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Research article

Whither *Polyalthia* (Annonaceae) in Peninsular Malaysia? Synopses of *Huberantha*, *Maasia*, *Monoon* and *Polyalthia* s.s.

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Abstract. An updated classification of *Polyalthia* in Peninsular Malaysia is presented. A synopsis (listing of species with synonymy and typification, and keys to species) is presented for the genera *Huberantha*, *Maasia*, *Monoon* and *Polyalthia sensu stricto*. One new species (*Polyalthia pakdin* I.M.Turner & Utteridge sp. nov.) is described and a conservation assessment presented for it. *Monoon xanthopetalum* Merr. represents a new record for Peninsular Malaysia. Six new lectotypes are designated.

Keywords. *Enicosanthum*, *Huberantha*, *Maasia*, *Monoon*, *Polyalthia*.

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Introduction

When Sinclair (1955) revised the Annonaceae of the Malay Peninsula he recognised 32 species of *Polyalthia* Blume (including *Polyalthia evecta* Finet & Gagnep. from Peninsular Thailand still unrecorded from Peninsular Malaysia, and the cultivated *Polyalthia longifolia* (Sonn.) Thwaites). The 30 native species made *Polyalthia* the largest genus in the family as represented in the Malayan flora. The genus was characterised by Sinclair largely in terms of floral morphology including subequal corolla whorls of spreading, relatively flat, petals, numerous flat-topped stamens and many carpels with 1–5 ovules each. Sinclair considered the genus to be divisible into two sections that he called 'Polyalthia section Eu-Polyalthia' (correctly *Polyalthia* section *Polyalthia*) and *Polyalthia* section *Monoon* (Miq.) Benth. & Hook.f. Sinclair appeared confident in the classification, noting the *Polyalthia* was a large genus 'but very uniform'. However, in recent years the homogeneity of *Polyalthia* has come under close scrutiny with a growing conviction that it represented an unnatural grouping. Molecular analyses have confirmed the polyphyletic nature of *Polyalthia sensu lato* leading to a process of dismemberment as species have been transferred to various different genera. Of relevance to the species included in *Polyalthia* by Sinclair, section *Monoon* has been raised again to generic rank (Xue *et al.* 2012) (14 spp. of Sinclair's native *Polyalthia* species) and includes *Enicosanthum* Becc. (7 spp. recognised by Sinclair). Three of Sinclair's section *Monoon* species are now recognised in the new genus *Maasia* Mols *et al.* (Mols *et al*. 2008) and two in *Huberantha* Chaowasku in Chaowasku *et al.* [Chaowasku *et al.* 2015, originally named *Hubera* Chaowasku in Chaowasku *et al.* (Chaowasku *et al*. 2012) but this was considered to be an illegitimate later homonym of *Huberia* DC. (Melastomataceae)]. The 17 species Sinclair recognised in 'section Eu-Polyalthia' are all now deemed to belong in *Polyalthia sensu stricto*.

Some Asian *Polyalthia* species have also been transferred to *Marsypopetalum* Scheff. (Xue *et al.* 2011), but this has not affected any of the species native to Peninsular Malaysia.

In this paper, we review these changes in the taxonomy of *Polyalthia* and associated genera in Peninsular Malaysia. This is done by providing synopses of the four genera *Huberantha*, *Maasia*, *Monoon* Miq. and *Polyalthia* including keys to the species. One new species of *Polyalthia* is described and a conservation assessment for it provided.

Materials and methods

Material in the herbarium of the Royal Botanic Gardens Kew (K) and a loan of Annonaceae specimens from the herbarium of the Forest Research Insitute of Malaysia (KEP) was examined. For the new species, specimens were geo-referenced using Hamidah *et al.* (2011), and a conservation assessment was made following IUCN criteria (IUCN 2012) using Geocat to estimate the Extent of Occurrence (EOO) and Area of Occupancy (AOO) (http://geocat.kew.org; Bachman *et al.* 2011).

Results

Order Magnoliales Juss. ex Bercht. & J.Presl
Family Annonaceae Juss.
Subfamily Malmeoideae Chatrou & al.
Tribe Miliuseae Hook.f. & Thomson

Key to genera

1. Lower surface of leaves densely covered with minute papillae giving a white or glaucous appearance ..... ***Maasia***
– Leaves not white or glaucous below 2

2. Leaf venation herringbone (eucamptodromous) with insertion of lateral veins to the midrib decurrent; intercostal venation scalariform to subscalariform ..... ***Monoon***
– Leaf venation looping (brochidodromous) with insertion of the lateral veins to the midrib not decurrent; intercostal venation reticulate 3

3. Leaf base generally more or less symmetrical, not (sub)cordate. Ovules 1 per carpel. Seeds 1 per monocarp ..... ***Huberantha***
– Leaf base generally more or less asymmetrical, often (sub)cordate. Ovules usually 2–6 per carpel. Seeds usually 2 or more per monocarp ..... ***Polyalthia***

Maasia Mols *et al.*

Systematic Botany 33: 493 (Mols *et al.* 2008). – Type: *Maasia hypoleuca* (Hook.f. & Thomson) Mols *et al.*

Key to species of *Maasia*

1. Leaves generally not exceeding 8 cm long, 3 cm wide. Flowering pedicel to 5 mm long, petals to 6 mm long. Monocarps ellipsoidal, few (5 or less), not exceeding 2 cm long ..... ***M. hypoleuca***
– Leaves generally more than 8 cm long, 3 cm wide. Flowering pedicel more then 5 mm long, petals more than 6 mm long. Monocarps globose or if ellipsoidal then many (generally 10 or more) and more then 2 cm long at maturity 2

2. Flowering pedicel more than 17 mm long, *c.* 1 mm thick, petals more than 1 cm long. Monocarps ellipsoidal ..... ***M. sumatrana***
– Flowering pedicel to 17 mm long, *c.* 0.5 mm thick, petals to 8 mm long. Monocarps globose .... ***M. glauca***

Maasia glauca (Hassk.) Mols *et al.*

Systematic Botany 33: 493 (Mols *et al.* 2008). – *Uvaria glauca* Hassk., *Flora (Beiblätter)* 25, 2 (2): 31 (Hasskarl 1842). – *Guatteria glauca* (Hassk.) Miq., *Flora van Nederlandsch Indië* 1 (2): 49 (Miquel 1858), *nom. illegit.*, *non G. glauca* Ruiz & Pav. (Ruiz & Pavon 1798). – *Monoon glaucum* (Hassk.) Miq., *Annales Musei Botanici Lugdunu-Batavi* 2: 19 (Miquel 1865). – *Polyalthia glauca* (Hassk.) F.Muell., *Descriptive notes on Papuan plants. Appendix*: 95 (von Mueller 1877). – Lectotype (designated by Turner 2011: 46): Indonesia, Java, *J.K. Hasskarl s.n.* (L (L 0188666)). – Epitype (designated by Turner 2011: 46): Indonesia, Java: Udjung Kulon Reserve, Mt Pajung, 17 Nov. 1960, *A.J.G.H. Kostermans et al. UNESCO 165* (holo-: L (L 0188665); iso-: A, BO, G, K).
Guatteria hypoleuca Miq., *Flora van Nederlandsch Indië. Supplementum primum. Prodromus florae sumatranae*: 381 (Miquel 1861). – Lectotype (designated by Rogstad 1989: 209): Indonesia, Sumatra: Priaman, *s. dat.*, *H. Diepenhorst s.n.* [Herb. Bogor. no. 2095] (U (U 0000368)).
Unona merrittii Merr., *Philippine Journal of Science 1, supplement III*: 190 (Merrill 1906). — *Polyalthia merrittii* (Merr.) Merr., *Philippine Journal of Science. Section C, Botany* 10: 250 (Merrill 1915). – Lectotype (designated by Turner 2011: 46): Philippines, Mindoro, Bongabong River, Feb. 1906, *H.N. Whitford 1447* (hololecto-: K (K000691629); isolecto-: US).
Polyalthia parkinsonii Hutch., *Bulletin of Miscellaneous Information, Kew* 1917: 25 (Hutchinson 1917). – Lectotype (designated by Turner 2011: 46): India, Andaman Islands, Bom-Ling-La, 11 Feb. 1916, *C.E. Parkinson 943* (hololecto-: K (K000691470); isolecto-: K (K000691469)).

Description and distribution

Sinclair (1955: 321), Kochummen (1972: 88), Rogstad (1989: 209–212), Turner (2014: 74–75).

Maasia hypoleuca (Hook.f. & Thomson) Mols *et al.*

Systematic Botany 33: 493 (Mols *et al.* 2008). – *Polyalthia hypoleuca* Hook.f. & Thomson, *The Flora of British India* 1: 63 (Hooker & Thomson 1872). – Lectotype (designated by Rogstad 1989: 227): Singapore, Sep. 1867, *A.C. Maingay 1516A* [Kew Distrib. no. 50] (K (K000691444)).

Description and distribution

Sinclair (1955: 320–321), Kochummen (1972: 88), Rogstad (1989: 227–229), Turner (2014: 75–76).

Maasia sumatrana (Miq.) Mols *et al.*

Systematic Botany 33: 493 (Mols *et al.* 2008). – *Guatteria sumatrana* Miq., *Flora van Nederlandsch Indië. Supplementum primum. Prodromus florae sumatranae*: 380 (Miquel 1861). – *Monoon sumatranum* (Miq.) Miq., *Annales Musei Botanici Lugdunu-Batavi* 2: 19 (Miquel 1865). – *Polyalthia sumatrana* (Miq.) Kurz, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 43: 53 (Kurz 1874). – Lectotype (designated by Rogstad 1989: 220): Indonesia, Sumatra, Priaman Province, *H. Diepenhorst s.n.* [Herb. Bogor. 2342] (U (U 0000372)).

Description and distribution

Sinclair (1955: 319–320), Kochummen (1972: 91), Rogstad (1989: 229–221), Turner (2014: 76–78).

Huberantha Chaowasku in Chaowasku *et al.*

Kew Bulletin 70 (2)-23: 1 (Chaowasku *et al.* 2015). – *Hubera* Chaowasku in Chaowasku *et al.*, *Phytotaxa* 69: 46 (Chaowasku *et al.* 2012), *non Huberia* DC. (de Candolle 1828). – Type: *Hubera cerasoides* (Roxb.) Chaowasku.

Key to species of *Huberantha*

1. Sepals suborbicular, to 3 mm long; petals drying uniformly pale brown .... ***H. jenkinsii***
– Sepals triangular, *c.* 6 mm long or more; petals often drying with powdery yellow patches ……..... ..... ***H. rumphii***

Huberantha jenkinsii (Hook.f. & Thomson) Chaowasku in Chaowasku *et al*.

Kew Bulletin 70 (2)-23: 2 (Chaowasku *et al.* 2015). – *Guatteria jenkinsii* Hook.f. & Thomson, *Flora Indica*: 141 (Hooker & Thomson 1855). — *Polyalthia jenkinsii* (Hook.f. & Thomson) Hook.f. & Thomson, *The Flora of British India* 1: 64. (Hooker & Thomson 1872). – *Hubera jenkinsii* (Hook.f. & Thomson) Chaowasku in Chaowasku *et al*., *Phytotaxa* 69: 48 (Chaowasku *et al*. 2012). – Lectotype (designated by Turner 2011: 73): India, Assam, *s.dat*., *F. Jenkins s.n.* (K (barcode no. K000691481)).
Polyalthia andamanica Kurz ex King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 53 (King 1892). – Lectotype (designated by Turner 2011: 74): India, Andaman Islands, South Andaman, Namanagha, 13 Dec. 1890, *King's Collector* [H.H. Kunstler] *s.n*. (hololecto-: K (K000739193); isolecto-: K).
Polyalthia havilandii Boerl., *Icones Bogorienses* 1: 107, t. 66 (Boerlage 1899a). – Type: Borneo, Sarawak, near Kuching, 15 Feb. 1894, *G.D. Haviland 2* (holo-: BO (sheet no. BO-1352593); iso-: L (L 0188829)).
Polyalthia cumingiana Merr., *Publications of the Bureau of Science Government Laboratories* 35: 71 (Merrill 1905). – Lectotype (designated by Turner 2011: 74): Philippines, Luzon, Prov. Tayabas, *H. Cuming 827* (hololecto-: K (K000691639); isolecto-: K [×2], NY, WU).
Unona agusanensis Elmer, *Leaflets of Philippine Botany* 5: 1743 (Elmer 1913). – *Polyalthia agusanensis* (Elmer) Merr., *Philippine Journal of Science. Section C, Botany* 10: 250 (Merrill 1915). – Lectotype (designated by Turner 2011: 74): Philippines, Mindanao, Province of Agusan, Cabadbaran (Mt Urdaneta), Sep. 1912, *A.D.E. Elmer 13654* (hololecto:- NY (00026313); isolecto-: A, K, L).

Description and distribution

Sinclair (1955: 305–306), Kochummen (1972: 88), Turner (2014: 71–72).

Huberantha rumphii (Blume ex Hensch.) Chaowasku in Chaowasku *et al*.

Kew Bulletin 70 (2)-23: 2 (Chaowasku *et al.* 2015). — *Guatteria rumphii* Blume ex Hensch., *Vita G. E. Rumphii*: 153 (Henschel 1833). – *Polyalthia rumphii* (Blume ex Hensch.) Merr., *An Enumeration of Philippine flowering plants* 2: 162 (Merrill 1923). – *Hubera rumphii* (Blume ex Hensch.) Chaowasku in Chaowasku *et al*., *Phytotaxa* 69: 50 (Chaowasku *et al*. 2012). – Type: Entirely based on Arbor nigra parvifolia of Rumphius, *Herbarium Amboinense* 3: 10, t 4, f 2, t 5 (Rumphius 1743).
Guatteria canangioides Rchb.f. & Zoll. in Zollinger, *Linnaea* 29: 322–323 (Zollinger 1858). – *Monoon canangioides* (Rchb.f. & Zoll.) Miq., *Annales Musei Botanici Lugdunu-Batavi* 2: 18 (Miquel 1865). – *Polyalthia canangioides* (Rchb.f. & Zoll.) Boerl., *Catalogus Plantarum Phanerogamarum quae in Horto Botanico Bogoriensi Coluntur Herbaceis Exceptis* (1): 19 (Boerlage 1899b). – Lectotype (designated by Turner 2011: 78): Indonesia, Sumatra, Province of Lampong, *H. Zollinger 3047* (hololecto-: P (P01983362); isolecto-: ?BM, ?P).

Guatteria parveana Miq., *Flora van Nederlandsch Indië* 1 (2): 48 (Miquel 1858). – *Polyalthia canangioides* var. *parveana* (Miq.) Boerl., *Catalogus Plantarum Phanerogamarum quae in Horto Botanico Bogoriensi Coluntur Herbaceis Exceptis* (1): 20 (Boerlage 1899b). Type: Based on manuscript description by H. Zollinger of *Uvaria parveana*.
Unona borneensis Miq., *Annales Musei Botanici Lugdunu-Batavi* 2: 11 (Miquel 1865). – *Desmos borneensis* (Miq.) Merr. *Journal of the Straits Branch of the Royal Asiatic Society*, Special Number: 255 (Merrill 1921). – Lectotype (designated by Turner 2011: 78): Borneo, Poeloe Lampei, *P.W. Korthals s.n*. (L (L 0189189)).
Polyalthia scortechinii King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 56 (King 1892). – Lectotype (designated by Turner 2011: 78): Peninsular Malaysia, Perak, Larut, May 1884, *King's Collector* [H.H. Kunstler] *6125* (hololecto-: K (K000739187); isolecto-: CAL, DD, K (K000739186)).
Polyalthia kunstleri King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 55 (King 1892). – Lectotype (designated by Turner 2011: 78): Peninsular Malaysia, Perak, Larut, Jan. 1883, *King's Collector* [H.H. Kunstler] *3767* (hololecto-: K (K000691450); isolecto-: CAL, DD, K (K000691451), MEL).
Polyalthia glandulosa Merr., *Philippine Journal of Science. Section C, Botany* 10: 247 (Merrill 1915). – Lectotype (designated by Turner 2011: 78): Philippines, Mindanao, District of Zamboanga, Santa Maria, near Mount Pulangbato, 4 Oct. 1912, *J. Reillo Bur. Sci. 16460* (hololecto-: US (US00098663); isolecto-: K (K000691642), L, P (P00372685)).

Description and distribution

Sinclair (1955: 306–307), Kochummen (1972: 89) Turner (2014: 72).

Monoon Miq.

Annales Musei Botanici Lugdunu-Batavi 2: 15 (Miquel 1865). – Lectotype (designated by Saunders & Xue 2011: 236): *Monoon lateriflorum* (Blume) Miq.
Enicosanthum Becc., *Nuovo Giornale Botanico Italiano* 3: 183 (Beccari 1871). – Type: *Enicosanthum paradoxum* Becc.
Marcuccia Becc., *Nuovo Giornale Botanico Italiano* 3: 181, t. 3 (Beccari 1871). – Type: *Marcuccia grandiflora* Becc.
Griffithia Maingay ex King, *Annals of the Royal Botanic Garden (Calcutta)* 4: 8 (King 1893), *non Griffithia* Wight & Arn. (Wight & Arnott 1834). – *Griffithianthus* Merr., *Philippine Journal of Science. Section C, Botany* 10: 231 (Merrill 1915). – Lectotype (designated by Merrill 1915: 231): *Griffithia magnoliipetala* Maingay ex King.
Woodiella Merr., *Journal of the Straits Branch of the Royal Asiatic Society* 85: 187 (Merrill 1922), *non Woodiella* Sacc. & P.Syd. (Sydow 1899). – *Woodiellantha* Rauschert, *Taxon* 31: 555 (Rauschert 1982). – Type: *Woodiella sympetala* Merr.
Cleistopetalum H.Okada, *Acta Phytotaxonomica et Geobotanica* 47: 4 (Okada 1996). – Type: *Cleistopetalum borneense* H.Okada.

Key to species of *Monoon*

1. Inflorescences on trunk or restricted to base of trunk 2
– Inflorescences in leaf axils, or on twigs behind leaves (sometimes on branches) 6

2. Inflorescences borne on slender, flexible, branched basal flagellae ..... ***M. hypogaeum***
– Not so 3

3. Inflorescences on stout, sparsely branching axes to at least 7 cm long ..... ***M. praestigiosum***

– Inflorescences on woody tubercles or much-branched axes less than 7 cm long 4

4. Inflorescences on woody tubercles ..... ***M. anomalum***
– Inflorescences on much-branched axes 5

5. Leaves with 8–10 pairs of lateral nerves. Outer petals to 2.5 cm long, 0.5 cm wide. Monocarps with blunt beak ..... ***M. borneense***
– Leaves with *c.* 20 pairs of lateral nerves. Outer petal to 7 cm long, 2.5 cm wide. Monocarps with hard, sharp beak ..... ***M. congregatum***

6. Leaves membranous. Inflorescences axillary, few-flowered (generally more than one). Sepals more than 8 mm long. Monocarps globose to ellipsoidal with rounded to slightly blunt apex .... ***M. membranifolium***
– Leaves chartaceous to coriaceous. Inflorescences single to multi-flowered but if few-flowered and axillary then with sepals to 6 mm long. Monocarps ellipsoidal with blunt to beaked apex 7

7. Young flowers with conical 'bud' stage; sepals more than 6 mm wide 8
– Young flowers not with a conical 'bud' stage; sepals less than 6 mm wide 11

8. Leaves with generally more than 20 pairs of lateral nerves. Flower pedicels more than 2.5 cm long .... ***M. macranthum***
– Leaves with up to 20 pairs of lateral nerves. Flower pedicels to 1 cm long 9

9. Twigs densely tomentose. Leaves with dense hairs on nerves below. Flower pedicel to 12 mm long ... . ***M. fuscum***
– Twigs glabrescent. Leaves glabrous to glabrescent beneath. Flower pedicel generally more than 12 mm long 10

10. Leaves to 17 cm long, 7 cm wide. Sepals much broader than long. Monocarps woolly hairy, apex rounded ..... ***M. cupulare***
– Leaves generally more than 17 cm long, 7 cm wide. Sepals about as long as broad. Monocarps not woolly hairy, apex beaked ..... ***M. magnoliiflorum***

11. Petals distinctly longitudinally nerved. Monocarps subsessile, pale tomentose ..... ***M. pachyphyllum***
– Petals not longitudinally nerved. Monocarps stipitate, glabrous to tomentose 12

12 (Leaves more than 24 cm long, 7 cm wide). Flowers borne distichously on sparsely branched hairy axes to 2 cm long, 4 mm thick. Petals thick and fleshy. Monocarps with stipe to 14 mm long, shorter than seed-bearing portion ..... ***M. malayanum***
– (Leaves generally smaller). Flowers borne in fascicles or on very short and relatively slender axes. Petals relatively thin. Monocarps with stipe generally exceeding length of seed-bearing portion ... 13

13. Flowering pedicel *c.* 0.5 mm thick; sepals to 2 mm long; petals to 3 mm wide ..... ***M. asteriellum***
– Flowering pedicel at least 1 mm thick; sepals more than 2 mm long; petals 4 mm wide or more ... 14

14. Petals 4–5 mm wide. Monocarps densely short brown tomentose, stipe attachment eccentric. .... ***M. xanthopetalum***
– Petals 8 mm or more wide. Monocarps more or less glabrous, stipe attachment not eccentric 15

15. Outer petals obovate (widest above midway), claw and blade distinct 16

– Outer petals lanceolate to oblong-linear (widest at or below midway), little distinction between claw and blade 17

16. Leaves obovate, reticulations obscure from above ..... ***M. hookerianum***
– Leaves elliptic, reticulations distinct from above ..... ***M. glabrum***

17. Leaves generally less than 20 cm long and 5 cm wide; lateral nerves 9–13 pairs. Sepals 3–4 mm long .. .. ***M. sclerophyllum***
– Leaves generally more than 20 cm long and 5 cm wide; lateral nerves 14–15 pairs. Sepals to 3 mm long..... ***M. lateriflorum***

Monoon anomalum (Becc.) B.Xue & R.M.K.Saunders

Taxon 61: 1030 (Xue *et al.* 2012). – *Polyalthia anomala* Becc., *Nuovo Giornale Botanico Italiano* 3: 188 (Beccari 1871). – Type: Borneo, Sarawak, Mt Mattan, May 1866, *O. Beccari P.B. 1605* (holo-: FI-B (Erb. Becc. no. 481)).
Polyalthia clavigera King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 60 (King 1892). – Lectotype (designated by Turner 2010a): Peninsular Malaysia, Perak, Waterfall Hill, Jun. 1888, *L. Wray 2075* (hololecto-: K (K000691553); isolecto-: CAL, SING).
Polyalthia glomerata King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 61 (King 1892). – Lectotype (designated by Sinclair 1955: 318): Peninsular Malaysia, Perak, Jan. 1883, *King's Collector* [H.H. Kunstler] *3817* (hololecto-: K (K000691552); isolecto-: BM, L, P).
Polyalthia sumatrana var. *macrocarpa* Kochummen & Whitmore in Kochummen *et al*., *Federation Museums Journal* 13: 134 (Kochummen *et al*. 1970). – Lectotype (designated here): Peninsular Malaysia, Johore, Labis, Compartment 81, 15 Apr 1967, *T. Suppiah KEP 104976* (hololecto-: KEP (fruiting material, explicitly excluding the foliage material); isolecto-: K).
Cleistopetalum sumatranum H.Okada, *Acta Phytotaxonomica et Geobotanica* 47: 5, Fig. 4 (Okada 1996). – Type: Indonesia, Sumatra, West Sumatra, Gunung Gadut, Bukit Pinang Pinang, *c.* 20 km east of Padang, 14 Dec. 1987, *H. Okada 4607* (holo-: BO; iso-: KYO).

Description and distribution

Sinclair (1955: 318–319), Turner (2014: 110).

Remarks

Note that *Polyalthia sumatrana* var. *macrocarpa* was described from a mixed collection. Fruiting material of *Monoon anomalum* was confused with foliage of *Maasia sumatrana*. As the diagnosis focused on the characters of the fruits, we here designate the fruiting material as lectotype and exclude the foliage material.

Monoon asteriellum (Ridl.) B.Xue & R.M.K.Saunders

Taxon 61: 1030 (Xue *et al.* 2012). – *Polyalthia asteriella* Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 82: 169 (Ridley 1920). Lectotype (designated here): Peninsular Malaysia, Perak, Larut Hills, 1892, *H.N. Ridley 2986* (hololecto-: K (K000691443); isolecto-: CAL, SING (SING 0048679)).

Description and distribution

Sinclair (1955: 309–310).

Monoon borneense (H. Okada) B.Xue & R.M.K.Saunders

Taxon 61: 1030 (Xue *et al.* 2012). – *Cleistopetalum borneense* H.Okada, *Acta Phytotaxonomica et Geobotanica* 47: 4, Fig. 3 (Okada 1996). – *Polyalthia sinclairiana* I.M.Turner, *Gardens' Bulletin, Singapore* 58: 275 (Turner 2007). – Type: Borneo, East Kalimantan, Sungai Menubar, 12 Dec. 1980, *Kato & Wiriadinata 7119* (holo-: KYO; iso-: BO, L).
Polyalthia macropoda King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 60 (King 1892), *non P. macropoda* (Miq.) F.Muell. (von Mueller 1877). – Lectotype (designated by Turner 2007): Peninsular Malaysia, Perak, Jun. 1883, *King's Collector* [H.H. Kunstler] *4279* (hololecto-: K (K000691557); isolecto-: BM, L, P).

Description and distribution

Sinclair (1955: 316–317).

Monoon congregatum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1031 (Xue *et al.* 2012). – *Polyalthia congregata* King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 61 (King 1892). – *Enicosanthum congregatum* (King) Airy Shaw, *Bulletin of Miscellaneous Information, Kew* 1939: 277 (Airy-Shaw 1939). – Lectotype (designated by Xue *et al*. 2012: 1031): Peninsular Malaysia, Perak, Gopeng, Aug. 1883, *King's Collector* [H.H. Kunstler] *4831* (hololecto-: K (K000691419); isolecto-: CAL, DD, SING (SING0059443)).

Description and distribution

Sinclair (1955: 194).

Monoon cupulare (King) B.Xue & R.M.K.Saunders

Taxon 61: 1031 (Xue *et al.* 2012). – *Griffithia cupularis* King, *Annals of the Royal Botanic Garden (Calcutta)* 4: 9, t. 219 (King 1893). – *Griffithianthus cupularis* (Maingay ex Hook.f. & Thomson) Merr., *Philippine Journal of Science. Section C, Botany* 10: 231 (Merrill 1915). – *Enicosanthum cupulare* (King) Airy Shaw, *Bulletin of Miscellaneous Information, Kew* 1939: 277 (Airy-Shaw 1939). – Lectotype (designated by Xue *et al*. 2012: 1031): Peninsular Malaysia, Perak, Larut, May 1885, *King's Collector* [H.H. Kunstler] *7630* (hololecto-: K (K000691422); isolecto-: BM (BM001050387), CAL).

Description and distribution

Sinclair (1955: 188–189).

Monoon fuscum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1031 (Xue *et al.* 2012). – *Griffithia fusca* King, *Annals of the Royal Botanic Garden (Calcutta)* 4: 10, t. 220 (King 1893). – *Griffithianthus fuscus* (Maingay ex Hook.f. & Thomson) Merr., *Philippine Journal of Science. Section C, Botany* 10: 231 (Merrill 1915). *Enicosanthum fuscum* (King) Airy Shaw, *Bulletin of Miscellaneous Information, Kew* 1939: 277 (Airy-Shaw 1939). – Lectotype (designated by Xue *et al*. 2012: 1031): Peninsular Malaysia, Perak, Ulu Bubong, Jul. 1886, *King's Collector* [H.H. Kunstler] *10404* (hololecto-: K (K000691418); isolecto-: BM (BM001100029), CAL).

Description and distribution

Sinclair (1955: 189–190).

Monoon glabrum (Hook.f. & Thomson) B.Xue & R.M.K.Saunders

Taxon 61: 1031 (Xue *et al.* 2012). – *Ellipeia glabra* Hook.f. & Thomson, *The Flora of British India* 1: 52 (Hooker & Thomson 1872). – *Polyalthia glabra* (Hook.f. & Thomson) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 315 (Sinclair 1955). – Type: Peninsular Malaysia, Malacca, 14 Dec. 1867, *A.C. Maingay 3007* [Kew distribution no. 66] (holo-: K [×2] (K000691571, K000691570); iso-: CAL).
Polyalthia curtisii Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 54: 11 (Ridley 1910). – Lectotype (designated here): Peninsular Malaysia, Penang, Telok Bahang, Jun. 1901, *C. Curtis 3644* (hololecto-: K (K000691572); isolecto-: SING).

Description and distribution

Sinclair (1955: 315).

Monoon hookerianum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1032 (Xue *et al.* 2012). – *Polyalthia hookeriana* King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 57 (King 1892). – Lectotype (designated by Turner 2011: 72): Peninsular Malaysia, Perak, Feb. 1884, *King's Collector* [H.H. Kunstler] *5550* (hololecto-: K (K000691563); isolecto-: CAL, P (P00601064)).

Description and distribution

Sinclair (1955: 312–315), Turner (2014: 113–115).

Monoon hypogaeum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1032 (Xue *et al.* 2012). – *Polyalthia hypogaea* King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 62 (King 1892). – Lectotype (designated by Turner 2011: 72): Peninsular Malaysia, Perak, Larut, 1881, *King's Collector* [H.H. Kunstler] *2437* (hololecto-: K (K000691555); isolecto-: CAL).

Description and distribution

Sinclair (1955: 315–316), Turner (2014: 115–116).

Monoon lateriflorum (Blume) Miq.

Annales Musei Botanici Lugdunu-Batavi 2: 19 (Miquel 1865). – *Guatteria lateriflora* Blume, *Bijdragen tot de flora van Nederlandsch Indië*: 20 (Blume 1825). – Lectotype (designated by Turner 2011: 74): Indonesia, Java: s.dat., *Anon. s.n.* (L (L 0188880)).

Description and distribution

Sinclair (1955: 310–311), Kochummen (1972: 88–89), Turner (2014: 116).

Monoon macranthum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1032 (Xue *et al.* 2012). – *Polyalthia macrantha* King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 54 (King 1892). – *Enicosanthum macranthum* (King) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 190 (Sinclair 1955). – Lectotype (designated by Xue *et al*. 2012: 1032): Peninsular Malaysia, Perak, *King's Collector* [H.H. Kunstler] *6654* (hololecto-: L (L0037926); isolecto-: CAL, DD).

Description and distribution

Sinclair (1955: 190–191).

Monoon magnoliiflorum (Maingay ex Hook.f. & Thomson) B.Xue & R.M.K.Saunders

Taxon 61: 1032 (Xue *et al.* 2012). – *Polyalthia magnoliiflora* Maingay ex Hook.f. & Thomson, *The Flora of British India* 1: 64 (Hooker & Thomson 1872). – *Griffithia magnoliipetala* King, *Annals of the Royal Botanic Garden (Calcutta)* 4: 9, t. 218 (King 1893), as '*magnoliaepetala*', *nom. superfl.* – *Griffithianthus magnoliiflorus* (Maingay ex Hook.f. & Thomson) Merr., *Philippine Journal of Science. Section C, Botany* 10: 231 (Merrill 1915). – *Enicosanthum magnoliiflorum* (Maingay ex Hook.f. & Thomson) Airy Shaw, *Bulletin of Miscellaneous Information, Kew* 1939: 277 (Airy-Shaw 1939). – Lectotype (designated by Xue *et al*. 2012: 1032): Malacca, 6 Feb. 1868, *A.C. Maingay 3259* [Kew distrib. no. 93] (K (K000691423)).

Description and distribution

Sinclair (1955: 187–188).

Monoon malayanum I.M.Turner & Utteridge

Webbia 70: 99 (Turner & Utteridge 2015). – Type: Peninsular Malaysia, Trengganu, Ulu Trengganu, Ulu Telemong Forest Reserve, Batu Kota, 16 Sep. 1969. *H.S. Loh FRI 13446* (holo-: KEP; iso-: K [×2]).

Description and distribution

Turner & Utteridge (2015: 99).

Monoon membranifolium (J.Sinclair) B.Xue & R.M.K.Saunders

Taxon 61: 1032 (Xue *et al.* 2012). – *Enicosanthum membranifolium* J.Sinclair, *Gardens' Bulletin, Singapore* 14: 191 (Sinclair 1955). – Lectotype (designated by Xue *et al*. 2012: 1032): Peninsular Malaysia, Kelantan, Gua Panjang at Gua Ninik, 21 Oct. 1927, *M.R. Henderson SFN 19522* (hololecto-: SING (SING0048664); isolecto-: K (K000691413), SING (SING0048665)).

Description and distribution

Sinclair (1955: 191).

Monoon pachyphyllum (King) B.Xue & R.M.K.Saunders

Taxon 61: 1033 (Xue *et al.* 2012). – *Polyalthia pachyphylla* King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 66 (King 1892). – Lectotype (designated by Xue *et al*. 2012: 1033): Peninsular Malaysia, Perak, *King's Collector* [H.H. Kunstler] *6655* (hololecto-: K (barcode no. K000691559); isolecto-: BM (BM000754027), CAL, DD, SING).

Description and distribution

Sinclair (1955: 308).

Monoon praestigiosum (J.Sinclair) B.Xue & R.M.K.Saunders

Taxon 61: 1033 (Xue *et al.* 2012). – *Enicosanthum praestigiosum* J.Sinclair, *Gardens' Bulletin, Singapore* 14: 192 (Sinclair 1955). – Lectotype (designated by Xue *et al*. 2012: 1032): Peninsular Malaysia,

Johore, Sungei Kayu, 10 Oct. 1936, *Kiah SFN 32017* (hololecto-: SING (SING00048666); isolecto-: A (A00039311), BO, BKF, K [×2] (K000691412, K000898010), KEP (KEP 8626), L, LAE, PNH).

Description and distribution

Sinclair (1955: 192–194).

Monoon sclerophyllum (Hook.f. & Thomson) B.Xue & R.M.K.Saunders

Taxon 61: 1033 (Xue *et al.* 2012). – *Polyalthia sclerophylla* Hook.f. & Thomson, *The Flora of British India* 1: 65 (Hooker & Thomson 1872). – Lectotype (designated here): Peninsular Malaysia, Malacca, 9 May 1867, *A.C. Maingay 1340* [Kew distrib. no. 101] (hololecto-: K [×2] (K000691575, K000691576)). *Polyalthia purpurea* Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 82: 168 (Ridley 1920). – Lectotype (designated by Turner 2012: 242): Singapore, cultivated in Singapore Botanic Gardens, Jun. 1904, *H.N. Ridley 12014* (hololecto-: K (K000691573); isolecto-: SING).

Description and distribution

Sinclair (1955: 311–312).

Monoon xanthopetalum (Merr.) B.Xue & R.M.K.Saunders

Taxon 61: 1034 (Xue *et al.* 2012). – *Polyalthia xanthopetala* Merr., *Journal of the Straits Branch of the Royal Asiatic Society* 85: 185 (Merrill 1922). – Lectotype (designated by Turner 2011: 80): Borneo, Sabah, Batu Lima near Sandakan, Sep.–Dec. 1920, *M. Ramos 1705* (hololecto-: K (K0006916180); isolecto-: A (A00242651), BM (BM000754105), BO, L (L0189515), US (US00098685)).

Remarks

In studying material of *Monoon* from Peninsular Malaysia a group of specimens was found that did not match any of the species recorded from this area. The specimens were notable for the persistent golden-brown tomentum on the twigs, the often dark brown shade of the dry leaves, petals linear-lanceolate *c.* 4 cm long and *c.* 5 mm wide, monocarps ellipsoidal, covered with a short dense pale brown tomentum with the stipe attached slightly eccentrically giving a similar appearance to those of some *Uvaria* species previously included in the genus *Ellipeia*. One of us (IMT) having worked on the Borneo species (Turner 2014), the specimens were reminiscent of *Monoon xanthopetalum* Merr. Comparison of the specimens from Peninsular Malaysia with collections from Borneo (cf. Turner 2014: Fig. 26) produced a close match. We have no doubt that *Monoon xanthopetalum* does occur in Peninsular Malaysia, representing a major range extension for the species. It is interesting to note that the Peninsular Malaysia collections of *M. xanthopetalum* are all from the East Coast which fits with the presence of the species in Borneo.

Specimens examined

PENINSULAR MALAYSIA: Johore, Mersing, Hutan Simpan Lenggor, 2 Nov. 2010, *L.E. Teo & Din KL 5758*, (KEP). Pahang, Rompin, Gunong Lesong Forest Rerve, 2 May 1956, *Forester Lindong KEP 83466* (K); Lesong Forest Reserve, 27 Jun. 1972, *Y.C. Chan FRI 19827* (K, KEP). Trengganu, 26 Oct. 1994, *C. Wiart & L.E. Teo KL 4434* (KEP); Kemaman, Kajang, Ulu Bendong, 6 Nov. 1935, *E.J.H. Corner SFN 30291* (K).

Polyalthia Blume

Flora Javae (Anonaceae): 68 (Blume 1830). – Lectotype (designated by Hutchinson 1923: 259): *Polyalthia subcordata* (Blume) Blume.

Sphaerothalamus Hook.f., *Transactions of the Linnean Society of London* 23: 156 (Hooker 1860). – Type: *Sphaerothalamus insignis* Hook.f.

Key to the species of *Polyalthia*

1. Inflorescences cauliflorous, ramiflorous or axillary 2
– Inflorescences subopposite leaves 8

2. Flower pedicel 2–5(–7) mm long; petals narrowly linear (generally more than 10 times long as broad). Monocarps subsessile (stipes to 5 mm long) 3
– Flower pedicel (6–)10–30 mm long; petals not narrowly linear (rarely to 10 times as long as broad). Monocarps stipitate (stipes 10 mm long or more)..... 6

3. Subshrub to 30 cm tall. Petals not exceeding 3 cm long ..... ***P. pumila***
– Tree to 6 m or more tall. Petals to 5 cm or more long 4

4. Petals 5 mm wide or more. Monocarps densely brown woolly hairy ..... ***P. cinnamomea***
– Petals 2–5 mm wide. Monocarps pubescent, becoming glabrous with maturity 5

5. Inflorescences mostly on trunk and branches. Twigs persistently brown hairy. Sepals 15–17 mm long. Monocarps 2 cm wide ..... ***P. stenopetala***
– Inflorescences mostly among leaves. Twigs becoming glabous with age. Sepals 7 mm long. Monocarps less than 1 cm wide ..... ***P. angustissima***

6. Inflorescences mostly cauliflorous, or if among leaves then pedicel generally 20 mm long or more .... ***P. cauliflora***
– Inforescences not cauliflorous, flower pedicel to 12 mm long 7

7. Leaves drying grey. Flower pedicel more than 1 mm wide, widening distally; petals 2–5 cm long. Monocarps more or less cylindrical, 6–7 mm diameter; stipe *c.* 1 mm diameter ..... ***P. lateritia***
– Leaves drying brown or grey-brown. Flower pedicel *c.* 0.5 mm wide; petals less than 1 cm long. Monocarps more or less globose, *c.* 15 mm diameter; stipe *c.* 2 mm diameter..... ***P. obliqua***

8. Leaves with many lateral nerves (at least 18 pairs); lamina bullate 9
– Leaves with up to 17 pairs of lateral nerves; lamina not bullate 10

9. Twigs villose. Base of leaf auriculate or cordate, often extending below twig ..... ***P. bullata***
– Twigs glabrous or hairy, not villose. Base of leaf not auriculate or cordate, never extending below twig ..... ***P. pakdin*** I.M.Turner & Utteridge sp. nov.

10. Leaves narrowly elliptic or lanceolate to 2.5 cm wide, apex long acuminate ..... ***P. dumosa***
– Leaves generally more than 2.5 cm wide, apex not long acuminate 11

11. Leaf apex obtuse. Branchlets with thick corky bark. Flower pedicel slender (5–25 mm long, < 1 mm thick) ..... ***P. suberosa***
– Leaf apex generally acute to acuminate. Branchlets not corky-barked. Flower pedicels generally shorter and/or thicker 12

12. Flowers subsessile (pedicel to 2 mm long) 13
– Flowers distinctly pedicellate (pedicel 5 mm long or more) 14

13. Leaves glabrous; elliptic-lanceolate; apex blunt. Petals coriaceous, fleshy ..... ***P. parviflora***

– Leaves pubescent beneath; lanceolate; acuminate. Petals thin ..... ***P. hirtifolia***

14. Twigs, leaf undersides, flowers and fruits furry ..... ***P. chrysotricha***
– Twigs, leaf undersides, flowers and fruits glabrous or hairy but not all furry 15

15. Leaves generally with 10 or fewer pairs of lateral nerves. Flower pedicel to 5 mm long. Monocarps to 6, stipe shorter than seed-bearing portion ..... ***P. brunneifolia***
– Leaves with 12 or more pairs of lateral nerves. Flower pedicel 5 mm or more long. Monocarps 10 or more, stipe generally longer than seed-bearing portion 16

16. Petals relatively thin; sparsely hairy outside. Stipe of monocarps *c.* 0.5 mm thick ..... ***P. socia***
– Petals relatively thick and leathery; densely hairy outside. Stipe of monocarps *c.* 1 mm thick 17

17. Pedicel 3–6 cm long ..... ***P. oblonga***
– Pedicel to 1 cm long ..... ***P. motleyana***

Polyalthia angustissima Ridl.

Journal of the Straits Branch of the Royal Asiatic Society 54: 11 (Ridley 1910). – Lectotype (designated by Bunchalee & Chantaranothai 2006: 3): Singapore: Bukit Timah, Feb. 1896, *H.N. Ridley 8050* (hololecto-: SING (SING0048677); isolecto-: K).

Description and distribution

Sinclair (1955: 286).

Polyalthia brunneifolia J.Sinclair

Gardens' Bulletin, Singapore 14: 301 (Sinclair 1955). – Lectotype (designated here): Peninsular Malaysia, Selangor, Bukit Enggang, Kajang, 8 Apr. 1930, *C.F. Symington 24179* (hololecto-: K (K000691554); isolecto-: SING (SING0048680).

Description and distribution

Sinclair (1955: 301–302).

Polyalthia bullata King

Journal of the Asiatic Society of Bengal. Part II (Natural History &c.) 61: 64 (King 1892). – Lectotype (designated by Turner 2009: 92): Peninsular Malaysia, Perak, Gopeng, Kinta, Aug. 1883, *King's Collector* [H.H. Kunstler] *4804* (hololecto-: CAL; isolecto-: K (K000691434)).

Description and distribution

Sinclair (1955: 300–301), Turner (2014: 145).

Polyalthia cauliflora Hook.f. & Thomson

Flora Indica: 138 (Hooker & Thomson 1855). – Type: Singapore, Oct. 1822, *N. Wallich s.n.* [EIC 6476] (holo-: K-W (K001123992)).
Guatteria teysmannii Miq., *Flora van Nederlandsch Indië. Supplementum primum. Prodromus florae sumatranae*: 378 (Miquel 1861). – *Monoon teysmannii* (Miq.) Miq., *Annales Musei Botanici Lugdunu-Batavi* 2: 19 (Miquel 1865). – *Polyalthia teysmannii* (Miq.) King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 67 (King 1892). – Lectotype (designated by Turner 2011:

69): Indonesia, Sumatra, Palembang, Batu Radja, *s. dat.*, *J.E. Teijsmann s.n.* [Herb. Bogor. 3901] (U (U 0000373)).
Unona desmantha Hook.f. & Thomson, *The flora of British India* 1: 61 (Hooker & Thomson 1872). – *Desmos desmanthus* (Hook.f. & Thomson) Saff., *Bulletin of the Torrey Botanical Club* 39: 508 (Safford 1912). – *Polyalthia cauliflora* var. *desmantha* (Hook.f. & Thomson) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 295 (Sinclair 1955). – Lectotype (designated by Turner 2010b: 268): Malaysia, Peninsular Malaysia, Malacca, 1865-1866, *A.C. Maingay 1045* [Kew distribution no. 48] (K (K000691431)).
Polyalthia beccarii King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 65 (King 1892). – *Polyalthia cauliflora* Hook.f. & Thomson var. *beccarii* (King) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 294 (Sinclair 1955). – Lectotype (designated by Turner 2009: 93): Malaysia, Peninsular Malaysia, Perak, Gopeng, Kinta, Jul. 1883, *King's Collector* [H.H. Kunstler] *4522* (hololecto-: K (K00069131); isolecto-: CAL, DD, U).
Unona pycnantha Hook.f. & Thomson, *The Flora of British India* 1: 60 (Hooker & Thomson 1872). – *Polyalthia pycnantha* (Hook.f. & Thomson) King, *Journal of the Asiatic Society of Bengal. Part II (Natural History &c.)* 61: 67 (King 1892). – Lectotype (designated by Turner 2010b: 268): Malaysia, Peninsular Malaysia: Malacca, 9 Jan. 1865 or 1866, *A.C. Maingay 1491* [Kew distribution no. 48] (K (K000691459)).
Unona wrayi Hemsl., *Hooker's Icones Plantarum* 16: t. 1553 (Hemsley 1887). – *Polyalthia wrayi* (Hemsl.) Ridl., *The Flora of the Malay Peninsula* 1: 49 (Ridley 1922). – *Polyalthia cauliflora* Hook.f. & Thomson var. *wrayi* (Hemsl.) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 296 (Sinclair 1955). – Type: Peninsular Malaysia, Perak, Ulu Kenring, Jan. 1884, *L. Wray 560* (holo-: K (K000691466)).

Description and distribution

Sinclair (1955: 292–297), Turner (2014: 145–146).

Polyalthia chrysotricha Ridl.

The Flora of the Malay Peninsula 1: 57 (Ridley 1922). – Type: Peninsular Malaysia, Selangor, Ulu Langat, Menuang Gasing, Feb. 1912, *C.B. Kloss s.n.* (holo-: K (K000691577)).

Description and distribution

Sinclair (1955: 302–303), Turner (2014: 147).

Polyalthia cinnamomea Hook.f. & Thomson

Flora Indica: 138 (Hooker & Thomson 1855). – Lectotype (designated by Airy-Shaw 1939: 282): Singapore, *Anon.* [?N. Wallich] *s.n.* [EIC 6444] (hololecto-: K-W (K001123933)).
Unona cauliflora Hook.f. & Thomson, *Flora Indica*: 137 (Hooker & Thomson 1855), *non U. cauliflora* Blanco (Blanco 1845). – Type: Singapore, *T. Lobb s.n.* (holo-: K (K000691457) [excl. material in packet from EIC = K000691458]).
Polyalthia velutinosa Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 59: 64 (Ridley 1911). – Lectotype (designated here): Peninsular Malaysia, Lankawi, Gunong Raya at 1500 feet, Feb. 1911, (Aniff) *Haniff 15552* (hololecto-: SING (SING 0058808); isolecto-: BM, K (K000691439), BM).

Description and distribution

Sinclair (1955: 286–288), Kochummen (1972: 87–88), Turner (2014: 148).

Polyalthia dumosa King

Journal of the Asiatic Society of Bengal. Part II (Natural History &c.) 61: 52 (King 1892). – Lectotype (designated by Bunchalee & Chantaranothai 2006: 3): Peninsular Malaysia, Perak, Maxwell's Hill, *L. Wray 2628* (hololecto-: SING; isolecto-: CAL).

Description and distribution

Sinclair (1955: 297).

Polyalthia hirtifolia J.Sinclair

Gardens' Bulletin, Singapore 14: 300 (Sinclair 1955). – *Polyalthia hirta* Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 82: 168 (Ridley 1920), *non P. hirta* (Miq.) Diels (Diels 1912). – Lectotype (designated by Turner 2012: 241): Peninsular Malaysia, Penang, Pulau Butong Reserve, Mar. 1892, *C. Curtis 2745* (hololecto-: K (K000691452); isolecto-: BM, K (barcode no. K000691453), SING).

Description and distribution

Sinclair (1955: 300).

Polyalthia lateritia J.Sinclair

Gardens' Bulletin, Singapore 14: 290 (Sinclair 1955). – Type: Peninsular Malaysia, Perak, Waterloo New Road, May 1890, *C. Curtis 2704* (holo-: SING (SING0048683); iso-: K (K000691549), SING (SING0051296)).

Description and distribution

Sinclair (1955: 290–291),

Polyalthia motleyana (Hook.f.) Airy Shaw

Bulletin of Miscellaneous Information, Kew 1939: 280 (Airy-Shaw 1939). – *Oxymitra motleyana* Hook.f., *Transactions of the Linnean Society of London* 23: 155 (Hooker 1860), as '*molleyana*'. – Lectotype (designated by Turner 2011: 76): Borneo, Labuan, *E.S. Barber 228* (hololecto-: K (K000691612); isolecto-: K (K000691613)).
Polyalthia sarawakensis Diels, *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 11: 80 (Diels 1931). – Type: Borneo, Sarawak, Mt Mattan, Apr. 1866, *O. Beccari P.B. 1623* (holo-: FI-B (Erbario collesioni Beccari no. 415)).
Polyalthia motleyana var. *glabrescens* Airy Shaw, *Bulletin of Miscellaneous Information, Kew* 1939: 282 (Airy-Shaw 1939). – Type: Borneo, Sarawak, *O. Beccari P.B. 1813* (holo-: K (K000691611); iso-: FI-B).

Description and distribution

Sinclair (1955: 303–305), Turner (2014: 157–159).

Polyalthia obliqua Hook.f. & Thomson

Flora Indica: 138 (Hooker & Thomson 1855). – Lectotype (designated by Turner 2011: 77): Peninsular Malaysia, Malacca, *s. dat.*, *W. Griffith s.n.* (K (K000691435)).

Polyalthia similis Merr., *Philippine Journal of Science. Section C, Botany* 8: 371 (Merrill 1913). – Lectotype (designated by Turner 2011: 77): Philippines, Leyte, Dagami, Aug. 1912, *M. Ramos Bur. Sci. 15185* (hololecto-: K (K000691620); isolecto-: BM, US (US00098679)).
Polyalthia lopadantha Diels, *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 11: 81 (Diels 1931). – Type: Borneo, Sarawak, *O. Beccari P.B. 1819* (holo-: FI-B (Erb. coll. Becc. no. 419); iso-: A[×2], B[×2] (B 10 0186733, B 10 0186734 (fragment)), K (K000691615), M).

Description and distribution

Sinclair (1955: 290), Turner (2014: 159–160).

Polyalthia oblonga King

Journal of the Asiatic Society of Bengal. Part II (Natural History &c.) 61: 65 (King 1892). – *Polyalthia motleyena* var. *oblonga* (King) J.Sinclair, *Gardens' Bulletin, Singapore* 14: 304 (Sinclair 1955). – Lectotype (designated by Turner 2011: 77): Peninsular Malaysia, Perak, Larut, May 1885, *King's Collector* [H. H. Kunstler] *7671* (hololecto-: K; isolecto-: CAL, DD, SING).

Description and distribution

Sinclair (1955: 304), Turner (2014: 160).

Polyalthia pakdin I.M.Turner & Utteridge sp. nov.
Figs 1–2
urn:lsid:ipni.org:names:77153637-1

Diagnosis

With its large, multi-nerved leaves the new species has generally been confused with *Polyaltha bullata* King, but it lacks the villose tomentum on the twigs and the strongly auriculate to cordate leaf bases. In comparison with *P. bullata*, the flowers are borne on shorter pedicels (< 1 versus 2 cm) with shorter sepals (3–4 versus 7 mm) and petals (to 1 cm versus up to 4 cm); and with monocarps on shorter stipes (to 6 mm versus up to 10 mm).

Etymology

We are pleased to commemorate the late Prof. Kamarudin Mat Salleh (1959–2009). A leading Malaysian student of the Annonaceae, he was widely known as 'Pak Din' (Uncle Din in Malay, Din being the common abbreviation of names with that ending). The epithet represents a compounding of this soubriquet. Kamarudin was native to the state of Kelantan, which is part of the range of the new species.

Type

PENINSULAR MALAYSIA: Trengganu, Jambu Bongkok Forest Reserve [4°50'N 103°22'E], 21 Mar. 1972, *L.E. Teo & G. Pachiappan KL 3033* [*T & P 433*] (holo-: K).

Additional specimens examined

PENINSULAR MALAYSIA: Kelantan, Chabang Tongkat Forest Reserve [5°49'N 102°17'E], compt 77, alt. 250' 28 Apr. 1967, *K.M. Kochummen FRI 2317* (KEP). Trengganu, Dunggun, Jambu Bongkok [4°50'N 103°21'E], 12 Mar. 1961, *J. Carrick s.n.* (K ×2); ibid., Sekayu, Bukit Lanjut Forest Reserve [4°58'N 102°58'E], 18 Sept. 1969, *H.S. Loh FRI 13467* (KEP); ibid., Dungun, near 36th mile, Jerangau Road [4°56'36"N 103°10'42"E], 22 Sept. 1955, *J. Sinclair & Kiah bin Salleh SFN 40941* (K, KEP); ibid., Sekayu Forest Reserve [4°58'N 102°57'E], compt 43, 22 Sept. 1969, *T. Suppiah FRI 11853* (KEP);

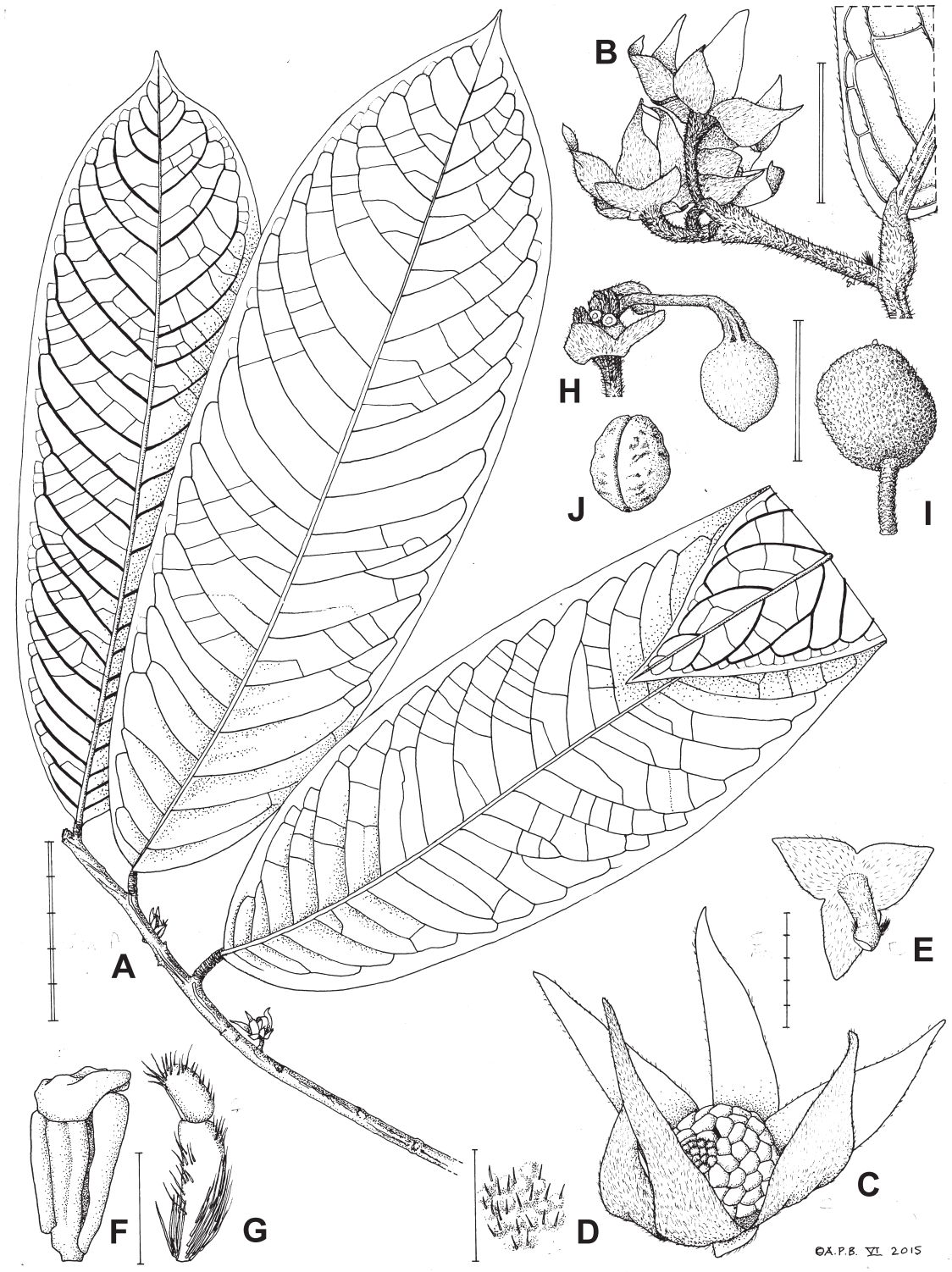

Fig. 1. *Polyalthia pakdin* I.M.Turner & Utteridge sp. nov. **A**. Leafy twig with flowers. **B**. Inflorescence and base of leaf (abaxial view). **C**. Flower. **D**. Magnified view of abaxial surface of outer petal. **E**. Calyx from below. **F**. Stamen. **G**. Carpel. **H**. Infructescense with immature monocarp. **I**. Mature monocarp. **J**. Seed. Scale bars: single bar = 1 mm, graduated single bar = 5 mm; double bar = 1 cm, graduated double bar = 5 cm. Drawn from *Carrick s.n*. (A, C–E), *KL 3033* (B, F, G), *SFN 40941* (H), *FRI 11853* (I), *FRI 13467* (J).

ibid., Bukit Bauk Forest Reserve, compartment 8A [4°45'N 103°21'E], 17 June 1967, *T.C. Whitmore FRI 3903* (KEP).

Description

Shrub 1–4 m tall. Young twigs drying red-brown, rather smooth and shiny, with some irregular longitudinal ridges with rounded tops, varying from glabrous to densely pale short hairy, twigs becoming black to brown with age. Leaves chartaceous to subcoriaceous (tend to look more leathery than they are to the touch), often bullate, drying grey or grey-brown, more rarely dark brown, above, brown or grey-brown below with brown venation, midrib and laterals sunken above in dry leaves, prominent beneath, more or less glabrous though sometimes with pale hairs along midrib below near base, lamina oblong-oblanceolate to narrowly oblong-elliptic, 17–36 × 3.5–9 cm, apex acuminate, base obtuse, generally slightly asymmetric, lateral nerves 19–24 pairs, arching and looping within margin to form a scalloped intramarginal nerve, reticulations distinct. Petiole drying dark brown to black, 6–10 mm long, 2–4 mm in diameter, sometimes with short erect pale hairs. Inflorescences subopposite leaves, single- or few-flowered. Flowering pedicel 2–8 mm long, 1 mm diameter widening distally, drying brown with minute pale hairs [some 4-merous flowers present on *KL 3033*], sepals ovate *c.* 3–4 × 2–3 mm, outside brown, minutely bumpy with short pale hairs, inside glabrous, petals thin-textured, ovate to ovate-lanceolate 6–10 × 2.5–3 mm, drying dark brown to blackish, outside minutely bumpy with adpressed pale hairs, inside glabrous, stamens many *c.* 1.5 mm long, carpels many. Fruiting pedicel to 2 mm thick, sepals often persisting, monocarps to 9 or more, irregularly ellipsoidal, 8–10 × 7–9 mm, drying red-brown, surface minutely pimply with pale hairs, apiculate, stipe to 6 mm long, 1 mm diameter, pimply, pale hairy. Seeds generally two, lenticular, *c.* 7 × 6 × 4 mm, drying golden brown with a longitudinal groove running parallel to the flat face.

Field notes

Leaves bullate (*SFN 40941*), dark glossy green above, paler green beneath (*SFN 40941*), shiny dark green above, slightly yellowish green below (*KL 3033*); flowers yellowish (*KL 3033*), petals reddish orange (*SFN 40941*), petals and sepals orange (*FRI 2317*), stamens paler reddish orange (*SFN 40941*), no scent with flowers (*SFN 40941*); fruits green (*FRI 3903*), fruits green turning red (*FRI 11853*), fruits red (*FRI 13467*, *SFN 40941*); seeds brown (*SFN 40941*).

Distribution and habitat

Recorded from the eastern side of Peninsular Malaysia from Kelantan and, with most records, Trengganu (Fig. 2). It occurs in lowland tropical rain forest.

Conservation status

Polyalthia pakdin sp. nov. is restricted to the lowland forests of eastern Peninsular Malaysia and currently known from seven collections from five localities (two are from the Sekayu area and two from Jambu Bongkok). The Extent of Occurrence (EOO) is 1,856 km^2 falling within the Endangered (EN) threshold of less than 5,000 km^2, and the Area of Occupancy (AOO; based on a user-defined cell width of 2 km) is 28 km^2 falling within the Endangered (EN) threshold. Whilst none of the collections is contemporary (the most recent is 1972), nearly all are from forests reserves, and, in addition, one collection is from 'roadside forest' (*J. Sinclair & Kiah bin Salleh SFN 40941*). Whilst the EOO is within the EN threshold, the presence of the species within protected areas would not place the species within this category because recent satellite imagery shows the protected areas still with relatively large areas of intact forest (using the most recent Google Earth imagery). The Sekayu collections, for example, are on the edge of the very poorly known and under-collected Taman Negara National Park and more field collections are needed in such areas to better understand the distribution of this species. Without any other information, we must assume that the species is still present in these protected areas and that the protected areas still

harbour the appropriate habitat for *P. pakdin* sp. nov. It is difficult to demonstrate trends in the reduction of habitat etc. without modern collections, and for these reasons we assign a preliminary conservation assessment of Near Threatened (NT).

Affinities

Polyalthia bullata, the species with which *P. pakdin* sp. nov. was formerly confused, was included in the informal group of *Polyalthia* species termed the *Polyalthia insignis* group by Johnson & Murray (1999). They characterised the group as follows: shrubs or small trees; leaves oblique, subcordate or auriculate at base, often drying grey above, brown below; inflorescences internodal to leaf opposed or sometimes cauliflorous; petals orange or red; apex of ovary woody and persistant as a short beak on the monocarp; stigmas capitate and cohering to drop as a cap at the end of anthesis, several ovules per carpel, laterally attached in vertical row and seed not pitted but with encircling groove. While *Polyalthia pakdin* sp. nov. does exhibit some of these characters, it does not have auriculate or cordate leaf bases and the stigmas do not seem to cohere. In fact, *P. pakdin* sp. nov. also comes close to the Bornean *Polyalthia polyphlebia* Diels which was not included in the *P. insignis* group by Johnson & Murray. The leaf form of *P. pakdin* sp. nov. and *P. polyphlebia* are similar but *P. polyphlebia* generally has greyish corky twigs, longer pedicels (8–15 versus 2–8 mm) with the flowers larger (outer petals 13–14 mm versus 6–10 mm) and the petals fleshy rather than thin in texture; with the monocarps on longer stipes (to 25 mm versus 6 mm).

Polyalthia parviflora Ridl.

Journal of the Straits Branch of the Royal Asiatic Society 61: 49 (Ridley 1912). – Lectotype (designated by Turner 2012: 241): Peninsular Malaysia, Pulau Langkawi, Kuala Malacca, Sep. 1890, *C. Curtis 2533* (hololecto-: SING (SING 0059296); isolecto-: CAL).
Polyalthia rufa Craib, *Bulletin of Miscellaneous Information, Kew* 1924: 82 (Craib 1924). – Type: Thailand, Nakawn Sawawn, Mê Wong, 25 May 1922, *A.F.G. Kerr 6022* (holo-: K[×2] (K00595497, K00595496); iso-: ABD, BM (000553972(BM))).

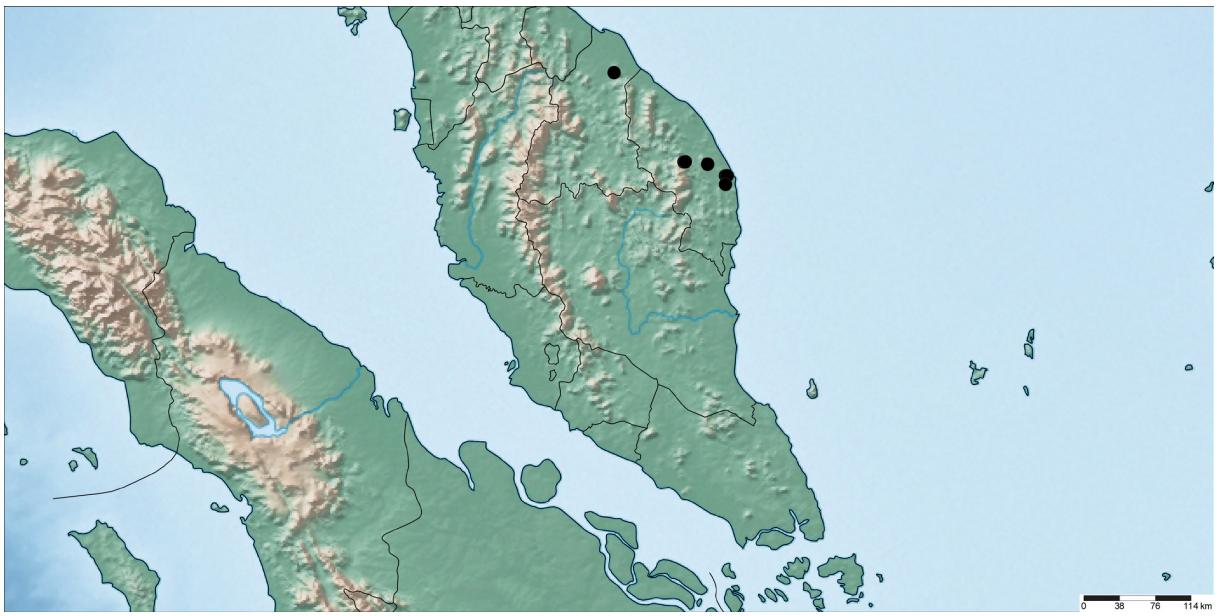

Fig. 2. Map showing the collecting localities of *Polyalthia pakdin* I.M.Turner & Utteridge sp. nov.

Description and distribution

Sinclair (1955: 299).

Polyalthia pumila Ridl.

Journal of the Straits Branch of the Royal Asiatic Society 54: 12 (Ridley 1910). – Lectotype (designated by Turner 2012: 241): Peninsular Malaysia, Perak, Dindings, Sera Woods, Mar. 1896, *H.N. Ridley 7996* (hololecto-: SING (SING 0059298); isolecto-: K (K000691442)).

Description and distribution

Sinclair (1955: 289).

Polyalthia socia Craib

Bulletin of Miscellaneous Information, Kew 1925: 10 (Craib 1925). – Type: Thailand, Pattani, Bukit, 400 m, evergreen forest, 7 Jul. 1923, *A.F.G. Kerr 7101* (holo-: K (K000595494); iso-: ABD[×2], BK (257670), BM (000553974(BM)), TCD (TCD0009808)).

Description and distribution

Sinclair (1955: 291–292).

Polyalthia stenopetala (Hook.f. & Thomson) Finet & Gagnep.

Mémoires de la Société Botanique de France 4: 96 (Finet & Gagnepain 1906). – *Unona stenopetala* Hook.f. & Thomson, *Flora Indica*: 136 (Hooker & Thomson 1855). – *Desmos stenopetalus* (Hook.f. & Thomson) Saff., *Bulletin of the Torrey Botanical Club* 39: 507 (Safford 1912). – Lectotype (designated by Sinclair 1955: 285): Java, *T. Lobb 414* (hololecto-: K (K000691463); isolecto-: CGE).
Unona crinita Hook.f. & Thomson, *The Flora of British India* 1: 61 (Hooker & Thomson 1872). – *Desmos crinitus* (Hook.f. & Thomson) Saff., *Bulletin of the Torrey Botanical Club* 39: 507 (Safford 1912). – *Polyalthia crinita* (Hook.f. & Thomson) Ridl., *Journal of the Straits Branch of the Royal Asiatic Society* 75: 6 (Ridley 1917). – Type: Peninsular Malaysia, Malacca, 18 Jan. 1865 or 1866, *A. C. Maingay 1513* [Kew Distribution no. 41] (holotype: K[×2] (K000691461, K000691462)).

Description and distribution

Sinclair (1955: 285), Turner (2014: 162).

Polyalthia suberosa (Roxb.) Thwaites

Enumeratio Plantarum Zeylaniae 5: 398 (Thwaites 1864). – *Uvaria suberosa* Roxb., *Plants of the Coast of Coromandel* 1: 31, t. 34 (Roxburgh 1795). – *Guatteria suberosa* (Roxb.) Dunal, *Monographie de la famille des Anonacées*: 128 (Dunal 1817). – Lectotype (designated by Huber 1985: 41): Roxburgh's plate t. 34.

Description and distribution

Sinclair (1955: 298).

Discussion

The changes in the species recognised for Peninsular Malaysia between Sinclair's revision and the current compilation are summarised in Table 1. Three species have been added to the list in the

Table 1. Comparison of accepted names of species in *Polyalthia sensu lato* native to Peninsular Malaysia between Sinclair (1955) and the current paper.

Sinclair 1955	Current Paper
Enicosanthum congregatum	*Monoon congregatum*
Enicosanthum cupulare	*Monoon cupulare*
Enicosanthum fuscum	*Monoon fuscum*
Enicosanthum macranthum	*Monoon macranthum*
Enicosanthum magnoliiflorum	*Monoon magnoliiflorum*
Enicosanthum membranifolium	*Monoon membranifolium*
Enicosanthum praestigiosum	*Monoon praestigiosum*
Polyalthia jenkinsii	*Huberantha jenkinsii*
Polyalthia rumphii	*Huberantha rumphii*
Polyalthia glauca	*Maasia glauca*
Polyalthia hypoleuca	*Maasia hypoleuca*
Polyalthia sumatrana	*Maasia sumatrana*
Polyalthia asteriella	*Monoon asteriellum*
Polyalthia clavigera	*Monoon anomalum*
Polyalthia glabra	*Monoon glabrum*
Polyalthia hookeriana	*Monoon hookerianum*
Polyalthia hypogaea	*Monoon hypogaeum*
Polyalthia lateriflora	*Monoon lateriflorum*
Polyalthia macropoda	*Monoon borneense*
Polyalthia pachyphylla	*Monoon pachyphyllum*
Polyalthia sclerophylla	*Monoon sclerophyllum*
-	*Monoon malayanum*
-	*Monoon xanthopetalum*
Polyalthia angustissima	*Polyalthia angustissima*
Polyalthia bullata	*Polyalthia bullata*
Polyalthia brunneifolia	*Polyalthia brunneifolia*
Polyalthia cauliflora	*Polyalthia cauliflora*
Polyalthia chrysotricha	*Polyalthia chrysotricha*
Polyalthia cinnamomea	*Polyalthia cinnamomea*
Polyalthia dumosa	*Polyalthia dumosa*
Polyalthia hirtifolia	*Polyalthia hirtifolia*
Polyalthia lateritia	*Polyalthia lateritia*
Polyalthia motleyana	*Polyalthia motleyana*
Polyalthia motleyana var. *oblonga*	*Polyalthia oblonga*
Polyalthia obliqua	*Polyalthia obliqua*
Polyalthia parviflora	*Polyalthia parviflora*
Polyalthia pumila	*Polyalthia pumila*
Polyalthia socia	*Polyalthia socia*
Polyalthia stenopetala	*Polyalthia stenopetala*
Polyalthia suberosa	*Polyalthia suberosa*
-	*Polyalthia pakdin* sp. nov.

intervening 60 years which is perhaps fewer than might be expected and must reflect Sinclair's thorough study of the specimens available to him. There have been a large number of name changes, with fewer than half the species still having the same accepted name – all in *Polyalthia* s.s. The reason for this is primarily to create a more phylogenetically accurate taxonomy. It is clear that *Polyalthia sensu lato* was heterogeneous: uniting species with a roughly similar floral morphology. Users of taxonomy, such as foresters and ecologists, generally dislike name changes so there may not be much enthusiasm from them after these changes. The splitting up of *Polyalthia* will possibly have some practical advantages as large genera can be unwieldy and daunting to non-specialists. However, expanding the list of genera in a family that already has a large number to deal with may also discourage the users of taxonomy. Fortunately in this case, one of the three 'new' genera – *Maasia* – is easy to recognise because of the white or glaucous underside to the leaves giving a consistent gestallt to specimens that is soon learnt. *Monoon* and *Polyalthia sensu stricto* can be distinguished fairly readily, though some would doubtless have preferred the continued use of *Enicosanthum* rather than the resurrection of *Monoon*.

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