

ADDITIONAL NOTES ON THE FIJIAN SPECIES OF PEPEROMIA

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SINCE MY PREVIOUS PUBLICATIONS dealing with the genus *Peperomia* in Fiji,¹ new collections have resulted in the discovery of noteworthy material. Most of the specimens mentioned in the present paper were collected in 1947 by Dr. A. C. Smith,² but one new species is based upon a collection by Mr. B. E. V. Parham, of the Department of Agriculture, Suva. It seems advisable at this time to propose a revised key to the species known to occur in Fiji; following this, the recently available material is detailed and three species and three varieties are described as new. Types of novelties are deposited in the herbarium of the Arnold Arboretum, and duplicates of Dr. Smith's collections of *Peperomia* are in the herbarium of DePauw University.

KEY TO THE FIJIAN SPECIES OF PEPEROMIA

- Leaves predominantly opposite or verticillate.
 - Leaves moderately to densely hirtellous.....*P. leptostachya*.
 - Leaves glabrous or at most with only a few hairs.
 - Stems with nodal thickenings; leaves 1.2 cm. wide \times 3 cm. long...
.....*P. nodosa*.
 - Stems without nodal thickenings; leaves mostly more than 2.5 \times 3
cm.....*P. pilostigma*.
- Leaves predominantly alternate.
 - Spikes sympodial (leaf-opposed).
 - Plants glabrous.....*P. flexuosa*.
 - Plants densely hirtellous.....*P. vitilevuensis*.
 - Spikes axillary and/or terminal.
 - Plants obviously and mostly more or less completely hairy.
 - Plants mostly 5 cm. or less tall; petioles up to 2-2.5 cm. long..
.....*P. orbiculimba*.
 - Plants much larger; petioles shorter.
 - Spikes mostly solitary (not in branching axillary clusters).
 - Leaves palmately 3-nerved, oval or obovate.
 - Leaves up to 2 \times 3.5 cm.; stem densely hairy, the
hairs up to 1 mm. long; spikes up to 7 cm. long;
peduncle 12 mm. long.....*P. nandarivatensis*.
 - Leaves 1.1 \times 1.7 cm.; stem minutely puberulent;
spikes up to 1.4 cm. long; peduncle 3 mm. long..
.....*P. curtispica*.

¹ Bishop Mus. Bull. 141: 25-47. fig. 8-20. 1936; Bishop Mus. Occ. Pap. 17: 215-220. fig. 1-3. 1943.

² Dr. Smith's collections were made under the auspices of the Arnold Arboretum of Harvard University and the John Simon Guggenheim Memorial Foundation, with the aid of grants from the Penrose Fund of the American Philosophical Society and the Bache Fund of the National Academy of Sciences.

Leaves palmately 5-nerved.

Leaf apex acute to narrowly acuminate.

Stem hairs erect.....*P. Parhamii*.

Stem hairs appressed.....*P. vitiana*.

Leaf apex obtuse to acutish; plants appressed-hirsute.....*P. ciliifolia*.

Spikes in branching axillary clusters, occasionally solitary.

Stems long-villous; inflorescence usually of 3 umbellately clustered spikes.....*P. naitasiriensis*.

Stems hirtellous; inflorescence not umbellate.....*P. nandalana*.

Plants essentially glabrous or at most with only a few hairs.

Leaves cordate-ovate; fruit longitudinally ribbed...*P. pellucida*.

Leaves and fruit not as above.

Leaves palmately 3-5-nerved, essentially glabrous.

Spikes mostly solitary; leaves not exceeding 4 cm. in length.

Plants suberect, glabrous; leaves briefly attenuate, mostly more than 2.5 cm. long.....*P. Endlicheri* var. *fijiana*.

Plants decumbent, spreading, minutely puberulent; leaves not attenuate, less than 1.5 cm. long....*P. curtispica*.

Spikes mostly in branching axillary clusters; leaves mostly larger.

Leaves mostly less than 2.5 cm. wide and 3 or more times longer than wide (less in var. *microlimba*).....*P. lasiostigma*.

Leaves up to 4 cm. wide and mostly less than 3 times longer than wide.....*P. kandavuana*.

Leaves mostly plinerved, glabrous or sparingly hairy.

Leaves plinerved within the lowermost 5 mm.

Leaves narrowly and attenuately acuminate, the upper surface glabrous; inflorescence branched and disposed along the stem.....*P. attenuata*.

Leaves acute to acuminate, hirtellous along the nerves on the upper surface; inflorescence mostly in the upper leaf axils.....*P. flavida*.

Leaves with the main lateral nerves branching off the midrib 5-10 mm. above the base.

Stems with many branches; leaves mostly about twice as long as wide.....*P. Albertiana*.

Stems mostly unbranched; leaves 3-5 times longer than wide.....*P. laevilimba*.

***Peperomia leptostachya* Hooker & Arnott in Bot. Beechey 96. 1832.**

VITI LEVU: Mba: Vicinity of Nalotawa, eastern base of Mt. Evans Range, epiphyte in forest along creek, alt. 550-600 m., *Smith* 4433; northern portion of Mt. Evans Range, between Mt. Vatuyanitu and Mt. Natondra, on boulders in crest thickets, alt. 700-900 m., *Smith* 4296.

VANUA LEVU: Mathuata: Mt. Uluimbau ["The Three Sisters"], south of Lambasa, stems pink to red, on cliffs and boulders on exposed summit, alt. 150–369 m., *Smith 6605*.

This species is widely distributed on the islands of the Pacific area. It is found most commonly on rocks and cliffs at low to moderate altitudes.

***Peperomia vitilevuensis* sp. nov.**

Herba sat parva epiphytica; caule ad 15 cm. alto, conferte hirtulo; foliis alternis, ellipticis, ca. 1.5 cm. latis, 1.5–4 cm. longis, apice truncato-acutis, basi acutis, utrinque puberulis, ciliolatis, palmatim 3–5-nerviis; petiolo 3–5 mm. longo, hirtulo; spicis oppositifoliis; pedunculo gracili, 3–5 mm. longo, hirtulo; drupa globosa, stigmate subapicali.

A rather small, epiphytic herb; stem up to 15 cm. tall, branching, sub-erect, 2 mm. thick at the base when dry, densely hirtellous, the internodes mostly 10–15 mm. long; leaves alternate, elliptic, mostly 1.2–1.8 cm. wide \times 1.5–4 cm. long, the apex bluntly acute, the base acute, puberulent on both sides, ciliate, palmately 3–5-nerved, the nerves branched upward, moderately dark-glandular dotted, drying membranous, translucent; petiole about 5 mm. long, hirtellous; spikes leaf-opposed, 1 mm. thick \times 15–20 mm. long, moderately to loosely flowered; peduncle slender, 3–5 mm. long, hirtellous; rachis glabrous; bracts round-peltate; drupe globose, about 0.5 mm. long, the apex oblique, the stigma slightly subapical.

VITI LEVU: Mba [formerly Tholo North]: Summit of Mt. Nanggara-nambuluta [Lomalangi], east of Nandarivatu, epiphyte in dense forest, alt. 1100–1120 m., June 23, 1947, *Smith 4862* (TYPE, in Arnold Arb. herbarium). Ra [formerly Tholo North]: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi [Mt. Victoria], stem and leaves frequently reddish-mottled, epiphyte in dense forest, alt. 1050–1120 m., *Smith 5711*.

The comparatively small, densely hirtellous plants, and especially the sympodial spikes distinguish this species. From *P. flexuosa*, which also has leaf-opposed spikes, it differs because of its densely hirtellous stems.

***Peperomia orbiculimba* Yuncker var. *mathuataensis* var. nov.**

Foliis orbicularibus vel elliptico-obovatis, 1–2.5 cm. latis, 1–3 cm. longis, apice rotundatis, obtusis, basi obtusis vel acutis; petiolo gracili, ad 6 cm. longo (pro more 1–2.5 cm.); pedunculo ad 2 cm. long.

Leaves from orbicular to elliptic-obovate, 1–2.5 cm. wide \times 1–3 cm. long, the apex rounded, the base obtuse to acute; petioles slender, mostly 1–2.5 cm. or rarely up to 6 cm. long; peduncle up to 2 cm. long.

VANUA LEVU: Mathuata: Southern base of Mathuata Range, north of Natua, on rocky banks along stream in dense forest, alt. 100–250 m., Dec. 4, 1947, *Smith 6859* (TYPE, in Arnold Arb. herbarium); southern slopes of Mt. Numbuiloa, east of Lambasa, leaf-blades reddish purple beneath, on cliffs in steep open forest, alt. 350–500 m., *Smith 6569*.

There is great variation in the size and shape of the leaves on the specimens included here. The leaves on the type specimen of the species, collected near Levuka on Ovalau, are only about 1 cm. long and orbicular or

nearly so. Some leaves on the type specimen of this variety resemble those of the species but most of them are much larger and somewhat obovate while those on no. 6569 are mostly elliptic-obovate. All agree, however, in being small plants with villous stems and leaves, and in having long, slender petioles and peduncles, and somewhat pointed fruits.

Peperomia nandarivatensis Yuncker in Bishop Mus. Occ. Pap. 17: 216, fig. 1. 1943.

VITI LEVU: Mba [formerly Nandi]: Upper slopes of Mt. Koromba [Pickering Peak], on boulders in dense forest, alt. 800–1075 m., *Smith 4670*.

Peperomia curtispica C. DC. in Jour. Linn. Soc. 39: 166. 1909.

VITI LEVU: Mba [formerly Tholo North]: Summit of Mt. Nanggara-nambuluta [Lomalangi], east of Nandarivatu, epiphyte in dense forest, alt. 1100–1120 m., *Smith 4861*; hills east of Nandala Creek, about 3 miles south of Nandarivatu, epiphyte in dense mossy forest on ridge, alt. 850–970 m., *Smith 5948*. Nandronga & Navosa [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Nandrau and Nanga, epiphyte in dense forest, alt. 725–825 m., *Smith 5515*. Ra [formerly Tholo North]: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi [Mt. Victoria], epiphyte in dense forest, alt. 1050–1120 m., *Smith 5710*. Naitasiri [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, nodes deep red, epiphyte in dense forest, alt. 870–970 m., *Smith 5772*.

This is a small, decumbent, epiphytic species rather common in densely forested areas. Considerable variation is shown in the size and shape of the leaves on individual plants.

Peperomia Parhamii sp. nov.

Herba epiphytica statura modica erecta vel suberecta; caulis conferte hirtulis; foliis alternis vel infimis oppositis vel verticillatis, ellipticis, elliptico-lanceolatis vel subobovatis, infimis obovatis, apice angustatis acutis vel infimis obtusis, palmatim 5-nerviis, utrinque hirtulis (ad venas saltem); petiolo 3–10 mm. longo, conferte hirtulo; spicis terminalibus et axillaribus; pedunculo dissite hirtulo; ovario ovoideo, apice obliquo, stigmatibus subapicali.

A moderate-sized erect or suberect epiphytic herb; stem succulent, 5 mm. thick when dry, up to 30 cm. or more tall, strongly branched upward, densely hirtellous, hairs erect, the internodes 1 cm. long above, up to 4 cm. downward; leaves alternate or those on the lower nodes opposite or whorled, the upper leaves elliptic, lance-elliptic or subobovate, the lower whorled leaves obovate, quite variable in size, the upper leaves about 1.2 cm. wide \times 2.5 cm. long, the lower leaves up to 2–2.5 cm. wide \times 3–4 cm. long, the apex narrowed, acute, or lower obovate leaves scarcely pointed and obtuse, palmately 5-nerved, hirtellous on both sides, especially along the nerves, dark above, paler and strongly dark-glandular-dotted beneath, ciliolate above the middle, drying rather thin, translucent; petioles mostly 3–5 mm. long above, up to 1 cm. on the larger lower leaves, densely hirtellous; spikes axillary and terminal, moderately flowered, 1 mm. thick

× 3 cm. long; peduncle about 5 mm. long, loosely hirtellous; bracts round-peltate; ovary ovoid, the apex oblique, the stigma subapical; fruit not present.

VITI LEVU: Namosi: Korombasambasanga Mt., alt. 1050 m., Mar. 24, 1940, B. E. Parham 2187 (TYPE, in Arnold Arb. herbarium).

This species resembles *P. nandarivatensis* to some extent but differs because of the larger size of the plants, shorter pubescence, leaf shape and pubescence, shorter peduncles, etc. From *P. vitiana* it differs in the size and shape of the leaves and the character of the pubescence.

Peperomia naitasiriensis sp. nov.

Herba epiphytica; ramis e basi decumbente radicante ad 35 cm. vel ultra sat conferte albo-villosis, pilis ad 1 mm. vel ultra longis erectis; foliis alternis distichis ellipticis vel elliptico-lanceolatis, apice acutis acuminatis, basi acutis, utrinque dissite villosis, palmatim 5-nerviis; petiolo conferte villosa; inflorescentia umbellata; spicis 5–10 mm. longis; pedunculo gracili glabro vel dissite villosa.

An epiphytic herb, branching from the rooting, decumbent base, the branches simple, virgate, 3 mm. thick at the base when dry, up to 35 cm. or more long, rather densely white-villous, the hairs erect, up to 1 mm. or more long, the internodes about 1 cm. long; leaves alternate, distichous, elliptic or lance-elliptic, 1–1.4 cm. wide × 3–4.5 cm. long, gradually reduced upward, the apex acute to acuminate, the base acute, loosely villous on both sides, ciliate, palmately 5-nerved, the lateral nerves slender, dark above, pale beneath, drying thin and membranous; petiole 2–3 mm. long, densely villous; spikes as yet young, scarcely 1 mm. thick × 5–10 mm. long, moderately flowered, mostly in umbellate clusters of three, subtended by a lanceolate bract with an apical tuft of hairs, on slender, axillary, loosely villous stalks about 3 mm. long, or uppermost spikes may be solitary; peduncle slender, up to 5 mm. long, glabrous or sparsely villous; bracts round-peltate; ovary turbinate (?), the stigma apical (?); fruit not present.

VITI LEVU: Naitasiri [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, apparently rare and seen only once, stems and lower leaf-surfaces reddish-tinged, epiphyte in dense forest, alt. 870–970 m., Sept. 18, 1947, Smith 6144 (TYPE, unicate in Arnold Arb. herbarium).

The long-villous stems and leaves and the umbellate inflorescence distinguish this species from other known Fijian species.

Peperomia nandalana Yuncker var. *nudipeduncula* var. nov.

Foliis ellipticis, obovato-ellipticis rhombeisve, ca. 1.5 cm. latis, 2.5–4 cm. longis, apice acutis vel subobtusis, basi acutis, utrinque sat crispo-puberulis; spicis 5–10 mm. longis; pedunculo glabro.

Leaves elliptic or elliptic-obovate or rhomboidal, 1.2–1.7 cm. wide × 2.5–4 cm. long, the apex acute or obtusish, the base acute, moderately to sparingly crisp-puberulent on both sides; spikes 1 mm. thick × 5–10 mm. long; peduncle glabrous.

VANUA LEVU: Mathuata: Southern base of Mathuata Range, north of Natua, on rocky banks along stream in dense forest, alt. 100–250 m., Dec. 4, 1947, *Smith 6862* (TYPE, in Arnold Arb. herbarium).

This variety resembles the species in many respects but differs because of the smaller size of the plants, shape and size of the leaves, and glabrous peduncles. It differs from *P. vitiana* because of the erect stem hairs, less pointed leaves and shorter spikes which are commonly multiple on axillary stalks.

***Peperomia lasiostigma* C. DC. in Jour. Linn. Soc. 39: 165. 1909.**

VITI LEVU: Mba [formerly Tholo North]: Hills between Nggalawana and Nandala Creeks, south of Nauwanga, nodes deep red, internodes green or sometimes reddish-flecked, on trees and boulders in dense forest, alt. 725–850 m., *Smith 5810*; hills between Nandala and Nukunuku Creeks, along trail from Nandarivatu toward Lewa, nodes purplish, internodes reddish-tinged, spikes dull red, epiphyte in dense forest, alt. 750–850 m., *Smith 6191*; slopes of the escarpment north of Nandarivatu, nodes purplish, spikes reddish-tinged, on rocks in woods along stream, alt. 550–800 m., *Smith 6266* (some leaves and parts of the stems are minutely hirtellous); valley of Nggalawana Creek, north of the sawmill at Navai, nodes and spikes red, internodes and petioles red-tinged, epiphyte in dense forest, alt. 725–850 m., *Smith 5347*; western and southern slopes of Mt. Tomanivi [Mt. Victoria], branches reddish, epiphyte in dense forest, alt. 850–1150 m., *Smith 5268*; summit of Mt. Tomanivi [Mt. Victoria], branches pale green with faint red longitudinal stripes, epiphyte in dense mossy forest, alt. 1290–1323 m., *Smith 5197*; western slopes of Mt. Nanggaranambuluta [Lomalangi], east of Nandarivatu, nodes dull red, internodes, leaves, and spikes green, sometimes reddish-tinged, epiphyte in dense forest, alt. 850–1000 m., *Smith 6306a*; same locality, alt. 1000–1100 m., *Smith 4896*; eastern slopes of Mt. Koroyanitu, Mt. Evans Range, epiphyte in dense low forest, alt. 950–1050 m., *Smith 4145*. Mba [formerly Nandi]: Upper slopes of Mt. Koromba [Pickering Peak], on rocks in dense forest at crest, alt. 800–1075 m., *Smith 4699*. Nandronga & Navosa [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Nandrau and Rewasau, nodes swollen, deep red, epiphyte in dense forest, alt. 725–825 m., *Smith 5596*. Naitasiri [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, nodes, internodes and sometimes lower leaf-surfaces reddish-streaked, epiphyte in dense forest, alt. 870–970 m., *Smith 5773, 6107*.

***Peperomia lasiostigma* var. *carnosa* (C. DC.) Yuncker in Bishop Mus. Bull. 141: 36. 1936.**

VITI LEVU: Ra [formerly Tholo North]: Ridge from Mt. Namama (east of Nandarivatu) toward Mt. Tomanivi [Mt. Victoria], stems often deep red, up to 1 cm. diameter near the base, epiphyte in dense forest, alt. 1050–1120 m., *Smith 5720*. Mba [formerly Tholo North]: Ridge between Mt. Nanggaranambuluta [Lomalangi] and Mt. Namama, east of Nandarivatu, stems reddish, epiphyte in dense forest, alt. 1050–1120 m., *Smith 4985*; western slopes of Mt. Nanggaranambuluta [Lomalangi], east of Nandarivatu, nodes dull red, internodes, leaves, and spikes green, sometimes reddish-tinged,

epiphyte in dense forest, alt. 850–1000 m., *Smith 6306*; summit of Mt. Tomanivi [Mt. Victoria], stems and branches deep red, succulent, epiphyte in dense mossy forest, alt. 1290–1323 m., *Smith 5148*.

There is some question whether the specimens listed above as variety *carnosa* are identical with the original *P. carnosae* C. DC. or not. They appear to agree sufficiently well with the original description and a photograph of the type, however, to warrant placing them here, at least questionably.

***Peperomia lasiostigma* var. *tomaniviensis* var. nov.**

Herba divaricatim ramosa; caule ad 40 cm. adscendente; foliis ellipticis vel inferis elliptico-subobovatis, 1–1.5 cm. latis, 2.5–3 cm. longis, apice abrupte brevis-acutis; petiolo gracili, ca. 5 mm. longo.

Stems divaricately branched upward, up to 30 cm. tall; leaves elliptic or lower leaves elliptic-subobovate, 1–1.5 cm. wide \times 2.5–3 cm. long, the apex abruptly short-acute; petioles slender, about 5 mm. long.

VITI LEVU: Mba [formerly Tholo North]: Western and southern slopes of Mt. Tomanivi [Mt. Victoria], epiphyte in dense forest, alt. 850–1150 m., July 7, 1947, *Smith 5114* (TYPE, Arnold Arb. herbarium); hills east of Nandala Creek, about 3 miles south of Nandarivatu, epiphyte in dense forest, alt. 850–970 m., *Smith 6242*.

These specimens resemble *P. lasiostigma* in being glabrous and having axillary, compound inflorescences. They differ because of the shape and smaller size of the leaves and more slender petioles. The stems are also more erect and more widely branched upward.

***Peperomia kandavuana* Yuncker in Bishop Mus. Bull. 141: 39, fig. 15. 1936.**

VITI LEVU: Mba [formerly Tholo North]: Hills between Nggaliwana and Tumbeindreketi Creeks, east of the sawmill at Navai, internodes pinkish, nodes purplish red, young spikes reddish, on humus-covered boulders in dense forest, alt. 725–800 m., *Smith 5885*. Naitasiri [formerly Tholo North]: Northern portion of Rairaimatuku Plateau, between Mt. Tomanivi [Mt. Victoria] and Nasonggo, internodes green, nodes deep red, epiphyte in dense forest, alt. 870–970 m., *Smith 5782*.

The fruit on the type specimen of this species is well developed with the stigma appearing to be nearly apical. The fruit on no. 5885 is immature but the ovaries show an oblique apex with the stigma somewhat subapical. No other difference has been noted, however, and it is believed that it is the same as this species.

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