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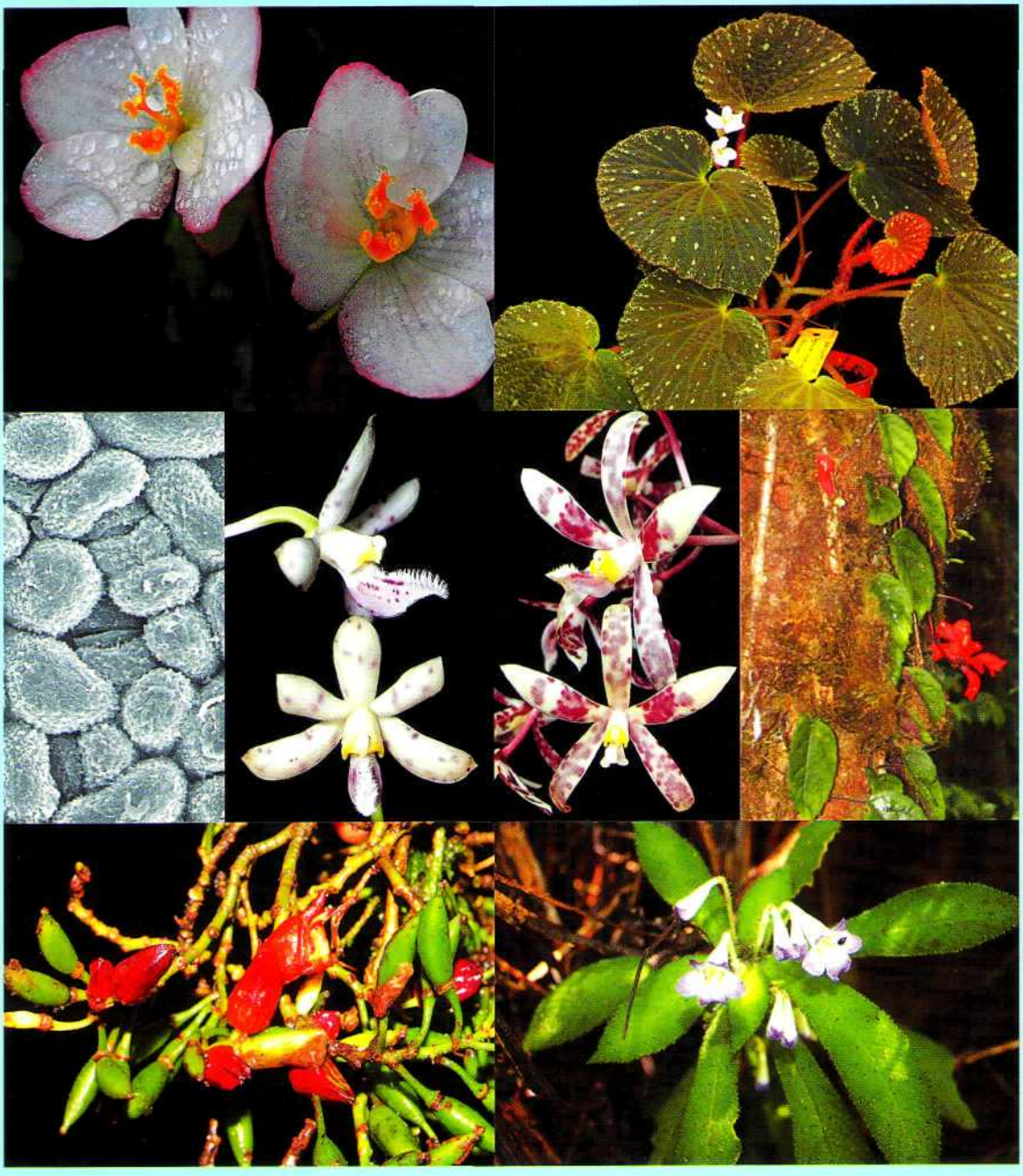

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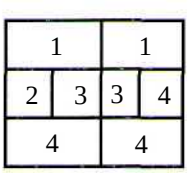

Cover images: 1. *Begonia holosericeoides* (female flower and habit) (Begoniaceae; Ardi *et al.); 2.* Abaxial cuticles of *Alseodaphne rhododendropsis* (Lauraceae; Nishida & van der Werff); *3. Dipodium puspitae, Dipodium purpureum* (Orchidaceae; O'Byrne); 4. *Agalmyla exannulata, Cyrtandra coccinea* var. *celebica, Codonoboea kjellbergii* (Gesneriaceae; Kartonegoro & Potter).

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THE GESNERIACEAE OF SULAWESI VI: THE SPECIES FROM MEKONGGA MTS. WITH A NEW SPECIES OF CYRTANDRA DESCRIBED

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ABSTRACT
KARTONEGORO, A. & POTTER, D. 2014. The Gesneriaceae of Sulawesi VI: The species from Mekongga Mts. with a new species of *Cyrtandra* described. *Reinwardtia* 14 (1): 1 – 11. — Field exploration of the flora of the Mekongga Mountainous area of Southeast Sulawesi was conducted from 2009 to 2011. Herbarium specimens collected during this exploration and additional collections from Herbarium Bogoriense (BO) included 21 species in nine genera of the family Gesneriaceae. These comprise one species of *Aeschynanthus*, four species of *Agalmyla*, one species of *Codonoboea*, seven species of *Cyrtandra*, one species of *Epithema*, three species of *Monophyllaea*, two species of *Rhynchoglossum*, one species of *Rhynchotechum* and one species of *Stauranthera*. Twelve of these species are considered endemic to Sulawesi while the rest are known to occur on neighbouring islands or are more widely distributed. *Monophyllaea merrilliana,* previously known only from the Philippine Islands and Borneo, is newly recorded for Sulawesi. A new species of *Cyrtandra* collected in the Mekongga area, *C. widjajae,* which resembles *C. gorontaloensis* from North Sulawesi but differs in having shorter pedicels and curved rather than straight fruits, is described.

Key words: Endemic, Gesneriaceae, Mekongga Mountainous area, Sulawesi.

ABSTRAK
KARTONEGORO, A. & POTTER, D. 2014. Gesneriaceae Sulawesi VI: Jenis-jenis dari Pegunungan Mekongga dengan deskripsi satu jenis baru *Cyrtandra*. *Reinwardtia* 14 (1): 1 – 11. — Eksplorasi tumbuhan di wilayah Pegunungan Mekongga Sulawesi Tenggara telah dilakukan sejak 2009 sampai 2011. Spesimen herbarium yang dikoleksi dalam eksplorasi ini dan koleksi tambahan dari Herbarium Bogoriense (BO) terdiri dari 21 jenis dalam sembilan marga dari suku Gesneriaceae. Jenis-jenis tersebut terdiri dari satu jenis *Aeschynanthus*, empat jenis *Agalmyla*, satu jenis *Codonoboea*, tujuh jenis *Cyrtandra*, satu jenis *Epithema*, tiga jenis *Monophyllaea*, dua jenis *Rhynchoglossum*, satu jenis *Rhynchotechum* dan satu jenis *Stauranthera*. Dua belas jenis dari keseluruhan merupakan endemik untuk Sulawesi sedangkan sisanya diketahui terdapat di pulau lainnya atau tersebar lebih luas. *Monophyllaea merrilliana*, sebelumnya diketahui hanya terdapat di Filipina dan Borneo, terekam baru untuk Sulawesi. Satu jenis baru *Cyrtandra* dipertelakan berasal dari wilayah Mekongga, *C. widjajae*, yang mirip dengan *C. gorontaloensis* dari Sulawesi Utara tetapi berbeda karena memiliki tangkai bunga yang lebih pendek dan buah yang melengkung dan tidak lurus.

Kata kunci: Endemik, Gesneriaceae, Pegunungan Mekongga, Sulawesi.

INTRODUCTION

The plant species richness of Sulawesi, Indonesia is much lower than Borneo, Sumatra or New Guinea in the Malesian region, but the level of endemism in Sulawesi flora is very high. This pattern is apparent in the family Gesneriaceae, in which eleven genera are currently recorded from Sulawesi, including *Aeschynanthus, Agalmyla, Boea, Codonoboea, Cyrtandra, Epithema, Monophyllaea, Paraboea, Rhynchoglossum, Rhynchotechum* and *Stauranthera*. About 50 species are found on with the island, mostly from *Cyrtandra* and followed by several other genera. *Boea*, *Codonoboea*, *Rhynchotechum* and *Stauranthera* are each represented by only one species (Mendum & Atkins, 2004).

The Mekongga Mountains are located on the southeastern peninsula of Sulawesi (Sulawesi Tenggara Province), extending from the North Kolaka Regency in the north to Kolaka Regency in the south. The area is characterized by tropical lowland evergreen forest and tropical montane forest (Mortelliti *et al*., 2012). The highest peak, Mosero-Sero, reaches an elevation of about 2620 m above sea level. The Mekongga Mountains include karst areas similar to those in the Verbeek Mountains in South Sulawesi. The Mekongga Mountains area has been designated as protected forest by the Ministry of Forestry, but, to date, it has not been included in any conservation area such as a National Park or Nature Reserve.

MATERIAL AND METHODS

Herbarium specimens of Gesneriaceae from Herbarium Bogoriense (BO) collected from Mekongga Mts. were examined. Most of these collections were made during field exploration for an International Cooperative Biodiversity Groups (ICBG) Project from 2009-2011. Additional specimens examined were collections made by Gunar Kjellberg in 1929. The data were supplemented by additional field notes from the specimens.

RESULTS

Nine genera and about 21 species of Gesneriaceae were recognized from the Mekongga Mountains. *Cyrtandra* is the best represented genus, with seven species, one of which is described as new in this account and one of which remains undetermined. *Agalmyla*, *Monophyllaea* and *Rhynchoglossum* are represented, respectively, by four, three and two species, while each of the genera *Aeschynanthus*, *Codonoboea*, *Epithema*, *Rhynchotechum* and *Stauranthera* is represented by only one species. Twelve species are endemic to Sulawesi (four from *Agalmyla*, five from *Cyrtandra*, two from *Monophyllaea* and one from *Rhynchoglossum*) and two species, *Agalmyla scabriflora* Hilliard & B. L. Burtt and *Cyrtandra widjajae* Karton., are endemic to Mekongga Mts.

A new species of *Cyrtandra*, *C. widjajae*, is here described from the Mekongga Mountains in Southeast Sulawesi. The species belongs to the section *Dissimiles* C. B. Clarke, a group distinguished by clear diagnostic characters including anisophyllous opposite leaf arrangement, a zygomorphic calyx with the three upper lobes fused and the two lower lobes free, and the corolla small (less than 2 cm long) and fleshy (Bramley, 2005).

Key to genera (adapted from Weber, 2004).

1a. Fleshy herb, unifoliar or leaves asymmetric, ovary and fruit globose, not twisted ……. 2
1b. Shrubs or not fleshy herb, leaves equal in size, ovary and fruit elongate, twisted or not…..… 5
2a. Plant unifoliar, sepals ovate to suborbicular, ovary bilocular ……..... *Monophyllaea*
2b. Plant not unifoliar, leaves asymmetric, sometimes anisophyllous or pseudoalternate …..… 3
3a. Leaves of upper nodes equal in size and shape, inflorescence scorpioid ……..…… *Epithema*
3b. Leaves of all nodes unequal in size and shape, inflorescence not scorpioid ……..... 4
4a. Leaves opposite; inflorescence a thyrse …….. …….. *Stauranthera*
4b. Leaves alternate, asymmetrical; inflorescence a unilateral raceme in two rows.. *Rhynchoglossum*
5a. Fruit fleshy, indehiscent ……...… 6
5b. Fruit a capsule, dehiscent ……. 7
6a. Corolla tube shorter than 6 mm, fertile stamens 4 ……..…. *Rhynchotechum*
6b. Corolla tube longer than 6 mm, fertile stamens 2 ……... *Cyrtandra*
7a. Plants epiphytic, fruits straight…….. 8
7b. Plants terrestrial, fruits bent …….... *Codonoboea*
8a. Leaves not coriaceous, lateral veins visible, fertile stamens 4 ……..…… *Agalmyla*
8b. Leaves coriaceous, lateral veins invisible, fertile stamens 2 ……..….. *Aeschynanthus*

***Aeschynanthus* Jack**, Trans. Linn. Soc. London 14 (1823) 42, nom. cons. — Type: *A. volubilis* Jack.

Aeschynanthus comprises about 160 species distributed from India through South China and Southeast Asia to the Solomon Islands (Middleton, 2007). The genus is easily recognized by its epiphytic pendulous habit with opposite or verticillate coriaceous leaves. The fruits are long narrow capsules that dehisce loculicidally.

AESCHYNANTHUS RADICANS Jack

Aeschynanthus radicans Jack, Trans. Linn. Soc. London 14 (1823) 43. — Type: Sumatra, Bencoolen, *Jack* s.n. (lost). Neotype (Middleton 2007): Sumatra, Lampung, Gunung Rate Telanggaran, *Iboet* 57 (L; isotype BO).

This is the first confirmed report from Sulawesi of this species, which is widespread in western Malesia including Southern Thailand. It is usually found in evergreen forest, often along streams. In Kalimantan (Indonesian part of Borneo), the species has been recorded grown in peat swamp forest. *Aeschynanthus radicans* is often confused with *A. pulcher* (Blume) G. Don, which is distributed in western Malesia as well. The difference between these two closely related species is that leaves are generally pubescent in *A. radicans*, but rarely so in *A. pulcher*. They also differ in pubescence of the ovary, which is densely pubescent in *A. radicans* and with sessile glands in *A. pulcher* (Middleton, 2007).

Additional distribution. South Thailand, Peninsular Malaysia, Sumatra, Borneo, Java.

Specimen examined. *Julianto* 17, Tinukari 704 m.

***Agalmyla* Blume**, Bijdr. Fl. Ned.-Ind. 14 (1826) 766. — Lectotype: *A. parasitica* (Lam.) Kuntze

Agalmyla is a genus comprising about 99 species found in the rain forest areas from Malay Peninsula eastwards to New Guinea. Hilliard & Burtt (2002) divided this genus into 3 sections, *Agalmyla*, *Dichrotrichum* (de Vriese) Hilliard & B. L. Burtt and *Exannularia* Hilliard & B. L. Burtt. The section *Agalmyla* is found only in west of the Wallace line while the other two are found only in east of the line. Twelve species known from Sulawesi belong to the section *Exannularia*, characterized by the lack of an annulus inside corolla tube, which is present in other sections of the genus either as a ring or as a broad band of hairs. Moreover, all the Sulawesi species are endemic to the island. Four species have been collected in the Mekongga Mts.

Key to species

1a. Corolla glabrous or sparsely hairy on the edge of the lobes ……...……... 2
1b. Corolla densely covered with coarse hairs on the tube and lobes …….. *A. scabriflora*
2a. Calyx lobes as long as tube ……... *A. brownii*
2b. Calyx lobes longer than tube ……... 3
3a. Leaf blade oblong, 30-70 cm long; corolla lobes yellow …….. *A. remotidentata*
3b. Leaf blade ovate, less than 25 cm long; corolla lobes red ……... *A. exannulata*

1. AGALMYLA BROWNII (Koord.) B. L. Burtt

Agalmyla brownii (Koord.) B. L. Burtt, Edinburgh J. Bot. 59 (2002) 76. — *Didymocarpus brownii* Koord., Meded. Lands Plantentuin 19 (1898) 551, 628; Suppl. Fl. N. O. Sulawesi (1922) tab. 121. — *Dichrotrichum brownii* (Koord.) B. L. Burtt, Notes Roy. Bot. Gard. Edinburgh 24 (1962) 41. — Lectotype: Sulawesi, Province Minahassa, Gunung Lokon, *Koorders* 17177β (L; isotype BO).

Agalmyla brownii is distributed widely in separated localities in Sulawesi, especially in montane forest from 1700 and 2500 m asl. (Hilliard & Burtt, 2002). The species has been collected from the north peninsula area (Lokon) through the Central (Nokilalaki-Roreka Timbu) and into the Southern (Latimojong) and Southeastern (Mekongga-Watuwila) regions of the island. This species shows variation in leaf shape based on age. Young leaves are usually ovate with lobes accounting for roughly half the blade. The second leaves are elliptic and coarsely toothed and the third leaves are obovate. All leaves are hairy, with denser pubescence along the midrib and lateral veins. The peduncle is usually long up to 23 cm, with 3–7 red flowers in each cyme.

Additional distribution. North Sulawesi (Mt. Lokon, Mt. Ambang), Central Sulawesi (Mt. Nokilalaki, Mt. Roreka Timbu, Mt. Beabis), South Sulawesi (Latimojong Mts.), Southeast Sulawesi (Mt. Watuwila).

Specimen examined. *Widjaja et al.* 9816, Tinukari 1900 m.

2. AGALMYLA EXANNULATA Hilliard & B. L. Burtt — Fig. 1A

Agalmyla exannulata Hilliard & B. L. Burtt, Blumea 44 (1999) 383; Hilliard & B. L. Burtt, Edinburgh J. Bot. 59 (2002) 95. — Type: Sulawesi, Gunung Nokilalaki, *Johansson, Nyboom & Riebe* 257 (E; isotype L).

The name of the species refers to the lack of annulus inside the corolla tube, a character shared by all species of *Agalmyla* in Sulawesi for which the Section *Exannularia* (Hilliard & Burtt, 2002) to which they belong is also named. The inflorescence in this species is almost sessile in few-flowered axillary cyme. Some individuals have the posticous stamens reduced into staminodes; to date, this condition has been observed only in specimens from west of the Wallace line. Hairs on the leaves are relatively few and scattered.

Additional distribution. Central Sulawesi (Mt. Nokilalaki, Mt. Tambusisi, Tojambu), Southeast Sulawesi (Mt. Watuwila).

Specimens examined. *Kjellberg* 2676, Bulu Porema, 1200 m; *Widjaja et al.* 9765, Tinukari, camp 4-5, 1500 m.

3. AGALMYLA REMOTIDENTATA Hilliard & B. L. Burtt — Fig. 1B

Agalmyla remotidentata Hilliard & B. L. Burtt, Edinburgh J. Bot. 59 (2002) 98. — Type: Sulawesi, Mts. Roroka Timbu South of Palu, *Hennipman* 5480 (E; isotypes BO, L).

This species is endemic to Sulawesi, so far only known from Mt. Roreka Timbu in Central Sulawesi and Mekongga Mts. in SE Sulawesi. It has narrow leaves that are longer than any other species of *Agalmyla* in Sulawesi, up to 70 cm long. The lower surface of the leaves with gland-dotted and scattered coarse hairs, densely along the midrib. Another feature that makes the species easy identified among other Sulawesi species is the bright red corolla with yellow edges on the lobes.

Fig. 1A. *Agalmyla exannulata*

Fig. 1B. *Agalmyla remotidentata*

Additional distribution. Central Sulawesi (Mt. Roreka Timbu).

Specimen examined. *Hafid* 132, Tinukari.

4. AGALMYLA SCABRIFLORA Hilliard & B. L. Burtt

Agalmyla scabriflora Hilliard & B. L. Burtt, Edinburgh J. Bot. 59 (2002) 87. — Type: Sulawesi, Mekongga Mts., B. Porema, *Kjellberg* 2636 (S; isotype BO).

Agalmyla scabriflora is known endemic to Mekongga Mts.; the type collection was collected by Kjellberg from Bulu Porema in northern part of the mountain. It has corolla with a coarse hairs on both side and the lobes. This feature makes this species distinct among all the Sulawesi *Agalmyla* (Hilliard & Burtt, 2002). The flowers are small and solitary in the leaf axils, which is very rare for the genus.

Habitat and ecology. In wet mountainous forest, rich with bryophytes, 1400-2576 m.

Specimens examined. *Widjaja et al.* 9289, Sero-Sero 2576 m; *Kjellberg* 2636, Porema 1400 m.

***Codonoboea* Ridl.**, Fl. Malay Pen. 2 (1923) 533. — Lectotype: *C. leucocodon* (Ridl.) Ridl.

Codonoboea is the third largest genus of Gesneriaceae in Malesia after *Cyrtandra* and *Aeschynanthus*. More than 100 species are known which previously described under *Didymocarpus* and *Henckelia*. The genus is distributed in western Malesia from southern Thailand eastward to New Guinea and the Philippines but absent from Java and the Lesser Sunda Islands. The center of distribution is in Peninsular Malaysia.

CODONOBOEA KJELLBERGII (B. L. Burtt) Karton. — Fig. 2

Codonoboea kjellbergii (B. L. Burtt) Karton., Edinburgh J. Bot. 69 (2012) 360. — *Henckelia kjellbergii* B. L. Burtt, Beitr. Biol. Pflanzen 70 (1998) 378. — Type: Sulawesi, B. Watoewila, *Kjellberg* 1092 (S; isotype BO).

Codonoboea kjellbergii is found in Sulawesi, Moluccas and New Guinea. These areas comprise the eastern most distribution of the genus (Kartonegoro, 2012). This is also the only species of the genus in Sulawesi. *Codonoboea kjellbergii* is easily distinguished by its oblong lanceolate pubescent leaves and corolla with a white tube and purple lobes.

Additional distribution. Central Sulawesi (Kolonedale, Poso), South Sulawesi (Mt. Latupa, Mt. Taponga, Tojambu, Soroako), Southeast Sulawesi (Mt. Watuwila, Kolaka, Pohara), Moluccas (Ambon, Seram), New Guinea (Paniai Lake).

Specimens examined. *Widjaja et al.* 9945, Tinukari, Sero-Sero 2560 m; *Widjaja & Sujadi* 8973, Tinukari, on the way to Point 1250 m.

***Cyrtandra* J. R. Forst & G. Forst**, Char. Gen. Pl. (1775) 3. — Type: *C. biflora* J.R. Forst & G. Forst.

Cyrtandra is a large genus in Gesneriaceae, comprising *ca*. 600 species of herbs, shrubs, climbers and small trees. The genus has wide distribution from Nicobar Islands in the west to Polynesia and Hawaii to east, and the southern Japan islands in the north to northern Australia in the south (Atkins, 2004). The center of diversity of *Cyrtandra* is in Malesia with more than 400 species. In Sulawesi there are so far 17 described species and at least 11 awaiting description known (Mendum & Atkins, 2004).

Fig. 2. *Codonoboea kjellbergii*

Key to species

1a. Leaves anisophyllous, reduced leaf smaller or scale-like ……..…… 2
1b. Leaves isophyllous, equal ……... 3
2a. Reduced leaf scale-like; inflorescences 1-flowered; pedicels 15-30 mm long; fruits straight …….. *C. gorontaloensis*
2b. Reduced leaf ovate to peltate; inflorescences 3-7 flowered; pedicels 3-4 mm long; fruits curved ……..... *C. widjajae*
3a. Stem strongly woody; inflorescence cauliflorous …….. 4
3b. Stem strongly fleshy; inflorescence in the leaf axils ……..……..... 5
4a. Plants 2-3 m high; inflorescence arising from stem above ground; corolla bright red ……. ……...*C. cocinea* var. *celebica*
4b. Plants 0.5-1 m high; inflorescence arising at stem below ground; corolla white.. *C. hypogaea*
5a. Stem tessellated; corolla yellow ….. *C. fasciata*
5b. Stem smooth; corolla white …….. *C. polyneura*

1. CYRTANDRA COCCINEA Blume var. CELEBICA (Blume) C. B. Clarke — Fig. 3A

Cyrtandra coccinea Blume var. *celebica* (Blume) C.B. Clarke in A.DC & C.DC, Monog. Phan. 5 (1883) 256. — *Cyrtandra celebica* Blume, Bijdr. 14 (1826) 772. — Type: Sulawesi, *Forsten* s.n. (L).

Specimens examined. *Hidayat et al.* 4095, Tinukari, Patikal Forest 130 m; *Widjaja et al.* 9694, Tinukari, on the way to camp 3, 952 m; *Potter* 16, Tinukari.

2. CYRTANDRA FASCIATA H. J. Atkins

Cyrtandra fasciata H.J. Atkins, Edinburgh J. Bot. 60 (2004) 309. — Type: Sulawesi, Gorontalo, Gunung Gambuta, *Atkins et al.* 54 (BO; isotype E).

Cyrtandra fasciata is easily distinguished from other species by its tessellated and erect stems and flowers with red and yellow lobes constricted below the tips.

Additional distribution. North Sulawesi (Mt. Gambuta), Central Sulawesi (Tambing Lake), West Sulawesi (Polewali).

Specimen examined. *Widjaja et al.* 9711, Tinukari, on the way to camp 3, 931-942 m.

3. CYRTANDRA GORONTALOENSIS H. J. Atkins

Cyrtandra gorontaloensis H. J. Atkins, Edinburgh J. Bot. 60 (2004) 307. — Type: Sulawesi, Gorontalo, Gunung Gambuta, *Atkins et al.* 91 (BO; isotype E).

Cyrtandra gorontaloensis is allied with two other species of the genus found in Sulawesi, *C. engleri* Koord. and *C. widjajae*; all three of these species have anisophyllous leaf pairs, calyces with united 3-upper lobes and the densely hairy corolla exteriors. *Cyrtandra gorontaloensis* differs from the other two by having longer pedicels (1.5 to 3 cm long) and yellow corollas. This species was previously known only from the northern peninsula of Sulawesi and is here reported from the southeastern peninsula.

Specimen examined. *Rinal et al.* 8, Tinukari, on the way to the top, 1300 m.

4. CYRTANDRA HYPOGAEA Koord. — Fig. 3B

Cyrtandra hypogaea Koord., Meded. Lands Plantentuin 19 (1898) 550, 628. — Type: Sulawesi, Minahassa, Lolomboelan, *Koorders* 17190β (BO).

There are three species *Cyrtandra* from Sulawesi that have flowers borne on trailing stems that originated from the base plant. One of them is *C. hypogaea* which has geocarpic inflorescences with a reddish brown calyx and white corollas with yellow dots on the lobes. The other two species are *C. geocarpa* Koord. with bright red corollas and *C. luteiflora* H. J. Atkins with yellow corollas.

Specimens examined. *Widjaja et al.* 9713, Tinukari, on the way to camp 3, 931-942 m; *Widjaja et al.* 9717, Tinukari, on the way to camp 3, 931-942 m.

5. CYRTANDRA POLYNEURA (C.B. Clarke) B. L. Burtt

Cyrtandra polyneura (C. B. Clarke) B. L. Burtt, Edinburgh J. Bot. 47 (1990) 225. — *Cyrtandra decurrens* de Vriese var. *polyneura* C. B. Clarke in A. DC & C. DC, Monog. Phan. 5 (1883) 233. — Type: Sulawesi, *Forsten* 86 (L).

Specimens examined. *Widjaja & Sujadi* 9051, Tinukari, Plot 4.1, 478 m; *Widjaja et al.* 9699, Tinukari; *Widjaja et al.* 9712, Tinukari, on the way to camp 3, 931-942 m.

6. **Cyrtandra widjajae Karton.** *spec.nov*. — Fig. 4

Cyrtandra widjajae belongs to Section *Dissimiles*, in whose members are characterized by anisophyllous leaf arrangement, zygomorphic calyces and small corollas 1.5 –2 cm long. The flowers of *C. widjajae* are densely hairy outside and glabrous inside and the fruits are curved, hairy, and tessellated. *Cyrtandra widjajae* is most similar to *C. gorontaloensis* H.J. Atkins but differs from the latter by its ovate or peltate reduced leaf, 3–7-flowered inflorescences with shorter pedicels (3-4 mm long) and curved fruits rather than scale-like reduced leaf, 1–flowered solitary inflorescences with longer pedicels (15 –30 mm long) and straight fruits. —Type: Sulawesi, South East Sulawesi Province, Mekongga Mts., North Kolaka, Rante Angin District, Tinukari village, Hura Hura. 1426 m. 28.xi.2010. *Widjaja et al.* 9412 (BO; isotypes DAV; E).

Shrub; stem woody, terete, subangular, glabrous to puberulous, *ca*. 3.5 mm in diameter; nodes swollen, interpetiolar line conspicuous. *Leaves* opposite, anisophyllous; larger leaf oblong-elliptic, entire, 7.8–16 by 2–4 cm, tip acuminate, 0.5–1 cm long, base cuneate; reduced leaf ovate to peltate, entire, 0.4–2 by 0.3–1 cm, tip acute, base cordate, subsessile or with *ca*. 0.2 mm long petiole; lamina glabrous

Fig. 3A. *Cyrtandra coccinea* var. *celebica*

Fig. 3B. *Cyrtandra hypogaea*

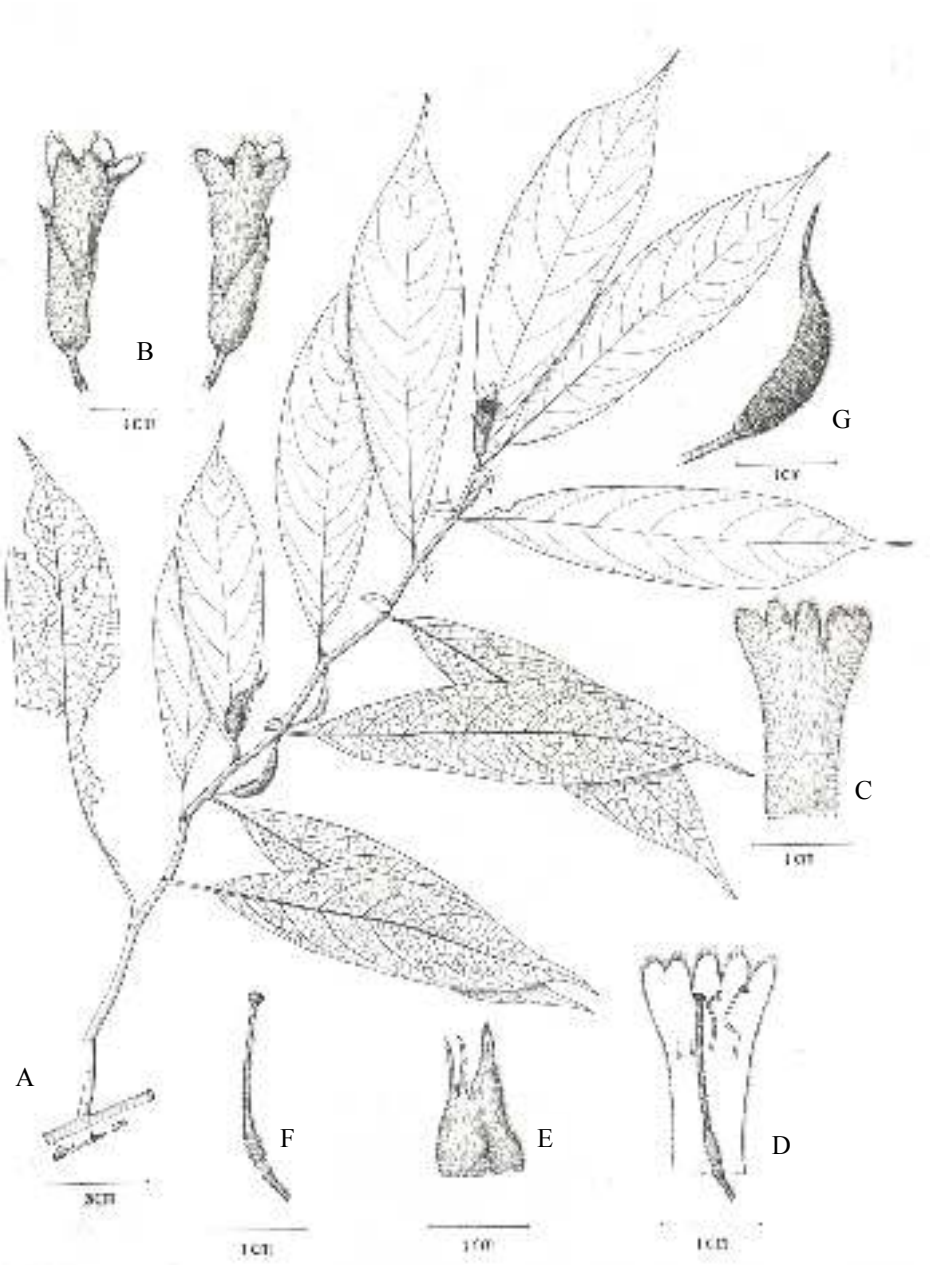

Fig. 4. *Cyrtandra widjajae*. A. Habit; B. Flowers; C. Corolla (outside); D. Corolla (inside); E. Calyx; F. Style; G. Fruit. (from *Widjaja et al.* 9412 [holotype BO]).

above, dark green, glabrescent below, brownish when dry, densely hairy when young; venation reticulate below, lateral nerves in 10–14 pairs. Petiole terete, glabrous, 0.5–0.7 cm long. *Inflorescence* axillary, 3–7 flowered, sessile; flowers 2–2.5 cm long. *Bracteoles* ovate to linear, glabrous *ca*. 0.5 mm long. *Pedicels* terete, sparsely to densely hairy, 3–4 mm long. *Calyx* campanulate to tubular, white to pale green, connate at base, glabrous to sparsely hairy, 6–7 by 2–2.5 mm; calyx 5-lobed, bilabiate, 3 upper lobes united into shallowly triangular lip, 2 lower lobes mostly free with subconnate base, 3–7 mm long, base hairy. *Corolla* white, densely hairy outside *ca*. 0.5–1 mm long, glabrous inside, 1.5–2 cm long; limb bilabiate, not recurved, 2 upper lobes equal, 2–4 mm by 1–2 mm, 3 lower lobes 3–5 mm by 1–2 mm. *Stamens* 2, exserted from corolla tube in the lower lobes; filaments terete 3–5 mm long; anthers ovoid, glabrous, *ca*. 1.5 mm long, cohering at tips. *Ovary* densely hairy, 5–7 mm long; style terete, hairy, up to 2 cm long; stigma bilobed *ca*. 1.5 mm long. *Disk* cupular, *ca*. 1 mm, glabrous. *Fruits*

elongate, acute with 1–2 mm long tip, curved, densely hairy, tessellate, 1.3–2.5 by 0.3–0.5 cm; stalk glabrous, *ca*. 0.5 cm long.

Distribution. Sulawesi (only known from Mekongga Mts.)

Habitat. Mountain forest under canopy at 1426 m.

Etymology. The epithet name after Elizabeth A. Widjaja (BO), a bamboo taxonomist and collector of plants.

Notes. Similar to *C. gorontaloensis* H. J. Atkins, but differs by its inflorescences with 3–7 flowers with short pedicels (3–4 mm long) and its elongate curved fruits. *Cyrtandra gorontaloensis* has solitary flowers with longer pedicels (15–30 mm long) and ovoid fruits that are not recurved. The two species are similar in having unequal leaf pairs, corollas less than 2 cm long, calyces with the three upper lobes united and the two lower lobes mostly free. Based on those characters, the species is included in Section *Dissimiles*, which is also known from Sumatra and Borneo. Sterile specimens of this species are similar to *C. rubropicta* Kraenzl., which is known from Borneo but the two species differ in habit: *C. rubropicta* is an epiphyte or scrambler (Bramley, 2005), while *C. widjajae* is an erect shrub. So far *C. widjajae* is known only from Mekongga Mts., SE Sulawesi, while *C. gorontaloensis* known from there as well as from North Sulawesi.

Additional specimens examined. *Widjaja et al.* 9727, Tinukari, on the way camp 3, 931-942 m.

7. *Cyrtandra* sp.

An unidentified species of *Cyrtandra* was collected from Mekongga in August 2009. The plant was fruiting at the time of collection; no flowers were collected. Based on the habit and leaves, this species is similar to *C. gorontaloensis*, but it differs from the latter in having large glabrous (*ca*. 22 mm long) and smooths fruits rather than small (12-18 mm long) densely hairy fruits with tessellated surfaces.

Specimen examined. *Hidayat et al.* 4217, Tinukari 1063 m.

***Epithema* Blume**, Bijdr. Fl. Ned.-Ind. 14 (1826) 737. — Type: *E. saxatile* Blume

EPITHEMA SAXATILE Blume

Epithema saxatile Blume, Bijdr. Fl. Ned.-Ind. 14 (1826) 737. — Type: Java, *Blume* sn. (L).

Epithema saxatile also found in some areas in Malesia. The species also found in Sumatra, Peninsular Malaysia, Borneo and Java. Resembles with *E. horsfieldii* but different with having opposite leaves near apex while the later having solitary leaves at apex.

Specimen examined. *Kjellberg* 2616, Kosali-Porema 500 m; *Kjellberg* 2618, Kosali-Porema 600 m.

***Monophyllaea* R. Br.**, in Bennett, Pl. Jav. Rar. (1838) 121. — Type: *M. horsfieldii* R.Br.

Monophyllaea is a genus that has distribution along Malesian region from Sumatra to New Guinea. This genus has a unique character, an unifoliar leaf with inflorescence arising from the base of petiole or base of lamina. Members of this genus are usually found growing on limestone or other rocky habitats in rainforest and on the edges of streams. Another genus whose members occupy similar habitats is *Whytockia* from China.

Key to species

1a. Inflorescence branched ……...…….. 2
1b. Inflorescence not branched ……. *M. eymae*
2a. Leaf blade ovate, indumentum hairs branched, dendroid; inflorescence forked ... *M. merrilliana*
2b. Leaf blade oblong, indumentum hairs simple; inflorescence with lateral branches ……. ……. *M. anthocrena*

1. MONOPHYLLAEA ANTHOCRENA B.L. Burtt — Fig. 5A

Monophyllaea anthocrena B.L. Burtt, Notes Roy. Bot. Gard. Edinburgh 37 (1978) 35. — Type: Sulawesi, Bantimoeroeng, between Makassar and Maros, *Van Steenis* 10445 (L; isotypes A, BO, K, NY, SING).

Compared to other species, *M. anthocrena* has more crowded branches in the inflorescences with a bright white corolla and pinkish portion close to the upper lobes. The leaf shape of this species is also oblong rather than ovate-lanceolate.

Specimens examined. *Hidayat et al.* 4185, Tinukari, water fall area 1063 m; *Hidayat et al.* 4096, Tinukari, Patikala Forest, 130 m.

Fig. 5A. *Monophyllaea anthocrena*

Fig. 5B. *Monophyllaea merrilliana*

2. MONOPHYLLAEA EYMAE B. L. Burtt

Monophyllaea eymae B.L. Burtt, Notes Roy. Bot. Gard. Edinburgh 37 (1978) 30. — Type: Sulawesi, Res. Menado, Loewoek, between Pinapoeang-G.Loloa-G.Beabis, *Eyma* 3875 (L; isotypes A, BO, K).

Specimens examined. *Kjellberg* 2603, Kosali-Porema, 650 m; *Widjaja et al.* 9320, Tinukari, Sero-Sero, 2576 m; *Widjaja* 9815, Tinukari.

3. MONOPHYLLAEA MERRILLIANA Kraenzl. — Fig. 5B

Monophyllaea merrilliana Kraenzl., Philipp. J. Sci., C 8 (1913) 168. — Lectotype: Philippines, Mindanao, District of Zamboanga, Sax River (BM; isotype K).

Monophyllaea merrilliana is one of the species in the genus that has a widespread distribution. Prior to 1978 the species was only known from Philippines Islands, but it has more recently been found in several locations in Borneo and also Sulawesi. The other *Monophyllaea* species that has a widespread distribution is *M. horsfieldii*, which is found in Sumatra, Peninsular Malaysia and Java. *Monophyllaea merrilliana* is also unusual in the genus in that the species is not only found on limestone substrates but is also sometimes found on other rock types close to streams. Several collections from Mekongga show a leaf shape that is more ovate compared to the type, whose leaves have an oblong leaf shape.

Specimens examined. *Kjellberg* 2617, Kosali-Porema, 650 m; Widjaja *et al.* 9697, Tinukari, on the way to camp 3, 952 m.

***Rhynchoglossum* Blume**, Bijdr. Fl. Ned.-Ind. 14 (1826) 741. — Type: *R. obliquum* Blume.

Rhynchoglossum is a genus of fleshy herbs with anisophyllous, decussate or alternate leaves with asymmetrical leaf blades and unilateral inflorescences. Its preferred habitat is on wet and shady (especially limestone) rocks, in forest or in open vegetation or shady places, usually in the lowlands. *Rhynchoglossum* is distributed in tropical Asia from India, Sri Lanka, China, Taiwan and Indochina to New Guinea and in the New World in Central and South America extending from Mexico to Peru (Kartonegoro, 2013).

Key to species

1a. Leaf blade oblong; fruits elongate, half enclosed by persistent calyx ……..... *R. capsulare*
1b. Leaf blade ovate to elliptic; fruits ovoid, fully enclosed by persistent calyx …….. *R. obliquum*

1. RHYNCHOGLOSSUM CAPSULARE Ohwi ex Karton.

Rhynchoglossum capsulare Ohwi *ex* Karton., Edinburgh J. Bot. 69 (2012). — Type: Sulawesi, Res. Menado, OA Poso, Maraowa, *Eyma* 1572 (BO; isotypes A, K, L).

Fig. 6A. Inflorescence of *Rhynchotechum parviflorum*

Fig. 6B. Close up flower of *Rhynchotechum parviflorum*

Rhynchoglossum capsulare is endemic to Sulawesi and known only from two collections. The species is not easily confused with other species in the genus due to its oblong-lanceolate (*vs*. ovate to elliptic in other species) leaves and the capsule-like fruits with a persistent calyx not bearing a wing and not fully enclosing the fruit. This species is mostly similar to a common *R*. *obliquum* which is widespread through Southeast Asia.

Specimen examined. *Kjellberg* 2663, Bulu Porema, 1400 m.

2. RHYNCHOGLOSSUM OBLIQUUM Blume

Rhynchoglossum obliquum Blume, Bijdr. 14 (1826) 741. — Lectotype: Java, *Blume* 52 (L).

Rhynchoglossum obliquum is the most common and widespread species in the genus. This species has a long and crowded inflorescence with a small white to blue-purple flowers. Another closely related species found in Sulawesi is *R*. *capsulare*, but the latter differs from the former by having oblong-lanceolate leaves and a half-enclosed persistent calyx.

Habitat and ecology. Open places along streams, in secondary forest, creeping on rocks up to 1400 m.

Additional distribution. India, Srilanka, South China, Taiwan, Indochina, Thailand throughout Malesia to New Guinea.

Specimen examined. *Widjaja et al.* 10020, Tinukari.

***Rhynchotechum* Blume**, Bijdr. Fl. Ned.-Ind. 14 (1826) 775. — Type: *R. parviflorum* Blume

Rhynchotechum is a genus of about 16 species of understory subshrubs distributed from India, South China, Formosa, and Ryukyu, southwards through Indochina, Thailand, Malesia to Papua New Guinea. The genus is allied with *Cyrtandra* but differs by its four fertile stamens with unilocular anthers and its globose fruits (Anderson & Middleton, 2013).

RHYNCHOTECHUM PARVIFLORUM Blume — Fig 6A & 6B.

Rhynchotechum parviflorum Blume, Bijdr. 14 (1826) 775; Anderson & Middleton, Edinburgh J. Bot. 70 (2013) 160. — Lectotype: Java, Mt. Seribu, *Blume* sn. (L).

This is the only species of *Rhynchotechum* that occurs in Sulawesi. The species also found widespread from China to Southeast Asia trough New Guinea (Anderson & Middleton, 2013). Like most other species of the genus, it grows in primary and secondary forests and thickets, near stream or in limestone and sandstone bedrocks.

Specimens examined. *Widjaja & Sujadi* 9038, Tinukari, Hutan Masembo 515 m; *Widjaja & Sujadi* 8931, Tinukari, Point 1, 250 m; *Widjaja & Sujadi* 9056, Tinukari, Surrounding Plot 4.1, 478 m; *Widjaja et al.* 9700, Tinukari, on the way to camp 3, 931-942 m.

***Stauranthera* Benth.**, Scroph. Ind. (1835) 57. — Type: *S. grandiflora* Benth.

STAURANTHERA COERULEA (Blume) Merr.

Stauranthera coerulea (Blume) Merr., Enum. Philipp. Fl. Pl. 3 (1923) 455. — *Miquelia coerulea* Blume, Bull. Sci. Phys. Nat. Néerl. 1 (1838) 94. — Type: *Blume* sn., Java (L).

This species has a widespread distribution in Malesia; it is found in Sumatra, Java and Sulawesi. It had also been reported from the Philippines, but speci-

mens from there have recently been assigned to a different species, *S. philippinensis* Elmer (Burtt, 1984).

Specimen examined. *Kjellberg* 2619, Kosali-Porema, 650 m.

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