garay in Bot. Mus. Leaflet. 23: 196. 1972.

Robiquetia mimus Garay in Bot. Mus. Leaflet. 23: 197. 1972.

Robiquetia graeffei Garay in Bot. Mus. Leaflet. 23: 197. 1972.

Epiphytic plant to 35 cm. long, the stem stout, 6–10 mm. in diameter, laxly foliate, completely obscured by the persistent, overlapping leaf sheaths; leaves distichous, patent, the sheaths 1.2–2 cm. long, somewhat inflated distally, the blades articulate, ligulate, (8–) 12–24 cm. long, 1.2–2.8 cm. broad, coriaceous, gradually angustate with leaf sheaths proximally, more or less unequally bilobed at apex, the tips of lobes obtuse; inflorescences lateral, opposite leaves, pendulous, racemose, (8–) 15–28 cm. long, the peduncle terete, as long as or 2 or 3 times longer than rachis, with 2–5 obliquely funnel-shaped cataphylls, the rachis densely many-flowered, the bracts reflexed, more or less appressed to rachis, scalelike or deltoid, 0.5–1.5 mm. long, about 1 mm. broad, subacute to obtuse at apex; flowers patent, variously colored (pale green with pink markings, pure white, white with pink markings, light to dark pink, or deep red, sometimes with the perianth tips suffused with green), glabrous or with a few scattered hairs near base of perianth segments; sepals spreading, oblong-obovate, 3.5–5 mm. long, 2.5–3.5 mm. broad, the distal portion slightly carinate externally, broadly acute to subacute at apex; petals erect or slightly spreading, elliptic-obovate, 3–4.5 mm. long, 3–3.5 mm. broad, obtuse at apex; labellum prominently spurred, 3-lobed, 1–1.5 cm. long overall, fleshy, the spur retrorse, slightly curved, cylindrical, about as long as ovary, frequently somewhat constricted near middle, with the apex obtuse, the lateral lobes ascending, truncate, 1.5–2 mm. long, 1–1.5 mm. broad, the anterior margins somewhat thickened internally, the midlobe slightly deflexed at base, gradually becoming porrect distally, deltoid, 1.5–2 mm. long, 1–1.5 mm. broad, with a transverse, semicircular depression at base, the apex very fleshy, subacute to obtuse, the disk with a small, transverse, weakly trilobulate callus continuous with anterior margins of lateral lobes; column short, about 2 mm. long, prominently dilated distally; clinandrium hardly excavate, with a small, porrect, slightly inflexed tooth near dorsal margin; anther ovate, about 1.25 mm. long and 1 mm. broad, slightly crested externally, with a small, blunt rostrum at apex; pollinia 2, subglobose, about 0.4 mm. in diameter, the stipe uncinat, about 1.25 mm. long, linear throughout the lower 2/3, with lateral margins slightly revolute, distally more or less rhomboid, the viscidium obovate, about 1 mm. long and 0.4 mm. broad; rostellum perpendicular to column throughout most of its length, shieldlike, about 1 mm. long, with 2 small, porrect, acicular lobes at apex; stigma deeply recessed, emarginate; ovary 8–10 mm. long, weakly 6-ribbed.

TYPIFICATION AND NOMENCLATURE: Five types are involved in the above-cited synonymy; these were discussed in my 1989 treatment and are here merely listed. *Saccolabium bertholdii* is typified by *Seeman 595* (K LECTOTYPE; ISOLECTOTYPE at W 19083; drawing of w sheet at AMES), collected between July 24 and Aug. 2, 1860, on the Viti Levu mainland near Mbau Island, either in the old Tikina of Namara (now Verata) or near Namata, Tailevu Province. The basis of *S. constrictum* is *U. S. Expl. Exped.* (w 19082 HOLOTYPE; ISOTYPE at AMES 76648; drawing of w sheet at AMES), collected in 1840 in Fiji without further locality. The type of *S. mimus* is *Peter Veitch s. n.* (w 19081 HOLOTYPE; drawing of holotype at AMES), from a cultivated plant said to have come originally only from the "South Sea Islands." *Saccolabium graeffei* is based on *Graeffe ex hort.* (w 19080 HOLOTYPE; drawing of holotype at AMES), collected in Fiji without further locality but brought to flower in cultivation. The type of *S. kajewskii* is *Kajewski 205* (AMES 36375 p. p. HOLOTYPE; ISOTYPES at AMES 76621, BISH), collected in April, 1928, at Undine Bay, Efaté, New Hebrides. As I mentioned in 1989, none of these five taxa seem separable in the light of many specimens of the complex now at hand.

DISTRIBUTION: Santa Cruz Islands, New Hebrides, Fiji, and Tonga. In the New Hebrides and Fiji the species is frequent, but in Tonga it is known only from 'Eua; I have studied about 30 Fijian collections, which come from dense forest at elevations of 50–1,050 m. Flowers have been noted between April and June and between November and January, fruits in April and May.

LOCAL NAME: *Papara* (Ra Province).

REPRESENTATIVE COLLECTIONS: VITI LEVU MBA: Slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, *Smith 4400*; Nandarivatu and vicinity, *in Thurn 47, 269*; Sovutawambu, *Degener 14668*. NANDRONGA & NAVOSA: Nausori Highlands, *Melville et al. 7031*. SERUA: Inland from Korovisilou, *DF 496 (Damanu 135)*; hills north of Ngaloa, in drainage of Waininggere Creek, *Smith 9414*. NAMOSI: Trail between Nanggarawai and Wainimakutu, *Gillespie 3210*. RA: Vatundamusewa, vicinity of Rewasa, near Vaileka, *Degener 15452*. NAITASIRI: Wainisavulevu Creek, Wainimala River headwaters, *Hassall 117929*; Viria, *Parks 20446*; Nasinu, *Tothill 871*. TAILEVU: Hills east of Wainimbuka River, vicinity of Ndakuivuna, *Smith 7069*. REWA: Veisari, *Vaughan 3294*. OVALAU: Hills west of Lovoni Valley, on ridge south of Mt. Korolevu, *Smith 7627*. VANUA LEVU: MBUA: Upper Ndama River Valley, *Smith 1592*. THAKAUNDOVE: Savusavu Bay region, *Degener & Ordenez 13961*.

The closest relative of *Robiquetia bertholdii* is probably *R. mooreana* (Rolfe) J. J. Sm., of New Guinea and the Solomon Islands, a species with massive, many-flowered inflorescences with narrowly acuminate bracts up to 4–8 mm. long.

59. *SCHOENORCHIS* Reinw. ex Bl. Cat. Buitenzorg, 100, nom. nud. 1823; Reinw. in Hornsch. Syll. Pl. Nov. 2: 4. 1825; Reinw. ex Bl. Bijdr. Fl. Ned. Ind. 361. 1825, Tab. Pl. Jav. Orchid. t. III. 1825; J. J. Sm. in Natuurk. Tijdschr. Ned.-Indië 72: 99. 1912; Garay in Bot. Mus. Leaf. 23: 202. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 375. 1977; Seidenfaden in Opera Bot. 95: 66. 1988; Kores in Allertonia 5: 199. 1989; Lewis & Cribb, Orch. Vanuatu, 142. 1989.

Erect or pendulous epiphytic plants with short to long, usually branched, leafy stems; leaves caulescent, articulate, with overlapping, tubular, sheathing bases, the blades terete, linear or rarely linear-lanceolate and conduplicate, fleshy or coriaceous; inflorescences lateral, erect or pendulous, racemose or paniculate, few-many-flowered; flowers small, resupinate; sepals and petals free, slightly dissimilar, connivent or hardly spreading; labellum immobile, 3-lobed, spurred, frequently becoming somewhat thickened anteriorly, the spur more or less perpendicular to labellum, straight or somewhat inflexed distally, cylindrical or ellipsoid, sometimes septate, the lateral lobes erect, clasping the column, short, broad, the midlobe fleshy, laterally compressed, contracted at base, the disk often with a small callus or thickening near anterior side of entrance to spur; column short; column foot absent; clinandrium fairly deeply excavate; anther terminal, operculate, with a distinct, geniculately inflexed rostrum; pollinia 2, waxy, each deeply cleft to form 2 more or less unequal halves, borne on a common stipe, this linear-ligulate, the viscidium relatively large, oblong or narrowly elliptic; rostellum prominent, long, distinctly bilobed, the lobes porrect, acicular; stigma at base of column, small, marginate.

LECTOTYPE SPECIES: *Schoenorchis juncifolia* Reinw. ex Bl. (vide Garay in Bot. Mus. Leaf. 23: 202. 1972).

DISTRIBUTION: The Himalayas and southern China southward to Australia and eastward into the Pacific to New Caledonia, the New Hebrides, Fiji, and Samoa, with about 24 species. A single widely distributed species represents the genus in Fiji.

Although a few species of *Schoenorchis* have leaves that are linear-lanceolate, channelled, and occasionally reaching 1 cm. in width, the taxa found in Fiji and other Pacific archipelagoes all have terete or nearly terete leaves; consequently this character has been mentioned in the generic key to distinguish *Schoenorchis* from other closely related genera found in Fiji. On more technical grounds, the genus may be recognized

by the short, footless column with a basal, emarginate stigma, by the prominent, elongated restellum which ends in two porrect, acicular lobes, and by the anther, which ends in a distinct, abruptly inflexed beak.

USEFUL TREATMENT OF GENUS: SMITH, J. J. *Sarcanthus* Lindl. und die nächstverwandten Gattungen. *Natuurk. Tijdschr. Ned.-Indië* 72: 80-115. 1912.

1. *Schoenorchis micrantha* Reinw. ex Bl. *Cat. Buitenzorg*, 100, nom. nud. 1823, *Bijdr. Fl. Ned. Ind.* 362. 1825; J. J. Sm. in *Natuurk. Tijdschr. Ned.-Indië* 72: 100. 1912; Holtum, *Fl. Malaya* 1: 663. *fig. 200.* 1953; Backer & Bakh. f. *Fl. Java* 3: 440. 1968; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 375. *pl. 153.* 1977; Seidenfaden in *Opera Bot.* 95: 70. *fig. 37.* 1988; Kores in *Allertonia* 5: 200, excl. syn. *Ascocentrum micranthum*. 1989; Lewis & Cribb, *Orch. Vanuatu*, 142, excl. syn. *Ascocentrum micranthum*. 1989.

Dendrobium millingani sensu Seem. in *Bonplandia* 9: 259. 1861, Viti, 442. 1862; non F. v. Muell.

Sarcanthus seu *Saccolabium* sp. sensu Reichenb. f. in Seem. *Fl. Vit.* 298. 1868.

Schoenorchis densiflora Schlechter in *Repert. Sp. Nov. Beih.* 1: 986. 1913, in op. cit. 21: t. 347, no. 1339. 1928.

Epiphytic plant to 15 cm. long, the stem rooting basally, much branched, slender, terete, completely obscured by the persistent leaf sheaths, the internodes 3–5 mm. long; leaves more or less patent, 1.5–4 cm. long, about 2 mm. broad, the sheaths tubular, slightly inflated distally, with prominent longitudinal striations, the blades frequently curved abaxially, thick, fleshy, terete, slightly to moderately channelled dorsally, acute at apex; inflorescences unbranched, 2–5 cm. long, the peduncle much abbreviated, the rachis subdensely multifloowered; flowers initially white, sometimes also pink-tinged, gradually becoming yellow with age; sepals oblong to oblong-ovate, 1.5–2 mm. long, 0.6–0.8 mm. broad, slightly carinate distally, subacute at apex; petals slightly smaller, obliquely oblong-obovate, 1.3–1.8 mm. long, 0.3–0.5 mm. broad, subacute to obtuse at apex; labellum closely appressed to column throughout lower half, distally slightly curved abaxially, (excluding spur) about as long as petals, the spur saccate, about 0.9 mm. in diameter, the lateral lobes erect, fleshy, much broader than long, slightly convex on upper margins, the midlobe porrect, fleshy, laterally compressed, oblong-ovate, acute at apex, the disk with a low callus near anterior side of entrance to spur; column about 0.6 mm. long, greenish yellow; anther light yellow, with a large, abruptly inflexed, broadly triangular beak; pollinia subglobose, about 0.2 mm. in diameter, the stipe linear-ligulate, slightly dilated distally, about 0.2 mm. long, the viscidium narrowly elliptic; capsules fusiform, 0.8–1.2 cm. long, 0.4–0.7 cm. in diameter, weakly 6-ribbed.

TYPEIFICATION AND NOMENCLATURE: The type of *Schoenorchis micrantha* is *Blume s. n.* (L HOLOTYPE), collected in mountain forest in the Province of Salak, Java; *S. densiflora* is based on *Schlechter 17316* (B HOLOTYPE, destroyed; ISOTYPE at K), collected in February, 1908, in forest near Djamu, New Guinea. These two taxa were treated as conspecific by Hallé (1977) and also by Lewis and Cribb (1989); it now appears that *S. micrantha* is somewhat more variable than anticipated in my precursory treatment (1989).

DISTRIBUTION: Southeastern Asia to Java and eastward into the Pacific to Samoa. In Fiji *Schoenorchis micrantha* is found in dense or open forest at elevations of 725–900 m.; colonies are apparently small, since most known collections are unicates. Flowers have been noted in July and August; fruits between February and August.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *im Thurn 135* (K), *Degener 14845* (AMES); Mt. Matomba, Nandala, south of Nandarivatu, *Degener 14444* (AMES); valley of Nggaliwana Creek, north of the sawmill at Navai, *Smith 5351* (AMES, US). NANDRONGA & NAVOSA: Nausori Highlands, *Melville et al. 7038* (K); northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5536* (AMES, BISH, K, US). KANDAVU: Mt. Mbuke Levu, *Seemann 581* (K, W).

60. *CLEISOSTOMA* Bl. Bijdr. Fl. Ned. Ind. 362. 1825, Tab. Pl. Jav. Orchid. t. III. 1825; Garay in Bot. Mus. Leafl. 23: 168. 1972; Seidenfaden in Dansk Bot. Arkiv 23 (3): 7. 1975; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 376. 1977; Kores in Allertonia 5: 200. 1989; Lewis & Cribb, Orch. Vanuatu, 143. 1989.

Sarcanthus Lindl. Collect. Bot. pl. 39, B, nom. illeg. 1826; J. J. Sm. in Natuurk. Tidschr. Ned.-Indië 72: 81. 1912; non Lindl. (1824), nom. rejic. vs. *Acampe* Lindl. (1853).

Epiphytic plants with short to long, erect or dependent, unbranched, leafy stems; leaves few to many, more or less distichous, articulate, with tubular sheathing bases, the blades flat and conduplicate or sometimes terete, coriaceous or fleshy; inflorescences lateral, perforating the leaf sheath, erect or pendulous, many-flowered; flowers rather small, fleshy, resupinate; sepals free, usually spreading, slightly unequal; petals free, usually spreading, similar to sepals or somewhat narrower; labellum immobile, 3-lobed, spurred, the spur conical, cylindrical or rarely shortly saccate, often longitudinally septate, with a prominent callus on the posterior wall near mouth, the callus more or less grooved, either alone or in conjunction with an opposing callus on midlobe completely obscuring opening to spur, the lateral lobes ascending, usually small, subdeltoid, with the posterior margins adnate to column foot or base of column, the midlobe porrect or erect, usually deltoid or sagittate, often with a prominent callus or thickening near base; column short, stout, often somewhat broader near base; column foot very short, stout, or sometimes absent; clinandrium shallowly excavate; anther terminal, operculate, frequently somewhat rostrate; pollinia 2, waxy, more or less globose, each deeply cleft to form 2 unequal halves, borne on a common stipe, this usually narrow, linear or somewhat broadened near apex, rarely broadly rectangular, the viscidium small, subglobose or sometimes broad and hippocrepiform; stigma relatively small, transverse, more or less deeply recessed.

LECTOTYPE SPECIES: *Cleisostoma sagittatum* Bl.; vide Garay in Bot. Mus. Leafl. 23: 168. 1972. My 1989 discussion summarizes the status of *Cleisostoma* in respect to *Sarcanthus* Lindl., as clarified by Garay in 1972.

DISTRIBUTION: India through southeastern Asia and Malesia to northern Australia and eastward in the Pacific to Fiji, with approximately 160 (or perhaps fewer) species. The range of the genus terminates in Fiji with a single indigenous species.

1. *Cleisostoma longipaniculatum* Kores in Allertonia 5: 202. (Aug.) 1989. FIGURE 82.

Cleisostoma pacificum Cribb & B. Lewis in Lewis & Cribb, Orch. Vanuatu, 143. fig. 31, sine descr. lat. (Oct.) 1989, in Orchid Rev. 97: 251. (Oct.-Dec.) 1989.

Large epiphyte, with an elongate stem and leaves with blades 18–33 cm. long, with a large, paniculate, long-pedunculate, many-flowered inflorescence 20–45 cm. long and yellow to greenish yellow flowers.

TYPIFICATION AND NOMENCLATURE: *Cleisostoma longipaniculatum* is typified by *Smith 7416* (US 2190330 HOLOTYPE; many ISOTYPES), collected May 14, 1953, in hills southeast of the valley of the Mbureta River, Ovalau; *C. pacificum* is based on *Wheatly 302* (K HOLOTYPE; ISOTYPE at PVNH), from Pentecost, New Hebrides. The excellent illustration provided by Lewis and Cribb (1989) makes it clear that the two taxa are conspecific.

DISTRIBUTION: The New Hebrides and Fiji; in the latter archipelago is known only from Viti Levu and Ovalau, occurring in dense forest at elevations between 100 and about 500 m. Flowers have been noted in April and May and fruits only in May. Lewis and Cribb (1989) note that the species also occurs in the Solomon Islands and New Caledonia; the latter occurrence may refer to Hallé's mention of *Cleisostoma montanum* (J. J. Sm.) Garay (in Fl. Nouv.-Caléd. et Dépend. 8: 378. pl. 154. 1977).

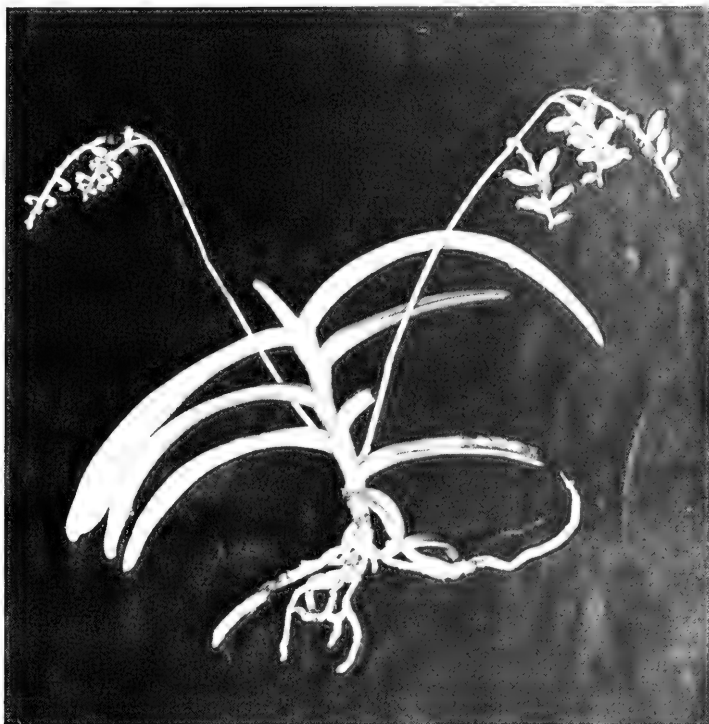


FIGURE 82. *Cleisostoma longipaniculatum*; flowering plant with developing capsules, collected for cultivation in Suva from near the Monasavu dam site, Viti Levu (R. H. Phillips, no voucher retained), \times about 1/5.

AVAILABLE COLLECTIONS: VITI LEVU: NAITASIRE: Vicinity of Monasavu dam site, R. H. Phillips s. n., May, 1989 (live material returned to Suva for cultivation). REWA: Summit of Mt. Korombamba, Hassall 048047 (K spirit). VITI LEVU without further locality, Simmonds s. n. (K spirit 13802). OVALAU: U. S. Expl. Exped. (AMES 76649, W), L. Jonsson 2451 (UPS).

The recently described *Cleisostoma longipaniculatum* is suggestive of *C. montanum* (J. J. Sm.) Garay, from Java, from which it is readily distinguished by its long inflorescences, large perianth segments (3.5–5 mm. long), and narrowly triangular lateral lobes (to 1×0.5 mm.) of the labellum.

61. POMATOCALPA Breda, Gen. Sp. Orchid. Asclep. [29]. t. [15]. 1829; J. J. Sm. in Natuurk. Tijdschr. Ned.-Indië 72: 81. 1912; Holtum, Fl. Malaya 1: 626. 1953; Backer & Bakh. f. Fl. Java 3: 441. 1968; Garay in Bot. Mus. Leaflet. 23: 189. 1972; Seidenfaden in Opera Bot. 95: 97. 1988; Kores in Allertonia 5: 203. 1989; Lewis & Cribb, Orch. Vanuatu, 145. 1989.

Epiphytic plants with short to long, erect or rarely climbing, leafy stems; leaves few to many, often congested, articulate, with somewhat flattened, often overlapping, sheathing bases, the blades oblong or ligulate, conduplicate in bud, coriaceous; inflorescences lateral, erect or pendulous, racemose or laxly paniculate, usually densely many-flowered; flowers small, fleshy, nonresupinate; sepals and petals free, slightly dissimilar, spreading; labellum immobile, 3-lobed, shortly spurred, the spur saccate, usually somewhat inflated distally, not longitudinally septate, with a prominent, linguiform appendage on inner surface of posterior wall above base, the appendage ascending, more or less extending to opening of spur, entire or weakly toothed at apex, the lateral lobes erect, small, broadly triangular, partially adnate to base of column along posterior margins, with the anterior margins incurved distally, the midlobe porrect or recurved, fleshy, usually semiorbicular or ovate-triangular; column short, stout; column foot absent; clinandrium shallowly excavate; anther terminal, operculate, shortly rostrate; pollinia 2, waxy, subglobose, each deeply cleft to form 2 unequal halves, borne on a common stipe, this slender, linear, with lateral margins often somewhat revolute, the viscidium small, usually narrowly obovate or subglobose; rostellum small, retrorsely reflexed distally, often appearing more or less malleiform in cross section, briefly 2-lobed at apex; stigma transverse, deeply recessed.

TYPE SPECIES: *Pomatocalpa spicatum* Breda, the only original species. Like the other plants described in Breda's work of 1828-1829, this species is based on material collected in Java by H. Kuhl and J. C. van Hasselt (Stafleu and Cowan, Tax. Lit. ed. 2. 1: 313. 1976), but it does not seem requisite to include the collectors' names in the authorship of *Pomatocalpa*, as listed by ING (1979).

DISTRIBUTION: India, Ceylon, and southeastern Asia through Malesia to northern Australia, the Solomon Islands, New Hebrides, Fiji, and Samoa, with about 35 species, one of which is indigenous in Fiji.

USEFUL TREATMENT OF GENUS: SMITH, J. J. *Sarcanthus* Lindl. und die nächstverwandten Gattungen. *Natuurk. Tijdschr. Ned.-Indië* 72: 80-115. 1912.

1. *Pomatocalpa vaupelii* (Schlechter) J. J. Sm. in *Natuurk. Tijdschr. Ned.-Indië* 72: 107. 1912; *Kores in Allertonia* 5: 203. 1989.

Saccolabium vaupelii Schlechter in *Repert. Sp. Nov.* 9: 110. 1911.

Erect or pendulous epiphytic plant up to 30 cm. long, the stem somewhat fleshy, about 8 mm. in diameter, densely foliate, completely obscured by the persistent, overlapping leaf sheaths; leaves ascending, the sheaths 1.2-2.2 cm. long, prominently striate, slightly inflated distally, the blades articulate, ligulate, 10-24 cm. long, (1.8-) 2.2-3.8 cm. broad, coriaceous, gradually angustate with leaf sheaths proximally, prominently and unequally bilobed at apex, the lobes obtuse at tips; inflorescences lateral opposite leaves, pendulous, racemose, 10-14 cm. long, the peduncle short, stout, terete, 1.5-3 cm. long, with 1 or more tubular sheathlike cataphylls at base, the rachis up to 11 cm. long, laxly to subdensely many-flowered, the bracts reflexed, small, broadly deltoid, 1-1.5 mm. long and broad; flowers patent, yellow with dark red to reddish brown blotches near bases of segments, with a few widely scattered hairs externally near base of sepals; odd sepal spreading, oblong to oblong-obovate, 5-7 mm. long, 3-4 mm. broad, fleshy, obtuse at apex; lateral sepals patent, obovate, slightly oblique, 4.5-6 mm. long, 3.5-4.5 mm. broad, broadly acute at apex; petals erect or weakly spreading, fleshy, narrowly oblong-obovate, slightly falcate, 5-6 mm. long, 2.5-3 mm. broad, glabrous, broadly rounded at apex; labellum porrect, shortly spurred, 3-lobed, 2.5-3 mm. long overall, fleshy, the spur saccate, slightly to moderately inflated distally, 3-4 mm. long, 2.5-3 mm. across, with a prominent lamellate appendage on posterior wall about midway, the appendage ascending, almost completely obscuring opening to spur, broadly oblong-ovate, 1.5-2 mm. long, about 1.5 mm. broad near base, obtuse at apex with a slightly erose margin, the lateral lobes

erect, broadly obtuse, 0.8–1.2 mm. long, 1.5–1.8 mm. broad, the midlobe small, fleshy, blade-like, transverse-ovate, 2–2.5 mm. long, 3–3.5 mm. broad, subacute to obtuse at apex; column short, stout, semiterete, 1.5–2 mm. long; column foot absent; clinandrium very shallowly excavate, the lateral margins slightly raised; anther transverse-ovate, operculate, about 1.75 mm. across, ultimately briefly retuse at apex; pollinia 2, subglobose, unequally divided, 0.4–0.5 mm. in diameter, the stipe oblong, 0.4–0.5 mm. long, with lateral margins slightly revolute, the viscidium obovate, 0.2–0.3 mm. long, 0.1–0.2 mm. broad; rostellum small, more or less oblong, 0.2–0.3 mm. long, 2-lobed; stigma transverse, deeply recessed; capsules cylindrical-fusiform, up to 2.5 cm. long, about 0.5 cm. in diameter, weakly 6-ridged.

TIPIFICATION: The type is *Vaupel 323* (B probable HOLOTYPE presumably destroyed), collected April 20, 1906, near Panafu, Savai'i, Samoa.

DISTRIBUTION: A rare species, presently known from only three Samoan collections (from Savai'i and Upolu) and from Viti Levu in Fiji, where it occurs in dense forest at elevations of about 50–1,100 m.; flowers have been obtained between September and December and in April, fruits in June, August, and October.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Vicinity of Nandarivatu, *im Thurn 271* (K), *Hassall 97913* (K spirit); western slopes of Mt. Nangaranambuluta, east of Nandarivatu, *Smith 4895* (AMES, unicate), *Jons-son 2319* (UPS). NAMOSI: Veinungga Creek, Navua River tributary, *Horne 886* (K); hills east of Wainikoroi-luva River, near Namuamua, *Smith 9039* (BISH, US). (*Im Thurn 271* is difficult to interpret, as the sheet bears three labels, two implying the locality as Nandarivatu and the dates as Nov. 22 and 26, 1906, with a bracketed [=269?]; the third label also gives the number 271 and the date Nov. 22, 1906, but states "common on rocks around Suva Harbour." The last locality seems highly questionable, in view of the duplicated date and the fact that no other collection of the species from near sea level is available, as might be anticipated if the species were common in the vicinity of Suva.)

62. *MICROTATORCHIS* Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 224. 1905, in Bot. Jahrb. 39: 88. 1906, in Repert. Sp. Nov. 9: 111. 1911, in Repert. Sp. Nov. Beih. 1: 998. 1913; Garay in Bot. Mus. Leaflet. 23: 187. 1972; Hallé in Fl. Nouv.-Caléd. et Dépend. 8: 388. 1977; Kores in Allertonia 5: 203. 1989; Lewis & Cribb, Orch. Vanuatu, 145. 1989.

Geissanthera Schlechter in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Südsee, 231. 1905.

Very small epiphytic plants with flattened, ribbonlike, photosynthetic roots, often devoid of leaves throughout much of the year, the stem very short, often defoliate; leaves if present crowded, small, articulate, deciduous, the blades usually oblong-ovate, membranous, conduplicate in bud; inflorescences lateral, erect, racemose, many-flowered, the rachis more or less fractiflex, often 4-angled or -winged, the bracts persistent, usually small, ovate-acuminate or less commonly subfoliaceous, with or without 2 small, decurrent, narrowly triangular to aristate, stipulelike appendages on either side at base, more or less apiculate at apex; flowers developing sequentially, very small, membranous, generally pale green to yellow, resupinate; sepals and petals fused throughout the lower 1/3 to 1/2 to form a distinct tube, the distal portions free, erect or slightly spreading, ligulate or ovate-attenuate; petals usually slightly shorter than sepals; labellum immobile, erect, entire or weakly 3-lobed, shortly spurred, the spur retrorse, small, scrotiform or saccate, frequently with a globular or dactyliform appendage within, with the opening partially or completely sealed by a hyaline septum, the base more or less excavate dorsally, the lateral margins becoming somewhat convolute distally, the apex subacute to obtuse, frequently with a retrorsely inflexed tooth or bristle; column very short, with 2 small, obtuse stelia at apex which project into excavation at base of labellum; column foot absent; clinandrium shallowly excavate; anther terminal, operculate, shortly rostrate; pollinia 2, waxy, subglobose, undivided, borne on a common stipe, this short to long, oblanceolate, the viscidium small; stigma transverse, deeply recessed.

LECTOTYPE SPECIES AND NOMENCLATURE: *Microtatorchis* was originally described with two species, *M. perpusilla* Schlechter, from New Guinea, and *M. fasciola* (Forst. f.) Schlechter, from the Pacific Islands. However, the second of these has four distinct pollinia and is correctly referred to *Taeniophyllum fasciola* (Forst. f.) Seem. *Microtatorchis perpusilla* is thus to be taken as the lectotype species of the genus (ING, 1979; cf. Kores, 1989). The type species of *Geissanthera* is *G. papuana* Schlechter; Schlechter himself combined the two genera in 1911 under the name *Microtatorchis*, although he later reinstated the name *Geissanthera* at infrageneric rank when he recognized two sections within *Microtatorchis* (1913; cf. Kores, 1989).

DISTRIBUTION: A genus of about 47 species occurring from the Philippines, Java, and Celebes eastward to parts of Micronesia and the Society Islands. Two species represent the genus in Fiji, both very rare, one endemic and one also found in Samoa.

KEY TO SPECIES

- Floral bracts reduced, scalelike, 0.5–0.8 mm. long, the stipulelike appendages deltoid to attenuate, less than 0.3 mm. long. 1. *M. samoensis*
 Floral bracts enlarged, subfoliaceous, up to 9 mm. long, the stipulelike appendages aristate, 1–2 mm. long. 2. *M. smithii*

1. *Microtatorchis samoensis* Schlechter in Repert. Sp. Nov. 9: 111. 1911; Kores in Allertonia 5: 205. 1989.

Microtatorchis schlechteri sensu Lewis & Cribb, Orch. Vanuatu, 145, quoad spec. vit. 1989; non Garay.

Small epiphytic plant 2–4 (–6) cm. tall, subcaulescent, the roots filiform, 0.8–1 mm. broad, up to 3 cm. long, glabrous; leaves oblanceolate, sometimes slightly oblique, 0.8–1.5 cm. long, 2–3 mm. broad, membranous, glabrous, narrowly angustate at base, acute at apex and slightly or not apiculate; inflorescences erect, 2–3 cm. tall, glabrous, the peduncle subequal to rachis in length, gradually becoming somewhat winged distally, the rachis slender, rather prominently winged, laxly few-flowered, with flowers developing sequentially, distichous, the bracts small, scalelike, ovate-acute, 0.5–0.8 mm. long, about 0.3 mm. broad, the stipulelike appendages deltoid, less than 0.3 mm. long; flowers very small, greenish yellow, glabrous; sepals and petals fused in the lower 1/3, 1.5–2 mm. long overall, the free portions of sepals sublanceolate, narrowly acuminate at apex, the free portions of petals slightly broader, ovate-acuminate, about half as long as free portions of sepals; labellum erect, narrowly elliptic-ovate, 1.5–2 mm. long, 0.4–0.6 mm. broad, with the lateral margins somewhat incurved throughout lower half, the spur globose to broadly obovoid, about 0.5 mm. in diameter, at apex within sometimes with a small dactyliform appendage 0.2–0.3 mm. long, the base cuneate, the apex narrowly attenuate or acuminate, the disk naked; ovary briefly pedicellate, 1–2 mm. long overall; capsules oblong-ovoid, frequently somewhat curved, 4–6 mm. long, 1.5–3 mm. in diameter, weakly 6-winged.

TIPIFICATION: The type is *Vaupele* 470 (HOLOTYPE presumably deposited in Schlechter's herbarium at B and destroyed; no isotypes seen), collected Sept. 20, 1906, in flower, at Mataana, Savai'i, Samoa.

DISTRIBUTION: Known only from Samoa (Savai'i) and Fiji, very rare in both archipelagoes. In Fiji it occurs as an epiphyte on the small twigs of trees in dense forest at elevations (on Viti Levu) of 725–1,120 m.; the Yathata specimen cited below may have come from near the summit of that island (256 m.). Flowers have been recorded in April, August, and September, fruits in July to September.

AVAILABLE COLLECTIONS: VITI LEVU: M8A: Western and southern slopes of Mt. Tomanivi, *Smith 5258* (AMES, unicate). NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5455* (AMES, unicate). RA: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi, *Smith 5730* (AMES, BISH, US, etc.). YATHATA: *DA*, April 2, 1968 (coll. *D. Koroiveibau*) (SUVA, probably unicate).

The probable close relationship between *Microtatorchis samoensis* and *M. paife* (Drake) Garay, originally described as *Taeniophyllum paife* by Drake in 1892, has been noted (Kores, 1989). Should they prove identical, the latter taxon, based on a Tahitian plant, would have nomenclatural priority.

2. *Microtatorchis smithii* Kores in *Allertonia* 5: 205. 1989.

Small, acaulescent epiphyte to 6 cm. tall, with filiform roots and leaves 6–12 × 3–5 mm., the inflorescences to 6 cm. tall; floral bracts subfoliaceous, 3–6.5 (–9) × 1.2–1.75 mm., with stipulelike appendages 1–2 mm. long; flowers greenish yellow.

TYPIFICATION: The type is *Smith 6142* (AMES 90942 HOLOTYPE), a unicate specimen obtained Sept. 18, 1947, in flower and fruit, on the northern portion of the Rairaimatuku Plateau between Mt. Tomanivi and Nasonggo, Naitasiri Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the holotype, found as an epiphyte in dense forest at an elevation of 870–970 m.

The recently described *Microtatorchis smithii* belongs to sect. *Geissanthera* and apparently has no closely related species in the Fijian Region. It seems most suggestive of the New Guinean *M. papuana* (Schlechter) Schlechter, differing in a number of floral characters (cf. Kores, 1989). It is readily distinguished from *M. samoana* Schlechter by its conspicuous, subfoliaceous floral bracts.

63. TAENIOPHYLLUM Bl. *Bijdr. Fl. Ned. Ind.* 355. 1825, Tab. Pl. Jav. Orchid. t. III. 1825; Reichenb. f. in Seem. *Fl. Vit.* 296. 1868; Schlechter in *Repert. Sp. Nov. Beih.* 1: 1008. 1913; C. E. Carr in *Gard. Bull. Straits Settlement.* 7: 61. 1932; Garay in *Bot. Mus. Leaflet.* 23: 205. 1972; Garay & Sweet, *Orch. S. Ryukyu Isl.* 158. 1974; Hallé in *Fl. Nouv.-Caléd. et Dépend.* 8: 380. 1977; van Royen, *Alpine Fl. New Guinea* 2: 806. 1979; Seidenfaden in *Opera Bot.* 95: 17. 1988; Kores in *Allertonia* 5: 206. 1989; Lewis & Cribb, *Orch. Vanuatu*, 149. 1989.

Small to minute epiphytic plants with photosynthetic roots, these appressed against the substrate or pendulous, spreading, strongly flattened and ribbonlike or rarely subterete, often long, the stem very short; leaves rudimentary, scalelike; inflorescences lateral, racemose, densely or laxly few-many-flowered; flowers distichous, small or medium-sized, ephemeral or lasting a few days, often resupinate, usually pale green to yellowish white; sepals and petals free or fused in proximal portion to form a tube, this fissured on the side with labellum, the free portions erect or weakly spreading, slightly dissimilar; labellum immobile, entire or 3-lobed, spurred, the spur frequently retrorse, short to long, with the opening often partially or entirely covered by a hyaline septum, the base often somewhat concave, the lateral margins more or less inflexed, the apex subacute to acute and sometimes provided within with a reflexed tooth or bristlelike appendage or truncate and unappendaged, the disk naked or with a single callus; column short, usually with 2 small to large lobes on adverse sides of apex which project into concave base of labellum; column foot absent; clinandrium rather shallowly excavate; anther proclined, often somewhat rostrate; pollinia 4, free, waxy,

equal or unequal in size, frequently obovoid or ellipsoid, borne on a common stipe, this short to long, slender, frequently somewhat dilated distally, the viscidium large; rostellum short to long, bifid at apex; stigma large, transverse, deeply recessed.

LECTOTYPE SPECIES: *Taeniophyllum obtusum* Bl., one of the five original species included in the genus by Blume (vide Garay in Bot. Mus. Leaflet. 23: 205. 1972). Although this lectotypification has been accepted by authors of a number of recent treatments, as well as by ING (1979), it has been disputed by van Royen (1979). For a discussion of this matter and a decision to accept Garay's suggestion, cf. Kores (1989).

DISTRIBUTION: Tropical Asia from Ceylon, India, and Japan southeastward into Malesia, and from northern Australia and Micronesia eastward in the Pacific to the Austral Islands, and also in Africa, with about 170 species. Of the four species now known to be indigenous in Fiji, *T. confusum* falls into subgen. *Codonosepalum* Schlechter and the other three into subgen. *Taeniophyllum*.

KEY TO SPECIES

- Sepals and petals fused throughout the proximal 1/3-1/2; plants minute; roots 1.5-3.5 cm. long, 0.75-1 mm. broad (subgen. *Codonosepalum*). 1. *T. confusum*
 Sepals and petals free to base; plants small; roots 3.5-30 cm. long, 2-5 mm. broad (subgen. *Taeniophyllum*).
 Inflorescences short and stout, the peduncle usually distinctly verruculose, 0.1-1 cm. long; roots flexuose. 2. *T. fasciola*
 Inflorescences long and slender, the peduncle glabrous or laxly puberulent, 3-8.5 cm. long; roots hardly or not flexuose.
 Lower surfaces of roots with conspicuous, pellucid, spotlike pneumathodes; peduncle glabrous; mid-lobe of labellum rectangular. 3. *T. smithii*
 Lower surfaces of roots with elongated pneumathode-like areas; peduncle glandular-puberulent; midlobe of labellum fleshy-navicular. 4. *T. gracile*

1. *Taeniophyllum confusum* Kores & Jonsson in Allertonia 5: 208. 1989.

Plants minute, the roots applanate, flexuose, 1.5-3.5 cm. long, 0.75-1 mm. broad, smooth, shiny; inflorescences 0.5-1.5 cm. long, laxly and minutely verruculose; flowers small, pale yellow, glabrous; sepals and petals connate into a tube throughout the proximal 1/3-1/2, 2.5-3 mm. long, the free portions of sepals more or less ligulate, the free portions of petals a little shorter than those of sepals, more or less ovate; labellum erect, entire, ovate-attenuate, channelled, 2.25-2.5 mm. long, 0.5-0.75 mm. broad, the spur subglobose, 0.75-1 mm. across, the apex with a small, inflexed, subulate appendage; capsules cylindric, 0.6-1.2 cm. long, 1-2.5 mm. in diameter, weakly 9-winged.

TYPIFICATION: The type is *Smith 6645* (US 1966828 HOLOTYPE; many ISOTYPES), collected Nov. 25, 1947, on the Seanggangga Plateau, in drainage of Korovuli River, vicinity of Natua, Mathuata Province, Vanua Levu.

DISTRIBUTION: Endemic to Fiji and apparently rare, known from only three collections (one a unicate separated from a different species) from north-central Vanua Levu. The species occurs as an epiphyte in dense or open forest at elevations between 100 and 300 m., flowering and fruiting in November and December. Probably species of *Taeniophyllum* are indiscriminate as to the host plant, but in this case all three available collections were associated with Euphorbiaceae, two of them growing on small to medium-sized branches of *Glochidion cordatum* Seem. ex Muell. Arg.

AVAILABLE COLLECTIONS: VANUA LEVU: MATHUATA: Southern slope of Mathuata Range, north of Natua, *Smith 6784a* (K); Seangganga Plateau near Natua, along Korovuli River, *Jonsson 2393*.

The only known representative of subgen. *Codonosepalum* sect. *Sepalocodon* Schlechter in Fiji, *Taeniophyllum confusum* is suggestive of the New Caledonian *T. graptolium* Hallé or the Australian *T. mulleri* Lindl. ex Benth., but there are well defined differences among these three species (Kores & Jonsson, 1989).

2. *Taeniophyllum fasciola* (Forst. f.) Seem. in *Bonplandia* **10**: 153. (June) 1862, Viti, 443. (Sept.) 1862; Reichenb. f. in *Seem Fl. Vit.* 296. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 311. 1892; Rolfe in *J. Linn. Soc. Bot.* **39**: 176. 1909; L. O. Williams in *Bot. Mus. Leafl.* **5**: 140. 1938; J. W. Parham in *Agr. J. Dept. Agr. Fiji* **19**: 104, as *T. fasciola*. 1948; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 35. 1953; Yuncker in *Bishop Mus. Bull.* **220**: 92. 1959; J. W. Parham, *Pl. Fiji Isl.* 294. 1964, ed. 2. 388. 1972; P. S. Green in *Kew Bull.* **23**: 344. 1969; Sykes in *New Zealand Dept. Sci. Indust. Res. Bull.* **200**: 264. 1970; St. John in *Phytologia* **36**: 381. 1977; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 382. 1977; Kores in *Allertonia* **5**: 209. 1989; Lewis & Cribb, *Orch. Vanuatu*, 149. *fig. M-V*, excl. syn *T. asperulum*. 1989. FIGURE 83.

Epidendrum fasciola Forst. f. *Fl. Ins. Austr. Prodr.* 60. 1786.

Limodorum fasciola Sw. in *Kongl. Vetensk. Acad. Nya Handl.* **21**: 230. 1800.

Vanilla fasciola Spreng. *Pl. Min. Cogn. Pugill.* **2**: 83. 1815; Gaud. *Voy. Uranie et Physicienne*, Freycinet, *Bot.* 427. 1829.

Taeniophyllum Seem. in *Bonplandia* **9**: 260. 1861.

Taeniophyllum seemanii Reichenb. f. in *Seem. Fl. Vit.* 296, as *T. seemanii*. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 311. 1892; L. O. Williams in *Bot. Mus. Leafl.* **5**: 141. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 35. 1953; J. W. Parham, *Pl. Fiji Isl.* 294. 1964, ed. 2. 388. 1972.

Microtatorchis fasciola Schlechter in *K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Schutzgeb. Sudsee*, 224. 1905; non Schlechter (1906, nom. illeg.).

Taeniophyllum decipiens Schlechter in *Repert. Sp. Nov.* **9**: 112. 1911.

Taeniophyllum parhamiae L. O. Williams in *Bot. Mus. Leafl.* **7**: 147. 1939; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* **2**: 71. 1953; J. W. Parham, *Pl. Fiji Isl.* 294. 1964, ed. 2. 388. 1972.

Taeniophyllum sp. Yuncker in *Bishop Mus. Bull.* **178**: 43. 1943.

Taeniophyllum minutissimum sensu Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 382, pro syn. 1977; non Schlechter (1906).

Taeniophyllum fasciola var. *fasciola*; Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 384. *pl. 156*. 1977.

Taeniophyllum fasciola var. *mutina* Hallé in *Fl. Nouv.-Caléd. et Dépend.* **8**: 386. *pl. 157*. 1977.

Plants small, the roots spreading, ribbonlike, flexuose, 10–30 cm. long, 2–5 mm. broad; inflorescences stout, usually densely verruculose, (0.5–) 1–4.5 cm. long, the peduncle short, terete, 0.1–0.5 (–1) cm. long, the rachis slightly fractiflex, 1–4 cm. long, laxly few-several-flowered, the bracts ovate, about 1 mm. long; flowers erect or ascending, pale yellowish white with the tips of the spur tinged with darker yellow, fugacious; sepals free, spreading, ovate to elliptic-ovate, 2.7–4 mm. long, 1–2 mm. broad, slightly carinate externally distally, subacute at apex; petals free, weakly spreading, ligulate to elliptic-ligulate, sometimes slightly falcate, 2.6–3.8 mm. long, 0.5–1 mm. broad, subacute at apex; labellum erect, entire, navicular, 1.6–2.2 mm. long, the spur perpendicular or slightly retrorse, short, subcylindric or conical, 0.8–2.2 mm. long, obtuse to subacute at apex, the disk naked; column very short, prominently 2-lobed at apex, the lobes deltoid, about as long as anther; anther subquadrate, about 1 mm. across, truncate at apex, weakly trilobulate; pollinia 4, ellipsoid to obovoid, nearly equal in size, 0.5–0.7 mm. long, about 0.3 mm. broad; ovary initially subsessile but gradually becoming somewhat pedicellate with age, laxly glandular-puberulent; capsules cylindric-fusiform, 1.8–3 cm. long, 3–8 mm. in diameter, 6-ribbed.

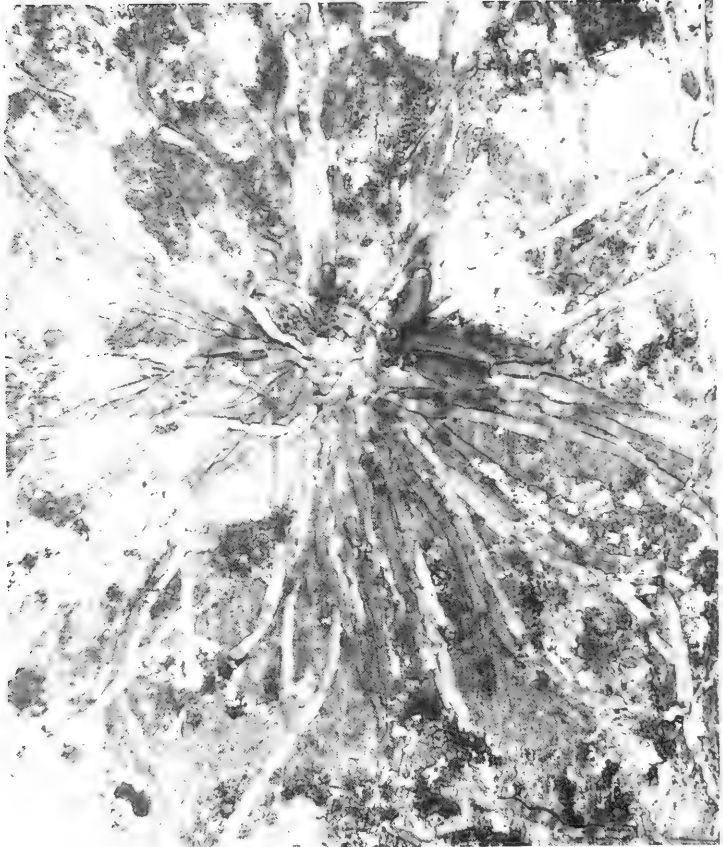


FIGURE 83. *Taeniophyllum fasciola*; mature plant with capsules, growing on the campus of the Fiji Institute of Technology, Suva, in May, 1989 (no voucher collected), about life-size.

TYPIFICATION AND NOMENCLATURE: *Epidendrum fasciola* is based on *J. R. & G. Forster* (BM LECTOTYPE; ISOLECTOTYPES at P (no. 172), w), collected on Tahiti during the second Cook voyage. *Taeniophyllum seemanii* was based on two collections; one of these, *Storck 907*, presumably from Moturiki or Ovalau, has not been located. The

appropriate type (Kores, 1989) is *Seemann 593* (K LECTOTYPE; putative ISOLECTOTYPES at AMES, BM, W 41558), collected in 1860 on Viti Levu probably from two localities, Namara (now in Tailevu Province) and the Navua River area, Serua Province. *Taeniophyllum decipiens* is typified by *Vaupel 278* (B HOLOTYPE, destroyed; ISOTYPES at AMES, BISH, K, MO), collected Jan. 15, 1906, near Aopo and Saleaula, Savai'i, Samoa. The type of *T. parhamiae* is *H. B. R. Parham 3* (AMES 50094 HOLOTYPE), collected in the old garden of the Parham house on Pender Street, Suva, Rewa Province, Viti Levu, on Aug. 24, 1938. The holotype consists of three small packets numbered 1, 2, and 3. Other collections obtained from the same locality but on different dates are also mounted along with the holotype. *Taeniophyllum fasciola* var. *mutina* is typified by *Mackee 29285* (P HOLOTYPE), collected at Balabio, Tiaodmoin, New Caledonia, on Sept. 16, 1974. No significant differences among the five concepts are apparent (Kores, 1989).

DISTRIBUTION: A very widely distributed species throughout the insular southern Pacific, found from New Caledonia northward to Guam and eastward to the Society Islands. The species is widespread in Fiji, occurring as an epiphyte in dry forest along rocky coasts and on offshore islets, on the inner edges of mangrove swamps, and sometimes in forested areas up to an elevation of approximately 500 m. In Fiji the species is now known from about 50 collections; it is a frequent volunteer on cultivated trees in gardens. Flowers and fruits seem most frequent between May and December.

LOCAL NAMES AND USES: *Nde ni thauthau* (*dust of the land breeze*); *mbevu*. The latter name was recorded by H. B. R. Parham (in Polynesian Soc. Mem. 16: 6. 1943), who indicated that Fijians consider the plant of medicinal value. The photosynthetic roots are crushed and rubbed on the affected area in treating lumbago and other pains of the lower back, while a drink made of the plant is used internally for abdominal pains.

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Inland from Lautoka, *Greenwood 59*. SERUA: Flat coastal strip in vicinity of Ngaloa, *Smith 9694*. NAMOSI: Valley of Wainandoi River, *Vaughan 3438*; Nanggara Island, *Jonsson 2473*. RA: Slopes of Nakorotumbu heights, opposite Narikoso Village, *Jonsson 2368*. TAILEVU: Korovou, *Jonsson 2374*; south of Naimasimasi, *Jonsson 2380*. REWA: Nasisi, Suva, *im Thurn 252*; Suva, *Gibbs 885*; Thurston Botanical Garden, Suva, *Jonsson 2385*. KANDAVU: Between Navuata and Vunisea, *Jonsson 2297*; Namalata Village, *DA 21274*. OVALAU: Above Levuka in dense mountain forest, *Jonsson 2433*. MOTURIKI: Between Niumbasanga and Nasauvuki, *Jonsson 2449*; Thangalai Island, south of Moturiki, *Jonsson 2448*. VANUA LEVU: MBUA: Lower Wainunu River Valley, *Smith 1833*. MATHUATA: Seanggangga Plateau, *Jonsson 2387*; hills along Mathuata coast, *Greenwood 601*; banks of lower Lambasa River, *Smith 6630*. THAKAUNDRIVE: Savusavu Bay, near Naingganggi Village, *DA 21403*; Savusavu Bay region, *Degener 13860a* (AMES). TAVEUNI: Between Somosomo and Lovonivonu, *Jonsson 2424*; south of Mbouma Village, track to Tevoro Falls, *Jonsson 2429*. VANUA MBALAVU: Evuevu Islet, northwest of main island, *Jonsson 2454*; small islet southeast of main island, *Jonsson 2455*.

Taeniophyllum fasciola is a representative of subgen. *Taeniophyllum* sect. *Taeniophyllum*, being the only member of the section to occur in Fiji. It is easily distinguished from the other Fijian species of the genus by its short, stout inflorescences with a distinctly verruculose rachis. Although no infraspecific taxa of *T. fasciola* have been maintained in the present treatment, the species is currently being studied by L. Jonsson (Institute of Systematic Botany, Uppsala), and a number of changes in its circumscription are to be anticipated.

3. *Taeniophyllum smithii* Kores & Jonsson in *Allertonia* 5: 211. 1989.

Plants small, the roots mostly free, pendulous, ribbonlike, hardly or not flexuose, 2.5–5 mm. broad and up to 30 cm. long, the upper surface smooth, shiny, the lower surface with numerous, scattered, pellucid, oblong pneumathodes; inflorescences long, slender, (3.5–) 5–10 cm. long, glabrous, the peduncle setiform, up to 8.5 cm. long, the rachis somewhat congested, distinctly fractiflex; flowers pale yellow with the bases of segments fading to white, the tip of the spur greenish yellow; sepals free, suberect, slightly dissimilar, oblong to oblong-elliptic, 2.25–2.75 mm. long, 0.75–1 mm. broad; petals free, erect, oblong-ligulate, slightly oblique, 2–2.5 mm. long, 0.5–0.75 mm. broad; labellum erect, 3-lobed, 2–2.5 mm. long, 1.5–2 mm. broad, the spur short, ovoid, 0.75–1 mm. long, about 0.6 mm. in diameter, the lateral lobes turned upward and embracing column, more or less rectangular, truncate at apex, the midlobe entire, rectangular, with lateral margins slightly turned upward, truncate at apex, the disk with a single, fleshy, ovate thickening at base of midlobe; capsules oblong-ellipsoid, 8–18 mm. long, 3–4 mm. in diameter.

TYPIFICATION: The type is *Smith 8547* (US 2191237 HOLOTYPE; many ISOTYPES), collected Sept. 17, 1953, in hills bordering Wainavindrau Creek, vicinity of Wainimakutu, Namosi Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known from three of the high islands as an epiphyte in forest from near sea level to about 800 m. Flowers and fruits have been noted between July and December.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Reserved mountain forest area east of Nandarivatu, *Jonsson 2340, 2342, 2347, 2353, 2356, 2358, 2360, 2364*. NANDRONGA & NAVOSA: Vicinity of Nandrau, *im Thurn 309*. NAITASIRI: Wainisavulevu Creek, upper Wainimala River basin, *Hassall 117919* (K spirit). REWA: Along Queen's Road about 2 miles west of Veisari River, *Vaughan 3306*. KANDAVU: Namalata Village above Vuniseru, *DA 21273, 21275*. VANUA LEVU: MATHUATA: Mt. Ndelaikoro, *Jonsson 2411*.

Quite distinct from other Fijian species of *Taeniophyllum*, *T. smithii* belongs to subgen. *Taeniophyllum* sect. *Loboglossum* Schlechter and is suggestive of, but readily separable from, the New Guinean *T. quadratum* Schlechter (Kores & Jonsson, 1989).

4. *Taeniophyllum gracile* (Rolfe) Garay in *Bot. Mus. Leafl.* 23: 206. 1972; Kores in *Allertonia* 5: 212. 1989. FIGURE 84.

Sarcophilus gracilis Rolfe in *J. Linn. Soc. Bot.* 39: 176. 1909; L. O. Williams in *Bot. Mus. Leafl.* 5: 138. 1938; B. E. V. Parham in *Trans. & Proc. Fiji Soc.* 2: 35. 1953; J. W. Parham, *Pl. Fiji Isl.* 294. 1964, ed. 2. 388. 1972.

Taeniophyllum vitiense L. O. Williams in *Bot. Mus. Leafl.* 5: 141. 1938; J. W. Parham, *Pl. Fiji Isl.* 295. 1964, ed. 2. 388. 1972.

Plants small, the roots appressed to bark of host and spreading, or mostly free and pendulous, ribbonlike, hardly or not flexuose, 3.5–20 cm. long, 2–4 mm. broad; inflorescences slender, 3.5–8 cm. long, few-several-flowered with flowers developing sequentially, the peduncle filiform, 3–7.5 cm. long, subdensely glandular-puberulent and laxly squamose, the rachis laxly flowered, fractiflex, 0.5–1.6 cm. long, the bracts ovate, 0.5–0.75 mm. long; flowers ascending or patent, greenish yellow to pale yellowish white; sepals and petals free, erect or weakly spreading, slightly dissimilar, lanceolate to oblong-lanceolate, 2.8–3.7 mm. long, 0.7–1.2 mm. broad, subacute to acute at apex; labellum erect, 3-lobed, ovate, channelled, 2.5–3 mm. long, 2–2.5 mm. broad, the spur retrorse, scrotiform-saccate, 1–1.5 mm. long, 0.75–1 mm. in diameter, the base dilated, concave, the lateral lobes turned upward, broad, obtuse, the midlobe fleshy, navicular, subacute and unappendaged at apex, the disk naked; column short, broad, about 0.75 mm. long; anther rostrate; capsules oblong-ellipsoid, 7–11 mm. long, 3–4 mm. in diameter, subdensely covered with small, spreading, obtuse, scalelike trichomes.

TYPIFICATION AND NOMENCLATURE: The type of *Sarcochilus gracilis* is Gibbs 727 (BM HOLOTYPE; ISOTYPE at K), collected in September, 1907, on a forested ridge in the vicinity of Nandarivatu, Mba Province, Viti Levu. *Taeniophyllum vitiense* is based on Smith 636 (AMES 42133 HOLOTYPE; many ISOTYPES), collected Nov. 28, 1933, on the southwestern slope of Mt. Mbatini, Thakaundrove Province, Vanua Levu. Garay was certainly correct in combining these taxa, between which no differences can be observed; presumably Williams did not examine Rolfe's species for its true generic identity.

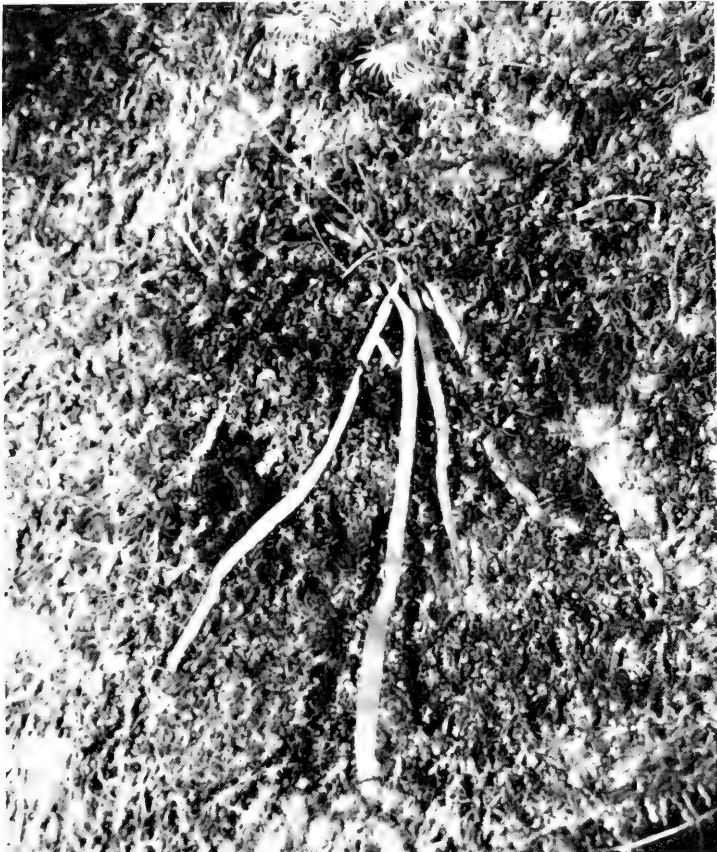


FIGURE 84. *Taeniophyllum gracile* from Mba Province, Viti Levu (Kores & Molvray F24); note old inflorescences to upper left of plant axis; about life-size.

DISTRIBUTION: Endemic to Fiji and now known from several of the islands. However, the species is apparently uncommon and is recorded from elevations between about 200 and 1,200 m. as an epiphyte in dense forest or montane thickets. It is often appressed to the bark of the host in association with bryophytes, but sometimes it is partially free and pendulous. Flowers and fruits have been found in months scattered throughout the year, but flowers mostly between November and March.

AVAILABLE COLLECTIONS: VITI LEVU: MBA: Slopes of Mt. Nairoso, eastern flank of Mt. Evans Range, *Smith 4387* (AMES; sterile but vegetatively appearing to belong here); upper slopes of Mt. Tomanivi, *Kores & Molvray F24*. NANDRONGA & NAVOSA: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith 5479*. NAMOSI: Korombasambasanga Range near summit of Mt. Vuimasia, *DA 2151* (coll. *B. E. V. Parham*); Namosi without further locality, *DA 3111*. RA: Ridge from Mt. Namama (east of Nandari-vatu) toward Mt. Tomanivi, *Smith 5717*. OVALAU: Summit of Mt. Tana Lailai and adjacent ridge, *Smith 7716* (us, unicate). NGAU: Mt. Ndelaitho, *Jonsson 2468*. TAVEUNI: East of Wairiki toward Des Voeux Peak, about 1,000 m., sterile, *Jonsson 2414*. YATHATA: Navukathuru, just below dense forest, in coconut plantation, sterile, *DA*, April 2, 1968 (coll. *D. Koroiveibau*).

Taeniophyllum gracile falls into subgen. *Taeniophyllum* and is a representative of sect. *Trachylepus* Schlechter, which otherwise does not occur as far east as Fiji.

SUPPLEMENT TO ORCHIDACEAE

Collections of Fijian orchids by Kores and Molvray in 1989 and a *DA* collection at SUVA are found to include three species of *Dendrobium* and *Bulbophyllum* that had not been known in Fiji at the time of my 1989 precursory study. These additional species are here discussed in a supplement, with comments as to their relationships, rather than in the preceding text, in order to obviate a revision of the numerical sequences and of the keys to species of the two large genera.

9a. ***Dendrobium delicatulum*** Kraenzl. in *Bot. Jahrb.* **16**: 17. 1893; T. Reeve & P. Woods in *Orchadian* **6**: 201. 1980, in op. cit. **7**: 18. 1981; Lewis & Cribb, *Orch. Vanuatu*, 109. *fig. 21*, *AEJ*, *pl. 6*, *B.* 1989; non F. v. Muell. & Kraenzl. (1894).

Small, creeping, mat-forming epiphytic plant up to 3 cm. tall, the rhizome elongate, laxly branched, about 1 mm. in diameter, the stems much reduced, 2–10 mm. distant from one another, pseudobulbous, globose to ovoid or rarely obovoid, 2–7 mm. long and in diameter, 2 nodes long, bifoliate at apex; leaves patent or weakly ascending, articulate, the sheaths very brief, tubular-complanate, hardly or not expanded distally, the blades ovate to elliptic, (3–) 9–15 mm. long, (2E) 5–8 mm. broad, coriaceous, broadly cuneate at base, minutely mucronate at apex; inflorescence borne at upper node of mature, often leafless pseudobulbs, much abbreviated, racemose, 1–3-flowered, the bracts clasping, ovate, about 3 mm. long, membranous; flowers erect, nonresupinate, often pale purplish pink or less commonly blue to violet, with the distal portion of the labellum somewhat darker in color; medial sepal erect, elliptic-lanceolate, 4–6 mm. long, 1.5–2 mm. broad, narrowly acute at apex; lateral sepals weakly spreading, lanceolate, 8–9.5 mm. long, 2–2.5 mm. broad, narrowly acute at apex; mentum retrorse, closely appressed to ovary, cylindrical, about 5 mm. long, obtuse at tip; petals weakly spreading, linear-oblancoolate, 4–5 mm. long, 1–1.5 mm. broad, narrowly acute at apex; labellum adnate to column foot, immobile, erect, entire,

ligulate, 7–9 mm. long, 1.5–2 mm. broad, the apex reflexed, acute, the disk usually with a small, reflexed, transverse callus about midway to apex; column semiterete, about 1.3 mm. long; column foot 4–5.5 mm. long; clinandrium shallowly excavate, broad, weakly trilobulate at margin; anther transversely obovate-cucullate, about 1.2 mm. across, broadly truncate at apex; pollinia oblong-obovoid, about 0.75 mm. long and 0.3 mm. broad; rostellum retroflex, transverse; stigma oblong-elliptic; ovary pedicellate, clavate, 7–9 mm. long overall, distinctly 5-ribbed.

TIPIFICATION AND NOMENCLATURE: As originally proposed by Kraenzlin in 1893, *Dendrobium delicatulum* was based on *Hellwig 303* (B HOLOTYPE, destroyed), from the Finisterre Range of what is now Papua New Guinea. Unfortunately this collection, apparently a unicate, is no longer extant, and no illustration was included in the protologue. Consequently, Reeve and Woods (1981) proposed *A. Millar NGF 22862* (LAE NEOTYPE; ISONEOTYPE at K), from Simba, Madang Province, Papua New Guinea, to serve as the nomenclatural type. It should be noted that the same binomial was later illegitimately applied to a second species of *Dendrobium* by von Mueller and Kraenzlin in 1894. Kraenzlin realized the error and attempted to rectify it by placing the original binomial of 1893 in the synonymy of *D. subacaule* Reinw. ex Lindl. However, most authors regard that species as distinct from *D. delicatulum* (sensu Kraenzlin, 1893). As a consequence there has been a certain amount of uncertainty surrounding the historical application of the name *D. delicatulum*. The correct application of this binomial was recently clarified in a detailed treatment by Reeve and Woods (1981).

DISTRIBUTION: A relatively widespread species, found in Celebes, New Guinea, Solomon Islands, New Hebrides, Fiji, and Ponape. The species has only recently been reported from Fiji and is known only from north-central Viti Levu, where it occurs at approximately 900 m. in dense forest.

AVAILABLE COLLECTION: VITI LEVU: MBA: Vicinity of Nandarivatu, *R. H. Phillips s. n.*, May 19, 1989 (living material collected for cultivation in Suva).

Dendrobium delicatulum is one of three species from Fiji of subgen. *Dendrobium* sect. *Oxyglossum*. It is readily distinguished from the other Fijian representatives of the section by its creeping habit, elongate rhizome, ovate or elliptic leaves, and ligulate labellum. In *D. prasinum* and *D. masarangense* the rhizome is much abbreviated, the pseudobulbs are closely approximate, the leaf blades are either ligulate or linear, and the labellum is noticeably broader toward apex. Although *D. delicatulum* was not included above in my key to the species of *Dendrobium*, it can be identified as follows:

Rhizome much abbreviated; pseudobulbs closely approximate; leaves linear or ligulate; outer perianth segments greenish white, white, or cream-colored.

Leaves 5–14 mm. broad, ligulate; ovary prominently 3-angled or triangular in cross section. 8. *D. prasinum*

Leaves 0.7–2 mm. broad, linear; ovary 5-ribbed or weakly 5-winged in cross section. 9. *D. masarangense*

Rhizome elongated; pseudobulbs 2–10 mm. distant from one another; leaves ovate or elliptic; outer perianth segments usually purplish pink or rarely blue or violet.

9a. *D. delicatulum*

20a. *Dendrobium reineckei* Schlechter in Repert. Sp. Nov. 9: 102. 1911.

Dendrobium gemellum sensu Kraenzl. in Bot. Jahrb. 25: 604. 1898; non Lindl.

Erect or ascending epiphytic plants up to 1 m. long, the rhizome much abbreviated, the stems closely spaced, slender, reedlike, hard, 0.2–0.4 cm. in diameter, distally multifoliate, many nodes in length, the internodes 1.5–3 cm. long, smooth, shiny; leaves ascending, articulate, the sheaths tubular, weakly striate, prominently lobed on upper margin opposite blade, obliquely oriented to stem after blade abscises, the blades linear-lanceolate, 8–15 cm. long, 0.4–0.7 cm. broad, chartaceous, cuneate at base, gradually tapering to a narrow obliquely acute apex; inflorescences borne at nodes throughout distal portion of stem, short, racemose, the peduncle slender, 1–1.5 cm. long, the rachis much abbreviated, 2-flowered, the bracts very small, triangular, about 1 mm. long, membranous; flowers weakly ascending or patent, resupinate, membranous, ephemeral, white with numerous light pink to red blotches; dorsal sepal erect, linear-lanceolate, up to 40 mm. long, 1.5–2 mm. broad, narrowly attenuate distally, filiform at apex; lateral sepals weakly spreading, obliquely linear-lanceolate, up to 40 mm. long, 2–3 mm. broad, narrowly attenuate distally, filiform at apex; mentum perpendicular, slightly inflexed distally, conical, 4–5 mm. long, obtuse at tip; petals similar to dorsal sepal; labellum adnate to column foot, immobile, arcuate, 3-lobed, 9–12 mm. long overall, 4–5 mm. broad, the lateral lobes turned upward, oblong-ovate, the midlobe narrowly triangular, with fimbriate lateral margins, the disk with 1 major and 2 minor carinae extending from base of labellum to base of midlobe; column brief; column foot slender, about 5 mm. long; clinandrium with upper margin entire.

TYPEFICTION: The type is *Reinecke 234* (B HOLOTYPE, probably destroyed; ISOTYPE at G), collected as an epiphyte on *Dysoxylum*, March, 1894, near the Letogo River, Upolu, Samoa.

DISTRIBUTION: Previously thought to be endemic to Samoa, but now also known to occur in Fiji, where it has been collected only once, on Taveuni, as an epiphyte on moss-covered rocks at an altitude of approximately 840 m., flowering in August.

AVAILABLE COLLECTION: TAVEUNI: Crater Lake, *DA 19886* (coll. J. & W. Ash) (SUVA), Aug. 11, 1984.

Dendrobium reineckei is very similar in appearance to *D. biflorum* (Forst. f.) Sw., but it is apparently much more rare in Fiji than the latter. It differs from *D. biflorum* in its enlarged, somewhat curved sheaths which surround the developing inflorescences, and in its larger, more attenuate flowers, which are conspicuously marked with pink or dark red spots. In *D. biflorum* the sheaths which surround the inflorescences are oblong-ovate and only about 5 mm. long, as opposed to 1–1.5 cm. in *D. reineckei*, and the flowers lack red spots. *Dendrobium reineckei* may be inserted into the key to the Fijian species of the genus as follows:

Leaf blades linear-lanceolate, 0.3–0.7 cm. broad; carina or carinae on labellum with the upper margin or margins entire or with only a few small teeth at apex.

Sheath surrounding developing inflorescences 0.3–0.6 cm. long; flowers cream-colored to pale yellow, not marked with red. 20. *D. biflorum*

Sheath surrounding developing inflorescences 1–1.5 cm. long; flowers white with numerous red or pink spots. 20a. *D. reineckei*

15a. *Bulbophyllum phillipsianum* Kores, sp. nov.¹ FIGURE 90 (lower left & lower right).

Dependent epiphytic plant, to 30 cm. long, the rhizome completely obscured by persistent sheaths, the pseudobulbs weakly ascending, unifoliolate, the leaves short-petiolate, with small, ligulate, dark green blades, the inflorescences solitary, very short, 1-flowered, the outer perianth segments white with 5–7 dark maroon stripes, the petals entire, the labellum broadly subelliptic and subdensely puberulent beneath.

TYPEFICTION: The type is *Kores & Molvray F27* (K HOLOTYPE; ISOTYPE at SUVA), collected May 21, 1989, about 300 m. past the rest house at Nandarivatu along the road to Navai, Mba Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from the immediate vicinity of Nandarivatu, Mba Province, Viti Levu, but appearing to be moderately common in this area as a dependent epiphyte on tree trunks and large branches in cutover forest under light to dense shade. Flowers were seen only in May.

The new species was first collected, for cultivation, by Richard H. Phillips, a horticulturist and orchid enthusiast resident in Suva, who brought the plant to my attention during a brief stay at Nandarivatu.

Bulbophyllum phillipsianum, with its dependent habit, rhizome covered by persistent sheaths, weakly ascending pseudobulbs, and short, solitary inflorescences, is probably best placed in subgen. *Schlechteria* sect. *Fruticola*; it is the second representative of this predominantly Papuanian section known to occur in Fiji. It appears to have no close relatives in the Fijian Region but is most similar in appearance to *B. curvicaule* Schlechter (in *Repert. Sp. Nov. Beih.* 1: 839. 1913, in op. cit. 21: t. 288, no. 1105. 1928), from New Guinea. However, *B. curvicaule* has pseudobulbs only 0.6–0.9 cm. long, its outer perianth segments are glabrous, its petals are obliquely oblong-ligulate, and the auricles at the base of its labellum are only weakly developed. In *B. phillipsianum* the pseudobulbs are (2–) 2.5–3 cm. long, the sepals are laxly to subdensely puberulent on the inner surfaces, the petals are distinctly spatulate, and the labellum has well-developed auricles at its base.

¹*Bulbophyllum phillipsianum* Kores, sp. nov.

Herba epiphytica dependens ad 30 cm. longa, radicibus supra basim plantae rhizoma arcte adpressis filiformibus flexuosis laevibus; rhizomate paulo elongato simplici vel interdum laxe ramoso tereti 3–5 mm. diametro vaginis persistentibus omnino occulto; pseudobulbis 0.5–1 cm. distantibus leniter adscendentibus ovoideis, (2–) 2.5–3 cm. longis, 1–1.5 cm. diametro, unifoliatis; folio erecto vel adscendenti breviter petiolato, petiolo comparate lato subcarinato 3–4 mm. longo, lamina coriacea atrovirenti ligulata, (5.5–) 6–7.5 cm. longa, 0.9–1.2 cm. lata, basi gradatim angustata, apice acuta; inflorescentia laterali solitaria adscendenti brevissima uniflora 0.6–0.8 cm. longa, scapo gracili tereti 0.4–0.6 cm. longo cataphyllis 2 vel 3 confertis vaginantibus praedito, pedicello brevissimo 1–2 mm. longo ovario articulato, bractea parva amplectenti oblique tubulari-infundibulari ad 2 mm. longa; floribus patentibus, perianthii segmentis externis albis et lineamenta 5–7 atro-coccinea praebentibus, labello atro-rubro basi vivide luteo; sepalo mediano patenti vel subreflexo ovato, 3.8–4.5 mm. longo, ca. 2 mm. lato, apice abrupte acuminato, intus laxe vel subdense puberulo; sepalis lateralibus patentibus vel subreflexis elliptico-ovatis, 3.8–4.5 mm. longis, 3.5–4 mm. latis, apice subacutis vel obtusis, intus laxe vel subdense puberulis; petalis porrectis spatulatis, 1.2–1.5 mm. longis, ca. 1.2 mm. latis, marginibus lateralibus apice subacutis laxe vel subdense puberulis; labello porrecto late subelliptico proxime et lateraliter subcomplanato, 2.5–3 mm. longo, ca. 1.5 mm. lato, pagina infera omnino subdense puberulo, basi manifeste auriculata, apice late rotundato, disco nudo; columna semitereti 1–1.2 mm. longa, brachiis subulatis ca. 0.75 mm. longis; columnae pede valido distalter parum incurvato ca. 1.5 mm. longo leniter canaliculato; clinandrio vadose excavato secus marginem dorsalem lobo prominenti subdeltoideo praedito; anthera ovato-galeata ca. 0.4 mm. lata apice subacuta; pollinibus binatim leniter cohaerentibus insignite dimorphis, paribus lateralibus majoribus ca. 0.5 mm. longis et 0.15 mm. latis, paribus mediis minoribus ca. 0.35 mm. longis et 0.15 mm. latis; rostellum brevi obtuso; stigmatibus parvo elliptico; ovario 2–3 mm. longo leniter 6-sulcato glabro. HOLOTYPE: FIJI: VITI LEVU: MBA: *Kores & Molvray F27* (K).

Among Fijian species of *Bulbophyllum* that share a dependent habit, *B. phillipsianum* is readily distinguished by its large, relatively closely spaced, ovoid to ovoid-ellipsoid, nonangular pseudobulbs, its brief, solitary inflorescences, and its fleshy, broadly subelliptic labellum. The key to the species of *Bulbophyllum* should be modified as follows:

- Inflorescences solitary, very short, the scape hardly or not elongated.
 Leaf blades 0.4–1.2 cm. broad, not ovate or elliptic-ovate; petals entire, not appendaged.
 Rhizome completely obscured by persistent sheaths; labellum subdensely puberulent beneath; sepals usually yellow or white with reddish purple stripes.
 Pseudobulbs 0.4–0.7 cm. long; leaves dark olive-green; labellum more or less oblong-ligulate, slightly arcuate. 15. *B. betchei*
 Pseudobulbs (2–) 2.5–3 cm. long; leaves dark green; labellum more or less elliptic, not arcuate. 15a. *B. phillipsianum*
 Rhizome not obscured by persistent sheaths; labellum glabrous; sepals pale yellow to yellowish white. 16. *B. sessile*
 Leaf blades 1.2–2 cm. broad, ovate to elliptic-ovate; petals divided into several conspicuous, cylindrical appendages. 17. *B. hexarhopalos*
 Inflorescences fasciculate, moderately elongated, the scape well developed.

Species doubtfully in Fiji

Pholidota imbricata Hook. Exot. Fl. 2: pl. 138. 1825.

A large epiphytic plant up to 66 cm. high, with pseudobulbous stems and oblong or oblong-obovate leaves 15–52 cm. long by 1.5–9 cm. broad; inflorescences pendulous, up to 46 cm. long, several- to many-flowered; flowers white to cream-colored, about 15 mm. in diameter, the labellum 3-lobed with the midlobe briefly bilobulate at apex.

TIPIFICATION: The species was originally based on *Wallich s. n.*, cultivated at Kew from living material collected in the Himalayas. According to M. Clements (Cat. Austral. Orch., 1989), this material is no longer extant, and the plate in Hooker's *Exotic Flora* should be considered the type.

The species is widespread in Asia, southeastern Asia, and Malesia, extending into northern Australia. In the insular Pacific it is known from New Caledonia, the Loyalty Islands, Solomon Islands, Santa Cruz Islands, and New Hebrides. It is reported to occur in Fiji by Lewis and Cribb (Orch. Vanuatu, 60. 1989), but no Fijian collections are cited, nor have I encountered such specimens. Given the size of this species and its conspicuous inflorescences, it seems doubtful that it would be overlooked by collectors, and its presence in Fiji must be considered dubious until adequate vouchers are obtained from that archipelago.

Spathoglottis unguiculata (Labill.) Reichenb. f. in Seem. Fl. Vit. 300, in obs. 1868.

A large terrestrial plant up to 1 m. tall, with lanceolate, plicate leaves up to 1 m. long; inflorescences erect, up to 1 m. tall, many-flowered; flowers rose to dark purple, about 4 cm. across, the labellum trilobed, the lateral lobes large, diverging from the midlobe at an acute angle, the midlobe with a brief claw and a terminal, transverse, elliptic or orbicular blade.

TIPIFICATION: *Limodorum unguiculatum* Labill., the basionym, is based on *Labillardiere s. n.* (P HOLOTYPE), from New Caledonia.

Spathoglottis unguiculata is found in New Caledonia, Isle of Pines, Banks Islands, and New Hebrides; it was recently reported from Fiji and the Horne Islands by Lewis and Cribb (Orch. Vanuatu, 57. 1989). However, no Fijian collections are cited, and all the specimens listed by Reichenbach (1868) represent *S. pacifica*. The presence of *S. unguiculata* in Fiji must be considered dubious.

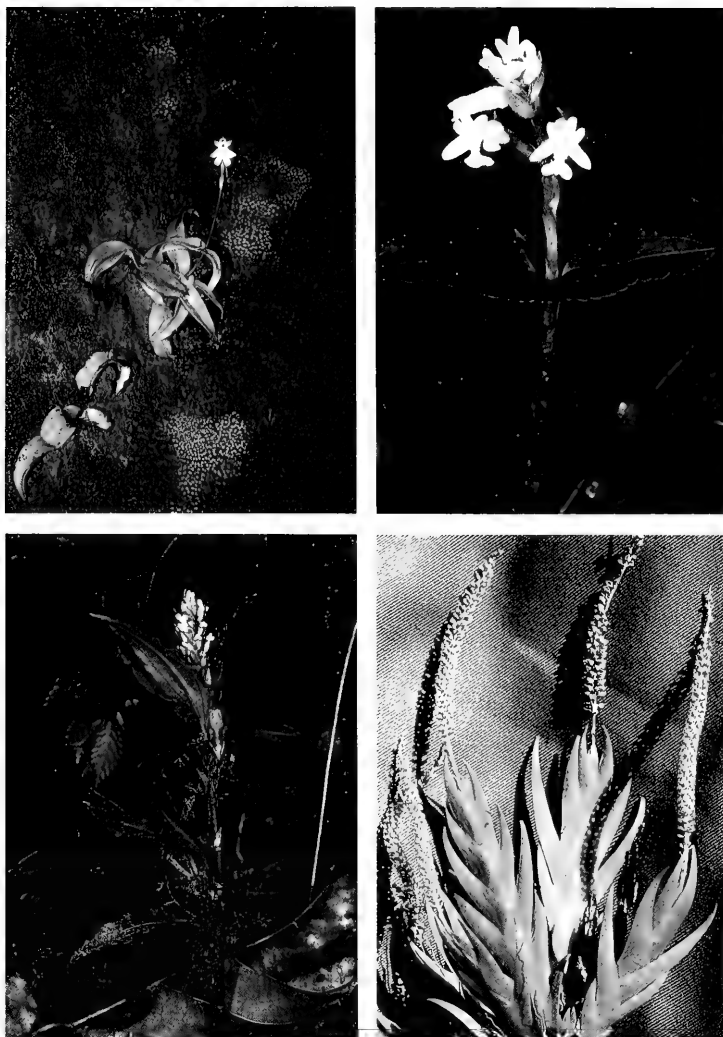


FIGURE 85. (Upper left) *Cynorkis fastigiata* on a steep clay bank in Naitasiri Province, Viti Levu (Kores & Molvray F9), \times about 1/4.

(Upper right) *Pristiglotis degeneri* in forest in Mba Province, Viti Levu (Kores & Molvray F21), \times about 1/2.

(Lower left) *Vrydagzynea vitiensis* in forest in Mba Province, Viti Levu (Kores & Molvray F25), \times about 1/2.

(Lower right) *Oberonia equitans*, from Mba Province, Viti Levu (Kores & Molvray F19), \times about 2/3.

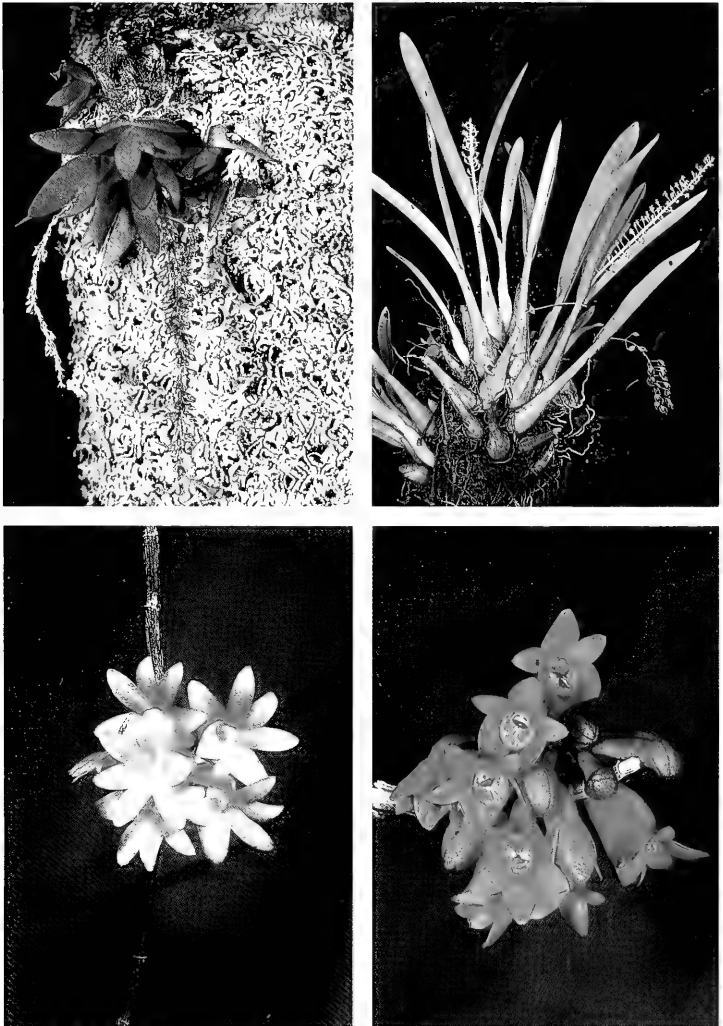


FIGURE 86. (Upper left) *Oberonia titania* in cutover forest in Mba Province, Viti Levu (photographed by Kores but not collected), \times about 2/3.

(Upper right) *Liparis condylobulbon*, from Tailevu Province, Viti Levu (Kores & Molvray F17), \times about 1/4.

(Lower left) An inflorescence of *Dendrobium catillare* in dense forest in Mba Province, Viti Levu (Kores & Molvray F20), about life-size.

(Lower right) An inflorescence of *Dendrobium mohlianum* in dense forest in Mba Province, Viti Levu (Kores & Molvray F22), about life-size.



FIGURE 87. (Upper) *Dendrobium macrophyllum* in cutover forest in Mba Province, Viti Levu (Kores & Molvray F30), \times about 1.4.
(Lower) Flowers of *Dendrobium macrophyllum* (Kores & Molvray F30), about life-size.



FIGURE 88. (Upper) An inflorescence of *Dendrobium tokai*, from a specimen cultivated in Suva, Rewa Province, Viti Levu (Kores & Molvray F1), \times about $1/2$.

(Lower left) Flowers of *Dendrobium kraenzlinii*, from a plant growing in Honolulu, cultivated from living material from Viti Levu (Gagné s. n.), slightly larger than life-size.

(Lower right) Inflorescences of *Dendrobium biflorum*, from a specimen cultivated in Suva, Rewa Province, Viti Levu (Kores & Molvray F15), about life-size.

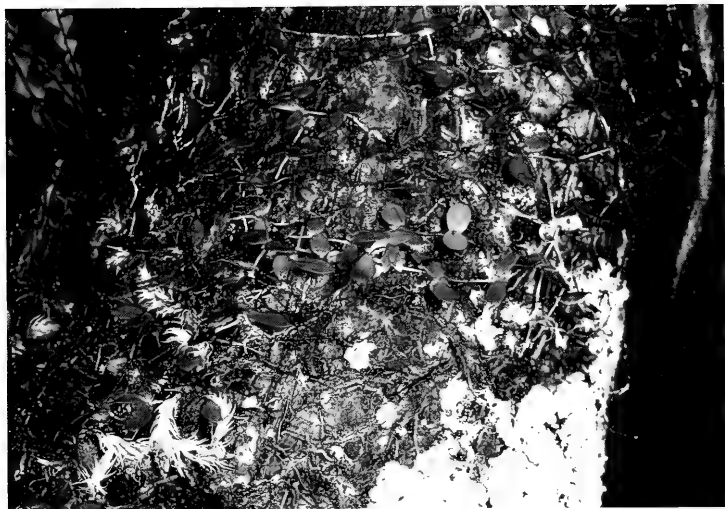


FIGURE 89. (Upper) *Eria bulbophylloides* in forest in Naitasiri Province, Viti Levu (Kores & Molvray F5), × about 1/2.

(Lower left) *Appendicula pendula* in forest in Naitasiri Province, Viti Levu (Kores & Molvray F12), × about 1/2.

(Lower right) *Calanthe hololeuca* in forest in Naitasiri Province, Viti Levu (Kores & Molvray F8), × about 1/5.

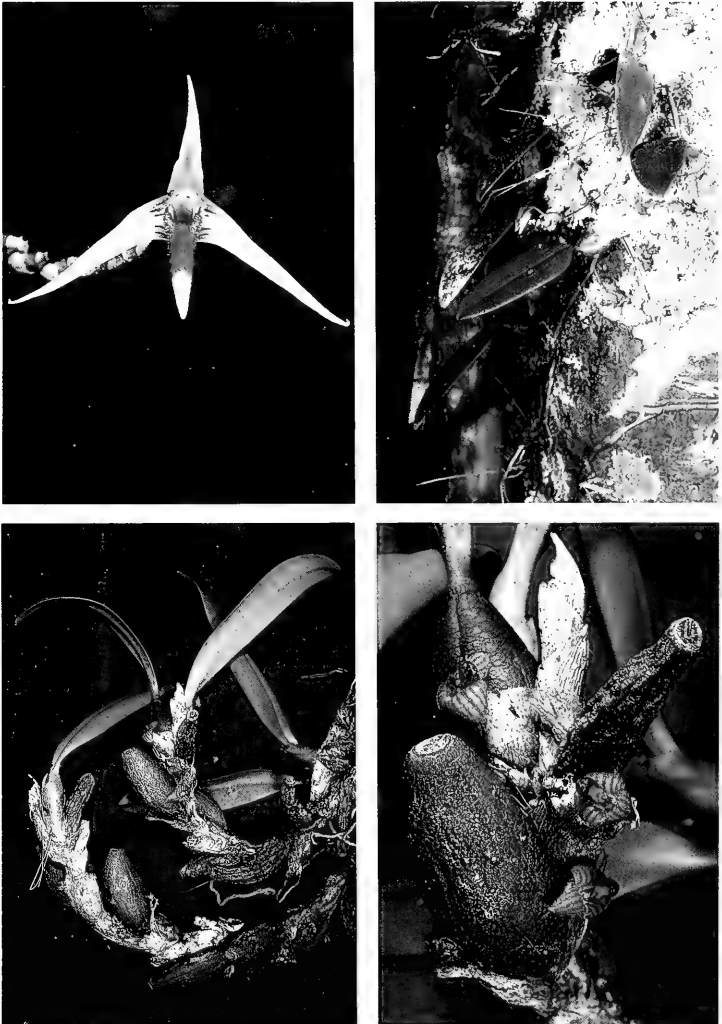


FIGURE 90. (Upper left) A flower of *Bulbophyllum longiscapum*, from a plant in forest in Naitasiri Province, Viti Levu (Kores & Molvray F6), about life-size.

(Upper right) *Bulbophyllum rostriceps* in forest in Naitasiri Province, Viti Levu (Kores & Molvray F10), \times about 1/2.

(Lower left) *Bulbophyllum phillipsianum* in cove forest in Mba Province, Viti Levu (Kores & Molvray F27), \times about 1/2.

(Lower right) Pseudobulbs and flowers of *Bulbophyllum phillipsianum* (Kores & Molvray F27), slightly larger than life-size.



FIGURE 91. (Upper left) An inflorescence of *Eulophia pulchra*, from a plant in forest in Naitasiri Province, Viti Levu (Kores & Molvray F7), \times about 1.2.

(Upper right) *Phreatia stenostachya* in forest in Mba Province, Viti Levu (Kores & Molvray F18), \times about 1.2.

(Lower) *Phreatia micrantha* in forest in Mba Province, Viti Levu (Kores & Molvray F23), \times about 1.3.



FIGURE 92. (Upper) A flower of *Degeneria vitiensis*, from a tree in forest in Namosi Province, Viti Levu (Miller 975), \times about 2. Photograph by J. M. Miller.

(Lower) A flower of *Degeneria roseiflora*, from a tree in Mathuata Province, Vanua Levu (Miller 1075), \times about 2. Photograph by J. M. Miller.

ADDENDA ET CORRIGENDA

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NAGEIA Gaertn. Fruct. Sem. Pl. 191.1788; G. Gordon, Pinetum, 134. 1858; de Laubenfels in Blumea 32: 209. 1987.

Decussocarpus de Laubenfels in J. Arnold Arb. 50: 340. 1969.

TYPE SPECIES: *Nageia japonica* Gaertn., nom. illeg. (*Myrica nagi* Thunb.) = *Nageia nagi* (Thunb.) Kuntze.

Nageia was proposed by Gaertner with a description combining characters of *Myrica* and a podocarpaceous plant. The latter has been included in a broad usage of *Podocarpus* L'Hér. ex Pers. (1807), which has been conserved over *Nageia*. Gordon (1858) lectotypified *Nageia* by its podocarpaceous element, and the generic name may be used in that sense by authors who wish to use it at the generic level (ICBN, Art. 14.6). It then replaces *Decussocarpus*, as indicated by de Laubenfels (in Blumea 32: 209-211. 1987), who provides several necessary new combinations. The name now to be used for the well-known Fijian timber tree, in place of *Decussocarpus vitiensis* (Seem.) de Laubenfels, is:

***Nageia vitiensis* (Seem.) Kuntze, Rev. Gen. Pl. 2: 800. 1891.**

Podocarpus vitiensis Seem. in J. Bot. 1: 33. pl. 2. 1863.

Decussocarpus vitiensis de Laubenfels in J. Arnold Arb. 50: 342. 1969; A. C. Sm. Fl. Vit. Nova 1: 99. fig. 34. 1979.

Vol. 1, p. 140 seq.

In discussing the representatives occurring in Fiji of the families of the general alliance of the Liliaceae, I adopted the circumscription of the order Liliales and a family sequence suggested by Takhtajan (1969, pp. 235-236). In recent decades monocotyledonous families have been intensively reexamined, with the result that specialists have redefined the boundaries of orders and families to such an extent that floristic students face a bewildering array of possible sequences and groupings of genera. For example, the 22 genera which in 1979 (pp. 140-176) I treated as falling into ten families of the order Liliales are now placed by Takhtajan (Syst. Magnol. 287-318. 1987) in 15 families belonging to seven orders. The same 22 genera are placed by Dahlgren et al. (Fam. Monocot. 107-344. 1985) in 14 families belonging to four orders. The four genera which I accepted as members of the Liliaceae are now to be placed in four different families which belong to three (Takhtajan) or two (Dahlgren et al.) orders, and there are left no representatives in Fiji of the family Liliaceae. In view of such new understandings of the interrelationships among monocotyledonous genera it is at present difficult for a floristic treatment to reflect any constant classification system.

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***Collospermum montanum* (Seem.) Skottsb.**

The known distribution of this species now includes the New Hebrides (cf. P. S. Green in Bramwell, Plants and Islands, 44. 1979), and therefore the species is not

endemic to Fiji. The range of the genus is also, by this discovery, extended to the New Hebrides from New Zealand, Fiji, and Samoa. New Hebridean specimens of *Collosspermum montanum* (all at κ) have been seen from Espiritu Santo (alt. 1,600–1,700 m.), Tanna (alt. 1,000–1,080 m.), and Aneityum (alt. 550–750 m.).

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In reference to my 1979 treatment of *Dianella*, the desirable acceptance of the family Phormiaceae has kindly been called to my attention by R. J. F. Henderson, as well as my oversight of the genus *Rhuacophila*. I am greatly indebted to Dr. Henderson for offering the following treatment of the family Phormiaceae as it occurs in Fiji.

FAMILY 14A. PHORMIACEAE

By RODNEY J. F. HENDERSON

(Queensland Herbarium, Brisbane)

PHORMIACEAE J. Agardh, *Theoria Syst. Pl.* 7. 1858.

Small to tall, rhizomatous, herbaceous perennials, the stems erect, leafy, the roots fibrous or tuberous (not in Fiji); leaves alternate, usually distichous, linear; inflorescence terminal, paniculiform, the flowers \char"26 , usually actinomorphic, usually 3-merous, hypogynous; perianth petaloid, the segments usually 6 in 2 distinct but similar series, imbricate; stamens 6 (rarely as many as 8), opposite perianth segments, the anthers 2-locular, introrse or extrorse, dehiscent by pores becoming longitudinal slits or by longitudinal slits, the pollen trichotomosulcate; ovary superior, 3 (rarely 4)-locular, with axile placentation, the ovules 2-many and 2-seriate in each locule, anatropous, the style entire, filiform, erect or slightly upcurving, the stigma terminal, punctiform, papillose; fruit a berry or a loculicidal capsule (not in Fiji), the seeds black, with copious endosperm, the embryo straight or nearly so, from about 1/3 to almost equaling the length of the endosperm; basic chromosome number $x = 8$.

DISTRIBUTION: Mainly in the Southern Hemisphere but with some genera extending north of the equator in southeastern Asia and the Pacific Basin area. Two genera are indigenous in Fiji.

USEFUL TREATMENT OF FAMILY: HENDERSON, R. J. F., & H. T. CLIFFORD. A recircumscription of the Phormiaceae Agardh. *Taxon* 33: 423–427. 1984. DAHLGREN, R. M. T., H. T. CLIFFORD, & P. F. YEO. The Families of the Monocotyledons—Structure, Evolution, and Taxonomy. I–XII, 1–520 (Phormiaceae, pp. 172–175). 1985. Springer-Verlag.

Most present-day authors have included this family within a broadly construed Liliaceae; additionally, those who maintain the Phormiaceae variously interpret its limits. As presently understood by me it contains some eight genera with about 40 species, but cladistic studies by H. T. Clifford (University of Queensland) and his students indicate that many genera presently included in the Anthericaceae should be moved into the Phormiaceae.

KEY TO GENERA

- Leaf sheaths compressed and keeled, fused into a short cylinder around stem at base and with sides almost wholly connate distally; medial bracts inconspicuous, deltoid-subulate; staminal filaments with a distinct distal struma, the anthers remaining straight after anthesis; seeds with a punctiform hilum. 1. *Dianella*
- Leaf lacking a distinct sheath, rounded and encircling stem below but not forming a closed cylinder; medial bracts foliaceous but smaller than leaves; staminal filaments fusiform, the anthers coiling after anthesis; seeds with a linear hilum. 2. *Rhuacophila*

1. *DIANELLA* Lam. ex Juss. Gen. Pl. 41. 1789.

Stems condensed or elongate; leaves usually differentiated into sheath and blade, borne along stem or toward apex of stem or branches, the sheath connate into a short cylinder around stem near base, the sides partly connate to form an occlusion zone distally, this more or less Y-shaped in cross section; inflorescence compound-cymose, partially bracteate, the flowers pedicellate, primarily in condensed racemiform cymules (bostryces); perianth segments blue, greenish blue, or white, spreading to reflexed, then convergent and marcescent; staminal filaments glabrous below and with a colored papillose struma distally, the anthers basifixed, remaining straight after dehiscence from terminal extrorse pores becoming lateral longitudinal slits; ovary with 2–12 pendulous ovules per locule; fruit a blue or rarely white berry containing 2–many seeds, these with a punctiform hilum; $2n = 8-64$.

LECTOTYPE SPECIES: Typification of the generic name has changed in accord with changes made in the ICBN in 1983; the type species is now the one containing the type of the only species name associated with Jussieu's protologue, namely *Dracaena ensifolia* L. = *Dianella ensifolia* (L.) DC.; vide R. J. F. Henderson in Fl. Australia 45: 479. 1987. This is a supersedure of the earlier typification (Henderson in Taxon 26: 136. 1977); the species from Mauritius with which Lamarck dealt, however, remains *Dianella ensata* (Thunb.) R. J. Henderson.

DISTRIBUTION: Mascarene Islands and tropical southeastern Asia (from Japan and Taiwan southward) to Malesia, Australia, New Zealand, and Pacific Islands including Hawaii, with 20–40 species depending upon the taxonomy accepted, but about 30 species appears likely. One species is indigenous in Fiji.

USEFUL TREATMENTS OF GENUS: SKOTTSBERG, C. *Dianella* Lam. Occas. Pap. Bishop Mus. 13: 234–240, 242. 1937. SCHLITTLER, J. Monographie der Liliaceengattung *Dianella* Lam. Mitt. Bot. Mus. Univ. Zurich 163: 1–283. 1940. SCHLITTLER, J. Unsere Gegenwaertige Kenntnis ueber die Liliaceengattung *Dianella* in Malesien. Blumea 6: 200–226. 1948. SCHLITTLER, J. Die Verbreitung der Liliaceengattung *Dianella* Lam. Mitt. Bot. Mus. Univ. Zurich 207: 1–38. 1957. HENDERSON, R. J. F. Typification of *Dianella* Lam. ex Juss. (Liliaceae). Taxon 26: 131–137. 1977. HENDERSON, R. J. F. *Dianella*. Fl. Australia 45: 194–225, 434–437, 476–485. 1987. HENDERSON, R. J. F. Nomenclatural studies in *Dianella* Lam. ex Juss. (Phormiaceae) I. Austrobaileya 2: 419–426. 1988.

The only comprehensive revision of *Dianella*, that of Schlittler (1940), is difficult to use, the taxonomy being inadequate, as the author (1948) later acknowledged; in many instances the nomenclature employed is quite erroneous according to the current ICBN (1988).

1. *Dianella adenanthera* (Forst. f.) R. J. Henderson in Austrobaileya 2: 421. fig. 1. 1988.

Anthericum adenanthera Forst. f. Fl. Ins. Austr. Prodr. 24. 1786.

Dianella ensifolia sensu Seem. in Bonplandia 9: 260. 1861, Viti, 443. 1862; Guillaumin in J. Arnold Arb. 13: 112. 1932; (?Yuncker in Bishop Mus. Bull. 220: 78. 1959, spec. n. v.); J. W. Parham, Pl. Fiji Isl. ed. 2. 357, p. p. 1972; non DC. in Redouté (1802).

Dianella intermedia sensu Seem. Fl. Vit. 312. 1868; Drake, Ill. Fl. Ins. Mar. Pac. 320. 1892; (?Gibbs in J. Linn. Soc. Bot. 39: 178. 1909, Gibbs 574, n. v.); Krause in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 15a: 295, p. p. 1930; Skotts. in Occas. Pap. Bishop Mus. 13: 234. 1937; Schlittler in Mitt. Bot. Mus. Univ. Zurich 163: 247. t. 9. 1940, in op. cit. 207: 30. 1957; (?Yuncker in Bishop Mus. Bull. 220: 79. 1959, spec. n. v.); A. C. Sm. Fl. Vit. Nova 1: 144, p. p., quoad fig. 47. B. D. 1979; non Endl. (1833).

Dianella nemorosa sensu (?Gibbs in J. Linn. Soc. Bot. 39: 178. 1909, Gibbs 573, n. v.); Schlittler in Blumea 6: 213. 1948; J. W. Parham, Pl. Fiji Isl. 263, p. p. 1964; non Lam. nom. inval. (1786) et illeg. (1792).

Dianella caerulea sensu Krause in Engl. & Prantl, Nat. Pflanzenfam. ed. 2. 15a: 295, p. p. 1930; non Sims (1801).

Dianella intermedia var. *norfolkensis* sensu F. Br. in Occas. Pap. Bishop Mus. 9 (4): 11. 1930; J. W. Parham, Pl. Fiji Isl. 263. 1964, ed. 2. 357. 1972; non sensu lectotypi.

Plant including inflorescence to about 1 m. tall, tufted, the tufts to about 8 cm. across at base, the aerial stems to about 20 cm. long, leafy throughout; leaves to about 75 cm. long, the sheath more or less completely occluded distally, the blade to 1.5 cm. broad, the midrib below and the margins scabrid or minutely toothed, sometimes only very sparsely so; inflorescence erect, exceeding foliage, the bostryces open but progressively contracted distally, 2-9-flowered, the pedicels to about 20 mm. long, decurving; perianth segments pale blue or greenish blue to white, the sepals to 6 mm. long, 5-nerved, the petals to 5.5 mm. long, 3-nerved; staminal struma yellow, the anthers red-brown; ovules 2 per locule; berry purplish black, obloid to ovoid and apically pointed, the seeds 3-4 mm. long, the testa black and very shiny.

TIPIFICATION AND NOMENCLATURE: The lectotype is *J. R. & G. Forster* (κ LECTOTYPE; ISOLECTOTYPES at C, GOET, κ), collected in New Caledonia on Cook's second voyage (Henderson, 1988). The plants from New Caledonia that G. Forster named *Anthericum adenanthera* represent three taxa belonging to at least two species, neither of which is the same as Endlicher's *Dianella intermedia* from Norfolk Island (Henderson, 1988, pp. 423-425. fig. 2), neotypified by *McComish* 47, sheet 1 (κ).

Dianella caerulea was recorded for Fiji by Krause in 1930 and was presumably based on the more elongate-stemmed form of *D. adenanthera*. As *D. caerulea* with all its varieties (Henderson, 1987) is presently considered confined to eastern Australia and Papua New Guinea, use of the name for Fijian material is considered a misapplication.

Dianella intermedia var. *norfolkensis* was based by F. Brown on two "reference types," *F. Brown* 162 (BISH) from New Zealand and *Bryan* 534 (BISH) from Fiji, neither of which is conspecific with Endlicher's *D. intermedia*. Indeed, they represent two different species, *D. nigra* Colenso (the only *Dianella* species occurring naturally in New Zealand) and *D. adenanthera* (from New Caledonia and Fiji). Following the current ICBN (Art. 7.4), and based on Brown's protologue, I herewith designate *F. Brown* 162 (BISH), from New Zealand, as lectotype of his varietal name, thus rendering it a synonym of *D. nigra* and hence misapplied to the Fijian plants of the short-stemmed form of *D. adenanthera*.

DISTRIBUTION: From present knowledge, *Dianella adenanthera* occurs in both New Caledonia and Fiji and possibly (or probably) extends more widely in the southern Pacific region. Determination of its complete distributional range must await a critical study of plants of *Dianella* in their natural habitats. Such a study would also establish whether or not the two forms of *D. adenanthera* currently recognized (short-stemmed and long-stemmed forms) are worthy of formal recognition. In lectotyping *D. adenanthera* in 1988 I noted that two species were represented in the New Caledonian Forster material, *D. adenanthera* (short-stemmed and long-stemmed forms, the former including the lectotype) and *Rhuacophila javanica*; all three of these taxa are also represented in Fiji.

LOCAL NAME: *Varavara* has been recorded by Bryan (in one instance with a query) for his Lauan plants, but that name is probably also applicable to plants of *Rhuacophila javanica*, as well as to various terrestrial orchids.

REPRESENTATIVE COLLECTIONS: *Short-stemmed form:* VITI LEVU: M&A: Upper slopes of Mt. Koromba, alt. 800-1,075 m., June, 1947, *Smith* 4703 (BISH). VANUA LEVU: MATHUATA: Summit ridge of Mt. Numbuiloa, east of Lambasa, alt. 500-590 m., Nov., 1947, *Smith* 6505 (BISH). LAKEMBA: On ridges and peaks at about 200 m. alt., Sept., 1924, *Bryan* 534 (BISH). *Long-stemmed form:* MAMANUTHAS: NGGALITO Island, Malolo Group, near coast, Feb., 1969, *O. & I. Degener* 32250 (BISH). VITI LEVU: M&A: Mt. Evans Range, Jan., 1964, *DA* 14532 (coll. *D. Koroiveibau*) (SUVA); Nandarivatu, Jan., 1940, *B. E. V.*

Parham, p. p. (inflorescence only) (SUVA); Nandarivatu, near old D. C. house, Dec., 1968, *O. & I. Degener 31998* (BISH). NAMUKA-I-LAU: Alt. 10–20 m., Aug., 1924, *Bryan 473* (BISH). FULANGA: On limestone formation, alt. 0–80 m., Feb., 1934, *Smith 1195* (BISH).

There appears to be some correlation between stem length and habitat and altitude. The short-stemmed forms seem to occur in forest at comparatively high altitude, whereas the long-stemmed forms appear to be in more open/cleared areas at lower altitudes (down to sea level). But of course this needs further investigation.

2. *RHUACOPHILA* Bl. Enum. Pl. Javae, 13. 1827.

Stems always elongate; leaves sheathing stem at base but not differentiated into distinct sheath and blade separated by zone of almost total bilateral fusion, not connate into a cylinder about the stem proximally; inflorescence compound-cymose, partially bracteate, the flowers pedicellate, primarily in few-flowered, racemiform cymules (bostryces); perianth segments pale blue to white, or lilac or yellow (not in Fiji), spreading, mostly deciduous; staminal filaments glabrous except for a supramedi- al, fusiform, yellow, papillose struma, the anthers basally dorsifixed, coiling after anthesis, dehiscent by lateral, longitudinal slits; ovary with 8–20 erect to pendulous ovules per locule; fruit a purple to black berry containing many seeds, these with a linear hilum.

TYPE SPECIES: *Rhuacophila javanica* Bl.

DISTRIBUTION: From Malesia throughout Papua New Guinea and the Solomon Islands to New Caledonia (including Île des Pins) and Fiji, where the generic range terminates. The genus contains a single species.

USEFUL TREATMENTS OF GENUS: SCHLITTLER, J. (Within *Dianella*, as cited above under that genus.) JESSOP, J. P. (As *Dianella javanica*) Fl. Males. I. 9: 209. 1979.

Until recently most concerned authors have included *Rhuacophila* within *Dianella*, but it differs from that genus in several fundamental ways. *Rhuacophila* is more closely related to *Stypandra* R. Br., in the sense of Henderson (1987), than it is to *Dianella* with respect to form of stem, leaves, bracts, flowers, stamens, and seeds. However, unlike *Stypandra*, its fruit is a berry, not a capsule, and thus it should be kept distinct from *Stypandra* at least until further studies are undertaken.

1. *Rhuacophila javanica* Bl. Pl. Javae, 14. 1827.

Dianella javanica Kunth, Enum. Pl. 5: 52. 1850; Schlittler in Mitt. Bot. Mus. Univ. Zürich 163: 241. t. 1. 1940; Jessop in Fl. Males. I. 9: 209. 1979.

Dianella nemorosa sensu (?Gibbs in J. Linn. Soc. Bot. 39: 178. 1909, *Gibbs 573*, n. v.); J. W. Parham, Pl. Fiji Isl. 263, p. p. 1964; non Lam. nom. inval. (1786) et illeg. (1792).

Dianella ensifolia sensu J. W. Parham, Pl. Fiji Isl. ed. 2. 357, p. p. 1972; non DC. in Redouté (1802).

Dianella intermedia sensu A. C. Sm. Fl. Vit. Nova I: 144, p. p., quoad fig. 47. A. C. 1979; non Endl. (1833).

Plant including inflorescence to about 2 m. tall, tufted, the tufts to about 20 cm. across at base, the aerial stems branched or unbranched, scaly for most of their length below, leafy only distally, the scales deciduous; leaves to about 45 cm. long, the blade 0.7–4 cm. broad, with several prominent longitudinal veins, the midrib and margins smooth; inflorescence rounded (in outline), partially exceeding foliage, the bostryces open, 2–4-flowered, the pedicels to about 20 mm. long, spreading, decurving distally; perianth segments pale blue to white, 6–12 mm. long, 5-nerved; staminal struma pale yellow, the anthers yellow; ovules 8–20 per locule; berry purplish to black, ellipsoid, more or less rounded apically, the seeds to about 2 mm. long, the testa usually matt black.

TIPIFICATION AND NOMENCLATURE: The lectotype, here first chosen, is a sheet from *Blume 419* (L 903.316-77 LECTOTYPE), from volcanic areas on Mt. Gedé, Java, one of a number that could just as easily serve the purpose. A lectotype is designated because

Blume's original material, mounted on seven sheets, includes three different sheets annotated by three different hands as "type" of Blume's name. Of these three, the above specified sheet at L, the only one with both flowers and fruits, is the most suitable lectotype. The subsequent combination under *Dianella* by Kunth for this plant is thus also lectotypified by this specimen. The above-cited references to *D. nemorosa* in Fiji refer at least in part to *Rhuacophila javanica*, as do the references to *D. ensifolia* and *D. intermedia*.

DISTRIBUTION: As of the genus; in Fiji the species is thus far known with certainty only from altitudes of 800–1,323 m. in north-central Viti Levu.

LOCAL NAME: *Vavara* (recorded only by *O. Degener et al.* 31997).

REPRESENTATIVE COLLECTIONS: VITI LEVU: MBA: Nandarivatu and vicinity, Nov., 1927, *Gillespie 3903* (BISH), Jan., 1940, *B. E. V. Parham*, p. p. (leaves only) (SUVA), Nov., 1940, *Degener & Ordenez 13547* (BISH), Feb.–Mar., 1941, *Degener 14588* (BISH), Nov., 1961, *H. W. Simmonds* (SUVA); slopes and summit of Mt. Tomanivi, July, 1947, *Smith 5146* (summit) (BISH), Feb., 1951, *DA 7132* (coll. *B. E. V. Parham*) (SUVA), Jan., 1966, *DA 14650* (coll. *D. Koroiveibau*) (SUVA), Dec., 1968, *O. & I. Degener & T. B. Ketewai 31997* (BISH).

Although its currently known distribution in Fiji is from a fairly restricted area, *Rhuacophila javanica* is to be anticipated elsewhere on Viti Levu and perhaps on other islands in similar habitats.

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Changes in the conservation of the genus *Cordyline* and in the correct name of its most common species are noted (cf. Brummitt & Marais in *Taxon* 30: 825–826. 1981; Brummitt et al. in op. cit. 33: 300. 1984; Fosberg in *Baileya* 22: 180–181. 1985; ICBN (Berlin ed., 1988): 176).

CORDYLINE Commerson ex R. Br. Prodr. Fl. Nov. Holl. 280. 1810. Nom. cons.

TYPE SPECIES: *Cordyline cannifolia* R. Br. (typ. cons.).

Cordyline fruticosa (L.) A. Chev. Cat. Pl. Jard. Bot. Saigon, 66. 1919.

As well discussed by Fosberg (1985), the binomial *Cordyline fruticosa* Goepp. (in *Nova Acta Acad. Leop.-Carol.* 25: 53. 1855) is a nomen nudum and does not prevent the use of the basionym *Convallaria fruticosa* L. for this species. *Cordyline terminalis* (L.) Kunth (based on *Asparagus terminalis* L., 1762) has been more commonly used in botanical literature referring to the Pacific, but that binomial must now be considered a synonym of *C. fruticosa*.

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In reference to the genus *Hymenocallis*, add:

USEFUL TREATMENT OF GENUS: SEALY, J. R. Review of the genus *Hymenocallis*. *Kew Bull.* 1954: 201–240. 1954.

I am indebted to L. M. Hume (National Tropical Botanical Garden) and G. Staples (Bishop Museum) for calling my attention to the fact that some of the cultivated and naturalized plants of *Hymenocallis* passing in Pacific archipelagoes as *H. littoralis* (Jacq.) Salisb. do not represent that species. That there has been much uncertainty regarding the limits and nomenclature of the species of *Hymenocallis* was pointed out by Sealy (1954), who reviewed the genus in order to clarify the identity of commonly cultivated species. Quite probably more than one species of the genus is to be found in cultivation or naturalized in the Pacific, but the single collection from Fiji referred by me in 1979 to *H. littoralis* is better placed in the following species.

Hymenocallis pedalis Herbert, Appendix, 44. 1821, Amaryllidaceae, 214. 1837; Sealy in Kew Bull. 1954: 225. 1954.

TYPIFICATION: The type was from a plant grown in Herbert's garden, said by him to have been introduced into the Liverpool Botanic Garden but of unknown origin (Sealy, 1954, who cites specimens from Colombia and Brazil in addition to cultivated or naturalized collections from Africa).

DISTRIBUTION: Tropical America, probably widely cultivated and sometimes naturalized in other tropical areas. In the Pacific, specimens referable to the species are noted from Tonga (L. M. Hume, in litt.), Niue, Samoa, and Hawaii, as well as Fiji, where it is documented only by the Ovalau collection cited by me in 1979.

Hymenocallis pedalis is characterized by its long and slender perianth tube, its funnel-shaped staminal cup with erect margins, and its perianth segments being free from the staminal cup; in *H. littoralis* the staminal cup has the margins widespreading-rotate, and the perianth segments are closely appressed to it proximally. Additionally, the leaves of *H. pedalis* are usually considerably the broader, 3-6 (-7.4) cm. broad in the upper two-thirds, while those of *H. littoralis* are 2-3.8 cm. broad in the upper two-thirds.

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Add to the synonymy of:

Smilax vitiensis (Seem.) A. DC.

Smilax tongaensis St. John in Bull. Torrey Bot. Club 105: 230. fig. 1. 1978.

The holotype of *Smilax tongaensis*, Krauss 1386 (BISH), from Tongatapu, Tonga, does not differ materially from 20 or more other Tongan collections available at BISH; this material is approximately median in the normal variability to be found among the numerous Fijian collections of the common *S. vitiensis*.

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In reference to the genus *Heliconia*, add:

USEFUL TREATMENT OF GENUS: KRESS, W. J. The taxonomy of Old World *Heliconia* (Heliconiaceae). Allertonia 6: 1-58. fig. 1-27. 1990.

In his valuable review of the paleotropical species of *Heliconia* (Moluccas to Samoa), Kress recognizes six species, one of them with five varieties, and places them in subgen. *Heliconiopsis* (Miq.) W. J. Kress, pointing out strong characters that separate them from the neotropical species of the genus.

Heliconia paka A. C. Sm.; W. J. Kress in Allertonia 6: 32. fig. 1, C, 2, E, F, 12, 22, A, B. 1990.

In first describing *Heliconia paka* (in Contr. U. S. Nat. Herb. 37: 69. 1967), I considered it a Fijian endemic, hesitating to combine with it the available Samoan material. Subsequently, however (in Allertonia 1: 340. 1978; in this *Flora* 1: 188. 1979), I decided that Fijian and Samoan specimens could be combined into a reasonable concept of *H. paka*. Kress, in his recent study, finds good separating characters and describes the Samoan element as a new species, *H. laufao* W. J. Kress. Thus, *H. paka* is now properly to be taken as endemic to Fiji. In listing Fijian material available to him, Kress cites a specimen from Ovalau, the fifth island from which it is known; he also cites a specimen cultivated in Hawaii.

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(p. 192) ZINGIBERACEAE. At end of paragraph "USEFUL TREATMENTS OF FAMILY," add:

BURTT, B. L., & R. M. SMITH. *Etilingera*, the inclusive name for *Achasma*, *Geanthus* and *Nicolaia* (Zingiberaceae). *Op. cit.* 43:235–241. 1986. SMITH, R. M. New combinations in *Etilingera* Giseke (Zingiberaceae). *Op. cit.* 43:243–254. 1986.

(p. 193) KEY TO GENERA:

Steps leading to genera 4 and 5 may be eliminated and the preceding step may lead to a single genus: 4. *Etilingera*. Thus, only six genera of Zingiberaceae are represented in Fiji, not seven.

(pp. 198, 199) Replace genera 4 (NICOLAIA) and 5 (GEANTHUS) by:

4. *ETLINGERA* Giseke, *Prael. Ord. Nat. Pl.* 209, 229, 251, as *Etilingera*. 1792; Burtt & R. M. Sm. in *Notes Roy. Bot. Gard. Edinburgh* 43: 239. 1986. (*Nicolaia* Horan. (1862) and *Geanthus* Valetton (1914) are to be listed as synonyms.)

TYPE SPECIES: *Etilingera littoralis* (König) Giseke (*Amomum littorale* König).

The generic name *Amomum* Roxb. (1820) was first conserved in the Seattle (1972) edition of ICBN, as proposed by Burtt and Smith in *Taxon* 17: 730–731. 1968, with *Etilingera* Giseke (1792) as one of the nomina rejicienda. The same situation has persisted through the Berlin (1988) edition, although obviously *Etilingera* should now be removed as a nomen rejiciendum, as permitted by ICBN Art. 14.6.

Nomenclatural questions raised in the discussions of the genera *Nicolaia* and *Geanthus* are resolved by the 1986 publications of Burtt and Smith. Both these genera are reduced to *Etilingera*; the two species of *Etilingera* known to occur in Fiji may be readily distinguished by the key steps leading to the genera *Nicolaia* and *Geanthus* (p. 193).

(p. 199) Replace *Nicolaia elatior* by:

1. *Etilingera elatior* (Jack) R. M. Sm. in *Notes Roy. Bot. Gard. Edinburgh* 43: 244. 1986. (*Nicolaia elatior* (1862) is to be listed in synonymy.)

(p. 200) Replace *Geanthus cevuga* by:

2. *Etilingera cevuga* (Seem.) R. M. Sm. in *Notes Roy. Bot. Gard. Edinburgh* 43: 244. 1986. (*Geanthus cevuga* (1930) is to be listed in synonymy.)

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ALPINIA Roxb. An additional "USEFUL TREATMENT OF GENUS" is:

SMITH, R. M. *Alpinia* (Zingiberaceae): a proposed new infrageneric classification. *Edinburgh J. Bot.* 47: 1–75. 1990.

The treatment recognizes two subgenera, subgen. *Alpinia* and subgen. *Dieramalpinia*, each with several sections. The five indigenous Fijian species (all of them endemic) of the genus fall into the latter subgenus, four of them (*Alpinia boia*, *A. horneana*, *A. parksii*, and *A. vitiensis*) into sect. *Pycnanthus* subsect. *Pycnanthus*, the fifth (*A. macrocephala*) into sect. *Pycnanthus* subsect. *Amomiceps* (composed of this one endemic Fijian species).

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Add a genus of Cyperaceae following *Schoenoplectus*:

6a. *ISOLEPIS* R. Br. Prodr. Fl. Nov. Holl. 221. 1810.

TYPE SPECIES: *Isolepis setacea* (L.) R. Br. (*Scirpus setaceus* L.).

DISTRIBUTION: A widely distributed genus of about 60 species, one of which has recently been reported from Fiji.

1. *Isolepis inundata* R. Br. Prodr. Fl. Nov. Holl. 222. 1810; K. L. Wilson in *Telopea* 2: 167. 1981.

DISTRIBUTION: Australia, Malesia, New Zealand, Norfolk Island, and South America, now reported from Fiji by K. L. Wilson. It is to be assumed that the species is adventive in Fiji.

AVAILABLE COLLECTION: VITI LEVU: MBA: Nandi area, *Latz NT 56894* (NT), obtained in April, 1971.

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The correct authorship of the following species is:

3. *Mariscus sumatrensis* (Retz.) Raynal in *Adansonia* II. 15: 110. 1975.

It is not surprising that Koyama, in making the same combination in 1977, was unaware of Raynal's earlier treatment.

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(p. 393) ARECACEAE. At end of paragraph "USEFUL TREATMENTS OF FAMILY," add:

UHL, N. W. & J. DRANSFIELD. *Genera Palmarum: A Classification of Palms Based on the Work of Harold E. Moore, Jr. i-xxii, 1-610. 1987. L. H. Bailey Hortorium and The International Palm Society.* This beautiful and comprehensive book provides us with an up-to-date major study of the morphology, evolution, and classification of the important palm family.

(p. 424) Add genus and species:

17a. *GULUBIA* Becc. in *Ann. Jard. Bot. Buitenzorg* 2: 128, 131, 134. 1885; Essig in *Principes* 26: 162. 1982; Uhl & Dransf. *Gen. Palm.* 409. 1987.

A genus related, among genera known to occur in Fiji, to *Areca* (although that is not indigenous). For a key showing the position of *Gulubia* in the subtribe *Arecinae*, cf. Uhl and Dransfield (1987, p. 403).

LECTOTYPE SPECIES: *Gulubia moluccana* (Becc.) Becc. (*Kentia moluccana* Becc.); vide Beccari & Pichi-Sermolli in *Webbia* 11: 40. 1955.

DISTRIBUTION: From the Moluccas, New Guinea, and Palau to Australia and eastward to Fiji, with nine species; a recently described Fijian endemic terminates the range of the genus to the east.

USEFUL TREATMENT OF GENUS: ESSIG, F. B. A synopsis of the genus *Gulubia*. *Principes* 26: 159-173. 1982.

1. *Gulubia microcarpa* Essig in *Principes* 26: 173. fig. 8, 17. 1982.

TYPIFICATION: The type is *Moore & Phillips 10543* (BH HOLOTYPE), collected March 22, 1980, inland from Ngaloa, Serua Province, Viti Levu.

DISTRIBUTION: Endemic to Fiji and thus far known only from two collections from the same locality on Viti Levu, in forest on an inland ridge or on a steep slope at an elevation of 180–260 m.

AVAILABLE COLLECTION: VITI LEVU: SERUA: Inland from Ngaloa, *DA L.30688* (coll. *S. Vodonaivalu*) (SUVA; photo at BH).

(p. 431) Add genus and species:

23a. **ALSMITHIA** H. E. Moore in *Principes* 26: 122. 1982; Uhl & Dransf. *Gen. Palm.* 437. 1987.

A genus related, among genera known to occur in Fiji, to *Cyphosperma* and *Physokentia*, differing in the completely encircling base of the prophyll at insertion, in the oblique fibers that underly the epicarp, and in the extraordinary fibers about the endocarp that resemble to some degree those of *Ptychococcus* among genera of the *Ptychosperma* alliance. For a key showing the position of *Alsmithia* in the subtribe Iguanurinae, cf. Uhl and Dransfield (1987, pp. 417–418).

TYPE SPECIES: *Alsmithia longipes* H. E. Moore.

DISTRIBUTION: Endemic to Fiji, with a single species.

USEFUL TREATMENT OF GENUS: MOORE, H. E., JR., R. H. PHILLIPS, & S. VODONAIVALU. Additions to the palms of Fiji. *Principes* 26: 122–125. 1982.

1. **Alsmithia longipes** H. E. Moore in *Principes* 26: 124. *fig. 1*. 1982; Uhl in op. cit. 26: 138. 1982; Uhl & Dransf. *Gen. Palm.* 437. *fig. 143*. 1987.

TYPIFICATION: The type is *Moore, Phillips, & Vodonaivalu 10545* (BH HOLOTYPE; ISOTYPES at K, P, SUVA, US), collected March 25, 1980, along ridge from Wainambau Creek to crest of mountains west of Lavena Village, Taveuni.

DISTRIBUTION: Endemic to Fiji and thus far known only from two collections from the same locality on Taveuni, in wet forest at an elevation of 325–450 m.

AVAILABLE COLLECTION: TAVEUNI: Track from Lavena Village toward crater lake, *DA L.31471* (coll. *S. Vodonaivalu*, Sept. 12, 1979) (BH, SUVA).

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AMORPHOPHALLUS Bl. ex Dec.

TYPE SPECIES: *Amorphophallus campanulatus* Dec.; cf. Committee for Spermatophyta in *Taxon* 27: 545. 1979, in op. cit. 32: 283. 1983. This correction of the authorship of the binomial is first reflected in ICBN (Sydney edition), 1983.

Vol. 1, p. 476, line 13

The publication cited in discussing *Pandanus tectorius* should have been Naturforscher (Halle) [not (Berlin)].

Vol. 2, p. 7 seq.

FAMILY 44. DEGENERIACEAE

A recent and detailed field study of the supposedly monotypic family Degeneriaceae by John M. Miller has resulted in the surprising but certainly correct observation that the population of the genus *Degeneria* occurring on Vanua Levu and Taveuni differs from that found on Viti Levu. Miller (1988) has described a second species of *Degeneria*. The two species of this remarkable genus also differ in wood anatomy (Carlquist, 1989).

(p. 8) At end of paragraph "USEFUL TREATMENTS OF FAMILY," add:

MILLER, J. M. A new species of *Degeneria* (Degeneriaceae) from the Fiji Archipelago. *J. Arnold Arb.* **69**: 275-280. 1988. MILLER, J. M. The archaic flowering plant family Degeneriaceae: its bearing on an old enigma. *Nat. Geogr. Res.* **5**: 218-231. 1989. CARLQUIST, S. Wood and bark anatomy of *Degeneria*. *Aliso* **12**: 485-495. 1989.

(p. 9) A key to the two now known species of *Degeneria* is provided by Miller (1988) and is here transcribed:

KEY TO SPECIES

Flowers white to light beige, 40-80 mm. in diameter; microsporophylls white to beige, rarely purple; staminodes 9-15, in 2 or more whorls, distally brown and coated with brilliant yellow exudate (rarely streaked with pink); fragrance of *Cananga odorata*; fruits generally 6-12 cm. long; bark dark gray to black; flowering between October and January; Viti Levu. 1. *D. vitiensis*

Flowers pinkish white to magenta, 20-40 mm. in diameter; microsporophylls rich purple; staminodes 5-11, in 2 whorls, distally purple; fragrance of musty *Rosa*; fruits generally less than 6 cm. long; bark cinnamon-brown or light gray; flowering between January and April; Vanua Levu and Taveuni.

2. *D. roseiflora*

(p. 9) Add to bibliographic citations of:

1. *Degeneria vitiensis* I. W. Bailey & A. C. Sm.: . . . J. M. Miller in *J. Arnold Arb.* **69**: 275. *fig. 1, C.* 1988, in *Nat. Geogr. Res.* **5**: 218. *fig. 2, 4, 5, 8* (top, middle), *9* (top), *12, 13.* 1989; Carlquist in *Aliso* **12**: 489. *fig. 10-14.* 1989. FIGURE 92 (upper).

(p. 10) Modify "LOCAL NAMES AND USES:"

Another Fijian name used for *Degeneria vitiensis* is *mbaubau* (Miller, 1989). *Yarangele* refers to the following species on Vanua Levu.

(p. 13) Modify "AVAILABLE COLLECTIONS:"

The last four citations should be referred to the following species.

(p. 13) Add the new species of *Degeneria*:

2. *Degeneria roseiflora* J. M. Miller in *J. Arnold Arb.* **69**: 277. *fig. 1, A, B.* 1988, in *Nat. Geogr. Res.* **5**: 218. *fig. 3, 8* (bottom), *9* (middle, bottom). 1989; Carlquist in *Aliso* **12**: 486. *fig. 1-9, 15-18.* 1989. FIGURE 92 (lower).

Degeneria vitiensis sensu A. C. Sm. *Fl. Vit. Nova* **2**: 9, p. p., quoad spec. Vanua Lev. et Tav. et quoad *fig. 77* (upper left). 1981; non sensu spec. Viti Lev.

TYPIFICATION: As type Miller has selected *J. M. Miller 1075* (A HOLOTYPE; ISOTYPES at K, NSW, RSA, SUVA), collected on the central spine of Vanua Levu in Mathuata Province between the catchments of the Wailevu and Ndreketi Rivers.

DISTRIBUTION: Endemic to Fiji and now known from Vanua Levu and Taveuni (for additional specimens cf. Miller, 1988).

LOCAL NAMES: *Karawa* (Miller, 1988), *yaranggele*.

I am greatly indebted to Dr. Miller for his kind permission to use hitherto unpublished photographs of the flowers of both species of the genus.

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The following binomial should replace *Peperomia endlicheri* var. *fijiana* Yuncker:

18. ***Peperomia urvilleana*** A. Rich. in Dumont D'Urville, Sert. Astrolab. 356. 1834.

Peperomia endlicheri Miq. Syst. Piper. 102. 1843.

TYPIFICATION: The type of *Peperomia urvilleana* is *Dumont D'Urville* (HOLOTYPE presumably at P), from Tasman Bay, South Island, New Zealand. For *P. endlicheri* Miquel cited an unpublished illustration of Ferdinand Bauer, from a Norfolk Island plant, and also indicated that an Endlicher specimen from Norfolk Island was at B.

DISTRIBUTION: Solomon Islands, New Hebrides, New Caledonia, Lord Howe and Norfolk Islands, New Zealand, Fiji, and Samoa.

I am indebted to P. S. Green for pointing out to me that *Peperomia urvilleana* has priority of some nine years over *P. endlicheri* and must be used in its stead. Throughout the species as a whole the leaf blades vary from obtuse to obtusely attenuate at apex, and therefore the value of Yuncker's var. *fijiana* is questionable; it is probably advisable to take Richard's concept as inclusive of the available Fijian material.

Vol. 2, pp. 252-253

In 1981 I indicated Adanson as publishing author of the genus *Casuarina* and J. R. & G. Forster as establishing the widespread species *C. equisetifolia*, following ING (1979) and suggestions by L. A. S. Johnson. The important discussion by I. Friis (The authority and date of publication of the genus *Casuarina* and its type species. *Taxon* 29: 499-501. 1980) was not available to me in time to be taken into consideration. In that discussion Friis indicated that Linnaeus's publication of 1759 first established the names of both taxa. Friis provided background information on the uses by different botanists of these names, also including *C. litorea* L. (1754), which he considered to be an illegitimate superfluous name. Since then, F. R. Fosberg (in *Taxon* 30: 218-227. 1981) published a thorough discussion of names proposed by Linnaeus (in Stickman's dissertation) in *Herb. Amb.* (1754), suggesting a change in ICBN to consider certain of those names to be invalid. Nevertheless, Fosberg and Sachet (in *Smithsonian Contr. Bot.* 24: 4. 1975) had previously accepted as valid the name *C. litorea*. Not until the 1988 (Berlin) edition of ICBN was this point clarified (Art. 34.1 and Ex. 2); it must now be accepted that *Casuarina* and *C. litorea* are among the names in the Linnaean thesis (1754) that are not validly published. The use of Linnaeus's 1759 publication of both the genus and species is now accepted by Johnson (in litt., 1989). Nomenclatural corrections are:

CASUARINA L. Amoen. Acad. 4: 143. 1759.

TYPE SPECIES: *Casuarina equisetifolia* L.

Casuarina equisetifolia L. Amoen. Acad. 4, as *C. equiseifolia*. 1759.

TYPIFICATION: Linnaeus, like the Forsters (1775), based his concept on Rumph. Herb. Amb. 3: 86. t. 57. 1743.

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As the valuable studies of Casuarinaceae by L. A. S. Johnson have progressed, he has now described a new genus to include *Casuarina torulosa*:

ALLOCASUARINA L. A. S. Johnson in J. Adelaide Bot. Gard. 6: 73. 1982.

TYPE SPECIES: *Allocasuarina torulosa* (Ait.) L. A. S. Johnson.

DISTRIBUTION: Australia, with about 46 species, chiefly in the southern part of the continent.

Allocasuarina torulosa (Ait.) L. A. S. Johnson in J. Adelaide Bot. Gard. 6: 79. 1982.

The species has been cultivated in Fiji, but whether it still persists in the archipelago remains to be verified.

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The sole species of *Boerhavia* believed to occur in Fiji should probably be referred to:

Boerhavia repens L. Sp. Pl. 3. 1753.

Boerhavia diffusa sensu Seem. et auct.; non L.

TYPIFICATION: The type of *Boerhavia repens* (as indicated by Fosberg, discussed below) is the specimen numbered 9.8 (LINN), from Africa. For *B. diffusa*, Fosberg has designated as lectotype the specimen numbered 9.3 (LINN), from Ceylon.

DISTRIBUTION: Widespread in the Indo-Pacific and Africa.

A recent review of elements of the genus *Boerhavia* by F. R. Fosberg (in Smithsonian Contr. Bot. 39: 1-20. 1978) indicates that the strand plant commonly passing in the Pacific as *B. diffusa* presumably represents *B. repens*; it is believed that *B. diffusa* probably does not extend farther east in the Pacific than Malesia and Australia. *Boerhavia repens* is a complex species, some varieties of which are differentiated by Fosberg, who does not discuss the Fijian specimens. While the correct name for the species designated as *B. diffusa* in Fl. Vit. Nova may be taken as *B. repens* L., an appropriate infraspecific epithet cannot be suggested prior to a detailed revision of the genus in Malesia and Melanesia.

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Elatine gratioloides A. Cunn.

DISTRIBUTION: Amend to include New Caledonia.

It has kindly been called to my attention by H. S. MacKee that the genus *Elatine* occurs in New Caledonia (cf. Guillaumin, Fl. Nouv.-Caléd. 219. 1948); I had erroneously implied that the genus was known only from Fiji in the Pacific, other than in

Australia and New Zealand. Its indigenous occurrence in New Caledonia (*Vieillard*, from Balade; *Balansa*, from Canala; *MacKee* 27472, 40450) provides a satisfactory station between Fiji and the more southerly areas. Guillaumin's use of the name *E. americana* doubtless refers to *E. gratioides*.

Vol. 2, p. 437

While preparing an account of *Sida* for *Flore des Mascareignes*, W. Marais has kindly called my attention to the erroneous use of the binomial *Sida parvifolia* DC. for the small-leaved *Sida* indigenous in the Fijian Region. *Sida parvifolia* (1824) is in fact a later synonym of *S. pusilla* Cav. (1785), which is endemic to coral islets and islands of the western Indian Ocean. The correct entry for the species occurring in Fiji should read:

2. *Sida samoensis* Rechinger in Repert. Sp. Nov. 4: 228. 1907, in Denkschr. Akad. Wiss. Wien 85: 308. 1910; Christophersen, Yuncker, and Sykes have correctly used this binomial.

Sida microphylla sensu Benth., Seem., Drake, Greenwood; non Cav. (as printed).

Sida retusa sensu A. Gray, Seem.; non L. (as printed).

Sida parvifolia sensu Borss. in Blumea 14: 192, p. p. 1966; J. W. Parham, Pl. Fiji Isl. ed. 2. 172. 1972; A. C. Sm. Fl. Vit. Nova 2: 437. 1981; non DC.

LECTOTYPIFICATION: In his 1910 publication Rechinger added a fourth number, 1444, to the three cited in 1907. As no lectotypification has been noted, I here indicate *Rechinger 1719* (W LECTOTYPE; ISOLECTOTYPE at K), collected near Matautu, Savai'i, Samoa.

DISTRIBUTION: *Sida samoensis* may be limited to Fiji, Samoa, Tonga, and Niue. In implying its inclusion in *S. parvifolia* (i. e. *S. pusilla*) in 1966, Borssum Waalkes interpreted that species too broadly. From it, *S. samoensis* differs in having its carpels with long, pubescent awns. The plant of the Lesser Sunda Islands here included by Borssum Waalkes is apparently still different, having a conspicuously articulated pedicel and a calyx typical of the *S. rhombifolia* complex (fide Marais).

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ACALYPHA L.

In their studies of Micronesian plants, F. R. Fosberg and M.-H. Sachet (in Smithsonian Contr. Bot. 45: 7-12. 1980) reconsidered some aspects of the large genus *Acalypha* which have a bearing on my treatment in Fl. Vit. Nova (1981). Fosberg and Sachet have accepted *A. amentacea* Roxb. (1832) as a complex taxon extending at least from India to Fiji and Tonga and including "a myriad of variations and local races." Two subspecies and several other infraspecific taxa are recognized. *Acalypha grandis* Benth., which I noted (1981) as a widespread species ranging from Malesia to Samoa and the Horne and Wallis Islands, is referred by Fosberg and Sachet to *A. amentacea* subsp. *amentacea* var. *grandis* (Benth.) Fosberg, said to be known definitely only from Fiji. The taxon was lectotypified by Fosberg by *Barclay* (K), from

Nukulau Island, the same specimen so designated by me in 1981. Other changes relate to *A. wilkesiana* Muell. Arg. and its two forms that are known to be cultivated in Fiji. New names proposed for these taxa are *A. amentacea* subsp. *wilkesiana* (Muell. Arg.) Fosberg, *A. amentacea* subsp. *wilkesiana* f. *wilkesiana*, and *A. amentacea* subsp. *wilkesiana* f. *circinata* (Muell. Arg.) Fosberg.

While the use of *Acalypha amentacea* as the appropriate name for *A. grandis* may indeed prove to be correct, Roxburgh's species at this time does not seem sufficiently well understood to serve as a depository for numerous other taxa from Malesia and the Pacific, necessitating a plethora of trinomials and quadrinomials. A thorough revision of *Acalypha*, at least in Malesia and the Pacific, is required before a final solution is reached. The last comprehensive revision of the subtribe Acalyphinae (by Pax and Hoffmann in *Pflanzenr.* **85** (IV. 147. XVI): 1-231. 1924), however valiant, has not seemed to satisfy many recent botanists.

Vol. 2, p. 656

MELICYTUS J. R. & G. Forst.

USEFUL TREATMENT OF GENUS: KELLOGG, E. A., & A. L. WEITZMAN. A note on the oceanic species of *Melicytus* (Violaceae). *J. Arnold Arb.* **66**: 491-502. 1985.

The cited paper reviews *Melicytus ramiflorus* J. R. & G. Forst. and its relatives *M. fasciger* Gillespie (Santa Cruz Islands, New Hebrides, and Fiji) and *M. samoensis* (Christophersen) A. C. Sm. (Samoa and Tonga). The authors provide new information supporting the recognition of the two latter species as distinct from *M. ramiflorus* (New Zealand and Kermadec Islands as to the typical subspecies and with a second subspecies on Norfolk Island).

Vol. 2, pp. 676-680

(p. 676) **Benincasa hispida** (Thunb.) Cogn.

It has been brought to my attention by W. A. Whistler that the dried pericarp of the fruit of this species is commonly used in the Fijian Region as a container for oils and other fluids. I cited no available specimens of the species in 1981, but in fact the two sheets of *Seemann 195* (κ) (from Namara, Tailevu Province, Viti Levu) cited by me (p. 680) as *Lagenaria siceraria* actually represent *Benincasa hispida* (C. Jeffrey in litt. to Whistler). The local names *vango*, *ndango*, *ndaimbe*, and *ndindi* are presumably Fijian names for *Benincasa hispida*.

(pp. 678-680) **LAGENARIA** Seringe.

The genus *Lagenaria* and the species *L. siceraria* presumably do not now occur in Fiji, and in fact their aboriginal introduction and use cannot be verified in any part of the Fijian Region (Whistler, pers. comm.). Seemann erroneously referred his no. 195 to this taxon (as *L. vulgaris*) rather than to *Benincasa hispida*, discussed above. (However, *Lagenaria siceraria* is known as a very recent introduction into gardens in Tonga from *Soakai 894* (κ), fide Jeffrey.) The bibliographic references to the Fijian occurrence of *L. siceraria* given by me (p. 679) should all be referred ("sensu") to *Benincasa hispida*.

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Zehneria mucronata (Bl.) Miq.

Fosberg and Sachet (in *Smithsonian Contr. Bot.* **47**: 11–13. 1981) have discussed the genus *Zehneria* as it occurs in Polynesia and Fiji, proposing three new combinations for names that I listed in the synonymy of *Z. mucronata* in *Flora Vitiensis Nova*. These new names are: *Z. samoensis* (A. Gray) Fosberg & Sachet (based on *Melothria samoensis* A. Gray), *Z. grayana* (Cogn.) Fosberg & Sachet (based on *Karivia samoensis* A. Gray, for which *Melothria grayana* Cogn. was a new name), and *Z. grayana* var. *vitiensis* (A. Gray) Fosberg & Sachet (based on *Karivia samoensis* var. *vitiensis* A. Gray). The discussion of Fosberg and Sachet does not provide convincing reasons thus to divide the large and plastic population of *Zehneria* in the southern Pacific, but, of course, it is entirely possible that a complete revision of the genus will demonstrate that *Z. mucronata* has been too broadly interpreted.

Vol. 2, p. 688

The genus *Begonia* has apparently not been recorded as indigenous in the New Hebrides, and so recent collections from Espiritu Santo (*McKee* RSNH 24163 and *Raynal* RSNH 16283, both κ) are noteworthy. The species represented appears to be undescribed but is related to the rare *B. vitiensis* A. C. Sm., endemic to Fiji, differing in its much broader ovary wings, more numerous stamens, and somewhat different leaf blades, which are larger, glabrous or very early glabrate, and with a large basal sinus bordered by the bases of concurrent principal nerves.

Vol. 3, pp. 176–179

In reference to *SESBANIA*, add to:

USEFUL TREATMENTS OF GENUS: SACHET, M.-H. The littoral species of *Sesbania* (*Leguminosae*) in the South Pacific islands and its relatives. *Bull. Mus. Nat. Hist. Nat.* (Paris) **9**, sect. B, Adansonia 1: 3–27. 1987.

In the cited paper Sachet presents an admirable (and sadly posthumous) review of *Sesbania* subgen. *Agati*, which includes six species, two of them occurring in Fiji, *S. grandiflora* (cultivated) and *S. coccinea* (indigenous). Much of Sachet's paper deals with the typification and division of *S. coccinea*; the taxon discussed as this in *Fl. Vit. Nova* may be known as:

Sesbania coccinea (L. f.) Poir. subsp. ***coccinea***; Sachet in *Bull. Mus. Nat. Hist. Nat.* (Paris) **IV**, **9**, sect. B, Adansonia 1: 20. *pl. 1, 5* (right). 1987.

TIPIFICATION: The type, as indicated in *Fl. Vit. Nova* on the advice of Sachet, is a Forster collection (LINN HOLOTYPE) from New Caledonia (presumably from Île Amér ). The number 1208.5 is added by Sachet; probably this is the Linnaean Herbarium number. Other Forster collections at BM, κ , P, and UPS are detailed by Sachet.

DISTRIBUTION: New Caledonia, Loyalty Islands, Fiji, and Tonga. Other than the Forster material the only collection from New Caledonia is from the Île des Pins; Sachet does not speculate as to whether all the Forster collections are duplicates, but no collections unequivocally from mainland New Caledonia are listed by her.

The second subspecies of *Sesbania coccinea* is subsp. *atollensis* (St. John) Sachet, which comprises five varieties (Sachet, 1987, pp. 22–27) occurring in the Society, Tuamotu, and Marquesas Islands and on Henderson Island.

Vol. 3, pp. 479–487

References to Nooteboom's revision of Simaroubaceae in *Fl. Males. I. 6*: 193–226 were dated 1962; the correct publication date of his work was 1963.

Vol. 3, p. 595

***Alectryon grandifolius* A. C. Sm.**

In line 4 of the description, the word "petals" should be replaced by "anthers;" petals are lacking in this species.

Vol. 3, pp. 596–599

Recently P. C. van Welzen (in *Blumea* 33: 411–421, 1988) described some 19 species of *Guioa* as new, as a precursor to a proposed revision of the genus. One of the new species is the Fijian *G. punctata*, which formerly had been confused with the related *G. rhoifolia*. Since the novelties are only briefly described, usually with only the types cited, van Welzen has kindly provided me with his rationale for dividing the material I referred to *G. rhoifolia*. The two species may be distinguished as follows:

Leaflets obviously asymmetric, comparatively large, with a sinuately decurrent apex and usually raised nervation, not punctate, with only 1 domatium; petals with very long, slender, clavate crests.

1. *G. rhoifolia*

Leaflets less obviously asymmetric, somewhat smaller, with a usually gradually decurrent apex and less obviously raised venation (especially on upper surface), punctate (presumably due to presence of mucilage cells), with 1–many domatia; petals with long scales with small, blunt crests.

1a. *G. punctata*

Notes on the new species, to be inserted as the second species of *Guioa*, and comments on *G. rhoifolia* follow:

1. *Guioa rhoifolia* (A. Gray) Radlk.

I mentioned (p. 599) examining about 40 Fijian collections of this species from nine islands, but only 19 of these were cited in addition to the type. Of the cited specimens, van Welzen kindly advises me that the following are correctly placed in *G. rhoifolia*:

Gillespie 2074, 3624; DA 11656, 13907, 14731, 15466; Seemann 69; Smith 4603, 9241.

1a. *Guioa punctata* van Welzen in *Blumea* 33: 420. fig. 8, a–c. 1988.

Guioa rhoifolia sensu A. C. Sm. *Fl. Vit. Nova* 3: 597, p. p., quoad fig. 143 et aliquot spec. cit. 1985; non Radlk.

TYPIFICATION: The type is *Greenwood 749* (κ HOLOTYPE), obtained between Penang and Ellington, Ra Province, Viti Levu. Van Welzen's illustration was drawn from *Bryan 449* (BISH) and *Parham 5* (κ). The first of these was cited by me as *G. rhoifolia*, but I have no record of a *Parham 5*, although two collections by H. B. R. Parham (not cited by me) have been referred to *G. rhoifolia* in my unpublished notes.

DISTRIBUTION: Presumably endemic to Fiji. Of the specimens cited by me, van Welzen indicates (in litt.) that the following (in addition to the type) are referable to *G. punctata*:

Bryan 449; Gibbs 687; St. John 18143; Smith 1084, 1477, 4223. The ultimate revision will presumably provide citations of additional collections, as well as clarify the status of *G. subfalcata* Radlk., referred by me (p. 597) to the synonymy of *G. rhoifolia*.

Vol. 3, p. 632

Meryta tenuifolia A. C. Sm.

P. P. Lowry II (in Ann. Missouri Bot. Gard. **75**: 389–391. fig. 1. 1988) has provided a greatly expanded description and an illustration of this Fijian endemic, based on his collections from essentially the type locality. The species had previously been known only from the fruiting type collection.

Vol. 4, p. 9

GENIOSTOMA. The second primary step in the key to species should read:

Stipules intrapetiolar or essentially so. . . (not interpetiolar).

Vol. 4, p. 124

FAMILY 167. OLEACEAE

Add to USEFUL TREATMENTS OF FAMILY:

BAAS, P., P. M. ESSER, M. E. T. VAN DER WESTEN, & M. ZANDEE. Wood anatomy of the Oleaceae. IAWA Bull. n. s. **9**: 103–182. 1988.

This valuable treatment reviews the wood anatomy of the recognized 24 genera of Oleaceae, greatly illuminating the relationships and compositions of these genera. Of particular interest to students of tropical plants is the conclusion (pp. 130–133, 165) that *Chionanthus* (with two species) and *Linociera* (with many species) appear to be biphyletic in origin. Although combination of these genera under the older name, *Chionanthus*, has now been accepted by practically all taxonomists studying the family (cf. Fl. Vit. Nova **4**: 136. 1988), future studies may call for a reconsideration.

Vol. 4, p. 234

Note the following correct combination:

Cyclophyllum barbatum (Forst. f.) Hallé & Florence in *Rapa* **1986**: 155. 1986.

This combination antecedes that made by Smith and Darwin, who overlooked the earlier publication. *Rapa* appears to be a journal published by the Service Mixte de Contrôle Biologique, Direction des Centres D'Expérimentations Nucléaires.

INDEX OF SCIENTIFIC NAMES

Names of families, genera, species, and infraspecific taxa adopted in this Flora are indexed, new names are printed in **boldface** type; an asterisk (*) following a page number indicates a figure. Suprafamilial taxa, synonyms, and vernacular names are not indexed.

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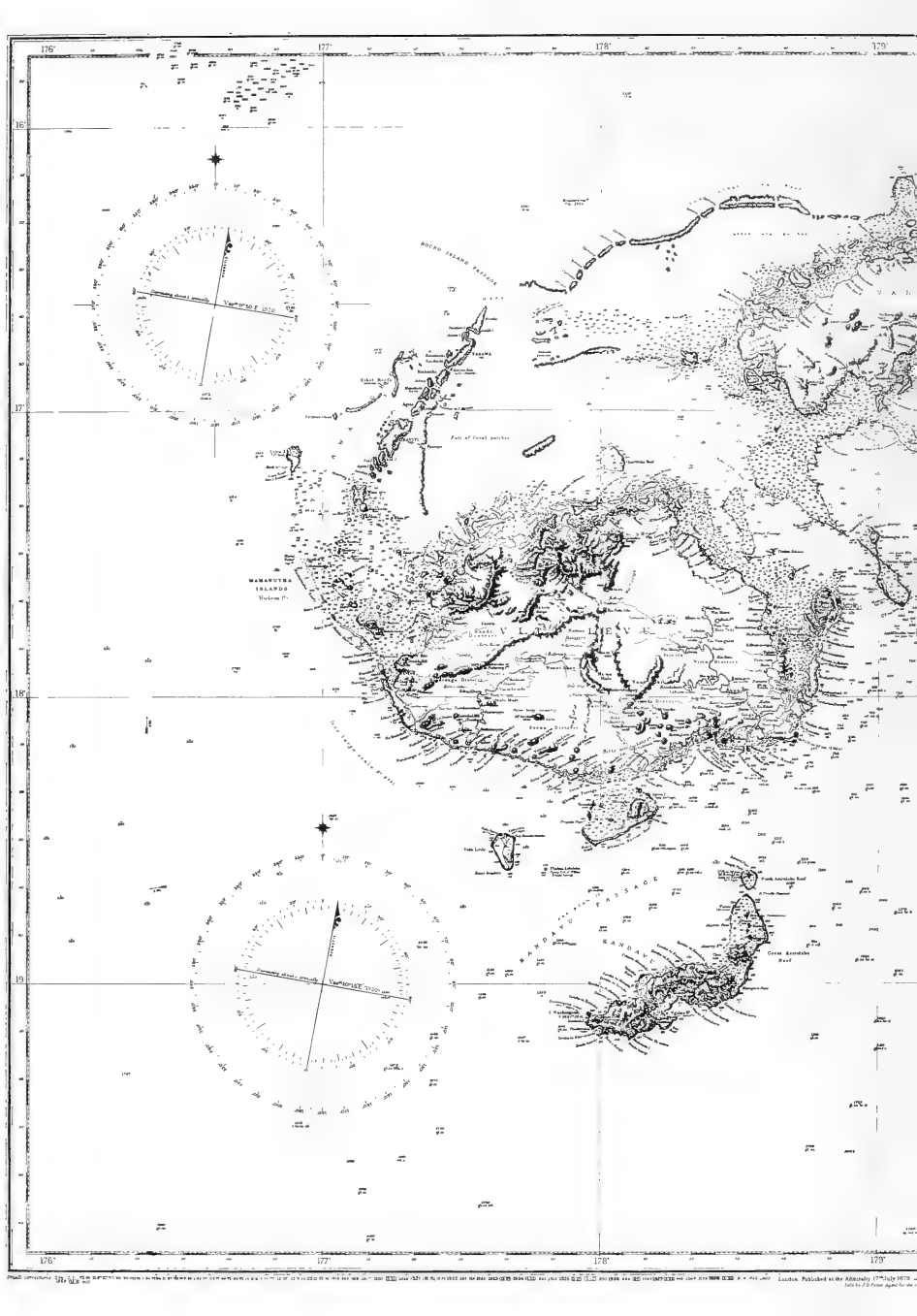
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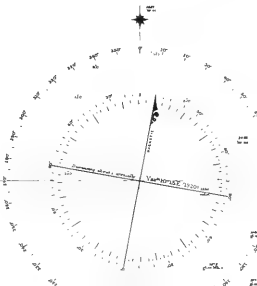
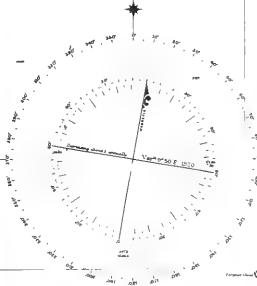


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SOUTH PACIFIC

FIJI ISLANDS

From the Survey of Captain FENNER, R.N., 1814-16.
Lithographed by W. Mason and G.E. Roberts, R.N.
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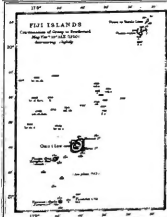
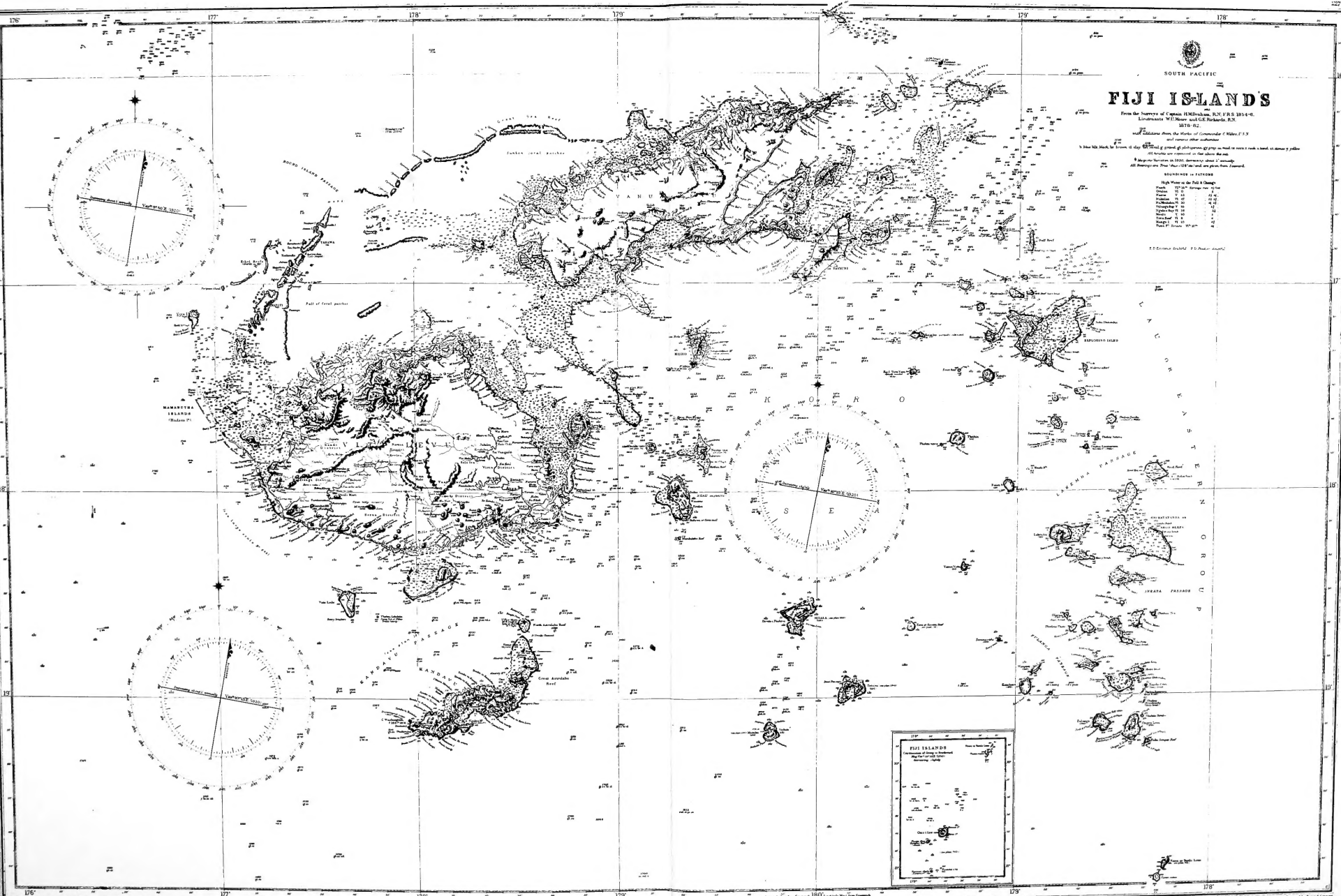
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This Sheet shows a general plan of the Islands of Fiji as far as is known, and is intended to be used in conjunction with other sheets of the same series.
All heights are measured in feet above the sea.
All bearings are True (True 180° and are given from the meridian).

MEASURES IN FATHOMS

100 Fathoms	182.88 Meters
200	365.76
300	548.64
400	731.52
500	914.40
600	1097.28
700	1280.16
800	1463.04
900	1645.92
1000	1828.80
1100	2011.68
1200	2194.56
1300	2377.44
1400	2560.32
1500	2743.20
1600	2926.08
1700	3108.96
1800	3291.84
1900	3474.72
2000	3657.60

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