

Flora of Singapore precursors 48: Further notes on the genus *Piper* (Piperaceae) in Singapore

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ABSTRACT. Further work on the genus *Piper* L. in Singapore has led to the need for a number of nomenclatural and taxonomic clarifications. Lectotypes are designated for ten names: *Piper flavimarginatum* C.DC., *P. pachyphyllum* Hook.f., *P. crassipes* Korth. ex Miq., *Cubeba neesii* Miq., *P. burkillii* Ridl., *P. lanceolatum* Roxb., *P. ridleyi* C.DC., *P. velutibracteum* C.DC., *P. rostratum* Roxb., and *P. sarmentosum* Roxb. A neotype is designated for *P. latifolium* W.Hunter, and previous confusion in the literature is clarified.

Keywords. Holotype, isolectotype, isoneotype, lectotype, neotype, typification

Introduction

The genus *Piper* L. includes about 2000 species worldwide (Asmarayani, 2018). In Singapore, 18 native, naturalised or casual species are recorded (Lindsay et al., 2022). In preparation for an account of the Piperaceae for the *Flora of Singapore*, Gajurel & Lua (2020) published a precursor paper to clarify a number of nomenclatural and taxonomic issues relating to the species found in Singapore. At around the same time, Suwanphakdee et al. (2020) published a paper to clarify some nomenclatural and taxonomic issues relating to the species found in Thailand. There are a number of typifications in common in these papers and as Suwanphakdee et al. (2020) was published earlier, the typifications published there have priority. However, we also question some of the decisions made in that paper and discuss these below. In addition, further work on the Piperaceae in Singapore has highlighted the need for notes on some names not previously discussed.

For each name, only the protologue and the entry in Lindsay et al. (2022), when relevant, are cited. Further literature of relevance to Singapore can be found in Lindsay et al. (2022). The names are arranged alphabetically by the correct name of the taxon with discussion of any synonyms under each correct name. The herbarium acronyms

follow Thiers (continuously updated). Specimens from the East India Company Herbarium (EIC), frequently referred to as the Wallich Herbarium, are cited here by the collector and collector number (often just *s.n.*) with the EIC number given in square brackets. In one case, ‘HEIC’ is used to refer to a specimen with a ‘Herbarium of the East India Company’ label but which is not part of the ‘Wallich Herbarium’. ‘KD’ is an abbreviation for ‘Kew Distribution’. The EIC, HEIC and KD numbers should not be mistaken for collection numbers given by collectors.

Nomenclatural and taxonomic notes

1. *Piper baccatum* Blume, Verh. Batav. Genootsch. Kunsten 11: 172, t. 3, fig. 9 (1826); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 601 (2022). – *Muldera baccata* (Blume) Miq., Syst. Piperac., fasc. 2: 341 (1844). – TYPE: Indonesia, Java, *C.L. Blume* 624 (lectotype L [L.1535860], designated by Suwanphakdee et al., Nord. J. Bot. 34: 607 (2016); isolectotype K [K000794885]).

Piper flavimarginatum C.DC., Rec. Bot. Surv. India 6: 26 (1912). – TYPE: Singapore, Chan Chu Kang, 1892, *H.N. Ridley* 3772 (lectotype CAL [CAL0000020925], designated here).

Piper pachyphyllum Hook.f., Fl. Brit. India 5, fasc. 13: 80 (1886), nom. illeg. hom., non Baker (1885). – TYPE: [Peninsular Malaysia], Malacca [Melaka], *W. Griffith* *s.n.* [HEIC 4427] (lectotype K [K000575309], designated here).

Notes. Suwanphakdee et al. (2016, 2020) provided an extensive synonymy for *Piper baccatum* Blume, including the names *P. flavimarginatum* C.DC. and *P. pachyphyllum* Hook.f., both of which have been extensively used as the name of this species in Singapore (Lindsay et al., 2022). Suwanphakdee et al. (2016, 2020) cited a ‘holotype’ for each of these names, ‘*Ridley* 3772’ (SING) for *Piper flavimarginatum* and ‘*Griffith* 4427’ (K) for *P. pachyphyllum*. Under the rules of the ICN (Turland et al., 2018), neither name has a holotype. For *Piper flavimarginatum*, the collection locality Suwanphakdee et al. (2016, 2020) provided for the ‘holotype’ does not match that provided in the protologue and no specimen of *Ridley* 3772 could be found in SING. Instead, we designate as the lectotype a specimen of *Ridley* 3772 in CAL with details matching the protologue. For *Piper pachyphyllum*, we designate as the lectotype the specimen cited as the ‘holotype’ by Suwanphakdee et al. (2016, 2020) but noting that 4427 is not a Griffith collection number but rather an EIC number.

2. *Piper crassipes* Korth. ex Miq., Comm. Phytogr., fasc. 1: 22 (1839); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 602 (2022). – *Cubeba crassipes* (Korth. ex Miq.) Miq., Comm. Phytogr., fasc. 2: 45 (1840). – TYPE: [Indonesia], Sumatra, comm. 1863, *P.W. Korthals* *s.n.* (lectotype K [K000575314], designated here).

Cubeba neesii Miq., Syst. Piperac., fasc. 1: 292 (1843). – *Piper pedicellosum* Wall. ex C.DC. in de Candolle, Prodr. 16(1): 343 (1869), nom. illeg. superfl. – *Piper neesii* (Miq.) P.K.Mukh., Phytotaxa 289: 190 (2016). – TYPE: Singapore, 1822, *N. Wallich s.n.* [EIC 6646A] (lectotype K-W [K001124404], designated here).

Notes. This species has been most commonly referred to as *Piper pedicellosum* Wall. ex C.DC. in Singapore but that name is superfluous and is now treated as a heterotypic synonym of *P. crassipes* Korth. ex Miq. (Lindsay et al., 2022).

Suwanphakdee et al. (2018) incorrectly suggested that the name *Piper crassipes* had been lectotypified by Miquel (1840). Suwanphakdee et al. (2020) later suggested that Suwanphakdee et al. (2018) had effectively designated the lectotype. In the absence of a ‘designated here’ statement in Suwanphakdee et al. (2018) or Suwanphakdee et al. (2020), the name has not been lectotypified. We designate the same specimen here to avoid confusion. Suwanphakdee et al. (2018) cited the specimen as *Korthals 1863* but the specimen has no collection number and the ‘1863’ is rather a date.

Suwanphakdee et al. (2018) cited a ‘holotype’ for the names *Cubeba neesii* Miq. and *Piper pedicellosum* Wall. ex C.DC. which they correctly treated as homotypic. Suwanphakdee et al. (2020), however, treated *Cubeba neesii* and *Piper pedicellosum* as heterotypic and again cited a ‘holotype’ for *P. pedicellosum*. *Piper pedicellosum* is superfluous as it includes the valid and legitimate name *Cubeba neesii* in synonymy and is typified by the name that should have been adopted, i.e. the type of *Cubeba neesii*. *Cubeba neesii* was published with a reference to Wallich List no. 6646A from Singapore. There is no holotype under the rules of the ICN (Turland et al., 2018) but the specimen cited as such by Suwanphakdee et al. (2018) is designated here as the lectotype.

3. *Piper curtisii* C.DC., Rec. Bot. Surv. India 6: 14 (1912); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 602 (2022). – TYPE: [Peninsular Malaysia], Malacca, 1 October 1885, *Alvins 2337* (lectotype SING [SING0206243], designated by Gajurel & Lua, Gard. Bull. Singapore 72: 136 (2020)).

Piper burkillii Ridl., J. Straits Branch Roy. Asiat. Soc. 82: 189 (1920). – TYPE: [Peninsular Malaysia], Negeri Sembilan, Gunong Tampin Hill, 10 July 1916, *I.H. Burkill 1177* (lectotype K [K000794927], designated here; isolectotype SING [SING0068757]).

Notes. The name *Piper curtisii* C.DC. was lectotypified by Gajurel & Lua (2020). The heterotypic synonym *Piper burkillii* Ridl. was based on the collection *Burkill 1177* but without a holotype designated in the protologue. There are duplicates in K and SING, and the K specimen is designated here as the lectotype as it is in slightly better condition.

4. *Piper lanatum* Roxb., Fl. Ind. 1: 161 (1820); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 602 (2022). – TYPE: India, *W. Roxburgh s.n.* (lectotype BR [BR0000006597801], designated by Suwanphakdee et al., Thai Forest Bull., Bot. 48: 159 (2020)).

Piper densibaccum C.DC., Philipp. J. Sci., C5: 454 (1910). – TYPE: Philippines, Lake Lanao, Camp Keithley, March 1906 or March 1907, *M.S. Clemens s.n.* (not found).

Notes. This species has commonly been referred to under both of the names *Piper lanatum* Roxb. and *P. caninum* Blume in the Singapore literature (Lindsay et al., 2022) but *P. caninum*, along with many other names in Malesia, is now treated as a synonym of *P. lanatum* (Suwanphakdee et al., 2020). *Piper lanatum* was lectotypified by Suwanphakdee et al. (2020) and *P. caninum* by Suwanphakdee et al. (2018). Suwanphakdee et al. (2020) also included in the synonymy of *Piper lanatum* the name *Piper densibaccum* C.DC. from the Philippines. They cite a ‘holotype’ in G-DC (*Clemens s.n.* [G00329052]), which is, however, not original material of *Piper densibaccum* as, although the locality is correct, the month of collection does not match that given in the protologue and de Candolle has not annotated the sheet with the name *Piper densibaccum* as would be expected. Instead, de Candolle labelled this specimen as *Piper caninum* var. *glabribRACTEUM* C.DC. *Piper densibaccum* is not treated by Gardner (2006) in his review of the Philippine species of *Piper*. A more suitable specimen that is a better match to the protologue could not be found in the Geneva herbarium and the collections in PNH were destroyed in World War II. The status of *Piper densibaccum* should, therefore, be reassessed when either original material is located or the name is neotypified as part of a suitable taxonomic and/or regional study.

5. *Piper macropiper* Pennant, Outlin. Globe 4 [View Malay. Isl.]: 242 (1800); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 603 (2022). – TYPE: [Published illustration] Rumphius, Herb. Amboin. 5: 46, t. 28, fig. 1 (1747), lectotype designated by Chew, J. Arnold Arbor. 53: 10–11 (1972).

Piper lanceolatum Roxb., Fl. Ind. 1: 162 (1820), nom. illeg. hom., non Ruiz & Pav. (1798). – *Piper lonchites* Schult., Mant. 1: 241 (1822). – *Piper moluccanum* Spreng., Syst. Veg. (ed. 16) 1: 112 (1824 [‘1825’]), nom. illeg. superfl. – *Chavica lanceolata* Miq., Syst. Piperac., fasc. 1: 264 (1843), nom. illeg. superfl. – TYPE: [Indonesia, Moluccas], *W. Roxburgh s.n.* [EIC 6644A] (lectotype K-W [K001124398], designated here).

Piper miniatum Blume, Verh. Batav. Genootsch. Kunsten 11: 166, fig. 6 (1826). – TYPE: [Indonesia], Java, Tjiradjas, *Collector unknown s.n.* (lectotype L [L.1546296], designated by Suwanphakdee et al., Thai Forest Bull., Bot. 48: 166 (2020)).

Notes. *Piper lanceolatum* Roxb. was described by Roxburgh as a ‘native of the Molucca Islands’. As *Piper lanceolatum* Roxb. is a later homonym of *P. lanceolatum* Ruiz & Pav., *Piper lonchites* Schult. was published as a replacement name. Unfortunately, despite these names being homotypic, they have come to be treated as two different species in the literature (e.g., Suwanphakdee et al., 2020), a situation that was addressed by Mukherjee (2016). Suwanphakdee et al. (2020) proposed a Roxburgh specimen in G as the ‘holotype’ of *Piper lanceolatum* Roxb. and the specimen under 6644B in K-W as the lectotype of *P. lonchites* Schult. *Piper lanceolatum* does not have a holotype and the specimen cited as the lectotype of *P. lonchites* is a Porter specimen from Penang and is, therefore, not original material for the name (but see Mukherjee (2016) for a discussion on later uses of the name). We designate an unlocalised Roxburgh specimen under 6644A in K-W [K001124398] as the lectotype for both names (being homotypic) as this specimen is very likely to be original material. There is no extant Roxburgh drawing for this name (Sealy, 1956; Sanjappa et al., 1994).

Piper miniatum Blume was lectotypified by both Suwanphakdee et al. (2020) and Gajurel & Lua (2020). The designation by Suwanphakdee et al. (2020) has priority. Although the specimen selected as the lectotype by Gajurel & Lua (2020) is listed as an isolectotype by Suwanphakdee et al. (2020), along with specimens in BO and K, it is questionable as to whether these are duplicates of a single gathering and are, therefore, not listed here.

6. *Piper porphyrophyllum* (Lindl. ex Blandy) N.E.Br., Gard. Chron., n.s., 22: 438 (1884); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 604 (2022). – *Cissus porphyrophylla* Lindl. ex Blandy, Proc. Roy. Hort. Soc. London 1: 225 (1860), as ‘*porphyrophyllus*’. – TYPE: [Peninsular Malaysia], Penang, August 1822, *N. Wallich s.n.* [EIC 6643E] (neotype K [K000794902], designated by Suwanphakdee et al., Kew Bull. 73: art. 33, p. 14 (2018); isoneotypes K [K000794900], K-W [K001124395]).

Notes. The basionym of *Piper porphyrophyllum* (Lindl. ex Blandy) N.E.Br., *Cissus porphyrophylla* Lindl. ex Blandy, was described in a write-up on plants of horticultural interest under the chairmanship of John Jackson Blandy (1794–1866) in the *Proceedings of the Royal Horticultural Society of London*. Convention has it that the ‘chair’ of each section of the Proceedings is taken as the author of the following text unless otherwise indicated. The name *Cissus porphyrophylla* is ascribed to Lindley but under the rules of the ICN (Turland et al., 2018) as there is no evidence that Lindley wrote the validating description, the name must also be ascribed to Blandy. *Cissus porphyrophylla* was described from living material grown from a Lobb collection from ‘India’. The combination in *Piper* was made by Brown (1884) who acknowledged the original Lobb collection and added that the material in the EIC, *Wallich s.n.* [EIC 6643E], from Penang, and *Griffith s.n.* [KD 4429], from Malacca, also belonged to this species.

Suwanphakdee et al. (2018) lectotypified the name ‘*Piper porphyrophyllum* N.E.Br.’ on ‘*Wallich 6643E*’ in K-W without referring to the basionym. The EIC

specimen 6643E in K-W is not original material as the collection is not referred to at all in the protologue of *Cissus porphyrophylla* and there is no evidence that Lindley or Blandy included this material. It cannot, therefore, be designated as a lectotype. Likewise, *Griffith s.n.* [KD 4429] is not original material. However, no material that could be considered to be original material of *Cissus porphyrophylla* could be found in BM, CGE or K and there is no illustration in the protologue. Therefore, the specimen mistakenly designated as a lectotype by Suwanphakdee et al. (2018) can be taken as a correctable error to neotype (Art. 9.10, Turland et al., 2018).

7. *Piper ramipilum* C.DC., Rec. Bot. Surv. India 6: 3 (1912); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 604 (2022). – TYPE: [Peninsular Malaysia], Penang, Balik Palau, March 1892, *C. Curtis* 792 (lectotype SING [SING0194877], designated by Gajurel & Lua, Gard. Bull. Singapore 72: 136 (2020); isolectotype K [K000794922]).

Notes. Suwanphakdee et al. (2020) claimed that a lectotype had been chosen for the name *Piper ramipilum* C.DC. by Suwanphakdee et al. (2006). However, in that work, several collections are cited as ‘Types’ but a specimen of only one of those collections, *Curtis* 792 (SING), was noted as having been seen. As that specimen is not otherwise highlighted as a lectotype, we do not consider this to be an effective lectotypification of the name. Therefore, the designation of the lectotype was done by Gajurel & Lua (2020).

8. *Piper ridleyi* C.DC., Rec. Bot. Surv. India 6: 19 (1912); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 604 (2022). – TYPE: [Peninsular Malaysia], Selangor, 15th mile Pahang Track, 1897, *H.N. Ridley* 8519 (lectotype CAL [CAL0000020947], designated here).

Piper velutibracteum C.DC., Annuaire Conserv. Jard. Bot. Genève 21: 284 (1920). – TYPE: [Malaysia], North Borneo [Sabah], Labuk Bay, 1897, *H.N. Ridley s.n.* (lectotype SING [SING0194874], designated here).

Notes. Suwanphakdee et al. (2018) designated *Ridley* 7609 (SING) as the lectotype of *Piper ridleyi* C.DC. This specimen cannot be found in SING, nor any of the other syntypes. As the ICN (Turland et al, 2018) does not mandate that the isolectotype of *Ridley* 7609 (CAL) be chosen as a lectotype in the event of the loss of the lectotype, we designate one of the other syntypes, the CAL specimen of *Ridley* 8519, as the lectotype because the specimen *Ridley* 7609 (CAL) is sterile.

Suwanphakdee et al. (2018, 2020) referred to *H.N. Ridley s.n.* (SING [SING0194874]) as the ‘holotype’ of *Piper velutibracteum* C.DC. However, there is no holotype for this name under the rules of the ICN (Turland et al., 2018) so the specimen previously referred to as a holotype is designated here as the lectotype.

Suwanphakdee et al. (2018, 2020) included *Piper malaccense* C.DC. as a synonym of *P. ridleyi* C.DC. However, in the forthcoming *Flora of Singapore* account

of Piperaceae by Gajurel & Lua, *Piper malaccense* will be treated as a synonym of *P. muricatum* Blume.

9. *Piper rostratum* Roxb., Fl. Ind. 1: 162 (1820); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 604 (2022). – *Peperomia rostrata* (Roxb.) A.Dietr., Sp. Pl., ed. 6, 1: 153 (1831). – *Rhyncholepis roxburghii* Miq., Syst. Piperac., fasc. 1: 284 (1843), nom. illeg. superfl. – TYPE: [Peninsular Malaysia], Malacca, *W. Roxburgh* 2675 (lectotype BM [BM000939635], designated here).

Notes. Suwanphakdee et al. (2018, 2020) refer to *Roxburgh* 2675 (BM) as the ‘holotype’ of *Piper rostratum* Roxb. However, this name has no holotype and it is not a correctable error under the rules of the ICN (Turland et al., 2018: Art. 9.1, 7.11). We, therefore, designate the same specimen here as the lectotype. There is no extant Roxburgh drawing for this name (Sealy, 1956; Sanjappa et al., 1994).

10. *Piper sarmentosum* Roxb., Asiat. Res. 11: 565 (1810); Lindsay et al., Gard. Bull. Singapore 74(Suppl. 1): 604 (2022). – *Peperomia sarmentosa* (Roxb.) A.Dietr., Sp. Pl., ed. 6, 1: 161 (1831). – *Chavica sarmentosa* (Roxb.) Miq., Syst. Piperac., fasc. 1: 242 (1843). – TYPE: India, Calcutta, 1809, *W. Roxburgh* s.n. (lectotype LINN [HS 73.49], designated here).

Piper latifolium W.Hunter, Asiat. Res. 9: 392 [‘362’] (1809), nom. illeg. hom., non L.f. (1782). – TYPE: India, Calcutta, 1809, *W. Roxburgh* s.n. (neotype LINN [HS 73.49], designated here).

Notes. Gilbert & Xia (1999) proposed Roxburgh’s drawing 1267 as the type of *Piper sarmentosum*. This is a drawing of *Torenia multiflora* Roxb. and as it appears not to be original material and is in conflict with the protologue, it can be superseded. We select a specimen in the Smith Herbarium at LINN as it is dated from before the publication of the name and is likely to be original material.

Piper latifolium W.Hunter was cited as a synonym in the protologue of *P. sarmentosum* Roxb. As Hunter’s name is an illegitimate later homonym, *Piper sarmentosum* is not superfluous and is not automatically typified by Hunter’s type. *Piper latifolium* was published with a brief description and was based on a small plant from Penang. No material of this plant has been traced. Hunter explained in the paper in which *Piper sarmentosum* was described that he sent material from Penang to Roxburgh in Calcutta in order to grow the plant there. They then discovered that this was the same species as one Roxburgh already had in cultivation that he was calling *Piper sarmentosum*. The lectotype selected here doubtless came from the material grown in Calcutta, but whether it represents Roxburgh’s original plant or the later accession from Hunter in Penang is uncertain. The same specimen is designated here as neotype for *Piper latifolium* W.Hunter.

ACKNOWLEDGEMENTS. We thank Bazilah Ibrahim (SING), Sam Brockington (CGE), Martin Callmander (G), Maria Del Mar Millan Pita (CGE) and David Simpson (K) for their assistance with the location of specimens. We also thank John McNeill (E) for his nomenclatural advice.

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