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Studies on Schismatoglottideae (Araceae) of Borneo XX: Beccari's «La Più piccola delle Aracee» (*Microcasia pygmaea*) recollected and transferred to *Bucephalandra* Schott*

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Studi sulle Schismatoglottideae (Araceae) del Borneo XX: «La più piccola delle Araceae» del Beccari (Microcasia pygmaea) riscoperta e trasferita a Bucephalandra Schott — Dopo circa 145 anni è stata riscoperta *Microcasia pygmaea* Becc. Una attenta indagine rivela, contrariamente a recenti trattamenti tassonomici, che è da ritenersi una specie distinta del genere *Bucephalandra*, ma tuttavia non conspecifica di *B. motleyana* Schott. *Microcasia pygmaea* Becc. Viene qui trasferita in *Bucephalandra* come **B. pygmaea** (Becc.) P.C. Boyce & S.Y. Wong, **comb. nov.** Vengono fornite alcune note tassonomiche basate sulla morfologia. *Bucephalandra* è considerato comprendere cinque specie, esposte in una nuova chiave identificativa. Vengono anche fornite note tassonomiche su *Bucephalandra* e *Microcasia*, e *B. pygmaea* viene illustrata da piante vive.

Key words: Araceae, Borneo, *Bucephalandra,* Malaysia, *Microcasia,* Sarawak, Schismatoglottideae.

Introduction

Odoardo Beccari (1879) described and figured a remarkable new aroid based on material he gathered from humid riverside cliffs along the Sungai Entabai, in modern Sarikei Division of Sarawak, Malaysian Borneo, in September or October 1867.

The most striking feature of Beccari's plants is their diminutiveness, the largest not exceeding 25 mm tall, and with several only half this size. The equally modest inflorescence, with a spathe to only 13 mm long, although comparatively enormous for the size of the overall plant, combined to make it the smallest then-known aroid; hence Beccari's paper title «*La Più piccola delle Aracee*».

Beccari proposed a new genus, *Microcasia*, for his plants, accentuating their tiny stature with the trivial epithet *pygmaea*. Unfortunately, owing to errors and omissions in Schott's plate of *Bucephalandra* (Schott, 1858: t. 56; see Bogner, 1980) Beccari was misled into supposing his Entabai aroid did not fit into pre-existing *Bucephalandra* to which, in fact, it belongs. Not until Josef Bogner's critical re-examination of *Bucephalandra* were the generic problems engendered

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by Schott's inaccurate plate revealed, and resolved (Bogner, 1980). Prior, neither Hotta, who took a particular interest in rheophytic Schismatoglottideae (e.g., Hotta, 1965), nor Engler, when working up *Bucephalandra* and *Microcasia* for *Das Pflanzenreich* (Engler, 1912), perceived the problems.

It seems plausible that Beccari and Hotta (and indeed, although perhaps improbably, Engler) never examined the type of *B. motleyana* [*J. Motley 404* (K)], relying instead on Schott's typically elegant but uncharacteristically seriously flawed plate. However, it is perhaps more likely that Engler, with whom Beccari corresponded regarding the identity of his miniscule Entabai aroid, *did* cursorily examine the Motley type, but failed to notice the irregularities of the Schott plate.

This might appear an outrageous suggestion were it not for the fact that specimens of obligate rheophytic Schismatoglottideae species are notoriously troublesome to interpret taxonomically. Even fertile, when not damaged by pollinators, or post-preservation by herbarium insects, material often suffers from failure on the part of the collector to prepare fresh inflorescences in a manner to enable convenient examination by opening/removing the spathe to reveal the spadix before pressing. Removing the spathe from a long-since dried specimen without damaging the underlying, usually adhering, spadix is almost impossible.

Add to this the often minute, always intricate, and above all delicate floral morphologies; it is little wonder that so many specimens in herbaria are wrongly identified for want of critical examination.

With customary painstaking exactitude Bogner (1980) clarified the circumscription of *Bucephalandra*, highlighting the inaccuracies – lacking diagnostic shield-shaped staminodes between the staminate and pistillate flower zones, and incorrectly depicting parietal (not basal) placentation – of Schott's published plate, and demonstrating Beccari's *Microcasia* to be a junior synonym of *Bucephalandra*. However, problems remain with Bogner's species' delimitation which has influenced later publications (e.g., Bogner, 1984; Bogner & Hay, 2000). In particular Bogner places much emphasis on the (genuine) variability of the vegetative morphology, notably of the leaf blades, but assumed that this variability extends to the floral morphologies. This is not so and has obscured a suite of reliable, admittedly not conveniently observable, floral morphologies. Floral morphologies of rheophytic Schismatoglottideae are critical and *Bucephalandra* is no exception.

These key floral morphologies are:

- Morphology of the appendix staminodes, particularly the presence and nature of any surface ornamentation.
- Morphology of the staminate flowers, notably the plan and three dimensional shape of the filament.
- Insertion, orientation, and shape of the thecae, including any surface ornamentation.
- Orientation, posture, shape, and relative length (to the thecae and filament) of the thecae horns.
- Morphology of the shield-shaped staminodes, notably overall (plan) shape, and topology of the ventral surface.
- Shape and colour of the pistils.
- Shape of the sub-pistillar staminodes.

Our observations in the field and on an extensive living collection conclude that there are many more species of *Bucephalandra* than the two accepted by the last revision (Bogner & Hay, 2000). Some species are already described in *Bucephalandra* (*B. catherineae* P.C. Boyce, Bogner & Mayo, 1995, *B. magnifolia* H. Okada & Mori, 2000) but almost since publication have been treated as synonyms of an artificially polymorphic *B.motleyana*, Others, such as the subject of this paper, have been previously described in the genus *Microcasia* (see Appendix A) will eventually require transferral to *Bucephalandra*. A rather large number are undescribed and await formal description in *Bucephalandra* and will be the subject of forthcoming papers. One reason we are reluctant to transfer mechanically pre-existing species to *Bucephalandra* is that recognition of Schismatoglottideae based solely on preserved dried (pressed) material is highly problematic. For this reason, we only recognize novelties (and make transfers) of taxa that we have observed living.

Bucephalandra Schott, Gen. Aroid. t. 56 (1858) & Prodr. Syst. Aroid. 319. 1860

Engler in A.L.P. de Candolle & A.C.P. de Candolle, Monogr. Phan. 2: 354 (1879); Brown in G. Bentham & J.D. Hooker, Gen. Pl. 3(2): 984-985

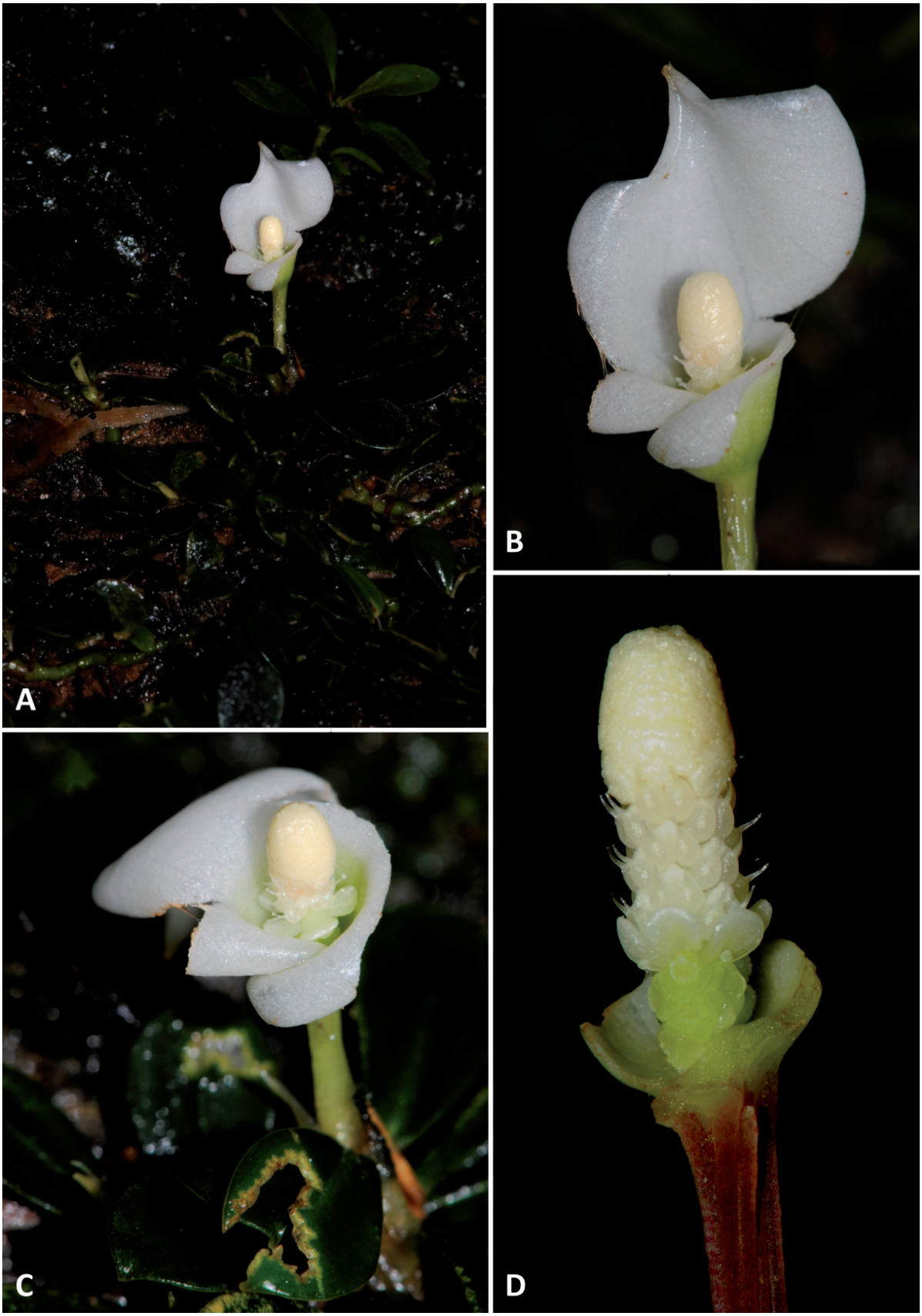

Fig. 1 – *Bucephalandra pygmaea* (Becc.) P.C. Boyce & S.Y. Wong. A. Flowering plant in habitat on shale. B. Close up of inflorescence at late pistillate anthesis. Note that the spathe limb is beginning to shed. The long thecae horns are clearly visible just below the appendix. C. Flowering plant at onset of staminate anthesis. The spathe limb has reflexed and is nearly completely detached. Note that the shield-shaped staminodes have reflexed to close access to the pistillate flowers. D. Spadix at pistillate anthesis, spathe artificially removed. Note the the shield-shaped staminodes are still erect. All from: *P.C. Boyce & Wong Sin Yeng AR-3632*.

(1883); Engler in H.A.G. Engler & K.A.E. Prantl, Nat. Pflanzenfam. 2 (3): 132 (1889) & in H.A.G. Engler, Pflanzenr. 55 (IV.23Da):122, Fig. 74 (1912); Merrill, J. Straits Branch Roy. Asiat. Soc., Special Issue 21: 103 (1921); Bogner, Aroideana 3: 134-143, Figs 1-15 (1980) & Pl. Syst. Evol. 145: 159-161), Fig. 1 & 2 (1984); Boyce, Curtis's Bot. Mag. 12 (3), 131-134, Pl. 272 (1995); Mayo, Bogner & Boyce, Genera of Araceae 189, Map. 52, pl. 52, 118B (1997); Boyce et al., Aroideana 33: 41-43, Pl.19 (2010).

TYPE: *Bucephalandra motleyana* Schott.

Microcasia Becc., Bull. Real. Soc. Tosc. Ortic. 4: (179-) 180 (-181), Fig. 8. 1879

Engler in O. Beccari, Malesia 1: 290, t. 22, f. 22-24 & t. 25, f. 2-3 (1883); Brown in G.Bentham & J.D. Hooker, Gen. Pl. 3(2): 986 (1883); Engler in H.A.G. Engler & K.A.E. Prantl, Nat. Pflanzenfam. 2(3): 132, Fig. 85 (1889); Ridley, J. Straits Branch Roy. Asiat. Soc. 44183 (1905); Engler in H.A.G. Engler, Pflanzenr. 55 (IV.23Da): 128-130, Fig. 77 (1912); Hotta, Mem. Coll. Sci. Univ. Kyoto, Ser. B, 32: 20-22, Fig.1 (1965).

TYPE: *Microcasia pygmaea* Becc. [= *Bucephalandra pygmaea* (Becc.) P.C. Boyce & S.Y. Wong].

Bucephalandra pygmaea (Becc.) P.C. Boyce & S.Y. Wong, **comb. nov.**

Bas.: *Microcasia pygmaea* Becc., Bull. Real. Soc. Tosc. Ortic. 4: 180 (1879); Engler in O.Beccari, Malesia 1: 290, t. 22, f. 22-24 (1883) & in H.G.A. Engler & K.A.E. Prantl, Nat. Pflanzenfam. 2(3): 132, Fig. 85 (1887) & in H.G.A.Engler, Pflanzenr. 55 (IV.23Da): 128-130, Fig. 77 A-D (1912).

TYPE: Malaysian Borneo, Sarawak, Sarikei Division, Julau, Sungai Entabai, 28 Oct. 1867 (annotated on FI sheet), or Sept. 1867 (annotated on B sheet, and stated in Beccari, 1879), or 26th October 1867 (stated in Beccari, 1902, 1904), *O.Beccari PB 3883* (FI!, holo; iso B!). Figs. 1 & 2.

DESCRIPTION: Diminutive obligate rheophytic herb 1-3 cm tall, occurring as individual plants or forming patches up to 50 cm across. *Stem* creeping with the active portion suberect, branching repeatedly, branches 0.5-6 cm long × 2-4 mm diam. **Leaves** to c. 8 together; petiole 0.5-1 cm long × ca 2 mm diam., adaxially canaliculate, reddish, sheathing at the extreme base, the wings extended into a very narrowly triangular ligular portion to 1 cm long; blade obovate to elliptic, (0.7-) 2.5 cm long × 1-1.5 cm wide, rather thickly coriaceous, semiglossy dark green adaxially, paler abaxially and usually tinged reddish, very finely punctate on both surfaces, base cuneate, apex rounded and apiculate for ca 1.5 mm, margin usually straight, midrib abaxially and adaxially prominent, reddish abaxially, with (1-) 3-4 primary lateral veins on each side, diverging at 25-60° and running to a marginal vein; secondary venation adaxially more or less obscure, abaxially fine and not dense (c. 1-1.5 mm apart); tertiary venation adaxially obscure, abaxially forming a faint tessellate reticulum. **Inflorescence** solitary; peduncle exceeding the petioles, 1.5-2 cm long, conspicuously longitudinally sulcate and occasionally distally winged, reddish (in life this colour derived from copious, minute speckles). **Spathe** broadly ovate, not constricted, ca 1.5 cm long, the lower part funnel-shaped, green, persistent, limb gaping, then caducous, white, apiculate for ca 2 mm. **Spadix** 0.5-1.0 cm long; pistillate zone 2-2.5 mm long, ca 1.5 mm diam., with 2-5 whorls of pistils; pistils rhombic-globular in plan view, ca 0.5 mm diam., lime green; stigma sessile, umbonate, about half the diameter of the ovary, papillate at anthesis, later (post anthesis) sunken centrally; **interpistillar staminodes** 2-4 at the base of the pistillate zone, squat-fusiform with a terminal beak, in all ca 0.35 mm diam., about half as wide, white; **interstice** with c. 2 whorls of **scale-like staminodes**, these 1-2 mm long × 0.8-1.5 mm wide, the margin ventrally thickened into a conspicuous rim, at first erect then spreading, initially white, later (post anthesis) becoming green and persisting to cover the developing fruit; staminate zone 2-2.5 mm long, ca 1.5 mm diam., consisting of 2-5 irregular whorls of flowers; staminate flowers each consisting of a single stamen, stamens comparatively large, ca 1 mm across, filament strap-shaped; thecae inserted ventrally, ellipsoid, ca 1 mm long × ca 0.3 mm wide, smooth; thecae horns equalling the associate theca, setaceous, upward-pointing; **appendix** globular to bluntly cylindrical, 1-2 mm long × 1.5-2 mm diam., cream; **staminodes** of appendix

Fig. 2 – *Bucephalandra pygmaea* (Becc.) P.C. Boyce & S.Y. Wong. A. Extensive population in habitat on shales. B. Detail of plants. The middle specimen in early fruit. C. Detail of the fruiting. The spathe limb has been shed to leave the persistent funnel-form lower spathe. Note that the shield-shaped staminodes have become green and persist to protect the developing fruits, the spent portion of the spadix has fallen.

obpyramidal, truncate, 0.5-1 mm diam., the upper surface smooth and somewhat glossy. **Fruiting spathe** funnel-shaped, ca 1 cm diam., with the shield-shaped staminodes persistent, turning green, spent distal part of the spadix falling; **berry** depressed-globular, 1-1.8 mm long, 1-1.5 mm diam., with numerous seeds, berries forming a hemispherical cluster protected by the persistent staminodes, later pushed off and falling to reveal the mature fruits; fruits decomposing at maturity, forming a pulp with the seeds held in the persistent lower spathe; **seed** narrowly ellipsoid, 1-2 mm long × 0.25-0.3 mm diam., light brown, very slightly longitudinally ribbed, with a curved micropylar appendage to 1 mm long.

ETYMOLOGY: From Greek *pygmaios* via Latin *pygmaeus* (dwarf); in allusion to the stature of the whole plant.

DISTRIBUTION: Malaysian Borneo (Sarawak), Sarikei and Kapit Divisions. Scattered, but often forming significant populations.

ECOLOGY: Obligate rheophyte on shale, or very occasionally sandstone, along streams and waterfalls under moist or perhumid lowland forest; 10-55 m asl.

OTHER MATERIAL SEEN: **Malaysian Borneo**: **Sarawak**, Kapit Division, Taman Rekreasi Sebabai, 01 56 39.4 N; 112 54 16.8 E, 29 Aug. 2011, *P.C. Boyce & Wong Sin Yeng AR-3632* (SAR).

NOTES: The plate accompanying Beccari (1879) & Engler (1887) is rather crude but correctly depicts the appendix staminodes to be smooth. Engler had the plate partially re-worked for *Malesia* (Engler, 1883) and *Das Pflanzenreich* (Engler, 1912), but in so doing introduced a spurious papillate surface to the staminodes.

Key to **Bucephalandra**

1. Plants 40 cm or more tall; leaf blades to 25 cm long, with ca 16-20 prominent primary lateral veins on each side of the midrib. ***B. gigantea***
– Plants much smaller, at most 25 cm tall (usually very much less); leaf blades at most 20 cm long, with (0-)1-4 very weak primary lateral veins on each side of the midrib. 2
2. Appendix staminodes papillate-tuberculate. ***B. motleyana*** (*sensu* Bogner & Hay, 2000 *pro. parte minor*)
– Appendix staminodes smooth, surface unbroken, or with a deep irregular suture; filament of stamen strap-like, or rhomboidal (side view). 3
– Appendix staminodes with a deep U- or T-shaped suture; filament of stamen forming an oblique or scalene pyramid. ***B. magnifolia***
4. Filament of stamen strongly dorso-ventrally flattened, strap-like; thecae inserted on the ventral surface; thecae horns equalling the thecae, directed upwards; scale-like staminodes with the vental margin with a conspicuous raised rim; leaf blades elliptic-oblanceolate to weakly spathulate with a well-defined petiole. ***B. pygmaea***
– Filament of stamen rhomboidal, block-like, thecae inserted on the distal end; thecae horns much shorter than the thecae, directed outwards; scale-like staminodes without a raised rim along ventral margin ventrally; leaf blade linear-elliptic, petiole not well defined. ***B. catherineae***

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REFERENCES

BECCARI O., 1879 – *La più piccola delle Aracee*. Bull. R. Soc. Tosc. Ortic. 4: 179-181.

BECCARI O., 1902 – *Nelle foreste di Borneo, viaggi e ricerche di un naturalista*. Società Geografica Italiana. S. Landi, Firenze.

BECCARI O., 1904 – *Wanderings in the great forests of Borneo - travels and researches of a naturalist in Sarawak*, tr. by E.H. Giglioli, rev. & ed. by F.H.H. Guillemard. A. Constable & Co., Ltd. London

BOGNER J., 1980 – *The genus Bucephalandra Schott*. Aroideana 3(4): 134-143.

BOGNER J., 1984 – *Two New Aroids from Borneo*. Pl. Syst. Evol. 145: 159-164.

BOGNER J. & HAY A., 2000 – *Schismatoglottideae in Malesia II - Aridarum, Bucephalandra, Phymatarum and Piptospatha.* Telopea 9(1): 183-194.

BOYCE P.C., BOGNER J. & MAYO S.J., 1995 – *Bucephalandra catherineae, a new species from Kalimantan*. Curtis's Bot. Mag. 12(3), 150-153

ENGLER A., 1883. – In: BECCARI O. (ed.), *Malesia* 1:259-304, fig. 16-28.

ENGLER A., 1889 –ENGLER H.A.G. & PRANTL K.A.E., Nat. Pflanzenfam. Teil 2, Abt. 1-6, 102-164.

ENGLER A., 1912 – *Araceae-Philodendroideae-Philodendreae-Homalomeninae und Schismatoglottidinae.* In: ENGLER A. (ed.), Das Pflanzenreich 55(IV. 23Da):1-134. W. Engelmann, Berlin.

HOTTA M. 1965 – *Notes on Schismatoglottidinae of Borneo. I.* Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 32(1): 19-30.

OKADA H. & MORI Y., 2000 – *Three new species of Schismatoglottideae, Araceae, from Borneo.* Acta Phytotax. Geobot. 51: 1-9.

SCHOTT H.W., 1858 – *Genera Aroidearum*, 98 plates. C.Ueberreuter, Vienna.

Summary: Beccari's *Microcasia pygmaea* has been recollected in Sarawak after almost 145 years. Examination reveals, contrary to recent taxonomic treatments, it to be a distinct species (of the genus *Bucephalandra*) not conspecific with *Bucephalandra motleyana* Schott. *Microcasia pygmaea* Becc. is here transferred to *Bucephalandra* as **Bucephalandra pygmaea** (Becc.) P.C. Boyce & S.Y. Wong, **comb. nov.** Notes on taxonomically critical morphologies are provided. *Bucephalandra* is now considered to comprise five published accepted species, elucidated in a new key. Notes on the taxonomy of *Bucephalandra* and *Microcasia* are given and *Bucephalandra pygmaea* is illustrated from living plants.

APPENDIX A

Conspectus of *Bucephalandra* & *Microcasia*

Bucephalandra catherineae P.C. Boyce, Bogner & Mayo, Curtis's Bot. Mag. 12(3): 152. 1995.

TYPE: Indonesian Borneo, Kalimantan Timur, Apo Kayan, east of Long Nawan, Gunung Sungai Pendan, east ridge, 1 56 N; 115 1 E, 14 Oct. 1991, *E.F.de Vogel & P.J.Cribb 9210* (L! holo; iso K - spirit coll. no 57575!).

NOTES: Known with certainty only from the type locality. Morphologically rather similar plants are known from Nangga Pinoh (Kalimantan Barat), but have yet to flower and enable confirmation of their identity.

Bucephalandra gigantea Bogner, Pl. Syst. Evol. 145: 159, Fig. 1 & 2 (1984); Bogner & Hay, Telopea 9(1): 196. 2000.

TYPE: Indonesian Borneo, Kalimantan Timur ('Central East Borneo'), W. Koetai, Kiau River, 25 Oct 1925, *F.H. Endert 4580* (K! holo; iso BO!, L!).

NOTES: Presently the largest described species, and remarkable for the size of the leaf blades. Known only from the type locality.

Bucephalandra magnifolia H. Okada & Y. Mori, Acta Phytotax. Geobot. 51: 4. 2000.

TYPE: Indonesian Borneo, Kalimantan Timur, Bulungan, Long Bawan, G. Malim, 11 Sept. 1990, *H. Okada & D. Komara 5024* (TI, holo; iso BO!).

NOTES: Known definitely from the type locality. Plants in cultivation from further east (Malinau) are in cultivation but as yet un-flowered.

Bucephalandra motleyana Schott, Gen. Aroid.: t. 56 (1858); Engler in H.G.A. Engler, *Pflanzenr*. 55 (IV.23Da): 122, Fig. 74. 1912.

TYPE: Indonesian Borneo, Kalimantan Selatan, (Banjarmasin?), *J.Motley 404* (K!, holo).

NOTES: It is not certain where Motley's collection originates, although it very probably is from the area around Banjarmasin, where from 1854 Motley superintended the Julia Hermina coal mine at Kalangan. During this time, as he had from Labuan, Motley sent plant material, including living aroids, to Europe. Motley, his wife, and three children were murdered at Kalangan on the 1st May 1859 during a local uprising at the start of the Bandjarmasin War.

Despite almost universal application in literature and on the internet of the name *B. motleyana* we have not seen any plants that convincingly match this species. It is quite likely a local endemic.

Bucephalandra pygmaea (Becc.) P.C. Boyce & S.Y. Wong, Webbia 67(2): 142. 2012.

Microcasia pygmaea Becc., Bull. Real. Soc. Tosc. Ortic. 4: 180. 1879.

Engler in O.Beccari, Malesia 1: 290, t. 22, f. 22-24 (1883) & in H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 2(3): 132, Fig. 85 (1887) & in H.G.A.Engler, Pflanzenr. 55(IV.23Da): 128-130, Fig. 77 A-D (1912).

TYPE: Malaysian Borneo, Sarawak, Sarikei Division, Julau, Sungai Entabai, 28 Oct. 1867 (annotated on FI sheet), or Sept. 1867 (annotated on B sheet, and stated in Beccari, 1879), or 26th October 1867 (stated in Beccari, 1902, 1904), *O.Beccari PB 3883* (FI-B!, holo; iso B!).

Microcasia elliptica Engl., Bull. Real. Soc. Tosc. Ortic. 4: 299.1879.

Engler in O.Beccari, *Malesia* 1: 290, t. 25, f. 2-3 (1883) & in H.G.A.Engler, *Pflanzenr*. 55 (IV.23Da): 128-130, Fig. 77 (1912).

TYPE: Malaysian Borneo, Nov. 1866, *O. Beccari PB 2817* (FI-B!, holo).

NOTES: We have seen no living flowering plants that match this species. The Type specimen makes no mention of the collecting site but it is possible from the collecting date of November 1866 to speculate a probable locality. Beccari's itinerary for November 1866 is entirely in SW Sarawak: "middle of Nov. [1866] starting to the upper waters of the Sarawak River, Tappo Kakas [1 11 30 N 110 12 30 E], G(unung) Wa (Nov. 19), Pan(g)kalan Ampat [1 11 00 N 110 15 00 E], Senna (Nov. 23), G(unung) Braam (Braang) - 1 13 30 N 110 16 00 E), Koom (Nov. 26)" - www.nationaalherbarium.nl/FMCollectors/B/BeccariO.htm#1866. These areas all belong to the Penrissen karst limestone formation.

Microcasia muluensis M. Hotta, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 32(1): 20, Fig. 1A-F. 1965.

TYPE: Malaysian Borneo, Sarawak, Miri ('4th Divn,'), along Sg. Payau from Sg. Melinau Paku to Rubang Payau, foot of G. Mulu, 22 March 1964, *M. Hotta 15329* (KYO!, holo).

NOTES: There are at least two species present at Mulu pertinent to *Bucephalandra*. One is karst limestone-restricted and very likely referable to *M. muluensis*. Another is restricted to shales in the SW and NE of the park, and to sandstone in the central part of the park. It is not clear if these represent one or more taxa. Further work is required before definitively assigning to species of *Bucephalandra*.

Microcasia oblanceolata M. Hotta, Mem. Coll. Sci. Kyoto Imp. Univ., Ser. B, Biol. 32(1): 21. 1965.

TYPE: Brunei Darussalam, Temburong Prov., vicinity of Labu, Bukit Peradayan, 25 Jan. 1964, *M. Hotta 13586* (KYO!, holo; iso L!, SAR!).

NOTES: See notes under *Microcasia muluensis*.