THE GENUS CYRTANDRA IN FIJI [1]

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Introduction

The present study is a limited revision of the genus *Cyrtandra* in Fiji and is related to the series initiated by A.C. Smith on selected families of phanerogams from Fiji and the adjacent archipelagos. The earlier work on *Cyrtandra* in Fiji (Seemann, 1861, 1866; Gray, 1862; Clarke, 1883; Gillespie, 1930; Smith, 1936, 1942, 1953) necessarily emphasized exploration and the description of new species. This preliminary phase has included well over 200 collections and the description of a total of 45 species. The present work emphasizes the review of previously known species, the amplification of early descriptions, and a comparative study to provide for the delineation of infrageneric groups and the identification of species.

The importance of *Cyrtandra* in Fiji was emphasized by Smith (1953) who noted that it was exceeded in number of species only by *Psychotria*. The wide distribution and frequent occurrence of this Malaysian-Pacific genus make it an important element in several other floras, including that of Polynesia. Therefore, the present study included a review of all Polynesian species and an investigation of relationships between the Cyrtandrae of Fiji and those of Polynesia.

In number of species (ca. 600) *Cyrtandra* is the largest genus in the Gesneriaceae, and among the families of Engler's Tubiflorae (including the Polemoniales, Lamiales, and Scrophulariales) it is exceeded in number of species only by the genus *Solanum*. Its territory extends from Malaya to Eastern Polynesia, with centers of diversity in Borneo and New Guinea. B. L. Burtt (written communication) estimates the number of species to be between 130 and 150 for each of these centers. The great diversity and the large number of species in the genus impose formidable demands on the taxonomist who aspires to interpret its infrageneric taxonomy. Notable among those who have

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attempted this was C. B. Clarke who, in 1883, described 2 subgenera and 13 sections based on a study of 167 species. In 1888, Hillebrand described five sections, these embracing only the species indigenous to the Hawaiian Islands. Schlechter (1923) published a treatment of the *Cyrtandra* of New Guinea in which he recognized 96 species, dividing these among two subgenera and 14 sections. Unlike his predecessors, Schlechter provided a key to his sections. His treatment probably has considerable merit, yet it pertains to only a portion of the genus, and surely excludes significant evolutionary lines among the hundreds of species that do not occur in New Guinea. It is because of the incomplete, questionable status of the present infrageneric taxonomy that I have not followed any one interpretation but instead have designated provisional species groups that appear as homogeneous, natural units. None of these are formally described and named because certain groups include species outside of Fiji, and these will require revisions as future work is accomplished. Through successive regional treatments of this type, perhaps the infrageneric relationships can gradually be brought into focus and the principal evolutionary stocks described and named with the minimum of ambiguity and confusion.

Smith (1955) has shown that many genera in the flora of Fiji have their maximum speciation in territory to the west, principally in New Guinea, with a poorer representation in Fiji. This attenuated phytogeographic pattern is expressed by *Cyrtandra*, which has approximately 250–300 species in New Guinea and Borneo but only 35 species in Fiji by the present treatment. Further exploration will surely increase the number of species in Fiji, but the possibility of the adjusted figure being more than a relatively small fraction of the total for New Guinea and Borneo seems most unlikely. The examination of extensive herbarium material representing all of Polynesia, but of only limited material from New Guinea, Borneo, and the Philippines, suggests that the Fijian and Polynesian species combined portray only a subsidiary portion of the total morphological expression for the genus.

A short summary of the phytogeographical relationships of the six species groups that are recognized in this paper is in order. Each of these is further discussed under the particular species. Species Group 1 (the *Cyrtandra vitiensis* group) extends from Fiji to Samoa and Hawaii. Species Group 2 (the *C. chippendalei* group) extends from Fiji to Samoa, southern Polynesia, and Hawaii. Species Group 3 (the *C. kandavuensis-C. attenuata* group) extends eastward from Fiji, occurring throughout most of Polynesia. Species Group 4 (the *C. denhamii* group) extends eastward from Fiji to Samoa and the Marquesas Islands but is not known in Hawaii. Neither Group 5 (the *C. harveyi* group) nor Group 6 (the *C. prattii* group) are known to occur east of

Fiji. However, both Group 5 and Group 6 have closely related species in New Guinea, verified by the comparison of herbarium material.

In his recent monograph of *Cyrtandra* on Oahu, Hawaiian Islands, St. John (1966) recognizes a total of 133 species, an amazing concentration for an island of only 600 square miles, of which only a small portion is *Cyrtandra* territory. However, a herbarium and field study of the Oahu species and of the other Hawaiian species reveals that they are relatively homogeneous in comparison with the Fijian Cyrtandrae. Using the key to the six species groups in Fiji, all of the Hawaiian species would be accommodated in Group 1, Group 2, and Group 3. Remarkable similarities exist between Group 2 (the *C. chippendalei* group) and subgenus *Brachycyathus* in St. John's monograph. However, the former embraces only 8 species for all of Fiji, while the latter includes 4 sections and 89 species for the island of Oahu.

Habitat Relationships

Guppy (1906) indicated that the Cyrtandrae of the Pacific Islands are most frequent in moist woods among rank vegetation, but he also stated that they may occur in more exposed and drier habitats. Field observations that I made in Java, Borneo, and Hawaii indicate that *Cyrtandra* invariably grows as an understory element in dense rain forest, often in ravines and gorges characterized by high humidity, very low light intensities, and an almost constant moisture supply. In many species the root systems are shallow, often clinging to the surfaces of moist rocks. These habitat characteristics pertain to elevations between 50 and 2,000 meters. It is known that some species of *Cyrtandra* are capable of surviving intermittent droughts, but in the Pacific the genus is in no instance adapted to arid or semiarid, exposed habitats. The basic relationship is with upland rain forests, and the genus occurs only on the islands of the Pacific where substantial areas of upland rain forest are preserved. It is not an element of the strand flora, and it does not occur on "high" islands that have a low rainfall. Examples of the latter include Niihau, in the Hawaiian Islands, from which no *Cyrtandra* collections are known, even though populations abound on the island of Kauai, scarcely 20 miles distant. It is not likely that *Cyrtandra* could have established founder populations on Pacific islands prior to the development of a relatively dense overstory vegetation. Considering the large number of species in the genus and its extensive geographical range, it would appear to have an unusually narrow habitat relationship. The habitats in Hawaii seem remarkably uniform in character to the point of making it very difficult to cite differences that could account for the presence of a given species in one area and its exclusion from another.

Pollination and Breeding System

The consideration of the breeding system and its relationship to variability and the delineation of species should precede a taxonomic study, if possible. This information provides helpful guidelines for the interpretation of variability and morphological differences within and between populations. The types of variation patterns to be expected from different breeding systems have been presented by Baker (1959), whose interpretations are followed in this study. It has not been possible to carry out a field study of *Cyrtandra* in Fiji, but this has been accomplished on populations of closely related species in Hawaii—plants that have the same basic floral morphology, and the white, fleshy corollas that characterize at least three-fourths of the species known in Fiji. The observations cited below have been made by me on several Hawaiian species occurring on Kauai, Oahu, Lanai, Molokai, Maui, and Hawaii, and together they present a consistent pattern of floral ontogeny and pollination.

The flowers of *Cyrtandra* are protandrous, and there appears to be a conspicuous provision for outcrossing. This is promoted not only by the earlier maturity of the anthers but also through the positioning of the anthers and stigma to minimize self-pollination. The effectiveness of this system is indicated by the complete absence of fruit in 116 bagged flowers of the Oahu species, *Cyrtandra garnotiana* Gaud., and by the production of fruit in 39 out of 42 unbagged controls on the same plants. Self-incompatibility is not known in the Gesneriaceae, and the above evidence is most inadequate for postulating its occurrence in *Cyrtandra*. Therefore, a measure of inbreeding remains a possibility inasmuch as the complete exclusion of entomophilous self-pollination would seem unlikely.

At early anthesis, the filaments extend forward in the corolla tube and hold the basifixed, apically coherent anthers with the connectives against the wall of the tube and the thecae face-to-face on the midplane of the tube. The anthers are then parted from below and are spread so that the thecae lie in one plane. Simultaneously, the anthers are elevated so that the connectives are appressed to the tube opposite the upper sinus. The thecae now occupy a position directly over the access to the nectiferous, cupulate annular disc at the base of the tube. At this time the immature lobes of the stigma are closely appressed. In later anthesis the anthers are shifted in position, being lowered to the anterior surface of the tube, the thecae appressed to the tube opposite the lower lobe, so that any residual pollen is isolated from contact with the mature stigma. The stigmatic lobes now expand and separate, the cleft of separation usually extending farther down on the anterior side of the style, so that the lobes very often form a

cordate receptive surface. The extended stigma is now held over the access to the nectary, near the position formerly occupied by the thecae of the anthers. It is clear that two patterns of configuration are displayed by a given flower and that two insect visits are necessary for accomplishing cross-pollination. Actual pollination has not been observed, but it is assumed that this is accomplished by night-flying Lepidoptera attracted to the white corollas and inflorescences. A lepidopterous antenna has been recovered from one flower. These observations confirm earlier reports of protandry in *Cyrtandra* by St. John (1966) and Carlquist (1965, 1966).

In at least one Fijian species, *Cyrtandra harveyi*, the outbreeding system is further specialized through the gynodioecious habit, and unisexual flowers are known to occur in several additional species in New Guinea and the Pacific.

It seems clear that in Pacific species of *Cyrtandra* there is a very strong trend to outcrossing which in turn would promote variability involving many genotypes (Baker, 1959). The outcrossing mechanism would be expected to facilitate interspecific cross-pollinations since flowers of different species often are remarkably similar, and two, three, or more species very often occur in the same relatively narrow habitat. One putative interspecific hybrid, between *C. milnei* and *C. vitiensis*, has been distinguished in the present study.

The outcrossing breeding system provides for the retention of temporarily disadvantageous genes, including new mutations, through their inclusion in heterozygous genotypes. Such a breeding system would thus tend to enlarge the genetic resources, providing for flexibility. It is significant that this system is, in *Cyrtandra*, correlated with the propensity of the genus to establish populations on isolated island habitats. This breeding system, through its provision of maximum genetic resources for the immigrants and of maximum flexibility for the founder population, is probably of considerable significance in the successful establishment of populations on island habitats.

The recombination potential of a species is increased by its capacity for the dispersal of diaspores (Grant, 1958). In the Pacific species of *Cyrtandra*, the fruit is nearly always a conspicuous, succulent berry, and there seems little reason to doubt the thesis of Guppy (1906) that these are eaten and dispersed by birds. The seeds are very small, usually less than 1 mm. in diameter, with perhaps 50 to 100, or more, per fruit. The seed dispersal would seem to be very effective, so that a given population could include progeny of neighboring populations that lie beyond the range of pollen vectors. This would suggest that the variability of a given species would be a pattern of intergradations extending over a territory of generous dimensions. However, inter-island dispersal apparently is not common in *Cyrtandra*, for a great

many species are restricted to a single island, and few species are known to occur beyond a given archipelago (Guppy, 1906). This restriction is indicated in the Fijian species (fig. 1, table 1).

The extensive geographical territory and impressive speciation of *Cyrtandra* suggest that an effective balance is maintained between dispersal and geographical isolation. The genus has had dispersability sufficient to accomplish its distribution over the vast expanses of the western Pacific. However, the high level of speciation suggests that there have been time intervals between dispersal events, and that these have been of duration sufficient to provide the geographical isolation requisite for evolutionary change.

Acknowledgments

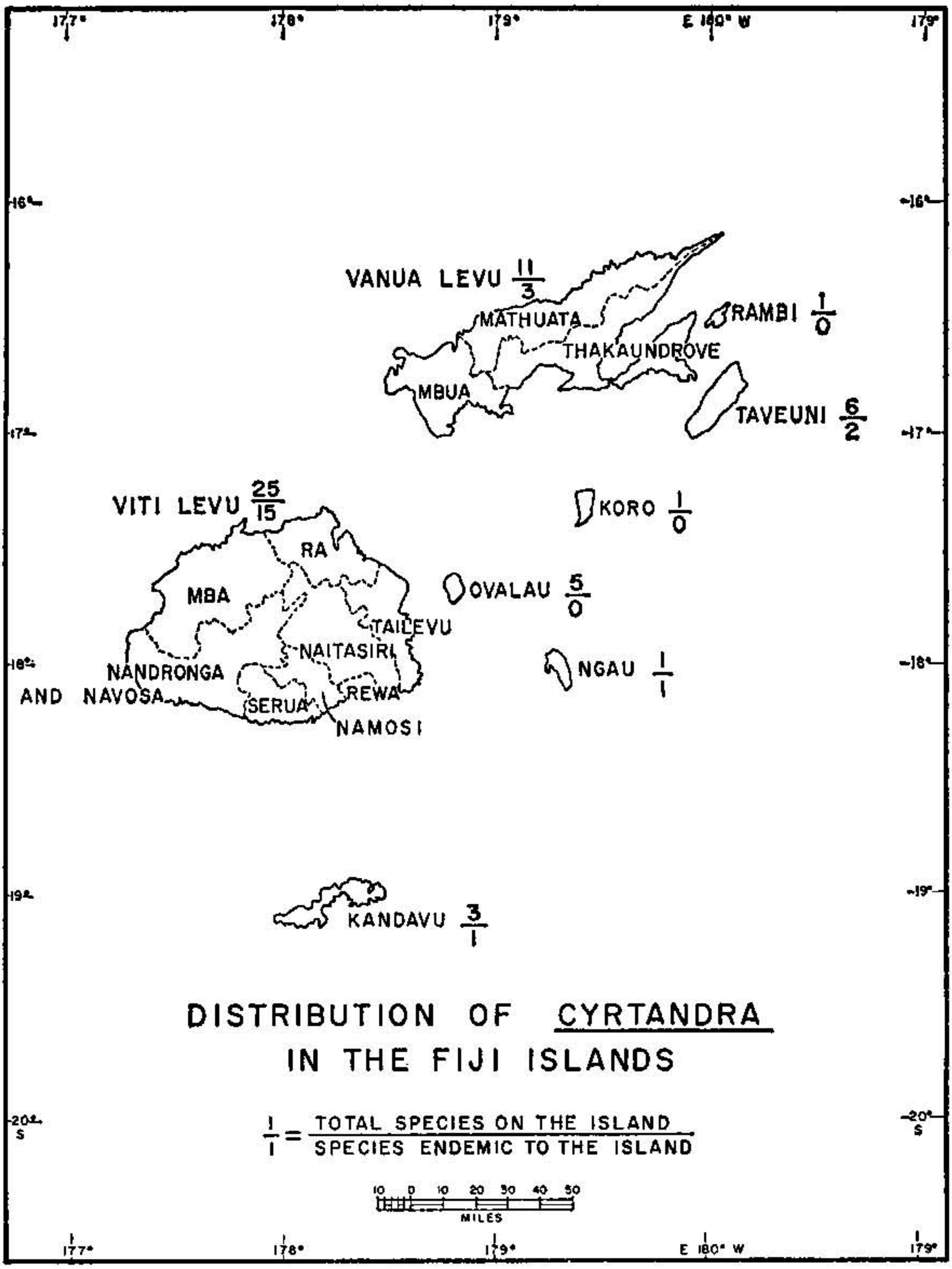
The herbarium material of several institutions has been examined in this study and is here cited, with the indicated abbreviations: Arnold Arboretum of Harvard University (A); Bernice P. Bishop Museum (BISH); British Museum (BM); Gray Herbarium of Harvard University (GH); Royal Botanic Gardens, Kew (K); New York Botanical Garden (NY); the University of California (UC); and U.S. National Herbarium (US). Appreciation is extended to the administrators of these herbaria for the privilege of examining specimens under their care. Special thanks are extended to Mr. B. L. Burtt, Royal Botanic Garden, Edinburg, who reviewed the manuscript and communicated many helpful suggestions. Appreciation is extended to Dr. Harold St. John, Bernice P. Bishop Museum, who reviewed the manuscript. The encouragement, valuable suggestions, and numerous reference materials made available to me by Dr. A. C. Smith, Wilder Professor of Botany, University of Hawaii, are gratefully acknowledged.

Systematic Treatment

Cyrtandra J. R. & G. Forst. Char. Gen 5. *pl. 3.* 1776. [2]

Herbs, vines, shrubs, or small trees, the stems round to sharply quadrangular, the trichomes septate, uniseriate, capitate or non-capitate hairs; leaves whorled, opposite or pseudoalternate by the reduction of one member of the pair, petiolate to sessile to connate-perfoliate, the blades simple; inflorescence a congested or elongate cyme, sessile or pedunculate, axillary on young branches or cauliflorous on older stems, sometimes arising among adventitious roots, usually bracteate, the outer bracts persistent or deciduous, foliaceous to corolloid and soft-textured, minute to as long as, or longer than,

[2] Greek *kyrtos*, curved, and *andros*, stamens.



the inflorescence, free or connate and cyathiferous, the inner bracts like the outer but smaller; flowers perfect, often protandrous, sometimes unisexual, the calyx foliaceous or corolloid, persistent or deciduous, spathaceous to variously cleft from summit nearly to base into 2 to 5 equal or unequal, valvate lobes; corolla fleshy to chartaceous, usually white, but also green, yellow, orange, red, pink, or lavender, 1-6 cm. long, cleft to half its length into rounded, equal to unequal, spreading to erect lobes, these imbricate in bud, the limb often bilabiate, the

TABLE 1.—*Distribution of* Cyrtandra *in Fiji, by islands*

Species	Viti Kandavu	Viti Levu	Viti Ovalau	Viti Ngau	Vanua Koro	Vanua Levu	Vanua Taveuni	Vanua Rambi
acutangula		×						
aloisiana		×						
anthropophagorum		×	×			×		
attenuata						×	×	
cephalophora		×				×		
chippendalei		×				×	×	
chlorantha		×						
ciliata					×	×	×	
coleoides		×						
cyathibracteata		×						
denhamii				×				
dolichocarpa						×		×
esothrix		×	×					
harveyi						×		
hornei		×						
involucrata		×	×			×		
jugalis		×						
kandavuensis	×							
leucantha		×					×	
milnei	×	×	×					
montana		×						
multiseptata		×						
muskarimba		×				×		
occulta		×						
prattii		×						
pritchardii		×	×					
reticulata						×		
spathacea	×	×						
taviunensis							×	
tempestii							×	
trichophylla		×						
ventricosa					×			
victoriae		×						
vitiensis		×						
xanthantha		×						

Total species: 35, all endemic to the Fiji Islands; 22 species are restricted to a single island; 8 species occur on 2 islands; 5 species occur on 3 islands.

lower or anterior lobe usually equal to or larger than the others; stamens 2, the filaments adnate to the tube opposite the sinuses of the anterior corolla lobe, the lower portion of each filament variously twisted, the anthers coherent at apices; staminodes 2 or 3, 0.5-5 mm. long, adnate to the corolla tube opposite the posterior sinuses, sometimes bearing small, vestigial anthers; base of the ovary clasped by a nectiferous, annular, cupulate, or one-sided disc, this often persistent in mature fruit, the ovary and style glabrous or variously pubescent, the stigma

capitate to applanate and bilobed, the plane of the expanded lobes perpendicular, oblique, or parallel to the axis of the style; fruit white, green, yellow, orange, red, or pink, a succulent to coriaceous berry, ovoid to oblong, up to 4 cm. long, or cylindrical and up to 12.5 cm. long, often beaked by the persistent style base; seeds many, usually less than 1 mm. long, usually embedded in the fleshy placentae.

Perhaps 600 species, distributed in rain forest habitats from the Nicobar Islands to the Malay Peninsula of the Asian mainland; through the Philippine Islands to Botel Tobago Island southeast of Formosa, and the Ryukyu Islands; throughout the Malay Archipelago, southeast to Queensland and the Loyalty Islands; east on the high islands of the Pacific to the Hawaiian Islands and the Marquesas Islands. The genus is not known on Formosa, Yap, the Marianas Islands, New Caledonia, or the Tuamotu Archipelago.

Key to Species Groups

Inflorescence capitate to subcapitate, the pedicels concealed by the congested flowers and bracts . . . . . GROUP 1
Inflorescence a branching cyme, not capitate or subcapitate; pedicels visible, not obscured by congested flowers and bracts.
  Calyx persistent, not abscissing from the maturing fruit . . . . . GROUP 2
  Calyx deciduous, abscissing at or shortly after anthesis.
    Flowers not borne on an elongate, woody, branchlike inflorescence axis.
      Styles and anthers restricted to the corolla tube, the filaments 1–4 mm. long, rarely 5 mm. long.
        Calyx lobes about as long as the calyx tube . . . . . GROUP 3
        Calyx lobes 2 to 5 times as long as the calyx tube . . . . . GROUP 4
      Styles, or anthers, exserted above the corolla tube, displayed in or above the broad corolla throat; filaments 8–12 mm. long; flowers sometimes unisexual . . . . . GROUP 5
    Flowers borne on a woody, branchlike inflorescence axis up to 20 cm. long, bearing numerous pedicels ca. 0.5 cm. long . . . . . GROUP 6

GROUP 1

Outer inflorescence bracts fused into a cup-shaped involucre.
  Leaf blades glabrous; calyx and bracts glabrous on the abaxial surfaces.
    1. C. cyathibracteata
  Leaf blades, calyx, and bracts sericeous on the abaxial surfaces . . **2. C. occulta**
Outer inflorescence bracts free; inflorescence without a cup-shaped involucre.
  Inflorescence cylindrical; peduncle 10–15 mm. long; calyx and bracts with indument of dark brown, rigid, glistening hairs . . . . **3. C. cephalophora**
  Inflorescence spreading, not cylindrical; peduncle 2–10 mm. long; calyx and bracts glabrous or with light brown, crumpled, capitate and noncapitate hairs.
Outer surfaces of calyx and bracts glabrous to gabrate; bracts lobed; petioles glabrate, winged to base . . . . . **4. C. vitiensis**
Outer surfaces of calyx and bracts moderately to densely pubescent with capitate and noncapitate hairs; bracts not lobed; petioles conspicuously pubescent, rarely winged.
  Hairs of the petiole shorter than the petiole diameter . . **5. C. leucantha**

Hairs of the petiole longer than the petiole diameter.
Inner surface of corolla glabrous; corolla green . . . **6. C. chlorantha**
Inner surface of corolla pubescent; corolla green to white . **7. C. milnei**

GROUP 2

Fruit long-attenuate, narrow-cylindrical, scarcely tapered to the style, up to 5.5 cm. long; corolla up to 5.5 cm. long . . . . . **8. C. dolichocarpa**
Fruit fusiform to ellipsoid to ovoid, conspicuously tapered to the base of the style, up to 2.5 cm. long; corolla up to 3.5 cm. long.
Calyx utriculose to ventricose, concealing the fruit, the lobes erect.
Leaf blades pubescent above, the under surface with tertiary veins concealed by pubescence; branches rounded, not sharply quadrangular.
Hairs of petioles about equal to petiole diameter; outer surface of corolla pubescent; fruit fusiform . . . . . **9. C. multiseptata**
Hairs of petioles 2–3 times as long as petiole diameter; outer surface of corolla glabrous; fruit ovoid . . . . . **10. C. ventricosa**
Leaf blades glabrous above, the under surface with conspicuous tertiary veins perpendicular to the secondary veins; branches sharply quadrangular. **11. C. acutangula**
Calyx campanulate to cylindrical with spreading lobes, the developing fruit exposed.
Inflorescence and leaves with appressed-sericeous pubescence.
Shrub or small tree up to 6 m. high with coarse, woody branches; peduncles up to ca. 0.5 cm. long . . . . . **12. C. trichophylla**
Shrub or herb 1–3 m. high with slender branches; peduncles 1–2 cm. long. **13. C. muskarimba**
Inflorescence and leaves with spreading, velutinous pubescence.
Calyx lobes thick, coriaceous; calyx 2.5 to 3.5 cm. long . **14. C. victoriae**
Calyx lobes foliaceous, not thick or coriaceous; calyx 1.5 to 2.5 cm. long. **15. C. chippendalei**

GROUP 3

Calyx spathaceous with a single cleft nearly to base . . . . . **16. C. spathacea**
Calyx not spathaceous, but variously cleft or lacerated.
Peduncle subtending a branching cyme bearing 6 to 10 flowers, or more.
Calyx lobes ovate; outer surface of calyx pubescent . . **17. C. kandavuensis**
Calyx lobes lanceolate-attenuate; outer surface of calyx glabrous. **18. C. attenuata**
Peduncle subtending 1 to 3, rarely 4, pedicellate flowers.
Pedicels subtended by a pair of connate-perfoliate bracts. **19. C. involucrata**
Pedicels subtended by free bracts.
Corolla with dense outer indument of capitate or noncapitate hairs.
Outer surface of corolla with indument of capitate hairs. **20. C. reticulata**
Outer surface of corolla with indument of noncapitate hairs.
Mature leaves glabrous above. . . . . **21. C. jugalis**
Mature leaves pubescent above. . . . . **22. C. anthropophagorum**
Corolla glabrous on outer surface.
Calyx lacerated into unequal segments, the outer surface glabrate, the inner surface pilose with ascending hairs; leaves pubescent below.
Calyx thick, fleshy, drying to a coriaceous texture, the apices of the lobes triangular . . . . . **23. C. esothrix**

Calyx thin, not fleshy and not coriaceous upon drying, the apices of the lobes lanceolate-attenuate. . . . . **24. C. hornei**
Calyx parted into 5 equal lobes, the leaves glabrous below.
Fruit orange to red; inflorescence filiform, with 2, 3, or more pairs of bracts; style glabrous.
Young stems drying to a flaky surface; bracts lanceolate. **25. C. taviunensis**
Young stems drying to a smooth surface; bracts linear. **26. C. montana**
Fruit white; inflorescence not filiform, with 1 pair of bracts; style with indument of capitate hairs . . . . . **27. C. pritchardii**

GROUP 4

Calyx lobes large, 1–1.5 cm. long.
Peduncles 4–9 cm. long; leaf blades lanceolate to ovate . . . **28. C. denhamii**
Peduncles 0.5–1.5 cm. long; leaf blades ovate to obovate. . . **29. C. tempestii**
Calyx lobes small, ca. 0.5 cm. long.
Outer surface of calyx glabrous, the lobes with rounded apices; peduncles up to 5 cm. long . . . . . **30. C. ciliata**
Outer surface of calyx with dense, velutinous pubescence, the lobes with acute apices; peduncles up to 1.5 cm. long.
Young petioles tomentose, the hairs about 0.5 as long as the petiole diameter.
Montane habitats 500–1100 m. . . . . **31. C. xanthantha**
Young petioles densely villous, the hairs 1–4 times as long as the petiole diameter. Lowland habitats below 150 m. . . . . **32. C. aloisiana**

GROUP 5

Corolla with dense outer indument of capitate hairs; mature leaves pubescent beneath . . . . . **33. C. harveyi**
Corolla glabrous on outer surface; mature leaves glabrous beneath. **34. C. coleoides**

GROUP 6

A single species . . . . . **35. C. prattii**

1. Cyrtandra cyathibracteata Gillett, sp. nov.

Frutex ad 2 m. altus, partibus novellis indumento pruinoso indutis mox glabratis, ramulis ad 2 cm. diametro; folia opposita, petiolis alatis 1–4 cm. longis, laminis ovatis vel obovatis ad 40 cm. longis et 17 cm. latis, basi in petiolum alatum inequilateraliter attenuatis, apice acutis, margine hydathodis ca. 0.5 mm. longis et inter se ca. 1 mm. inconspicue serratis, maturitate utrinque glabris, venis primariis utrinsecus 7–12 adscendentibus, secundariis subtus inconspicuis; inflorescentiae capitatae, pedunculo crasso ca. 1 cm. longo apice bracteis caducis ornato, bracteis extimis in involucrum cyathiforme 1–2 cm. longum connatis ut bracteis interioribus ovatis extus glabris intus pilosis (pilis patentibus ca. 25μ diametro ad 2 mm. longis), pedicellis crassis 1–2 cm. longis; calyx carnosus ca. 12 mm. longus caducus in lobis haud 1 mm. longis fissus, sinibus sub anthesi irregulariter laceratis, tubo extus glabro intus piloso; corolla alba

carnosa ad 2 cm. longa in lobis subaequalibus rotundatis ca. 0.2 fissa extus indumento eglanduloso ornata intus glabra; staminia tubo corollae medium versus affixa, filamentis ca. 3 mm. longis, antheris in apice adhaerentibus ca. 2 mm. infra fauces corollae; staminodia 2, ca. 0.5 mm. longa infra filamenta 3 mm. et sinibus lateralibus oppositis disposita; discus annulari-cupuliformis prominens ca. 1.5 mm. altus deciduus; gynoecium ca. 12 mm. longum, ovario glabro, stylo indumento noncapitato ornato, stigmate bilobato pelviformi; fructus albi ovoidei ca. 8 mm. longi apice styli basi 1–2 mm. longo apiculati.

Type in the herbarium of the B. P. Bishop Museum, collected on bank of creek in Wainimala Valley, near Matawailevu, Waimano Creek, Province of Naitasiri, Viti Levu, Fiji, alt. about 500 m., Aug. 3, 1937, by *H. St. John* (18191). Duplicate at US.

DISTRIBUTION: Known only from the type specimen.

This species is closely related to *Cyrtandra occulta* and to *C. vitiensis*, differing from both in its glabrous foliage. It appears to be sympatric with the latter species. Further comments on the relationships in this group are included under *C. occulta*.

2. Cyrtandra occulta A. C. Smith, Journ. Arnold Arb. 34: 39. 1953.[3]

Erect shrub 2–3 m. high with densely sericeous pubescence of septate, uniseriate, noncapitate hairs ca. 20μ in diameter and up to 7 mm. long, the foliage and inflorescences subcoriaceous when dry; leaves opposite, the petioles 1–7 cm. long, winged, the blades ovate to oblanceolate, up to 40 cm. long and 18 cm. broad, tapering to the petiole acute to rounded at apex, undulate-crenate, glabrous above and densely sericeous beneath, the pubescence obscuring the secondary veins; inflorescences densely capitate, on stout axillary peduncles up to 3.5 cm. long, terminated by matted-sericeous, connate bracts forming a cuplike involucre up to 3 cm. long subtending a bracteolate, branched, many-flowered cyme 5–10 mm. long, the bracteoles greenish white, ovate-acuminate, up to 3 cm. long, with matted-sericeous pubescence on both surfaces; calyx greenish white, up to 2.5 cm. long, cleft 0.5 to 0.66 of its length into lanceolate-acuminate lobes with dense-sericeous pubescence on both surfaces; corolla white, cylindrical up to 2 cm. long, cleft ca. 0.25 of its length into unequal, rounded lobes with dense-sericeous outer pubescence and inner pubescence of very short, capitate hairs; filaments 3–4 mm. long, bearing apically coherent anthers 2–3 mm. below the corolla sinuses; staminodes 2,

[3] This and most of the other species of *Cyrtandra* are mentioned in J. W. Parham, Plants of the Fiji Islands (1964); most of the older species were mentioned in Horne, A Year in Fiji (1881), and by C. B. Clarke, in DC. Monogr. Phan., vol. 5 (1883).

adnate 8–10 mm. below the upper sinuses and near the middle of the corolla tube; cupulate annular disc conspicuous at anthesis, ca. 1 mm. high, deciduous from the maturing fruit; ovary and style ca. 12 mm. long, the style with indument of capitate hairs on the upper 0.66 of its length, separating 1–2 mm. above the apex of the mature ovary, the stigma applanate, bilobed, the lobes spreading from an oblique terminal cleft; fruit white, ovoid, ca. 1.6 cm. long and 1 cm. broad.

TYPE LOCALITY: Western slopes of Mount Tomanivi, Viti Levu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Dense forests of Viti Levu, at altitudes of 250–1300 m.

VITI LEVU: Mba: Mount Tomanivi, *Smith* 5913 (A-type, BISH, US), *Parks* 20841 (BISH, UC, US). Namosi: Hills north of Wainavindrau Creek, *Smith* 8507 (BISH, US). Naitasiri: Rairaimatuku Plateau, *Smith* 5792 (A. US).

The present species and the related *Cyrtandra cyathibracteata* are distinguished from other members of this group by the cuplike involucre formed by the fusion of the two outer bracts of the inflorescence. This character has been observed in *C. godeffroyi* Reinecke (Samoa), *C. burbidgei* C. B. Clarke (Borneo), and *C. cumingii* C. B. Clarke (Philippine Islands). In *C. burbidgei*, the white involucre is certainly a most conspicuous feature, and it probably is of significance in attracting pollinators.

All of the species in Group 1 are characterized by bracts, calyces, and corollas that gradually rot and fall from the inflorescences, exposing the white fruits.

3. Cyrtandra cephalophora Gillespie, Bishop Mus. Bull. 74: 21, *fig. 26*. 1930.

Erect shrub 2–3 m. high, the young foliage glabrate, the stems up to 1.5 cm. in diameter, quadrangular, the pith up to 1 cm. in diameter; leaves opposite, the petioles 6–9 cm. long, the blades lanceolate to lanceolate-ovate to ovate, up to 24 cm. long and 12 cm. broad, equilateral and cuneate at base, acute to rounded at apex, entire to faintly serrate, at maturity glabrous above, glabrate beneath with scattered, noncapitate hairs ca. 25μ in diameter and 0.3 mm. long, the lower surface with 5–7 strongly ascending, raised primary veins on each side; inflorescences capitate-cylindrical, on stout peduncles 1–1.5 cm. long, the flowers partially concealed by conspicuous, persistent, ovate to orbicular subtending bracts 5–10 mm. long, the bracts with rigid, glistening, dark brown, noncapitate hairs ca. 30μ in diameter and 0.5–1 mm. long without, with similar but much larger hairs 1–3 mm. long within; calyx persistent, ca. 10 mm. long, cleft into equal, lanceolate-attenuate lobes ca. 4 mm. long, glabrate without with small, noncapitate hairs, pilose within with similar, ascending hairs to 3 mm. long; corolla white, 12 mm. long, cleft 0.33 of its length into rounded,

unequal lobes, glabrous on both surfaces; filaments 2–3 mm. long, bearing apically coherent anthers 1–2 mm. below the corolla limb; staminodes 2, clavate, ca. 1.5 mm. long, adnate ca. 1 mm. below the limb; cupulate annular disc prominent, ca. 1 mm. high, persistent; ovary and style ca. 8 mm. long, glabrous, the style curved toward the corolla throat and bearing an applanate, bilobed stigma, the lobes thick, ovate; fruit orange, ovoid, ca. 7 mm. long, terminated by the persistent style base.

TYPE LOCALITY: Namosi, Viti Levu, Fiji; type collected by Gillespie, cited below.

DISTRIBUTION: Namosi, Naitasiri, and Rewa, Viti Levu; Thakaundrove, Vanua Levu, in rain forest habitats between 150 and 1,200 meters.

VITI LEVU: Namosi: Naitarandamu Mountain, just below summit, *Gillespie* 3121 (BISH-type, NY, UC). Naitasiri: Tamavua Woods, 7½ miles from Suva, *Gillespie* 2416 (BISH). Rewa: Mount Kombalevu, *Parks* 20924, (BISH, UC). VANUA LEVU: Thakaundrove: Mount Mariko, *Smith* 463 (BISH).

The present species is one of the most easily recognized of Fijian Cyrtandrae by its conspicuously bracteate, capitate-cylindrical inflorescence and the peculiar indument of the inflorescence. The clavate, conspicuous staminodia borne near the summit of the corolla tube are not known to occur in other Fijian species.

4. Cyrtandra vitiensis Seem. (Bonplandia 9: 257. 1861, nom. nud.; Seem. ex A. Gray, Proc. Amer. Acad. 6: 41. 1862, nom. nud.) Fl. Vit. 182. 1866.
Cyrtandra amicta A.C. Smith, Journ. Arnold Arb. 34: 38. 1953.

Erect herbaceous to shrubby plants up to 4 m. high, with coarse branches up to 2 cm. in diameter and with extensive pith ca. 1.5 cm. in diameter, the young vegetative parts with sericeous pubescence of sepatate, uniseriate, noncapitate hairs ca. 20μ in diameter and up to 1.5 mm. long; leaves opposite, with winged petioles 4–15 cm. long, the blades lanceolate to oblanceolate to ovate, up to 70 cm. long and 22 cm. broad, with an inequilateral, decurrent base and an acute to obtuse to rounded apex, entire to undulate to faintly serrate at margin, glabrous above, faintly pubescent beneath with noncapitate hairs, the primary veins raised beneath, 6–20 per side, curved upward, the secondary veins forming a conspicuous reticulate pattern beneath; inflorescences congested-capitate, many-flowered, on stout peduncles 5–10 mm. long, these terminated by a pair of ovate, greenish white, lobed bracts up to 3 cm. long, these glabrous without and densely sericeous within, subtending a bracteolate, branching cyme, the bracteoles ovate-elliptic to lanceolate, 2- or 3-lobed, up to 3 cm. long, similar to the bracts in color and indument; calyx 1.5–4 cm. long, persistent, but rotting from the mature fruit, cleft ca. 0.25 of its length into unequal lanceolate to triangular lobes, these glabrous or

with scattered capitate hairs without and densely sericeous within at the base of the tube; corolla cylindrical, 1.7–4.5 cm. long, with 5 rounded, unequal lobes 2–10 mm. long, sericeous without when young, becoming glabrate at maturity, glabrous within; filaments 2–5 mm. long, arising opposite the lower sinuses and bearing apically coherent anthers at or below the corolla limb; staminodes 2, ca. 0.5 mm. long, adnate opposite the upper sinuses at about the same level as the stamens; cupulate annular disc prominent, ca. 1–1.5 mm. high at anthesis, deciduous from maturing fruits; ovary and style ca. 1–1.5 cm. long, the ovary glabrous, the style with sericeous indument on upper 0.33 of its length, but with capitate hairs below the stigma, the stigma with 2 flattened, applanate, ovate lobes perpendicular to the style, the style separating 1–2 mm. above the summit of the mature ovary; fruit white, ellipsoid, up to 2.5 cm. long.

TYPE LOCALITY: Namosi, Viti Levu, Fiji. Type collected by Seemann, cited below.

DISTRIBUTION: Upland rain forests of Viti Levu, between 125 and 1300 meters.

VITI LEVU: Mba: Mount Koroyanitu, Mount Evans Range, *Smith* 4244 (A, BISH, US); Mount Tomanivi, *Smith* 5914 (A-type of *Cyrtandra amicta*, BISH, US), *Smith* 5103 (A, US), *Gillespie* 4095 (BISH, NY, UC, US); Nandala Creek, near Nandarivatu, *Smith* 6223 (A, BISH, US), *Degener* 14925 (A, NY). Nandronga & Navosa: Rairaimatuku Plateau, *Smith* 5654 (A, BISH, US). Serua: Korovou, *St. John* 18941 (BISH, US). Namosi: Woods near Namosi, *Seemann* 277 (GH, K-type); Voma Mountain, *Gillespie* 2480 (BISH); without further locality, *Parks* 20239 (BISH, UC, US), *Parks* 20429 (UC), *Parks* 20271 (BISH, UC, US); Korombasambasanga Range, *Smith* 8649 (BISH, US). Naitasiri: Matawailevu, *St. John* 18184 (BISH, US). Rewa: Near Suva, *Tothill* 649 (BISH), *Setchell* & *Parks* 15156 (UC), *Setchell & Parks* 15135 (UC).

Useful distinguishing characters of *Cyrtandra vitiensis* include the large, lanceolate to oblanceolate, glabrate to faintly pubescent leaves with decurrent bases and reticulate venation beneath, and the congested, many-flowered, bracteate inflorescences, and glabrous outer surfaces of the bracts. The corolla has a sericeous outer pubescence when young but becomes glabrate to glabrous upon maturity, as in specimens originally referred to *C. amicta*. Both phases have calyces with pilose inner surfaces and are so closely similar in leaf and inflorescence characters that the possibility of their being conspecific had to be evaluated. After considerable study, I have concluded that their separation must rest on calyx and corolla measurements that contrast the larger flowers of *C. amicta* (calyx 3.5—4 cm. long; corolla 4—4.5 cm. long) with the smaller flowers of *C. vitiensis* (calyx 1.5—2.5 cm. long; corolla 1.7—2.8 cm. long). It is my conclusion that these differences in size, based on very limited material, probably reflect the normal variability within *C. vitiensis*.

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Specimens (*Smith* 4243, A, BISH, US) intermediate between *Cyrtandra vitiensis* and *C. milnei* have been collected on Mount Koroyanitu, Mount Evans Range, Mba, where both species occur. This collection surely portrays a combination of characters of the two species, including the decurrent petioles and the lanceolate to oblanceolate lamina of *C. vitiensis*, and the more dense indument of petioles and leaves, the shorter, triangular calyx-lobes, and the high frequency of capitate hairs, all of which characterize *C. milnei*. The collection is placed under *C. milnei* in the present study. There seems little doubt that the two species are very closely related.

The facies of certain species of the Hawaiian Islands suggests a close relationship with *Cyrtandra vitiensis* and other species of Group 1. These species include *C. oblanceolata* St. John & Storey and *C. waianuensis* Rock, which have the habit as well as the congested inflorescence and indument of *C. vitiensis*. In addition, the habit inflorescence, leaves, and flowers of *C. richii* A. Gray, of Samoa, suggest that it is of the same evolutionary stock as *C. vitiensis*.

5. Cyrtandra leucantha A. C. Smith, Journ. Arnold Arb. 34: 41. 1953.

Shrub up to 3 m. high with brown indument of septate, uniseriate capitate and noncapitate hairs up to ca. 100μ in diameter and 1–2 mm. long; leaves opposite, the petioles 3–10 cm. long, with pubescence shorter than petiole diameter, the blades oblanceolate to lanceolate-ovate to ovate, up to 32 cm. long and 15 cm. broad, inequilateral and cuneate to attenuate at base, acute to acuminate at apex, coarsely serrate to biserrate at margin, tomentose on both surfaces; inflorescenses many-flowered, congested, the peduncles ca. 2–5 mm. long, terminated by glabrate, ovate to elliptic to reniform, corolloid, persistent bracts up to 1 cm. long, these subtending branching, bracteolate cymes 5–10 mm. long, the bracteoles similar to and closely subtended by the outer bracts; calyx white, 1.5 cm. long, unequally cleft into 5 triangular-acuminate lobes 2–3 mm. long, persistent, with dense outer pubescence of capitate and noncapitate hairs, with inner pubescence of noncapitate hairs; corolla white, up to 2.5 cm. long, cleft into subequal, rounded lobes 2–3 mm. long, with dense, capitate and noncapitate hairs without, glabrous within; filaments ca. 3 mm. long, arising ca. 10 mm. below the sinuses of the lower corolla lobe and bearing apically coherent anthers well below the corolla throat; staminodes 2, ca. 1 mm. long, recurved, adnate opposite the upper sinuses at approximately the same level as the filaments; cupulate annular disc conspicuous, ca. 1 mm. high, deciduous from the mature fruit; ovary and style 12–15 mm. long, the ovary glabrous, the style with long, capitate hairs throughout its length, terminated by an applanate, bilobed stigma, the broadly ovate lobes of the stigma

perpendicular to the axis of the style, the style separating 1–2 mm. above the apex of the mature ovary; fruit white, ellipsoid, ca. 2 cm. long and 1.4 cm. wide.

TYPE LOCALITY: Mount Nanggaranambuluta, Mba, Viti Levu, Fiji. Type collected by A. C. Smith, cited below.

LOCAL NAME: "Mbeta kai" (*Smith* 4767).

DISTRIBUTION: Upland rain forests between 300 and 1,100 meters, in Mba, Viti Levu, and on Taveuni.

VITI LEVU: Mba: Mount Nanggaranambuluta, *Smith* 4767 (A. BISH, US), *Smith* 6312 (A-type, BISH, US), *Gillespie* 3689 (A, BISH, UC); Nandarivatu, *Tothill* 644 (BISH), *Degener & Ordonez* 13523 (A. BISH, NY, UC, US); Nandala, *Degener* 14836 (A, BISH, NY, UC, US). TAVEUNI: Hills east of Somosomo, *Smith* 8375 (BISH, US); Somosomo, edge of woods, *Gillespie* 4780 (BISH, US); valley between Mount Manuka and Mount Koroturanga, *Smith* 8253 (BISH, US).

The relationship between this species, *Cyrtandra chlorantha* A. C. Smith, and *C. milnei* A. Gray is very close. A tabular summary of distinguishing characters is presented under *C. chlorantha*. It has been pointed out in the discussion under *C. occulta* and *C. vitiensis* that this group of species is also represented in Polynesia, Borneo, and the Philippine Islands. An additional western relationship is portrayed by a collection from the Solomon Islands (*Brass* 3147, San Cristoval, BISH) in which the calyx, leaf, and inflorescence characters suggest the *C. leucantha* lineage.

6. Cyrtandra chlorantha A. C. Smith, Journ. Arnold Arb. 34: 42. 1953.

Shrub 3–4 m. high with pubescence of brown, septate, uniseriate capitate and noncapitate hairs up to 120μ in diameter and up to 4 mm. long; leaves opposite, the petioles 3–5 cm. long, the blades lanceolate to elliptic, up to 17 cm. long and 6 cm. broad, inequilateral and acute to cuneate at base, acute to acuminate at apex, coarsely serrate, tomentose to glabrate on both sides; inflorescences many-flowered, congested, the penduncles up to ca. 0.5 cm. long, terminated by persistent, green, ovate-elliptic bracts ca. 1.5 cm. long, these with a dense pubescence of long, capitate hairs without, glabrous to glabrate within, subtending short, branching bracteolate cymes, the bracteoles similar to the bracts but smaller; calyx green, broad-cylindrical, persistent, ca. 1.5 cm. long, cleft ca. 0.25 of its length into unequal triangular lobes, with dense, capitate hairs without, glabrous to glabrate with few capitate hairs within; corolla green, narrowly cylindric, ca. 1.5–2.2 cm. long, slightly exserted beyond the calyx, cleft ca. 0.2 of its length into rounded lobes, with capitate hairs without, glabrous within; filaments adnate near the middle of the corolla tube, ca. 3 mm. long, bearing apically coherent anthers 1–2 mm. below the corolla limb; staminodes 3, ca. 1 mm. long, adnate

opposite the upper sinuses at same level as filaments, the median staminode ca. 1 mm. above the laterals; cupulate annular disc prominent, ca. 1.5 mm. high; ovary and style ca. 1 cm. long, the ovary glabrous, the style with capitate hairs over its entire length, the stigma applanate, bilobed, the lobes perpendicular to the axis of the style, borne below the anthers.

TYPE LOCALITY: Naitasiri, Viti Levu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Known only from the type locality, alt. 870–970 m.

VITI LEVU: Naitasiri: Northern portion of Rairaimatuku Plateau, between Mount Tomanivi and Nasonggo, in dense forest, *Smith* 5789 (A-type, BISH, US).

This species and the related *Crytandra milnei* and *C. leucantha* can be separated from each other by the following characters:

	C. chlorantha	*C. milnei*	*C. leucantha*
Color of calyx and corolla:	green	greenish-white to white	white
Inner corolla surface:	glabrous	pubescent	glabrous
Number of staminodes:	3	3	2
Length of petiole hairs:	3–4 mm.	3–6 mm.	1–2 mm.

7. Cyrtandra milnei (Seem. in Bonplandia 9: 257. 1861, nom. nud.) Seem. ex A. Gray, Proc. Amer. Acad. 6: 40. 1862.

Cyrtandra desvoeuxii Horne (A year in Fiji, 260. 1881, nom. nud.) ex C. B. Clarke in DC Monogr. Phan. 5: 265. 1883.

Cyrtandra glandulosa Gillespie, Bishop Mus. Bull. 74: 22, *fig. 28*, 1930.

Sparsely branched herb or shrub 1–4 m. high with indument of brown, septate, uniseriate trichomes, the capitate hairs 50–100μ in diameter and 1–2 mm. long, the noncapitate hairs up to 120μ in diameter and up to 6 mm. long; leaves opposite, the petioles up to 20 cm. long, densely villous, the hairs equal to or longer than the petiole diameter, the blades lanceolate to elliptic to ovate to obovate, up to 50 cm. long and 21 cm. broad, rounded, obtuse, acute, cuneate, or attenuate at base, obtuse, acute, or acuminate at apex, simply or doubly serrate, tomentose to glabrate above, moderately pilose beneath; inflorescences many-flowered, congested, the peduncles to 1 cm. long, terminated by corolloid, green to white, ovate to elliptic bracts up to 2 cm. long and 1 cm. wide, with a sparse to dense pubescence of capitate hairs without, glabrous within, subtending a bracteolate, branching cyme 0.5–3 cm. long, the bracteoles similar to but smaller than the bracts; calyx green to white, cylindrical, persistent, 1–2.5 cm. long, cleft ca. 0.25 of its length into 5 unequal lobes, the 3 smaller upper lobes triangular, the 2 larger lower lobes lanceolate-triangular, with capitate hairs on both surfaces; corolla green to white, 2–3 cm. long, cylindrical, cleft ca. 0.12 of its length into unequal,

rounded, erect lobes, with capitate and noncapitate hairs on both surfaces; filaments 3–4 mm. long, arising 8–10 cm. below the sinuses of the lower corolla lobe, bearing apically coherent anthers 1–2 mm. below the limb; staminodes 3, clavate, adnate opposite the upper sinuses at approximately the same level as the filaments, the medial staminode up to 2 mm. long, the lateral to 1 mm., borne slightly above the medial; cupulate annular disc prominent, ca. 1 mm. high, deciduous; ovary and style 1.2–2 cm. long, the ovary glabrous, the style with capitate hairs, separating 1–2 mm. above the apex of the mature ovary, the stigma applanate, bilobed, the lobes perpendicular to the axis of the style; fruit white, ovoid, up to 2 cm. long and 1.5 cm. wide.

TYPE LOCALITY: Ovalau, Fiji. Type collected by the U.S. Exploring Expedition, cited below.

LOCAL NAME: "Me-diri-ta-bua" (*Gillespie* 2601); "beta levu" (*Gillespie* 3852); and "kau-bi-bi" (*Gillespie* 2749).

DISTRIBUTION: Dense forests between 50 and 1,250 meters on Viti Levu, Kandavu, and Ovalau.

VITI LEVU: Mba: Mount Koroyanitu, Mount Evans Range, *Smith* 4129 (A, BISH, US), *Smith* 4243 (A, BISH, US); valley of the Singatoka River, near Nandarivatu, *Gillespie* 3852 (BISH-type of *Cyrtandra glandulosa* Gillespie, UC); Mount Tomanivi, *Gillespie* 4108 (BISH, UC, US), *Smith* 5101 (A, BISH, US), *Degener* 14335-a (A, NY); near Nandarivatu, *Gillespie* 4253 (BISH, UC, US); Nauwanga, near Nandarivatu, *Degener* 14686 (A, BISH, NY, UC, US); hills between Nggaliwana and Nandala creeks, south of Nauwanga, *Smith* 5848 (A, BISH, US). Namosi: Namosi Village, *Gillespie* 2601 (BISH); Voma Mountain, *Gillespie* 2749 (BISH); hills east of Wainikoroiluva River, near Namuamua, *Smith* 8940 (BISH, US), *Smith* 8963 (BISH, US). KANDAVU: Mount Mbuke Levu, *Smith* 287 (BISH, NY). OVALAU: Near summit of range west of Levuka *Gillespie* 4445 (BISH, NY, UC); Lovoni Valley, *Horne* 179 (GH, K-type of *Cyrtandra desvoeuxii* Horne ex C. B. Clarke); without further locality, *U.S. Expl. Exped.* s.n. (GH, US-type).

Seemann used Gray's description, verbatim, in Flora Vitiensis. Clarke wrote an abbreviated version of this, following it with a longer description of *Seemann* 281, which is *Cyrtandra chippendalei*, not *C. milnei*.

The designation of Ovalau as the type locality for this species rests on indirect evidence. The Wilkes Expedition is known to have collected six species of *Cyrtandra* in Fiji. The type material of *C. dolichocarpa* A. Gray and a sterile specimen of *C. harveyi* bear the locality of Sandalwood Bay, Vanua Levu. The remaining four species almost certainly were obtained on Ovalau, where the expedition spent a total of 42 days, nearly half of the visitation to Fiji. Pickering noted four collections of *Cyrtandra* on Ovalau. Ovalau is designated as the locality for three of these: *C. involucrata* Seem., *C. anthropophagorum* Seem.

ex A. Gray, and *C. pritchardii* Seem. The label of the fourth collection, the type of *C. milnei*, carries only "Feejee Islands" for locality; this is cited by Gray, but it may be assumed that the collection was obtained on Ovalau.

The bracts of the inflorescence are large and conspicuous, often exceeding the calyx. There is considerable range in flower size and this is sometimes expressed within a single inflorescence. The overall variability of this species is extensive and includes variation in leaf size, leaf shape, frequency and dimensions of capitate and noncapitate hairs. The colors of the bracts, calyces, and corollas have been variously reported as from greenish white to white. This variability extends to *Cyrtandra vitiensis* through one collection, *Smith* 4243, which is intermediate between *C. milnei* and *C. vtiensis*. The variability of present collections indicates that *C. milnei* is a complex assemblage of populations that make a difficult taxonomic problem. A portion of this complex was described by Gillespie as *C. glandulosa*. However, I have been unable to separate Gillespie's material from the rest of the complex.

8. Cyrtandra dolichocarpa A. Gray, Proc. Amer. Acad. 6:40. 1862. *Cyrtandra microstigma* C. B. Clarke, in DC. Monogr. Phan. 5: 284. 1883.

Shrub or spreading tree 1–4 m. high with ferrugineous pubescence of septate, uniseriate, capitate and noncapitate hairs up to 100μ in diameter and 6 mm. long; leaves opposite, the petioles 1–4 cm. long, the blades lanceolate-ovate, up to 21 cm. long and 6 cm. broad, with inequilateral, obtuse, acute, or cuneate bases, acute to acuminate at apex, serrate, with 2 or 3 teeth per cm., moderately pubescent above, densely pubescent beneath, the veins obscure above, conspicuous beneath, the primary veins raised, curved upward, 6–8 per side, the secondary veins reticulate; inflorescences pilose, the peduncles 0.5–1 cm. long, terminated by persistent, ovate bracts 3–5 mm. long, subtending 1–5 bracteolate pedicels 2–2.5 cm. long, the bracteoles ca. 3 mm. long, pilose on both surfaces; calyx 2.5–3 cm. long, persistent, cylindrical, the lanceolate-acuminate lobes connivent, parted 10–15 mm. along 1 or 2 sinuses, with dense, noncapitate hairs on both surfaces; corolla chartaceous, distinctly bilabiate, white, up to 5.5 cm. long, cleft about 0.25 to 0.33 of its length into unequal, rounded lobes, the lower (anterior) lobe up to 2 cm. long and 1 cm. broad, the limb with conspicuous longitudinal veins, with numerous capitate hairs on both surfaces, the tube with capitate hairs without, glabrous within; filaments ca. 3 mm. long, arising 3–4 mm. below sinuses of the anterior corolla lobe, bearing apically coherent anthers at the throat; staminodes 3, 1.5 mm. long, arising ca. 5 mm. below sinuses of the upper lip, the median slightly shorter and borne 1–2

mm. above the lateral; cupulate annular disc conspicuous, ca. 1 mm. high; ovary and style ca. 2.5 cm. long, extending to ca. 5 mm. below corolla throat, densely pubescent with capitate and noncapitate hairs below, capitate hairs above, the ovary attenuate to the style and stigma, the stigma applanate, bilobed, the lobes thick, ca. 1 mm. long, spreading obliquely to the axis of the style; fruit cylindrical, elongate, up to 5.5 cm. long and 5–7 mm. broad.

TYPE LOCALITY: Mbua Bay (Sandalwood Bay), Vanua Levu. Type collected by the U.S. Exploring Expedition, cited below.

DISTRIBUTION: Dense forests of Vanua Levu and Rambi, 100–700 m.

LOCAL NAME: "Muskarimba" (*Smith* 612, 1594).

VANUA LEVU: Mbua: Mbua Bay, *U.S. Expl. Exped.* (GH, US-type); upper Ndama River Valley, *Smith* 1594 (BISH). Mathuata: Northwestern slope of Mount Numbuiloa, east of Lambasa, *Smith* 6530 (A, BISH, US). Thakaundrove: Southwestern slope of Mount Mbatini, *Smith* 612 (BISH, GH, NY, UC, US). Rambi: No locality, *Horne* 439 (K-syntype of *Cyrtandra microstigma* C. B. Clarke, the other syntype, *Horne* 439a, has not been seen.)

The present species has the largest flowers and surely the most peculiar, distinctive fruits of all the Fijian species. The extension of this lineage into Polynesia is indicated by similar flowers, inflorescences, and fruits in the Cyrtandrae of Samoa, such as *C. krugeri* Rein., *C. nudiflora* C. B. Clarke, and *C. pulchella* Rich., all of which have glabrous fruits, and *C. vaupelii* Lauterb., in which the fruits have a pubescence similar to that of *C. dolichocarpa*.

9. Cyrtandra multiseptata Gillespie, Bishop Mus. Bull. 74: 23, fig. 31. 1930.

Shrub or slender tree 2–4 m. high with brown indument of septate, uniseriate noncapitate hairs up to 60μ in diameter and 3 mm. long; leaves opposite, the petioles 1–6 cm. long, the blades lanceolate to ovate to obovate, up to 20 cm. long and 10 cm. wide, inequilateral, cuneate at base, acute to acuminate at apex, serrate, with 1–3 teeth per cm., at maturity glabrate above, tomentose beneath; inflorescences tomentose, the penduncles 2–5 mm. long, terminated by connate, deciduous bracts ca. 6 mm. long, subtending 1–3 bracteolate pedicels ca. 0.5 cm. long, the bracteoles connate, deciduous, equal to or smaller than the bracts; calyx 3.5 cm. long, ventricose, cleft ca. 0.33 of its length into unequal lanceolate-acuminate lobes, with noncapitate hairs ca. 40μ in diameter without, and a dense tomentum of smaller hairs ca. 15μ in diameter within; corolla with coarse, noncapitate hairs without, glabrous within; cupulate annular disc conspicuous, ca. 1 mm. high, persisting as a broken, irregular ring on mature fruits; fruit fusiform, sheathed by the calyx, up to 2.5 cm. long and 1 cm. wide.

TYPE LOCALITY: Wet canyons near Namosi Village, Viti Levu, Fiji. Type collected by Parks, cited below.

DISTRIBUTION: Dense forests between 800 and 1,000 meters, Mba and Namosi, Viti Levu.

VITI LEVU: Mba: Western slopes of Mount Nanggaranambuluta, east of Nandarivatu, *Smith* 6327 (A, BISH, US); Mount Tomanivi, *Smith* 5102 (A, US). NAMOSI: Canyons near Namosi Village, 800 m., *Parks* 20237 (BISH-type UC, US).

This species is distinguished from *Cyrtandra dolichocarpa* and *C. ventricosa* by the differences cited in the tabular summary given under the latter species. The habit, inflorescences, and chartaceous corollas of *C. multiseptata*, *C. ventricosa*, and *C. dolichocarpa* suggests that the three species are of a common evolutionary line. The extension of this lineage into Polynesia is discussed under *C. dolichocarpa*.

10. Cyrtandra ventricosa Gillett, sp. nov.

Herba suffruticosa 1-2 m. alta, pilis septatis 120μ diametro et ad 6 mm. longis induta; folia opposita, petiolis 1–7 cm. longis, laminis ovatis vel lanceolato-ovatis ad 22 cm. longis et 12 cm. latis, basi subaequilateraliter cuneatis, apice acutis vel acuminatis, margine hydathodis serratis, supra glabratis, subtus dense pubescentibus, venis primariis utrinsecus 6–10 curvatis; inflorescentiae pilosae pauciflorae, pedunculis axillaribus erectis 1–2 mm. longis, bracteis terminalibus lanceolatis caducis foliosis ca. 5 mm. longis, pedicellis bracteatis 10–12 mm. longis, bracteis interioribus caducis deltoideis basi connatis; calyx persistente cylindricus fauce constrictus 1.5 cm. longus in lobis 4 vel 5 valvatis lanceolatis 0.25 fissus utrinque pilosus; corolla chartacea viridi-alba vel eburnea 18 mm. longa, utrinque glabra, reticulato-venosa, in lobis 5 inaequalibus fissa, lobis 2 posterioribus 7 mm. longis et 6 mm. latis, lobis 3 anterioribus 10 mm. longis et 9 mm. latis; stamina 2 mm. infra sinus corollae lobi inferioris enata, antheris apice adhaerentibus in corollae faucium ore; staminodia 3 infra filamenta 2 mm. et sinibus superioribus opposita disposita, staminodio medio ca. 1 mm. longo et 1 mm. supra staminodia lateralia 2 mm. longa; discus annulari-cupuliformis prominens 1.5 mm. altus, sub fructu interruptus; gynoecium 1.5 cm. longum glabrum, styli parte superiore caduca, stigmate bilobato, lobis applanatis obliquis; fructus ovoidei 12 mm. longi, 7 mm. lati.

Type in the herbarium of the Bernice P. Bishop Museum, collected on the southern slope of the Valanga Range, Province of Thakaundrove, Vanua Levu, Fiji, alt. 100 m., Nov. 11, 1933, by A. C. Smith (368). Duplicates at A, NY, UC, US.

ADDITIONAL SPECIMENS EXAMINED:

VANUA LEVU: THAKAUNDROVE: Savu Savu Bay, Vatunivuamonde Mountain, *Degener & Ordonez* 13968 (A, BISH, UC, US).

LOCAL NAME: "Merikula" (*Smith* 368).

The affinities of this species are with *Cyrtandra multiseptata* and *C. dolichocarpa*. It is distinguished from the others by its indument, fruits, and habit, as shown in the following tabular summary:

	C. ventricosa	*C. multiseptata*	*C. dolichocarpa*
Dimensions of leaf trichomes:	120μ × 6–7 mm.	60μ × 3 mm.	100μ × 6 mm.
Fruit shape:	ovoid	fusiform	cylindrical
Habit:	subligneous herb 1–2 m. high	shrub or slender tree 2–4 m. high	shrub or tree 1–4 m. high

11. Cyrtandra acutangula Seem. (Bonplandia 9: 257. 1861, *nom. nud.;* Seem. ex A. Gray, Proc. Amer. Acad. 6: 41. 1862, *nom. subnud.*) Fl. Vit. 182. 1866. *Cyrtandra utriculosa* C. B. Clarke, in DC. Monogr. Phan. 5: 230. 1883.

Shrub 2–3 m. high with dark brown indument of septate, uniseriate, noncapitate hairs 15–25μ in diameter and up to 1 mm. long, the young branches sharply quadrangular, the bark with linear striations; leaves opposite, the petioles 1–6 cm. long, 3–4 mm. in diameter, the blades dark brown, lanceolate to elliptic to ovate, up to 23 cm. long and 8 cm. broad, equilateral and cuneate at base, acute to obtuse at apex, faintly serrate, when young glabrous above and densely brown-sericeous beneath, at maturity glabrous on both surfaces, the lower surface with conspicuous, raised veins, the secondary veins perpendicular to the primary veins; inflorescences tomentose, the peduncles 2–8 mm. long, reflexed, terminated by a pair of linear-lanceolate, free, caducous bracts up to 1.5 cm. long and subtending 1–3 bracteolate pedicels, the bracteoles lanceolate, free, caducous, up to 7 mm. long; calyx cylindrical, persistent, up to 3.5 cm. long, cleft to about half its length into lanceolate, acuminate lobes, the tube glabrous without, pilose with brown, ascending hairs 3–4 mm. long within; cupulate annular disc 2 mm. high, persistent, forming a continuous ring in mature fruit; fruit ovoid, about 1 cm. in diameter and 2 cm. long, tipped by the basal 3 mm. of the style and enclosed in the persistent calyx.

TYPE LOCALITY: Namosi, Viti Levu, Fiji. Type collected by Seemann, cited below.

DISTRIBUTION: Known with certainty only from the upland rain forests of Namosi Province, where it occurs at elevations near 1,000 m.

VITI. LEVU: Namosi: "Mountains near Namosi," *Seemann* 276 (GH, K-type); damp, shaded forests near Vienunga, *Horne* 911 (GH, K-type of *Cyrtandra utriculosa* C. B. Clarke); Mount Naitarandamu, *Gillespie* 3120 (BISH, UC). Viti Levu, without further locality: *Parks* 20478 (UC), 20954 (BISH, UC, US).

I have been unable to find a morphological basis for separating *Cyrtandra utriculosa* C. B. Clarke from *C. acutangula*. Both species are

based on material from a limited region of Namosi, so that the reduction of *C. utriculosa* seems justified. The facies of this species is very different from that of other species in Group 2, and I have seen no Polynesian material that bears a close resemblance to it.

The present species differs from the *Cyrtandra dolichocarpa-C. ventricosa-C. multiseptata* lineage in its much smaller trichomes, sharply quadrangular stems, dark brown foliage, and glabrous leaves. The trichomes of *C. multiseptata* are over twice the diameter of those of the present species, and those of *C. ventricosa* over five times.

12. Cyrtandra trichophylla A. C. Smith, Journ. Arnold Arb. 34: 44. 1953.

Shrub to slender tree 2–6 m. high with brown, appressed-sericeous pubescence of septate, uniseriate, noncapitate hairs 20–40μ in diameter and up to 2 mm. long; stems up to 8 cm. in diameter 1.5 m. above the ground, with much xylem and little pith; leaves opposite, the petioles 1–5 cm. long, the blades ovate to obovate to oblanceolate, up to 32 cm. long and 12 cm. broad, inequilateral and acute to cuneate at base, acute to obtuse to rounded at apex, dentate-crenate, glabrate to glabrous above, sericeous beneath, the primary veins conspicuously raised on lower surface, 9–12 per side, curved upward, the secondary veins sometimes obscured by pubescence; inflorescences with brown, dense, sericeous pubescence, few-flowered, nearly sessile, the stout peduncles terminated by connate, caducous bracts ca. 5 mm. long, subtending 1–3 pedicels 5–14 mm. long; calyx persistent, eventually rotting from mature fruit, 12–15 mm. long, cleft 0.5 to 0.66 of its length into lanceolate-acuminate lobes, densely sericeous on both surfaces; corolla ca. 2 cm. long, curved-cylindrical, cleft ca. 0.25 of its length into rounded, unequal lobes, densely sericeous without, the limb and throat with capitate hairs within; filaments ca. 3 mm. long, bearing apically coherent anthers at the base of the corolla limb; staminodes 3, ca. 0.5 mm. long, arising 5–6 mm. below the upper sinuses; cupulate annular disc thick, prominent, ca. 1 mm. high, breaking into plates persisting in mature fruit; ovary and style 12 mm. long, the ovary glabrous, the style with numerous capitate hairs in the upper half of its length, separating 1–2 mm. above the mature ovary, the stigma borne 1–2 mm. below the anthers, bilobed, applanate, the lobes oblique to the axis of the style; fruit white, ovoid-ellipsoid, up to 2 cm. long and 1 cm. wide.

TYPE LOCALITY: Ridge from Mount Namama toward Mount Tomanivi, Viti Levu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Dense forests of Viti Levu from 100 to 1,300 m.

VITI LEVU: Mba: Nandala Creek, 3 mi. south of Nandarivatu, *Smith* 6246 (A, BISH, US). Namosi: Ridges near Namosi Village, *Gillespie* 2690 (BISH, NY, UC); Valley of the Waindina, near Namosi, *Gillespie* 2595 (BISH); Naitarandamu Mountain, *Gillespie* 3243 (BISH), *Gillespie* 3244 (BISH, UC), *Gillespie* 3378

(BISH, UC), *Gillespie* 3303 (BISH, UC); Wainavindrau Creek, near Wainimakutu, *Smith* 8544 (BISH, US); Vakarongasiu Mountain, *Gillespie* 3289 (BISH, UC); without further locality, *Parks* 20269 (BISH, UC). Ra: Ridge from Mount Namama toward Mount Tomanivi, *Smith* 5698 (A-type, BISH, US). Naitasiri: Wainisavulevu-Numbulolo Divide, *St. John* 18324 (BISH, US); near Tamavua, 150 m., *Gillespie* 2455 (A, BISH), Tamavua Village, *Gillespie* 2116 (BISH, UC). Rewa: Korombamba Mountain, *Gillespie* 2257 (BISH, UC), *Parks* 20138 (UC).

Among Fijian Cyrtandrae this species has the most conspicuously woody habit; the proportion of wood in the stem and branches is greater than it is known to be in any of the other species. It occurs in the territory of *Cyrtandra vitiensis* but is easily distinguished by its open, few-flowered inflorescences in contrast to the capitate, many-flowered inflorescences of *C. vitiensis*. The contrast in the proportion of wood in these species is shown below:

	C. vitiensis	*C. trichophylla*
Diameter of stem (mm.)	20	10; 15; 16
Diameter of pith cylinder (mm.)	15	4 5 4

Neither *Cyrtandra trichophylla* nor any closely related species are known to occur in Polynesia.

13. Cyrtandra muskarimba A.C. Smith, Bishop Mus. Bull. 141:132. *fig. 67.* 1936.

Shrub or succulent herb 1–3 m. high, the young parts with dark brown, appressed, septate, uniseriate, noncapitate hairs ca. 60–80μ in diameter and up to 3 mm. long; leaves opposite, the petioles 4–11 cm. long, the blades elliptic to ovate, up to 28 cm. long and 15 cm. broad, unequal and obtuse to cuneate at base, acute to acuminate at apex, finely serrate, above with appressed, usually parallel, sericeous hairs, beneath densely pubescent, with 9–11 upwardly curved, raised primary veins on each side of midvein, the secondary veins obscured by pubescence; inflorescences elongate, branching cymes with 1–4 flowers; peduncles 1–2 cm. long, terminated by lanceolate bracts ca. 1.5 cm. long, subtending pedicels ca. 1.5 cm. long; calyx persistent, ca. 1.5–1.8 cm. long, cleft 0.5 to 0.66 of its length into unequal, triangular to lanceolate lobes, with dark brown, appressed-ascending pubescence on both surfaces; corolla white, 2.0–2.3 cm. long, cleft into 5 rounded, unequal lobes 2–3 mm. long, cylindrical, coriaceous, externally glandular with capitate hairs or pilose with ascending, noncapitate hairs, within with capitate hairs; filaments 2–3 mm. long, bearing apically coherent anthers ca. 1 mm. below the corolla limb; staminodes 2, ca. 0.5 mm. long, arising near middle of corolla tube; cupulate annular disc conspicuous, ca. 1 mm. high, persisting as a broken ring in mature fruit; ovary and style 7–8 mm. long, the style with capitate hairs in upper 0.25 of its length; stigma borne 1–2 mm. below the anthers, weakly bilobed; fruit ovoid, ca. 1.5 cm. long

and 0.8 cm. wide, tipped by 1–2 mm. of the persistent style base, sheathed by the persistent calyx.

TYPE LOCALITY: In dense forest on the southwestern slope of Mount Mbatini, Vanua Levu, Fiji. Type collected by A.C. Smith, cited below.

LOCAL NAME: "Muskarimba" (*Smith* 1914).

DISTRIBUTION: Upland rain forests of Serua, Viti Levu, and Thakaundrove, Vanua Levu, between 300 and 700 meters.

VITI LEVU: Serua: Namboutini, *Damanu* 70 (K); Mbuyombuyo, near Namboutini, *Tabualewa* 15577 (A, BISH, NY, UC, US). VANUA LEVU: Thakaundrove: Southwestern slope of Mount Mbatini, *Smith* 673 (BISH-type, GH, NY, UC, US); Mount Ndikeva, *Smith* 1914 (BISH, GH, NY, UC, US).

This species is closely related to *Cyrtandra trichophylla*, differing from it in its decidedly less woody habit, larger trichomes, shorter peduncles, and the presence of only two staminodes.

14. Cyrtandra victoriae Gillespie, Bishop Mus. Bull. 74: 25, *fig. 34.* 1930.

Shrub to small tree 2–5 m. high with ferrugineous, septate, uniseriate, noncapitate hairs ca. 100–160μ in diameter and up to 5 mm. long; leaves opposite, the petioles 2–6 cm. long, with dense, velutinous pubescence, the blades ovate, obovate, oblanceolate, or lanceolate, up to 35 cm. long and 15 cm. broad, inequilateral and acute to cuneate at base, acute to acuminate at apex, serrate to entire, with moderate to dense tomentum above, the hairs lying parallel and upwardly directed on younger leaves, spreading on mature foliage, velutinous beneath; inflorescences with few flowers, the peduncles stout, 0.5–1 cm. long, terminated by velutinous, greenish white, ovate to lanceolate, attenuate, free to connate, caducous bracts 3–5 cm. long, these subtending 2–4 pedicels 5–10 mm. long; calyx white, growing with the developing fruit and persistent on mature fruits, 1.7–3 cm. long at anthesis, 3–4 cm. long in mature fruit, cleft 0.5 to 0.66 of its length into unequal, lanceolate-attenuate lobes, velutinous without, within glabrous above, below with a dense tomentum of ascending noncapitate hairs; corolla white, ca. 3.0–3.5 cm. long, cylindrical, slightly curved, cleft into rounded, unequal lobes 4–5 mm. long, with velutinous outer pubescence projecting well above the lobes, the inner surface with capitate hairs in upper third and mixed noncapitate and capitate hairs below; filaments 4–5 mm. long, bearing apically coherent anthers at the corolla throat; staminodes 3, adnate near the middle of the corolla tube, up to 1.5 mm. long, the median up to 0.5 mm. long, borne 2 mm. below the lateral; cupulate annular disc conspicuous, ca. 1 mm. high, persisting as a broken, thick, dark ring in mature fruit; ovary and style ca. 1.8 cm. long, the ovary glabrous, the style with dense indument of capitate hairs in upper 0.75 of its length,

separating 2–3 mm. above the apex of the fruit, the stigma weakly bilobed; fruit ovoid, up to 2 cm. long and 1.5 cm. wide.

TYPE LOCALITY: Mount Tomanivi, Mba, Viti Levu, Fiji. Type collected by Gillespie, cited below.

LOCAL NAME: "Doo'-re le'vu" (*Gillespie* 4088).

DISTRIBUTION: Dense upland forests of central Viti Levu, between 250 and 1,250 meters.

VITI LEVU: Mba: Mount Tomanivi, *Gillespie* 4088 (BISH-type, UC), *Smith* 5915 (A, BISH, US), 5916 (A, US), 5917 (A, BISH, US); summit of Mount Nanggaranambuluta, *Gillespie* 4349 (BISH); escarpment west of Nandarivatu, *Smith* 5081 (A, BISH, US). Namosi: Summit of Vakarongasiu Mountain, *Gillespie* 3263 (BISH); valley of Wainambua Creek, south of Mount Naitarandamu, *Smith* 8801 (BISH, US). Ra: Mount Namama, east of Nandarivatu, *Smith* 5697 (A, BISH, US), 5722 (A, BISH, US).

The significant features of *Cyrtandra victoriae* are the very large, fleshy (drying to coriaceous) calyx and corolla. The flowers and fruits of *Smith* 5081 and 5917 indicate that the calyx grows considerably after anthesis, a useful distinguishing character for the species.

	Length of Calyx	
	at anthesis	*in mature fruit*
	30 mm.	40 mm.
Smith 5081 (US)	20 mm.	30 mm.
	17 mm.	38 mm.
Smith 5917 (US)	30 mm.	37 mm.
	30 mm.	

The closest relationship of this species is with *Cyrtandra chippendalei*, and this is discussed under the latter species.

15. Cyrtandra chippendalei Horne ex C. B. Clarke, in DC. Monogr. Phan. 5: 230. 1883.

Cyrtandra tomentosa A. C. Smith, Sargentia 1: 116. 1942.

Herbaceous to shrubby plants 1–4 m. high with light brown, septate, uniseriate, noncapitate hairs 100–160μ in diameter and 2–5 mm. long; leaves opposite, the petioles 2–10 cm. long, with villous pubescence of hairs as long as the petiole diameter, the blades ovate to lanceolate to oblanceolate, up to 28 cm. long and 13 cm. wide, inequilateral and rounded to cuneate to attenuate at base, acute to acuminate at apex, finely serrate, moderately pubescent above and velutinous beneath; inflorescences with 1–6 flowers, densely villous; peduncles 1–3 cm. long, terminated by ovate, acuminate, basally connate, caducous bracts to 4 cm. long, these subtending bracteolate pedicels 0.5–2 cm. long; calyx 1.2–2.5 cm. long, distended by the maturing fruits, cleft ca. 0.5 to 0.66 of its length into 5 unequal, triangular to attenuate-

lanceolate, foliaceous lobes, densely pilose on both surfaces; corolla white, 2–3 cm. long, fleshy, drying to a coriaceous texture, cleft into unequal, rounded lobes 3–4 mm. long, pilose without, glabrous within or with capitate hairs; filaments 4–5 mm. long, bearing apically coherent anthers slightly below the corolla throat; staminodes 2, conspicuous, ca. 1.5 mm. long, adnate opposite the upper lateral sinuses at the same level as the filaments; cupulate annular disc conspicuous, ca. 1 mm. high, persisting as a fragmented brown disc in mature fruit; ovary and style 10–12 mm. long, the ovary glabrous, the style glabrous below, with dense indument of capitate hairs in the upper half of its length, separating 1–5 mm. above the summit of the mature ovary, the stigma applanate, bilobed, borne near the filament bases; fruit ovoid, ca. 2.2 cm. long and 1.8 cm. wide, the color not known.

TYPE LOCALITY: Mountain forests near Wai-Wai, Savu Savu Bay, Vanua Levu, Fiji. Type collected by Horne, cited below.

LOCAL NAME: "Mbeta" (*Degener* 14889); "Muskarimba" (*Smith* 1986).

DISTRIBUTION: Rain forests of Viti Levu, Vanua Levu, and Taveuni, between 150 and 1,250 meters.

VITI LEVU: Mba: Hills east of Nandala Creek, about 3 mi. south of Nandarivatu, *Smith* 6237 (A, US). Nandronga and Navosa: Nandrau, *Degener* 14889 (A-type of *Cyrtandra tomentosa* A. C. Smith, BISH, NY). Namosi: Naitarandamu Mountain, *Gillespie* 3351 (BISH, NY UC); Wainavindrau Creek, near Wainimakutu, *Smith* 8549 (BISH, US); Wainavindrau Creek, n. slope of Korombasambasanga Range, *Smith* 8720 (BISH, US). Rewa: Korombamba, *Parks* 20129 (UC). VANUA LEVU: Thakaundrove: Near Wai–Wai, Savu Savu Bay, *Horne* 577 (GH, K-type); Natewa Peninsula, Uluingala, *Smith 1986* (BISH, GH, NY, UC, US). TAVEUNI: Between Somosomo and Wairiki, *Smith* 885 (BISH, NY), hills east of Somosomo, *Smith* 8377 (BISH, US); without further locality, *Seemann* 281 (GH, K).

The type has triangular sepals and the inner surface of the corolla is glabrous. This is one of the most variable of Fijian Cyrtandrae. However, this variablity involves differences that do not seem to be in any case of sufficient magnitude to justify the recognition of more than one species. There is a close relationship between *Cyrtandra chippendalei* and *C. victoriae*. The foliaceous, smaller calyx (1.2-2.5 cm. long) of *C. chippendalei* does not have postanthesis growth and therefore is easily distinguished from the fleshy (drying to coriaceous) calyx of *C. victoriae*, which has considerable postanthesis growth.

There is as yet no evidence that the *Cyrtandra chippendalei* lineage extends into Tonga, Samoa, or eastern Polynesia. However, the Cyrtandrae of Hawaii that are classified under subgenus *Brachycyathus* C. B. Clarke (St. John, 1966) are of this lineage. The Hawaiian species possess the calyx, inflorescence, and indument characters of Group 2 of the Fijian Cyrtandrae and surely would be placed near C. *chip-*

pendalei. The discontinuous distribution of this group is comparable to that of certain other Pacific genera. These include *Cheirodendron* (Araliaceae), locally common in the Marquesas Islands and the Hawaiian Islands but not known elsewhere; *Pelea* (Rutaceae), restricted to Tahiti, the Marquesas, and Hawaii; *Gouania* (Rhamnaceae), in Fiji and Hawaii, but not known in Samoa or Tonga; and *Exocarpos* (Santalaceae) in Fiji, Rapa, and Hawaii, but not known elsewhere in Polynesia.

Hawaiian representatives of the *Cyrtandra chippendalei* line currently number 89 species on the island of Oahu (St. John, 1966).

16. Cyrtandra spathacea A. C. Smith, Bishop Mus. Bull. 141: 133. *fig. 69.* 1936.

Slender tree to 4 m. high, the young parts with indument of dark brown, septate, uniseriate hairs ca. 20μ in diameter and 0.2 mm. long; leaves opposite, the petioles 1.5–6 cm. long, the blades lanceolate-ovate, to ovate-elliptic, up to 22 cm. long and 14 cm. broad, unequal, obtuse to acute at base, acute to obtuse to rounded at apex, serrate, with 2 or 3 obtuse teeth per cm., each dentition with a distal hydathode, at maturity glabrous above, glabrate to glabrous below, the primary veins 6–10 per side, curved upward, the secondary veins conspicuous, reticulate; inflorescences branched cymes of 1–4 flowers, the peduncles 1–2 mm. long, terminated by a pair of caducous bracts ca. 1 mm. long, subtending a bracteolate cyme up to 4 cm. long; calyx spathaceous, ca. 1.5 cm. long, deciduous, cleft, and lacerated nearly to base at one sinus, on both surfaces with scattered, noncapitate hairs; corolla cream-white, glabrous on both surfaces, ca. 3 cm. long, cleft 0.5–1 cm. into unequal, rounded lobes, the broad throat tapering into a tube ca. 1 cm. long; filaments ca. 5 mm. long, adnate opposite the sinuses of the lower corolla lobe, bearing apically coherent anthers at the sinuses; staminodes 3, ca. 1 mm. long, arising ca. 5 mm. below upper sinuses, the median staminode 1–2 mm. below the lateral; cupulate annular disc prominent, ca. 1 mm. high, with inner pubescence of noncapitate hairs projecting above the rim, the disc drying to an inconspicuous, fragmented ring in mature fruit; ovary and style 1.5 cm. long, the ovary glabrous, the style with capitate and noncapitate hairs over its entire length, separating 1–2 mm. above apex of the mature ovary, the stigma applanate, bilobed, the lobes thick, symmetrical, perpendicular to the axis of the style, borne 4–5 mm. below the anthers; fruit white, ellipsoid, up to 12 mm. long and 8 mm. wide.

TYPE LOCALITY: Kandavu, Fiji; the type is *Smith* 258, cited below.

DISTRIBUTION: Upland rain forests of Viti Levu and Kandavu.

VITI LEVU: Mba: Mountains near Lautoka, *Greenwood* 51 (K). KANDAVU: Mount Mbuke Levu, *Smith* 258 (BISH-type, GH, NY, UC, US).

The spathaceous calyx is also present in *Cyrtandra longiflora* J. W. Moore of Polynesia, and specimens of the latter species collected in the Society Islands bear a striking similarity to the material from Viti Levu. The spathaceous calyx is present in several Hawaiian species of subgenus *Cyrtandra*. Additional evidence of the extension of this group into Polynesia is presented under *C. kandavuensis* and *C. attenuata*.

17. Cyrtandra kandavuensis A. C. Smith, Bishop Mus. Bull. 141: 132, *fig. 68.* 1936.

Shrub or small, spreading tree 2–4 m. high, the foliage and inflorescences with light brown septate, uniseriate, noncapitate hairs ca. 20μ in diameter and 1 mm. long; leaves opposite, the petioles 3–9 cm. long, the blades ovate to elliptic, up to 25 cm. long and 14 cm. wide, unequal, obtuse to oblique at base, acuminate at apex, serrate, with 1 or 2 teeth per cm., above with scattered, appressed hairs ca. 1 mm. long and parallel to primary veins, beneath densely pubescent on the veins, with nearly glabrate areoles, the primary veins 6–8 per side, curved upward, converging at margins; inflorescences many-flowered, branched, open cymes, with dense, erect, capitate and noncapitate hairs up to 0.33 mm. long, the peduncles 4–9 cm. long, terminated by a pair of deciduous, ovate, foliaceous bracts ca. 2–2.5 cm. long, the pedicels 2.5–4 cm. long; calyx deciduous, ca. 1.5 cm. long, cleft 0.66 of its length into 5 equal, ovate, acuminate, valvate lobes, with noncapitate and capitate hairs without, glabrous within; corolla white, ca. 1.5–2 cm. long, cleft ca. 0.25 of its length into rounded lobes, the throat funnelform, with capitate and noncapitate hairs without, glabrous within; filaments ca. 3 mm. long, arising 3 mm. below the sinuses of the lower corolla lobe and projecting upward scarcely more than 1 mm., bearing apically coherent anthers below the corolla limb; staminodes 3, ca. 1 mm. long, adnate ca. 5 mm. below the upper sinuses, the median staminode about 1 mm. above the lateral; cupulate annular disc conspicuous, ca. 1.5 mm. high, persisting as a divided pelviform structure in mature fruit; ovary and style glabrous, ca. 10 mm. long, the style separating ca. 3 mm. above the mature ovary, bearing an applanate, bilobed stigma ca. 2–3 mm. below the anthers; fruit white, ellipsoid, ca. 12 mm. long and 8 mm. wide.

TYPE LOCALITY: Mount Mbuke Levu, Kandavu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Dense forests on Kandavu, 200–840 m.

KANDAVU: Mount Mbuke Levu, *Smith* 282 (BISH-type, GH, UC, US), *Smith* 288 (BISH, GH, NY, UC, US), Smith 214 (BISH, GH, NY, UC, US).

Related material in Polynesia includes an undetermined *Cyrtandra* from Tahiti, *St. John* 17154, and *C. pupukeaensis* St. John & Storey,

of Oahu, Hawaiian Islands. Both have the inflorescence, calyx, corolla, and indument of *C. kandavuensis.*

18. Cyrtandra attenuata Gillett, sp. nov.

Frutex 1–4 m. altus, pilis septatis ad 20μ diametro et 0.5 mm. longis indutus maturitate glaber; folia opposita, petiolis 1–3 cm. longis, laminis lanceolatis vel ovatis ad 15 cm. longis et 7 cm. latis, basi inaequilateraliter acutis vel cuneatis, apice acutis vel acuminatis, dentatis vel undulatis; inflorescentiae cymosae subpatentes 2–8 florae, pedunculis 1–6 cm. longis indumento adscendente obtectis, bracteis terminalibus binis linearibus 2–3 mm. longis caducis, pedicellis 1 vel 2 bracteolatis ad 6 cm. longis; calyx caducus albus vel viridi-albus membranaceus manifeste venosus ad 2 cm. longus basi inflatus in lobis deltoideis vel lanceolatis attenuatis aequalibus 0.33–0.5 fissus utrinque glaber vel glabratus; corolla alba chartacea ad 4 cm. longa in lobis paullo inaequalibus 0.25 fissa extus glabra intus capitato-glanduloso-pilosa; stamina ca. 5 mm. infra sinus corollae lobi inferioris enata, filamentis 4–5 cm. longis, antheris in corollae faucibus in apice adhaerentibus; staminodia 3 infra sinus superiores 4–5 mm. disposita 1.5–2 mm. longa, staminodio medio paullo supra staminodia lateralia; discus annularicupuliformis prominens sub anthesi ca. 1 mm. altus; gynoecium ca. 1.5 cm. longum, ovario glabro superne gradatim attenuato, stylo inferne glabro superne capitato-glanduloso-piloso, stigmate applanato bilobato 1–2 mm. infra antheras; fructus maturi desiderati.

Type in the herbarium of the Bernice P. Bishop Museum, collected near Uluingala, Natewa Peninsula, Province of Thakaundrove, Vanua Levu, Fiji, alt. 600–820 m., June 15, 1934, by A. C. Smith (2006). Duplicates at GH, NY, UC, US.

ADDITIONAL SPECIMENS EXAMINED:

TAVEUNI: Hills east of Somosomo, west of old crater occupied by small swamp and lake, dense forest, *Smith* 8366 (US).

The distinctive features of this species include the relatively large flowers with inflated calyces and the chartaceous corollas with glabrous outer surfaces. Material of the Samoan *Cyrtandra divertae* Christopherson bears a strong similarity to *C. attenuata.* A specimen with remarkably similar flowers and inflorescences was collected in Tahiti (*St. John & Fosberg* 14158 (BISH)). Finally, the new species is remarkably similar to *C. nukuhivensis* F. Brown, of the Marquesas Islands, the inflorescences and flowers being generally comparable in form and indument. These comparisons seem to indicate clearly that the lineage of the new species extends into western and eastern Polynesia.

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19. Cyrtandra involucrata Seem. (Bonplandia 9: 257. 1861, nom. nud.; Seem. ex A. Gray, Proc. Amer. Acad. 6: 41. 1862, nom. subnud.) Fl. Vit. 183. 1866.
Cyrtandra monticola Gillespie, Bishop Mus. Bull. 74: 23, *fig. 30*. 1930.
Cyrtandra gillespieana A. C. Smith, Bishop Mus. Bull. 141: 134. 1936.

Shrub or small tree up to 5 m. high, the leaves and inflorescences with medium to dark brown pubescence of shiny, septate, uniseriate, noncapitate hairs up to 50μ in diameter and 1 mm. long, densely tomentose on younger parts, glabrate at maturity; leaves opposite, the petioles up to 4.5 cm. long, the blades lanceolate to oblanceolate to elliptic, up to 20 cm. long and 10 cm. wide, unequal and rounded, obtuse, attenuate, or cuneate at base, acute to acuminate at apex, crenate to serrate, with about 3 teeth per cm., the teeth tipped by hydathodes, tomentose to glabrate with appressed hairs or glabrous above, with dense, spreading hairs beneath; inflorescences appressed-sericeous, the peduncles 3–40 mm. long, terminated by 2 ovate, connate-perfoliate, foliaceous, deciduous bracts 5–8 mm. long, subtending 1–4 pedicels up to 2 cm. long; calyx deciduous, 6–8 mm. long, cleft about half of its length into 5 unequal, lanceolate, acuminate lobes, with noncapitate hairs on both sides; corolla cream to light yellow, ca. 1.5 cm. long, cleft ca. 0.25 of its length into rounded, subequal lobes, the tube cylindrical, with dense noncapitate and capitate hairs without, with short, capitate hairs within; filaments 2–3 mm. long, bearing apically coherent anthers 1–2 mm. below the corolla limb; staminodes 3, adnate opposite the upper sinuses ca. 3 mm. below the limb, the median staminode 1–2 mm. above the lateral; annular disc ca. 1 mm. high, persisting as rectangular plates in mature fruit; ovary and style up to 1 cm. long, the ovary glabrous, the style with capitate hairs over its entire length, separating at summit of ovary, the stigma applanate, bilobed, borne 2–3 mm. below anthers; fruit white, ovoid to ellipsoid, ca. 1.8 cm. long and 1.2 cm. wide.

TYPE LOCALITY: "Woods of Namosi," Viti Levu, Fiji. Type collected by Seemann, cited below.

LOCAL NAME: "Tangitangi" (*Tabualewa* 15596).

DISTRIBUTION: Interior mountains of Viti Levu, Ovalau, and Vanua Levu, between 30 and 1,150 m. in densely shaded creeks and drainages as an understory element in the rain forest.

VITI LEVU: Mba: Mount Evans Range, *Greenwood* 1228 (A, BISH, NY, UC, US); Mount Evans Range, eastern slopes of Mount Koroyanitu, *Smith* 4136 (A, BISH, US); Thol-i-nandarivatu Mountain, *Gillespie* 3866 (BISH, UC); hills east of Nandala Creek, ca. 3 mi. south of Nandarivatu, *Smith* 6221 (A, BISH, US); western and southern slopes of Mount Tomanivi, *Smith* 5318 (A, BISH, US). Nandronga & Navosa: Nausori highlands, in drainage of Namosi Creek above Tumbenasolo, *Smith* 4717 (A, BISH, US). Serua: Mbuyombuyo, near Namboutini, *Tabualewa* 15596 (A, BISH, UC, US); hills north of Ngaloa, in drainage of Waininggere Creek, *Smith* 9426 (BISH, US). Namosi: Without locality, *Seemann* 279 (GH, K-type); vicinity of Namosi Village, *Gillespie* 2691

(BISH); Naitarandamu Mountain, *Gillespie* 3122 (BISH-type of *Cyrtandra monticola* Gillespie, UC). OVALAU: Without further locality, *U.S. Expl. Exped.* s.n. (GH, US). VANUA LEVU: Mbua: H. B. R. *Parham* 17 (A).

The connate, foliaceous bracts subtending the pedicels provide a distinguishing feature for this species. However, the bracts are deciduous and if they are lacking, the species is easily confused with *Cyrtandra anthropophagorum*, in which the inflorescence bracts are also deciduous but are free and not connate. In such cases the following characters are of value:

	C. involucrata	*C. anthropophagorum*
Color of pubescence	dark brown	golden brown
Peduncle length	up to 4.5 cm.	up to 3 cm.
Trichomes of peduncle	up to 1 mm. long, appressed	up to 1.5 mm. long, spreading

These two species are relatively common in Fiji, but neither they nor related species are known to occur in Polynesia.

20. Cyrtandra reticulata Gillett, sp. nov.

Frutex 2–3 m. altus, partibus novellis pilis fuscis septatis ecapitatis ca. 30μ diametro ad 0.5 mm. longis dense sericeus, maturitate glaber; folia opposita, petiolis ad 4.5 cm. longis, laminis lanceolatis vel ellipticis ad 20 cm. longis et 7 cm. latis, basi inaequilateraliter rotundatis vel obtusis vel cuneatis, apice acutis vel attenuatis, integris vel dentibus 1 vel 2 per cm. crenatis vel serratis, supra puberulis vel glabris, subtus in nervis dense pubescentibus alibi subglabratis, venis primariis utrinsecus 6–8 curvatis, rete venularum conspicuo; inflorescentiae pilis patentibus dense pubescentes, pedunculis 6–12 mm. longis, bracteis terminalibus lanceolatis 4 mm. longis caducis, pedicellis 2 vel 3 et 5–12 mm. longis; calyx caducus ca. 8 mm. longus in lobis 5 aequalibus ovato-lanceolatis acuminatis 0.5 fissus extus ecapitato-pilosus intus glaber; corolla pallide lutea infundibuliformis ca. 1.8 cm. longa in lobis inaequalibus rotundatis ca. 0.25 fissa, extus capitato-glanduloso-pilosa, intus tubo glabra limbo capitato-glanduloso-pilosa; filamenta ca. 3 mm. longa, antheris in apice adhaerentibus ca. 1 mm. infra sinus corollae; staminodia 3, ca. 0.75 mm. longa prope filamenta enata, staminodio medio ca. 1 mm. supra staminodia lateralia; discus annulari-cupuliformis conspicuus ca. 1 mm. altus sub fructu fragmentibus persistens; gynoecium ca. 12 mm. longum, ovario glabro, stylo albo ubique capitato-piloso demum 1–2 mm. supra basim caduco, stigmate applanato bilobato ca. 3 mm. infra antheras; fructu albo ca. 1 cm. longi et 0.6 cm. lati.

Type in the herbarium of the Arnold Arboretum, collected on the southern slopes of Mount Numbuiloa, east of Lambasa, Province of Mathuata, Vanua Levu, Fiji, alt. 100–350 m., Oct. 27, 1947, by A. C. Smith (6343). Duplicates at BISH, US.

ADDITIONAL SPECIMENS EXAMINED:

VANUA LEVU: Mathuata: Same locality as type, *Smith* 6529 (A, BISH, US). Thakaundrove: Eastern drainage of Yanawai River, *Degener & Ordonez* 14088 (A, BISH, NY, UC, US).

The new species bears a superficial resemblance to *Cyrtandra harveyi* but lacks the exserted stamens and style, the long filaments, the pedestal or "gynophore" at the base of the ovary, and the much larger flowers of that species. Inflorescence and floral characters seem to place it near *C. involucrata* and *C. attenuata*. I have not seen other Melanesian or Polynesian Cyrtandrae that resemble the new species.

21. Cyrtandra jugalis A. C. Smith, Journ. Arnold Arb. 34: 49. 1953.

Shrub or slender tree 2–5 m. high, densely pubescent on younger parts with septate, uniseriate, light to dark brown, noncapitate hairs ca. 30μ in diameter and 0.5 mm. long; leaves opposite, the petioles 1–2 cm. long, the blades lanceolate to oblanceolate to ovate, up to 16 cm. long and 5 cm. wide, unequal and acute to cuneate at base, acute to acuminate at apex, undulate to serrate, with 2–3 teeth per cm. at margin, glabrous above, with dense tomentum of noncapitate hairs beneath, these more pronounced on the veins, the primary veins raised, 5–7 on each side of midvein, the secondary veins inconspicuously reticulate; inflorescence a simple dichasium, tomentose to glabrate, the peduncles 1–5 cm. long, terminated by a pair of deciduous lanceolate, free bracts ca. 0.5 cm. long, subtending pedicels 1–2.5 cm. long; calyx fleshy, drying subcoriaceous, ca. 1 cm. long, cleft ca. 0.33 of its length into 5 equal, triangular-attenuate lobes, glabrate on both surfaces; corolla white, ca. 2 cm. long, cleft ca. 0.33 of its length into unequal, rounded lobes, with dense, ascending, noncapitate hairs without, with capitate hairs within; filaments ca. 2 mm. long, adnate to corolla tube opposite lower sinuses, bearing apically coherent anthers at the base of the corolla limb; staminodes 3, adnate opposite upper sinuses at same level as filaments, the median staminode 1 mm. long, slender, the lateral 2 mm. long, clavate; cupulate annular disc prominent, 1 mm. high, persisting as rectangular fragments in mature fruit; ovary and style up to 10 mm. long, the ovary glabrous, the style with capitate hairs, separating ca. 1 mm. above apex of mature fruit, the stigma applanate, bilobed; fruit white, ellipsoid, ca. 1.2 cm. long and 0.8 cm. wide.

TYPE LOCALITY: Ridge between Mount Nanggaranambuluta and Mount Namama, east of Nandarivatu, Viti Levu. Type collected by A. C. Smith, cited below.

LOCAL NAME: "Mindra" (*Smith* 4994); "Mbetambeta" (*Degener* 14904).

DISTRIBUTION: Dense forests in the highlands of central Viti Levu, in the vicinity of Mount Tomanivi and the mountains west of Nandarivatu, between 700 and 1,150 meters.

VITI LEVU: Mba: Nambuisa Village, *Gillespie* 4134 (BISH, UC); ridge between Mount Nanggaranambuluta and Mount Namama, east of Nandarivatu, *Smith* 4994 (A-type, BISH, US); summit of Mount Nanggaranambuluta, *Smith* 4878 (A, BISH, US); western and southern slopes of Mount Tomanivi, *Smith* 5319 (A, BISH, US). Nandronga & Navosa: Vicinity of Nandrau, *Degener*, 14904 (A); northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, *Smith* 5569 (A, BISH, US). Ra: Ridge from Mount Namama toward Mount Tomanivi, *Smith* 5695 (A, BISH, US), *Smith* 5696 (A, BISH, US), *Smith* 5709 (A, BISH, US), *Smith* 5715 (A, BISH, US).

The present species appears to be closely related to *Cyrtandra involucrata* and *C. anthropophagorum;* it lacks the connate-perfoliate bracts of the former and the larger corollas (up to 20 mm. long) and indument of the latter. However, neither of the related species have the simple dichasium inflorescence that so well characterizes *Cyrtandra jugalis*. None of the Polynesian species have a close resemblance to this species.

22. Cyrtandra anthropophagorum Seem. (Bonplandia 9: 257. 1861, nom. nud.) ex A. Gray, Proc. Amer. Acad. 6: 41. 1862. Fl. Vit. 182. 1866.
Cyrtandra buttii Horne ex C. B. Clarke, in DC. Monogr. Phan. 5: 279. 1883.

Shrub or small tree to 4 m. high, the stem up to 6 cm. diameter 1.5 m. above the ground, freely branched, the young parts covered with golden-brown, velutinous, septate, uniseriate, noncapitate hairs 20–60μ in diameter and up to 1.5 mm. long; leaves opposite, the petioles 1–5 cm. long, the blades ovate-lanceolate, at maturity up to 30 cm. long and 12 cm. wide, unequal and acute, attenuate, or cuneate at base, acute to acuminate at apex, crenate to serrate, with about 3 teeth per cm., tomentose above, with appressed-ascending hairs parallel to the primary veins, densely tomentose beneath with spreading hairs, the primary veins 8–12 on each side of midvein, upwardly curved, the secondary veins concealed by pubescence; inflorescence densely tomentose, the peduncles 1–30 mm. long, terminated by a pair of lanceolate, free, deciduous bracts ca. 1.5 cm. long, subtending 1–4 pedicels 1–3 cm. long; calyx green to dull white, 5–7 mm. long, cleft half its length into 5 unequal, lanceolate, acute to acuminate lobes, both surfaces tomentose; corolla white, 12–15 mm. long, the tube cylindric, the lobes 4–5 mm. long, unequal, rounded, tomentose with noncapitate hairs without, and short, capitate hairs within; filaments ca. 2 mm. long, bearing apically coherent anthers slightly below the

corolla limb; staminodes 3, adnate opposite the upper sinuses near the middle of corolla tube, the lateral staminodes nearly 1 mm. long, the median ca. 0.25 mm. long; cupulate annular disc conspicuous, ca. 1 mm. high, drying to deciduous, rectangular segments; ovary and style ca. 8 mm. long, the ovary glabrous, the style with capitate hairs on the upper 0.75 of its length, separating ca. 1 mm. above summit of mature ovary, the stigma applanate, bilobed, borne below the anthers; fruit white, ovoid, up to 1.5 cm. long and 1 cm. wide.

TYPE LOCALITY: Viti Levu, Fiji. Type collected by Seemann (278).

LOCAL NAME: "Makamakandora" (*St. John* 18926).

DISTRIBUTION: Understory of rain forests in coastal and interior regions of southeastern Viti Levu and Ovalau, between 30 and 1,100 meters.

VITI LEVU: Without locality, *Seemann* 278 (GH-lectotype, K). Serua: Hills north of Ngaloa, in drainage of Waininggere Creek, *Smith* 9164 (BISH, US); track north of Korovou, *St. John* 18926 (BISH); Nakavu, *Parks* 20364, 20365 (BISH, UC, US). Namosi: Naitarandamu Mountain, *Gillespie* 3366 (BISH, UC), 3084 (A, BISH, NY, UC, US), 3139 (BISH), 3135 (BISH); without locality, *Horne* 818 (GH, K-type of *Cyrtandra buttii* Horne ex C. B. Clarke), *Horne* 956 (GH, K-syntype of *Cyrtandra buttii* Horne ex C. B. Clarke); without locality, *Gillespie* 2490 (BISH, UC), 2998 (BISH, UC, US), 2848 (BISH), *Parks* 20262 (BISH, UC), 20262-a, 20268, 20276 (BISH, UC, US); hills north of Wainavindrau Creek, between Korombasambasanga Range and Mount Naitarandamu, *Smith* 8411 (BISH, US); hills bordering Wainavindrau Creek, in vicinity of Wainimakutu, *Smith* 8565 (BISH, US); northern slopes of Korombasambasanga Range in drainage of Wainavindrau Creek, *Smith* 8719 (BISH, US); Namuamua, *Gillespie* 2992 (A, BISH); hills east of Wainikoroiluva River, near Namuamua, *Smith* 8909 (BISH, US); Navua River, *Greenwood* 1049 (A). Naitasiri: Nasinu, 9 mi. from Suva, *Gillespie* 3509 (BISH, UC); Tamavua-Sawani Road, *Setchell & Parks* 15143 (UC); Nasinu road, 2 mi. from Suva, *Gillespie* 3450 (BISH, NY, UC, US). Tailevu: Hills east of Wainimbuka River, in vicinity of Ndakuivuna, *Smith* 7062, 7110 (BISH, US). Rewa: Suva, *Meebold* 16725 (BISH), *Tothill* 640 (A, BISH), 641, 507 (BISH), *MacDaniels* 1138 (BISH). OVALAU: Summit of Mount Ndelaiovalau, *Smith* 7380 (BISH, US); without locality, undershrub in rain forest, *E. H. Bryan* 599 (BISH) without locality, *U.S. Expl. Exped.*, June 1840 (GH, US). VANUA LEVU: Mathuata: Wainikoro, Greenwood 687 (K).

Gray described the flower from the material of the U.S. Exploring Expedition, the young fruit from *Seemann* 278. The latter is here designated as the lectotype. This is one of the most frequently collected Cyrtandrae in Fiji. Its relationship is with *C. involucrata* and is discussed under that species.

23. Cyrtandra esothrix A.C. Smith, Journ. Arnold Arb. 34:45. 1953.

Shrub or small tree up to 6 m. high, the leaves and inflorescence with light tomentum of septate, uniseriate, erect, noncapitate hairs ca. 40 μ in diameter and 0.5 mm. long, the young stems quadrangular; leaves

opposite, the petioles 0.5 to 2.5 cm. long, the blades lanceolate to ovate, up to 22 cm. long and 8 cm. wide, unequal and obtuse to acute or cuneate at base, acute to acuminate at apex, entire to undulate to serrate, glabrous above, beneath with glabrous to glabrate areoles, the veins tomentose to glabrous, the primary veins raised, 6–9 per side, the secondary veins indistinct to conspicuous; inflorescences axillary, the peduncle up to 1 cm. long, terminated by minute, caducous bracts subtending 1–4 pedicels up to 1 cm. long; calyx greenish white, coriaceous, deciduous, up to 1 cm. long, cleft ca 0.25 of its length into equal, connivent, lobes, with 1 or 2 sinuses lacerated to base, glabrous without, pilose within, with ascending light brown hairs; corolla white, cylindrical, ca. 2 cm. long, cleft 0.20 of its length into unequal, rounded, spreading lobes pubescent without, with capitate and non-capitate hairs, glabrous within; filaments ca. 2 mm. long, adnate opposite the sinuses of the anterior corolla lobe and bearing apically coherent anthers at base of corolla limb; staminodes 3, ca. 0.5 mm. long, adnate opposite the upper sinuses near middle of corolla tube, the median staminode ca. 2 mm. below the lateral; cupulate annular disc conspicuous, ca. 0.75 mm. high, deciduous; ovary and style ca. 1 cm. long, the ovary glabrous, the style with capitate hairs, deciduous ca. 2 mm. above apex of the mature ovary, the stigma applanate, bilobed, borne ca. 5 mm. below the anthers; fruit white, elliposidal, up to 1.5 cm. long and 1 cm. broad.

TYPE LOCALITY: Northern portion of Rairaimatuku Plateau, Viti Levu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Interior mountains of eastern Viti Levu and Ovalau, in dense forest, 100 to 1,100 m.

LOCAL NAME: "Makamakandora" (*St. John* 18185).

VITI LEVU: Mba: Mount Tomanivi, *Gillespie* 4081 (BISH, GH, NY, UC), *Smith* 5098 (A, BISH, US), *Smith* 5267 (A, BISH, US). Namosi: Naitarandamu Mountain, *Gillespie* 3113 (BISH, UC, US). Naitasiri: Rairaimatuku Plateau, between Mount Tomanivi and Nasonggo, *Smith* 6134 (A-type, BISH, US); Wainamo Creek, near Matawailevu, *St. John* 18185 (BISH, US). Tailevu: Hills east of Wainimbuka River, near Ndakuivuna, *Smih* 7067 (BISH, US), *Smith*, 7134 (BISH, US), *Smith* 7179 (BISH, US). OVALAU: Mountains south of Levuka, on overland trail to the west coast, *Gillespie* 4538 (BISH, UC); hills east of Lovoni Valley, *Smith* 7261 (BISH, US), *Smith* 7679 (BISH, US).

The significant distinguishing features of this species include the thick, coriaceous calyx, which is lacerated below the short lobes, and the pilose interior of the calyx. There is some variability in the indument of the secondary veins of the lower leaf surface. In all collections from Ovalau and the adjacent territory of Tailevu, Viti Levu, these veins are glabrous; however, they are tomentose in the collections from central Viti Levu.

There appears to be a close morphological relationship between *Cyrtandra esothrix* and *C. hornei;* the two species can be distinguished by the differences cited in the following tabulation:

	C. hornei	*C. esothrix*
Surface of outer/calyx:	puberulent	glabrous
Surface of inner/corolla:	glandular	glabrous
Apices of calyx lobes:	attenuate	acute
Staminodes:	1.5 mm. long	0.5 mm. long

In the examination of the Polynesian representatives of the genus, I have seen no material that would appear to be closely related to these two species. The bark of *Cyrtandra esothrix* has been used medicinally to cause constipation after sickness, according to St. John.

24. Cyrtandra hornei C. B. Clarke, in DC Monogr. Phan. 5: 281. 1883.
Cyrtandra greenwoodiana A. C. Smith, Journ. Arnold Arb. 34: 46. 1953.

Shrub or small tree up to 6 m. high, with rubiginose tomentum of septate, uniseriate, noncapitate hairs ca. 15μ in diameter and 0.1–0.3 mm. long, becoming glabrate to glabrous; leaves opposite, the petioles 0.5–3 cm. long, the blades elliptic to ovate, up to 15 cm. long and 6 cm. wide, inequilateral and obtuse to acute or cuneate at base, obtuse to acute or acuminate at apex, entire to undulate, dentate, or serrate, glabrous above, tomentose to glabrate beneath, the primary veins 5–9 per side, the secondary veins reticulate, glabrous; inflorescences usually 1-flowered, tomentose to glabrate, the peduncle 0.5–2 cm. long, terminated by a pair of minute caducous bracts subtending a pedicel 3–15 mm. long; calyx ca. 11–16 mm. cleft ca. 0.33 of its length into free or connivent, valvate, acuminate lobes, usually lacerated below 2 sinuses, glabrate without, pilose within with ascending noncapitate hairs; corolla white, ca. 2-2.5 cm. long, cylindrical, cleft ca. 0.25 of its length into rounded, unequal, spreading lobes, glabrous without, with capitate hairs within; filaments ca. 2–3 mm. long, adnate opposite sinuses of anterior corolla lobe, bearing apically coherent anthers ca. 1 mm. below the corolla limb; staminodes 3, ca. 1.5 mm. long, adnate opposite posterior sinuses at middle of tube; cupulate annular disc conspicuous, 1 mm. high, deciduous; ovary and style ca. 8 mm. long, the ovary glabrous, the style with capitate hairs, separating 1–2 mm. above apex of mature ovary, the stigma applanate, bilobed, borne 6–7 mm. below the anthers; fruit white, ellipsoid, up to 25 mm. long and 8 mm. broad.

TYPE LOCALITY: Fiji, without further locality. Type collected by Horne, cited below.

DISTRIBUTION: Dense forest, interior mountains of central and northern Viti Levu, between 700 and 1,100 m.

LOCAL NAME: "Mimila" (*Smith* 4768).

FIJI: Without further locality, *Horne* 449 (K-lectotype), *Horne* 570–2 (GH, K). *Horne* 713 (GH).

VITI LEVU: Mba: Between Mount Vatuyanitu and Mount Natondra, Mount Evans Range, *Smith* 4304 (A, BISH, US); Mount Nairosa, eastern flank of Mount Evans Range, *Smith* 4412 (A-type of *Cyrtandra greenwoodiana* A. C. *Smith.*, BISH, US); Mount Evans Range, *Greenwood* 1260 (A, US), 871-a (A); western slopes of Mount Nanggaranambuluta, *Smith* 4768 (A, BISH, US); Mount Nanggaranambuluta, *Greenwood* 871 (A, UC, US); *Gillespie* 3684 (BISH, UC); near Nandarivatu, *Gibbs* 572 (BM); *Degener* 14622 (A, BISH, NY, US), *Gillespie* 3385 (BISH, NY, UC, US), *Gillespie* 4038 (BISH, UC); Mount Matomba, Nandala, near Nandarivatu, *Degener* 14512 (A, BISH, NY, UC, US), 14833 (A, BISH, NY, UC, US). Namosi: Voma Mountain, *Gillespie* 2890.1 (UC).

Clarke's description is based on *Horne* 449, 570, and 1134 (not seen), all at Kew, of which *Horne* 449 is here designated as lectotype.

The relationship of this species is surely with *Cyrtandra esothrix*, and a tabular contrast of the two species is given under the latter. There is considerable intergradation in the leaves of these two species, and I know of no reliable means of distinguishing material in which flowers are not present.

25. Cyrtandra tavinunensis Gillespie, Bishop Mus. Bull. 74: 24, *fig. 33*, 1930.

Glabrous, slender shrub or small tree 3–4 m. high, the young stems with a flaky surface when dried; leaves opposite, the petioles 0.5–2 cm. long, the blades lanceolate to ovate, up to 20 cm. long and 6 cm. broad, equilateral and acute to attenuate at base, acute to acuminate at apex, undulate, glabrous above and beneath, with 5–7 upwardly curved primary veins per side, the secondary veins faintly to conspicuously reticulate beneath; inflorescences elongate, filiform, one-flowered, the peduncles up to 6 cm. long, bearing a pair of ovate, foliaceous bracts 10–12 mm. long, and 1–4 pairs of bracteoles, the terminal bracteoles subtending a pedicel ca. 3 cm. long; calyx ca. 8 mm. long, cleft ca. 0.33 of its length into 3–5 ovate, valvate lobes, glabrous on both surfaces; corolla greenish white, ca. 1 cm. long, cleft ca. 0.33 of its length into unequal lobes, the exterior glabrous, the interior with dense indument of papillate hairs ca. 100μ in diameter; filaments ca. 3 mm. long, adnate opposite the sinuses of the anterior corolla lobe ca. 5 mm. below the limb, bearing apically coherent anthers near the base of the limb; staminodes 2, adnate ca. 5 mm. below the limb; cupulate annular disc prominent, ca. 1 mm. high at anthesis, deciduous from maturing fruit: ovary and style glabrous, ca. 7 mm. long, the style separating near summit of the fruit; stigma applanate, bilobed, the lobes ca. 1.5 mm. long, ovate, borne below the anthers; fruit bright red, ovoid, up to 1.5 cm. long and 1 cm. broad.

TYPE LOCALITY: Taveuni. Type collected by Gillespie, cited below.
DISTRIBUTION: Dense upland forests of Taveuni, 700–850 m.

TAVEUNI: Trail from Somosomo, *Gillespie* 4782 (BISH-type, NY, UC, US); summit and adjacent slopes of Mount Manuka, east of Wairiki, *Smith* 8234 (BISH, US).

The flaky surface of the young stems provides the most useful feature to distinguish *Cyrtandra taviunensis* from the closely related *C. montana*. This peculiar feature is not known in other Fijian species but does occur elsewhere in the genus, particularly in Malaysian species.

Further discussion of the relationship between this species and *Cyrtandra montana* is presented under the latter.

26. Cyrtandra montana Gillespie Bishop Mus. Bull. 74:22, *fig. 29*. 1939.
Cyrtandra bracteolosa A. C. Smith, Journ. Arnold Arb. 34:43. 1953.

Erect, glabrous shrub 2–5 m. high, the young foliage with indument of scattered, papillate hairs ca. 40μ in diameter, becoming glabrous at maturity; leaves opposite, the petioles 0.5–2.5 cm. long, the blades lanceolate to elliptic, up to 23 cm. long and 6 cm. broad, obtuse to acute to cuneate at base, acute to acuminate at apex, undulate to dentate, with 1–2 teeth per cm., glabrous above and beneath, 6–9 upwardly curved primary veins per side, the secondary veins faintly to conspicuously reticulate below; inflorescences filiform, glabrous, branching cymes, the peduncles ca. 1–3.5 cm. long, bearing a pair of deciduous, linear bracts 2–7 mm. long, the branches with 1–3 pairs of bracteoles, the terminal bracteoles subtending pedicels 0.5–3 cm. long; calyx 4–8 mm. long, glabrous on both surfaces, cleft ca. 0.5 of its length into ovate-acuminate, valvate lobes, the base slightly inflated; corolla white, broadly funnelform, up to 1.6 cm. long, cleft ca. 0.5 of its length into unequal, acute lobes, glabrous without, the limb within with indument of papillate hairs ca. 100μ in diameter, the throat within with short, capitate hairs ca. 30μ in diameter; filaments ca. 1.5 mm. long, bearing apically coherent anthers 1–2 mm. below the corolla limb; staminodes 3, ca. 0.5 mm. long, adnate ca. 3 mm. below the limb, the median staminode 1 mm. below the lateral; cupulate annular disc conspicuous, ca. 1 mm. high, deciduous; ovary and style glabrous, 5 mm. long, the style separating ca. 1 mm. above apex of mature fruit; stigma applanate, bilobed, borne ca. 2 mm. below the anthers; fruit orange to red, ovoid, up to 1.5 cm. long and 1 cm. broad.

TYPE LOCALITY: Wooded ridge on Naitarandamu Mountain, 1,100 m. Type collected by Gillespie, cited below.

DISTRIBUTION: Dense forests of Mba and Namosi, central Viti Levu, between 250 and 1,100 m.

VITI LEVU: Mba: Hills east of Nandala Creek, ca. 3 mi. south of Nandarivatu, *Smith* 6232 (A-type of *Cyrtandra bracteolosa* A. C. Smith, BISH, US). Namosi: Mount Naitarandamu, *Gillespie* 3144 (BISH-type, UC); Valley of Wainambua Creek, south of Mount Naitarandamu, *Smith* 8833 (BISH, US); hills north of Wainavindrau Creek, between Korombasambasanga Range and Mount Naitarandamu, *Smith* 8504 (BISH, US); northern slopes of Korombasambasanga Range, in drainage of Wainavindrau Creek, *Smith* 8732 (BISH, US).

A close examination of the types of *Cyrtandra montana* and *C. bracteolosa* has failed to reveal any differences that would justify the recognition of the latter as a distinct species. Smith (1953) indicated differences in the length of the calyx (4 to 5 mm. long in *C. bracteolosa* and 4 to 8 mm. long in *C. montana*), but a quantitative difference of this magnitude would be expected within a given species. The types were collected from the same general territory in the uplands of central Viti Levu.

The close relationship of *Cyrtandra montana* and *C. taviunensis* seems clearly indicated in their striking similarities in inflorescence, indument, flower structure, fruit size, fruit color, and other features. This lineage apparently does not extend into Polynesia, and there are no other currently known Fijian species that appear close to this remarkably distinctive pair. It seems reasonable to speculate that the two species were isolated by divergent, long-distance dispersal, probably by frugivorous birds attracted to the brightly colored fruits.

27. Cyrtandra pritchardii Seem. in Bomplandia 9: 257 (nomen), 364 (desc.). 1861; Fl. Vit. *t. 39.* 1866[4]

Cyrtandra coriacea C. B. Clarke, in DC. Monogr. Phan. 5: 280. 1883.

Cytandra gracilipes Gillespie, Bishop Mus. Bull. 74: 21, *fig.* 27. 1930.

Glabrous, freely branched shrub or small tree up to 5 m. high; leaves opposite, the petioles up to 2.5 cm. long, the blades lanceolate to elliptic, up to 18 cm. long and 5.5 cm. broad, equal to unequal and acute to cuneate at base, acute to acuminate at apex, undulate or entire, glabrous above and beneath, the primary veins obscure above, conspicious beneath, 8–12 per side, the secondary veins indistinct; inflorescences 1–3 flowered, the peduncles 0.5–1 cm. long on older branches, up to 2.5 cm. long on young shoots, terminated by a pair of caducous bracts ca. 0.5 mm. long, bearing 1–3 pedicels up to 2 cm. long; calyx coriaceous, 5–7 mm. long, cleft 0.33 of its length into 5 equal, valvate, lanceolate lobes, glabrous without, with capitate hairs within; corolla white, 1.5–1.8 cm. long, cleft ca. 0.33 of its length into unequal, rounded lobes, glabrous without, with capitate hairs within; filaments ca. 2 mm. long, adnate 3 mm. below the sinuses of the anterior corolla lobe, bearing apically coherent anthers at the base of the limb; staminodes 3, ca. 0.5 mm. long, adnate ca. 5 mm. below

[4] Also figured in Parham, Pl. Fiji Isl. *f. 87.* 1964.

the upper sinuses; cupulate annular disc prominent, ca. 0.5 mm. high at anthesis, drying to a fragmented, brown disc in mature fruit; ovary and style 9–12 mm. long, the ovary glabrous, the style with capitate hairs on upper 0.75 of its length, separating at summit or 2–3 mm. above apex of mature ovary, the stigma applanate, bilobed; fruit white, ellipsoid to fusiform, up to 2 cm. long and 1.2 cm. broad.

TYPE LOCALITY: Ovalau. Type collected by Seemann, cited below.

DISTRIBUTION: Dense forests of southeastern Viti Levu and Ovalau, between 50 and 500 m.

VITI LEVU: Serua: Hills west of Waivunu Creek, between Ngaloa and Korovou, *Smith* 9304 (BISH, US); hills between Waininggere and Waisese Creeks, between Ngaloa and Wainiyambia, *Smith* 9546 (BISH, US). Rewa: Summit of Korombamba Mountain, *Gillespie* 2393 (BISH); southeast slopes of Korombamba Mountain, *Gillespie* 2306 (BISH-type of *Cyrtandra gracilipes* Gillespie, UC), *Gillespie* 2221 (BISH, UC), Korombamba Mountain, *Meebold* 16726 (BISH); near Suva, *Horne* 698 (K-type of *Cytranda coriacea* C. B. Clarke), *Parks* 20068 (BISH, UC). OVALAU: "Mr. Pritchard's Estate," *Seemann* 283 (GH, K-type); without locality, *U.S. Expl. Exped.* (US).

The Ovalau specimens have broadly elliptic leaves, while the Viti Levu specimens have lanceolate to elliptic leaves; the material from the two islands seems similar in all other features. With no other differences to separate them other than slight contrasts in leaf shape, it seems best to refer *Cyrtandra coriacea* and *C. gracilipes* to *C. pritchardii*. This species was the first *Cyrtandra* to be described from Fiji; it is well illustrated in pl. 39 of Flora Vitiensis.

None of the Polynesian material I have examined bears any resemblance to *Cyrtandra pritchardii* but very similar material has been obtained from the Solomon Islands: San Cristoval, *Brass* 2690; and Guadalcanal, *Kajewski* 2711.

28. Cyrtandra denhamii Seem. Fl. Vit. 182. 1866.

Shrub or tree up to 5 m. high with rubiginose, septate, uniseriate, noncapitate hairs ca. 20μ in diameter and 0.25 mm. long; leaves opposite, glabrate at maturity, the petioles 1–3 cm. long, the blades lanceolate to elliptic, up to 19 cm. long and 6 cm. broad, unequal and obtuse to acute or cuneate at base, acute to acuminate at apex, undulate to dentate, with 1–3 teeth per cm., the venation conspicuous beneath, the primary veins 5–7 per side, the secondary veins reticulate; inflorescences many-flowered, branched, glabrate cymes, the peduncles 4–9 cm. long, terminated by a pair of deciduous, lanceolate to ovate bracts up to 1.5 cm. long, subtending braceteolate pedicels 0.5–3 cm. long, the bracteoles lanceolate, up to 6 mm. long; calyx white, deciduous, up to 1.5 cm. long, cleft nearly to base into 5 unequal, lanceolate, acuminate, valvate lobes, at maturity glabrate without, glabrous within; corolla white, 1 cm. long, cleft ca. 0.25 of

its length into unequal, rounded lobes, with capitate hairs ca. 40μ in diameter and up to 0.25 mm. long on both surfaces; filaments ca. 1 mm. long, bearing apically coherent anthers at the corolla sinuses; staminodes 3, 0.25 mm. long, adnate opposite the upper sinuses ca. 2 mm. below corolla throat, the median staminode about 0.5 mm. above the lateral; cupulate annular disc conspicuous, ca. 0.75 mm. high, drying to irregular rectangular fragments, persistent in mature fruit; ovary and style ca. 5 mm. long, the ovary glabrous, abruptly tapered to the style, the style with dense indument of capitate hairs, the stigma capitate, shallowly bilobed, the style separating 2–5 mm. above apex of mature fruit; fruit white, ellipsoid, up to 2.5 cm. long and 1.3 cm. wide.

TYPE LOCALITY: Mountains of Ngau, Fiji. Type collected by Milne, cited below.

DISTRIBUTION: Known only from the upland forests of Ngau, 300 to 450 m.

NGAU: "Mountains," *Milne* 236 (K-type); hills east of Herald Bay, inland from Sawaieke, *Smith* 7755 (BISH, US).

The type includes two specimens of which the lower specimen was annotated by Gray as a *Clerodendron*. However, my examination of the type reveals that the lower specimen is indeed *Cyrtandra denhamii*, as had been indicated by Seemann.

The deeply cleft calyx and sparse indument of the mature foliage characterize both *Cyrtandra denhamii* and *C. tempestii*. The eastward extension of this group into Polynesia is indicated by *C. feaniana* F. Brown, of the Marquesas Islands, and *C. longipedunculata* Rech., of Samoa, both of which have the inflorescence and flower characters of *C. denhamii*. The capitate, shallowly bilobed stigma of *C. denhamii* is unique among Fijian species of *Cyrtandra*, and also occurs in *C. feaniana*, cited above.

29. Cyrtandra tempestii Horne ex C. B. Clarke, in DC. Monogr. Phan. 5: 273. 1883.

Compact shrub or slender tree 3–4 m. high, with rubiginose tomentum on the younger parts, consisting of small, septate, uniseriate, noncapitate hairs ca. 15μ in diameter and 0.2 mm. long; leaves opposite, the petioles 5–6 cm. long, the blades ovate, up to 20 cm. long and 10 cm. broad, oblique and acute to obtuse at base, acute at apex, undulate to finely serrate at margin, at maturity glabrate above, glabrate to tomentose-sericeous beneath, the primary veins ca. 8–10 per side, the secondary veins reticulate; inflorescences many-flowered, branched cymes, the peduncles 0.5–1.5 cm. long, terminated by a pair of minute, caducous bracts subtending 2–4 branches, the pedicels 1–2 cm. long; calyx white, ca. 1 cm. long, cleft nearly to base into 5 equal, linear-lanceolate, valvate lobes, puberulent with

conspicuous, dark brown, noncapitate hairs without, glabrous within; corolla funnelform, white, ca. 2 cm. long, cleft 0.25 of its length into 5 unequal, reinform lobes to ca. 5 mm. broad, glabrous without, with capitate hairs within; filaments ca. 2 mm. long, adnate opposite the sinuses of the anterior corolla lobe, bearing apically coherent anthers ca. 3 mm. below the corolla limb; staminodes 3, 1–2 mm. long, adnate 1–2 mm. below filaments and opposite the posterior sinuses; cupulate annular disc conspicuous, ca. 1.5 mm. high, drying to a pelviform structure, persistent in mature fruit; ovary and style ca. 8 mm. long, glabrous, the style separating at the apex of the mature ovary, the stigma applanate, bilobed, borne ca. 4 mm. below the anthers; mature fruit white, ellipsoid, up to 1.6 cm. long and 1 cm. broad.

TYPE LOCALITY: Taveuni, "in woods near the sea at Na Seli Levie." Type collected by Horne, cited below.

DISTRIBUTION: Known only from two localities on Taveuni, where it occurs in dense forest at elevations from "near the sea" (*Horne* 1136) to 900 m.

TAVEUNI: East of Somosomo, near old crater occupied by small swamp and lake, *Smith* 8388 (BISH, US); Na Seli Levie, *Horne* 1136 (GH, K-type).

This species is closely related to *Cyrtandra denhamii* both in morphology and dispersal potential, for each species is of a lineage that has established populations in eastern Polynesia. The Polynesian populations related to *C. tempestii* occur on Rarotonga in the Cook Islands. These have the habit, leaves, inflorescence, calyx, and nectiferous annular disc of *C. tempestii*. The Cook Islands populations are currently recognized as a distinct species, *C. rarotongensis* Cheesm.

30. Cyrtandra ciliata Seem. (Bonplandia 9: 257. 1861, nom. nud.) Fl. Vit. 182. *pl. 41*. 1866.

Shrub to slender tree up to 4 m. high, the foliage with indument of septate, uniseriate noncapitate hairs ca. 30μ in diameter and up to 1 mm. long; leaves opposite, the petioles 2–6 cm. long, tomentose, the blades lanceolate to lanceolate-ovate or ovate, up to 28 cm. long and 12 cm. broad, oblique to inequilateral and rounded to acute or cuneate at base, acute to acuminate at apex, undulate to coarsely serrate, with ca. 2 teeth per cm., glabrous above, beneath glabrate to glabrous on the areoles, tomentose on the veins and margins, the primary veins 7 or 8 per side, the secondary veins reticulate below; inflorescences elongate, branching, many-flowered cymes with indument of noncapitate hairs ca. 20μ in diameter and 0.2 mm. long, the peduncles 0.5–5 cm. long, shorter in the inflorescences borne on older stems, terminated by caducous, linear bracts 1–2 mm. long, subtending bracteolate branches, the pedicels 1–5 cm. long; calyx green to white, deciduous, ca. 4 mm. long, cleft nearly to base into 5 equal, linear-lanceolate lobes with rounded apices, puberulent without, glabrous

within; corolla white, funnelform, ca. 2–2.5 cm. long, cleft 3–4 mm. into unequal, rounded lobes, with numerous capitate hairs without or glabrous, glabrous within; filaments ca. 3 mm. long, bearing apically coherent anthers at the base of the corolla limb; staminodes 3, ca. 1 mm. long, adnate ca. 4 mm. below the upper sinuses, the median staminode borne at same level as the lateral; cupulate annular disc prominent, ca. 1 mm. high, deciduous from the mature fruit; ovary and style ca. 1.5 cm. long, the ovary glabrous, the style with capitate hairs in upper half of its length, separating 1–4 mm. above the rounded apex of the mature ovary, the stigma applanate, shallowly bilobed, the lobes thick, spreading vertically; fruit white, ovoid, up to 12 mm. long and 7 mm. broad.

TYPE LOCALITY: Vuna, southwest Taveuni, Fiji. Type collected by Seemann, cited below.

LOCAL NAME: "Muskarimba" (*Smith* 1979).

DISTRIBUTION: Vanua Levu, Taveuni, and Koro, in dense forest, between 300 and 900 m.

KORO: Eastern slope of main ridge, *Smith* 965 (BISH, GH, NY, US). VANUA LEVU: Thakaundrove: Mount Mariko, *Smith* 435 (BISH, GH, NY, UC, US); Mount Ndikeva, *Smith* 1863 (BISH, GH, NY, UC, US); Natewa Peninsula, Uluingala, *Smith* 1979 (BISH, GH, NY, UC, US). TAVEUNI: Vuna, *Seemann* 282 (GH, K-type); between Somosomo and Wairiki, *Smith* 765 (BISH, GH, NY, US); Mount Manuka, east of Wairiki, *Smith* 8207 (BISH, US); without further locality, *Gillespie* 4724 (BISH, NY, UC).

The excellent plate in Flora Vitiensis has greatly facilitated identification, making this one of the most easily determined of the Fijian species. The affinities of *Cyrtandra ciliata* are not known. None of the other Fijian species have comparable flowers and inflorescences, and none of the Polynesian species are similar. It therefore seems likely that this species represents a lineage that is either peculiar to Fiji, or attenuated from Melanesian territory to the west, from which I have been able to examine very little material.

The variability in corolla indument is notable, for the populations from Vanua Levu are characterized by corollas with an outer indument of capitate hairs, while populations from Taveuni have corollas with a glabrous outer surface; however, the plants seem similar in other features. This difference is indicative of the propensity for evolutionary change in isolated populations of *Cyrtandra*. In such cases one has the alternative of either: circumscribing species to reasonably broad limits, or giving formal recognition to a number of separate, isolated populations, each distinguished by a slight morphological expression, such as the above.

31. Cyrtandra xanthantha A. C. Smith, Journ. Arnold Arb. 34: 48. 1953.

Shrub 3–4 m. high with ferrugineous, septate, uniseriate, noncapitate hairs ca. 30μ in diameter and to 1 mm. long; leaves opposite, the

petioles 1–3 cm. long, tomentose, the blades lanceolate to elliptic, up to 16 cm. long and 6 cm. broad, inequilateral and acute or cuneate at base, acute to acuminate at apex, entire to serrate, the serrations 1–2 per cm., papillate-puberulent to tomentose above, beneath densely tomentose with raised primary veins 6–8 per side and curved upwardly, the secondary veins reticulate beneath; inflorescences ferrugineous-tomentose, the peduncles 0.5–3 cm. long terminated by a pair of caducous, ovate-acuminate, connate bracts up to 1.7 cm. long and 0.8 cm. broad, the bracts villous above and below, subtending pedicels 0.5–1.5 cm. long; calyx deciduous, white to pale green, ca. 1 cm. long, cleft ca. 0.66–0.75 of its length into equal, lanceolate, valvate lobes, the tube and lobes villous without, glabrous within; corolla white to pale yellow, curved-cylindrical, up to 2.5 cm. long, cleft ca. 0.33 of its length into unequal, rounded, spreading lobes, the tube and lobes with capitate hairs without, glabrous within; filaments 2–3 mm. long, bearing apically coherent anthers at the base of the corolla limb; staminodes 2, ca. 1.5 mm. long, adnate near the middle of corolla tube; cupulate annular disc conspicuous, ca. 1 mm. high with irregular margin, deciduous in mature fruit; ovary and style 8–9 mm. long, the ovary glabrous, the style with capitate hairs in the upper half of its length, separating 1–2 mm. above the rounded apex of the mature ovary, the stigma applanate, shallowly bilobed, the lobes thick, spreading vertically, borne ca. 3 mm. below the anthers; fruit ellipsoid, up to 1.8 cm. long and 1 cm. broad.

TYPE LOCALITY: Slopes of the escarpment north of Nandarivatu, Fiji. Type collected by A. C. Smith, cited below.

DISTRIBUTION: Interior of Viti Levu in upland rain forest, 500–925 m.

VITI LEVU: Mba: Mount Evans *Greenwood* 376 (K); slopes of escarpment north of Nandarivatu, *Smith* 6277 (A-type, BISH, US); near Nandarivatu, *Gillespie* 4150 (A, BISH); valley of Singatoka River, near Nandarivatu, *Gillespie* 3979 (A, BISH).

The affinity of this species is with *Cyrtandra aloisiana*, and these two species do not appear to be closely related to other Fijian or Polynesian species. A tabular contrast of *C. xanthantha* and *C. aloisiana* is offered below:

	C. xanthantha	*C. aloisiana*
Habitat:	Montane inland rain forests 550–925 m.	Lowland coastal rain forests below 150 m.
Length of calyx lobes:	Lobes 2–3 times length of calyx tube.	Lobes 4–5 times length of calyx tube.
Inflorescence bracts:	Only outer bracts present.	Outer and inner bracts present.
Length of corolla:	Corolla up to 25 mm. long.	Corolla up to 10 mm. long.
Hairs of the petiole:	0.25–1.0 mm. long.	2–7 mm. long.
Staminodes	2, ca. 1.5 mm. long.	3, ca. 0.5 mm. long.

32. Cyrtandra aloisiana A. C. Smith, Sargentia 1: 116. 1942.

Shrub about 1 m. high with villous, rubiginose, septate, uniseriate noncapitate hairs ca. 60μ in diameter and up to 7 mm. long; leaves opposite, the petioles 1–5 cm. long, densely villous, the blades lanceolate to elliptic to ovate, up to 22 cm. long and 8 cm. broad, inequilateral and acute or cuneate at base, obtuse to acute or acuminate at apex, entire to faintly serrate, sparsely villous on the upper surface, beneath with villous pubescence and raised primary and secondary veins, the primary veins 6 or 7 per side; inflorescences congested, with 2–8 flowers, the peduncles 3–12 mm. long, terminated by a pair of caducous, lanceolate-ovate, acuminate, villous bracts up to 15 mm. long and 7 mm. broad, the bracts subtending bracteolate pedicels ca. 10 mm. long, the bracteoles up to ca. 7 mm. long and 3 mm. broad, deciduous, villous on both surfaces; calyx ca. 6 mm. long, deciduous, cleft nearly to base into 5 equal, lanceolate, acuminate lobes, these often connivent, villous without, glabrous within; corolla pale yellow, cylindrical, ca. 1 cm. long, cleft 2–3 mm. into unequal, erect, rounded lobes, the tube and lobes with capitate hairs without, glabrous within; filaments adnate ca. 2 mm. below the corolla throat, opposite sinuses of the anterior lobe, bearing apically coherent anthers at the base of the corolla limb; staminodes 3, ca. 0.5 mm. long, adnate near middle of the corolla tube; cupulate annular disc ca. 0.5 mm. high, conspicuous, with irregular margin, falling from the maturing fruit; ovary and style ca. 5 mm. long, the ovary glabrous, the style with indument of capitate hairs on upper 0.25 of its length, separating 2–3 mm. above the apex of the mature ovary, the stigma applanate, shallowly bilobed, the lobes thick, spreading vertically, borne 2–3 mm. below the anthers; fruit white, ellipsoid, 12–16 mm. long.

TYPE LOCALITY: Near Ngaloa, Serua, Viti Levu, Fiji. Type collected by Degener, cited below.

DISTRIBUTION: Forested slopes near the ocean, south coast of Viti Levu, 0–150 m.

LOCAL NAME: "Makamakandora" (*Degener* 15105); "Soronimbengga" (*St. John* 18952).

VITI LEVU: Nandronga & Navosa: Mbelo, near Vatukarasa, *Tabualewa* 15619 (A, BISH, UC, US); track north of Komave, *St. John* 18952 (BISH, US). Serua: Thulanuku, near Ngaloa, *Degener* 15105 (A-type, BISH, NY, UC, US).

This species and the closely related *Cyrtandra xanthantha* have no relationships to the Cyrtandrae of Polynesia insofar as I have been able to determine. The contrasts between *C. xanthantha* and *C. aloisiana* are presented under the former species.

33. Cyrtandra harveyi Seem. Fl. Vit. 182. 1866.
Cyrtandra gorriei Horne ex C. B. Clarke, in DC. Monogr. Phan. 5: 273. 1883.

Shrub 1–4 m. high with perfect or unisexual flowers and dark brown, septate, uniseriate, noncapitate hairs ca. 20μ in diameter and up to 0.5 mm. long, the pubescence dense and closely appressed on younger parts, sparse on mature foilage; leaves opposite, the petioles 2–9 cm. long, the blades lanceolate to ovate, up to 25 cm. long and 9 cm. wide, unequal and rounded to acute or cuneate at base, acute to acuminate at apex, serrate, above with appressed, upwardly directed parallel hairs, beneath with moderate to dense pubescence of spreading hairs; inflorescences bearing 1–3 flowers, the peduncles 3–15 mm. long, pubescent, very short and slender on older stems, longer and thicker on young shoots, terminated by caducous, lanceolate bracts 2–3 mm. long subtending pedicels 5–12 mm. long; calyx caducous, greenish white, fleshy, drying subcoriaceous, ca. 7 mm. long, cleft nearly half its length into 5 ovate to lanceolate, acuminate, free or connivent lobes, with 1 or more of the sinuses often lacerated, the tube and lobes with scattered, conspicuous, dark brown hairs without, glabrous within; corolla white, 2.5–3 cm. long, funnelform, slightly curved, and cleft ca. 0.125 of its length into rounded, unequal lobes, the tube and lobes with conspicuous capitate hairs ca. 30μ in diameter and 0.33 mm. long without, glabrous within; filaments of bisexual flowers ca. 8 mm. long and adnate 3 mm. below the sinuses of the anterior corolla lobe, bearing 2 apically coherent anthers in the broad corolla throat; staminodes 3, 1 mm. long, adnate ca. 7 mm. below the posterior sinuses, the median staminode borne ca. 1 mm. above the laterals; cupulate annular disc prominent, ca. 1 mm. high clasping a stalk, or gynophore ca. 1.5 mm. long, this expanding upward to the base of the ovary; ovary and style 1.7–2 cm. long, the ovary glabrous, the style with short, capitate hairs over its entire length, exserted 2–3 mm. above the corolla throat, separating 1–5 mm. above the apex of the mature ovary, the stigma applanate, shallowly bilobed; fruit white, ellipsoid, ca. 2 cm. long and 1 cm wide.

In female flowers (*Smith* 367, all cited specimens) both stamens and staminodes are absent and the style and ovary are 2–2.3 cm. long. The style is 1 mm. in diameter, much thicker than in bisexual flowers, and is exserted 3–4 mm. above the throat of the corolla.

TYPE LOCALITY: Nandi, Mbua, Vanua Levu, Fiji. Type collected by Harvey, cited below.

LOCAL NAME: "Merikula" (*Smith* 367).

DISTRIBUTION: Dense rain forests of Vanua Levu, between 100 and 400 meters.

VANUA LEVU: Mbua: Nandi, *W. H. Harvey*, s.n. (GH, K-type; Sandalwood Bay, *U.S. Explor. Exped.*, s.n. (GH, US). Mathuata: Southern base of Mathuata

Range, north of Natua, *Smith* 6761 (A, BISH, US); Wainunu-Ndreketi divide, *Smith* 1847 (BISH, GH, NY, US). Thakaundrove: Hills east of Mbalanga, Savu Savu Bay region. *Degener & Ordonez* 13899 (A, BISH, NY, UC, US); Vatunivu-amonde Mountain, Savu Savu Bay region, *Degener & Ordonez* 13969 (A, BISH, NY, UC, US); southern slope of Valanga Range, *Smith* 367 (BISH, GH, NY, UC, US); "mountains at Koro-ni-Saca" (near Nakuku), *Horne* 546 (K-type of *Cyrtandra gorriei* Horne ex C. B. Clarke).

The affinity of *Cyrtandra harveyi* clearly is with *C. coleoides*. Both species have distinctive morphological features not known in other Fijian Cyrtandrae. These include the peculiar stalk, or gynophore, at the base of the ovary, the exserted style, and the long (8–15 mm.), exposed filaments. The presence of gynodioecious flowers in this species is unique in Fiji; however, the occurrence of unisexual flowers in *Cyrtandra* is known in at least 16 species from New Guinea, 2 from Borneo, and 1 from Hawaii. Lauterbach placed the unisexual material in a separate genus, *Cyrtandropsis*, which Burtt (1936) considers untenable.

34. Cyrtandra coleoides Seem. (Bonplandia 9: 257. 1861, nom. nud.) **Fl. Vit. 181,** *pl. 40.* 1866.[5]

Cyrtandra alba Gilliespie, Bishop Mus. Bull. 74: 20, *fig. 25.* 1930.

Erect shrub or small tree 2–4 m. high with pruinose indument on younger parts, becoming glabrous at maturity; leaves opposite, the petioles 1–4 cm. long, the blades elliptic to ovate, up to 20 cm. long and 9 cm. wide, unequal to oblique and rounded to acute or cuneate at base, acute to rounded at apex, serrulate to undulate or entire, the primary veins raised beneath, 6–8 on each side of midvein; inflorescences borne on older, woody stems, glabrous, the peduncles ca. 1 mm. long, bearing deciduous bracts less than 0.5 mm. long, the bracts subtending 1–4 bracteolate pedicels, the bracteoles 0.5 mm. long, deciduous; calyx ca. 1 cm. long, parted or lacerated into irregular lobes, glabrous on both surfaces; corolla funnelform, ca. 2.5 cm. long, cleft 3–5 mm. into rounded, unequal lobes, the tube and lobes glabrous on both surfaces; filaments 10–12 mm. long, adnate 2–3 mm. below the sinuses of the anterior corolla lobe, bearing 2 apically coherent anthers above the throat; staminodes 2, 2.5 mm. long, adnate opposite the lateral sinuses at about the middle of the corolla tube; cupulate annular disc conspicuous, 1.5 mm. high, deciduous, flanged at base and constricted at rim, clasping a short stalk or gynophore ca. 1.5 mm. long, this expanding upwardly to the base of the glabrous ovary; ovary and style to 2.2 cm. long, at anthesis the ovary scarcely broader than the style, the upper half of the style with capitate hairs, separating at summit of the mature ovary, the stigma applanate, shallowly bilobed, presented above the throat and opposite the upper sinus but

[5] Illustrated in Parham, Pl. Fiji Isd. *f. 86.* 1964.

slightly below the anthers; fruit white, ellipsoid, up to 18 mm. long and 9 mm. wide.

TYPE LOCALITY: Namosi, Viti Levu, Fiji. Type collected by Seemann, cited below.

LOCAL NAME: "Makamakandora" (*St. John* 18227); "Lembalemba" (*Smith* 5628; "Mandiri tambua" (*Gillespie* 2671).

DISTRIBUTION: Dense upland rain forests of central and eastern Viti Levu, 150–1150 m.

VITI LEVU: Mba: Mount Tomanivi, *Smith* 5259 (A, BISH, US); hills between Nggaliwana and Nandala creeks, south of Nauwanga, *Smith* 5813 (A, BISH, US). Nandronga & Navosa: Northern portion of Rairaimatuku Plateau, *Smith* 5628 (A, BISH, US). Namosi: Voma Mountain, *Gillespie* 2671 (BISH-type of *Cyrtandra alba* Gillespie, UC), *Gillespie* 2924.1 (BISH); Wainavindrau Creek, near Wainimakutu, *Smith* 8879 (BISH), US; without further locality, *Seemann* 280 (GH, K-type). Naitasiri: Wainamo Creek, *St. John* 18227 (BISH, US). Rewa: Suva ditch trail, *Bryan* 378 (A, BISH).

It has not been possible for me to find a morphological basis for separating *Cyrtandra alba* from *C. coleoides*. The types of both species were collected in the province of Namosi, Viti Levu. The type of *C. alba* was collected on Voma Mountain, Namosi. It is known that Seemann collected on the same mountain so that the locality information as well as available morphological comparisons support the reduction of *C. alba* to synonymy under *C. coleoides*. Gillespie's illustration of *C. alba* incorrectly portrays the calyx with 5 equal lobes. The type material clearly has the calyx lacerated into irregular segments as in *C. coleoides*, and a pencil sketch attached to the type of *C. alba*, obviously the basis for the published illustration, portrays the calyx with lacerated, irregular segments. There is obviously a close relationship between this species and *Cyrtandra harveyi*. The morphological comparisons of these two species are presented under the latter.

35. Cyrtandra prattii Gillespie, Bishop Mus. Bull. 74: 24, *fig. 32*. 1930.

Erect shrub up to 3 m. high, the ligneous branches to ca. 2 cm. in diameter, the pith scanty, up to 1.5 mm. in diameter, the young foliage tomentose with septate, uniseriate, noncapitate hairs ca. 50μ in diameter and 0.75 mm. long, becoming glabrate to glabrous at maturity; leaves opposite, the petioles 1–3.5 cm. long, the blades lanceolate to elliptic, up to 20 cm. long and 8 cm. broad, acute to cuneate at base, acute to acuminate at apex, faintly serrate, with 1–2 serrations per cm., at maturity glabrate to glabrous above, densely pubescent to glabrate beneath, the primary veins raised beneath, curved upward, 6–9 per side, the secondary veins conspicuously reticulate beneath; inflorescences with an elongate, woody axis to 35 cm. long, arising in the lower part of stem or at ground level among the adventitious

roots, bearing at 1–3 cm. intervals ovate, connate-perfoliate, deciduous bracts 0.5–1 cm. long, the bracts glabrate without, pilose within, subtending tomentose pedicels 3–7 mm. long; calyx ca. 2 cm. long, cleft ca. half its length into unequal, lanceolate, acuminate, sometimes connivent lobes, often lacerated nearly to base below the anterior sinus, densely tomentose on both surfaces; corolla pale yellow, cylindrical, fleshy, drying coriaceous, ca. 3 cm. long, cleft to 0.33 of its length into unequal, rounded lobes, the tube and lobes tomentose without, glabrous within; filaments 2–3 mm. long, bearing apically coherent anthers ca. 1 mm. below the corolla limb, the anthers black, apiculate, ca. 2 mm. long; staminodes 2, ca. 0.5 mm. long, adnate opposite posterior sinuses ca. 5 mm. below the limb; cupulate annular disc conspicuous, ca. 1.5 mm. high, deciduous in mature fruit; ovary and style ca. 2 cm. long, densely tomentose with noncapitate hairs ca. 40μ in diameter and up to 1 mm. long, the stigma applanate, bilobed, the lobes ovate, ca. 4 mm. long, with inner pubescence of capitate hairs ca. 20μ in diameter and ca. 0.1 mm. long, the style separating ca. 3 mm. above apex of mature ovary; fruit white, ovoid, ca. 2 cm. long and 1.2 cm. broad.

TYPE LOCALITY: Near summit of Mount Tomanivi, Mba, Viti Levu, Fiji. Type collected by Gillespie, cited below.

DISTRIBUTION: Dense upland forests of central Viti Levu, 900–1300 m.

LOCAL NAME: "Andalunga" (*St. John* 18260).

VITI LEVU: Mba: Mount Tomanivi, *Gillespie* 4091 (BISH-type, UC). Naitasiri: Wainamo-Wainisavulevu Divide, Rarandawai, *St. John* 18260 (BISH, US). Fiji, without further locality, *Parks* 20242 (BISH).

No likeness to this species has been seen in other Fijian Cyrtandrae, nor in the Polynesian material. The unique inflorescence surely justifies the assignment of this species to a distinct group among the Fijian species of *Cyrtandra*. The closest relationship of *Cyrtandra prattii* would appear to be with *C. nodosula* Schlecht., of New Guinea.

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