STUDIES IN THE GESNERIACEAE OF THE OLD WORLD XXXIII: SOME SPECIES OF CYRTANDRA, CHIEFLY BORNEAN

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ABSTRACT. Thirty four Bornean species are annotated: of these 9 are new, one is a new name, two are new combinations based on names previously described under *Didymocarpus*, two are new records from Borneo of Philippine species, twenty two are previously described species; three species are reduced to synonymy. In addition there are notes on the Moluccan *C. decurrens* and the Javanese *C. pilosa*, names that have been applied to a diversity of plants.

The preceding paper on foliar sclereids in *Cyrtandra* has made it necessary to advance the publication of certain of the new species that have been detected in a current study of the genus in Malesia. Borneo is undoubtedly one of the main centres of diversification of this genus and the final account of *Cyrtandra* on this island alone may well have to deal with some 130 species. The present paper provides annotations on as many of the species used in the preliminary study of foliar sclereids as can be safely named at the moment: this includes 9 not previously described. There are also notes on a few other species.

Cyrtandra in Borneo has attracted remarkably little attention since C. B. Clarke's revision of the genus (1883, pp. 201–287). Only Kraenzlin has made any determined effort to deal with the genus and his efforts, confined to herbarium studies, have not always led to very happy results. Even Ridley, who collected on Borneo and worked so enthusiastically on the Gesneriaceae of the Malay Peninsula, left the Bornean *Cyrtandra* severely alone. To work at all happily with the herbarium specimens some acquaintance with the living plants is essential. The attempts made by Clarke and Kraenzlin to subdivide the genus give little hint of the grouping together of species whose similarity in the field is very obvious. Lack of flowers on herbarium specimens often forced these authors to rely unduly on superficial vegetative features and in a general treatment of the genus we must start again from the beginning.

Too little is yet known to generalize about distributional patterns. The following notes record, for the first time, that two species are common to the Philippine Islands and Sabah, *C. angularis* and *C. elatostemoides*; further examples must be expected and it is this that, to some extent, slows down the treatment of the Bornean species. It is noted that *C. subgrandis* may be close to *C. gitingensis*. On the other hand the Moluccan *C. decurrens* and the Javanese *C. pilosa* are not now thought to occur in Borneo, though there are many species in the affinity of *C. decurrens* and further information about the plant in the Moluccas is badly needed. The Javanese *C. oblongifolia* is, however, widespread in Sarawak and Kalimantan (Indonesian Borneo). Within Borneo itself there undoubtedly are definite distributional patterns but they are being uncovered rather slowly. It is noteworthy that the species described by Lauterbach (1910) from the collections of Hubert Winkler in south-east Borneo (between Bandjermasin and Samarinda) are being found

in river valleys far from that area. Kraenzlin's (1927) new species collected by Hans Winkler in the hills around the upper Serawei and Kapuas rivers (central west Kalimantan) are being found over the border on the mountains of Sarawak, but are perhaps less widely distributed in the island as a whole.

In citing some of C. B. Clarke's type specimens I have given localities more detailed than those originally supplied. These are derived from examination of the sheets in the Florence herbarium (FI) kindly sent on loan to Edinburgh some years ago by the Curator, Dr. G. Moggi. I have also had the advantage of the loan of Hans Winkler's Bornean Cyrtandras from Hamburg and of types and other material from Kew and Leiden.

In the following notes species are arranged alphabetically. The initials RSNB in the citation of specimens refer to the Royal Society North Borneo Expedition 1961, the collectors being (separately or together) W. L. Chew, E. J. H. Corner and J. D. A. Stainton.

Cyrtandra adnata B. L. Burtt, **species nova**

Surculi basi decumbentes radicantes supra erecti c. 25–40 cm alti, eramosi, partibus junioribus pilis rigidis atrorubris appressis induti, inferne glabrescentes. *Folia* opposita subaequalia; petiolus 10–15 mm longus canaliculatus, marginibus leviter undulatis, pubescens; lamina obovato-elliptica, 7–10 × 3–4 cm, apice rotundata (raro subacuta), basi attenuata, primum atrorubro-pilosa, utrinque nervis in pagina inferiore exceptis glabrescens, marginibus distanter denticulatis, nervis lateralibus utrinsecus 8–10 ascendentibus subtus conspicuis. *Flores* axillares ut videtur solitarii, breviter pedicellati, bracteis duobus oblongis c. 1 cm longis pilosis basi quasi pedicello adnatis instructi. *Calyx* 1 cm longus, inferne per 7 mm tubulosus, superne in labia bi- et tri-dentata 3 mm longa divisus, setoso-pilosus. *Corolla* 40 mm longa, extra sericeo-pilosa; tubus c. 27 mm, ad basin versus cylindricus supra medium ampliatus infundibuliformis, intus glaber; lobi superiores c. 7 × 7 mm; labium inferius 10 mm; lobi laterales c. 7 × 7 mm, medianus 8 × 8 mm. *Stamina* paullo supra medium tubi orientia; filamenta 8 mm, apicem versus glandulis sessilibus praedita; antherae 2 mm; staminodia lateralia 3 mm. *Discus* vix 2 mm altus, irregulariter dentatus vel fissus. *Ovarium* 5–6 mm longum, glabrum; stylus 22 mm longus, patule pilosus; stigma expansum, crateriforme. *Fructus* 2 cm longus, 5 mm diam., oblongo-ellipsoideus, basi truncatus, apice acuminatus.

Type: Sabah, Mt. Kinabalu, Sungei Mesilau, c. 6° N, 116° 35′ E, 1500 m, Agathis-Podocarpus-oak forest, 23 viii 1961, *RSNB* 1359 (holo K; iso E).

SABAH. Mt. Kinabalu, Ulu Langanani, Sungei Mamut [6° 4′ N, 116° 40–44′ E], 1350 m, 8 viii 1961, *RSNB* 1258; Pinosuk plateau [6°–6° 3′ N, 116° 37–41′ E], 1650 m, 19 viii 1961, *RSNB* 1853; Eastern shoulder, [6° 5′ N, 116° 36–40′ E], 1500 m, 31 vii 1961, *RSNB* 1577; Penaturan river basin, 1500 m, 22 vii 1933, *Clemens* 34023.

The rather large sericeous corolla of *C. adnata* shows it to have some affinity with *C. decurrens* and its allies; it is however a more slender plant than most of that group, the filaments do not show either a central knob-like thickening or spiral retraction after dehiscence of the anthers; the crateriform stigma is also noteworthy. The inflorescence is also distinctive: the flowers

are solitary and are closely invested at the base by the two oblong bracts; these however do not arise freely from the top of the pedicel; on the contrary they appear to arise right at its base and to completely enclose it so that the apparent rather thick and slightly compressed pedicel is really the lower part of the bracts adnate to the pedicel between them.

Cyrtandra andersonii B. L. Burtt, **species nova** (Fig. 1.)

Planta subacaulis. *Folia* rosulata; petioli 1·5–4 cm longi pilosi; lamina 5–10 × 2–5 cm, elliptica vel late elliptica, apice acuta, basi leviter cordata, supra pilosa, subtus in venis brevius pilosa cetera glabra, venis lateralibus utrinsecus c. 7 patulis in siccitate conspicuis. *Inflorescentiae* pedunculis brevibus 5 mm tantum longis; bracteis subfoliaceis, c. 12 × 6 mm, laciniatis, pilosis. *Calyx* fere ad basin in segmentis linearibus c. 5 mm longis (uno aliis interdum longiore) divisus, pilosus. *Corolla* alba area aurantiaca in palato excepta, extra pilosa; tubus anguste cylindricus 20 mm longus; lobi posteriores 7–8 × 6 mm; labium inferius 10 mm; lobi laterales 8 × 7–8 mm, medianus 7 × 7 mm; lobi omnes intus pubescentes. *Filamenta* prope orem corollae orientia, 2 mm longa; antherae 1·5 mm longi. *Discus* 2 mm altus, unilateralis. *Ovarium* 2·5 mm longus, pilosus; stylus 13 mm longus, glaber; stigma in lobos laterales duos 2 mm longos bifidum. *Fructus* ellipsoideus vel ovoideus 8–10 mm longus, c. 4 mm diam., pilosus.

Type: Sarawak, First Division, Bukit Gaharu [c. 1° N, 110° 48′ E], c. 900 m, 1 viii 1962, *Anderson & Burtt*, *B.* 2654 (holo E; iso SAR).

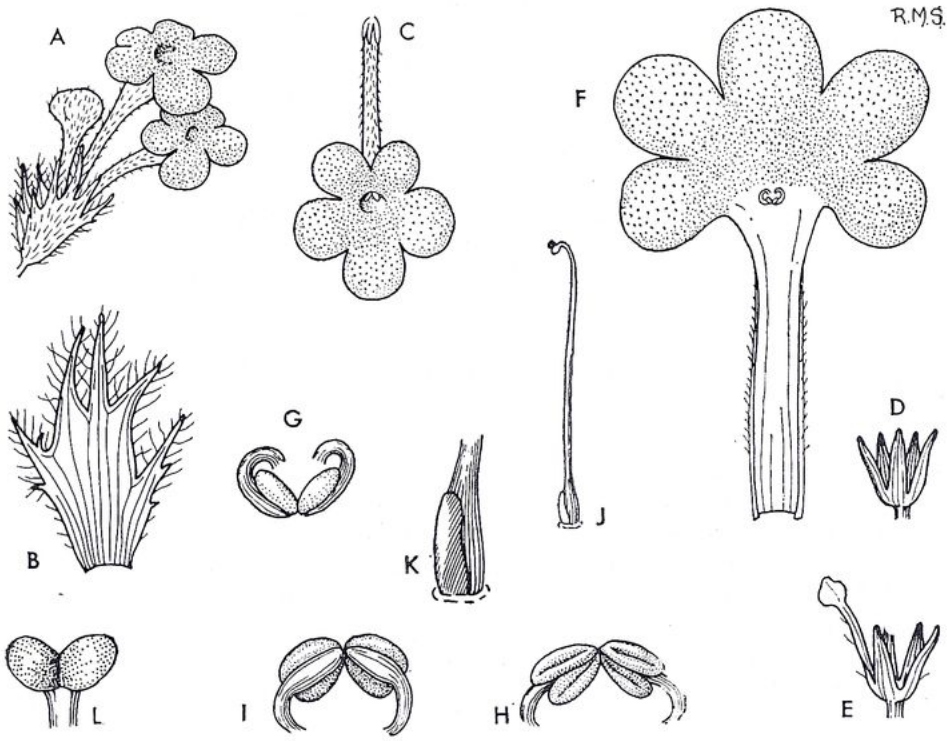

FIG. 1. *Cyrtandra andersonii* B. L. Burtt. A, inflorescence, x 1; B, bract, x 2; C, flower, x 1; D, calyx, x 2; E, calyx from another flower, x 2; F, corolla, dissected, x 2; G, stamens, x 4; H, I, stamens from unopened flower, x 4; J, gynoecium, x 2; K, disc and ovary, x 4; L, stigma, x 8. (*Anderson & Burtt*, *B.* 2654).

Named in gratitude after Dr. J. A. R. Anderson, who actually found the first specimen and whose help on two trips to Sarawak has been beyond repayment.

C. andersonii forms a tight rosette on sandstone cliffs and is perhaps the most herbaceous species of the genus seen in Sarawak. It looked very like a species of *Didymocarpus*, of which an unnamed rosulate species grew alongside; however a brief search showed the characteristic crustaceous indehiscent fruits hidden in the leaf axils. The affinity is with *C. schizostyla*, from which its dwarfer habit and the leaves being cordate at the base easily distinguish it. Like that species it has tracheoids in the hypodermis and astrosclereids in the mesophyll.

Cyrtandra angularis Elmer (1910, p. 960).

Type: Philippine Islands, Mindanao, District of Davao, Todaya (Mt. Apo), v 1909, *Elmer* 10698 (iso E).

SABAH. Sine loc., 1896, *Creagh* (K). Penghalan Tiaggau R., [c. 4° 33′ N, 117° 23′ E], *Keith* 9088 (K, E). Sandakan, Sepilok F. R., *Sinclair & Lal* 9351 (E). Lahad Datu, Tapadong Hill, *Orolfo* 1318 (K). Kwanut R., Kuala Kasuyun, [c. 5° 13′ N, 117° 29′ E], *Keith* 9048 (K).

This species has not previously been recorded from Sabah, where it has been confused with *C. oblongifolia*; indeed Merrill reduced it to that species in his Philippine work. *C. oblongifolia* does occur on the borders of Sabah but all the material seen from localities clearly within the state have proved to be *C. angularis*, as has all the Philippine material. Distinction is not difficult: *C. angularis* has a tubular calyx 1 cm long with short rounded lobes; *C. oblongifolia* has five short triangular calyx segments c. 2 mm long, scarcely united into a tube at the base.

C. angularis frequently occurs as an epiphyte.

Cyrtandra areolata (Stapf) B. L. Burtt, **comb. nov.**

Type: Sabah, Kinabalu, 1500–2100 m, *Haviland* 1248 (K).

Syn.: *Didymocarpus areolatus* Stapf (1894, p. 213).
Cyrtandra didissandriformis Merrill (1923, p. 33). Type: Sabah, Batu Lima, near Sandakan, *Ramos* 1458.

SABAH. Much material from Mt. Kinabalu area including *Clemens* 26182, 26183, 26787, 27721, 27983, 31572, 31974, 33764; *Carr*, SFN 26427, 27583; *RSNB* 4064, 4526, 4693, 7131. Sepilok F. R., Elopura, Sandakan, *For. Dept.* A696 (SING).

The long slender fruit of this species deceived Dr. Stapf, whose material had immature fruits only, into thinking it was a *Didymocarpus*. The species is either highly variable in leaf form and indumentum or the material being placed here tentatively includes more than one species. Field work will be needed to settle this question. The characteristic leaf surface, from which Stapf took the specific epithet, may be regarded as an incipient state of the strongly mamillate leaf of *C. splendens* and on floral characters as well the affinity may be with that species, which seems to replace *C. areolata* in Sarawak.

Cyrtandra axillaris C.B. Cl. (1883, p. 260)

Type: Kalimantan, Sebalouw [0° 53′ N, 109° 34′ E], *Teyssmann* 10886 (FI).

SARAWAK. Third Division, Pelagus Rapids on Batang Rejang, erect stem

with leaves tufted at top, corolla pale reddish purple outside, 21 vii 1962, *Burtt & Woods*, *B.* 2588 (E, SAR).

The above specimen is the one examined for sclereids: there are a number of others from the area Pelagus Rapids—S. Tatau—Bellaga (e.g. *Purseglove* 5426, *Ashton* S. 18206, *Anderson* S. 14706, *Brooke* 9087 and others) which are probably conspecific.

This species is retained with some doubt: it may well prove to be indistinguishable from *C. latens* and their close affinity is emphasised by the discovery that both have dendrosclereids in the leaves. *C. latens* is common on Gunong Gading near Lundu in the First Division: *C. axillaris* was described from SW Kalimantan, but material now referred to it comes from around the Pelagus Rapids on Batang Rejang in the Third Division. Clarke failed to associate *C. axillaris* and *C. latens* in any way. *C. axillaris* seems to have tighter inflorescences and more broadly ellipsoid fruits.

Cyrtandra bracheia B. L. Burtt, **species nova**

Syn.: *C. decurrens* De Vriese var. *puncticulata* C. B. Cl. (1883, p. 232), pro parte (*Beccari* 938, 1070).

Planta humilis, caule lignoso c. 10 cm alto. *Folia* opposita, plus minusve aequalia, anguste elliptica vel oblanceolato-elliptica, 15–20 × 5–7 cm, apice acuta vel breviter acuminata, basi in petiolum 8 cm usque attenuata, supra primum breviter pilosa demum glabrata, margine distanter denticulata. *Inflorescentia* axillaris subsessilis, bracteis duobus ovatis pubescentibus et verrucosis circumdata. *Calyx* ut videtur c. 10 mm longus, tenuis, extra longe brunneo-pilosus, corolla crescente perruptus et mox disintegrans. *Corolla* 40 mm longa, extra longe sericeo-brunneo-pilosa; tubus 27 mm longus, inferne cylindricus, superne ampliatus; labium superius 12 × 14 mm, ad 4 mm bilobatum; labium inferius 12 mm longus, lobis subaequalibus 10 × 6 mm; lobi omnes intus papillosi. *Filamenta* c. 10 mm supra corollae basin orientia, 20 mm longa, dimidio inferiore recta, medio bulboso-incrassata, dimidio superiore primum recta ascendentia polline delapso spiraliter retracta; antherae 2·5 mm longae, apicibus cohaerentes. *Discus* cupularis, 2 mm altus, margine undulatus. *Ovarium* cylindricum, c. 15 mm longum pilis patentibus glandulosis et eglandulosis intermixtis pubescens, sursum in stylum aequilongum glanduloso-pubescentem pergradatim transeuns; stigma in lobos laterales duos brevissime divisum. *Fructus* 12 × 5 mm, acutus.

Type: Sarawak, First Division, Mt. Matang near Kuching, 600 m, 15 vii 1962, *Burtt & Woods*, *B.* 2511 (holo E, iso SAR).

SARAWAK. Widespread in the south-western half of the country. Representative specimens are: First Division: Sungei Lundu, foot of Gunong Perigi, *Burtt & Woods*, *B.* 2696; Santubong, *Paie* S. 8313, *Burtt & Woods*, *B.* 1971; Bidi, *Ridley* s.n.; Gunong Krian, near Bau, *Burtt & Woods*, *B.* 1889; foot of Bukit Gaharu, 70 miles from Kuching on Simanggang road, *Burtt* 2637; Piningiaio, S of Kuching, *Beccari* 938; Quop [= Kuap], S of Kuching, *Beccari* 1070. Third Division: Nanga Mujong, *Brooke* 8974; Pelagus rapids on Batang Rejang, *Burtt & Woods*, *B.* 2547; Kapit, *Clemens* 21230; Gaat, *Clemens* 21643. Fourth Division: Sungei Tau, *Purseglove* 5421.

To designate one out of several hundred species of *Cyrtandra* simply *bracheia*, the short one, may seem ridiculous: but within the group of species to which it belongs the shortness of stem and internodes and the long petiolate erect leaves are distinctive features of this species. Others, with which it has been previously confused, for example *C. erectipila* and *C. subgrandis*, all have decidedly taller stems, longer internodes and more shortly petiolate leaves.

C. bracheia is rather a common species in the First Division, growing on the forest floor and when on steeply sloping ground often supported by prop roots, a feature of a number of unrelated species in this genus.

C. bracheia was one of the species included by C. B. Clarke in his *C. decurrens* var. *puncticulata*. *C. decurrens* is a much less robust plant from the Moluccas with smaller leaves and well-developed internodes. Leaf texture is reflected, perhaps, in *C. bracheia* having both hypodermal and mesophyll sclereids, whereas *C. decurrens* has them only in the mesophyll.

Cyrtandra cretacea Kraenzlin (1906, p. 279)

Type: Sarawak, Niah, on limestone, *Haviland & Hose* 3530 (K).

SARAWAK. Fourth Division, Niah Caves, on rough limestone just before reaching the caves, flowers white with two yellow bars in the throat, 3 vi 1962, *Burtt & Woods*, *B.* 1991 (E, SAR).

C. cretacea shares with a number of other limestone species the excretion of calcium to form a deposit on the leaf-surface. It is at present only known from the immediate neighbourhood of the Niah Caves.

Cyrtandra decurrens De Vriese (1856, p. 14)

Type: Moluccas, Amboina, *De Vriese* (L).

C. B. Clarke took a broad view of this species (1883, p. 232) adding three varieties and including material ranging from Penang to New Guinea. This was quite reasonable on the very poor material that he had available, but a group of closely allied species is now emerging. *C. bracheia*, *C. erectipila* and *C. subgrandis* are three of these dealt with in this paper. It is too early to say yet whether true *C. decurrens* does occur on Borneo or not. The three species just mentioned all have unbranched stems and large leaves: *C. decurrens* seems rather to be one of the more slender stoloniferous species of which *C. gracilenta*, differing from *C. decurrens* in its long acuminate leaves, is an example. The three coarser species all have sclereids in hypodermis and mesophyll; *C. decurrens* and *C. gracilenta* only in the mesophyll.

Cyrtandra digitaliflora B. L. Burtt, **species nova**

Herba robusta 1·5 m usque alta, caulibus pilis axillaribus exceptis glabris fusco-purpureis. *Folia* discoloria petiolis longissimis 6–12 cm longis; lamina angustissime elliptica, 15–25 × 3·5–5·5 cm, apice acuminata, basin versus attenuata saepe obliqua, margine undulato-denticulata, utrinque glabra, nervis lateralibus paulo irregularibus utrinsecus c. 7–9. *Inflorescentiae* axillares in alabastro bracteis c. 5 mm longis circumdatis, c. 6-florae; pedicelli 5–10 mm longi. *Calyx* 8 mm, glaber, crassiusculus, demum irregulariter ruptus persistens; tubus 7 mm, levissime inflatus; dentes 1 mm longi, acuti, triangulares. *Corolla* 30–35 mm; tubus 27 mm, triente inferiore cylindricus, glaber, deinde subito ampliatus pilis brevibus conicis erectis densiuscule

vestitus; lobi extra similiter vestiti, subaequales, 7 × 7 mm. *Stamina* 15 mm supra corollae basin orientia; filamenta 8 mm longa, glabra, demum spiraliter retracta; antherae apicibus cohaerentibus, 3 mm longae; staminodia lateralia 7 mm longa. *Discus* 1·5 mm, lobatus. *Ovarium* basi per 5 mm glabrum minutissime verruculosum superne per 6 mm piloso-barbatum; stylus 10 mm, basi longe pilosum sursum pilis brevioribus indutus; stigma in lobos laterales duos 2 mm divisum. *Fructus* 30 mm longus, 5 mm diam., parte superiore pilosa, basi styli persistente acuminatus.

Type: Sarawak, Fourth Division, Gunong Mulu, c. 1200–1300 m, 14 vi 1962, *Burtt & Woods*, *B.* 2098 (holo E, iso SAR).

SARAWAK. Fourth Division, Gunong Mulu, 1260 m, *Anderson* 4226 (SAR), 4594 (SAR); Melinau gorge [c. 4° 5′ N, 114° 50′ E], pathway above camp, *Burtt & Woods*, *B.* 2245 (E, SAR).

The field notes for the type record "Outside of corolla white, hairy with conical erect hairs: lobes pale yellow except that on the upper lip the margins are white and there is a white patch from the sinus: inside of corolla tube brown: filaments bent so that anthers are at right angles to mouth and cohering tip to tip. Calyx light green. Stem, petioles and pedicels purplish red".

Amongst described species, *C. digitaliflora* seems to have most affinity with *C. radiciflora*. There are a number of undescribed and little known forms in this group.

Cyrtandra elatostemoides Elmer, (1913, p. 1781)

Type: Philippine Islands, Palawan, Puerto Princesa (Mt. Pulgar), *Elmer* 13207 (iso E).

SABAH. Bongaya [6° 10′ N, 117° 35′ E], 1897, *Ridley* s.n. (K). Bettotan, near Sandakan, *Boden Kloss* 18996 (SING, K). Kinabalu, eastern shoulder, [6° 05′ N, 116° 36–40′ E], 1050 m, *RSNB* 623 (K, E).

Not previously recorded from Borneo. Elmer originally spelt the epithet '*elatostemmoides*' but corrected it to '*elatostemoides*' on an errata-sheet, apparently issued with the title-page etc. of the volume.

Chew, Corner & Stainton give the following note: "Calyx white, tinged pink. Corolla white, fine magenta spots in throat and inner face of petals, lower side of throat with a broad yellow mark". This is the only specimen seen with flowers (which were not described by Elmer).

Cyrtandra erectipila B. L. Burtt, **species nova**

Syn.: *C. decurrens* var. *puncticulata* C. B. Clarke (1883, p. 232) pro parte, quoad *Beccari* 253, 909.

Caulis simplex, 1 m usque altus. *Folia* opposita, sessilia juvenilia basi connata seniora demum sejuncta; lamina obovata vel oblanceolata in plantis magnis usque ad 45 × 15 cm sed saepissime minora c. 20 × 5, apice rotundata vel breviter acuminata, basin versus gradatim attenuata ad 1–2·5 cm lata, basi ipsa iterum leviter expansa, margine inconspicue denticulata, supra praecipue in statu juvenili pilis mollibus erectis parciuscule induta, subtus nervis pubescentibus exceptis subglabra. *Inflorescentiae* axillares c. 9-florae bracteis robustis demum caduca primum involucratae; pedicelli c.

5–7 mm longi. *Calyx* 15 mm longus, basi per 8 mm tubulosus, superne 7 mm bilabiatus, dentibus ut videtur cohaerentibus, setoso-pilosus. *Corolla* 4 cm longa, extra brunneo-sericeo-pilosa; tubus c. 2·8 cm, basi per 1 cm cylindricus, superne subito ampliatus, ore c. 1·2 cm diametro; labium superius 1 cm longum lobis triangularibus duobus 3 mm longis basi 5 mm latis; lobi laterales et medianus triangulares, c. 10 × 8 mm, omnes intus dense papillosi. *Stamina* c. 1 cm supra corollae basi orientia; filamenta parte inferiore 5 mm longa ala membranacea ad tubum conjuncta, parte superiore c. 8 mm longa post anthesin spiraliter retracta; antherae vix 3 mm longae, apicibus cohaerentes; staminodia 5 mm. *Discus* 2·5 mm altus cupularis margine dentatus. *Ovarium* cylindricum, c. 7 mm longum, inferne subglabrum, apice longe piloso-barbatum; stylus fere 20 mm longus, patenter glanduloso-pubescens; stigma transversale, ovale, 3 mm diam. *Fructus* c. 15 mm longus et 5 mm diam., basi truncatus, apice basi styli persistente acuminatus.

Type: Sarawak, Fourth Division, Lambir Hills, fairly common in damp places near streams, 6 vii 1962, *Burtt & Woods*, *B.* 2421 (holo E, iso SAR).

SARAWAK. First Division: Gunong Berumput, Poi Range, c. 1050 m, *Burtt & Woods*, *B.* 2849 (E, SAR); Gunong Gading, Lundu, 150 m, *Purseglove & Shah*, P 4557 (E, K, SING), ibid., *Burtt & Woods*, *B.* 2675 (E, SAR), *B.* 2688 (E, SAR); Bau, 30 m *Purseglove* 4452 (E, K, SING); Kuching, *Beccari* 253 (FI, K), 909 (FI); Semengoh F.R., 12 miles SE of Kuching, *Burtt & Woods*, *B.* 2483 (E, SAR). Third Division: Pelagus Rapids, *Burtt & Woods*, *B.* 2589 (E, SAR). Fourth Division: Gunong Mulu, ascent from Sungei Melinau Paku, *Burtt & Woods*, *B.* 2061 (E, SAR); near Long Kapa, Mt. Dulit (Ulu Tinjar), c. 300 m, *Richards* 1456 (K).

The above selection of specimens shows that *C. erectipila* is widespread in Sarawak, though it has not yet been recognized elsewhere in Borneo. It is characteristically found in damp soil in gullies and near stream sides, usually well-shaded. It is recognized in this group by the soft erect hairs on the upper leaf surface: they can easily be seen, and felt, on the fully expanded young leaves. On older leaves there is often a heavy growth of epiphyllous liverworts etc. which makes them harder to observe.

The connate leaf bases of this plant catch falling debris from the trees above, they also hold water; the axillary flowers are rather thick and decay quickly into an unpleasant mush: in all this matter, various worms and grubs make their home. The result is a microcommunity in the leaf axils, and into this the plant sends out adventitious roots, reminding one—though the method is here much less sophisticated—of the pitcher leaves of *Dischidia rafflesiana* which are also invaded by the plant's own roots.

I regret that my material of this species is an object lesson in how not to collect. The herbaria of the world have long demonstrated that if you press this sort of *Cyrtandra* with the flowers *in situ* you will be very lucky if you ever see one again. Flowers must be removed and pressed separately if they are to be retained.

Cyrtandra eximia C. B. Cl. (1883, p. 210)

Type: Sarawak, in monte Matang, iv 1866, *Beccari* 1440 (FI).

SARAWAK. First Division: Mt. Matang, 1929, *Clemens* 22375 (K); 90 m, 16 vi 1954, *Brooke* 8709 (L); 29 v 1962, *Burtt & Woods*, *B.* 1941 (E, SAR);

750 m, 1965, *Anderson* S. 20971 (SAR); Sungei China, 1° 38′ N, 110° 8′ E, 14 vii 1962, *Burtt & Woods*, *B.* 2506 (E, SAR). Third Division: Pelagus rapids on Batang Rejang, c. 2° 11′ N, 113° E, 21 vii 1962, *Burtt & Woods*, *B.* 2586 (E, SAR); southern end Hose Mts., Bukit Nibong, 7 vii 1967, *Burtt & Martin*, *B.* 4830 (E, SAR).

In 1962 the discovery of *C. eximia* in a gulley crossing the pathway along the Pelagus rapids on the Rejang, 210 miles from Matang, came as a surpris and as a reminder of how little we know about *Cyrtandra* distribution in Sarawak. In 1967 it was found at the southern end of the Hose Mts. on a steep hill slope, probably a landslide area just like some of its habitats on Mt. Matang. Thus from its old state as a Matang endemic, which lasted for nearly 100 years, *C. eximia* is now emerging as a species with some breadth of distribution.

C. eximia is a common plant along the sides of the track leading up Mt. Matang and appears to occur from near the foot to near the summit of the mountain. A very fine colony was seen towards the north end of the same range above Sungei China; a rocky sandstone platform on a steep slope had an almost pure stand of this species, the slender unbranched stems being 4·5 cm in diameter at the base and up to 4 m high, with about 6 pairs of well-developed but unequal leaves near the top. Occasionally 2 or 3 stems joined at the base, as though the terminal bud of a seedling had been damaged and replaced by lateral shoots: there was no branching higher up. The plants were flowering and fruiting freely on the bare stems, right down to ground level.

On Matang and at the Pelagus rapids the flowers are greenish-white, the lower lip being marked with a few broken red-purple lines (the colour apparently located in the bases of the hairs), the two upper lobes are deep reddish-purple. The Hose Mts. population lacks the reddish purple on the upper lobes.

Cyrtandra farinosa C. B. Cl. (1883, p. 67).

Type: Sarawak, Busso, prope Kuching, July 1865, *Beccari* 229 (FI).

SARAWAK. First Division: Mt. Braang, 210 m, *Haviland* (K); 'Kuching & vicinity', 1929, *Clemens* 20533 (K); 21st mile Serian road, 13 iii 1966, *Anderson* S. 20998 (E, SAR); Bukit Angob, Padawan road, 38 miles from Kuching, 6 iii 1969, *Anderson* S. 27507 (E, SAR).

This species is apparently confined to limestone and the farina to which the epithet refers is in fact a granular deposit of calcium salts.

Cyrtandra gibbsiae S. Moore (1914, p. 116).

Type: Sabah, hills above Tenom, 600 m, *Gibbs* 3113 (BM).

SABAH. Frequent on Mt. Kinabalu between 375–1500 m, representative sheets, *Carr* SFN 26273, 26774; *Clemens* 28471, 29267, 31226, 32856, 50083; *Darnton* 422; *RSNB* 1357. Island of Nunukan [c. 3° 59′ N, 116° 50′ E], low altitude, *Meijer* 2247, *Kostermans* 9029.

SARAWAK. Fourth Division; Melinau gorge pathway [c. 4° 5′ N, 114° 50′ E], 23 vi 1962, *Burtt & Woods*, *B.* 2233 (E, SAR).

A rather weak species, usually less than 0·5 m high, with somewhat fleshy stems clad with brown spreading hairs. One leaf of each pair is reduced to

a small auricle. It will be seen from the above records that the known range of the species is being steadily increased. It is easily distinguished from *C. elatostemoides* and *C. quinquenotata* by the longer and more acuminate leaves.

Cyrtandra gracilenta Kraenzlin (1906, p. 278).

Type: Borneo, near Dator (Datar?), *Curtis* 455, comm. Veitch 1897 (K).

This specimen has not been exactly matched amongst more recent collections and the type locality has not been traced: "Borneo" does not appear on the label, that is Kraenzlin's addition. The sheet holds a single slender shoot with internodes 5 cm long: what proportion of the whole plant this represents one cannot tell but it suggests one of the rhizomatous species. The corolla is large and has long silky hairs on the outside, so that the general affinity with the *C. decurrens* group is not in doubt. Other Bornean species of this group so far examined have sclereids in both hypodermis and mesophyll: in *C. gracilenta* they are present only in the mesophyll.

Cyrtandra horizontalis B. L. Burtt, **species nova**

Suffrutex epiphyticus ramis horizontaliter patentibus primum dense aureo-sericeis demum glabrescentibus. *Folia* opposita; unum cujusque paris parvum, subsessile, oblique ovato-ellipticum, 3–4 × 1–2 cm, acuminatum, basi rotundatum, primum aureo-sericeum, demum glabratum; alterum petiolo c. 1 cm longo suffultum; lamina lineari-oblonga, c. 15–20 × 2–3 cm, apice acuminata, basi angustata, utrinque primum aureo-sericea, supra mox infra tardius glabrata, marginibus integris. *Inflorescentia* axillaris, pedunculo aureo-sericeo c. 7 mm longo suffulta; bracteae ovatae c. 1·5–2·5 × 1 cm, acutae, utrinque aureo-sericeae; flores congesti, c. 6. *Calyx* ad basin in dentes 5 triangulares vix 2 × 1 mm crassiusculos acutos divisus. *Corolla* c. 2 cm longa, alba, intus transverse brunneo-corrugata et media linea flava notata; tubus parte inferiore cylindricus 5 × 3·5 mm paulo curvatus, parte superiore subito ampliatus campanulatus 7 mm longus et ore 7 mm diam.; lobi superiores 5 × 6 mm subporrecti, laterales 6 × 7 mm patentes, medianus 8 × 7 mm deflexus, omnes rotundati. *Filamenta* basi partis campanulatae corollae orientia, 5 mm longa, sursum incrassata, ad apicem et in connectivo crasso glandulis pedicellatis instructa; antherae lobi paralleli, 1·7 mm longi, cohaerentes. *Discus* cupularis, oblique 1·5–2·5 mm altus. *Ovarium* 5 mm longum, 1·2 mm diam., breviter et patenter glanduloso-pubescens; stylus 6 mm, 0·7 mm diam., uti ovarium pubescens; stigma capitatum, stylo vix latius, sulco verticali praeditum. *Fructus* immaturus 25 × 4 mm, cylindricus, leviter curvatus.

Type: Sarawak, Fifth Division, route from Bakelalan to Gunong Murud, above Sungei Konap, c. 1300 m, 23 ix 1967, *Burtt & Martin, B.* 5169 (holo E, iso SAR).

C. horizontalis is certainly allied to the very widespread *C. oblongifolia*; it has the same elongate rather fleshy leaves, similar bracts to the small clustered inflorescence and a superficially similar corolla, but *C. oblongifolia* has a tube which widens gradually from base to mouth.

Cyrtandra hoseana B. L. Burtt, **species nova**

Caulis 15–30 cm altus, simplex, dense appresse sericeus. *Folia* opposita; unum cujusque paris parvum subappressum, c. 2·5 cm longum basi vaginatum; alterum petiolo 4–5 cm longo appresse sericeo suffultum; lamina anguste elliptica, usque ad 35 × 10 cm, apice breviter acuminata, basi attenuata, margine distanter denticulata, utrinque primum fulgenter sericea, demum supra glabra subtus tenuiter appresse sericea; nervi laterales utrinsecus c. 15, ascendentes. *Inflorescentiae* axillares, floribus c. 6 fasciculatis; bracteae exteriores ovatae 2 × 1 cm mox deciduae, interiores 5 mm lanceolatae, pubescentes; pedicelli c. 10 mm. *Calyx* in segmenta 5, 3 mm longa basi 1 mm lata divisus. *Corolla* c. 32 mm longa, extra et ad lobos interne breviter et acute pubescens; tubus 18 mm longus, supra basin 4 mm diam., medio 3 mm diam., ore 8 mm diam.; lobi superiores 5 × 7 mm; labium inferius 12 mm longum; lobi laterales et medianus 6 × 7 mm. *Filamenta* 16 mm supra corollae basin orientia, 3 mm longa; antherae 2 mm longae, loculis basi inflatis, connectivis loculos superantibus cohaerentibus. *Discus* 1 mm altus. *Ovarium* 7 mm longum minute verruculosum, apice glanduloso-piloso-barbatum; stylus 10 mm, glanduloso-pubescens; stigma in lobos laterales 1·5 mm longos divisum. *Fructus* immaturus 3·5 cm longus, siccitate pallide stramineus, laevis.

Type: Sarawak, Fourth Division, Lambir Hills, 5 vii 1962, *Burtt & Woods, B.* 2365 (holo E, iso SAR).

SARAWAK. Fourth Division, Baram district, Mt. Trekan, 600 m, vii 1895, *Hose* 15 (K, BM); Melinau gorge [c. 4° 5′ N, 114° 50′ E] path east of camp, sandstone hillock, 22 vi 1962, *Burtt & Woods, B.* 2212 (E, SAR).

C. hoseana commemorates that redoubtable administrator and naturalist Charles Hose, whose books on Sarawak and its peoples continue to give instruction and pleasure to all who are interested in the country. He was the first to collect this species.

C. hoseana is one of the species of *Cyrtandra* whose leaves are arranged to form a fan, held away from the sandstone bank, the most usual habitat, by the short stem which is often supported by prop roots. Just the same habit is found in the related *C. penduliflora*, but it is found in other affinities as well. A characteristic and beautiful feature of this plant is that the youngest leaf is very densely covered with shining silky hairs and it hangs downwards at the top of the shoot, like a tiny silvery flag. The corolla is cream, flushed palest mauve on the outside of the tube, and marked with two strong orange bars on the lower part of the palate and in the throat.

Cyrtandra impar Kraenzlin (1927, p. 97).

Type: Kalimantan, auf dem Bidang Menabei [c. 0° 35′ S, 112° 30′ E], 26 xii 1924, *Winkler* 1070 (HBG; E).

SARAWAK, First Division. Gunong Berumput, Poi Range, c. 1050 m, *Burtt & Woods, B.* 2811 (E, SAR).

Not previously recorded from Sarawak. The plants formed a clump of stems about 1 m high among granite boulders in a steep gulley. It has remarkably scaly bark, a feature more common in New Guinea than in Bornean species, but also shown by *C. dispar* DC. on the Malay Peninsula.

It seems to be a feature that recurs in various groups and is not indicative of close affinity.

Kraenzlin described the calyx as being split to the base into ligulate segments, but it is clearly bilabiate: an upper member with 3 blunt short teeth and two lower segments free to the base. It thus clearly belongs to the group of *C. trisepala* and *C. multibracteata* and the small white rather translucent corollas confirm this.

Cyrtandra lambirensis B. L. Burtt, **species nova**

Suffrutex, ramis ad 80 cm longis horizontaliter patentibus primum dense et appresse piloso-pubescentibus demum glabratis apicem versus foliatis. *Folia* opposita; unum cujusque paris parvum, lineare, c. 1 cm longum, pilosum, mox deciduum; alterum petiolo c. 7 mm longo suffultum; lamina lineari-oblonga, 18–22 × 2·5–3·5 cm, apice gradatim acuminata basi angustata, utrinque primum fulvo-sericea, supra mox infra tardius glabrata, marginibus distanter denticulatis. *Flores* pauci fasciculati in axillis foliorum delapsorum, pedicellis 4 mm longis fulvo-pilosis suffulti, bracteis parvis pilosis. *Calyx* hirtus, in segmenta 5 linearia 3 mm longa divisus. *Corolla* 15 mm longa; tubus 7 mm longus basi per 3 mm leviter inflata; lobi superiores 1·5 × 3 mm; labium inferius 6 mm; lobi aequales 3 × 4 mm. *Filamenta* 5 mm supra corollae basin orientia, 3 mm longa, glabra, apicem versus demum semel torta; antherae vix 1 mm longae apicibus cohaerentes. *Discus* unilateralis 2 mm longus. *Ovarium* 4 mm, stylus 3 mm longus, utrumque pilis brevibus patulis acutis indutum; stigma capitatum in lobos laterales breviter divisum. *Fructus* 1·5–2 cm longus et 3–4 mm diametro, breviter acuminatus.

Type: Sarawak, Fourth Division, Lambir Hills, on sandstone cliffs, 4 vii 1962, *Burtt & Woods, B.* 2360 (holo E; iso SAR).

Phrases in the above description are very similar to some in the description of *C. horizontalis*, but this does not mean the species are closely allied. It just happens that both have the same general growth form, though *C. horizontalis* is an epiphyte whereas *C. lambirensis* is found on sandstone cliffs. The real affinity of this species is uncertain, but the occurrence of dendrosclereids in its leaves and in the leaves of *C. latens* is interesting as in floral structure they are not very far apart. In leaves and habit, however, they are very different and the affinity cannot be very close.

Cyrtandra latens C. B. Clarke (1883, p. 215)

Type: Sarawak, in monte Gading [1° 44′ N, 109° 50′ E] *Beccari* 2300 (FI) SARAWAK. First Division, Lundu, *Ridley* 12446 (K); *Anderson* 100 (K); Gunong Gading, *Clemens* 22222 (K); *Brooke* 8413 (L); *Purseglove* 4550 (E, SING); *Burtt & Woods, B.* 2673 (E, SAR).

Cyrtandra latens is an erect unbranched plant about 0·5 m high, with axillary clusters of small pale pink flowers; it is the common *Cyrtandra* of the group of hills, Gading, Lundu and Perigi, near Lundu. One specimen was found not far from the foot of Gunong Berumput in the Poi Range, but it was not seen anywhere on the mountain itself. Clarke saw no flowers and only a single small plant. We were, however, able to find one comparable

in size and have no doubts about the identification. *C. latens* does not occur elsewhere in Beccari's collections and he could scarcely have missed it while climbing Gunong Gading.

C. latens is one of the species with dendrosclereids growing down from the hypodermis into the mesophyll and also has much branched astrosclereids in the mesophyll. *C. axillaris* is a very closely allied species and its relationship to *C. latens* is discussed above. It is also doubtful if *C. dajakorum* Kraenzl. is distinct.

C. latens has small pale-pink, sometimes almost white, flowers with 2 lines or a patch of yellow at the base of the palate which becomes stippled brown lower down; the anthers are bent down to the floor of the tube after dehiscence. The details absent from the original description are:—
Calyx 3 mm, 5-toothed, teeth 1·5 × 0·75 mm, narrowly triangular. Corolla 16 mm, very shortly pubescent outside; tube 9 mm, c. 1·5 mm diam. at base widening above the middle to 4 mm at mouth; upper lobes 2 × 3 mm; lower lip 6 mm, lobes 3 × 4 mm. Filaments arising 5 mm above corolla base, 3 mm long, glabrous; anthers 1·25 mm, cohering face to face; lateral staminodes 0·5 mm. Ovary 3 mm, minutely puberulous; style 2·5 mm, strongly puberulous; stigma shallowly bilobed.

Cyrtandra mirabilis C. B. Clarke (1883, p. 283)

Type: Kalimantan, Landak, *Teysmann* 11224 (FI).
SARAWAK. First Division: Gunong Berumput, Poi Range, c. 1050 m, 13 viii 1962, *Burtt & Woods*, *B.* 2809 (E, SAR).

Clarke wrote "*C. ? mirabilis*", showing that he was in some doubt about the genus of this plant, but there is no more reason to doubt its position in *Cyrtandra* than the felicity of Clarke's epithet. The following account, based on field notes, affirms this.

C. mirabilis was found in a steep gulley filled with enormous granite boulders; it grew out horizontally from some of the largest of these in damp, very sheltered hollows. The stem was up to 60 cm long and unbranched: at its base the roots spread out over the surface of the granite like a gigantic spider's-web, 3 ft or more in radius; their attachment was so slight that a tap of the finger was enough to knock the plant away at the centre, and leave it dangling by the peripheral rootlets. The leaves formed a fan at the apex of the stem; the largest hanging downwards were up to 75 × 15 cm, very brittle, mamillate, bright yellowish green above (especially the younger ones) pale and pitted below. Calyx green with glandular hairs. Corolla tube 2·5 cm to lower side of oblique mouth, narrow within the calyx, broadening above; the limb spreading and oblique, c. 3·5 × 4 cm, the largest seen 5 × 5 cm; outside of corolla almost white, lobes palest purple, two yellow bands in throat not reaching to the sinuses.

A young plant brought back to Edinburgh flowered twice in cultivation, though only an inch or two high, but eventually succumbed. *C. impar* was another species growing in the same gully.

Cyrtandra megalocrater Kraenzlin (1927, p. 111)

Syntypes: Kalimantan, am unteren Serawei, *Winkler* 1261; Bukit Mulu, *Winkler* 451, 1215 (all HBG).
SARAWAK. Third Division: south east end of Hose Mts., just north of Bukit

Mabong, on wet rocks and banks in forest, 6 viii 1967, *Burtt & Martin*, *B.* 4827 (E, SAR).

The identification here is open to doubt because Kraenzlin records that the bracts surrounding the inflorescence are white when fresh, pale yellow when dried. In our specimen they were green and herbaceous, but it agrees with *C. megalocrater* in having yellow flowers, a rather unusual feature in *Cyrtandra*.

Cyrtandra multibracteata C. B. Clarke (1883, p. 253)

Type: Sarawak, in colle Bellaga, *Beccari* 3777 (FI).

SARAWAK. Third Division, south eastern end of Hose Mts., Bukit Mabong, 5 viii 1967, *Burtt & Martin*, *B.* 4801 (E, SAR).

C. multibracteata is closely allied to *C. trisepala*. Typically there is no difficulty in distinguishing them: the broadly elliptic leaf of *C. multibracteata* is very different from the narrowly oblong one of *C. trisepala*. There are, however, many plants which do not match closely to either pattern in leaf-form, and these predominate, for instance, in Sabah. The recent collection cited above seems typical.

Cyrtandra oblongifolia (Bl.) C. B. Clarke (1883, p. 206).

Syn.: *Whitia oblongifolia* Blume (1823, p. 17; 1826, p. 774).

Type: Java, *Blume* (L).

Widely distributed in Borneo.

SARAWAK. Sample sheets:—*Clemens* 20538, 21622; *Sarawak Forest Dept.* S. 17635, 19236, 19268, 19896, 21102, 21219, 21619; *Burtt & Woods*, *B.* 1829, 2641; *Hirano & Hotta* 567, 1903; *Beccari* 207.

KALIMANTAN. *Kostermans* 13232; *Endert* 1783.

BRUNEI. *Ashton*, Brun. 3205, 3399.

Apparently absent from Sabah where it is replaced by *C. angularis* (q.v.). This is one of the commonest and most widely distributed species in the southern part of Borneo: it was not seen on the trip to Gunong Murud, on which the related *C. horizontalis* was collected (q.v.). It is apparently the same as the Javanese plant. *C. oblongifolia* may form a shrub up to 2 m high when growing on rather open limestone rocks, but is often a much smaller epiphyte.

Cyrtandra penduliflora Kraenzlin (1927, p. 100)

Type: Kalimantan, Bukit Obat, [1° 20′ N, 113° 15′ E], c. 150 m, 29 i 1925, *Winkler* 1328 (HBG—lectotype).

KALIMANTAN. Bukit Obat, c. 90 m, 31 i 1925, *Winkler* 1399 (HBG—syntype).

SARAWAK. Third Division: Pelagus Rapids on Batang Rejang, *Burtt & Woods*, *B.* 2559 (E, SAR); *Brooke* 8986, 9264 (BM, L); Teneong, *Brooke* 9135 (BM, L); Bah, *Brooke* 9021 (BM, L); Sungei Benar, *Burtt* 2610 (E); Kapit, *Clemens* 21233 (Z). Fourth Division: Bintulu distr., Ulu Sungei Sinonuk, *Hotta* 14247 (E, KYO); Minah Camp, Sungei Kakus, *Hirano & Hotta* 220 (E, KYO); N. Setungan, Ulu Segan, *Ashton* S 22019 (E); Melinau gorge pathway, *Burtt & Woods*, *B.* 2240 (E, SAR).

BRUNEI. Sungei Tongkat, a branch of Sungei Batu-Apoi, Brunei Tembrong, *Hotta* 13759 (E, KYO).

The above selected citations show that *C. penduliflora* is widespread in Sarawak. It has not been found, as yet, in the First Division, where the allied *S. sarawakensis* is not infrequent, but it reaches further north than that species. The two overlap in central Sarawak.

The leaves of *S. penduliflora* are arranged on the short stem so that they form a fan: it often grows on steep forest banks and the stem is supported by prop roots. The youngest leaf is densely covered with dark red shining hairs and hangs down like a small flag (cf. *C. hoseana*). This and the long trailing inflorescence make *C. penduliflora* a very easily recognized species.

Cyrtandra pilosa Blume (1826, p. 770); Backer & Bakhuizen, (1965, p. 528).
Type: Java, in humidis montium Salak, Gede, Seribu etc., *Blume* (L).
JAVA. Mt. Salak, July 1915, *Ridley* s.n. (K).

Backer and Bakhuizen note that no flowers of this species had been seen. The specimen collected by Ridley on Mt. Salak matches well with the sheet marked as the type at Leiden, but it too lacks flowers suitable for dissection. However enough can be seen to confirm that the corolla is large and densely clothed with long hairs on the outside. The stem of the Javanese plant is more slender, the internodes longer, and the bracts of the inflorescence smaller than in most material from Borneo and the Malay Peninsula to which the name has been applied. We need the critical details about the plant on Java before any firm decision about its occurrence elsewhere is possible. It has sclereids in the mesophyll only.

Cyrtandra quinquenotata Kraenzlin (1927, p. 105).
Type: Kalimantan, Bukit Bidang Menabei [c. 0° 35′ S, 112° 30′ E], 700 m, 12 xii 1924, *Winkler* 787 (HBG).

Kraenzlin correctly allied this to *C. gibbsiae* without realizing that the conclusive point of resemblance lies in the possession of vermiform sclereids in the hypodermis of the leaf. *C. elatostemoides* is the third species in this group: the sclereids are easily visible with a hand lens in the dried leaf, but are difficult to see in living specimens. The other species which Kraenzlin mentioned as allies, *C. paxiana* Lauterb. and *C. radiciflora* C. B. Cl., both lack these sclereids and are less closely related.

Cyrtandra radiciflora C. B. Clarke (1883, p. 239, tab. 28)
Type: Sarawak, prope Gading [1° 44′ N, 109° 50′ E], *Beccari* 2318 (FI).
SARAWAK. First Division: Gunong Gading, *Burtt & Woods*, *B.* 2692 (E, SAR); Gunong Berumput, Poi Range, *Burtt & Woods*, *B.* 2754, *B.* 2871 (E, SAR); Sungei China, N end Mt. Matang, *Burtt & Woods*, *B.* 2508 (E, SAR); Bau, Seburan Mine, *Burtt & Woods*, *B.* 1918 (E, SAR); N slopes Bukit Krian, Bau, *Anderson & Ashton* S 20266. Fourth Division: Sungei Melinau, between Camp I and the gorge camp, *Burtt & Woods*, *B.* 2205 (E, SAR).

The flowers are borne at the base of the stem; the corolla is cream with the centre of the three lower lobes blood red. Like other species of the forest floor it is evidently widespread.

Cyrtandra sarawakensis C. B. Clarke (1883, p. 209)

Type. Sarawak, Kuching, Sept. 1865, *Beccari* 153 (FI—lectotype).

SARAWAK. First Division: Kuching, *Beccari* 911, 917 (FI—syntypes); Mt. Matang *Burtt & Woods, B.* 1947 (E), *Brooke* 9461 (L); Gunong Gading, *Burtt & Woods, B.* 2685 (E); Semengoh F. R., *Burtt & Woods, B.* 2487, *Burtt & Martin, B.* 4712 (E, SAR). Third Division: Pelagus Rapids, *Burtt & Woods, B.* 2544 (E, SAR); Sungei Benar, *Burtt* 2609 (E); Melinau community forest near Nanga Tunoh, south-east end Hose Mts., *Burtt & Martin, B.* 4772 (E, SAR); base of Bukit Temedu, Hose Mts., *Ashton* S. 19007 (E, SAR); Bukit Lumut, Ulu Amau, Mujong, Hose Mts. *Ashton* S. 21264 (E, SAR). Fourth Division: Bintulu distr., Bukit Kana, *Hotta* 15480 (E, KYO), *Hirano & Hotta* 1365 (E, KYO).

For a comment on distribution see under *C. penduliflora*. Like that species the leaf dries with a characteristic ripple which seems to be associated with the presence of hypodermal tracheoids.

Cyrtandra schizostyla C. B. Clarke (1883, p. 204).

Type: Sarawak, [Second Division] in colle Sakarang, Oct. 1867, *Beccari* 3842 (FI—lectotype).

SARAWAK. First Division: Kuching, 2 i 1892, *Garai* (*Haviland* 958—SING, K); Gunong Gaharu, *Burtt* 2672 (E). Second Division: Batang Lupar at Marop, ix 1867, *Beccari* 3316 (FI—syntype). Third Division: Ulu Pelagus, Kapit, 19 iv 1963, *Ashton* S. 17775 (SAR, E).

Of the two Beccari numbers cited by Clarke, one is labelled in the herbarium '*exemplum typicum*' and is therefore taken as the lectotype.

The above quoted specimens seem to belong here, but the species is a difficult one because material so far is very poor. It is undoubtedly the focus of a group of allied forms with leaves of characteristic texture, cream flowers with yellow in the throat and laciniate bracts. *C. andersonii*, a distinct species from the Lambir Hills and others belong here.

Cyrtandra splendens C. B. Clarke (1883, p. 209).

Syn.: *C. mamillata* Hallier f. (1898, p. 287, tab. 7, fig. 1).

Type: Sarawak, [First Division] Piningiao, 360 m, xi 1865, *Beccari* 947 (FI—lectotype).

Widely distributed in Sarawak and in Kalimantan but not represented in the material at present before me from Sabah. The following selection of numbered sheets may be cited:—*Sarawak Forest Dept.* S. 8319, S. 16341, S. 18236, S. 22696, S. 22699; *Hotta* 15365; *Singapore Field No.* 38473; *Clemens* 20089; *Brooke* 9054, 9090, 9253; *Burtt & Woods, B.* 1894, 1971A, 2132, 2164, 2686, 2810.

The species is variable in leaf colour, pure green, variously tinged red or purple to dark red above blood red below. The flowers are normally "white with irregular pale blood-red markings on each lobe" (*B. & W.* 1894). At the Pelagus Rapids there is a very striking form (*B. & W.* 2584, *Brooke* 8987) which was at first taken for a distinct species. It has the whole flower bright red and the calyx segments finer and longer than in the type. However study of further material has suggested that these two characters do not necessarily go together. For the time being, therefore, this form is left under *C. splen-*

dens: should it prove to have a wider distribution some form of recognition may be necessary.

Clarke's original description, from pressed material, referred to the upper leaf surface as hispid with "pilis basi conico-incrassatis". In fact each hair terminates a pinnacle of tissue that has been thrown up leaving a hollow below: thus the upper leaf surface is remarkably mamillate while the underside shows a set of corresponding invaginations. There are no foliar sclereids either in *C. splendens* or in *C. mirabilis*, another species with a similar leaf surface, nor indeed in other species which are merely bullate between the veins.

Cyrtandra subgrandis B. L. Burtt, **nom. nov.**

Syn.: *C. grandis* Kraenzlin (1927, p. 110)—non Bl. (1826).

Type: Kalimantan, Bukit Obat, [c. 1° 5′ N, 113° 30′ E], 90 m, 31 i 1925, *Winkler* 1401 (HBG).

SARAWAK. Third Division: Rejang River, Kapit, *Haviland* 585 (K), *Clemens* 21232 (K); Gaat, *Clemens* 21618 (K); Sungei Benar, *Burtt* 2630 (E, SAR); southern end Hose Mts., *Burtt & Martin*, *B.* 4812, 4840, 4905, 4958, 5000 (E, SAR). Fourth Division: Ulu Sungei Bejangung, east part of Bukit Kana, *Hotta* 15413.

In renaming *C. grandis* Kraenzlin non Blume I have endeavoured to retain some continuity with the previous epithet: the slight loss of stature involved is no more than this rather humdrum species deserves. I believe this to be a species distinct from *C. erectipila*, which has more rounded leaves with soft erect hairs on the upper surface and represents a distinct and easily recognized entity in the field.

C. subgrandis is close in leaf form to *C. gitingensis* Elmer, from the island of Sibuyan in the central Philippines. However Elmer says of that species "stem . . . yellowish green, heavy and watery, sparingly branched, 1 to 2 m long, reclining and taking root towards the base". The stems of *C. subgrandis* are woody, stiffly erect right from the base; the leaves too are stiff and ascending in *C. subgrandis*, "limp and gracefully recurved" in *C. gitingensis*.

This species seems to be a common one in the Rejang basin, the Third Division. Although usually about 1–1·5 m in height, I found one plant growing in a river bed through moss-forest at 5,000 ft in the Ulu Melinau, at the south east end of the Hose Mts. (*Burtt & Martin*, *B.* 5000) which was 2·5 m high: a long slender woody stem 2 cm in diameter, bare except for a tuft of leaves at the top. The amount of colouring on the flowers seems to vary considerably: sometimes there was only some speckling round the mouth, at others the whole of the inside of the lobes was closely dotted dull purple. Although this species clearly deserves recognition its limits are somewhat uncertain and some of the herbarium material is difficult to determine with confidence.

Cyrtandra trisepala C. B. Clarke (1883, p. 253, tab. 29).

Type: Sarawak [First Division], in monte Gading, *Beccari* 2452 (lecto FI, iso K).

SARAWAK. First Division, between Gunong Gading and Gunong Perigi, in valley, *Burtt & Woods*, *B.* 2709 (E, SAR).

C. B. Clarke also cited *Teysmann* 11347, 11349 from Pontianak in SW Kalimantan. In the herbarium *Beccari* 2452 is marked '*exemplum typicum*' and it was this sheet that formed the basis for the illustration. I therefore take it as lectotype.

C. trisepala seems to be a very variable species, grading perhaps into *C. multibracteata*. Until its limits have been critically investigated I prefer to cite only the one recent collecting, from the *locus classicus*. The field notes read: "On rock in streambed. Much branched. One leaf stipular. Flower greenish-white, semi-translucent, floor of tube red to base. Stamens with red glands and pouch between dorsal corolla lobes (where anthers are held) lined with red hairs".

I think that *C. producta* Kraenzlin (1927, p. 95) will prove to be a synonym of typical *C. trisepala*.

Cyrtandra velutina C. B. Clarke (1883, p. 208)

Type: Borneo, *Korthals* 248 (lecto L).

As Clarke took up the name *C. velutina* from Korthals, it seems that this specimen (rather than *Motley* 1223—K) should be taken as lectotype. At first it was thought that *C. lambirensis* might be of this affinity, but the long slender fruit and the thinner leaves, which altogether lack sclereids, show this idea to be false. Only two of four sheets at Leiden are numbered 248 and one of these bears Clarke's ticket: this must be the type sheet. It is not localised, but the names Gunong Pamatton and Gunong Sahoambang are on the unnumbered sheets. I have not seen the specimen (*Hubert Winkler* 2368) recorded as this species by Lauterbach (1910, p. 538), but it too lacked developed flowers.

Cyrtandra warburgiana Lauterbach (1910, p. 540)

Syn.: *C. campanulata* Merrill (1929, p. 270)—non Reinecke (1898).

Type: Kalimantan, zwischen Salinahu und Simpokak [c. 1° 50′ S, 115° 50′ E], 15 vii 1908, *Winkler* 2987 (iso L, BM).

SABAH. Tawao, *Elmer* 20867 (K, L—iso *C. campanulata* Merr.). Mt. Kinabalu, eastern shoulder [6° 05′ N, 116° 36–40′ E), 1050 m, 18 vi 1961, *RSNB* 640 (K, E).

SARAWAK. Fifth Division: Maputi, 2 days upriver from Lawas towards N Borneo, 28 vi 1955, *Brooke* 10166 (BM, L); Bakelalan, 900 m, 12 viii 1955, *Brooke* 10351 (BM, L); between Long Ugong and Long Semadoh, wet forest slopes, variegated leaves, large white cupule low down on stem, 18 x 1967, *Burtt* 5564 (E, SAR).

KALIMANTAN. W Koetai: no. 9 near Mt. Antjaloeng, 15 m, 18 vii 1925, *Endert* 2115 (L).

The presence of short brown bristles on both inside and outside of the involucre contradicts Lauterbach's statement that it is glabrous on both surfaces. Examination of the isotype at Leiden shows that he was mistaken in this, and these hairs are also found in the other material examined. Lauterbach's measurement of 8 mm for the calyx should be at least doubled. The calyx in this species is membranous and completely covers the young bud. For a time it grows with the corolla, to a length of about 10–12 mm, and then the latter bursts through: only a fully expanded flower will show a fully developed calyx. In this character it differs from *C. burbidgei*, in

which the more robust calyx shows little continuity of growth and fails to enclose the corolla beyond the 3–4 mm stage.

A fully developed intact corolla has not been available to any of the botanists who have studied this species, and there were none in the population found in 1967 (*B.* 5564). Merrill makes no attempt to describe floral characters at all, passing straight from the involucre to the fruit. However a young flower was found on an isotype of his species (*Elmer* 20867, K) and showed the calyx 16 mm and the delicate corolla, not yet open, nearly 30 mm long. This fits well with Lauterbach's description, but suggests that the fully developed corolla is something distinctly longer. If we assume that the mouth of the corolla should reach to the level of the top of the involucre, the tube alone would be about 3 cm long.

As evidenced by the specimens collected between Long Ugong and Long Semado (*B.* 5564) this species has astrosclereids in the mesophyll, no sclereids in the hypodermis (pattern VI in preceding paper).

Cyrtandra woodsii B. L. Burtt, **species nova**

Caules erecti ad 75 cm e basi repente, dense appresse brunneo-pubescentes internodiis 4–7 cm longis. *Folia* petiolis 3–4 cm longis pubescentibus suffulta; lamina elliptica, c. 10–14 × 4–6 cm, apice acuminata, basi angustata, margine serrata, supra primum setoso-pilosa demum glabrescens, subtus tenuiter tomentoso-pubescens; nervi laterales utrinsecus 6–7, supra inconspicui, subtus prominentes et fusci. *Inflorescentiae* axillares, subsessiles, 2–3-florae bracteis connatis atropurpureis pubescentibus 15 mm longis cinctae. *Calyx* 1·5 cm longus, tenuis, extra longe brunneo-setosus, segmentis apicibus cohaerentibus cornu formantibus, demum irregulariter ruptus. *Corolla* 40–50 mm longa, ochroleuca, extra longe pilosa; tubus inferne per 10 mm cylindricus superne subito ampliatus per 18 mm, ore c. 12 mm diam; labium superius 10 mm longum, ad 3 mm tantum bilobatum, lobis triangularibus basi 5 mm latis; labium inferius lobis subaequalibus c. 10 × 8 mm. *Stamina* 10 mm supra corollae basi orientia; filamenta per 5 mm basalia ad tubum membrana connecta, medio incrassata, superne 8 mm libera demum spiraliter torta; antherae vix 3 mm longae; staminodia lateralia 5 mm. *Discus* 1·5 mm. *Ovarium* subglabrum 3–4 mm in stylum basi pilosum superne patenter glanduloso-pubescentem 25 mm longum transeuns; stigma transversale ovale 3 mm. *Fructus* 25 × 7 mm breviter acuminatus.

Type: Sarawak, Third Division, Pelagus Rapids on Batang Rejang, 21 vii 1962, *Burtt & Woods*, *B.* 2579 (holo E, iso SAR).

SARAWAK. Third Division: Gilam Bakum rapids, above Bellaga, *Brooke* 9088 (L); Sungei Melinau, Rumah Ungka, *Burtt & Martin*, *B.* 4762 (E, SAR); south end Hose Mts., Bukit Mabong, *Burtt & Martin*, *B.* 4809 (E, SAR). Fourth Division: Sana, Sungei Tau, *Purseglove* 5110 (E, K, L, SING), 5139 (E, K, L, SING); Ulu Mayane, Kakus, *Sibat ak Luang*, S. 21850 (E, SAR); Melinau gorge, c. 4° 5′ N, 114° 50′ E, *Burtt & Woods*, *B.* 2234 (E, SAR).

This species is named as a tribute to the hard work, good companionship and photography of P. J. B. Woods, my colleague in Sarawak in 1962. It is clearly a fairly widespread species on damp forest slopes.

The behaviour of the calyx is noteworthy. The tips of the segments cohere to form a short horn; the texture of the calyx is quite thin and when it is

full grown (c. 1·5 cm long) the developing corolla bud breaks through it. This may result in the calyx splitting into two lips, but more often the segments remain united at their tips and the calyx is ruptured irregularly. The strongly developed knee-like swelling in the middle of the filament is orange, flecked with red; from this point the filaments rise sharply so that the anthers are held in a small pouch between the bases of the upper corolla lobes. After the anthers have dehisced the upper part of the filament coils, pulling the anthers down to the floor of the corolla.

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