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Studies on Schismatoglottideae (Araceae) of Borneo XV: A Second Species of *Bakoa* from Indonesian Borneo

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Bakoa brevipedunculata is newly combined as a second species of the Bornean endemic genus *Bakoa* (Araceae: Schismatoglottideae), based on *Hottarum brevipedunculatum*. A new generic delimitation to *Bakoa* and a key to the species of *Bakoa* are presented.

Key words: *Bakoa*, Borneo, endemic, Indonesia, Kalimantan Barat

Using a combination of morphological and molecular analyses Boyce & Wong (2008) and Wong *et al*. (2010) convincingly demonstrated *Piptospatha* N. E. Br. *sensu* Bogner & Hay (2000) to be polyphyletic. One result of redefining *Piptospatha* as monophyletic was the recognition of a morphologically highly distinctive new genus, *Bakoa* P. C. Boyce & S. Y. Wong, with one species, *B. lucens* (Bogner) P. C. Boyce & S. Y. Wong restricted to a single sandstone waterfall in Bako National Park, Kuching, Sarawak, and with a solitary specimen (*A. Elsener H164*) from Kalimantan Barat.

Recent herbarium-based work in BO, L & K provided access to herbarium material not available to the author during the work leading to Boyce & Wong (2008), including the type *Hottarum brevipedunculatum* H. Okada & Y. Mori. On examination, this proved to represent a second species of *Bakoa*, differing from *B. lucens* by the staminate flower zone free and completely fertile [vs. basally adnate to the spathe on the dorsal side, sometimes with only the ventral-most stamens (those exposed by gaping spathe limb) fertile, or more extensively fertile, but always sterile on the dorsal side]; and the stigma reaching to almost the edge of the gynoecium. Re-examination of *Elsener H164* (not critically examined previously) confirmed that this also belongs in *B. brevipedunculata*. Therefore, *Bakoa* is redefined to include the second species, *B. brevipedunculata*.

Bakoa P. C. Boyce & S. Y. Wong, Bot. Stud. (Taipei) 49(4): 398 (2008).—Type: *Bakoa lucens* (Bogner) P. C. Boyce & S. Y. Wong

Small rheophytic herbs. *Stem* condensed. *Leaves* several to many together; petiole sheathing only at the extreme base, thence extended into a very narrowly triangular marcescent ligular portion; blade very narrowly elongate-elliptic, rather coriaceous; midrib abaxially prominent with 4–6 very fine but well-differentiated (darker than surrounding tissue) primary lateral veins on each side, these hardly differentiated in thickness from the secondary venation and diverging at ca. 30°; secondary veins adaxially more or less obscure, abaxially fine and rather faint, running to a thicker marginal vein; tertiary venation forming an inconspicuous tessellate reticulum abaxially. *Inflorescence* solitary to three together on a single shoot; peduncle erect to arching at anthesis with the spathe slightly down-turned and the spathe opening ventral, declinate post anthesis and during fruiting. *Spathe* weakly nodding; more or less oblanceolate, hardly constricted, with a long apiculate tip. *Spadix* adnate to the

spathe in the lower 1/2–2/3; female zone completely adnate to the spathe on the dorsal side; ovary depressed globose and weakly angular, placentation basal, ovules orthotropous, long-beaked; stigma sessile, narrower than, or overtopping the ovary, button-like, papillate; interpistillar staminodes absent from the female zone; sterile interstice somewhat thicker than the female zone, dorsally adnate to the spathe, composed of large truncate mostly irregularly polygonal staminodes; male zone subcylindric-ellipsoid, apically narrowly acute and sometimes sterile, basally free or adnate to the spathe on the dorsal side; stamens crowded, truncate, dumb-bell-shaped to irregularly rectangular from above, often with the connective irregularly broadened on one side; thecae each opening through a conspicuous, broad-rimmed pore. *Fruiting spathe* persistent, at fruit maturity very swiftly drying and thence by reflexing of the spadix the spathe recurving and opening basally and also tearing at the peduncle insertion to expose the fruits, at the same time spathe limb remaining distally convolute and still clasping the spadix appendix remains; fruiting peduncle initially declinate, later twisting through 180° and becoming arching-erect; berry depressed globular; seed ellipsoid, micropyle blunt, testa slightly ribbed.

Key to species of *Bakoa*

1a. Spadix adnate to the spathe on the dorsal side to half the length of the staminate flower zone, sometimes with only the ventral-most stamens (those exposed by gaping spathe limb) fertile, or more extensively fertile, but always sterile on the dorsal side; stigma button-like, ca. 1/3 diam. of gynoecium. Spathe fully persistent into fruiting (see Boyce & Wong [2008] for discussion) ..... *B. lucens*

1b. Spadix adnate to the spathe on the dorsal side onto until the end of the pistillate flower zone; staminate flower zone fully fertile; stigma disc-like, reaching the edge or even slightly overhanging the edge of the gynoecium. Upper 1/3 of spathe shedding post-anthesis (fide Okada & Mori, see below) ..... **B. brevipedunculata**

Bakoa brevipedunculata (H. Okada & Y. Mori) S. Y. Wong, **comb. nov.**

Basionym: *Hottarum brevipedunculatum* H. Okada & Y. Mori, Acta Phytotax. Geobot. 51: 7, figs 3 & 4C (2000). –*Piptospatha brevipedunculata* (H. Okada & Y. Mori) Bogner & A. Hay, Telopea 9(1): 203 (2000). —Type: Indonesia, Kalimantan Barat, Putussibau, a branch of upper stream of Sg. Kapuas, Sg. Keriau, Salim village, 13 Jan 1992, *H. Okada & D. Komara 32321* (holo- TI, n.v.; iso- BO!).

Evegreen rheophytic herb to ca. 30 cm tall. *Stem* condensed, to ca. 4.5 cm long, 0.8–1.5 cm diam., with strong roots to 2–3 mm diam, and variously developed smaller roots, but no fine roots. *Leaves* many together, crowded; petiole (8–)15–20(–35) cm long, 1.5–2.5 mm diam., canaliculate adaxially, sheathing at the extreme base, the wings of the sheath extended into a narrowly triangular, membranous, ligular portion 1.5–4 cm long, drying brown; blade coriaceous, shining green, lanceolate to narrowly elliptic, (7–)10–18 cm long, (1.4–)2–2.5 cm wide, the base cuneate and somewhat decurrent, the apex acuminate and apiculate for (2–)4–6 mm, the margin thickened and recurved; midrib abaxially very prominent, somewhat prominent adaxially; primary lateral veins not or hardly differentiated from the secondary venation, adaxially inconspicuous, numerous and dense ca. 1 mm apart, diverging at ca. 30° and running to a marginal vein; tertiary venation obscure. *Inflorescence* solitary, erect; peduncle much shorter than the petiole, 1.2–3 cm long, 1–1.8 mm diam. *Spathe* white at anthesis, 3–4 cm long, 5–7 mm wide, apiculate for 2–3 mm, persistent in the lower ca. 2/3, the upper part falling after anthesis (see note below). *Spadix* 2.5–3.5 cm long, sessile; adnate dorsally until the top of the pistillate flower zone; *pistillate flower*

zone ca. 5 mm long, ca. 4 mm diam.; ovary depressed-globular, ca. 1.5 mm diam.; stigma sessile, discoid, centrally somewhat impressed, ca. 1 mm diam.; *interpistillar staminodes* absent; *sterile interstice* isodiametric with the fertile zones, ca. 5 mm long; *staminate zone* subcylindric, 0.8–1.3 cm long, 5 mm diam.; *stamens* crowded, not regularly arranged, weakly dumbbell-shaped from above, flat-topped, ca. 1 mm across, with conspicuous circular pores; *appendix* tapering to an obtuse point, 1–1.3 cm long, basally ca. 5 mm diam.; staminodes of appendix flat-topped, irregularly polygonal, 1–1.5 mm diam. *Fruiting spathe* 2–2.5 cm long, 1–1.5 cm wide, senescence not observed; *Fruit* and berry ca. 4 mm diam., crowned with persistent stigma remnants; *seed* subglobular, ca. 1 × 1 mm, shallowly ribbed, brown, with a transparent blunt micropylar appendage ca. 0.8 mm long.

Distribution. Indonesian Borneo: Kalimantan Barat, Kalimantan Tengah.

Ecology. Rheophytic on rocks along rapid streams in perhumid moist lowland forest, ca. 100 m asl.

Other specimens examined. INDONESIA. **Kalimantan Barat.** Sanggau, 1 July 1968, *A. Elsener H184* (K, L). **Kalimantan Tengah.** Kuala Rekut–Busang, Muara Rekut, Project Barito Ulu base camp and environs, 0°02′S; 114°06′E, 23 May 1990, *C. E. Ridsdale PBU163* (BO, K, L).

Note. Okada & Mori (2000) reported the spathe senescence mechanics to consist of the upper 1/3 of the spathe limb shedding post anthesis, with the lower 2/3 persistent into fruit (maturity?). However, based on the isotype of *Hottarum brevipedunculatum* this cannot be verified. Indeed, the one inflorescence with the spathe partially shed appears to be the result of intended removal to facilitate examination of the spadix. Of other material available, both duplicates of *Elsener H164* are at pre-anthesis, while the BO and K duplicates *Ridsdale PBU163* both show signs of the spathe limb and upper spadix being broken, rather than the limb having been lost through post-anthesis abscission.

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