

THE GENUS *CYRTANDRA* (*GESNERIACEAE*) IN PALAWAN, PHILIPPINES

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Collections of *Cyrtandra* from the island of Palawan in the Philippines are reviewed. Twelve species are present, of which only five species are already described. A further three species and one variety are described here: *C. cleopatrae* H.J. Atkins & Cronk *sp. nov.*, *C. pulgarensis* [Elmer ex] H.J. Atkins & Cronk *sp. nov.*, *C. hirtigera* H.J. Atkins & Cronk *sp. nov.*, and *C. hirtigera* var. *chlorina* H.J. Atkins & Cronk var. *nov.* Further material of the remaining four taxa (spp. B, C, D, E) will be needed before these can be formally named, although descriptions are provided here. All species are endemic except *C. elatostemoides* Elmer and *C. hypochrysoides* Kränzl., which also occur in Borneo and Luzon respectively. The pattern of narrow endemism shown by the *cyrtandras* of Palawan is commented on briefly.

Keywords. Local endemism, new species, new variety, sclereids, SE Asia.

INTRODUCTION

Cyrtandra J.R. Forster & G. Forster (*Gesneriaceae*) is a large genus of some 500–600 species of woody herbs, subshrubs (terrestrial or epiphytic) and, rarely, climbers. It is found from the Nicobar Islands in the Indian Ocean, throughout Malesia, in Taiwan, south-east to Queensland and east to the high islands of the Pacific and Hawaii. It reaches its most easterly position on the Marquesas Islands in French Polynesia. Its centres of diversity are New Guinea and Borneo (each with over 150 species) and the Philippines (over 80 species).

Since the genus was first described (Forster & Forster, 1776), there has been only one account of it across its full geographic range. This was attempted by C. B. Clarke (1883) who, using scant material, described a total of 167 species. Since then, various regional accounts have appeared, most notably of the *cyrtandras* of Peninsular Malaysia by Ridley (1905), those of New Guinea by Schlechter (1923), those of the Pacific *cyrtandras* by Gillett (1973a,b, 1975a,b), those of Fiji by A. C. Smith (1991), and those of Hawaii by Wagner *et al.* (1990). No one has attempted to revise the whole genus again, and its sheer size and the high numbers of local endemics would make this a somewhat onerous task.

The *cyrtandras* of the Philippines, including Palawan, are not well known. A few early collections were made in the Philippines at the end of the 19th century. No collections from Palawan, the most westerly of the Philippine islands, were known

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at that time. At the beginning of the 20th century two American botanists, Elmer Drew Merrill (1876–1956) and Adolph Daniel Edward Elmer (1870–1942), carried out extensive fieldwork in the Philippines. By 1915 most of the main islands in the archipelago had been subject to some intensive collecting (Merrill, 1915). As a result of this our knowledge and collections of *Cyrtandra* from this region expanded greatly. At the end of his period in the Philippines, Merrill (1923) produced his *Enumeration of Philippine Plants*. In this, some 83 species of *Cyrtandra* are described, including six from Palawan. No new species have been described from Palawan since the 1920s. However, during the 1980s and 1990s the Philippine Plant Inventory (PPI) project has generated further collections of *Cyrtandra* from throughout the Philippines, including Palawan.

One of the most significant features of this genus throughout its range is the occurrence of high numbers of local endemics. Despite the almost continuous distribution of the genus there are relatively few examples of widespread *Cyrtandra* species and many examples of species unique to one region, one archipelago and even one island. Hillebrand (1888) comments on the ‘extraordinary polymorphism’ of the Hawaiian *Cyrtandra* species thus: ‘no single form extends over the whole group, and not many are common to more than one island’. Wagner *et al.* (1990) also remarked on the ‘extensive polymorphism’ of the genus on Hawaii, ‘often within a very limited geographical area’.

This general pattern is also found in the Philippines. Of the twelve known Palawan species, only two have been collected from elsewhere: *C. elatostemoides* from Borneo and Palawan and *C. hypochrysoides* reputedly collected from both Palawan and Luzon, although no specimens of this species have been seen. Most of the Palawan species appear to have affinities with species from other islands in the Philippines with the exception of two species, including *C. elatostemoides*, which have affinities with Borneo (Atkins *et al.*, 2001).

In the following key and descriptions:

- i. All leaves are treated as mature unless specified otherwise.
- ii. The term ‘hairy’ indicates that the surface (of the leaf, petiole, calyx) has a significant covering of hairs but that it is not obscured; ‘densely hairy’ indicates that the covering of hairs is so dense that the surface itself is obscured.
- iii. The term ‘distantly serrulate’ is used to describe the leaf margin when the density of teeth is less than one per cm.
- iv. The term ‘apparently alternate’ has been used to describe a situation where complete abscission of the smaller leaf of a pair on an anisophyllous plant occurs apparently at a very early stage in its development. None, or very few, of the smaller leaves remain. The plant appears to have alternate leaves. On closer inspection tiny scars where the smaller leaves were attached can be seen.
- v. Absolute measurements are given for fruit length and width (dry material) in the descriptions, although the stage of maturity of the fruits on the herbarium

specimens is not always known. These measurements should therefore be treated with some caution. Floral measurements are taken from spirit material.

Sclereid characters are included in the descriptions. The presence, distribution and type of foliar sclereids have been shown to vary significantly in *Cyrtandra*, and their potential utility as taxonomic characters has been shown (Bokhari, 1970; Burt & Bokhari, 1973). The sclereid terminology and anatomical methods used here follow that used in those papers. The conspicuous epidermal sclereids of *C. elatostemoides* may be seen with a $\times 10$ hand lens and are a character used in the key.

All *Cyrtandra* species on Palawan are found in the same general habitat: on steep slopes, often in gulleys, in rain forest. For this reason, habitat information is not recorded separately for each species. The unnamed species are lettered B–E rather than A–D to be consistent with Atkins *et al.* (2001). These taxa are not formally named here as there is insufficient material for complete descriptions.

The little-known species *C. hypochrysoides* is excluded from the key as no specimens have been seen. It is, however, very distinctive, characterized by its large, anisophyllous leaves (c.22 \times 6cm, the larger; c.11 \times 4.5cm, the smaller) and its dense golden-reddish or reddish-brown indumentum. A brief description is included at the end of the account.

KEYS AND DESCRIPTIONS

Cyrtandra J.R. Forster & J.G.A. Forster, Charact. Gen. 5 (1776).

Herbs or shrubs. *Stems* rounded to angular, hairy (with uniseriate eglandular hairs) or glabrate. *Leaves* simple, opposite, sometimes appearing alternate, both leaves of a pair similar in size (isophyllous) or one leaf of a pair markedly reduced (anisophyllous), petiolate, hairy to glabrous above, often more densely hairy below especially on prominent veins and midrib, leaf bases occasionally markedly oblique, occasionally decurrent. *Inflorescence* in cymes, solitary or paired; pedunculate or sessile. *Flowers* one to numerous, usually in the upper leaf axils, sometimes at the base of stems. *Peduncle* with minute to large, sometimes connate, bracts. *Calyx* 5-lobed, deciduous or persistent in fruit. *Corolla* bilabiate or lobes subequal, usually white, sometimes yellowish-green, orange or lilac, sometimes with distinctive markings on lobes and throat. *Stamens* 2. *Staminodes* 2, usually inserted about halfway up corolla tube. *Ovary* superior, hairy or glabrous. *Stigma* bilobed. *Fruit* ovoid, ellipsoid, fusiform, conical or cylindrical, often tipped by a persistent style. *Seeds* numerous, ellipsoid.

The description above covers those species found in Palawan and adjacent areas only. *Cyrtandra* is represented on Palawan by the twelve species below.

Key to Cyrtandra in Palawan

- 1a. Leaves opposite and markedly anisophyllous or leaves apparently alternate 2
 1b. Leaves opposite and isophyllous _____ 7
- 2a. Leaf blade obovate; vermiform sclereids visible on the upper surface of leaves (with a $\times 10$ hand lens); unbranched rhizomatous herb – **1. C. elatostemoides**
 2b. Leaf blade elliptic or oblanceolate; vermiform sclereids not visible in the upper surface of leaves (with a $\times 10$ hand lens); branching shrub or non-rhizomatous herb _____ 3
- 3a. Inflorescence usually in axils of fallen leaves towards base of stem; leaves with 11–13 pairs of lateral veins; leaves apparently alternate ____ **11. C. sp. E**
 3b. Inflorescence usually in upper leaf axils; leaves with 6–11 pairs of lateral veins; leaves alternate or opposite and markedly anisophyllous _____ 4
- 4a. Leaf blade oblanceolate; calyx whitish; inflorescence 4–many-flowered; leaves apparently alternate _____ **8. C. sp. B**
 4b. Leaf blade elliptic; calyx green; inflorescence 1–3-flowered; leaves opposite and markedly anisophyllous _____ 5
- 5a. Shrub; upper surface of leaf hairy; calyx less than 1cm long overall, densely hairy externally; mature petioles densely hairy _____ **2. C. inaequifolia**
 5b. Herb; upper surface of leaf glabrous or sparsely hairy; calyx over 1cm long overall, glabrous externally; mature petioles glabrous or sparsely hairy ____ 6
- 6a. Stems branched; leaf bases not decurrent; corolla white with no markings; fruits fusiform _____ **4. C. rupicola**
 6b. Stems unbranched; leaf bases decurrent; corolla white suffused pink with yellow markings on throat; fruits ovoid _____ **3. C. livida**
- 7a. Leaf blade broadly elliptic, over 22cm long and 15cm wide, upper surface of mature leaf hairy; petiole over 5cm long _____ **7. C. hirtigera**
 7b. Leaf blade elliptic, obovate or oblanceolate, less than 22cm long and 8cm wide, upper surface of mature leaf glabrous or sparsely hairy; petiole less than 4cm long _____ 8
- 8a. Leaf blade obovate, lower surface glabrous, base decurrent; inflorescence bracts connate and glabrous; fruits cylindric _____ **10. C. sp. D**
 8b. Leaf blade elliptic, lower surface sparsely hairy or hairy, base not decurrent; inflorescence bracts free and hairy or sparsely hairy; fruits fusiform or ovoid _____ 9
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- 9a. Inflorescence subsessile, 1–3-flowered, usually in axils of fallen leaves towards base of stem _____ **9. C. sp. C**

- 9b. Inflorescence pedunculate, 4–many-flowered, in upper leaf axils _____ 10
 10a. Herb; calyx green shading to lilac at distal end, sparsely hairy, fused for less than half length; corolla lilac _____ **6. C. cleopatrae**
 10b. Shrub; calyx whitish, glabrous, fused for more than half length; corolla white _____ **5. C. pulgarensis**

1. *Cyrtandra elatostemoides* Elmer in Leafl. Philipp. Bot. 5: 1781 (1913) [as ‘elatostemmoides’; later corrected to ‘elatostemoides’ by Elmer in errata]; Merrill, Enum. Philipp. Fl. Pl.: 458 (1923). Type: Palawan, Mt Pulgar, v 1911, *Elmer* 13207 (iso. E!). Syn.: *Cyrtandra kraenzlinii* Merrill in Philipp. J. Sci. Bot. 10: 76 (1915) [‘*kränzlinii*’]. Type: Palawan, Malampaya Bay, Binaloan, ix 1910, *Merrill* 7247 (iso. E!).

Unbranched rhizomatous herb, to 50cm with dark brown-fuscous indumentum throughout, hairs coarse and patent; young stems densely hairy, mature stems hairy. *Leaves* opposite, anisophyllous, tending to be in one plane; petiole of large leaf (of pair) 0.5–1.5cm long, densely hairy; leaf blade obovate, 7–12 × 4–6cm, obtuse at apex, cuneate at base, markedly oblique in some cases, not decurrent, upper surface sparsely hairy, no hair bases markedly swollen, midrib and veins more densely hairy than rest of upper surface, lower surface hairy beneath, midrib and veins prominent beneath and more densely hairy than rest of upper surface, 6–8 lateral veins, hypodermis present, 1–2-layered, vermiform sclereids present in hypodermis, visible in upper surface of leaves (with a ×10 hand lens), polymorphic sclereids present in mesophyll, margins serrulate with hairs present on teeth; petiole of small leaf of pair up to 0.5cm long, leaf blade ovate, 1.5–2cm long, 1–2cm wide, hairy above. *Inflorescence* axillary, usually in axils of fallen leaves towards base of stem, pedunculate, 1–3-flowered. *Peduncle* 3–5mm long, hairy. *Bracts* not seen. *Bracteoles* not seen. *Pedicels* 1–2cm long, hairy. *Calyx* green, externally hairy, 1–1.5cm long overall, fused for more than half length, lobes 6–8mm long, narrowly acuminate at apex. *Corolla* externally white with eglandular hairs, internally with sessile glands and yellow markings on lip and throat, 2–4.5cm long overall; mouth 1–1.5cm wide, lobes bilabiate, spreading. *Stamens* attached 5–6mm from base of corolla, c.12mm long, glandular hairy; anthers c.3mm long, cohering at tips, at right-angles to filaments. *Staminodes* attached up to 1cm from base of corolla. *Ovary* not seen. *Style* up to 1cm long with eglandular hairs. *Fruits* cylindric, c.2cm × 3mm, glabrous, calyx and style persistent.

Distribution. Philippines (Palawan), Borneo (Sabah); 400–800m.

Additional specimens seen. PALAWAN. Mt Pulgar, v 1911, *Elmer* 13207 (E); Mt Mantalingajan, iv 1929, *Edaño* 77560 (GH); Mt Turabi, 5 xiii 1947, *Ebalo & Conklin* 1297 (GH); Thumb Peak, 28 i 1998, *Cronk et al.* 25498 (E, K, L, PNH).

BORNEO (Sabah). Mt Kinabalu, v 1961, *Chew, Corner & Stainton* 105 (E).

Cyrtandra elatostemoides was described by Elmer (1913) from a collection made on Mount Pulgar in Palawan. Since then, it has also been collected from Mount Kinabalu in Sabah. There are no discernible differences between the specimens seen

from Palawan and Borneo. The affinities of this species appear to lie with *C. gibbsiae* S. Moore, another Sabahian species, rather than with other Palawan *Cyrtandra*. *Cyrtandra elatostemoides* and *C. gibbsiae* share the same unusual sclereid pattern of vermiform sclereids in the hypodermis and polymorphic sclereids in the spongy mesophyll (Pattern I – Bokhari, 1971). This sclereid pattern has not been found in any other species yet seen from Palawan. The occurrence of this species in Borneo and Palawan is very interesting and is discussed in greater depth in Atkins *et al.* (2001).

2. *Cyrtandra inaequifolia* Elmer in Leaflet. Philipp. Bot. 5: 1782 (1913); Merrill, Enum. Philipp. Fl. Pl.: 460 (1923). Type: Palawan, Mt Pulgar, iv 1911, *Elmer* 13092 (iso. E!).

Branched shrub, 1–1.5m, with pale or whitish indumentum throughout, hairs coarse and patent; young stems hairy, mature stems glabrous. *Leaves* opposite, anisophyllous; petiole of large leaf of pair 0.5–1.5cm long, densely hairy, blade narrowly elliptic, 6.5–14 × 2.5–4cm, acuminate at apex, attenuate at base, markedly oblique in some cases, not decurrent, upper surface hairy, the bases of some hairs markedly swollen, midrib and veins more densely hairy than rest of upper surface, lower surface hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 7–11 pairs of lateral veins, hypodermis absent, sclereids absent from mesophyll, margins serrulate with hairs on teeth; petiole of small leaf of pair up to 0.5cm long, blade elliptic, 1.5–2 × 1–1.5cm, hairy above. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 1–2-flowered. *Peduncle* 1–2mm long. *Bracts* free, c.5 × 5mm, hairy. *Bracteoles* up to 5mm long. *Pedicels* 1–2mm long, densely hairy. *Calyx* green, externally densely hairy, up to 1cm long overall, fused for half or more of length; lobes up to 5mm long, acute at apex. *Corolla* externally white with eglandular hairs, internally with stalked glandular hairs and purple and yellow markings on upper lobes and lip, up to 1.5cm long overall; mouth 5–6mm wide, lobes subequal, spreading. *Stamens* attached 5–6mm from base of corolla, less than 1cm in length, with eglandular hairs; anthers c.1mm long, cohering at tips, parallel. *Staminodes* attached up to 1cm from base of corolla, up to 5mm long. *Ovary* 2–3mm long, glabrous. *Style* up to 5mm long, with glandular hairs. *Fruits* green when collected, ovoid, c.1cm × 5mm, glabrous, the inflorescence bracts, calyx and style persistent.

Distribution. Philippines (Palawan – endemic); 400–1000m.

Additional specimens seen. PALAWAN. Mt Pulgar, iv 1911, *Elmer* 13092 (E!); Cleopatra's Needle, 21 i 1998, *Cronk et al.* 25414 (E, PNH); Thumb Peak, 28 i 1998, *Cronk et al.* 25499 (E, PNH).

This distinct species was first described by Elmer in 1913. It is possible that its affinities lie with *C. livida* Kränzl. Both have markedly anisophyllous, thin, 'papery' leaves lacking both hypodermis and sclereids and typically single, white flowers. They are, however, very different in habit, *C. inaequifolia* being a branching shrub up to 1.5m in height and *C. livida* a small herb reaching no more than 50cm in

height. *Cyrtandra inaequifolia* has not been recorded from anywhere else in the Philippines or from Borneo.

3. *Cyrtandra livida* Kränzl. in Philipp. J. Sci. Bot. 8 (5): 322 (1913); Merrill, Enum. Philipp. Fl. Pl.: 461 (1923). Type: Palawan, *Foxworthy* Bur. Sci. 781 (n.v.).

Unbranched herb, up to 50cm, with pale or whitish indumentum throughout, hairs fine and woolly; young stems sparsely hairy, mature stems glabrous. *Leaves* opposite, anisophyllous; petioles of large leaf of pair 1–1.5cm long, glabrous, blade narrowly elliptic or elliptic, 6–14(–19) × (2–)4–7cm, acuminate at apex, attenuate at base, not markedly oblique, decurrent, upper surface sparsely hairy, midrib and veins more densely hairy than rest of upper surface, lower surface sparsely hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 7 pairs of lateral veins, hypodermis absent, sclereids absent from mesophyll, margins serrate or crenate, with hairs on teeth; petioles of small leaf of pair 0.5–1cm long, blade elliptic, 3–6 × 1–3cm, sparsely hairy above. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 1–3-flowered. *Peduncle* 3–4mm long, glabrous. *Bracts* not connate, apex obtuse, c.1cm × 2–3mm, glabrous. *Bracteoles* not seen. *Pedicels* 1–1.5cm long, sparsely hairy. *Calyx* green, externally more or less glabrous with a few hairs at apex, c.1.5cm long overall, fused for half or more of length; lobes up to 5mm long, narrowly acuminate at apex. *Corolla* externally white suffused pink with eglandular hairs, internally glabrous with yellow markings on throat, c.3cm long overall; mouth 1–1.2cm wide, lobes bilabiate, spreading. *Stamens* c.2.5cm long; anthers cohering at tips, parallel. *Staminodes* not seen. *Ovary* not seen. *Style* c.2cm long. *Fruits* ovoid, c.1cm × 5mm, glabrous, the inflorescence bracts and calyx not persistent, style persistent.

Distribution. Philippines (Palawan); 200m.

Additional specimens seen. PALAWAN. Mt Gantung, v 1929, *Edaño* 77268 (GH); Babuyan, 5 v 1947, *Edaño* 112 (GH); St Paul's Bay, 6 v 1984, *Dransfield* SMH1 (K).

No collections of this species have been recorded from elsewhere.

4. *Cyrtandra rupicola* Elmer in Leaf. Philipp. Bot. 5: 1784 (1913); Merrill, Enum. Philipp. Fl. Pl.: 464 (1923). Type: Palawan, Mt Pulgar, v 1911, *Elmer* 13213 (iso. E!).

Branched semiwoody herb, with pale or whitish indumentum throughout, hairs coarse and patent; young stems hairy, mature stems glabrous. *Leaves* opposite, anisophyllous; petiole of large leaf of pair 1–1.5cm long, sparsely hairy, blade of larger leaf of pair elliptic, 4–8 × 2–4cm, obtuse or acute at apex, cuneate at base, not markedly oblique, not decurrent, upper surface glabrous, midrib and veins not more densely hairy than rest of upper surface, lower surface sparsely hairy, midrib and veins more densely hairy than rest of lower surface, with up to 11 pairs of lateral veins, hypodermis present, 1-layered, sclereids absent from hypodermis and mesophyll, margins serrulate, no hairs on teeth; petiole of small leaf of pair up to 0.5cm

long, blade elliptic, 1–1.5 × c.1cm, sparsely hairy above. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 1–2-flowered. *Peduncle* 3–4mm long, glabrous. *Bracts* not connate, c.1 × 1cm, sparsely hairy. *Bracteoles* not seen. *Pedicels* 3–4mm long. *Calyx* green, externally glabrous, 1–1.5cm long overall, fused for half or more of length; lobes up to 5mm long, acute at apex. *Corolla* externally white with eglandular hairs, 2–2.2cm long overall, lobes subequal, spreading. *Stamens* glabrous; anthers c.2mm long. *Ovary* not seen. *Fruits* fusiform, c.1cm × 5mm, the inflorescence bracts persistent, calyx and style not persistent.

Distribution. Philippines (Palawan – endemic); altitude not recorded.

The isotype at E does not include fruits or flowers. Floral and fruit characters included in the description are based on Elmer (1913).

5. *Cyrtandra pulgarensis* [Elmer ex] H.J. Atkins & Cronk, sp. nov.

In fructibus fasciculatis et fusiformibus nigris ubi siccis, caulibus glabris, sepalis plus dimidio unitis, distinguitur.

Type: Palawan, Mt Pulgar, v 1911, *Elmer* 13204 (holo. E!).

Branched shrub, up to 2–2.5m, with reddish-brown indumentum throughout, hairs fine and woolly or fine and silky; young stems hairy, mature stems glabrous. *Leaves* opposite, isophyllous; petiole 0.5–1.5cm long, sparsely hairy, blade elliptic, 10–14(–18) × 4–6cm, acuminate at apex, cuneate at base, not markedly oblique, not decurrent, upper surface sparsely hairy, midrib and veins not more densely hairy than rest of upper surface, lower surface sparsely hairy, midrib and veins more densely hairy than rest of lower surface, with 6–8 pairs of lateral veins, hypodermis present, 2-layered, sclereids absent from hypodermis, polymorphic sclereids present in mesophyll or sclereids absent from mesophyll, margins serrate with no hairs on teeth. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 4- to many-flowered. *Peduncle* 1–1.5cm long and sparsely hairy. *Bracts* not connate, 1–1.5 × c.1cm, sparsely hairy. *Bracteoles* up to 5mm long. *Pedicels* less than 5mm long, sparsely hairy. *Calyx* whitish, externally glabrous, 1–1.5cm long overall, fused for half or more of length; lobes 7–8mm long, acute at apex. *Corolla* externally white with eglandular hairs, internally with short glandular hairs, c.1.5cm long overall; mouth c.0.5cm wide, lobes slightly bilabiate, spreading. *Stamens* not seen. *Ovary* 2–3mm long, glabrous. *Style* up to 5mm long, with glandular hairs. *Fruits* fusiform, c.1cm × 5mm wide, glabrous, the inflorescence bracts and calyx not persistent, style persistent.

Distribution. Philippines (Palawan – endemic); 1200m.

Additional specimens seen. PALAWAN. Mt Pulgar, v 1911, *Elmer* 13205 (E); Thumb Peak, 30 i 1998, *Cronk et al.* 25522 (E, PNH).

Two collections were made by Elmer in 1911 and distributed by him under the name *C. pulgarensis*. This name was not subsequently published although other collections made by Elmer of new species on the same field trip, such as *C. inaequifolia*,

C. rupicola and *C. elatostemoides*, were published in *Leaflets of Philippine Botany* in 1913. It is not clear why Elmer did not also publish *C. pulgarensis* as this is certainly a distinct species. We here resurrect and validate Elmer's original herbarium name of *C. pulgarensis* for this species.

6. *Cyrtandra cleopatrae* H.J. Atkins & Cronk, sp. nov.

Ab indumento aureorubro et floribus lilacinis distinguitur.

Type: Palawan, Cleopatra's Needle, 22 i 1998, Cronk *et al.* 25437A (holo. PNH!, iso. K, L, E!).

[*Cyrtandra* sp. A; Atkins *et al.* (2001)].

Unbranched herb, 1–1.5m, with golden-reddish indumentum throughout, hairs fine and woolly; young stems densely hairy, mature stems hairy. *Leaves* opposite, isophyllous; petioles 2.5–4cm long, densely hairy; blade elliptic, 12–16 × 3–6cm, acuminate at apex, cuneate at base, not markedly oblique, not decurrent, upper surface glabrous, midrib and veins slightly hairy, lower surface hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 8–10 pairs of lateral veins, hypodermis present, 1-layered, sclereids absent from hypodermis and mesophyll, margins serrulate, with hairs on teeth. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 4- to many-flowered. *Peduncle* c.5mm long, densely hairy. *Bracts* free, 1–1.3 × c.1cm, hairy. *Bracteoles* c.5mm long. *Pedicels* c.5mm long, sparsely hairy. *Calyx* green at base, becoming lilac distally, externally sparsely hairy with a tuft of white hairs at apex, 1–1.5cm long, less than half fused; lobes over 5mm long, acute at apex. *Corolla* externally lilac with darker veins with eglandular hairs, internally with stalked glandular hairs, c.1.5cm long overall; mouth 1–2cm wide, lobes spreading, bilabiate. *Stamens* attached 5–6mm from base of corolla, less than 5mm in length, glabrous; anthers mauve, c.2mm long, cohering at tips, parallel for most of their length. *Staminodes* attached up to 1cm from base of corolla, up to 5mm long. *Ovary* 4–5mm long, glabrous. *Style* green with glandular hairs. *Stigma* yellowish, bilobed. *Fruits* green when collected, ovoid, 1–1.5cm × c.5mm, glabrous, the inflorescence bracts and calyx persistent, style not persistent.

Distribution. Philippines (Palawan – endemic); 1550m.

Additional specimens seen. PALAWAN. Cleopatra's Needle, 22 i 1998, Cronk *et al.* 25437 (E, PNH).

The distinctive lilac corolla and calyx and ferruginous indumentum distinguish this striking new species from the other known Palawan species, and it is difficult to say where its affinities lie. Its leaf shape and texture are reminiscent of *C. pulgarensis* and *C. sp. D*. As this species is apparently restricted to the botanically rich summit plateau of Cleopatra's Needle its conservation status must be considered as critically endangered (CR) under the IUCN categories.

7. *Cyrtandra hirtigera* H.J. Atkins & Cronk, sp. nov.

Species magna et distincta, foliis villosissimis plus quam c.22cm longis, interdum rubris, a *C. villosissima* ex Mindanao calycis brevilobatis et fructu glabro distinguitur. Type: Palawan, Cleopatra's Needle, 29 i 1998, Cronk et al. 25433 (holo. PNH!, iso. E!, K, L).

[*Cyrtandra woodii* Merrill ined., in sched.].

Unbranched semiwoody herb, up to 2–2.5m tall, with crimson or pale/whitish indumentum, hairs coarse and woolly or coarse and patent; young stems densely hairy, mature stems glabrous. *Leaves* opposite, isophyllous; petioles 5–8cm long, densely hairy, blade broadly elliptic, 22–30cm × 15–18cm, acuminate at apex, cuneate at base, markedly oblique in some cases, not decurrent, upper surface hairy, some hair bases markedly swollen, midrib and veins more densely hairy than rest of upper surface, lower surface hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 12–14 pairs of lateral veins, hypodermis absent, sclereids absent from mesophyll, margins serrate with hairs on teeth. *Inflorescence* axillary, usually in upper leaf axils, subsessile, 4- to many-flowered. *Peduncle* 4–5mm long, hairy. *Bracts* not connate, c.1cm × 5mm wide, densely hairy. *Bracteoles* up to 5mm long. *Pedicels* up to 5mm long, hairy. *Calyx* red or green, externally hairy, 1–1.5cm long overall, fused for half or more of length; lobes up to 5mm long, acute or narrowly acuminate at apex. *Corolla* externally dull reddish-orange or yellowish-green flushed pink with age with eglandular hairs, internally with stalked glandular hairs, over 2cm long overall; mouth of corolla up to 1cm wide, lobes slightly bilabiate or subequal, spreading. *Stamens* attached 12–13mm from base of corolla, 1–1.5cm in length, glabrous; anthers c.2mm long, cohering at tips, parallel. *Staminodes* attached more than 1cm from base of corolla, up to 5mm long. *Ovary* 4–5mm long, glabrous. *Style* 5–8mm long, with glandular hairs. *Fruits* green when collected, ovoid, c.1cm × 5mm wide, glabrous, inflorescence bracts persistent, style and calyx not persistent.

Distribution. Philippines (Palawan – endemic); 30–900m.

This species was first collected from Palawan in 1922 by Merrill. This collection, of which two duplicates are known, one in the herbarium at Manila and one at Kew, was distributed by Merrill under the name *Cyrtandra woodii*. It appears that Merrill changed his mind about the distinctness of *C. woodii* and, after distributing it under this name, decided not to recognize it as a species. It bears a striking resemblance to *Cyrtandra villosissima* Merrill – a species which Merrill had himself described just a few years earlier from a specimen collected in Mindanao. In 1923 Merrill published his *Enumeration of Philippine Plants*. *Cyrtandra woodii* does not appear in this list and the distribution of *C. villosissima* was expanded from its original distribution of Mindanao to include Palawan. It seems, therefore, that Merrill decided to ‘sink’ his ‘*C. woodii*’ into *C. villosissima*. The vegetative similarities between the two species are impressive, and without fruits or flowers it would be impossible to distinguish

between them. On inspection of the reproductive structures, however, distinct and significant differences do emerge:

- i. The calyx of *C. villosissima* is divided almost to the base and the lobes are linear. That of *C. hirtigera* is fused for half or more of its length and the lobes are broadly lanceolate.
- ii. The surface of the fruit of *C. villosissima* has a sparse covering of uniseriate eglandular hairs; that of *C. hirtigera* is completely glabrous.
- iii. Eglandular hairs are also present on the style of *C. villosissima*; the style of *C. hirtigera* has a covering of glandular hairs only.

The corolla of *C. villosissima* from Mindanao has not been seen. Nevertheless we have decided to recognize the Palawan species as a distinct entity. Merrill's original herbarium name of *C. woodii* has not been revived in order to avoid confusion with the Bornean species *C. woodsii* B.L. Burt.

- 1a. Indumentum throughout plant crimson; calyx red, apex of calyx lobes acute; corolla dull reddish-orange, limb slightly bilabiate – **C. hirtigera** var. **hirtigera**
- 1a. Indumentum throughout plant pale; calyx green, apex of calyx lobes narrowly acuminate; corolla yellowish-green flushed pink with age, lobes subequal _____
 _____ **C. hirtigera** var. **chlorina**

var. **hirtigera**

Additional specimens seen. PALAWAN. Malampaya Bay, x 1922, Merrill 11573 (K, GH photo).

var. **chlorina** H.J. Atkins & Cronk, var. nov.

A *C. hirtigera* var. *hirtigera* indumento omnino pallido (haud kermesino), calyce viridi (haud rubro) lorum apicibus anguste acuminatis, corolla luteoviridi deinde roseotincta lobis subaequalibus, differt.

Type: Palawan, Thumb Peak, 29 i 1998, Cronk et al. 25518 (holo. PNH!, iso. K, L, E!).

Additional specimens seen. PALAWAN. Mt Mantalingajan, iv 1929, Edaño 77577 (GH); Mt Mantalingajan, 5 v 1947, Edaño 122 (GH); Mt Mantalingajan, 4 iii 1992, Argent & Romero 92172 (E); Pagdanan Range, 22 iv 1984, Podzorski SMHI 934 (L); San Vicente, 1992, Soejarto & Madulid 6353 (PNH).

The two varieties of *C. hirtigera* recognized here differ in their colouring, the shape of their calyces and the shape of the corolla limb – the limb of var. *hirtigera* being slightly more bilabiate than that of var. *chlorina*. The difference in colouring is likely to be due to the presence of anthocyanins in var. *hirtigera*; anthocyanin polymorphism is widespread in plants. Merrill's original collection of '*C. woodii*' (i.e. *C. hirtigera* var. *hirtigera*) was recorded by him as having 'purplish' flowers. We assume that this is an indication of the presence of anthocyanins. Those plants containing anthocyanins therefore become var. *hirtigera* and the variety without anthocyanins

has been designated var. *chlorina*. Inspection of further specimens from Palawan may result in the separation of these two into separate species if the three characters described above are found to be consistently different. It is possible, however, that intermediate specimens may be found and the safest course at present is to keep the two together as separate infraspecific taxa under *C. hirtigera*.

8. *Cyrtandra* sp. B. Exemplar specimens: Palawan, Cleopatra's Needle, 20 i 1998, Cronk *et al.* 25389 (E!, PNH!).

Branched shrub, 1–1.5m, with reddish-brown indumentum throughout, hairs fine and woolly; young stems hairy, mature stems sparsely hairy. *Leaves* apparently alternate, isophyllous, petioles 0.5–1.5cm long, hairy, blade oblanceolate, 14–22 × 3.5–6cm, acuminate at apex, cuneate at base, not markedly oblique, not decurrent, upper surface glabrous, midrib and veins more densely hairy than rest of upper surface, lower surface sparsely hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 7–8 pairs of lateral veins, hypodermis present, 1-layered, sclereids absent from hypodermis, sclereids absent also from mesophyll, margins distantly serrulate with no hairs on teeth. *Inflorescence* axillary, usually in upper leaf axils, pedunculate, 4- to many-flowered. *Peduncle* up to 5mm long, sparsely hairy. *Bracts* not connate, 1–1.5 × c.1cm, sparsely hairy. *Bracteoles* up to 5mm long. *Pedicels* c.1cm long, sparsely hairy. *Calyx* whitish, externally sparsely hairy, 1–1.5cm long overall, fused for half or more of length; lobes up to 5mm long, acute at apex. *Corolla* not seen. *Fruits* green when collected, conical, c.1cm × 5mm, glabrous, the inflorescence bracts, calyx and style persistent.

Distribution. Philippines (Palawan – endemic); 500m.

The oblanceolate, apparently alternate leaves of this species distinguish it from others on the island.

9. *Cyrtandra* sp. C. Exemplar specimen: Palawan, Thumb Peak, 30 i 1998, Cronk *et al.* 25520 (E!, PNH!).

Branched shrub, 1–1.5m, with dark brown-fuscous indumentum throughout, hairs coarse and patent; young stems hairy, mature stems glabrous. *Leaves* opposite, isophyllous; petioles 1–2cm long, hairy, blade subelliptic, 9–12 × 3–6cm, acute at apex, cuneate at base, markedly oblique in some cases, not decurrent, upper surface glabrous, midrib and veins not more densely hairy than rest of upper surface, lower surface sparsely hairy, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 5 pairs of lateral veins, hypodermis present, 1-layered, sclereids absent from hypodermis, astrosclereids present in mesophyll, margins serrulate with no hairs on teeth. *Inflorescence* axillary, usually in axils of fallen leaves towards base of stem, subsessile, 1–3-flowered. *Peduncle* up to 5mm long, sparsely hairy. *Bracts* not connate, 1–1.5 × c.1cm, sparsely hairy. *Bracteoles* not seen. *Pedicels* less than 5mm long, glabrous. *Calyx* externally sparsely hairy, 1–1.5cm long overall,

fused for half or more of length; lobes acute at apex. *Corolla* not seen. *Fruits* green when collected, ovoid, 1–1.5cm × c.5mm, glabrous, the inflorescence bracts and calyx persistent, style not persistent.

Distribution. Philippines (Palawan – endemic); 1200m.

The tough leaves of this new species contain astrosclereids. The only other specimen from Palawan with astrosclereids in the mesophyll is *Argent & Romero* 92172, which has been placed tentatively within *C. sp. D*. It is interesting to note that three of the four taxa with sclereids in their leaves – *C. elatostemoides*, *C. sp. C* and *C. sp. D* – also share the phenomenon of flowering at the base of the stem below the leaves.

10. *Cyrtandra sp. D*. Exemplar specimen: Palawan, Panalingajan River, iii 1929, *Edaño* 77433 (GH!).

Herb. Indumentum dark brown-fuscous, hairs coarse and patent; young stems sparsely hairy, mature stems glabrous. *Leaves* opposite, isophyllous; petioles 0.5–1cm long, glabrous, blade obovate, 14–19 × 5–7cm, attenuate at base, not markedly oblique, decurrent, upper surface glabrous, midrib and veins not more densely hairy than rest of upper surface, lower surface glabrous, midrib and veins prominent beneath and more densely hairy than rest of lower surface, with 6–7 pairs of lateral veins, hypodermis present, 2-layered, sclereids absent from hypodermis, astrosclereids present in mesophyll, margins serrulate with no hairs on teeth. *Inflorescence* axillary, usually in axils of fallen leaves towards base of stem, pedunculate, 1–3-flowered. *Peduncle* up to 5mm long, and glabrous. *Bracts* connate, 1–1.2 × c.1cm, glabrous. *Bracteoles* not seen. *Pedicels* up to 5mm long, glabrous. *Calyx* externally hairy, 1–1.5cm long overall, fused for half or more of length; lobes acute at apex. *Corolla* externally white with eglandular hairs; mouth 1–1.5cm wide. *Stamens* not seen. *Staminodes* not seen. *Ovary* not seen. *Fruits* cylindrical, 1–1.2cm × c.5mm, glabrous, the inflorescence bracts, calyx and style not persistent.

Distribution. Philippines (Palawan – endemic); 650–800m.

Additional specimen seen. PALAWAN. Penigisan, 1961, *Olsen* 360 (E, C photo).

Possible additional specimens. PALAWAN. Mt Mantalingajan, 5 iii 1992, *Argent & Romero* 92172 (E).

The specimens seen share the same vegetative characters and both have solitary inflorescences at the base of the stem below the leaves, although neither specimen has both fruits and flowers. Fruit characters are described, therefore, from *Edaño* 77433 and floral characters, as far as possible, from *Olsen* 360. Two duplicates of *Olsen* 360 have been seen; one, without flowers, is from E and a second, with a single flower, is a photocopy of a specimen lodged at C. The description of the flower is consequently brief.

Another possible example of this species is *Argent & Romero* 92172. The leaves of this specimen are somewhat smaller than the other two specimens and the flowers

(not seen) are described as being pink rather than white. The size of leaves may be affected by environmental conditions. This specimen has a 1-layered hypodermis and astrosclereids present in the mesophyll. This combination is also seen in *C. sp. C*, which however differs from *Argent & Romero 92172* in numerous other characters.

11. *Cyrtandra sp. E.* Exemplar specimen: Palawan, Mt Mantalingajan, 8 v 1947, *Edaño 50* (GH!).

Herb or shrub with dark brown-fuscos indumentum throughout, hairs fine and silky. Mature stems glabrous. *Leaves* apparently alternate, isophyllous; petioles 2.5–4cm long, sparsely hairy, blade elliptic, 6.5–22 × 2.5–8cm, acuminate at apex, cuneate at base, not markedly oblique, not decurrent, upper surface glabrous, midrib and veins not more densely hairy than rest of upper surface, lower surface glabrous, midrib and veins more densely hairy than rest of lower surface, with 11–13 pairs of lateral veins, margins serrulate, no hairs on teeth. *Inflorescence* axillary, usually in axils of fallen leaves towards base of stem, pedunculate. *Peduncle* c.5mm long, sparsely hairy. *Calyx* not seen. *Corolla* not seen. *Fruits* cylindrical, c.1cm × 5mm, with eglandular hairs, inflorescence bracts, calyx and style not persistent.

Distribution. Philippines (Palawan – endemic); altitude not recorded.

This species is described tentatively from a single specimen which does not have flowers. It appears on fruit and vegetative characters to be distinct from any of the other Palawan specimens seen.

12. *Cyrtandra hypochrysoides* Kränzl. in Philipp. J. Sci. 8: 319 (1913); Merrill, Enum. Philipp. Fl. Pl.: 460 (1923). Syntypes: Palawan, Mt Victoria, *Foxworthy* Bur. Sci. 650, 687 (n.v.); Luzon, Mt Pinatubo, *Foxworthy* Bur. Sci. 2543 (n.v.).

Shrub. Indumentum reddish-brown or golden-reddish throughout. Mature stems densely hairy. *Leaves* opposite, anisophyllous; petioles of large leaf of pair c.2cm long, densely hairy, blade oblong, c.22 × 6cm, shortly acute at apex and base, upper surface sparsely hairy, midrib and veins more densely hairy than rest of lower surface with 7–8 pairs of lateral veins, margins dentate; petioles of small leaf of pair c.1cm long, blade oblong, c.11 × 4.5cm, upper surface sparsely hairy. *Inflorescence* 1–3-flowered. *Bracts* broadly lanceolate. *Calyx* externally densely hairy, fused for less than half its length; lobes 5–6mm long, acute at apex. *Corolla* white suffused pink. *Fruits* ovoid, 7–8 × c.6mm.

Distribution. Philippines (Palawan and Luzon); 1520m.

No specimens of this species have been seen. The above brief description has been compiled from Kränzlin's original 1913 description. It is likely that the top set of

Kränzlin's original collection was kept at the National Herbarium in Manila and would have been destroyed in the Second World War. Kränzlin's own herbarium, which contained most of his type specimens, was acquired by Berlin and would also have been destroyed in the War. Other duplicates may have been distributed elsewhere but have not been traced.

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REFERENCES

- ATKINS, H., PRESTON, J. & CRONK, Q. C. B. (2001). A molecular test of Huxley's line: *Cyrtandra* (Gesneriaceae) in Borneo and the Philippines. *Biol. J. Linn. Soc.* 72: 143–159.
- BOKHARI, M. H. (1971). Studies in the Gesneriaceae of the Old World XXXII: foliar sclereids in *Cyrtandra*. *Notes Roy. Bot. Gard. Edinburgh* 30: 11–21.
- BURTT, B. L. & BOKHARI, M. H. (1973). Studies in the Gesneriaceae of the Old World XXXVI: foliar sclereids in New Guinea and Pacific *Cyrtandra*. *Notes Roy. Bot. Gard. Edinburgh* 32: 397–402.
- CLARKE, C. B. (1883). *Cyrtandreae* (Gesneracearum tribus). In: DE CANDOLLE, A. & DE CANDOLLE, C., *Monographiae Phanerogamarum*, Vol. 5, pp. 1–303. Paris: Sumptibus G. Masson.
- FORSTER, J. R. & FORSTER, G. (1776). *Characteres Generum Plantarum*. London: B. White, T. Cadell & P. Elmsley.
- GILLETT, G. W. (1973a). The genus *Cyrtandra* (Gesneriaceae) in the South Pacific. *Univ. Calif. Publ. Bot.* 66: 1–59.
- GILLETT, G. W. (1973b). The genus *Cyrtandra* (Gesneriaceae) in the Ryukyu and Caroline Islands. *J. Arnold Arbor.* 54: 105–110.
- GILLETT, G. W. (1975a). *Cyrtandra* (Gesneriaceae) in the Bismarck Archipelago and Solomon Islands. *Kew Bull.* 30: 371–412.
- GILLETT, G. W. (1975b). New records for *Cyrtandra* in the New Hebrides. *Kew Bull.* 29: 699–709.
- HILLEBRAND, W. (1888). *Flora of the Hawaiian Islands: a description of phanerogams and vascular cryptogams*. New York: B. Westerman & Co.
- MERRILL, E. D. (1915). The present status of botanical exploration of the Philippines. *Philipp. J. Sci.* 10: 159–167.
- MERRILL, E. D. (1923). *An Enumeration of the Philippine Flowering Plants*, Vol. 3. Manila: Bureau of Science.

- RIDLEY, H. N. (1905). The Gesneriaceae of the Malay Peninsula. *J. Straits Branch Roy. Asiat. Soc.* 44: 1–92.
- SCHLECHTER, R. (1923). Gesneriaceae Papuanae. *Bot. Jahrb. Syst.* 58: 255–379.
- SMITH, A. C. (1991). *Flora Vitiensis Nova. A new flora of Fiji (spermatophytes only)*, Vol. 5. *Angiospermae: Dicotyledones, Families 170–186; Monocotyledones, Family 32*. Lawai, Kauai, Hawaii: National Tropical Botanical Garden.
- WAGNER, W. L., HERBST, D. R. & SOHMER, S. H. (1990). *Manual of the Flowering Plants of Hawaii*, Vol. 1. Honolulu: University of Hawaii Press.

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