



The genus *Ormocarpum* (*Fabaceae*–*Papilionoideae*) in Malesia and the Pacific

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Key words

Fabaceae
lectotypification
Leguminosae
Malesia
new species
Ormocarpum
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Abstract The genus *Ormocarpum* P.Beauv. is revised for Malesia and the Pacific region. Several new species (*O. fijianse* Arbainsyah, *O. neocaledonicum* Arbainsyah, *O. philippinense* Arbainsyah, *O. sculptilium* Arbainsyah, *O. smitsii* Arbainsyah, *O. vanuatense* Arbainsyah) are described. A key to the species of Malesia and the Pacific is presented. *Diphaca cochinchinensis* Lour. is lectotypified.

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INTRODUCTION

Ormocarpum P.Beauv. is a medium-sized genus of *Fabaceae*, subfamily *Papilionoideae*, tribe *Aeschynomeneae*. It is found in the tropics of the Old World and S Pacific up to New Caledonia. *Ormocarpum* has long and short shoots. In young twigs mostly long shoots are present bearing leaves. Later on short shoots are produced in the axils of the leaves on the long shoots. The short shoots are densely covered by stipules and leaves. Inflorescences are mainly formed in the upper part of the short shoots. The flowers have a hypanthium that abruptly narrows into a pedicel-like stipe. The bracteoles are inserted at the apex of the true pedicel. A clear articulation between the pedicel and the stipe-like part of the hypanthium is found just above the insertion of the bracteoles. The stamens may be monadelphous, all ten united in an open sheath, or diadelphous and then either nine united and one free or ten divided into two bundles of five. However, often an open sheath also splits at the side opposite of the original split, resulting finally in also two bundles of five stamens. In at least one case a specimen of a species with normally two bundles of five stamens had nine united stamens and one free. One should be aware of these overlaps and use the character with some care. Colleters may be present at the base of stipules, bracts and bracteoles. Several species have wing petals that are sculptured outside. These wings have small semilunar ridges in rows between the veins at the basal upper side (see Fig. 2a, g, k). The sculpturing of the wings may offer visiting bees or bumblebees a holdfast or support when collecting nectar (Stirton 1981, Etcheverry 2001). It is also a useful character for identifying species.

Most species are found in Africa and Madagascar, even though several of the African species have been transferred to the new genus *Zygocarpum* Thulin & Lavin (2001). For Malesia, adjacent

SE Asia and the Pacific usually two species are mentioned, *O. cochinchinense* (Lour.) Merr. and *O. sennoides* (Willd.) DC. The material under these names appeared to be very variable, necessitating this revision.

RESULTS AND DISCUSSION

Here we describe several new species from the Lesser Sunda Islands, the Philippines, Fiji, Vanuatu and New Caledonia. Several names described from Indonesia or Continental Asia are transferred to more widely distributed species: *O. orientale* (Spreng.) Merr. and *O. glabrum* Teijsm. & Binn. to *O. cochinchinense*; *O. intermedium* Teijsm. & Binn. and *O. suberosum* Teijsm. & Binn. to *O. sennoides*.

Apart from the nomenclatorial confusion about *O. cochinchinense* (see there), there has also been much confusion about the species status of *O. cochinchinense* and *O. sennoides*. Even up to now several floras treat these species as one. However, as was shown by Gillett (1966) and others, the two are really different species (Table 1); though at the end of his paper Gillett (1966) seems to express some doubt about his own conclusion that the two species are really different species.

In this paper several new species are described by Arbainsyah. The differences between the species are shown in Table 1 and the key to the species in SE Asia and the Pacific. One name is lectotypified. An identification list for the specimens studied is provided at the end.

TAXONOMIC TREATMENT

Ormocarpum P.Beauv.

Ormocarpum P.Beauv. (1806) 95, t. 58, nom. cons.; Miq. (1855) 280; Verdc. (1979) 364; O.N.Allen & E.K.Allen (1981) 473; G.P.Lewis et al. (2005) 334. — *Hormocarpus* Spreng. (1831) 594. — Type: *Ormocarpum verrucosum* P.Beauv.

Diphaca Lour. (1790) 453; Miq. (1855) 281, nom. rej. — Type: *Diphaca cochinchinensis* Lour. (= *Ormocarpum cochinchinense* (Lour.) Merr.).

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Table 1 Differences between the SW Asian and Pacific species of *Ormocarpum* P.Beauv.

| Species | Petiole / rachis indumentum | Size leaflets (mm) | Colour veins lower surface | Pediceal indumentum | Length calyx (mm) | Size standard blade (mm) | Wings | Ovary | Pods |
|--------------------------|-----------------------------------|--------------------|--------------------------------|---|-------------------|--------------------------|---------------------------|---------------------|---------------------|
| <i>O. cochinchinense</i> | glabrous | 13–45 by 3–20 | (slightly) darker | glabrous | 9–17 | 13–18 by 13–17 | not sculptured | glabrous | glabrous |
| <i>O. fijjense</i> | glabrous | c. 20 by 12 | darker | glabrous | c. 3.5 | c. 5 by 5 | not sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. neocaledonicum</i> | sericeous, bulbous-based hairs | 2–16 by 2–8.5 | mostly ± darker | (thinly) sericeous, bulbous-based hairs | 6–13 | 7–12 by 6–10 | not sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. philippinense</i> | glabrous or bulbous-based hairs | 14–27 by 4–9 | ± similar | glabrous | c. 7 | 12 by 13 | sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. sculptilium</i> | sericeous | 4–8 by 2–5.5 | ± similar or (slightly) darker | glabrous | 5–7 | 6–10 by 4–9 | sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. sennoides</i> | sericeous (+ bulbous-based hairs) | 2–10.6 by 1–3.7 | ± similar or slightly darker | thinly sericeous | 6.4–9 | 10–12 by 11–14 | sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. smitsii</i> | bulbous-based hairs | 6–10 by 3–6 | black | glabrous or some hairs | c. 8 | c. 12 by 15 | sculptured | bulbous-based hairs | bulbous-based hairs |
| <i>O. vanuatuense</i> | thinly sericeous | 5–7.5 by 3–3.5 | slightly darker | thinly sericeous | 10–16 | 11.7–12 by 12–13 | not or faintly sculptured | bulbous-based hairs | ? |

Rathkea Schumach. (1828) 365. — Type: *Rathkea glabra* Schumach. (= *Ormocarpum sennoides* (Willd.) DC. subsp. *hispidum* (Willd.) Brenan & J.Léonard).

Acrotaphros Steud. ex A.Rich. (1847) 207, t. 38. — Type: *Acrotaphros bi-bracteata* Steud. ex A.Rich. (= *Ormocarpum pubescens* (Hochst.) Cufod. ex J.B.Gillett).

Treelets, shrubs. *Leaves* imparipinnate, alternate; stipules present, caducous. *Leaflets* entire, alternate, with pellucid dots. *In-florescences* axillary racemes, rarely panicles or flowers solitary. *Pedicels* jointed and bi-bracteolate far below their apex. *Calyx* campanulate, bilabiate, upper lip 2-lobed, lower lip 3-lobed, median lobe usually longest, hypanthium present. *Corolla* white to pale yellow, rarely cream, with violet spots; standard without or with 1 or 2 basal callosities; wings sculptured or not, auricles present or absent; keel petals with or without auricles. *Stamens* monadelphous, all united in an open sheath or diadelphous, either 9 united and 1 free or divided into 2 bundles of 5 each; anthers all equal, all fertile. *Disc* cup-shaped or tubular. *Ovary* stalked, glabrous to hairy; ovules 2–10; style strongly curved; stigma terminal, small. *Pods* ± strap-like, septate, articulate, glabrous to hairy. *Seeds* flattened, asymmetrically ellipsoid, hilum eccentric.

Distribution — Circa 70 species from W to E and S Africa, Madagascar, Sri Lanka, India, through S & E Asia and *Malesia*, N Australia, Vanuatu, Fiji and New Caledonia.

Note — *Ormocarpum* P.Beauv. (1806) is antedated by *Di-phaca* Lour. (1790); however, it is conserved against the latter.

KEY TO THE SPECIES OF ORMOCARPUM IN MALESIA AND PACIFIC

(See also Table 1 for differences)

- Petioles and rachises glabrous, very rarely with bulbous-based hairs. Leaflet blades 13–45 by 3–20 mm. Pedicels glabrous. 2
- Petioles and rachises (±) sericeous to ± hirsute, usually with bulbous-based hairs. Leaflet blades 1–16 by 1–8.5 mm. Pedicels glabrous to sericeous or hirsute, with or without bulbous-based hairs 4
- Calyx 3.5–7 mm long. Standard blade 5–12 by 5–13 mm. Ovary and pods with bulbous-based hairs 3
- Calyx 9–17 mm long. Standard blade 13–18 by 13–17 mm. Ovary and pods glabrous, very rarely with some appressed hairs 1. *O. cochinchinense*
- Calyx c. 3.5 mm long. Standard blade c. 5 by 5 mm. Wings not sculptured outside. — Fiji 2. *O. fijjense*
- Calyx c. 7 mm long. Standard blade c. 12 by 13 mm. Wings sculptured outside. — Philippines 4. *O. philippinense*
- Calyx 6–16 mm long. Wings not or faintly sculptured outside 5
- Calyx 5–9 mm long. Wings sculptured outside 6
- Petiole, rachis and pedicels with bulbous-based hairs. Calyx 6–13 mm long. Wings not sculptured. — New Caledonia 3. *O. neocaledonicum*
- Petiole, rachis and pedicels without bulbous-based hairs. Calyx 10–16 mm long. Wings not or faintly sculptured. — Vanuatu 8. *O. vanuatuense*
- Pedicels glabrous or with some hairs 7
- Pedicels thinly sericeous, sometimes with bulbous-based hairs. — Calyx 6.4–9 mm long. Standard blade 9–12 by 8–14 mm 6. *O. sennoides*
- Venation on lower surface of leaflets brownish, similar in colour to darker than the rest of the surface. Calyx 5–7 mm long. Standard blade 6–10 by 4–9 mm. — Fiji, New Caledonia 5. *O. sculptilium*

7. Venation on lower surface of leaflets black. Calyx c. 8 mm long. Standard blade c. 12 by 15 mm. — Philippines, Lesser Sunda Islands 7. *O. smitsii*

1. *Ormocarpum cochinchinense* (Lour.) Merr. — Fig. 1

Ormocarpum cochinchinense (Lour.) Merr. (1910) 76; (1923) 282. — *Diphaca cochinchinensis* Lour. (1790) 454; Miq. (1855) 281. — *Dalbergia diphaca* Pers. (1807) 276, nom. superfl. — *Parkinsonia orientalis* Spreng. (1827) 170, nom. superfl. — *Ormocarpum orientale* (Spreng.) Merr. (1917) 266, nom. superfl.; Backer & Bakh.f. (1964) 598; Verdc. (1979) 364. — Lectotype (designated here by Adema): *de Loureiro s.n.* (lecto BM [BM000798089]*; isolecto BM [BM000798103]*), Indochina.

[*Solulus arbor* Rumph. (1743) 200, t. 128, nom. inval. See Merrill (1917) 266 for an interpretation.]

Aeschynomene coluteoides A.Rich. (1834) 87. — Type: *Richard s.n.* (n.v.), Guam.

Ormocarpum ochroleucum Zoll. & Moritzi in Moritzi (1845) 6. — Type: *Zollinger 1215* (n.v.), Java, Tjiringin, in littore maris.

Ormocarpum glabrum Teijsm. & Binn. (1864) 56. — Type: *Teijsmann s.n.* (BO?, n.v.), Moluccas, Ceram.

Ormocarpum glabrum Teijsm. & Binn. var. *minahassanum* Teijsm. & Binn. (1864) 56 ('*minahassana*'). — Type: *Teijsmann s.n.* (BO?, n.v.), Celebes, prov. Menado, Minahassa.

Treelets or shrubs, up to 10 m tall. *Twigs* terete, 3–5 mm diam, glabrous. *Stipules* (narrowly) triangular, 4.7–12 by 1.5–3 mm, outside tomentose, inside short-hairy, fimbriate at margins, later glabrous. *Leaves* with 11–17 leaflets. *Petioles* 2–16 mm long, ± terete, glabrous; rachis mostly as the petioles, 34–103 mm long; pulvinus 1–4 mm long. *Leaflets*: terminal one elliptic to obovate, 13–33 by 6–14 mm, 1–3.2 times as long as wide, base acute to cuneate, rarely rounded, apex rounded, apiculate, upper surface glabrous, lower surface glaucous, glabrous or with very few appressed hairs, midrib and nerves ± sunken above, nerves 5–10 per side, 1.7–3.7 mm apart, venation (slightly) darker than the rest of the surface, midrib sometimes whitish; lateral leaflets mostly as the terminal one, (narrowly) elliptic to obovate, 10–23 by 4–12 mm, 1.5–3.3 times as long as wide; pulvinus 1–2 mm long. *Bracts* to the flowers broadly obovate to orbicular, 1.3–2 by 0.7–2 mm, outside glabrous, inside with very few short hairs at the base. *Pedicels* 5–17 mm long, glabrous. *Bracteoles* circular to elliptic or narrowly triangular, 1.5–4 by 0.8–2 mm, outside glabrous, inside with some hairs at the base. *Flowers* fragrant. *Calyx* white to green, 9–17 mm long, tube 7–13 mm long; teeth of upper lip triangular to semi-rounded, 2–5.3 by 1.2–4 mm; lateral lobes elliptic to (narrowly) triangular, 3.3–7 by 2–4 mm, median lobe triangular, 4–7 by 2–4 mm; both sides glabrous. *Corolla* white to pale yellow, with violet spots. *Standard*: claw 1–3 mm long; blade orbicular, 13–18 by 13–17 mm, apex rounded, with 1 or 2 basal callosities, both sides glabrous. *Wings*: claw 2–4 mm long; blade obovate to elliptic, rarely semi-circular, 10–16 by 7–9 mm, apex rounded, both sides glabrous, not sculpted outside. *Keel petals*: claw 3–6 mm long; blade ovate, 7–14 by 7–10.7 mm, apex rounded, auricles inconspicuous, up to 0.3 mm long, both sides glabrous. *Stamens* in 2 bundles of 5 each, tube 6–10 mm long, free part 2–11 mm long, glabrous; anthers 1–2.3 by 0.5–0.9 mm, glabrous. *Disc* cup-shaped, 0.6–2 mm long, glabrous. *Ovary* 8–15 mm long, glabrous; stipe 2–8 mm long, glabrous or with few, appressed hairs at apex; ovules 3–10; style 3–12.5 mm long, glabrous. *Pods* strap-like, 6–12 by 0.4–0.8 cm, (light) green to yellow, mature brown, old black, veined, beak glabrous or with few appressed hairs, 5–8 mm long, stipe 5–10 mm long, glabrous, articles up to 8, flattened ellipsoid, 10–35 by 4–8 mm, glabrous. *Seeds* flattened ellipsoid, 5–8 by 2.5–4 by 0.4–2.2 mm, glabrous; hilum 0.5–1 mm long.

Distribution — China, Japan, Taiwan, Vietnam, Thailand; Malesia: Peninsular Malaysia, Singapore, Sumatra (Medan),

Java, Borneo (Sarawak), Philippines (Luzon, Mindanao), Sulawesi (Minahasa), Lesser Sunda Islands (Sumbawa, Timor), Moluccas (Ambon, Bacan, Halmahera, Seram), New Guinea; Australia, Solomon Islands, Vanuatu, New Caledonia.

Habitat & Ecology — Dry primary forests, secondary forests, grasslands, beaches, along rivers, inundated swamp areas. Altitude: up to 700 m. Flowering and fruiting: January to December.

Notes — 1. Hairs if present not bulbous-based.

2. Similar to *O. fijjense* in the large leaflets, different from that species in the smaller flowers with hairy ovaries.

3. According to Gillett (1966: 335) the name *Diphaca cochinchinensis* is doubtful or even illegitimate (see also Smith 1985). He based this idea on two facts: 1. *Diphaca* was described by De Loureiro (1790) on the fact that the flowers of the specimens have 2 ovaries; and 2. Gillett saw this as a 'monstrosity' and monstrosities were not accepted as type material. However, only one of the two sheets of De Loureiro's *Diphaca cochinchinensis* shows this character. Selecting the other sheet as lectotype, as done here, would easily have solved that problem. Furthermore, the rule that excludes 'monstrosities' as types has been removed from the code in 1978. Moreover, the presence of more than one ovary in flowers of *Fabaceae* is a normal though rare phenomenon. The sentence in the 'Observationes' (De Loureiro 1790): 'Hanc plantam *Hedysarum ecastaphyllum* vocaverat Linnaeus (Mantissa 446)' is not a citation of a synonym as proposed by Gillett, but a comparison. The sentence means: 'This plant reminds us (is reminiscent of) *Hedysarum ecastaphyllum* L.' In short: *Diphaca cochinchinensis* Lour. is a valid and legitimate name. The sheet taken as lectotype shows the most complete plant material and not the double ovaries.

4. According to Merrill (1917), Sprengel (1827) based his *Parkinsonia orientalis* solely on *Solulus arbor* of Rumphius (1743), however, Sprengel gives as synonyms also *Diphaca cochinchinensis* and *Dalbergia diphaca*. This makes both Sprengel's name *Parkinsonia orientalis* and Merrill's new combination *Ormocarpum orientale* (Spreng.) Merr. illegitimate.

5. *Kajewski 9292*, collected in Vanuatu, with glabrous petioles, rachises and pedicels is included here.

2. *Ormocarpum fijjense* Arbainsyah, sp. nov.

Petioles, rachises and pedicels glabrous. Calyx c. 3.5 mm long. Standard: blade c. 5 by 5 mm. Wings not sculptured outside. — Type: *US expedition s.n.* (holo K!), Fiji.

Twigs terete, c. 3 mm diam, glabrous. *Stipules* caducous. *Leaves* with 9 leaflets. *Petiole* c. 4 mm long, glabrous; rachis c. 28 mm long, glabrous; pulvinus c. 1 mm long. *Leaflets*: terminal one obovate, c. 20 by 12 mm, c. 1.6 times as long as wide, base acute, apex rounded, apiculate, upper surface glabrous, lower surface glabrous, nerves sunken above, 6 or 7 per side, c. 2.2–2.3 mm apart, venation darker than the rest of the surface; lateral leaflets mostly as the terminal one, c. 18 by 10 mm, 1.8 times as long as wide; pulvinus c. 1 mm long. *Bracts* to the flowers broadly ovate, c. 1.4 by 0.4 mm, both sides glabrous. *Pedicels* c. 2.7 mm long, glabrous. *Bracteoles* triangular, c. 2 by 1.2 mm, both sides glabrous. *Calyx* c. 3.5 mm long, tube c. 3 mm long; teeth of upper lip triangular, c. 1.8 by 1 mm; lateral lobes triangular, c. 3 by 1 mm, median lobe triangular, c. 4 by 1.7 mm; both sides glabrous. *Standard*: claw c. 1.3 mm long; blade orbicular, c. 5 by 5 mm, apex rounded, 2 basal callosities, both sides glabrous. *Wings*: claw c. 1.5 mm long; blade 'boat-shaped', c. 5 by 3 mm, apex rounded, both sides glabrous, not sculptured outside. *Keel petals*: claw c. 2.3 mm long; blade 'boat-shaped', c. 4.5 by 3 mm, both sides glabrous. *Stamens* united in an open sheet, in upper part split into two bundles of 5 each, tube 3.5–4.5 mm long, free part 1.5–3.5 mm long,

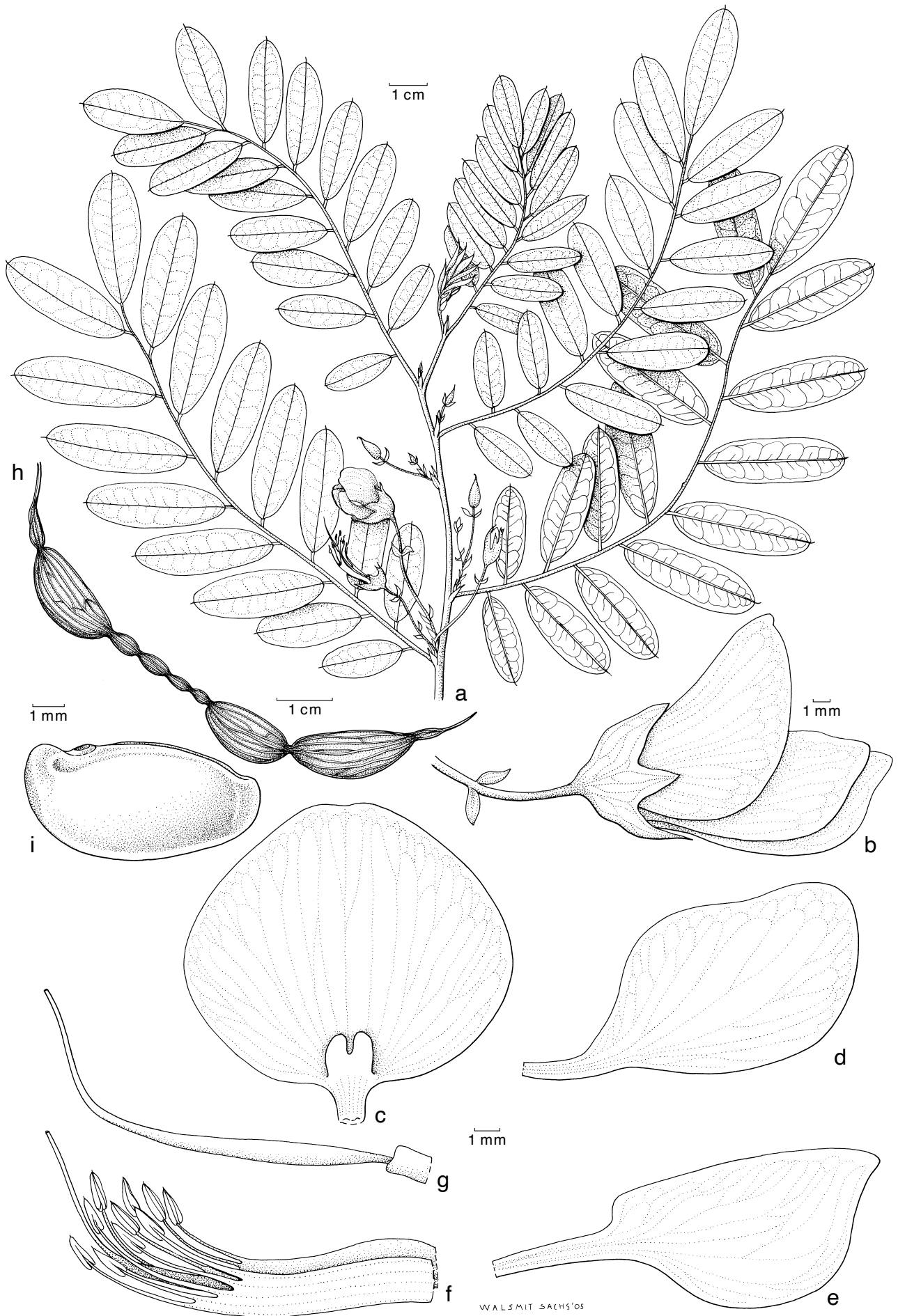


Fig. 1 *Ormocarpum cochinchinense* (Lour.) Merr. a. Habit; b. flower; c. standard, from inside; d. wing; e. keel petal; f. stamens, 2 bundles of 5; g. ovary and disc; h. fruit; i. seed (all: *Anonymous s.n.* (*Hortus Bogoriensis* II.0.21), L). — Drawing by Anita Walsmit Sachs.

glabrous; anthers c. 0.8 by 0.5 mm, glabrous. *Disc* c. 0.3 mm long, glabrous. *Ovary* c. 1.6 mm long, with bulbous-based hairs; stipe c. 1 mm long, with bulbous-based hairs; ovules 2; style c. 1.4 mm long, glabrous. *Pods* and *seeds* unknown.

Distribution — Fiji.

Note — Only known from the type. *Ormocarpum fijiensis* is similar to *O. cochinchinensis* in the size of the leaflets, the glabrous petiole, rachis and pedicel. The new species is similar to *O. sennoides* in the presence of bulbous-based hairs at the ovary. *Ormocarpum fijiensis* differs from the two other species in the much smaller flowers (Table 1).

3. *Ormocarpum neocaledonicum* Arbainsyah, *sp. nov.*

Petioles, rachises and pedicels sericeous, hairs bulbous-based. Calyx 6–13 mm long. Standard: blade 7–12 by 6–10 mm. Wings not sculptured. Ovary with bulbous-based hairs. — Type: *Pancher s.n.* (holo K [K000264775]!; iso K [K000264774]!, L [L 0419953]!), Nouvelle Calédonie.

Treelets or shrubs, 2–8 m high, 15–40 cm diam. *Twigs* terete, 4–7 mm diam, sericeous when young, later glabrous. *Stipules* triangular, 2–3 by 1–1.6 mm, outside glabrous, margin ciliate, inside hairy at the base, often caducous. *Leaves* with 7–15 leaflets. *Petioles* 2–6 mm long, sericeous to ± hirsute, hairs usually bulbous-based; rachis mostly as the petiole, 10–47 mm long; pulvinus 0.5–1.5 mm long. *Leaflets*: terminal one (broadly) obovate, 4–15 by 3–8.5 mm, 1.2–2.2 times as long as wide, base rounded to cuneate, apex rounded or emarginate, apiculate, upper surface glabrous, lower surface glabrous or with few hairs on midrib, midrib and nerves flat above, nerves 4–7 per side, 0.5–1.8 mm apart, venation mostly ± darker than the rest of the surface, midrib sometimes whitish; lateral leaflets mostly as the terminal one, obovate to elliptic, 5–16 by 3–7.5 mm, 1.3–2.1 times as long as wide; pulvinus 0.4–1 mm long. *Bracts* to the flowers broadly ovate to triangular, 1–2 by 0.5–1.6 mm, outside glabrous to hairy, margin ciliate, inside with few hairs at the base. *Pedicels* 0.5–11 mm long, (thinly) sericeous to hirsute, often also with bulbous-based hairs. *Bracteoles* elliptic to orbicular, 0.6–2.1 by 0.3–2 mm, outside glabrous or with some hairs at the apex, margin ciliate, inside glabrous or with some hairs at the base. *Calyx* 6–13 mm long, tube 3–11 mm long; teeth of upper lip semicircular or triangular, 0.3–1.5 by 0.5–3 mm; lateral teeth semicircular to triangular, 0.5–3 by 1–3 mm, median tooth broadly elliptic to triangular, 1.5–4.5 by 1.7–3.5 mm; outside glabrous to sericeous, inside glabrous. *Corolla* pinkish. *Standard*: claw 1–5 mm long; blade orbicular, 7–12 by 6–10 mm, apex rounded or emarginate, without or with inconspicuous callosities, both sides glabrous, ciliate at apex. *Wings*: claw 2–6 mm long; blade obovate or broadly elliptic, 7–11.5 by 3–6 mm, apex rounded, not sculptured outside, auricles up to 0.3 mm long, both sides glabrous, ciliate at apex. *Keel petals*: claw 3–6 mm long; blade obovate to 'boat-shaped', 6–14 by 3–9 mm, both sides glabrous. *Stamens* all in an open sheet, in upper part split into two bundles of 5 each, when older totally split, tube 4–20 mm long, free part 2–11.5 mm long, glabrous; anthers 0.6–1.3 by 0.3–0.7 mm, glabrous. *Disc* 0.2–0.8 mm long, glabrous. *Ovary* 5–13 mm long, hirsute with bulbous-based hairs; stipe 1–6 mm long, glabrous to hirsute with bulbous-based hairs; ovules 3–7; style 2.7–9 mm long, glabrous or with some hairs at the base. *Pods* strap-like, beak c. 5 mm long, articles flattened ellipsoid, 12–25 by 6–8 mm, with bulbous-based hairs. *Seeds* flattened ellipsoid, 5–7 by 1.5–4 by c. 0.2 mm; hilum 0.5–0.7 mm long.

Distribution — New Caledonia.

Habitat & Ecology — Along the coast, in sclerophyll coastal forest or secondary forest. Soil: ultrabasic. Altitude: up to 20 m. Flowering: May, August, September; fruiting: May, August.

Note — *Pancher s.n.* ('comm. M. Thorel. 3.1870.', Herb. Hookerianum (= K)) mounted on the same sheet as *Vieillard 398* might be a part of the type material of *O. neocaledonicum*.

4. *Ormocarpum philippinense* Arbainsyah, *sp. nov.* — Fig. 2k–n

Petioles and rachises glabrous or with bulbous-based hairs, pedicels glabrous. Calyx c. 7 mm long. Standard: blade c. 12 by 13 mm. Wings sculptured. Ovary with bulbous-based hairs. — Type: *Cuming 1849* (holo L!; iso K!), Philippines, Bohol.

Shrub. *Twigs* terete, c. 4 mm diam, glabrous. *Stipules* triangular, c. 5 by 2 mm, both sides glabrous. *Leaves* with 13 leaflets. *Petiole* c. 10 mm long, glabrous or with few bulbous-based hairs; rachis c. 72 mm long, with some bulbous-based hairs; pulvinus c. 2 mm long. *Leaflets*: terminal one narrowly obovate, 24–25 by 7–8 mm, 3–3.1 times as long as wide, base cuneate, apex rounded, apiculate, upper surface glabrous, lower surface glaucous, with some appressed hairs, mainly along midrib, midrib and nerves ± flat above, nerves c. 6 per side, 3–4.2 mm apart, venation ± similar in colour as the rest of the surface; lateral leaflets mostly as the terminal one, narrowly elliptic, 14–27 by 4–9 mm, 2.7–3.7 times as long as wide; pulvinus c. 1 mm long. *Bracts* to the inflorescence broadly ovate, c. 1 by 0.6 mm, outside glabrous, inside the base with very few short hairs. *Pedicels* c. 15 mm long, glabrous. *Bracteoles* circular, c. 1.2 by 1.1 mm, both sides glabrous. *Calyx* c. 7 mm long, tube c. 6 mm long; teeth of upper lip deltoid, c. 2.6 by 2.1 mm; lateral teeth triangular, c. 5 by 3.5 mm, median tooth triangular, c. 4 by 3.5 mm; both sides glabrous. *Standard*: claw c. 2 mm long; blade orbicular, c. 12 by 13 mm, apex emarginate, 2 basal callosities, both sides glabrous. *Wings*: claw c. 4 mm long; blade obovate, c. 12 by 8 mm, outside sculptured, both sides glabrous. *Keel petals*: claw c. 6.5 mm long; blade 'boat-shaped', c. 13 by 8 mm, auricles c. 1 mm long, both sides glabrous. *Stamens* 2 bundles of 5 each, tube 5–7 mm long, free part 9–10 mm long, glabrous; anthers c. 2 by 1 mm, glabrous. *Disc* c. 1 mm long, glabrous. *Ovary* c. 7 mm long, with bulbous-based hairs; stipe c. 2.5 mm long, glabrous; ovules 2; style c. 10 mm long, glabrous. *Pods* young, articles flattened ellipsoid, c. 15 by 4 mm, with bulbous-based hairs, beak c. 9 mm long.

Distribution — Philippines (Bohol).

Notes — 1. In size of leaflets and indumentum of petiole and rachis similar to *O. cochinchinense*, but different in the smaller flowers, the sculptured wings and the bulbous-based hairs of the ovaries and pods.

2. In several characters similar to *O. fijiense*, mainly different in the size of the flowers (Table 1).

5. *Ormocarpum sculptilium* Arbainsyah, *sp. nov.*

Petioles and rachises sericeous, pedicels glabrous. Standard: blade 6–10 by 4–9 mm. Wings sculptured. Ovary with bulbous-based hairs. — Type: *Milne 108* (holo K!), Fiji.

Treelets or shrubs. *Twigs* terete, 4–5 mm diam, glabrous. *Stipules* triangular, 2–4 by 1.2–1.7 mm, both sides glabrous. *Leaves* with 7–15 leaflets. *Petiole* 3–6 mm long, sericeous, with bulbous-based hairs; rachis mostly as the petiole, 10–23 mm long; pulvinus c. 1 mm long. *Leaflets*: terminal one (broadly) obovate, 4–8 by 2–5 mm, 1.1–2.1 times as long as wide, base cuneate to acute, apex acute to retuse, apiculate, upper surface glabrous, lower surface with few hairs, midrib and nerves flat above, nerves ± black, 2–5 per side, 1–1.3 mm apart; lateral leaflets mostly as the terminal one, obovate to elliptic, 3.5–8 by 1.6–5.5 mm, 1.2–2.1 times as long as wide, nerves 4–6 per side, 1–1.6 mm apart, venation brownish, ± similar to (slightly) darker than the rest of the surface; pulvinus 0.3–0.6 mm long.

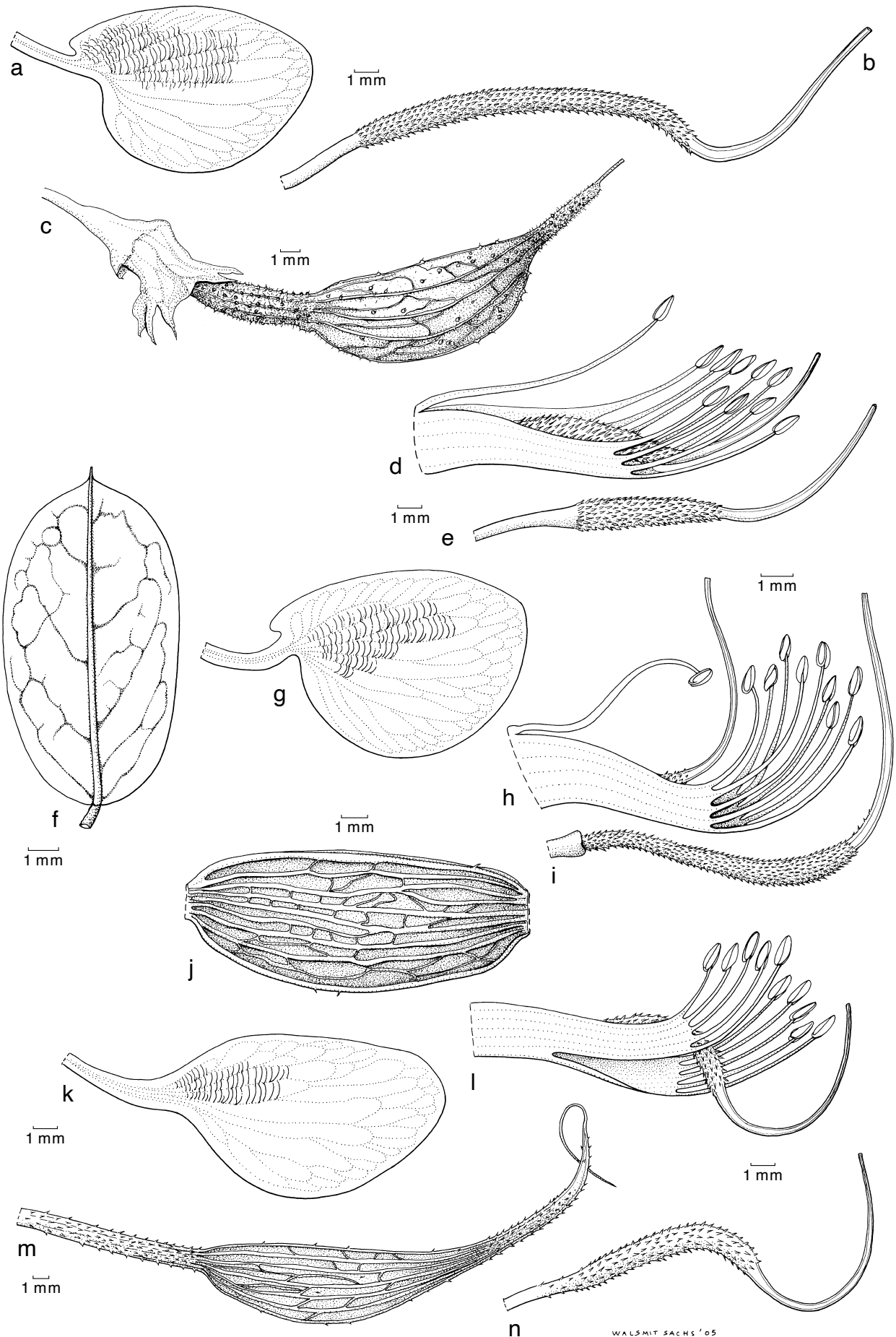


Fig. 2 Details of flowers and fruits of *Ormocarpum* species. a–c. *O. sennoides* (Willd.) DC. subsp. *sennoides*. a. Wing; b. ovary; c. fruit. — d, e. *O. vanuatense* Arbainsyah. d. Stamens, 9 + 1; e. ovary. — f–j. *O. smitsii* Arbainsyah. f. Leaflet; g. wing; h. stamens, 9 + 1; i. ovary; j. fruit. — k–n. *O. philippinense* Arbainsyah. k. Wing; l. stamens, 2 bundles of 5, not fully split; m. fruit; n. ovary (a, b: Jacobs 4896; c. Schmutz 2190; d, e: Berry 27; f–j: Jaag 922; k, m, n: Cuming 1849; l: Clemens 17870; all L.). — Drawing by Anita Walsmit Sachs.

Bracts to the flowers broadly obovate, 0.7–2.3 by 0.5–2 mm, outside glabrous, inside glabrous or with few hairs at the base. *Pedicels* 4.4–8 mm long, glabrous. *Bracteoles* circular to elliptic, 0.7–2.9 by 0.6–1.2 mm, both sides glabrous. *Calyx* 5–7 mm long, tube 4–5.5 mm long; teeth of upper lip triangular, 0.4–1.5 by 0.7–2 mm; lateral teeth triangular, 1.5–2 by 1.5–2 mm, median tooth triangular, 1.6–3 by 1.1–2 mm; both sides glabrous, teeth ciliate. *Standard*: claw 1.5–3 mm long; blade broadly obovate to orbicular, 6–10 by 4–9 mm, apex rounded or emarginate, with 1 or 2 basal callosities, both sides glabrous, apex ciliate. *Wings*: claw 2–2.5 mm long; blade obliquely obovate to 'boat-shaped', 5–10 by 4–5 mm, auricles 0.2–0.8 mm long, outside sculptured along upper margin in basal part, both sides glabrous, apex ciliate. *Keel petals*: claw 2.2–4 mm long; blade 'boat-shaped', 5–8 by 4.2–5.2 mm, auricles 0.4–0.6 mm long, both sides glabrous. *Stamens* all in an open sheet, in upper part split into two bundles of 5 each, tube 3.8–8 mm long, free part 1.5–6 mm long, glabrous; anthers 0.4–0.9 by 0.2–0.5 mm, glabrous. *Disc* 0.5–0.6 mm long, glabrous. *Ovary* 3–6 mm long, with bulbous-based hairs; stipe 2.5–4 mm long, glabrous or with bulbous-based hairs; ovules 2–4; style 4–6.5 mm long, glabrous. *Pods* (young) strap-like, beak c. 5 mm long, articles flattened ellipsoid, 12–13 by c. 6 mm, with bulbous-based hairs. *Seeds* flattened ellipsoid, c. 6 by 3.5 by 0.2 mm; hilum c. 1.8 mm long.

Distribution — Fiji, New Caledonia

Habitat & Ecology — Dry terrain, dry rocks, waste places.

Note — The specimen *Vieillard 398b* [P00440555] with rounded, retuse and acute young leaflets probably belongs here.

6. *Ormocarpum sennoides* (Willd.) DC. — Fig. 2a–c

Ormocarpum sennoides (Willd.) DC. (1825) 315; Miq. (1855) 280; Baker (1876) 152; Perkins (1904) 17. — *Hedysarum sennoides* Willd. (1802) 1207. — Neotype (here designated by Adema): *Klein 214* (neo B-Willd. 13871, seen photograph), India.

Aeschynomene atropurpurea Span. (1841) 192; Miq. (1855) 276. — Type: *Zippelius 51a* (holo L [L 0497617!]), Timor, Koepang.

Ormocarpum intermedium Teijsm. & Binn. (1864) 55. — Type: *Teijsmann s.n.* (BO?, n.v), Java.

Ormocarpum suberosum Teijsm. & Binn. (1864) 55; Backer & Bakf.f. (1964) 598. — Type: *Teijsmann s.n.* (BO?, n.v), Java, Soember-Waroe.

subsp. *sennoides*

Shrubs, up to 4 m tall. *Twigs* terete, c. 5 mm diam, glabrous. *Stipules* (narrowly) triangular, 4.7–1.5 by 1–5 mm, both sides glabrous, caducous. *Leaves* with 11–13 leaflets. *Petiole* 4–7 mm long, ± smooth, very shortly thinly sericeous, sometimes also with bulbous-based hairs; rachis mostly as the petiole, 30–35 mm long; pulvinus 1–2 mm long. *Leaflets*: terminal one elliptic to obovate, 6.5–11 by 3.5–6 mm, 1–3.2 times as long as wide, base cuneate, apex apiculate, upper surface with very few short whitish hairs, lower surface glabrous, midrib and nerves ± sunken above, nerves 4–5 per side, 0.6–2.2 mm apart, venation brownish, ± similar in colour to slightly darker than the rest of the surface; lateral leaflets mostly as the terminal one, elliptic, 7.5–9 by 3.5–3.7 mm, 2.1–2.5 times as long as wide, base obtuse; pulvinus 0.2–0.5 mm long. *Bracts* to the flowers orbicular, c. 0.5 by 0.4 mm, both sides glabrous. *Pedicels* 4–10 mm long, thinly sericeous, sometimes with bulbous-based hairs. *Bracteoles* broadly obovate to orbicular, 1–2.5 by 0.7–2 mm, both sides glabrous. *Calyx* pale green, 6.4–9 mm long, tube 6–8 mm long; teeth of upper lip triangular to semicircular, 0.5–2 by 0.5–3 mm; lateral teeth triangular, 2–3 by 1.2–3 mm, median tooth triangular, 3–5 by 2.2–4 mm; both sides glabrous. *Corolla* white to cream. *Standard*: claw 2–3 mm long; blade

orbicular, 9–12 by 8–14 mm, apex rounded to emarginate, with 2 basal callosities, both sides glabrous. *Wings*: claw 3–3.2 mm long; blade obovate, 7.5–11 by 5.5–7 mm, apex rounded, outside sculptured, both sides glabrous, auricles 0.2–0.3 mm long. *Keel petals*: claw 3–5.5 mm long; blade 'boat-shaped', 8–12 by 5–7 mm, apex rounded, auricles 0.2–0.4 mm long, both sides glabrous. *Stamens* monadelphous, all in an open sheath or diadelphous 5 + 5, rarely 9 + 1, tube 6–10 mm long, free part 2–6 mm long, glabrous; anthers 0.7–1.1 by 0.2–0.5 mm, glabrous. *Disc* 0.3–1 mm long, glabrous. *Ovary* 4–8.5 mm long, with bulbous-based hairs; stipe 2–3.5 mm long, glabrous; ovules 3 or 4; style 2–10 mm long, glabrous. *Pods* ± strap-like, c. 28 by 6 mm, articles flattened ellipsoid, 11–14 by 6–7 mm, veined, with bulbous-based hairs (see note 2). *Seeds* flattened ellipsoid, c. 2.8 by 1.2 by 0.9 mm; hilum c. 0.5 mm long.

Distribution — Africa; India; Sri Lanka; *Malesia*: Java, Philippines, Lesser Sunda Islands (Bali, Sumba, Sumbawa, Timor); Vanuatu.

Habitat & Ecology — Semi-dry forest, slope of mountains, along dry riverbeds, savannah. Altitude: up to 200 m. Flowering: April to August, November and December; fruiting: May, June.

Notes — 1. Willdenow (1802) cites no specimens with his description. In the Willdenow herbarium at B there is a specimen collected by Klein in India annotated by Willdenow. This specimen is selected as neotype.

2. The thin hair-like part of the bulbous-based hairs may break off, leaving the bulbous base behind. The petiole, rachis, pedicel and pods may be (look) rough by these hair bases.

3. *Morrison s.n.* from Vanuatu with slightly smaller flowers and clearly sculptured wings has been included here.

4. Gillett (1966) recognized three subspecies: subsp. *sennoides*, which is widespread; subsp. *hispidum* (Willd.) Brenan & J. Léonard, which is found in W and C Africa and Sri Lanka and subsp. *zanzibaricum* Brenan & J.B. Gillett, which is found in Kenya and Tanzania.

7. *Ormocarpum smitsii* Arbainsyah, *sp. nov.* — Fig. 2f–j

Petioles and rachises with bulbous-based hairs, pedicels glabrous or with few hairs. *Standard*: blade c. 12 by 15 mm. *Ovary* with bulbous-based hairs. — Type: *O. Jaag 922* (holo L!), Lesser Sunda Islands, Alor.

Shrub. *Twigs* terete, c. 6 mm diam, glabrous. *Stipules* triangular, c. 5 by 1–2 mm, both sides glabrous. *Leaves* with 13–15 leaflets. *Petiole* 5–6 mm long, with bulbous-based hairs, rarely glabrous; rachis mostly as the petiole, 20–53 mm long; pulvinus c. 1 mm long. *Leaflets*: terminal one obovate, 6–10 by 3–6 mm, 1.6–2 times as long as wide, base cuneate, apex rounded, apiculate, upper surface glabrous, lower surface glabrous or with some appressed hairs along the midrib, midrib and nerves ± sunken above, nerves 4–7 per side, 1–1.3 mm apart, venation black; lateral leaflets mostly as the terminal one, elliptic, 7.5–10 by 4–6 mm, 1.6–1.8 times as long as wide; pulvinus c. 0.5 mm long. *Bracts* to the flowers broadly obovate, c. 0.5 by 0.6 mm, both sides glabrous. *Pedicels* c. 7 mm long, glabrous or with some hairs. *Bracteoles* rounded, c. 0.8 by 1 mm, both sides glabrous. *Calyx* c. 8 mm long, tube c. 6 mm long; teeth of upper lip deltoid, c. 1 by 1.2 mm; lateral lobes deltoid, c. 2 by 3 mm, median lobe triangular, c. 4 by 3 mm; both sides glabrous. *Standard*: claw c. 3 mm long; blade orbicular, c. 12 by 15 mm, apex rounded, 2 basal callosities, both sides glabrous. *Wings*: claw c. 3 mm long; blade orbicular, c. 10 by 9 mm, apex rounded, outside sculptured, both sides glabrous, auricles c. 1 mm long. *Keel petals*: claw c. 5 mm long; blade 'boat-shaped', c. 12 by 6 mm, auricles c. 1 mm long, both sides glabrous. *Stamens* diadelphous (9 + 1), tube 6–10 mm long, free part 10–11 mm long, glabrous; anthers

equal, c. 1 by 0.5 mm, glabrous. *Disc* c. 1 mm long, glabrous. *Ovary* c. 5 mm long, with bulbous-based hairs; *stipe* c. 4 mm long, with bulbous-based hairs; *ovules* 3; *style* c. 8 mm long, glabrous. *Pods* young, articles flattened ellipsoid, c. 10 by 4 mm, with bulbous-based hairs.

Distribution — Philippines (Luzon), Lesser Sunda Islands (Alor).

Habitat & Ecology — Altitude: up to 200 m.

Note — The leaflets of *O. smitsii* are thick and have black veins at the lower surface.

8. *Ormocarpum vanuatuense* Arbainsyah, *sp. nov.* — Fig. 2d, e

Petioles, rachises and pedicels thinly sericeous. Calyx 10–16 mm long. Standard: blade 11.7–12 by 12–13 mm. Ovary with bulbous-based hairs. — Type: *Berry 27* (holo L!; iso K!), Vanuatu, Santo, Fortsenale.

Treelets, c. 6 m tall. *Twigs* terete, c. 4 mm diam, lenticelled, glabrous. *Stipules* caducous, narrowly triangular, c. 3 by 1.2 mm, outside glabrous, inside short hairy. *Leaves* with 9–15 leaflets. *Petiole* c. 4 mm long, thinly sericeous, without bulbous-based hairs; *rachis* c. 12 mm long, thinly sericeous, without bulbous-based hairs; *pulvinus* c. 1 mm long. *Leaflets*: terminal one obovate, c. 7.5 by 3.5 mm, c. 2.1 times as long as wide, base acute, apex rounded, apiculate, upper surface glabrous, lower surface glabrous, midrib and nerves \pm sunken above, nerves 4 or 5 per side, c. 0.9 mm apart, venation slightly darker than the rest of the surface; lateral leaflets mostly as the terminal one, elliptic, c. 5 by 3 mm, c. 1.6 times as long as wide; *pulvinus* c. 0.6 mm long. *Bracts* to the flowers broadly ovate to semicircular, c. 1.3 by 0.7 mm, outside glabrous, inside the base with short hairs. *Pedicels* c. 10 mm long, thinly sericeous, without bulbous-based hairs. *Bracteoles* ovate, 1.3–2 by 1.1–1.5 mm, both sides glabrous, margin ciliate, inside with some colleters at the base. *Calyx* light yellow, 10–16 mm long, tube 8–10 mm long, teeth of upper lip triangular, 1.7–2 by 2.2–2.5 mm; lateral teeth triangular, c. 4 by 3.7–4 mm, median tooth triangular, 5.1–6 by 4–5 mm; both sides glabrous. *Standard*: claw 2.7–3 mm long; blade orbicular, 11.7–12 by 12–13 mm, apex emarginate, 2 basal callosities, both sides glabrous, auricles absent. *Wings*: claw 3–4 mm long; blade broadly obovate, 11–13 by 8.5–9 mm, apex rounded, not or faintly sculptured outside, both sides glabrous. *Keel/petals*: claw 4–4.5 mm long; blade 'boat-shaped', 11.3–13 by 8.2–9 mm, auricles c. 0.2 mm long, both sides glabrous. *Stamens* diadelphous (9 + 1), tube 9–11 mm long, free part 5–8 mm long, glabrous; anthers equal, 1.1–1.6 by 0.5–0.8 mm, glabrous. *Disc* c. 1 mm long, glabrous. *Ovary* c. 7.5 mm long, hirsute-sericeous with bulbous-based hairs; *stipe* c. 4 mm long, glabrous; *ovules* 3; *style* c. 10 mm long, glabrous. *Pods* and *seeds* unknown.

Distribution — Vanuatu (one specimen).

Habitat & Ecology — Near a house. Altitude: c. 619 m. Flowering: December.

Note — *Berry 27* is variable in the ornamentation of the wing petals: some flowers have non-sculptured wing petals, while others have faintly sculptured wing petals.

9. *Ormocarpum* sp.

McKee 19448, New Caledonia, Ile Art, Mandélane; *McKee 22704*, New Caledonia, Ile Yandé, Ocumbaina; *McKee 23209*, New Caledonia, Baaba, Pointe S.O.

Three sterile specimens with \pm glabrous petioles and rachises and rather small leaflets. The glabrous petiole and rachis point to *O. cochinchinense*. However, the leaflets are much smaller than usual in that species.

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IDENTIFICATION LIST

- | | |
|------------------------------|---------------------------|
| 1 = <i>O. cochinchinense</i> | 6 = <i>O. sennooides</i> |
| 2 = <i>O. fijiense</i> | 7 = <i>O. smitsii</i> |
| 3 = <i>O. neocaledonicum</i> | 8 = <i>O. vanuatuense</i> |
| 4 = <i>O. philippinense</i> | 9 = <i>O. sp.</i> |
| 5 = <i>O. sculptilium</i> | |

Aet & Idjan 346: 1 – Alvarez FB 23721: 1.
 Backer 36: 1; 4254: 1; 8238: 6; 22116: 1; 23964: 1; 24607: 6; 33231: 1 – Balansa 2965: 1 – Barker & Vinas LAE 66755: 1 – Beccari PB 2733: 1 – Berry 27: 8 – Brass 1103: 1; 25906: 1; 27348: 1.
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 Saiti 3355: 1 – Satake & Nümura 946: 1 – Sayers NGF 21864: 1 – Schiefenhövel 3: 1 – Schiffner 2082: 1 – Schmutz 2190: 6 – Simaga 763: 1 – Sinclair SFN 38584: 1 – Smith 4926: 1 – Smitinand 5551: 1 – Streimann & Kairo NGF 39171: 1 – Suprin 2015: 1.
 Teijsmann HB 5116: 1; HB 5244: 1 – Toutain 3506: 3.
 Vieillard 398: 1; 398 (K Herb. Hookeriana, L [L 0419929], P [P0044559]): 3; 398 (P [P00440549, P00440550, P00440551]): 5; 398a (P [P00440552]): 5; 398b (P [P00440553, P00440554]): 3; 398b (P [P00440555]): 5; 398bis (P [P00440558]): 3; 398c (P [P00440556]): 5 – Van Ooststroom 12709: 1 – Van Royen NGF 16318: 1 – Vandenberg & Mann NGF 42285: 1 – Veillon 6658: 3; 6801: 3; 6819: 3; 6906: 2; 7023: 3 – Verdcourt & Katik 4962: 1.
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 Yoshida 2548: 1.

INDEX OF NAMES

Accepted names are in roman type, synonyms in *italics* (with accepted name between brackets) and new names in **bold**.

Acrotaphros Steud. ex A.Rich. (= *Ormocarpum*)
bibracteata Steud. ex A.Rich. (= *O. pubescens*)
Aeschynomene L.
atropurpurea Span. (= *O. sennooides*)
coluteoides A.Rich. (= *O. cochinchinensis*)
Dalbergia L.f.
diphaca (Lour.) Pers. (= *O. cochinchinensis*)
Diphaca Lour. (= *Ormocarpum*)
cochinchinensis Lour. (= *O. cochinchinensis*)
Hedysarum L.
sennooides Willd. (= *O. sennooides*)
Hormocarpus Spreng. (= *Ormocarpum*)
Ormocarpum P.Beauv.
cochinchinense (Lour.) Merr.
fijiense Arbainsyah
glabrum Teijsm. & Binn. (= *O. cochinchinensis*)
 var. *minahassana* Teijsm. & Binn. (= *O. cochinchinensis*)
intermedium Teijsm. & Binn. (= *O. sennooides*)
neocaledonicum Arbainsyah
ochroleucum Zoll. & Moritz (= *O. cochinchinensis*)
orientale (Spreng.) Merr. (= *O. cochinchinensis*)
philippinense Arbainsyah
pubescens (Hochst.) Cufod ex J.B.Gillett
sculptilium Arbainsyah
sennooides (Willd.) DC.
 subsp. *hispidum* (Willd.) Brenan & J.Léonard
 subsp. *sennooides*
 subsp. *zanzibaricum* Brenan & J.B.Gillett
smitsii Arbainsyah
suberosum Teijsm. & Binn. (= *O. sennooides*)
verrucosum P.Beauv.
vanuatuense Arbainsyah
Parkinsonia Plum. ex L.
orientalis Spreng. (= *O. cochinchinensis*)
Rathkea Schumach. (= *Ormocarpum*)
glabra Schumach. (= *O. sennooides* subsp. *hispidum*)
Solulus arbor Rumph. (= *O. cochinchinensis*)