

FLORAE MALESIANAE PRECURSORES XXXVIII
NOTES ON PISONIA L. IN THE OLD WORLD (NYCTAGINACEAE)

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SUMMARY

Among the *Nyctaginaceae* the genus *Pisonia* is the only one that has produced an appreciable number of species outside the New World. Some of these have very wide areas in the Pacific and along the borders of the Indian Ocean, others occupy smaller areas, mostly in eastern Malesia, Melanesia, and Polynesia. In Australia there are three species, in the north the circumtropical *P. aculeata* L., in the north and east *P. umbellifera* Seem. and *P. grandis* R. Br. In Africa there is only one circumtropical species in the eastern coastal parts, viz. *P. aculeata* L., further in the Malesian area two widely distributed Old World species, viz. *P. umbellifera* Seem. and *P. grandis* R. Br. occur.

This revision contains a brief taxonomic discussion of the infrageneric subdivision. *Calpidia*, *Ceodes*, and *Rockia* are merged with *Pisonia*. In all 13 species are distinguished, for which keys, synonymy, and typification are provided. Of the five extra-Malesian species a description is given. Four new combinations have been made.

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PISONIA

Plum. [Nov. Gen. (1703) 7, t. 11] ex Linné, Gen. Pl. ed. 5 (1754) 451; Sp. Pl. (1753) 1026; Choisy in DC., Prod. 13, 2 (1849) 440; Heimerl in E. & P., Pfl. Fam. 3, 1b (1889) 29; Barg.-Petr., Nuov. Giorn. Bot. It. n.s. 8 (1901) 604; Heimerl in E. & P., Pfl. Fam. ed. 2, 16c (1934) 126. — *Ceodes* J. & G. Forster, Char. Gen. Pl. (1776) 71, t. 71; Skottsbb., Svensk Bot. Tidskr. 30 (1936) 722; Heimerl, Occ. Pap. Bish. Mus. 13 (1937) 37. — *Calpidia* Thouars, Hist. Vég. Isle Fr. (1804) 37, t. 10; Heimerl, Oest. Bot. Z. 63 (1913) 19, 280; in E. & P., Pfl. Fam. ed. 2, 16c (1934) 125. — *Timeroyea* Montr., Mém. Ac. R. Imp. Lyon 10 (1860) 247. — *Vieillardia* Brongn. & Gris., Bull. Soc. Bot. Fr. 8 (1861) 375. — *Rockia* Heimerl, Oest. Bot. Z. 63 (1913) 289. — *Heimerlia* Skottsbb., Svensk Bot. Tidskr. 30 (1936) 738, non v. Höhnelt, 1903. — *Heimerliodendron* Skottsbb., Svensk Bot. Tidskr. 35 (1941) 364.

Typification. Linnaeus described two species of which *P. aculeata* L. was indicated as the type ("Grundlage") by Heimerl (1934). The other one was based on two citations of an Indian (Malabarian) plant — "*Amm. herb. 582*" and "*katu-kara-walli*" of Rheede, Hort. Mal. 7, 33, t. 17 — which he named *P. mitis* L., with the sole description "*Pisonia inermis*". The strange thing about this is that the plant depicted and described by Rheede is not

unarmed, but provided with large spines. It is clearly *P. aculeata* L. of which the fruit is galled. The type of *P. mitis* must then be "*Pisonia malabarica non spinosa*. Amm. herb. 582". As this, however, is of no importance here, I may refer for a further discussion of this point to a note under *P. aculeata*.

Seemann concluded wrongly (J. Bot. 1, 1863, 245 footnote) that because Linnaeus changed the concept *P. mitis* in the 2nd edition of the Species Plantarum and reduced it to the American *P. inermis* Jacq. non Forst., his name could have no basis in 1753. Neither had J. Smith the right to add the name *P. mitis* to a specimen in the Linnean Herbarium, unless this is a duplicate of Amman's

Delimitation and subdivision of the genus Calpidia Thouars, Hist. Vég. Isle Fr. (1804) 37, t. 10, based on a plant from Mauritius (now = *P. umbellifera*) was reduced to *Pisonia* by Choisy (1849, l.c.).

Seemann (1862, 1863) added *Ceodes* Forst., Char. Gen. (1776) 71, t. 71, which Choisy had overlooked, to the synonymy of *Pisonia*. Heimerl had first, in 1889, agreed with the reductions to one genus *Pisonia* and had used for the *Ceodes* concept *Pisonia* sect. *Prismatocarphae*. Later he changed his opinion and in 1934 he distinguished three genera: *Pisonia*, *Rockia*, and *Calpidia* instead of *Ceodes*. His argument was that *Ceodes* had been described on incomplete material. Skottsberg (1936, l.c.) pointed out, however, that the material basis for *Calpidia* is hardly better and correctly replaced *Calpidia* by *Ceodes*. Obviously Heimerl accepted Skottsberg's reasoning, as he described in 1937 a new species *Ceodes siphonocarpa*.

The monotypic genus *Rockia* Heimerl (1913, l.c.) based on *Pisonia sandwicensis* is here reduced to *Pisonia*. Its affinity lies with the East Malesian *P. longirostris* by its very long rostrum and almost linear perianth lobes about equalling in length the tube; by this it is very distinct from its congeners; besides it has, in its section, an unusually high number of stamens (18—19).

Heimerl's subdivision of *Pisonia* in 1889, as well as his later survey in 1934, is largely based on numbers of stamens, while he took together two species on the additional character of the presence of prickles (modified glands) on the anthocarp.

I believe that the possession of a rostrum — sterile apex of the fruit — is another valuable character, especially for the distinction of species, but also of value for the infra-generic taxa.

In the following table I have contrasted the subdivision of Old World species of *Pisonia* and allied genera as given by Heimerl of the species which he recognized:

1889	1934
genus <i>Pisonia</i>	genus <i>Pisonia</i>
sect. <i>Glanduliferae</i>	sect. <i>Glanduliferae</i>
<i>P. aculeata</i>	<i>P. aculeata</i>
<i>P. grandis</i>	<i>P. grandis</i>
	genus <i>Calpidia</i>
	sect. <i>Paucistaminatae</i>
	<i>Calpidia longirostris</i>
sect. <i>Prismatocarphae</i>	sect. <i>Excelsae</i>
<i>P. umbellifera</i>	<i>Calpidia umbellifera</i>
	<i>Calpidia cauliflora</i>
	<i>Calpidia gigantocarpa</i>
sect. <i>Timeroia</i>	sect. <i>Timeroia</i>
<i>P. artensis</i>	<i>Calpidia artensis</i>

*P. sandwicensis*genus *Rockia**Rockia sandwicensis*

unclassified by Heimerl:

P. corniculata, 1901*P. mülleriana*, 1891*P. diandra*, 1912*Calpidia gracilescens*, 1913*Calpidia pancheriana*, 1913*Ceodes siphonocarpa*, 1937

Heimerl (1913) mentioned seven characters for justifying the genus *Rockia*, but all of these are also found in other Pacific species of *Pisonia*; the exact reason for separating *Rockia* is to me quite unclear.

Skottsberg (1936) based a new genus *Heimerlia*, later renamed *Heimerliodendron*, on *Pisonia brunoniana* which had before often been reduced to *P. umbellifera*. The characters he mentions are, however, futile, and some even do not hold, for example unisexual flowers in *P. umbellifera* and bisexual flowers in *P. brunoniana*. This he admitted himself, adding, however, that functionally female specimens of the latter would be 'anomalous'. The stigma to which he pointed attention is variable, the number of stamens is rather constant for the species, but shows a wide range within the genus, whilst the presence of perianth remains on top of the anthocarp in *P. brunoniana* is nothing special in the genus. In my opinion the two are conspecific.

As said above there were for the infrageneric subdivision originally three characters, prickles on the anthocarp, the rostrum, and number of stamens. Though the first two characters maintain their value, that of the stamens seems to be unreliable as there is overlapping in sect. *Prismatocarpace* and *Timeroyea*, whereas in addition *P. gigantocarpa* and *P. sandwicensis* have an abnormally high number of stamens for sect. *Paucistaminatae*.

Through these exceptions the sections have become much less sharp than understood before and if none had been proposed before I probably would have refrained from raising them. I propose the following tentative infrageneric sub-division:

1. sect. *Pisonia*. — *Pisonia* sect. *Glanduliferae* Heimerl 1889; 1934. Prickles on the anthocarp, no rostrum. Stamens 6—10.
Species: *P. aculeata* L. (type of the genus), *P. grandis* R. Br.
2. sect. *Prismatocarpace* Heimerl 1889. — *Ceodes* Forst. 1776. — *Calpidia* sect. *Excelsae* Heimerl 1934, p.p. — *Heimerlia* Skottsberg. 1936. — *Heimerliodendron* Skottsberg. 1941. No prickles on the anthocarp, no rostrum. Stamens 6—15.
Species: *P. umbellifera* (Forst.) Seem. (type of the section), *P. cauliflora* Scheff., *P. gracilescens* (Heimerl) Steemm.
3. sect. *Timeroyea* (Montr.) Heimerl 1889, "*Timeroya*"; 1934. — *Timeroyea* Montr. 1860. — *Vieillardia* Brongn. & Gris. 1861. No prickles on the anthocarp, no rostrum. Stamens 11—40.
Species: *P. artensis* (Montr.) Barg.-Petr. (type of the section).
4. sect. *Paucistaminatae* (Heimerl) Steemm., *comb. nov.* — *Rockia* Heimerl 1913. — *Calpidia* sect. *Paucistaminatae* Heimerl 1934. No prickles on the anthocarp; rostrum distinct. Stamens 2—6(—19).
Species: *P. longirostris* T & B. (type of the section), *P. mülleriana* Warb., *P. corniculata* Barg.-Petr., *P. diandra* Pulle, *P. gigantocarpa* (Heimerl) Steemm., *P. siphonocarpa* (Heimerl) Steemm., *P. sandwicensis* Hillebr.

As frequently specimens lack fruit two keys are constructed which I hope will serve the purpose of identification.

Distribution of the sexes. As far as can be ascertained from herbarium material most species are definitely dioecious: *P. aculeata*, *P. artensis*, *P. corniculata*, *P. diandra*, *P. gigantocarpa*, *P. longirostris*, and *P. sandwicensis*, whereas *P. siphonocarpa* I only know in ♀ state (only 1 specimen known; Heimerl described also ♂ flowers). In these unisexual flowers one sex is reduced but the other sex remains always present in the sterile state.

Three other species have definitely bisexual flowers, namely *P. cauliflora*, *P. grandis*, and *P. mülleriana*. Possibly *P. gracilescens* has also bisexual flowers because Heimerl found a slightly developed ovary together with stamens in the single specimen known. Only in one species bisexual flowers have been found in addition to the monoecious state, viz. in *P. umbellifera*.

Note. For recognition and identification the anthocarp provides excellent diagnostic features. The difficulty, however, is that they are useless in male plants and besides they must be judged from the anthocarp in the ripe state which is seldom seen in herbarium specimens; in some species the ripe anthocarp is even not known.

As leaf characters are very unreliable in this genus and the number of stamens shows not seldom overlapping, I had to compromise in framing a key; as a matter of fact I am offering two separate keys.

FIRST KEY TO THE SPECIES

1. Plants unarmed, erect.
 2. Leaves distinctly petioled.
 3. Inflorescence terminal, at least not cauliflorous or ramiflorous. Petianth lobes not keeled on the inside.
 4. Leaves with distinct dark veins. On lower surface nerves and veins hairy. Perianth glandular. Anthocarp with 5 rows of mono-serial prickles 12. **P. grandis**
 4. Leaves without distinct veins, glabrous on lower surface. Perianth never glandular. Anthocarp without prickles.
 5. Veins on lower surface distinctly prominent. Perianth lobes often equalling the tube. Stamens 17—19. Anthocarp and rostrum (*ex descr.*) together c. 37.5 cm. 7. **P. sandwicensis**
 5. Veins on lower surface never prominent. Perianth lobes always distinctly shorter than the tube.
 6. Perianth lobes truncate. Stamens 3—6. Anthocarp c. 5 cm, rostrum c. 3 cm 5. **P. mülleriana**
 6. Perianth lobes not truncate.
 7. Perianth densely light-brown hairy. Stamens 25—40. Anthocarp with sulcate ribs 1. **P. artensis**
 7. Perianth dark-brown hairy, glabrescent. Stamens less than 15. Anthocarp without sulcate ribs.
 8. Perianth 5- or 10-lobed, the lobes short and wide, separated by shallow sinuses, the margin as a whole nearly sinuate rather than lobed. Stamens 2 or 4; in ♂ flower longer than the vestigial gynaeceum; staminodes in ♀ flower shorter than the gynaeceum. Anthocarp with a long rostrum 10. **P. diandra**
 8. Perianth distinctly 5-lobed. Stamens 5—14.
 9. Stamens 6—14. Anthocarp 2—4 cm, with 5 viscid ribs, without rostrum 2. **P. umbellifera**
 9. Stamens 5—9. Anthocarp mostly rostrate.
 10. Stamens 5—6. Leaves 18—24 by 7—11 cm. Anthocarp with a rostrum. *New Guinea* 11. **P. corniculata**
 10. Stamens 7—9. Leaves 10—18 by 4.5—10 cm.
 11. Stamens 8—9. Leaves 17—18 by 9—10 cm. Anthocarp with a rostrum. Only 1 specimen with ♀ flowers seen (Heimerl described also ♂ flowers). *Society Is.* 9. **P. siphonocarpa**

11. Stamens 7—8. Leaves 10—12 by 4.5—8 cm. Anthocarp unknown. Only 1 specimen with ♂ (♀)? flowers known. *Tahiti*.
 3. *P. gracilescens*
3. Inflorescence cauliflorous, sometimes ramiflorous. Perianth lobes keeled on the inside. Stamens 13—15. Anthocarp 7 cm long, not viscid. 4. *P. cauliflora*
2. Leaves (sub)sessile, elliptic to subspathulate, tapering towards the petiole.
 12. Leaves elliptic to obovate. Perianth densely hairy, with truncate lobes. Stamens 5. Anthocarp smooth when mature, rostrum 10—40 cm. 6. *P. longirostris*
 12. Leaves oblanceolate to subspathulate. Perianth sparsely hairy, without truncate lobes. Stamens 10—19. Anthocarp with 5 viscid ribs, rostrum 11—18 cm. 8. *P. gigantocarpa*
1. Plants spinose, climbing. Perianth limb with 5 great lobes, alternating with 5 smaller ones. Anthocarp with 5 rows of bi-serial prickles 13. *P. aculeata*

SECOND KEY TO THE SPECIES

1. Plants unarmed, erect.
 2. Perianth without the distinct, prominent, black glands in 5 lengthwise rows. Anthocarp without prickles.
 3. Anthocarp without a rostrum (unknown in *P. gracilescens*).
 4. Inflorescences terminal. Perianth lobes not keeled.
 5. Stamens 25—40. Anthocarp with 5 (—6) sulcate ribs, containing viscid glands in the furrows. Flowers densely light-brown hairy 1. *P. artensis*
 5. Stamens 6—14. Anthocarp with 5 viscid ribs, not sulcate. Flowers sparsely brown hairy or almost glabrous.
 6. Stamens 6—14, exserted for 4 mm. Apical part of buds distinctly thicker than lower part (2 mm \varnothing), rounded, 5-angular or even slightly 5-winged. Flowers bisexual or unisexual by reduction. Anthocarp without rostrum, strongly 5-ribbed and viscid, 3—4 cm long. 2. *P. umbellifera*
 6. Stamens 7—8, not exserted. Buds narrowly club-shaped, acute, terete, halfway slightly constricted, upper portion not very much thicker (1 mm \varnothing) than lower portion. Only male (bisexual?) flowers known. Anthocarp unknown. *Tahiti* 3. *P. gracilescens*
4. Inflorescence cauliflorous, sometimes ramiflorous. Perianth lobes triangular, keeled. Anthocarp with 5 ribs, not viscid. 4. *P. cauliflora*
3. Anthocarp with a rostrum.
 7. Leaves large, (sub)sessile.
 8. Leaves elliptic to oblong or obovate. Inflorescence fine. Flowers densely hairy; perianth lobes truncate. Stamens 5, not exserted. Anthocarp proper spindle-shaped, smooth, only the rostrum viscid 6. *P. longirostris*
 8. Leaves oblanceolate to subspathulate. Inflorescence proportionally coarse. Flowers, at least the tube, sparsely hairy to glabrous; perianth lobes not truncate. Stamens 10—19, exserted for c. 2 mm. Anthocarp proper narrow, 5-ribbed, both ribs and rostrum viscid. 8. *P. gigantocarpa*
7. Leaves medium-sized, distinctly petioled.
 9. Leaves with distinct prominent veins on lower surface. Perianth lobes in ♀ flower equalling the tube, in ♂ shorter. Stamens 17—19 (—26) 7. *P. sandwicensis*
 9. Leaves without prominent veins on lower surface. Perianth lobes always shorter than the tube. Stamens less than 9.
 10. Flowers densely hairy.
 11. Perianth distinctly 5-lobed; the lobes truncate. Stamens 3—6, not exserted. Rostrum c. 3 cm long, thick. 5. *P. mülleriana*
 11. Perianth 5- or 10-lobed, the lobes separated by shallow sinuses, the margin as a whole nearly sinuate rather than lobed. Stamens 2 or 4, exserted for c. 2 mm. Rostrum slender 10. *P. diandra*
10. Flowers sparsely hairy to glabrous.
 12. Petiole short, flat, c. 3—4 mm wide. Stamens 8—9. Leaves 17—18 by 9—10 cm. Rostrum short and rigid, 2—2½ cm long in the only specimen known. *Moorea, Society Is* 9. *P. siphonocarpa*
 12. Petiole slender, not flat, c. 1—1¼ mm wide.
 13. Stamens 5—6. Leaves 18—24 by 6—11 cm. Rostrum long and slender. Buds not club-shaped, with roundish apex in the only specimen known. *New Guinea* 11. *P. corniculata*

13. Stamens 7—8. Leaves 10—12 by 4½—8 cm. Anthocarp unknown. Buds club-shaped and acute in the only specimen known. *Tahiti* 3. *P. gracilescens*
 2. Perianth with 5 rows of distinct, prominent, black glands. Anthocarp with prickles 12. *P. grandis*
 1. Plants spinose, climbing, Anthocarp with prickles 13. *P. aculeata*

1. *Pisonia artensis* (Montr.) Barg.-Petr., Nuov. Giorn. Bot. It. n. s. 8 (1901) 619. — *Timeroyea artensis* Montr., Mém. Ac. R. Imp. Lyon 10 (1860) 247: *unknown coll.*; Guill., Ann. Mus. Col. Marseille II, 9 (1911) 210. — *Calpidia artensis* (Montr.) Heimerl, Oest. Bot. Z. 63 (1913) 282.

Vieillardia austro-caledonica Brongn. & Gris., Bull. Soc. Bot. Fr. 8 (1861) 375; *Vieillard 1060* (P; isotype L!) from New Caledonia.

Tree to 20 m, unarmed. *Leaves* (sub) opposite, elliptic to oblong, 8—16 by 4—6.4 cm; base acute, top obtuse; petiole 1.5—4 cm. *Inflorescences* terminal, of cymose umbels, 2.5—4 by 2.5—3.5 cm; peduncle 3.5 cm, densely light-brown hairy. *Flowers* unisexual by reduction; pedicel 3 mm, with one basal acute bracteole. Perianth campanulate, c. 6 mm high; limb with 5(—6) lobes. Stamens in 2 whorls, 40 or more in the ♂ flower, exerted for 1—2 mm; sterile and c. 25 in number in the ♀ flower, not exerted. Stigma little fimbriate. *Anthocarp* 2.9—3.5 by 0.8—0.9 cm, without a rostrum, 5(—6)-ribbed, each rib having a small furrow with small viscid glands. Seed 2.4—2.5 by 0.35—0.39 cm.

Distribution. New Caledonia. According to Heimerl also in the nearby islands; his expectation that the species might occur on New Guinea could not be corroborated.

2. *Pisonia umbellifera* (Forst.) Seem., Bonplandia 10 (1862) 154. — *Ceodes umbellifera* Forst., Char. Gen. Pl. (1776) 71, t. 71; Prod. (1786) 93, “*umbellata*”. — *Ceodes umbellifera* (Forst.) Skottsb., Svensk Bot. Tidskr. 30 (1936) 723. — *Forster* (BM, P!, isotype) from Tanna.

Calpidia lanceolata Poir. in Lamk, Enc. Méth. Bot. Suppl. 2 (1811) 38; from Ile de France.

P. excelsa Bl., Bijdr. 14 (1826) 735. — *Calpidia excelsa* (Bl.) Heimerl, Oest. Bot. Z. 63 (1913) 284. — *Ceodes excelsa* (Bl.) Skottsb., Act. Hort. Gothob. 2 (1926) 231. — *Blume s.n. in herb. L 908.157-350* (L!, lectotype) from G. Salak, W. Java.

P. brunoniana Endl., Prod. Fl. Norf. (1833) 43. — *Calpidia brunoniana* (Endl.) Heimerl, Oest. Bot. Z. 63 (1913) 283. — *Ceodes brunoniana* (Endl.) Skottsb., Svensk Bot. Tidskr. 30 (1936) 728. — *Heimerlia brunoniana* Skottsb., l.c. 738. — *Heimerliodendron brunonianum* Skottsb., op. cit. 35 (1941) 364. — *Bauer* (K) from Norfolk I.

P. macrocarpa Presl, Symb. Bot. (1833) t. 56, *non vidi*; coll. unknown.

Buginvillia racemosa Blanco, Fl. Filip. (1837) 307; from Mt Angat, Philippines.

P. forsteriana Endl. ex Walp., Nov. Act. Nat. Cur. 19, Suppl. 1 (1843) 403, t. 11. — *Calpidia forsteriana* (Endl.) Heimerl, Oest. Bot. Z. 63 (1913) 284. — *in herb. Meyen*, from Sandwich Is.

Cedrota guianensis Blanco, Fl. Filip. ed. 2 (1845) 213; from Cebu and Luzon, Philippines.

P. ovalifolia (Boj.) Choisy in DC., Prod. 13, 2 (1849) 441; *Bojer in herb. DC.*, from Mauritius.

P. costata (Boj.) Choisy in DC., Prod. 13, 2 (1849) 446; *Bojer* from Mauritius.

P. sinclairii Hook. f., Fl. Nov. Zel. 1 (1853) 209, t. 50; *Sinclair* (BM) from Wangarai, N. Island, New Zealand.

P. mooriana F. v. M., Fragm. Phyt. Austr. 1 (1858) 20; *Moore* (MELB?) from Illawarra.

P. calpidia (Steud.) Baker, Fl. Maurit. & Seychell. (1877) 264; from Mauritius.

P. inermis var. *leiocarpa* Hillebr., Fl. Hawaiian Is. (1888) 369; Hillebrand from Hawaii and Molokai.

P. aruensis Barg.-Petr., Nuov. Giorn. Bot. It. n. s. 8 (1901) 618; Beccari anno 6-1873 (FI!, holotype) from Aru Is.

P. gammillii Merr., Philip. J. Sc. 5 (1910) Bot. 175; For. Bur. 88 Gammill, anno 1904 (PNH) from Nagaba, Guimaras.

Calpidia taitensis Heimerl, Oest. Bot. Z. 63 (1913) 288; Vesco anno 1847 (P!, lectotype) from Tahiti.

Calpidia pancheriana Heimerl, Oest. Bot. Z. 63 (1913) 287; Pancher 437 (P!, lectotype) from Ile des Pins.

P. nishimura Koidz., Bot. Mag. Tokyo 33 (1919) 120; S. Niseimura (TI?, lectotype), from Bonin Is.

3. *Pisonia gracilescens* (Heimerl) Steemm., *comb. nov.* — *Calpidia gracilescens* Heimerl, Oest. Bot. Z. 63 (1913) 285; Pancher s.n. (P!, holotype) from Crête de la Vallée de la Reine, Tahiti.

Tree 4—5 m, unarmed. *Leaves* opposite, oblong-elliptic, 10—12 by 4.5—8 cm; base acute to rounded; top obtuse; petiole 1.9—2.7 cm. *Inflorescence* terminal, consisting of lax, cymosely arranged umbels, 3—7 by 4.5 cm; peduncle 4.5—7 cm long. *Flowers* unisexual (?), only at the top hairy, glabrescent; pedicel 3—4.5 mm, at the base with 1—2 bracteoles. Perianth campanulate, c. 6 mm long. Stamens 7—8. Stigma 'reduced', subcapitate to fimbriate. *Anthocarp* unknown.

Distribution. Tahiti (endemic).

Note. Only one specimen known, Pancher in herb. P!, from Crêtes de la Vallée de la Reine, with buds. A reduced seed is present, so Heimerl wrote on the label ♂ (?♂). Insufficiently known species.

4. *Pisonia cauliflora* Scheff., Nat. Tijd. N. I. 32 (1873) 417. — *Calpidia cauliflora* (Scheff.) Heimerl, Oest. Bot. Z. 63 (1913) 283. — Teysmann (BO), from Ceram, cult. Hort. Bog.

P. major Baill., Adansonia 10 (1872) 158; Gaudichaud anno 1817—1820 (P, is missing) from Rawak I.

5 *Pisonia mülleriana* Warb., Bot. Jahrb. 13 (1891) 304. — *Calpidia mülleriana* (Warb.) Heimerl, Oest. Bot. Z. 63 (1913) 287. — Warburg, holotype lost in World War II (B), from Sattelberg; Clemens 100 (L!, neotype) from Sattelberg, Morobe Distr., Territory of New Guinea.

Calpidia cuspidata Heimerl, Oest. Bot. Z. 63 (1913) 284; Beccari 340 (FI!, holotype) from Ramoi, West New Guinea.

Ceodes corniculata (non *Pisonia corniculata* Barg.-Petr.) Merr. & Perry, J. Arn. Arb. 20 (1939) 327, *quoad specim.*; Brass 6789 (L!) from Fly River, Papua, New Guinea.

6. *Pisonia longirostris* Teysm. & Binn., Nat. Tijd. N. I. 25 (1863) 401. — *Calpidia longirostris* (Teysm. & Binn.) Heimerl, Oest. Bot. Z. 63 (1913) 287. — *Ceodes longirostris* (Teysm. & Binn.) Merr. & Perry, J. Arn. Arb. 20 (1939) 328. — Teysmann anno 1859—1860 (L!, lectotype) from Oki, Buru, Moluccas.

P. grandifolia Warb., Bot. Jahrb. 13 (1891) 303. — *Calpidia grandifolia* (Warb.) Heimerl, Oest. Bot. Z. 63 (1913) 286. — Warburg, holotype lost in World War II (B), from Aru Is.

P. rostrata Warb., Bot. Jahrb. 13 (1891) 304. — *Calpidia rostrata* (Warb.) Heimerl,

Oest. Bot. Z. 63 (1913) 288. — *Warburg*, holotype lost in World War II (B), Sigar, New Guinea.

P. spathiphylla K. Sch. & Laut., Fl. Schutzgeb. (1900) 308. — *Calpidia spathiphylla* (K. Sch. & Laut.) Heimerl, Oest. Bot. Z. 63 (1913) 288. — *Tappenbeck* 7, holotype lost in World War II (B), from Ramu River, East New Guinea.

P. beccariana Barg.-Petr., Nuov. Giorn. Bot. It. n. s. 8 (1901) 612; *Beccari* 407 (Fl!, holotype) from Ramoi, West New Guinea.

P. triandra Barg.-Petr., Nuov. Giorn. Bot. It. n. s. 8 (1901) 610; *Beccari* 714 (Fl!, holotype) from Andai, West New Guinea.

Ceodes urocarpa Merr. & Perry, J. Arn. Arb. 20 (1939) 328; *Brass* 2972 (isotypes L!, SING!) from Ulawa I., Solomon Is.

7. *Pisonia sandwicensis* Hillebr., Fl. Hawaiian Is. (1888) 369. — *Rockia sandwicensis* (Hillebr.) Heimerl, Oest. Bot. Z. 63 (1913) 290; in E. & P., Pfl. Fam. ed. 2, 16c (1934) 126; Skottsbl., Svensk Bot. Tidskr. 30 (1936) 738, f. 5. — *Remy* 217 (L!, lectotype) from Lanai.

Tree to 20 m, unarmed. *Leaves* opposite to alternate, (8.8—)10—15.3(—15.8) by 4.9—9.1 cm, elliptic to obovate; base acute to rounded; top obtuse to rounded; nerves and veins prominent beneath; petiole 2.3—4.6 cm. *Inflorescence* in terminal to axillary, cymose umbels, 1.2—2.7 by 1.8—3.9 cm, many-flowered, densely red-brown hairy; peduncle 1.7—3.5 cm. *Flowers* unisexual by reduction, up to 1 mm pedicelled, with 2—3 bracteoles at different heights. Perianth tubular-campanulate, 8—9 mm long in ♂ flower and 3.7—4.5 mm in ♀ flower; limb 5-lobed, in ♂ flower equalling the tube and in ♀ flower shorter. Stamens 17—19 (11—26, Heimerl), exerted up to 1 cm, staminodes equalling the tube. Stigma fimbriate c. 1 cm exerted (in the ♂ flower c. 3 mm exerted). *Anthocarp* elongate, 37.5 cm long in all, with 5 viscid ribs; crowned by a limb rest.

Distribution. Hawaii (endemic).

Notes. I have indicated *Remy* 217 (L!) from Lanai, Hawaii, as lectotype.

The anthocarp length given by Heimerl as 4 cm is not correct.

8. *Pisonia gigantocarpa* (Heimerl) Stemm., *comb. nov.* — *Calpidia gigantocarpa* Heimerl, Oest. Bot. Z. 63 (1913) 284; *Vieillard* 3078 (L!, lectotype) from New Caledonia.

Timeroyea canalensis S. Moore, J. Linn. Soc. Bot. 45 (1921) 379, “*Timeroya*”; *Compton* 1266 (BM) from New Caledonia.

Tree to 8 m, unarmed. *Leaves* opposite or in whorls, (sub)-sessile to 1 cm petioled, oblanceolate to subspathulate, (25—)37—49.5(—54.5) by 1.5—3.5 cm; base obtuse; top acutish to rounded and shortly acuminate with an acute tip. *Inflorescences* terminal, laxly corymbose-umbellate, (7.5—)10—14.5(—17) by 5.5—8(—10) cm; peduncle (6.5—)9.2—21(—37.5) cm, short brown hairy to glabrous; pedicel 5—7 mm, at the base with 1—2 small bracteoles. *Flowers* unisexual by reduction, tubular-campanulate. Perianth 7—10 mm long, with 5 faint ribs forming small keels at the top of the limb, the latter 5 (rarely 4)-lobed. Stamens 10—19, in the ♂ flower exerted for 1.5—2 mm; staminodes in ♀ flower shorter than the gynaeceum; stigma fimbriate. *Anthocarp* elongate, 4.5—5 by 0.4—0.5 cm, with 5 viscid ribs; rostrum 11.5—18 by 0.25—0.3 cm, twisted to the left at maturity, with 5 viscid ribs. Seed 4.3—4.7 by 0.38—0.48 cm.

Distribution. New Caledonia.

Ecology. Forests, at 300—900 m.

Note. *Vieillard* 3078 (L!) is indicated as lectotype. There is confusion with the distribution of duplicates of *Vieillard* 1060 which, as well as *Vieillard* 1061, are mostly *P.*

artensis. However, Heimerl mentions also *Vieillard 1060* under *P. gigantocarpa*. One specimen of this number in herb. Leningrad is indeed *P. gigantocarpa*; it was distributed under the name *P. grandis* by the Paris Herbarium.

9. *Pisonia siphonocarpa* (Heimerl) Stemm., *comb. nov.* — *Ceodes siphonocarpa* Heimerl, Occ. Pap. Bish. Mus. 13 (1937) 43, f. 8; *Wilder 510* (BISH!), 'fruiting' part of holotype) from Moorea, Society Is.

Small tree, 3 m, unarmed. *Leaves* opposite or conferted towards the end of a twig, oblong to elliptic, 17—18 by 9.2—9.8 cm; base acute; top obtuse; petiole 1.2—1.8 cm. *Inflorescence* terminal, consisting of umbels, glabrous; peduncle 3.6—5.3 cm. *Flowers* unisexual by reduction; pedicel 4 mm, with 1 bracteole. Perianth 6—7 mm long, with 5 somewhat thickened lobes, filling the bottom. Stamens 8—9. Stigma fimbriate. *Anthocarp* spindle-shaped, c. 1.8 cm long (young), with a rostrum at least 2.2 cm long, bearing 5 faint viscid ribs, crowned by a limb rest; the pedicel in fruit stretching to 1.2—2 cm. Seed c. 10 mm (young).

Distribution. Society Is. (Moorea).

Ecology. Dense damp wood, at 30 m.

Notes. Heimerl described male flowers from the type specimen; I have found only young fruits.

The length of the perianth and pedicel could not be checked.

10. *Pisonia diandra* Pulle, Nova Guinea 8, 4 (1912) 629; *Gjellerup 347* (L!, lectotype) from Kaiserin Augusta River, Territory of New Guinea.

P. micrantha Valetton, Bot. Jahrb. 52 (1915) 102; *Schultze 159* (B!, holotype) from Kaiserin Augusta River, NE. New Guinea.

11. *Pisonia corniculata* Barg.-Petr., Nuov. Giorn. Bot. It. n.s. 8 (1901) 615, t. 11. — *Calpidia corniculata* (Barg.-Petr.) Heimerl, Oest. Bot. Z. 63 (1913) 283. — *Ceodes corniculata* (Barg.-Petr.) Merr. & Perry, J. Arn. Arb. 20 (1939) 327, *excl. specimina.* — *Beccari 650* (FI!, holotype) from Andai, Vogelkop, West New Guinea.

12. *Pisonia grandis* R. Br., Prod. Fl. Nov. Holl. 1 (1810) 422; *R. Brown s.n.* (BM; B!, isotype) from the North Coast of Australia (Iter Australiense).

Olus album insulare Rumph., Herb. Amb. 1 (1741) 193, t. 79, f. 1; from the Moluccas (Islands near Ambon).

Olus album Rumph., Herb. Amb. 1 (1741) 191, t. 78; from the Moluccas (Ambon).

Cordia olitoria Blanco, Fl. Filip. (1837) 123; from the Philippines.

P. protera Bertero *ex* Guill., Zephyr. Taitensis (1837) 39; *Bertero & Moerenhout* (P?) from Tahiti.

P. alba Span., Linnæa 15 (1841) 342; *herb. Spanoghe in herb. L 908.157-324* (L!, lectotype) from Timor.

P. macrophylla (Boj.) Choisy in DC., Prod. 13, 2 (1849) 446; *Bouton* (CALF!, isotype) from Galega ("Agalega I."), East Africa.

P. morindifolia R. Br. *ex* Wight, Ic. (1852) t. 1765 (*mornishifolia*); *Wallich Cat. 7130* in herb. Delessert. A specimen in herb. Leningrad is *Horsfieldia* sp.

P. sylvestris Teysm. & Binn., Nat. Tijd. N. I. 9 (1855) 355; *v. d. Wijck* anno 1845 cuttings, culta in Hort. Bogor.

P. inermis (*non* Forst.) Seem., J. Bot. 1 (1863) 245; based on drawing of Forster (BM) from Tahiti.

P. viscosa Balf., J. Linn. Soc. Bot. 16 (1877) 19; *Balfour* (P?) from Frigate & Rodriguez, Mascarenes.

13. *Pisonia aculeata* Linné, Sp. Pl. (1753) 1026; based on Plumier, Nov. Gen. (1703) 7, t. 11.

Limonellus funicularis montanus Rumph., Herb. Amb. 5 (1747) 25.

P. mitis Linné, Sp. Pl. 2 (1753) 1026.

P. villosa Poir. in Lamk, Enc. Méth. Bot. 5 (1804) 347; *Sonnerat* (P—LA).

P. limonella Bl., Bijdr. 14 (1826) 735; *Blume 1072* (L!, lectotype) from Kuripan, West Java.

P. anisophylla Hassk., Hort. Bog. Descr. 1 (1858) 85.

Note. *P. mitis* L. is here reduced for the first time. It was based on two citations, "*Pisonia malabarica non spinosa*. *Amm. herb. 582*" and on "*Katu-kara-walli*, *Rheede, Mal. 7, p. 33, t. 17*". The description merely consisted of "inermis". The type could hardly be Rheede's description and plate by the presence of large spines; Rheede's plant belongs to *P. aculeata* L. The other reference "*Amm. herb. 582*" refers to the work of Steller, *Musei imperialis Petropolitani vol. 1, pars 2* (1745) p. 582, No. 62 which describes a plant collected in "Ind. Or." by Amman. Thanks to a generous loan of *Pisonia* from the Leningrad Herbarium by the Chief of the Herbarium, Prof. Dr I. T. Vassilczenko, I have been able to locate a (small) specimen bearing a note which exactly corresponds with Steller's text which was also kindly provided by Prof. Vassilczenko. This is the unarmed tip of a female flowering twig of *P. aculeata* L. Thus it appears that both references of Linnaeus after all refer to the same species, *P. aculeata* L.

EXCLUDED NAMES

Pisonia membranacea K. Sch. & Hollr., Fl. Kais. Wilh. Land (1889) 43; from New Guinea. According to Warburg, Bot. Jahrb. 13 (1891) 303, this is a mixtum with flowers of *Pisonia* but leaves and twig of another plant, that is discordant elements. The name is for this reason illegitimate and should be omitted.

'*Pisonia lineatipilum* C. DC.' in Lorentz, Nova Guinea 8, 6 (1914) 1009, was in the Index Kewensis recorded under *Pisonia* instead of under *Piper*, where it belongs.