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Studies in Malesian Piperaceae 3[1]

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Abstract

Thirteen species, mostly from New Guinea, are dealt with in this paper, of which 12 other species previously considered distinct are reduced to synonymy. No new taxon is proposed.

Introduction

This is part of a series of papers, albeit variously titled, resulting from continuing work initiated some 35 years ago. As mentioned previously (*vide* Chew, *Journal Arnold Arboretum* **53** (1972) 1–25), the work began by way of an undertaking to identify the collection of *Piper* made by the Royal Society Expedition to the Solomon Islands in 1965. This necessitated reference to the New Guinea species of *Piper* which then extended to an assessment of the taxonomic status of the more than 150 species described by Casimir de Candolle from that region and surrounding islands.

I was encouraged to this much larger task by the fact that the type materials from the former German New Guinea held in the Berlin Herbarium are still extant, having been removed to safety prior to the destruction of the Herbarium, and assisted further by the availability of a vast collection of high quality specimens made since about 1945.

Thus, I was enabled to determine (at the least to assess, in a few cases) the taxonomic status of some 108 of de Candolle's species and to identify over 1,000 collections from New Guinea and the surrounding region. This resulted in the reduction of 75 Candollean names to synonyms. The assignment to synonymy of this large number of de Candolle's species should not detract from the otherwise excellent work accomplished by this great taxonomist: he did not have the advantage of the availability of the vast range of contemporary collections that I have.

Apart from the floristic account of the alpine species by van Royen in *The Alpine Flora of New Guinea* **3** (1982) 1267–1287, I am not aware of any major study having been undertaken on the New Guinea species since commencement of my work.

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[1]Following: *Blumea* **20** (1972) 145–149 and *Blumea* **37** (1992) 159–164.

There still remains quite a number of Candollean species requiring determination of their taxonomic status. Additionally, large quantities of unnamed materials in many herbaria await identification, some of which may represent undescribed species. As this is a large undertaking, it may need the assistance of future botanists to continue the work.

Unless otherwise stated, all collections cited in this paper have been seen and studied by me personally.

1. **Piper abbreviatum** Opiz *in* Presl., Rel. Haenk. 1 (1828) 157; Quisumbing, Philip. J. Sci. 43.1 (1930) 58, fig. 24 & 25; Chew, J. Arn. Arb. 53 (1972) 1. **Type**: Philippines, Luzon: *Haenke s.n.* (holotype PR).

Synonyms: *Piper minus* K. Schum. & Lauterb., Fl. Schutzgeb., (1900) 258, *syn. nov.* **Type**: New Guinea, Ramufluss, *Lauterbach 2611* (holotype B).
Piper subnudilimbum C.DC., Bot. Jahrb. 55 (1918) 205, *syn. nov.* **Type**: New Guinea, Djamu, *Schlechter 17347* (holotype B, iso K).
Piper quintuplinervium C.DC., Candollea, 1 (1923) 203, 204; Candollea, 2 (1925) 224 *syn. nov.* **Type**: New Guinea, *sine loc.*, *Lauterbach 605* (isotype WRSL).

Dioecious glabrous climber. *Lamina* shortly petiolate, elliptic, ovate to broadly ovate, c. 10 x 5 cm, length:breadth ratio c. 2:1, glabrous on both surfaces, apex acute to acuminate, base cuneate to rounded, symmetrical; lateral veins 4 pairs, the lowermost pair very short, arising from the base, the 2nd and 3rd usually long, arising from the midrib a little above the base, the distal 4th pair very short, often absent, arising from the midrib near the apex. *Stipules* to 1.5 cm long, often 1 cm long, usually as long as petioles. *Inflorescences* shorter than leaves, peduncle c. 1.5 cm long, usually as long as petioles; males thin, to 6 cm long, bracts orbicular, peltate, subsessile; females shorter and thicker, c. 2 x 0.8 cm, bracts orbicular, peltate, sessile. *Male flowers* 2-staminate; pedicel very short stout, hirsute; stamens c. 1 mm long, anthers reniform to subglobose, 2-valved, slightly shorter than filaments. *Female flowers* sessile; stigmas 3- or 4-fid, sessile. *Fruits* sessile, entirely concrescent at maturity.

Distribution: Philippines, Java, Sulawesi, Maluku, New Guinea, Bismark Archipelago and Solomon Islands.

Notes: *Piper minus* is a smaller-leafed version of *P. abbreviatum* and there are no essential differences that can justify their being kept apart. *Kajewski 2047* has leaves that vary greatly from the narrowly ovate c. 4 x 1.5 cm to broadly ovate c. 6 x 4 cm.

In *Piper subnudilimbum*, the type materials contain immature inflorescences. The leaves are large, much like those of the Philippine populations of *P. abbreviatum*, but the leaf bases are like the typical New Guinea plants with three pairs of lateral

veins. This difference is, however, not significant and cannot be relied on to distinguish *P. subnudilimbum* from *P. abbreviatum*.

As for *Piper quintuplinervium*, the isotype shows two leaf forms: the narrowly ovate, small ones borne on end of free branches and the large pentagonal leaves borne at the nodes of the climbing parts of the plant. Other than small differences between *P. quintuplinervium* and *P. abbreviatum*, there is nothing significant to keep the two species apart.

Specimens examined: NEW GUINEA: Djamu Distr., *Schlechter 17347*; Ramufluss, *Lauterbach 2611*; sine loc., *Lauterbach 605*. SOLOMON ISLANDS: *Kajewski 2047* (A).

2. **Piper arfakianum** C.DC. *in* Gibbs, Phyt. Fl. New Guinea. (1917) 127. **Type**: New Guinea, Irian Jaya: Arfak Mts., Angi Lake, *L.S. Gibbs 5525* (isotypes K, L).

Synonym: *Piper pilosulinodum* C. DC. *in* Gibbs, Phyt. Fl. New Guinea. (1917) 128, *syn. nov.* **Type**: New Guinea, Arfak Mts., Koebre Ridge. *L.S. Gibbs 5624* (holotype BM; isotype K).

Climber, usually glabrous, rarely hairy. *Leaves* with 1–2 cm-long petioles. *Lamina* symmetrically ovate, c. 9 x 4 cm; lateral veins 3 pairs, arising from the base; apex long acuminate; base rounded, not auriculate. *Inflorescence* longer than leaves; peduncle longer than petiole. *Bracts* peltate, circular. *Flowers* sessile, crowded. *Stigma* 3-fid, reflexed, subsessile.

Distribution: New Guinea.

Notes: Piper pilosulinodum, also from the Arfak Mountains, is conspecific with *P. arfakianum*. Having compared the type materials of these two species and with other recent collections, I am unable to keep the species apart. Of the collections cited above, *Kanehira & Hatusima 13708* is the closest match to the type material of *P. arfakianum* and *van Royen & Sleumer 7456* is a good match to the type material of *P. pilosulinodum*.

Piper arfakianum is closely related to *P. macropiper* Pennant from which it can be distinguished by the above enumerated combination of characters, especially the petiole being much longer than in the latter species and the lamina base not auriculate.

Specimens examined: IRIAN JAYA: Arfak Mt., alt. 2200 m, *Kanehira & Hatusima 13708*, April (A, BO); alt. 2400 m, *L.S. Gibbs 5525* (BM, K); Koebre Ridge, *L.S. Gibbs 5624* (BM, K); Mt. Nettoti, alt. 1920 m, *van Royen & Sleumer 7456*, Nov (A,

BRI, CANB, L, LAE). PAPUA NEW GUINEA: Central Division, Mt. Tafa, alt. 2300 m, *Brass 4047* (BRI), *5029* (BRI), *5116* (BRI); Chimbu Distr., Mt. Wilhelm, alt. 2600 m, *Borgmann 292*, Aug. (LAE); Milne Bay Distr., Mt. Dayman, alt. 2200 m., *Brass 22534*, May (A, CANB, LAE); Morobe Distr., Edie Creek, *Ridsdale NGF 30266*, Nov (LAE); alt. 2000 m, *Womersley & Thorne NGF 12837*, Jun. (BRI, CANB, LAE); Mt. Kaindi, alt. 2200 m, *Brass 29732*, May (LAE); alt. 2438 m: *Coode & Katik NGF 32863*, Jun. (BRI, CANB, LAE); alt. 2300 m, *Millar NGF 23627*, Aug. (BRI, CANB, LAE); alt. 2100 m, *Streimann NGF 30867*, Aug (BRI, LAE, NSW); Southern Highland Distr., Anga, alt. 2000 m, *Schodde 1556*, Jul. (A, CANB, LAE); Spreader Divide, alt. 2255 m, *Streimann & Kairo NGF 45446*, Nov (CANB, NSW).

3. **Piper austro-caledonicum** C.DC. *in* DC. Prodr. 16.1 (1869) 346; Schlechter, Bot. Jahrb. 39 (1906) 92; Moore, J. Linn. Soc. Bot. 45 (1921) 381; Guillaumin, *Flore analytique et synoptique de la Nouvelle-Caledonie, Phanerogames*. (1948) 90. **Type**: sine loc., *Forster s.n.* (syntype: BM). sine loc., *Vieillard 1227* (syntype: P).

Synonyms: *Piper paitense* Schltr., Bot. Jahrb. 39 (1906) 92, *syn. nov.* **Type**: New Caledonia, Mt Paita. *Schlechter 14964* (isotypes L, P, WRSL).
Piper comptonii S.Moore, J. Linn. Soc. Bot. 45 (1921) 381, *syn. nov.* **Type**: New Caledonia, Mt Panie. *Compton 1805* (isotype BM).
Piper peekelii C.DC., Bot. Jahrb. 57 (1922) 354, *syn nov.* **Type**: Neu-Mecklenburg, Namatanai, *P. Peekel 322* (holotype B).

Glabrous climber. *Leaves* petiolate. *Lamina* of lower leaves broadly ovate to somewhat rounded to cordate, c. 9 x 7 cm, those of the upper leaves usually smaller; apex shortly blunt-acuminate; base rounded to peltate, slightly unequal, glabrous on both surfaces. *Inflorescences* slender, as long as the leaves, peduncle as long as the petiole; bracts pedicellate. *Male flowers* 3-staminate, stamens subsessile. *Female flowers* with 3-fid stigmas.

Distribution: New Guinea, Bismarck Archipelago, Solomon Islands and New Caledonia.

Notes: Forster *f.* misidentified his collection from New Caledonia as *Piper siriboa* Forst. *f.* (auct. non L.). I have seen both Forster's and Vieillard's collections annotated by C.DC. and am confident that the collections belong to *P. austro-caledonicum*. Based on examination of the type specimens, *P. paitense*, *P. comptonii* and *P. peekelii* are all conspecific with this species because I cannot differentiate their type specimens from specimens of *P. austro-caledonicum*. They are therefore reduced to synonymy. *Piper austro-caledonicum* is closely related to *P. elbertii* C.DC. of Indonesia and *P.*

retrofractum Vahl of the Philippines. Further study is needed to assess their relationship.

Specimens examined: NEW GUINEA: Torricelli, *Schlechter 14381* (BO). BISMARCK ARCHIPELAGO: New Ireland (Neu-Mecklenburg), Namatanai, *P. Peekel 322* (B). SOLOMON ISLANDS: Guadalcanal, Wanderer Bay, *BSIP 12247* (LAE); Kolombangara, Kokove area, *BSIP 7579* (LAE); New Georgia, Kibukibu River, *BSIP 4819* (LAE); Ranongga Island, *BSIP 15572* (LAE); Santa Ysabel, Jejevo River, *BSIP 4700* (LAE), Sigana, *Brass 3451* (A, BRI), Vuranimala village, *BSIP 15401* (A, LAE). NEW CALEDONIA: Aoui, Mei, *Baumann-Bodenheim 10156* (P), *10176* (A, BRI, P); Bois du Mois de Mai, R. Blanche, *Baumann-Bodenheim 14071* (A, BRI,P), *15179* (A, BRI, P); Col de Vulcan, *Baumann-Bodenheim 8259* (A, BRI, P); Dambea, *Franc 3* (P), *Franc 3A* (L); Ermitage stream, *Compton 149* (P); Mt. Paita, alt. 300 m, *Schlechter 14964*, Oct 1902 (L, P, WRSL); Mt. Panie, *Compton 1805*, Aug 1914 (BM); Noudoure: *MacKee 2670* (A, P); Yaouhe, *Schlechter 14786* (P). SINE LOC: *Forster s.n.* (BM); *Vieillard 1227* (P); *Schlechter 14787* (L, WRSL).

4. **Piper bosnicanum** C.DC. *in* Gibbs, Phyt. Fl. New Guinea, (1917) 207; Candollea 1 (1923) 221, as *'bosniakanum'*. **Type**: New Guinea, Schouten Islands, Bosnic, *L.S. Gibbs 6277* (holotype K; isotype L).

Glabrous climber. *Lamina* ovate, to 15 x 10 cm, with 3 pairs of lateral veins arising directly from the base. *Petiole* to 2 cm long. *Inflorescence* to 5 cm long, shorter than leaves; peduncular stalks c. 2 cm long, bracts oblong with sinuous margin. *Female flowers* subsessile, spirally arranged; *stigmas* 3–4-fid, sessile, strongly reflexed. *Fruits* subsessile, obovoid to ovoid, c. 10 x 6 mm broad, crowded.

Distribution: New Guinea and the Solomon Islands.

Notes: Piper bosnicanum is very close to *P. buruanum* Miq. of Maluku: further study is needed to assess their relationship.

Specimens examined: IRIAN JAYA: Schouten Islands, Bisnik, *L.S. Gibbs 6277*, Jan (K; L); Vogelkop Peninsula, Aifact River, *van Royen & Sleumer 7260*, Nov (L). PAPUA NEW GUINEA: Sepik Distr., Aitepe Subdistr., along Pieni River, *Darbyshire & Hoogland 8007*, Jun (CANB). SOLOMON ISLANDS: Bougainville Island, north of Buin, *Craven & Schodde 256*, Aug (CANB, LAE); Guadalcanal, Wanderer Bay, *BSIP 9104* (LAE); Kolombangara, Bambari area, *BSIP 7511* (LAE); Malaita, Takwa, *BSIP 10785* (LAE); New Georgia Group, Roniane Lagoon, *BSIP 2918* (LAE); Wagina Island, *BSIP 5493* (LAE).

5. **Piper lessertianum** C.DC., J. Bot. 4 (1866) 164; Quisumbing, Philip. Jour. Sci.

43.1 (1930) 36, fig. 10, including *var. oblongibaccum* (C.DC.) Quisumbing. **Type**: Philippines, Luzon, *sine loc. Cuming 1343* (*'1342'*), 1841 (holotype BM).

Synonyms: *Chavica lessertiana* Miq., Syst. Piperac., (1843) 270 *non Piper lessertianum* C.DC. (1866); *Piper pseudo-chavica* C.DC. *in* DC., Prodr. 16.1 (1869) 351, *nom. superfl.* **Type**: Philippines: Luzon, Cagayan Province, *Cuming 1343* (holotype G, not seen; isotype K).

Piper biroi K.Schum. & Lauterb., Nachtr. Fl. Schutzgeb., (1905) 238, *syn. nov.* **Type**: New Guinea, near Malanaku, *Biro 32*, Oct. (holotype B).

Piper oblongibaccum C.DC. in Leafl. Philip. Bot. 3 (1910) 777, **Type:** Philippines: Oriental Negros Prov., *Elmer 9456* (not seen).

Piper lineatipilum C.DC., Nova Guinea Bot., 8.6 (1914) 1009, *syn. nov.* **Type**: New Guinea, Mt. Hellwig, *Römer 962* (holotype L).

Piper viridibaccum Trel., J. Arn. Arb., 9 (1928) 150, *syn. nov.* **Type**: New Guinea, Mowabula, *L.J. Brass 1370* (holotype A, isotype BRI).

Climber, dioecious, glabrous to villose. *Leaves* shortly petiolate, petiole to 1 cm long. *Lamina* narrowly ovate, ovate to broadly cordate, 12–32 x 5–17 cm; base unequally rounded, one lobe acute to narrowly rounded, the other auriculate, lateral veins 3–4 pairs, the distal pair arising about 2 cm from the midrib, the others almost directly from the base; apex often very long acute to acuminate. *Inflorescences* 5–12 cm long, less than 5 mm thick; peduncle slender, 3–8 cm long, much longer than the petiole and the floriferous part of the inflorescences. *Male flowers* with 2 subsessile stamens, with pedicellate peltate bracts. *Female flowers* with 3-fid rounded sessile stigmas. *Fruits* oblong, to 2.5 x 1.5 mm, borne crowded but not concrescent at maturity.

Distribution: Philippines, Sulawesi, New Guinea (Irian Jaya and Papua New Guinea).

Notes: This species is attributable solely to C.DC. who published it in 1866 basing on *Cuming 1342* (in herb. BM) without reference to Miquel's earlier species *Chavica lessertiana* which is based on *Cuming 1343* (in herb. G). I am grateful to have the advice of J.F. Veldkamp of Leiden (pers. comm., 2003) that *Cuming 1342* in C.DC.'s protologue of 1866 should read *Cuming 1343* because *Cuming 1342* refers to a species of Gramineae. Nevertheless, the authority of *Piper lessertianum* (1866) remains attributable solely C.DC. without reference to Miquel.

Later, in DC. Prodr. 16.1 (1869) 351, when C.DC. combined Miquel's *Chavica lessertiana* (1843) with his own *Piper lessertianum* (1866), he created the name *Piper pseudo-chavica* for the combined species. By contemporary rules, the name *Piper pseudo-chavica* is superfluous because his own *Piper lessertianum* (1866) is perfectly legitimate and should have been used instead.

Our Malesian species is not to be confused with *Piper lessertianum* (Miq.) C.DC. in DC. Prodr. 16(1): 258 (1869) based on *Ottonia lessertiana* Miq., which refers to an American species and, which binomial is a later homonym of our species.

Piper lessertianum C.DC. (1866) is readily recognised by the petioles being very short and the peduncles very long, often more than five times longer than the petiole and the floriferous part of the inflorescence. Yet, it is most variable in leaf form with lamina ranging from very narrowly ovate with a long attenuate apex through ovate ob-pentagonal to broadly cordate or heart-shaped. Besides, leaves borne on the climbing parts are usually small and broadly cordate to heart-shaped while those borne on the freely hanging branches tend to be ob-pentagonal to very narrowly ovate with long attenuate apices.

All these leaf forms have now been observed to occur on the same plant as evidenced by *Vink & Schram BW 8871*. In the circumstances, I have to assign to synonymy *Piper biroi, Piper lineatipilum* and *Piper viridibaccum* as they are distinguished purely on these leaf forms. For the same reason and after examination of collections authenticated by Quisumbing, I am unable to maintain var. *oblongibaccum* (C.DC.) Quisumbing.

Specimens examined: PHILIPPINES: Luzon, Cagayan Prov., *Cuming 1343* (BM, K); Mindoro, Mt. Halcon, *Ramos & Edano 40676*, Mar (NSW); Panay, Capiz Prov., Mt. Bulilao, *Martelino & Edano 35706*, Jun (NSW); Jaminden, *Ramos & Edano 30861, 31272*, May-Apr (NSW); Libacao, *Martelino & Edano 35395* (NSW), *35442*, May-Jun (NSW); Mt. Macosolon, *Ramos & Edano 30776*, Apr-May (NSW). SULAWESI: Kabaena Island, *Elbert 3393* (BO). IRIAN JAYA. Wati, Mapon Distr., *Ijiri & Niimura 674*, Apr (L); Wissel Lakes, Doglia, *Vink & Schram BW 8871*, May (CANB, LAE). PAPUA NEW GUINEA: Milne Bay, near Mayu Island, *Streimann NGF 28829*, Apr (L, NSW); Morobe Distr., Asubazo, *Kairo NGF 24403*, Jul (L); Northern Division, Sibium Range, *R. Pullen 5924*, Sept (CANB).

6. **Piper longipilum** C.DC., Bot. Jahrb. 55: 216 (1918); Candollea 1: 206 (1923). **Type**: New Guinea, Sepik, alt. 1–200 m, *Ledermann 7565* (holotype B, isotype B).

Climber, dioecious, lightly pilose. *Leaves* shortly petiolate, petiole to 2.5 cm long. *Lamina* ovate, c. 28 x 18 cm; base unequally cordate, lateral veins 5–6 pairs, the basal pair arising c. 1 cm from the base; apex acuminate. *Male inflorescences (immature)* c. 8 cm long, c. 3 mm thick; peduncle slender, c. 1.7 cm long. *Male flowers* with pedicellate peltate glabrous bracts. *Female* unknown.

Distribution: New Guinea.

Notes: The type material of this species consists of two sheets: the one with field

notes and annotation by C.DC in 1917 is the holotype, the other is the isotype. A cursory examination of the type material suggests an alliance with *Piper decumanum* L. of which it might represent a hairy variant. As the type seems to be the only material there is of this species, I am unable to determine its status until I see more collections, especially of female plants.

7. **Piper melula** Trel., J. Arn. Arb. 9 (1928) 148. **Type**: Papua New Guinea, Vaitata River, *L.J. Brass 1130* (holotype A; isotype BRI).

Dioecious glabrous climbers. *Leaves* moderately petiolate, petioles 2–4 cm long, much longer than peduncles. *Lamina* irregularly ovate, broadly ovate to pentagonal, c. 12 x 8 cm; apex bluntly shortly acuminate; base rounded to shallowly cordate; lateral veins 3 pairs, the distal pair arising alternately from the midrib about 0.5–1 cm from the base, the other 2 pairs directly from the base; only the distal pair reaching to the apex, the 2nd pair reaching to 1/2 the length of the lamina, the basal pair only to 1/3 of the length of the lamina. *Inflorescences* shorter than the leaves, males slightly longer than females. Male floriferous part to 6 cm long on a peduncle to 7 mm long; female floriferous part to 4 cm long on a peduncle to 1 cm long. *Bracts* circular, margin sinuate, peltate, very shortly pedicellate. *Male flowers* with strongly reniform anthers, dehiscing by long apical slits. *Female flowers* sessile, crowded; stigmas 3- to 4-fid, sessile, stigmatous part reflexed. *Fruits* almost entirely concrescent, free only at the apices.

Distribution: Papua New Guinea.

Notes: Piper melula has the same leaf venation pattern as *P. plagiophyllum* K.Sch & Laut., and in some cases even the lamina shape of that species, but it differs in being a climber amongst other characteristics.

The infructescences of *Piper melula* appear similar to those of *P. pachyarthrum* K.Sch., but these species differ in other respects.

Piper melula appears also to be related to *P. elbertii* C.DC. of the Lesser Sunda Islands and *P. austro-caledonicum* of the Solomon Islands and New Caledonia.

There is a collection, *Kellman ANU 1597* (CANB) from Mindanao in the Philippines, which is remarkably similar to *Piper melula*. However, as this collection has a very young inflorescence, I hesitate to identify it as this species.

Specimens examined: PAPUA: Gulf distr., Tauri River, *Schodde & Craven 4700*, Mar (CANB); Vailala River, *L.J. Brass 1130*, Mar (A, BRI); Milne Bay distr., Kwagira River, Peria Creek, *L.J. Brass 23997* (A, CANB, LAE), *24006*, Aug (A, CANB, LAE).

8. **Piper novo-guineense** Warb., Bot. Jahrb., 13 (1891) 284, K.Schumann & Lauterbach, Fl. Schutzgeb., (1900) 258. **Type**: New Guinea, Sattelberg bei Finnschlafen, *Warburg 20740* (holotype B; isotype A).

Glabrous climber. *Lamina* narrowly elliptic, narrowly ovate to broadly ovate or broadly pentagonal, 17–19 x 5–9 cm; apex shortly blunt acuminate to long acute; base cuneate to rounded, very slightly asymmetrical, not auriculate; lateral veins 3 pairs, the distal pair arising slightly alternately from the midrib c. 1–2 cm from the base, the other 2 pairs arising directly from the base, sometimes another faint short pair arising from the base; the veins on the underside, especially at the basal portion, often covered with minute reddish brown scales, petiole to 1 cm long. *Male inflorescences* thin, as long as the females, peduncle as long as the males. *Male flowers* with bracts as in the females; stamens subsessile with broadly crescent-shaped anthers. *Female inflorescences* to as long as the leaves, sometimes longer, usually to 15 cm long; peduncular stalk c. 2 cm long. *Female flowers* sessile, stigma 3–4-fid. *Fruits* sessile, oblong, crowded; bracts rounded peltate.

Distribution: New Guinea.

Notes: Piper novo-guineense is reported to be common in primary forest and older secondary forests, between 500 and 2000 m altitude. At higher altitudes, the plants tend to have smaller leaves.

This species is closely related to *Piper macropiper* Pennant and especially to *P. truncatibaccum* C.DC.

Specimens examined: IRIAN JAYA: Lake Habbema, *L.J. Brass 10299*, Oct (A). PAPUA NEW GUINEA: Morobe Distr., Boana Mt. *Clemens 8467* (A); Gurokar, *L.J. Brass 29499*, May (CANB, LAE); Huon Peninsula, Mt. Rawlingson, *Hoogland 9054*, Jun (A, BRI, LAE); Sattelberg, *Warburg 20740* (B, A); Wantoat area, Kikiepa, *Womersley & Thorne NGF 11875*, Jun (BRI, LAE); Selileo, *Hellwig 580*, Apr (B); Sepik, near Kilifas village, *Forman & Kumul NGF 48261*, Mar (LAE).

9. **Piper pallidilimbum** C.DC., Nova Guinea Bot. 8.6 (1914) 1009. **Type**: New Guinea, Mt. Hellwig, alt. 2600 m, *von Römer 1316* (holotype L).

Synonym: Piper peracutilimbum C.DC., Nova Guinea Bot. 8.6 (1914) 1005, *syn.nov.* **Type**: New Guinea, Mt. Hellwig alt. 2600 m, *von Römer 1252* (holotype L).

Climber, glabrous. *Leaves* shortly petiolate. *Lamina* ovate, 6–8 x 2–4 cm; base rounded, apex acuminate. Lateral veins 2–3 pairs, distal pair arising from the midrib a little

above the base. *Inflorescence* shorter than leaves. Peduncular stalk 7–10 mm long, about as long as petiole. *Males* up to 4 cm long, *females* c. 2 cm long. *Flowers* borne crowded, sessile. *Infructescence* congested, to 12 mm diam. as in *Piper abbreviatum* Opiz.

Distribution: New Guinea.

Notes: The type material of *Piper peracutilimbum* is indistinguishable from specimens of *P. pallidilimbum*. Therefore I see no reason to keep the two species apart.

Piper pallidilimbum is very close to *P. abbreviatum* Opiz from which it differs in the lamina being furnished with fewer lateral veins, one of which issues from the midrib, and also by the peduncular stalk being somewhat filamentous.

Specimens examined: IRIAN JAYA: Mt. Hellwig, alt. 2600 m, *von Römer 1316* (L), *1252* (L); *sine loc.*, *Pulle 700* (L), *737* (L), *834* (L).

10. **Piper pseudamboinense** C.DC., Bot. Jahrb. 55 (1918) 206. **Type**: New Guinea, Keneyia, alt. 150 m, *Schlechter 18445* (holotype B).

Climber. *Leaves* very shortly petiolate. *Lamina* pentagonal to oblong, commonly c. 24 x 11 cm; apex bluntly acuminate, acumen to 1.5 cm long, base asymmetrically cordate, one side often forming a large lobe, the lobes often covering the node; lateral veins usually 5 pairs, the distal pair alternate, arising from the midrib c. 2–3 cm from the base, the 2nd pair often arising also from the midrib but very close to the base; the other 3 pairs, often very short, issuing directly from the base; intercostals very prominent; upperside of lamina glabrous, undersides with short brown pubescence on the veins. *Female inflorescences* to as long as leaves, 20–24 cm long; the floriferous portion as long or to only slightly longer than the peduncular stalk; peduncle glabrous. *Bracts* circular, peltate, long pedicellate. *Female flowers* sessile, congested. *Stigma* 2-lipped, spreading, subsessile. *Fruits* sessile, free.

Distribution: New Guinea.

Notes: A lowland climber, *Piper pseudamboinense* is a little known species. Of the two collections identified as this species, *NGF 25678* appears to be the best match to the holotype, the other being a more hairy variant.

Piper pseudamboinense is very closely similar to *P. amboinense* (Miq.) C.DC. and from which it differs in the more prominent lateral veins and its stigma being 2-lipped. It is also closely similar to *P. lessertianum* C.DC. from which it can be distinguished by the 2-lipped stigma in addition to lamina and inflorescence characters.

Specimens examined: PAPUA NEW GUINEA: Morobe District, Buso River, *NGF 25678* Aug (CANB, LAE); Oomsis Creek, *T.G. Hartley TGH 10564*, July (A, CANB, LAE); Keneyia, alt 150 m, *Schlechter 18445* (B).

11. **Piper reinwardtianum** (Miq.) C.DC., DC. Prodr. 16.1 (1869) 354. Merrill, Inter. Rumph. Herb. Amb., (1917) 182. **Basionym.** *Macropiper reinwardtianum* Miq., Linnaea 21 (1848) 481. **Type**: Indonesia, Maluku, Nussa Laut, *Reinwardt*, July 1821 (holotype L?).

Synonym: Chavica reinwardtiana (Miq.) Miq., Ann. Mus. Bot. Ludg. Bat.1 (1863) 136.

Dioecious shrub, glabrous to lightly pilose. *Leaves* with petiole 2.5–5 cm long. *Lamina* broad ovate to rounded, c. 16 x 15 cm, slightly asymmetrical; apex shortly acute, base asymmetrically truncate-cordate, lateral veins usually 3–4 pairs, upperside of lamina glabrous, undersides lightly pilose on the veins. *Infructescences* to 11 cm long, peduncle glabrous to 2.5 cm long. *Female flowers* sessile, congested. *Stigma* 3, rarely 4, short thickset. *Fruits* sessile, somewhat obovoid, concrescent on the lower half.

Distribution: Indonesia, Maluku.

Notes: I have not seen any type material of this species which is probably in the Leiden Herbarium to which Reinwardt donated his collections from the region. The collections of *Robinson* and *Teysmann* cited herewith are all that I have seen of this species; and I must of neccesity rely on C. de Candolle and Merrill in the interpretation of this apparently rare species.

In general growth habit, *Piper reinwardtianum* recalls that of *P. sundaicum* Blume, also a shrub from the same region. However, it has infructescences similar to *P. mestonii* Bailey of New Guinea and Australia from which it can be distinguished by the stigma being 3- or 4-fid, not bifid, and the plant a shrub, not a climber. In these respects, *P. reinwardtianum* appears to be an interesting species, and further investigation may yield insight into the phytogeograpical relationship between the three species.

Specimens examined: INDONESIA: Maluku, Ambon, *Robinson 60* (L). Ceram, *Teysmann s.n.* (L).

12. **Piper subvirosum** C.DC., Bot. Jahrb. 55 (1918) 215. **Type**: New Guinea, Alexishafen, *Wiesenthal 68* (holotype B).

Climber, twigs minutely pubescent. *Lamina* broadly ovate, 15–20 x 10–12 cm, upper surface glabrous, lower surface sparsely covered with short stiff hairs especially on lateral veins on basal part of the lamina; apex shortly acuminate, acumen 1.5–2 cm long; base broadly cuneate, rounded to truncate; lateral veins 3 pairs, distal pair alternate, arising from midrib a little above the base, the others directly from the base; intercostals prominent. *Petiole* to 2 cm long. *Female inflorescence* to 27 cm long, peduncle to 3 cm long, floriferous part to 24 cm long; inflorescences usually longer than leaves, peduncle longer than petiole; mature inflorescence to 7 mm diam. *Female flowers* sessile, not concrescent, with 3- or 4-fid stigmas.

Distribution: New Guinea.

Notes: Piper subvirosum is related to *P. macropiper* Pennant from which it can be distinguished by the much larger leaves and inflorescences, at least one pair of the lateral veins arising from the midrib, the lamina base not auriculate, and the peduncle not excessively longer than the petiole.

Not much is known about this species. The two recent collections cited here are the closest match to the holotype.

Specimens examined: IRIAN JAYA: Star Mts., Sibil Valley, alt. 1200–1500 m, *Kalkman & Nicholas 4160*, May (L). PAPUA NEW GUINEA: Central Division, Mt. Tafa, *L.J. Brass 4127* (A); Alexishafen, *Wiesenthal 68* (B).

13. **Piper sundaicum** Blume, Verh. Bat. Genoots. 11 (1826) 187, fig. 14; C.DC., DC. Prodr. 16.1 (1869) 352; Koorders, Verh. Kon. Ak. Wet. Amsterdams. 2, 14.4 (1908) 42, *reprint*; Koorders, Exkursionsflora van Java. 2 (1912) 26; Koorders-Schumacher, Exkursionsflora Atlas. 4.2 (1924) 445, fig. 718G. **Type**: Maluku, Ambon. *Blume s.n., Leiden Herb. 908.363-43* (lectotype L, here designated).

Synonyms: Chavica sundaica (Blume) Miq. Syst. Piperac., (1843) 274; Fl.Ind. Bat 1(2) (1859) 446, exclusive of the synonym *P. album* Vahl.

Piper amplilimbum C.DC., Candollea 1 (1923) 213; Schroeder, Candollea 3 (1926) 135; Chew, Blumea. 20 (1972) 145, fig. 1, *syn nov.* **Type**: Maluku, Ambon, *Teysmann s.n.* 1905 (holotype BO).

Dioecious scandent shrubs, entirely glabrous. Twigs 5–8 mm diam.; internodes smooth; stipular scars prominent. *Lamina* symmetrically ovate, (23–)25–27 x 14–19 cm, somewhat coriaceous; apex acuminate, acumen to 2 cm long; base rounded; margin entire; lateral veins 3–4 pairs, very prominent, the distal pair arising alternately from the midrib at 2–3 cm from the base, the others directly from the base; intercostals

numerous, not straight, quite prominent. *Petioles* c. 2 cm long, smooth. *Stipules* to 8 x c. 1 cm, apparently not adnate to petioles. *Inflorescences:* male long, thin; female 11–13 x 0.7 cm, the peduncular stalk c. 1.5 cm long, glabrous. Bracts somewhat irregularly circular, peltate. *Female flowers* sessile; ovary pyramidal; stigmas 3-fid, short, sessile, slightly reflexed. *Fruits* ovoid, sessile, c. 3 cm long; crowded, not concrescent.

Distribution: Indonesia, Maluku.

Notes: Blume recorded this species as also occurring in Java. Koorders (1908, 1912) doubted the Javanese record as he failed to find any collection from that island. I have also been unsuccessful in finding any material of the species from Java. This is probably a very rare species: the type materials are all that is known of this species.

I have compared the type materials of *Piper sundaicum* with that of *P. amplilimbum* C.DC., and I am unable to distinguish the one from the other.

Piper sundaicum appears to have some relationship with *Piper reinwardtianum* from the same region (see above).

Piper sundaicum has been identified with *P. album* Vahl by previous botanists. The two species are however, quite distinct: *P. album* Vahl is a climber, our species is not.

Specimens examined: MALUKU: Ambon, *Blume s.n.* (L); *Teysmann s.n.* 1905 (BO).

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