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Abstract

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Two new species of *Bucephalandra* Schott are described and illustrated from Kalimantan Barat, Indonesian Borneo: *B. micrantha* S. Y. Wong & P. C. Boyce and *B. spathulifolia* Engl. ex S. Y. Wong & P. C. Boyce, the epithet of the second name adopted from an unpublished Engler name: “*Microcasia spathulifolia*”. Together these take *Bucephalandra* to 29 species. Both novelties are illustrated from living plants, and inserted into the most recent identification key to *Bucephalandra* species.

Additional key words: Indonesia, Kalimantan, rheophytic

Introduction

The most recent account of *Bucephalandra* Schott accepted 27 species, of which 19 were newly described, and three were transfers from congeneric *Microcasia* Becc. (Wong & Boyce 2014). Mention was then made that a considerable number of plants in the living collection underpinning the account still remained taxonomically unplaced, and were likely additional novelties; it was also noted that taxonomic interpretation of the abundant herbarium material posed considerable difficulties.

Recently two of these hitherto undetermined living collections have flowered and proven to be additional taxonomic novelties. Their unique defining combinations of characteristics are highlighted here in modifications to the key presented in Wong & Boyce (2014). One of these,

described below as *Bucephalandra micrantha* S. Y. Wong & P. C. Boyce, is remarkable for the diminutive stature of the plant and inflorescence, even in a genus notable for the tininess of some of its constituent species. The other species, proposed here as *B. spathulifolia* Engl. ex S. Y. Wong & P. C. Boyce, offers an almost unique example of the occurrence of a living plant precisely matching a historical herbarium specimen.

Results and Discussion

Bucephalandra micrantha S. Y. Wong & P. C. Boyce, **sp. nov.** – Fig. 1.

Holotype: Indonesian Borneo, Kalimantan Barat, Singtong, Sepauk, Kayu Lapis, village at km 46 on road to

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Fig. 1. *Bucephalandra micrantha* – A: plant in cultivation; B & C: inflorescence at pistillate anthesis, dorsal (B) and ventral (C) views; D: inflorescence at staminate anthesis, lower spathe artificially removed to reveal entire spadix; note the deflexed interstice staminodes and staminate flowers; E: inflorescence at staminate anthesis viewed from above; note the almost fallen spathe limb. – All from *Hiroyuki Kishi AR-4080*. – Photographs by Peter C. Boyce.

SE of Kayu Lapis, 00°14'39.7"S, 111°08'29.1"E, 10 Dec 2012, *Hiroyuki Kishi AR-4080* (BO! [alcohol]; isotype: SAR! [alcohol]).

Diagnosis — *Bucephalandra micrantha* is most similar to *B. belindae* S. Y. Wong & P. C. Boyce, differing by the little-branched shortly creeping stems rooting profusely (vs stems much-branched and elongated, not rooting along their length), and by a spadix interstice with c. 3 solitary green staminodes (vs interstice with a complete whorl of white staminodes).

Description — *Herbs* very diminutive, c. 1 cm tall, obligate rheophytic, occurring as extensive dense mats with roots strongly adhering to substrate. *Stem* slender, c. 1 mm in diam., erect and much-branched from base. *Leaves* forming dense carpets of rosettes; *petiole* c. 8 mm long × c. 0.5 mm in diam., adaxially canaliculate, pale green with copious minute reddish speckles, sheathing at extreme base, wings extended into a narrowly ligular portion c. 5 mm long; *blade* very narrowly oblong-linear, c. 16 mm long × c. 2 mm wide, blades semi glossy medium green adaxially, reddish tinged abaxially, base cuneate, margins strongly undulate-crispulate, apex rounded and apiculate for c. 0.2 mm; *midrib* abaxially somewhat prominent; *primary lateral veins* 1 or 2, running almost parallel to margins and merging with blade tip; *secondary venation* adaxially forming an obscure reticulum; all other venation invisible. *Inflorescence* solitary; *peduncle* exceeding petioles, c. 1.5 cm long, longitudinally sulcate, pinkish red. *Spathe* broadly ovate, not constricted, c. 8 mm long; *lower spathe* funnel-form, green, fading to white at spathe-limb junction, persistent; *limb* inflating and gaping distally to form a rather wide opening at pistillate anthesis, caducous during staminate anthesis, white with sub-microscopic pinkish speckles, dorsal median vein pinkish red, tip blunt, greenish red. *Spadix* c. 5 mm long; *pistillate zone* sessile, c. 1 mm long × c. 2 mm in diam., with 2 spirals of pistils; *pistils* compressed globose, c. 0.75 mm in diam., bright green; *stigma* sessile, slightly impressed discoid-umbonate, c. ¼ diameter of ovary, moist but not obviously papillate at anthesis; *pistillodes* absent; *interstice* with 2 or 3 isolated scale-like staminodes, these c. 0.5 mm long and wide, somewhat thickened, initially erect (pistillate anthesis), during staminate anthesis reflexing until perpendicular to spadix axis, green during and post-anthesis; *staminate zone* c. 1.2 mm long × c. 2 mm in diam., consisting of 2 rows of flowers; *staminate flowers* each consisting of a single stamen; *stamen* c. 0.6 mm across, waxy white; *filament* short; *connective* strap-like; *thecae* inserted ventrally on connective, individually ellipsoid, c. 0.4 mm long × c. 0.2 mm wide, smooth, waxy white; *thecae horns* c. ½ length of associated theca, setaceous; *appendix* conoid-globose, c. 2.25 mm long × 1.5–2 mm in diam., glossy waxy white; *appendix staminodes* few, comparatively large, c. 1.5 mm in diam., rhomboidal, tops smooth, very

slightly impressed centrally. *Fruiting spathe* broadly funnel-form, somewhat obliquely inserted on peduncle, c. 4 mm in diam., medium green with slight pinkish red speckles, with green shield-shaped persistent staminodes, spent distal part of spadix shed; *fruits* and *seeds* not seen.

Distribution — *Bucephalandra micrantha* is known only from the type locality.

Ecology — *Bucephalandra micrantha* occurs on shaded granitic rocks in swift-flowing streams under moist low-land forest at c. 100 m above sea level.

Etymology — The epithet is combined from the Greek adjective, *mikros* (small), latinized to *micro*s, and the Greek noun, *anthos* (flower), treated as a Latin adjective, *anthus* (flowered); hence small-flowered.

Remarks — *Bucephalandra micrantha* is one of a group of species with very narrowly oblong leaf blades with undulate-crispulate margins. The other described species are *B. belindae* and *B. catherineae* P. C. Boyce & al. It is not yet clear if they constitute a natural assemblage, although differences in the spadix appendix staminodes suggest that they do not.

Bucephalandra spathulifolia Engl. ex S. Y. Wong & P. C. Boyce, **sp. nov.** – Fig. 2 & 3.

Holotype: “Borneo, Exp. Nieuwenhuis, 1898–1899”, Soengai Boeleng [?Sungai Boeloengan = Sungai Kajan, see Nieuwenhuis 1900: 262], 28 Oct 1898, *Amdjah* 127 (BO 1563010!). – See note below under Distribution.

Diagnosis — *Bucephalandra spathulifolia* is immediately distinguished from all other species in the genus by the spatulate leaves and globose brain-like spadix appendix.

Description — *Herbs* tufted, small, c. 4 cm tall, obligate rheophytic, occurring as small clumps with roots strongly adhering to substrate. *Stem* slender, c. 2 mm in diam., erect and much-branched from base. *Leaves* ascending; *petiole* c. 6 mm long × c. 0.5 mm in diam., slightly longitudinally ridged, adaxially deeply canaliculate, reddish brown, sheathing at extreme base, wings extended into a reddish brown narrowly ligular portion to c. 1.5 cm long; *blade* oblong-spatulate, c. 3.5 mm long × c. 5 mm wide, distal margins slightly undulate, blades semi-matte dark green adaxially, paler reddish olive-tinged abaxially, base bluntly cuneate, apex rounded and apiculate for c. 0.2 mm; *midrib* abaxially somewhat prominent, dark reddish, weakly ridged; *primary lateral veins* 2 or 3, merging with blade tip; *secondary venation* adaxially forming a very obscure reticulum; all other venation invisible. *Inflorescence* solitary; *peduncle* exceeding petioles, c. 2 cm long × c. 1.2 mm wide, longitudinally sulcate, dark red. *Spathe* broadly elliptic-ovate with dorsally somewhat incurving limb, ventrally weakly gibbose, not constricted, c. 2 cm



Fig. 2. *Bucephalandra spathulifolia* – A: plant in cultivation; B & C: inflorescence at pistillate anthesis, dorsal (B) and lateral (C) views; D: inflorescence at staminate anthesis, spathe artificially removed to reveal entire spadix; note the globose brain-like appendix. – All from *J. Setiawan Sutanto* AR-4227. – Photographs by Peter C. Boyce.



Fig. 3. *Bucephalandra spathulifolia*, holotype specimen (BO 1563010). – Photograph by Peter C. Boyce.

long; *lower spathe* funnel-form, green, fading to white at spathe-limb junction, persistent; *limb* inflating and gaping distally to form a wide opening at pistillate anthesis, caducous during staminate anthesis, white, dorsal median vein speckled pinkish red, tip blunt, red. *Spadix* c. 9 mm long; *pistillate zone* sessile, c. 2.25 mm long × c. 1.5 mm in diam., with c. 3 spirals of pistils; *pistils* compressed globose, c. 0.75 mm in diam., bright green; *stigma* sessile, slightly impressed discoid, c. ½ diameter of ovary, moist and papillate at anthesis; *pistillodes* absent; *interstice* with 2 rows of *scale-like staminodes*, these c. 1 mm long and wide, almost circular, thickened, initially erect (pistillate anthesis), during staminate anthesis reflexing until perpendicular to spadix axis, greenish white during anthesis, later turning green post-anthesis; *staminate zone* c. 2 mm long × c. 2.5 mm in diam., consisting of 3 rows of flowers; *staminate flowers* each consisting of a single stamen; *stamen* c. 0.6 mm across, white with at least some of thecae stained reddish pink; *filament* short; *connective* strap-like; *thecae* inserted ventrally on connective, individually ellipsoid, c. 0.4 mm long × c. 0.2 mm wide, separated by a deep suture, smooth, waxy white, occasionally stained reddish pink; *thecae horns* c. ⅓ length of associated theca, basally quite stout, remainder setaceous; *appendix* globose, c. 3 mm long × c. 3 mm in diam., glossy waxy medium yellow; *appendix staminodes* hardly individually differentiated, together forming a brain-like mass. *Fruiting spathe* broadly funnel-form, c. 6 mm in diam., pale green, with green shield-shaped persistent staminodes; *fruits* and *seeds* not seen.

Distribution — *Bucephalandra spathulifolia* is known from two localities c. 500 km apart separated by the Muller Range. *Amdjah 127* was made under the aegis of the Nieuwenhuis 1898–1899 central Borneo expedition, with a presumably field-written tag attached to one of the 10 mounted plants stating “Soengai Boeleng” with the date “28 Oct 98”. From this it is possible to conclude that *Amdjah 127* was collected in the Ulu (headwaters) of the Mahakam River, where the Nieuwenhuis expedition was based from shortly after 16 September 1898 until 13 April 1899. However, no such locality name appears in Nieuwenhuis’s account of the expedition (Nieuwenhuis 1900), although the index to this work provides two similarly spelled possibilities for approximately the correct date of the Ahdjah collection. One is Boeloengan, one of the Dutch Administrative zelfbesturen (self-governing) Native States, and which includes much of modern Kalimantan Timur to its border with present day Kalimantan Barat, including the headwaters of the Mahakam River between the Muller and Iran Ranges. The other is Boeloeng (appearing in the index as Nanga Boeloeng and Telang Boeloeng), and which equates to an area of the NE part of the Muller Range.

Ecology — At both known localities *Bucephalandra spathulifolia* occurs on Cretaceous sediments under per-

humid lowland forest, recorded at between 60 m and 150 m above sea level.

Etymology — The epithet is adopted from the unpublished name “*Microcasia spathulifolia*”, used by Engler on a label on the holotype specimen (Fig. 3). It is combined from the Latin feminine noun, *spathula* (a paddle-shaped stirring tool), and the Latin neuter noun, *folium* (leaf), referring to the spatulate leaf blades.

Remarks — *Bucephalandra spathulifolia* is one of the most highly distinctive species yet described, offering a good example that species well-differentiated as living plants are often impossible to describe solely on the basis of herbarium material even when it is adequate and fertile.

Additional specimens seen (paratypes) — **INDONESIAN BORNEO: KALIMANTAN BARAT:** Sanggau, Sekayam, Balai Karangan, 00°49'02.0"N, 110°28'04.5"E, 27 Sep 2013, *J. Setiawan Sutanto AR-4227* (BO! [alcohol], SAR! [alcohol]).

Bucephalandra spathulifolia and *B. micrantha* may be inserted in the key to *Bucephalandra* species presented in Wong & Boyce (2014) as follows:

4. Appendix ellipsoid, accounting for c. ⅓ of the spadix **5**
 - Appendix globose, or bullet-shaped to conoid, accounting for c. ½ of the spadix **13**
 5. Appendix bullet-shaped to conoid; leaf blade elliptic, margin smooth, petiole long and well defined. Sarawak: Sri Aman, Triassic-Jurassic sediments **9. *Bucephalandra elliptica***
 - Appendix globose; leaf blade spatulate, margin undulate, petiole short and not readily discernible. Kalimantan Barat: Cretaceous sediments. ***Bucephalandra spathulifolia***
- Then to 5 in Wong & Boyce (2014).
16. Spadix appendix globose, comprised of several small staminodes, waxy white; stems little-branched, creeping, rooting profusely to rocks. Kalimantan Utara: Gunung Sungai Pendan, rheophytic on basalt **5. *Bucephalandra catherineae***
 - Spadix appendix conoid, comprised of very few, large staminodes, glassy **17**
 17. Stems much-branched and elongated, not rooting along their length except occasionally; interstice with a complete whorl of white staminodes. Kalimantan Barat: Nanga Pinoh, granite cascades under mostly permanent water flow . . . **3. *Bucephalandra belindae***
 - Stems little-branched, creeping, rooting profusely to rocks; interstice with c. 3 solitary green staminodes. Kalimantan Barat: Sintang, shaded granitic rocks ***Bucephalandra micrantha***
- Then to 17 in Wong & Boyce (2014).

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