

## Flora of Singapore precursors, 20: Notes on the genus *Piper* (Piperaceae) from Singapore

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**ABSTRACT.** Nomenclatural notes on six species of *Piper* occurring in Singapore are provided. Nine names are typified. Additional relevant information on the species is also included.

**Keywords.** Distribution, lectotype, nomenclature, synonym, typification

### Introduction

*Piper* L. is well known for species such as *P. nigrum* L., the pepper of commerce, *P. longum* L., the pipali of Ayurvedic medicine, *P. betle* L., the commercial betel leaf, and *P. methysticum* G.Forst., the medicinal kava. It is one of the largest genera of Angiosperms with about 2000 species (Quijano-Abril et al., 2006) distributed mostly in Neotropical and Paleotropical regions with the highest diversity in the Neotropics. About 600 species are reported from Asia with a major concentration in the Malesian region where there are about 450 species (Asmarayani, 2018). The taxonomy of the genus *Piper* from the region that is now Peninsular Malaysia and Singapore has been investigated by de Candolle (1869, 1912, 1914), Hooker (1886) and Ridley (1924). Hooker (1886) remarked that *Piper* is 'A most difficult genus, herbarium materials for the analysis of which have never been intelligently collected, whilst the descriptions of the published species are quite inadequate for their accurate determination'. Even almost one and a half centuries after his publication, the same is true. The dioecious nature of the species, the microscopic achlamydeous flowers, and the high intraspecific variation in the Asian species, makes the accurate delimitation of species difficult. Moreover, due to the recognition of a large number of species, particularly by de Candolle, without a thorough understanding of the ranges of variation in the species, clarifying the taxonomy has become increasingly challenging over time. Recently significant progress has been made on resolving taxonomic problems in Asia and a large number of species have been reduced to synonymy after careful typification and verification of species limits (Chew, 1992, 2003; Gilbert & Xia, 1999; Gajurel, 2002; Suwanphakdee & Chantaranothai, 2011; Suwanphakdee, 2012; Suwanphakdee et al., 2016, 2018; Mukherjee, 2017, 2018). However, not all problems were solved, particularly in the Malesian region, and considerably more work is still necessary.

During our studies on the Piperaceae for the *Flora of Singapore*, we have had to solve a number of taxonomic problems for several *Piper* species based on a thorough study of the herbarium materials and through fieldwork. We have also found that many names have not yet been lectotypified. In this paper we lectotypify 10 names, now comprising six species, and discuss a number of other nomenclatural issues. One species is reduced to synonymy.

### Materials and methods

The morphological characters and the range of variation within each of the species were studied from herbarium specimens and field work in Singapore. The original material for the names being considered was ascertained from the protologues. Images of the type material are available from many different herbaria through Global Plants on JSTOR (<http://plants.jstor.org/>), or studied at herbaria visited. Materials relevant for our study are mostly housed in HAL, G-DC, GZU, K, NYBG, P, PRC, U (for Herbarium codes see Thiers, continuously updated). The choice of designation of each lectotype is explained. Nomenclatural clarifications are given following Turland et al. (2018).

### Typifications

**1. *Piper curtisii*** C.DC., Rec. Bot. Surv. India 6: 14 (1912); de Candolle, J. Asiat. Soc. Bengal 75: 318 (1914). – TYPE: [Peninsular Malaysia], Malacca, 1 October 1885, *Alvins* 2337 (lectotype SING [SING0206243], designated here).

*Distribution.* Peninsular Malaysia and Singapore.

*Notes.* *Piper curtisii* was described by de Candolle (1912) where he cited five collections from the Malay peninsula: *Curtis* 2699, from Perak, Waterloo, *King's Collector* 6263 from Perak, Larut, *Scortechini s.n.* from Perak, *Curtis s.n.* from Kuala Lumpur, Selangor and *Alvins* 2337 (but as *Ridley* 2337), from Malacca. From the five collections we have located four specimens: *Curtis* 2699 (K [K000794926]), *Alvins* 2337 (SING [SING0206243]), *King's Collector* 6263 (G-DC [G00314122]) and *Scortechini s.n.* (G-DC [G00314123]). We have chosen the specimen *Alvins* 2337 at SING as the lectotype.

**2. *Piper ramipilum*** C.DC., Rec. Bot. Surv. India 6: 3 (1912); de Candolle, J. Asiat. Soc. Bengal 75: 299 (1914). – TYPE: [Peninsular Malaysia], Penang, Balik Palau, March 1892, *Curtis* 792 (lectotype SING [SING0194877], designated here; isolectotypes K [K000794921, K000794922]).

*Distribution.* Myanmar, Thailand, Peninsular Malaysia and Singapore.

*Notes.* *Piper ramipilum* was described by de Candolle (1912) based on seven collections from Penang, Perak and Johor in Peninsular Malaysia. He cited the collections *Curtis 792*, *Kunstler 1481*, *Kunstler 270* and *Deschamps s.n.* from Penang, *Ridley 9582* and *King's collector 3574* from Perak, and *Ridley 11022* from Johor. We have not found a specimen of *Ridley 9582* from Gunong Keledang, Perak but have located the following materials: *Curtis 792* (SING [SING0194877], K [K000794921, K000794922]), *Kunstler 1481* (G-DC [G00322194]), *Kunstler 270* (G-DC [G00322515]), *Deschamps s.n.* (G-DC [G00322209]), *King's collector 3574* (NY [NY00283873]) and *Ridley 11022* (K [K000794920]). We designate *Curtis 792* (SING [SING0194877]) as the most representative specimen as lectotype.

**3. *Piper macropiper*** Pennant, Outlin. Globe 4: 242 (1800). – *Piper arborescens* Roxb., Hort. Bengal. 80 (1814). – TYPE: [Published illustration] Rumphius, Herb. Amboin. 5: t. 28, fig. 1 (1747).

*Piper miniatum* Blume, Verh. Batav. Genootsch. Kunst. 11: 166 (1826). – *Chavica miniata* (Blume) Miq., Syst. Piperac. 234 (1843). – TYPE: [Indonesia, West Java], Gunong Parang, *s.d.*, *Blume 1270* (lectotype G-DC [G00206627], designated here).

*Piper glandulosum* Opiz in Presl, Reliq. Haenk. 1: 158 (1828). – *Chavica glandulosa* (Opiz) C.Presl, Epimel. Bot. 223 (1851). – TYPE: Philippines, Luzon, *s.d.*, *Haenke s.n.* (lectotype PRC [PRC450581], designated here; isolectotypes HAL [HAL0101617], PRC [PRC450108]).

*Distribution.* India, Peninsular Malaysia, Singapore, Sumatra, Borneo, Java, Sulawesi, Moluccas, Philippines, New Guinea and Solomon Islands.

*Notes.* *Piper miniatum* has been treated as a distinct species by some authors (Keng, 1978, 1990; Turner, 1993) even though Merrill treated it as synonymous with *P. arborescens* (Merrill, 1917) and, later, *P. macropiper* (Merrill, 1948). *Piper miniatum* was described by Blume based on his own collections from Parang and Tjiradjas in Karawang in West Java, Indonesia. We have traced herbarium sheets from Parang (G-DC [G00206627]) and from Tjiradjas (G-DC [G00206611, G00206628]), the latter with two specimens on the same sheet. We designate the specimen from Parang labelled as *Blume 1270* (G-DC [G00206627]) as the lectotype as it is the better specimen.

*Piper glandulosum* was described from a Haenke collection from Luzon in the Philippines. We have located two specimens of *Haenke s.n.* at PRC and one specimen at HAL [HAL0101617]. One of the specimens at PRC is selected as the lectotype. De Candolle (1914) included the species under *Piper miniatum* and we confirm that it is conspecific with *Piper macropiper*.

**4. *Piper maingayi*** Hook.f., Fl. Brit. India 5: 80 (1886). – TYPE: [Peninsular Malaysia], Malacca, April 1867, *Maingay 1336* (lectotype K [K000575318], designated here; isolectotype G-DC [G00320526]).

*Distribution.* Peninsular Malaysia and Singapore.

*Notes.* This species was described by Hooker (1886) based on Maingay collections from Malaysia and Singapore. We have located three specimens of which two are at K (*Maingay 1336* [K000575318] & *Maingay 1334/3086* [K000575319]) and one is at G-DC (*Maingay 1336* [G00320526]). One of the specimens at K [K000575319] has both the Kew Distribution number of 1334 with a collection locality of Malaya and Maingay's collection number of 3086 with a collection locality of Singapore. *Maingay 1336* [K000575318], a male plant, is the better specimen and is selected as lectotype.

**5. *Piper obtusissimum*** Miq., Syst. Piperac. 337 (1844). – *Piper clypeatum* Wall ex C.DC in A.DC., Prodr. 16(1): 378 (1869), nom. illeg. – TYPE: Singapore, 1822, *Wallich 6655B* p.p. (lectotype GZU [GZU000256190], designated here).

*Piper manillanum* Miq., Syst. Piperac. 339 (1844). – TYPE: Singapore, 1822, *Wallich 6655B* p.p. (lectotype GZU [GZU000256191], designated here).

*Distribution.* India, Peninsular Malaysia, Singapore and Philippines.

*Notes.* *Piper obtusissimum* and *P. manillanum* were described by Miquel (1844) in the same work. While describing these two species, Miquel included the invalid Wallich name *Piper clypeatum* and cited *Wallich 6655B* (in part) from Singapore for both species. Additionally, he also cited *Gaudichaud s.n.*, March 1837 from Pulau Pinang, Malaya for *P. obtusissimum* and *Gaudichaud 145*, December 1836 from Manila, Philippines for *P. manillanum*. When the types cited by Miquel were examined, all specimens were found to belong to the same species with some morphological variations. Two of the specimens of *Wallich 6655B* cited by Miquel are located at GZU [GZU000256190, GZU000256191], annotated as *Piper obtusissimum* and *Piper manillanum* respectively, both of which are leafy twigs only. These two Wallich specimens are quite different in leaf size which probably led Miquel to treat them as two different entities. Two Gaudichaud's specimens from Pulau Pinang are located at P [P02025653, P02025649] while one specimen from Manila is located at U [U1476337]. The Gaudichaud specimens from Pulau Pinang and Manila also look quite distinct from each other but are of the same species. The specimens of *Piper manillanum* from Manila (*Gaudichaud 145* at U) and from Singapore (*Wallich 6655B* at GZU [GZU000256191]) have very small leaves while the specimens of *P. obtusissimum* from Pulau Pinang (*Gaudichaud s.n.* at GZU [GZU000256190] and P [P02025649, P02025653]) have larger leaves. All of this material is of a single variable species for which the name *Piper obtusissimum* is chosen to have priority over *P. manillanum* as

the type materials are more representative of the variation usually found in the species. We have selected the specimens of *Wallich 6655B* at GZU as lectotypes for the two names.

*Piper clypeatum* was later described by de Candolle (1869), who took up Wallich's name and included the two Miquel species (*P. obtusissimum* and *P. manillanum*) as synonyms. This made the name *Piper clypeatum* superfluous.

*Piper obtusissimum* is one of the most distinct species in the genus *Piper* and has never been recorded in its fertile state. The species can easily be recognised by the unique character of the overlapping leaves which are round or oval and adpressed with recurved margins to the surface of the tree bark or rock on which it is climbing. Its habit bears some similarity to some *Pothos* L. species in the Araceae. Hooker (1886) included the species in a list of "Indeterminable and Excluded Species" of *Piper* and believed it to be a species of *Ficus*. Unpublished DNA sequence data from Dr Matti Niissalo (Singapore Botanic Gardens) confirms that it is a *Piper* (based on ITS sequence data, GenBank no. MT844072 – voucher *Lim et al. SING2019-023*, 16 Jan 2019 (SING)).

**6. *Piper schizonephros*** C.DC. in A.DC., Prodr. 16(1): 241 (1869). – *Schizonephros glaucescens* Griff., Not. Pl. Asiat. 4: 383 (1854), as '*Schizonephos*'. – TYPE: [Peninsular Malaysia], Malacca, Ching, Nhingull, 1845, *Griffith s.n.* (lectotype K [K000842201], designated here).

*Piper polygynum* C.DC., Rec. Bot. Surv. India 6: 27 (1912), **syn. nov.**; de Candolle, J. Asiat. Soc. Bengal 75: 337 (1914). – TYPE: [Peninsular Malaysia], Selangor, Gunong Pass, 1 May 1892, *Wray 4068* (lectotype G-DC [G00322193], designated here).

*Distribution.* Peninsular Malaysia and Singapore.

*Notes.* *Piper schizonephros* was published by de Candolle (1869) on moving the species *Schizonephros glaucescens* Griffith (1854) into *Piper* sect. *Schizonephros*. He used the specific epithet 'schizonephos' as *Piper glaucescens* was not available for use. The word 'Schizonephos' as used by Griffith and de Candolle is an orthographic error which was later rectified by Hooker (1886) who stated "I have altered the misprint 'Schizonephos' to 'nephros' as in Griffith's mss." whilst clarifying that the derivation of the name is from the kidney-shaped (reniform) receptacle of the male spike.

The description of *Schizonephros glaucescens* was based on Griffith collections from Ching, Malacca. We have located four specimens believed to be original material of *Schizonephros glaucescens*, three specimens of *Griffith 4400* at GH [GH00011479], K [K000575317] and P [P 01980783], none of which have locality details except "Burma & Malaya Peninsula", and another specimen at K [K000842201] annotated as "Malacca Griffith 1845" as well as "Ching Nhingull" with reference to Griffith's protologue page no. 383. As this specimen has the precise locality information as cited by Griffith and is in good condition, it is selected as the lectotype.

De Candolle described *Piper polygynum* based on the Malayan collections of *Stephenson s.n.* from Sungei Ugong, Penang and *Wray 4068*, from Gunong Pass, Selangor. On studying original material online and additional specimens at SING we found it to be conspecific with *Piper schizonephros* and have reduced it to synonymy. As we could not trace any material of *Stephenson s.n.* and located only *Wray 4068* at G-DC, this specimen is selected as lectotype.

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