

# Flora of Singapore precursors, 27: Typifications in the yam family (*Dioscoreaceae*) and the resurrection of *Dioscorea tenuifolia*

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**ABSTRACT.** Nomenclatural notes on several native species of *Dioscoreaceae* from Singapore are presented here. Twenty-three names, including nineteen synonyms, are typified. *Dioscorea tenuifolia* Ridl. is resurrected to the rank of species from a variety.

**Keywords.** *Dioscorea*, lectotype, neotype, nomenclature, synonym, *Tacca*

## Introduction

The yam family *Dioscoreaceae* consists of four genera and around 650 species, with a mostly pantropical distribution. The genus *Dioscorea* L. (containing important food species cultivated for edible tubers) forms the largest component, with the smaller genera *Tacca* J.R.Forst. & G.Forst., *Trichopus* Gaertn. and *Stenomeris* Planch. comprising only around 20 species (Couto et al., 2018; POWO, 2021). Only *Dioscorea* and *Tacca* occur in Singapore. In preparation for a taxonomic account of the *Dioscoreaceae* for the *Flora of Singapore*, herbarium and literature studies of the species found to occur in Singapore indicate that lectotypification is appropriate for several names. Morphological character distinctions have led to one name, *Dioscorea tenuifolia* Ridl., being resurrected to the species level rank and no longer recognised as a variety of *Dioscorea orbiculata* Hook.f.

Unless the specimens were located (and directly examined) in SING, all types from herbaria including B, BM, E, G, K, K-W, KIEL, L, LISU, M, NY, P, U, UPS and S (herbarium acronyms follow Thiers, continuously updated) were studied via digital images, accessed via a range of sources including the JSTOR Global Plants database, online specimen catalogues or provided directly by herbarium staff.

## Typifications and nomenclatural notes

**1. *Dioscorea bulbifera* L.**, Sp. Pl. 1033 (1753). – *Helmia bulbifera* (L.) Kunth, Enum. Pl. 5: 435 (1850). – *Polynome bulbifera* (L.) Salisb., Gen. Pl. 12 (1866). – *Dioscorea bulbifera* L. var. *vera* Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10(1): 26 (1914),

nom. inval. – TYPE: [Published illustration] Plate facing p. 217 in Hermann, *Paradisus Batavus* (1698), lectotype designated by Milne-Redhead (1975).

*Dioscorea pulchella* Roxb. [Hort. Bengal. 72 (1814), nom. nud.], Fl. Ind. 3: 801 (1832). – *Dioscorea bulbifera* var. *pulchella* (Roxb.) Prain, Bengal Pl. 2: 1066 (1903). – TYPE: [Cultivated in Calcutta, native of Bangladesh, Chittagong], *Roxburgh s.n.* (lectotype BM [BM000958182], designated here).

*Dioscorea crispata* Roxb. [Hort. Bengal. 72 (1814), nom. nud.], Fl. Ind. 3: 802 (1832). – *Dioscorea bulbifera* var. *crispata* (Roxb.) Prain, Bengal Pl. 2: 1066 (1903). – TYPE: [Unpublished illustration] Roxburgh Flora Indica illustrations 1706 (K), lectotype designated here.

*Dioscorea heterophylla* Roxb. [Hort. Bengal. 72 (1814), nom. nud.], Fl. Ind. 3: 804 (1832). – *Dioscorea bulbifera* L. var. *heterophylla* (Roxb.) Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 117 (1936). – TYPE: [Unpublished illustration] Roxburgh Flora Indica illustrations 2147 (K), lectotype designated here.

*Dioscorea bulbifera* L. var. *sativa* Prain, Bengal Pl. 2: 1066 (1903). – TYPE: [Cultivated at Kew from Indian source], 1912, *Prain s.n.* (neotype K [K001150777, K001150778 – a single specimen over 2 sheets], designated here).

*Dioscorea sativa* auct. non L.: Thunberg, Fl. Jap. 151 (1784).

*Distribution.* Widespread, occurring across Africa, Asia and Oceania, and introduced into the Americas.

*Notes.* Forman (1997) sets out the challenges of locating original material to typify Roxburgh's names, and points to Sealy (1956) on the interpretative importance of the *Flora Indica* drawings at Kew, particularly considering Roxburgh's proven involvement with the drawings. For *Dioscorea heterophylla* Roxb., no record of a specimen can be found. Prain & Burkill (1936) had, however, connected the drawing of *Dioscorea heterophylla* (Roxburgh number 2147) to their *D. bulbifera* var. *heterophylla*, although Burkill notes on the specimen of one of his collections (*Burkill 2203* [K001143067]) that Roxburgh's drawing erroneously shows prickles on the stem. Embellishment notwithstanding, the drawing can be taken as original material of *Dioscorea heterophylla* and was certainly used as reference material for Prain & Burkill's (1936) varietal decision.

Wilkin (2001) lists the type for *Dioscorea bulbifera* L. var. *sativa* Prain as the type for *D. sativa* Thunb.; however, the latter is a misapplied name since Thunberg had intended the Linnean name (*D. sativa* L.). Although Prain (1903) cites *Dioscorea sativa* L. in his protologue for *D. bulbifera* L. var. *sativa*, Burkill (1951) explains that Prain did not mean to accord a change of status of the Linnaean name, and he did not use the name '*sativa*' in reference to any previous use of the adjective. Also, Prain & Burkill

(1919) explain at great length the numerous confused applications of *Dioscorea sativa* in the literature, including Thunberg's misapplication for a Japan-cultivated specimen of *D. bulbifera*. Although Burkill (1951) states that the type of *Dioscorea bulbifera* L. var. *sativa* is a plant from the Pacific brought to India and cultivated under the name "Otaheite potato", no suitable specimen in India could be traced. However, a 1912 cultivated specimen at Kew, catalogued under *Prain s.n.*, is annotated with the name "Otaheite potato", with a written note indicating that "Doubtless the bulbils which enabled Kew to grow this were sent by Prain from Calcutta", and hence is neotypified here.

Given the recent designation of a lectotype for *Dioscorea bulbifera* var. *vera* (Hoque et al., 2018), it should be clarified that *D. bulbifera* var. *vera* is an invalid name as it is intended to be the type variety which should properly be called *D. bulbifera* var. *bulbifera* and is typified by the type of the species. The Hoque et al. (2018) lectotypification is therefore superfluous as the typification had already previously been done by Milne-Redhead (1975). In their monograph of the family, Prain & Burkill (1936) explain that they chose to compress both *Dioscorea crispata* and *D. pulchella* into the variety *D. bulbifera* var. *vera* (i.e., *D. bulbifera* var. *bulbifera*), as a decision of convenience given the size of herbarium material presented, having already come to the conclusion (Prain & Burkill, 1919) that *D. crispata* and *D. pulchella* were merely forms of *D. bulbifera*. Burkill (1951), in his *Flora Malesiana* account of Dioscoreaceae, removed all mention of *Dioscorea bulbifera* var. *vera* and, in the key to the varieties, the same description of *D. bulbifera* var. *vera* in Prain & Burkill (1936) has been replaced by *D. bulbifera* var. *bulbifera*.

**2. *Dioscorea hispida*** Dennst., Schlüssel Hortus Malab. 15, 20, 33 (1818). – *Dioscorea hirsuta* Blume, Enum. Pl. Javae 1: 21 (1827), nom. illeg. superfl. – *Helmia hirsuta* Kunth, Enum. Pl. 5: 438 (1850), nom. illeg. superfl. – TYPE: [Published illustration] 'Podava kelengu' in Rheede, Hort. Malab. 7: pl. 51 (1688), lectotype designated by Turner (2021).

*Dioscorea lunata* Roth, Nov. Pl. Sp. 370 (1821). – TYPE: India, prope minas adamantinas supra montes ad Basrapadsnam, August 1808, *B. Heyne s.n.* (neotype K [K001142618], designated by Turner (2021)).

*Dioscorea mollissima* Blume, Enum. Pl. Javae 1: 21 (1827). – *Dioscorea triphylla* L. var. *mollissima* (Blume) Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10(1): 26 (1914). – *Dioscorea hispida* Dennst. var. *mollissima* (Blume) Prain & Burkill, Bull. Misc. Inform. Kew 1927: 237 (1927). – TYPE: [Indonesia], Java, Madoera, Rapa, March 1915, *Backer 20185* (neotype L [L.1465085], designated here; isoneotypes L [L.1465084], U [U.1291661]).

*Dioscorea daemona* Roxb., Fl. Ind. 3: 805 (1832); Hooker, Fl. Brit. India 6: 289 (1892); Ridley, J. Straits Branch Roy. Asiat. Soc. 33: 167 (1900); Ridley, Mat. Fl. Malay. Penins. 2: 80 (1907). – *Helmia daemona* (Roxb.) Kunth, Enum. Pl. 5: 439 (1850). – *Dioscorea triphylla* L. var. *daemona* (Roxb.) Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10(1): 26 (1914). – *Dioscorea hispida* Dennst. var. *daemona* (Roxb.) Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 192 (1936). – TYPE: [Published illustration] ‘*Ubium silvestre*’ in Rumphius, Herb. Amboin. 5: 361, t. 128 (1750), lectotype designated here.

*Dioscorea daemona* Roxb. var. *reticulata* Hook.f., Fl. Brit. India 6: 289 (1892). – *Dioscorea triphylla* L. var. *reticulata* (Hook.f.) Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10(1): 26 (1914). – *Dioscorea hispida* Dennst. var. *reticulata* (Hook.f.) Prain & Burkill, Bull. Misc. Inform. Kew 1927: 237 (1927). – [*Dioscorea macrocarpa* Wall., Numer. List no. 5100 (1829), nom. nud.] – TYPE: Siam [Thailand], *Finlayson 474* [EIC 5100] (lectotype K [K001104760], designated here).

*Dioscorea hispida* Dennst. var. *scaphoides* Prain & Burkill, Bull. Misc. Inform. Kew 1927: 237 (1927). – TYPE: [Thailand], Pungah [Phangnga], Pulau Tebun, 29 November 1918, *Haniff & Nur 3596* (lectotype K [K001143923, K001143935 – a single specimen over 2 sheets], designated here).

*Dioscorea hispida* Dennst. var. *neoscaphoides* Prain & Burkill, Bull. Misc. Inform. Kew 1927: 237 (1927), nom. inval.

*Dioscorea triphylla* auct. non L.: Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10(1): 26 (1914); Ridley, Fl. Malay Penins. 4: 314 (1924).

*Distribution.* Extending from the Indian subcontinent and projecting into China through to Southeast Asia, also as distantly as north Australia (Queensland) and New Guinea perhaps due to cultivation.

*Notes.* The type for *Dioscorea mollissima* cannot be traced, hence a neotype is selected from the nearest locality within Java, a collection by Backer that had been determined by Burkill in 1916 as *D. triphylla* var. *mollissima*. *Dioscorea hispida* var. *neoscaphoides* is not a validly published name under Art. 36.1 of the Shenzhen Code (Turland et al., 2018), since Prain & Burkill (1936) explain that they consider the taxon as “con-variatal” with *D. scaphoides* and merely propose the name in anticipation of further evidence.

**3. *Dioscorea kingii*** R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 289 (1924); Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 381 (1938). – *Dioscorea kingii* R.Knuth var. *vera* Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 383 (1938), nom. inval. – TYPE: [Malaysia], Penang, May 1881, *King’s Collector 1748* (holotype B [B 10 0278826]; isotype K [K000098256]).

*Dioscorea nurii* R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 352 (1924). – TYPE: [Malaysia], Pulau Penang, Waterfall Valley, 29 January 1916, *Nur 1231* (lectotype B [B 10 0278807], designated here; isolectotype L [L.1465041]).

*Dioscorea harrissii* R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 352 (1924). – TYPE: [Malaysia], Pulau Penang, Moniot Road, 22 January 1917, *Haniff SFN 2406* (lectotype B [B 10 0278724], designated here; isolectotype SING [SING0054112]).

*Dioscorea porteri* Prain & Burkill ex Ridl., Fl. Malay Penins. 4: 318 (1924), nom. inval.

*Dioscorea porteri* Prain & Burkill ex Ridl. var. *purpureovenia* Prain & Burkill ex Ridl., Fl. Malay Penins. 4: 318 (1924), nom. inval. – *Dioscorea kingii* R.Knuth var. *purpureovenia* Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 383 (1938), nom. inval.

*Dioscorea porteri* Prain & Burkill ex Ridl. var. *andersonii* Prain & Burkill ex Ridl., Fl. Malay Penins. 4: 318 (1924), nom. inval.; Prain & Burkill, Ann. Roy. Bot. Gard. (Calcutta) 14: 383 (1938), nom. inval.

*Distribution.* Peninsular Malaysia and Singapore.

*Notes.* Although R. Knuth had annotated specimens of *Dioscorea nurii* and *D. harrissii*, no holotypes with herbarium locations were indicated in the protologues. Specimens annotated by the author have been designated as lectotypes. The digital record on JSTOR for the lectotype of *Dioscorea harrissii* records the collector's name as Hariss (the likely foundation for the specific epithet), which is a misreading for the locally known collector Haniff. Prain & Burkill (1938) explain that Knuth had chosen the name *Dioscorea harrissii* to honour Mr Haniff.

Prain & Burkill (1938) also clarify that their initial choice of the name *Dioscorea porteri* was superseded by Knuth publishing his monograph of Dioscoreaceae a few months earlier, and that Knuth's descriptions of *D. kingii*, *D. nurii* and *D. harrissii* refer in fact to the same species. The priority of *Dioscorea kingii* was established by Prain & Burkill (1938) as the name of this species.

**4. *Dioscorea laurifolia*** Wall. ex Hook.f., Fl. Brit. India 6(18): 293 (1892). – TYPE: [Malaysia], Penang, *Porter s.n.* [EIC 5111] (lectotype BM [BM001049925], designated by Pagare et al. (2020); isolectotypes K [K000098237, K000098238], K-W [K001104831]).

*Dioscorea laurifolia* Wall. ex Hook.f. var. *hookeri* R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 289 (1924). – TYPE: [Malaysia], Malacca, *Griffith 5556* (lectotype K [K001143227], designated here).

*Distribution.* Vietnam, Thailand, Peninsular Malaysia, Singapore and Borneo.

*Notes.* Both male and female specimens were found under the collection *Griffith 5556* as cited in the protologue of *Dioscorea laurifolia* var. *hookeri*. The female specimen has been selected as the lectotype; Burkill had annotated it as "...the only specimen of the form he [Hooker] knew".

**5. *Dioscorea polyclades*** Hook.f., Fl. Brit. India 6(18): 294 (1892). – TYPE: Singapore, Sungei Pandan, 14 January 1890, *Goodenough 1646* (lectotype BM [BM001051495], designated by Pagare et al., 2020; isolectotypes K [K001143450], SING [SING0010107]).

*Dioscorea polyclades* Hook.f. var. *oblongifolia* Uline ex R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 275 (1924). – TYPE: [Indonesia], Java, 1843, *Zollinger 283* (holotype B destroyed; lectotype G [G00191862], designated here; isolectotypes BM [BM001051499, BM001051500], G [G00191835], K [K000098332, K001144646], L [L.1465246], P [P01751236]).

*Dioscorea nummularia* Lam. var. *velutina* Kuntze, Revis. Gen. Pl. 2: 704 (1891). – *Dioscorea polyclades* Hook.f. var. *velutina* (Kuntze) Burkill, Fl. Males., ser. 1, 4(3): 335 (1951). – TYPE: [Indonesia], Java, 27 June 1875, *Kuntze 5249* (lectotype NY [NY00319338], designated here).

*Dioscorea nummularia* auct. non Lam.: Kunth, Enum. Pl. 5: 386 (1850), excluding references; Moritzi in Zollinger, Syst. Verz. 68 (1854).

*Dioscorea pubera* auct. non Blume: Koord.-Schum., Syst. Verz. Lief. 9 *genus* 1252 (1912); Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 282 (1924), p.p.

*Dioscorea oppositifolia* auct. non L.: Backer, Handb. Fl. Java 3: 115 (1924), p.p.

*Distribution.* Vietnam, through to Peninsular Malaysia, Singapore, Borneo and Indonesia (Java and Sumatra).

*Notes.* The lectotype of *Dioscorea polyclades* designated by Pagare et al. (2020) was wrongly identified as a collection of Ridley, when it was in fact made by J.S. Goodenough – this was confirmed by the clearer labels and written initials (J.S.G.) on duplicates held at SING and K. The single initial ('G') on the lectotype may be mistaken as Ridley's handwriting, and thus erroneously determined as the original material collected by Ridley in Hooker's protologue. However, the earliest known collection by Ridley from the island is dated to 1893; hence *Goodenough 1646* is the only collection made prior to Hooker's description in 1892, and it is possible that Hooker too might have misread the label as Ridley's handwriting, or might otherwise



have been aware that Goodenough had served in the Forest Service of the Straits Settlements and collected forest material for Ridley (Van Steenis-Kruseman & Van Steenis, 1950).

Burkill's (1951) typification of the male flowering specimen of *Dioscorea nummularia* var. *velutina* recorded the collector number wrongly (*Kuntze 5279* instead of *5249*); an understandable error given the cursive numbering on the written label. As both male and female types were designated by Burkill, lectotypification is desirable.

**6. *Dioscorea prainiana*** R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 286 (1924). – *Dioscorea deflexa* Hook.f., Fl. Brit. India 6(18): 293 (1892), non Griseb. (1875). – TYPE: Singapore, [1867–1868], *Maingay 3087* [Kew distribution no. 1705] (lectotype K [K000098240], designated here).

*Dioscorea maliliensis* R.Knuth, Repert. Spec. Nov. Regni Veg. 36: 127 (1934). – TYPE: [Indonesia], Celebes [Sulawesi], Malili, 2 August 1929, *Kjellberg 2009* (holotype B [B 10 0278817]).

*Dioscorea zollingeriana* auct. non Kunth: Ridley, Fl. Malay Penins. 4: 317 (1924), p.p.

*Dioscorea oppositifolia* auct. non L.: Backer, Handb. Fl. Java 3: 115 (1924), p.p.

*Distribution.* Indonesia (Sumatra and Sulawesi), Peninsula Malaysia and Singapore.

*Notes.* The labels on the original material of *Dioscorea prainiana* held at Kew specify only that the collections were made in 1867–1868 without specific dates. However, based on collecting localities recorded in the Cyclopaedia of Malesian Collectors (Van Steenis-Kruseman & Van Steenis, 1950), Maingay had passed through Malacca and Singapore between Aug–Sep 1867, hence the specimens must have been collected during these months.

**7. *Dioscorea pyrifolia*** Kunth, Enum. Pl. 5: 384 (1850). – TYPE: [Malaysia], Malacca, 1841, *Cuming 2314* (holotype KIEL; isotypes E [E00502158], G [G00191833, G00191834], K [K000098257], M [M0213487], P [P00748549]).

*Dioscorea zollingeriana* Kunth, Enum. Pl. 5: 384 (1850). – TYPE: [Indonesia], Java, *Zollinger 917* (holotype KIEL destroyed; lectotype B [B 10 0296759], designated here).

*Dioscorea diepenhorstiana* Miq., Fl. Ned. Ind., Eerste Bijv. 3: 611 (1861). – *Dioscorea pyrifolia* Kunth var. *diepenhorstiana* (Miq.) Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10: 33 (1914), as '*diepenhorstii*'. – TYPE: [Indonesia], Sumatra, Priaman, *Diepenhorst 2358* (lectotype U [U 0001612], designated here).

*Dioscorea pyrifolia* Kunth var. *ferruginea* Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10: 33 (1914). – [*Dioscorea ferruginea* Thunb., Fl. Java 6 (1825), nom. nud.] – TYPE: [Indonesia], Java, Herb. Thunberg fiche no. 988/10 (lectotype UPS, designated here).

*Dioscorea preangeriana* Uline ex R.Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 269 (1924). – TYPE: [Indonesia], Java, Mt Endoet, November 1886, *Warburg s.n.* (holotype B [B 10 0278794]).

*Dioscorea sandakanensis* R.Knuth, Repert. Spec. Nov. Regni Veg. 36: 127 (1934). – TYPE: [Malaysia], North Borneo, Sandakan, September–December 1920, *Ramos 1415* (holotype B [B 10 0278779]).

*Dioscorea nummularia* Lam. var. *puberula* Kuntze, Revis. Gen. Pl. 2: 704 (1891). – TYPE: [Indonesia], Java, Rambay, 26 June 1875, *Kuntze 5217* (lectotype NY [NY00319335], designated here).

*Dioscorea nummularia* Lam. var. *glabrescens* Kuntze, Revis. Gen. Pl. 2: 705 (1891). – TYPE: [Indonesia], Java, Plabuan, 11 June 1875, *Kuntze 4933* (lectotype NY [NY00319334], designated here).

*Dioscorea nummularia* auct. non Lam.: Blume, Enum. Pl. Javae 21 (1827); Hassk., Tijdschr. Natuurl. Gesch. Physiol. 9: 136 (1842).

*Dioscorea cornifolia* auct. non Kunth: Ridley, Mat. Fl. Malay. Penins. 2: 81 (1907).

*Dioscorea oppositifolia* auct. non L.: Backer, Handb. Fl. Java 3: 115 (1924), p.p.

*Distribution.* India, Vietnam, Thailand, Peninsular Malaysia, Singapore, Borneo and Indonesia (Java and Sumatra).

*Notes.* Kunth, in his protologue for *Dioscorea pyrifolia*, cites the type collection, *Cuming 2314*, as having been collected in the Philippines. However, Van Steenis-Kruseman & Van Steenis (1950) indicate that Cuming had by then left Manila and was in the Malay Peninsula, and that all of his collection numbers between 2154 and 2464 were accumulated outside the Philippines; this was also confirmed by subsequent accounts (Knuth, 1924).

The protologue for *Dioscorea diepenhorstiana* makes no mention of a particular specimen, only the collection location (Priaman, Sumatra). Stafleu (1966) notes that Miquel’s private herbarium was transferred to the Utrecht University in 1959. The specimen *Diepenhorst 2358* (previously determined by Uline as *Dioscorea glabra* Roxb. and confirmed by Prain & Burkill (1938) to be their *D. pyrifolia* var. *diepenhorstii*), now housed in Leiden, bears a Utrecht stamp and a “Typus” label with the writing “*Dioscorea diepenhorstii* Miq”, and should accordingly be the most ideal lectotype.



**8. *Dioscorea sansibarensis*** Pax, Bot. Jahrb. Syst. 15(2): 146 (1892). – TYPE: [Tanzania], Bagamojo, May 1874, *Hildebrandt 1284* (lectotype B destroyed, designated by Milne-Redhead (1975)).

[*Dioscorea toxicaria* Bojer, Hortus Maurit. 352 (1837), nom. nud.]

*Dioscorea macroua* Harms, Notizbl. Königl. Bot. Gart. Berlin 2: 266 (1896). – TYPE: [Cameroon], Yaounde, September 1893, *Zekner & Staudt 414* (lectotype K [K000098387], designated by Wilkin & Randriamboavonjy (2012); isolectotypes BM [BM000522081], S [S06-12918]).

*Dioscorea welwitschii* Rendle in Hiern, Cat. Afr. Pl. 2: 39 (1899); Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 324 (1924). – TYPE: Angola, Golungo Alto, Sobato Quilombo-Quiacatubia, February 1855, *Welwitsch 4041* (lectotype BM [BM000911557], designated here; isolectotypes BM [BM000911558], K [K000098456], LISU [LISU221921, LISU221922, LISU221923]).

*Dioscorea macabiha* Jum. & H.Perrier [Compt. Rend. Acad. Sci. Paris 149: 485 (1909) nom. nud.], Ann. Mus. Colon. Marseille, sér. 2, 8: 407 (1910); Knuth in Engler, Pflanzenr., IV, fam. 43 (Heft 87): 88 (1924); Perrier, Mém. Soc. Linn. Normandie, Bot. 1: 13 (1928). TYPE: Madagascar, Mahajanga, Autour de la ville de Maravoay (Boina), *Perrier 8247* (lectotype P [P00496229], designated by Wilkin & Randriamboavonjy (2012)).

*Distribution.* Native to tropical subsaharan Africa, including the Ivory Coast and Sudan, and further south to Angola, Mozambique and Madagascar. Introduced to the United States (Florida), India (Assam), Taiwan, Peninsular Malaysia and Singapore.

*Notes.* The protologue for *Dioscorea sansibarensis* makes no mention of the herbarium location for the type collection *Hildebrandt 1284*. The assertion by Milne-Redhead (1975) that the holotype is at B is therefore an effective lectotypification under Art. 9.10 of the Shenzhen Code (Turland et al., 2018) although this specimen is lost and no other original material is known. The distinctiveness of the taxon leaves no doubt as to its identity; however, neotypification is left to future researchers best able to investigate it in its natural range and collect from the type locality. For *Dioscorea welwitschii* no herbarium location is found in the protologue, and Wilkin & Randriamboavonjy's (2012) citation of a BM specimen as the holotype does not count as an effective lectotypification, being after 1 January 2001, under Art. 9.23 of the Shenzhen Code (Turland et al., 2018). The same specimen is, however, designated here as lectotype.

**9. *Dioscorea stenomeriflora*** Prain & Burkill, J. Proc. Asiat. Soc. Bengal 10: 40 (1914). – TYPE: Singapore, Changi, *Ridley s.n.* (lectotype BM [BM001051543], designated here).

*Peripetasma polyanthum* Ridl., J. Bot. 58: 147 (1920); Ridley, Fl. Malay Penins. 1: 103 (1922). – TYPE: [Malaysia], Selangor, Batu Tiga, *Ridley 11934*, February 1894, (lectotype K [K001143047], designated here).

*Distribution.* Indonesia (Sumatra), Peninsular Malaysia and Singapore.

*Notes.* Prain & Burkill (1914) state in their protologue of *Dioscorea stenomeriflora* that the only male plant they studied was preserved in the British Museum of Natural History, South Kensington. Two male flowering specimens are to be found in the BM, both collected by Ridley, and the one with more material is designated as the lectotype.

**10. *Dioscorea tenuifolia*** Ridl., J. Straits Branch Roy. Asiat. Soc. 41: 34 (1904), as ‘*tenifolia*’. – *Dioscorea orbiculata* Hook.f. var. *tenuifolia* (Ridl.) Thapyai, Thai Forest Bull., Bot. 33: 197 (2005). – TYPE: Singapore, Bukit Timah, 14 June 1891, *Ridley 4596* (lectotype SING [SING0010182], designated here; isolectotypes BM [BM000884590], SING [SING0192548]).

*Dioscorea glabra* auct. non Roxb.: Ridley, Mat. Fl. Malay. Penins. 2: 83 (1907), p.p.

*Dioscorea zollingeriana* auct. non Kunth: Ridley, Fl. Malay Penins. 4: 317 (1924), p.p.

*Dioscorea oppositifolia* auct. non L.: Backer, Handb. Fl. Java 3: 115 (1924), p.p.

*Distribution.* Indonesia (Sumatra), Thailand, Peninsular Malaysia and Singapore.

*Notes.* Thapyai et al. (2005) reduced *Dioscorea tenuifolia* to a variety of *D. orbiculata*, based on the assessment that the vegetative and reproductive morphologies were similar, including positively geotropic (pendent) male inflorescences and that ‘the only consistent difference between them is that *D. orbiculata* has stellate or dendroid pubescence, especially on young growth’. In the *Flora of Thailand* account of Dioscoreaceae (Wilkin & Thapyai, 2009), it is also noted under *Dioscorea orbiculata* var. *tenuifolia* (Ridl.) Thapyai that ‘the positive geotropism of the male partial inflorescences described by Prain & Burkill (1938) is hard to see in herbarium specimens. In Singapore, the benefit of multiple field observations and recent photographs justify the original observations of positive geotropism in the male inflorescences, clarifying the understandably misleading nature of several herbarium specimens, which had not been dried in the correct orientation. *Dioscorea orbiculata* does not occur in Singapore. However, a study of specimens available at SING and online images (including JSTOR and K) indicate stark differences in the male inflorescence arrangement, which

in *Dioscorea orbiculata* are not positively geotropic or downwardly directed flowering spikes, but rather the spikes are curved in a distinct manner as described in Prain & Burkill (1938), '(diverging) in a characteristic way from the axis at about 45° and are curved'. Such distinctive curvature does not occur in the loosely hanging spikes of *Dioscorea tenuifolia*; furthermore, the male inflorescences of *D. orbiculata* are mostly compound in nature, borne on long leafless rachises, whereas those of *D. tenuifolia* are generally simple and axillary amongst leaves. Other distinctions are listed in Table 1 and illustrated in Fig. 1.

**11. *Tacca cristata*** Jack, Malayan Misc. 1(5): 23 (1820). – TYPE: Singapore, *Jack s.n.* (lectotype E [E00301141], designated here).

*Tacca integrifolia* auct. non Ker Gawl.: Drenth, Blumea 20: 388 (1972).

*Tacca chantrieri* auct. non André: Ridley, Fl. Malay Penins. 4: 309 (1924).

*Distribution.* Peninsular Malaysia and Singapore.

*Notes.* Cowan (1954) lists William Jack's specimens found in the Herbarium of the Royal Botanic Garden Edinburgh as original material sent by Jack as a gift to the Marchioness of Edinburgh for her Museum, although not as well put together as Jack's consignments for Wallich. The specimen E00301141 contains a note in Jack's handwriting stating, "A new species found at Singapore", and he was recorded to have collected on the island between 31 May and 27 June 1819 (Van Steenis-Kruseman & Van Steenis, 1950). As Jack's death in September 1822 pre-dates the Wallich collection (1829–1847), the Wallich specimen designated as lectotype by Wong & Chua (2019) is not original material and is superseded here in favour of the Jack specimen.

**12. *Tacca leontopetaloides*** (L.) Kuntze, Revis. Gen. Pl. 2: 704 (1891). – *Leontice leontopetaloides* L., Sp. Pl. 1: 313 (1753). – *Tacca pinnatifolia* Gaertn., Fruct. Sem. Pl. 1: 43. t. 14. f. 2 (1788), nom. illeg. superfl. – TYPE: [Published illustration] '*Leontopetaloides follis profunde lacinatis, radice tuberosa*' in Amman, Comment. Acad. Sci. Imp. Petrop. 8: 211, t. 13 (1741), lectotype designated by Merrill (1945).

*Tacca pinnatifida* J.R.Forst. & G.Forst., Char. Gen. Pl., ed. 2: 70, t. 35 (1776). – TYPE: [French Polynesia, Tahiti], 1772–1775, *Forster s.n.* (lectotype BM [BM000990238], designated by Smith, 1979).

*Tacca dubia* Schult.f. in Roemer & Schultes, Syst. Veg., ed. 15, bis 7: 167 (1829). – [*Tacca phallifera* Rumh., Herb. Amboin. 5: 326, t. 113 (1750), p.p.] – TYPE: [Published illustration] '*Tacca phallifera*' in Rumphius, Herb. Amboin. 5: 326, t. 113, fig. 1 (1750), lectotype designated by Merrill (1917).

**Table 1.** Diagnostic differences between *D. tenuifolia* and *D. orbiculata*.

	<i>D. tenuifolia</i>	<i>D. orbiculata</i>
Indumentum	Absent except for simple pubescence on immature axillary shoots or inflorescence nodes	Stellate or dendroid pubescence on all parts
Leaf arrangement	Opposite or alternate	Usually opposite
Blade texture	Thinly herbaceous to chartaceous	Usually firm or more stiffly chartaceous
Blade shape (when mature)	Ovate to elliptic	Usually orbicular
Male inflorescence spikes	Directed earthwards (positively geotropic)	Standing in a curved manner at an angle of about 35–45° to the bearing axis
Male flower spacing	Loosely spaced from 0.5 to 3 times the diam. of each flower	Tightly spaced from 0 to 1.5 times the diam. of each flower
Stamen attachment	Adnate to base of tepals	Adnate to pistillode

*Tacca viridis* Hemsl., Hooker's Icon. Pl. 26: tt. 2515–2516 (1897). – TYPE: [Thailand], Trang, *Goldham s.n.* (lectotype K [K000292196], designated by Drenth (1972)).

*Distribution.* Widely distributed from Africa through South and East Asia, to North Australia and the South Pacific Islands.

*Notes.* *Tacca pinnatifolia* Gaertn. is a superfluous and illegitimate name as the protologue includes the type of *T. leontopetaloides* which is the name that ought to have been taken up under Art. 7.5 of the Shenzhen Code (Turland et al., 2018). For *Tacca viridis*, Ridley (1907) identified the source collection as *Goldham s.n.* from Trang in Southeast Siam [Thailand], clarifying the ambiguous location in the 1897 protologue as ‘probably from Malay Peninsula’.

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**Fig. 1. A.** *Dioscorea tenuifolia* Ridl. Plant with positively geotropic male inflorescence spikes. From Singapore, Central Catchment Nature Reserve. **B.** Lectotype of *Dioscorea orbiculata* Hook.f. (*Curtis 910*, designated by Thapyai et al., 2005). (Photos: A, R.C.J. Lim; B, Royal Botanic Gardens, Kew)

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