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Novitates Bruneienses, 5. *Polyalthia watui* (Annonaceae), a new tree species from Brunei, Borneo

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ABSTRACT. A new species, *Polyalthia watui*, is described. It resembles *Polyalthia bullata* King in having bullate leaves with a cordate base, but is distinguished by its flowers with shorter pedicels, longer sepals and petals, subsessile monocarps with long stiff erect hairs; and broad-obovate leaves with fewer pairs of secondary veins. The new species is only known from Brunei's Belait and Tutong districts and is very likely endemic to the Belait geosyncline that includes these areas.

Keywords. Annonaceae, biodiversity, Brunei, endemic species, *Polyalthia*, taxonomy

Introduction

The Annonaceae are a predominantly pantropical lowland forest family of trees, shrubs and lianas, estimated to include some 2440 species (Chatrou et al., 2012) in 122 genera (Rainer & Chatrou, 2014). *Polyalthia* Blume, a common Indo-Malesian genus in this family, was, until recently, a polyphyletic genus with some 170 accepted species, harbouring a morphologically heterogeneous assemblage of species. The reorganisation of the genus, correlating with molecular phylogenetic analyses, now recognises several distinct genera, including *Maasia* (Mols et al., 2008) *Fenerivia* Diels (Saunders et al., 2011), *Monoon* Miq. (Xue et al., 2012), *Huberantha* Chaowasku (Chaowasku et al., 2015), and *Polyalthia* s.s., as well as species that fall within *Marsypopetalum* Scheff. (Xue et al., 2011).

The taxonomically pruned version of *Polyalthia* is estimated to include some 80 species (Turner et al., 2014), with c. 30 species in Borneo (Turner, 2009, 2010; Turner et al., 2014). Various features in combination serve to distinguish the genus from others in Borneo: tree habit; hairs simple when present; non-glaucous leaves with non-prominent midrib on leaf upper surface and brochidodromous venation (with looping secondary veins); valvate perianth whorls with 3 sepals; apically flat and non-saccate petals in two similar whorls; non-verrucose non-clawed inner petals that are not tightly appressed over the reproductive parts; more than 3 carpels with 2–6 ovules per carpel; and commonly 1–2 seeds per carpel, each seed with a shallow circumferential groove (Turner et al., 2014).

In recent years, a distinctive species of *Polyalthia* with strongly bullate leaves has been collected in Brunei's Belait and Tutong districts, and during recent fieldwork there in 2015 under the auspices of the *Botanical Survey of Brunei Darussalam* programme organised by the Brunei Forestry Department and Singapore's National Parks Board (see Joffre et al., 2015), it was possible to further study this species in the field (Fig. 1). This unnamed species resembles several other species in individual characters but in the combination of characters it possesses it most resembles, and would appear to be most closely related to, *Polyalthia bullata* King (King, 1892; Sinclair, 1955; Turner et al., 2014). It also has similarities to *Polyalthia endertii* D.M.Johnson (Johnson & Murray, 1999). The new species is, however, clearly distinguished by characteristics of the flowers, fruits and leaves (Table 1). We are pleased to name this after Watu Awok of the Brunei National Herbarium's field team for his enthusiastic support and excellent company during field surveys, and for diligently searching out individuals of this extraordinary *Polyalthia* in the field.

Herbarium acronyms used follow Thiers (continuously updated). Conservation assessments follow the methodology of IUCN (2012). Dimensions in the description are for dried material. As shrinkage when dried can be quite pronounced, the dimensions from spirit material are also given for some flower parts.

Polyalthia watui K.M.Wong, **sp. nov.**

The new species resembles *Polyalthia bullata* King in having bullate leaves with a cordate base, but differs in its flowers with shorter (8–9 mm long) pedicels, 13–14 mm long ovate sepals, 24–31 mm long and 5–9 mm wide oblanceolate petals; monocarps with only 1–2 mm long stipes and stiff erect hairs mostly 3–5 mm long; and broad-obovate leaves with 16–18 pairs of secondary veins. In contrast, *Polyalthia bullata* has flowers with 10–25 mm long pedicels, 5–7 mm long lanceolate sepals, 21–25 mm long and 2–2.5 mm wide linear petals; monocarps with c. 5 mm long stipes and short hairs less than 1 mm long; and narrowly lanceolate to oblong-lanceolate leaves with 25–40 pairs of secondary veins. – TYPE: Brunei, Tutong, Lamunin, Bukit Sulang, Lamunin Forestry office, behind ex Plantation Nursery, 17 February 2005, flowers, *Muhammad Ariffin BRUN 21189* (holotype BRUN; isotypes K, SAN, SING). (Fig. 1, Table 1)

Treelet 1–4 m high; ***stem*** axes proximally vertical, distally curving over to a near-horizontal orientation, the older trunk developing from a sympodium of such proximal portions and attaining 1–3.5 cm diameter at the base; leafy branches near-horizontal. Young ***twigs*** densely covered with medium brown suberect 2–3 mm long hairs. ***Leaves*** distichously arranged throughout, broad-obovate, 20–25 cm long, 9–12 cm wide, apex acute to obtuse or rounded, base markedly cordate, auriculate, the basiscopic auricle conspicuously larger than the acroscopic auricle, the auricles overlapping the twig, chartaceous to thin-coriaceous, bullate, above glabrous except for the densely brown short-hairy midrib, below with dense brown suberect 1.5–2 mm long hairs on the midrib and sparse brown suberect 0.5–1 mm long hairs on the secondary veins, midrib sunken above and prominent below, secondary veins 16–18 pairs, forming bold loops near the margin, sunken above and prominent below, tertiary and higher-order venation subscalariform to reticulate, sunken above and prominent below, medium green and

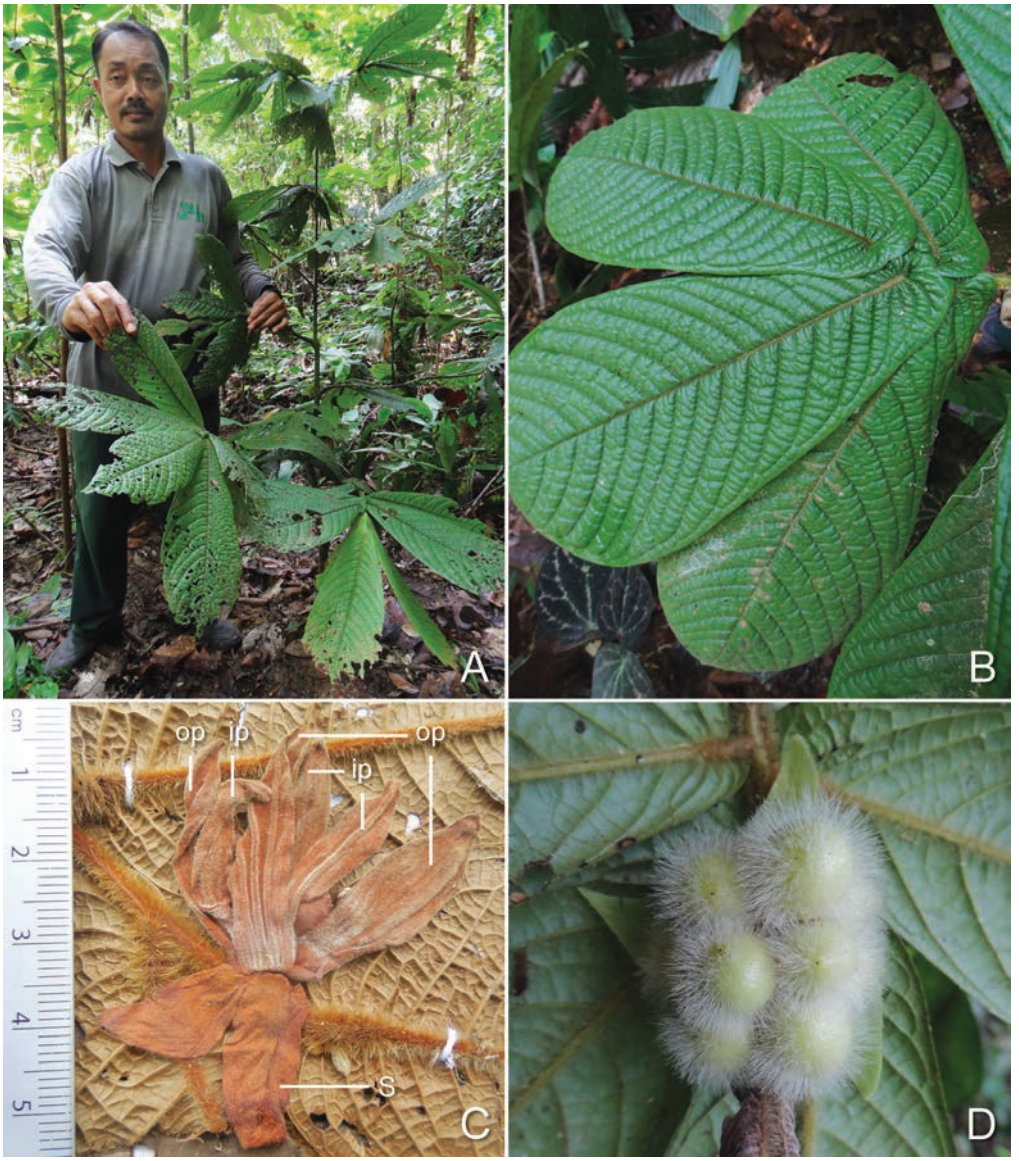

Fig. 1. *Polyalthia watui* K.M.Wong. **A.** Mature treelet displayed by Watu Awok of the Brunei National Herbarium. **B.** Strongly bullate leaf supper surfaces. **C.** A flower from the type specimen BRUN 21189 showing sepals (only one out of 3 indicated, s), 3 outer petals (op) and 3 inner petals (ip). **D.** Monocarps covered in white erect long hairs and basally subtended by the 3 persistent sepals. (Photos: A, B, D: K.M. Wong; C: Muhammad Ariffin)

slightly reflective above, pale grey-green and matt beneath, subsessile, petioles 4–8 mm long, stout. ***Flowers*** solitary, axillary to extra-axillary, deflexed to a pendulous position, pedicels 8–9 mm long (to 12 mm long in spirit material). ***Sepals*** 3, broad-ovate, apex acute, 13–14 mm long, 5–6 mm wide (29 mm long, 15 mm wide in spirit

Table 1. Comparison of *Polyalthia bullata* King, *P. endertii* D.M.Johnson and the new species. (Measurements are from dried herbarium material.)

Character	***Polyalthia bullata***	***Polyalthia endertii***	***Polyalthia watui***
Flower pedicels	10–25 mm long	c. 20 mm long	8–9 mm long
Flower sepals: shape, size	Lanceolate, 5–7 mm long, 1.5–2 mm wide	Lanceolate-ovate, 20–21 mm long, 11 mm wide	Ovate, 13–14 mm long, 5–6 mm wide
Petals: shape, size	Linear, 21–25 mm long, 2–2.5 mm wide	Oblanceolate, c. 27 mm long, 7 mm wide	Oblanceolate to strap-shaped, 24–31 mm long, 5–9 mm wide
Persistent sepals of fruit	5–7 mm long, 3–4 mm wide	(Unknown)	20–29 mm long, 10–15 mm wide
Monocarp stipes	c. 5 mm long	(Unknown)	1–2 mm long
Monocarp surface	Puberulous, hairs less than 1 mm long	(Unknown)	Covered in stiff erect hairs 3–5 mm long
Leaf shape	Narrowly lanceolate to oblong-lanceolate	Oblanceolate, slightly panduriform	Broad obovate
Leaf dimensions	25–50 × 0.5–12 cm	16.8–32 × 4.8–8 cm	20–25 × 9–12 cm
Leaf lateral veins	25–40 pairs	20–27 pairs	16–18 pairs
Leaf surface	Conspicuously bullate	Generally plane, not bullate	Conspicuously bullate

material), coriaceous, sparsely pubescent on both sides, creamy yellow. ***Petals*** in 2 series of 3, oblanceolate to strap-like, apices acute, coriaceous, outer petals 29–31 mm long, 8–9 mm wide (45 mm long, 10 mm wide in spirit material), with 3–5 bold longitudinal ridges on the inner surface, inner petals 24–26 mm long, 5–6 mm wide (42 mm long, 6 mm wide in spirit material), with 1–3 bold longitudinal ridges on the inner surface, all densely covered with pale hairs mostly less than 1 mm long on both surfaces, creamy yellow in live material. ***Stamens*** numerous, connectives slightly convex, apices of anther connectives bright yellow (measurements not taken). ***Carpels*** 15 seen in a single flower, elliptic-subglobose, densely pubescent, stigma sub-capitate, puberulous. ***Monocarps*** subglobose, 5–7 mm diameter (10–15 mm diameter when fresh), pale green to yellowish green, densely covered with stiffly erect pale 3–5 mm long hairs, 2–12 together (very rarely solitary) embraced by the 3 persistent ovate sepals 20–29 mm long, 10–15 mm wide (25–30 mm long, 20–25 mm wide when fresh); stipes 1–2 mm long. ***Seeds*** 2, plano-convex, with a shallow circumferential groove near the edge of the plane surface; endosperm glassy, ruminate by thin laminar intrusions of the seed coat.

Additional specimens examined. BRUNEI: **Belait:** Labi, Labi Hills Forest Reserve, Compartment 49, Ulu Sg. Rampayoh, 20 May 2009, fruits, *Azlan BRUN 22629* (BRUN, K, SAN, SING); **Tutong:** Rambai, Ladan Hills Forest Reserve, Benutan Dam catchment forest, tributary of Sungai Benutan, 7 Jun 2015, fruits, *Wong & Watu WKM 3425* (BRUN, SING), Ladan Hills Forest Reserve, Nyamokning West, southeast of LP 230, 4º24.45'N 114º48.36'E, 35 m asl, riverine mixed dipterocarp forest, 6 Jun 1996, fruits, *Joffre BRUN 17529* (BRUN).

Distribution. So far known only from Brunei, in the Belait and Tutong districts, in small populations. As discussed by Joffre et al. (2015), the Belait syncline covering both these districts is a geo-ecologically well-defined enclave that is likely to harbour its own endemic taxa. Given that the adjacent parts of Sarawak and nearby southwest Sabah have been generally well-collected and this species has not been documented in those territories, it is not likely to have a wider distribution than in these districts. The related *Polyalthia bullata* is known from Peninsular Malaysia and all territories in Borneo, including in adjacent Sarawak as well as Brunei (*Wong WKM 1710* (BRUN, K, SING)).

Habitat. Understorey of mixed dipterocarp forest on sandy clays and alluvium criss-crossed by shallow streams feeding tributaries of the Belait and Tutong rivers. The more widely distributed *Polyalthia bullata* also occurs in lowland forest but on hillsides and river terraces that are not as low-lying and moist as the habitat of *P. watui*.

Provisional IUCN conservation assessment. *Polyalthia watui* is so far documented only from undisturbed lowland primary forest in the Labi Hills Forest Reserve, Belait district, and several pockets in the Ladan Hills Forest Reserve, Tutong district. The IUCN status proposed here is Least Concern (LC) as the species is protected in forest reserves with no imminent threats. The Brunei Government officially announced in 2014 that logging will be phased out in all forest reserves (Brunei Times, 2014).

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References

Brunei Times (2014). Logging no longer allowed in forest reserves: Ministry of Industry and Primary Resources. 23 March 2014. http://bt.com.bn/news-national/2014/03/23/logging-no-longer-allowed-forest-reserves-mipr (accessed on 13 Feb. 2015).

Chaowasku, T., Johnson, D.M., Van der Ham, R.W.J.M. & Chatrou, L.W. (2015). *Huberantha*, a replacement name for *Hubera* (Annonaceae: Malmeoideae: Miliuseae). *Kew Bull.* 70: 23.

Chatrou, L.W., Pirie, M.D., Erkens, R.H.J., Couvreur, T.L.P., Neubig, K.M., Abbott, R.J., Mols, J.B., Maas, J.W., Saunders, R.M.K. & Chase, M.W. (2012). A new higher-level classification of the pantropical flowering plant family Annonaceae informed by molecular phylogenetics. *Bot. J. Linn. Soc.* 169: 5–40.

IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1.* 2nd ed. Switzerland, Gland and UK, Cambridge: IUCN.

Joffre, A.A., Ariffin, M.A.K., Low, Y.W. & Wong, K.M. (2015). Novitates Bruneienses, 1. A background to the botanical survey of Brunei Darussalam, and a new species of *Jarandersonia* (Malvaceae). *Gard. Bull. Singapore* 67(1): 51–60.

Johnson, D.M. & Murray, N.A. (1999). Four new species of *Polyalthia* (Annonaceae) from Borneo and their relationship to *Polyalthia insignis*. *Contr. Univ. Michigan Herb.* 22: 95–104.

King, G. (1892) Materials for a Flora of the Malay Peninsula. No. 4. *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 61(1): 1–130.

Mols, J.B., Kessler, P.J.A., Rogstad, S.H. & Saunders, R.M.K. (2008). Reassignment of six *Polyalthia* species to the new genus *Maasia* (Annonaceae): molecular and morphological congruence. *Syst. Bot.* 33: 490–494.

Rainer, H. & Chatrou, L.W. (2014). AnnonBase: world species list of Annonaceae, ver. Jan. 2014. http://www.sp2000.org and http://www.annonaceae.org (accessed on 14 Oct. 2015).

Saunders, R.M.K., Su, Y.C.F. & Xue, B. (2011). Phylogenetic affinities of *Polyalthia* species (Annonaceae) with columellar-sulcate pollen: Enlarging the Madagascan endemic genus *Fenerivia*. *Taxon* 60: 1407–1416.

Sinclair, J. (1955). A revision of the Malayan Annonaceae. *Gard. Bull. Singapore* 14: 149–518.

Thiers, B. (continuously updated). Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/ (accessed on 30 Jul. 2015).

Turner, I.M. (2009). New species and nomenclatural combinations in *Polyalthia*, *Meiogyne* and *Mitrella* (Annonaceae) from Borneo. *Malayan Nat. J.* 61: 267–276.

Turner, I.M. (2010). New species of *Polyalthia* (Annonaceae) from Borneo and their relationship to *Polyalthia cauliflora*. *Nordic J. Bot.* 28: 267–279.

Turner, I.M., Weerasooriya, A.D., Saunders, R.M.K. & Ganesan, S.K. (2014). Annonaceae. In: Soepadmo, E., Saw, L.G., Chung, R.C.K. & Kiew, R. (eds) *Tree Flora of Sabah and Sarawak*, vol. 8. Kepong, Malaysia: Sabah Forestry Department, Forest Research Institute Malaysia & Sarawak Forestry Department.

Xue, B., Su, Y.C.F., Mols, J.B., Kessler, P.J.A. & Saunders, R.M.K. (2011). Further fragmentation of the polyphyletic genus *Polyalthia* (Annonaceae): molecular phylogenetic support for a broader delimitation of *Marsypopetalum*. *Syst. Biodivers.* 9: 17–26.

Xue, B., Su, Y.C.F., Thomas, D.C. & Saunders, R.M.K. (2012). Pruning the polyphyletic genus *Polyalthia* (Annonaceae) and resurrecting the genus *Monoon*. *Taxon* 61: 1021–1039.