

REVISION OF THE GENUS *POLYCARPAEA*  
(CARYOPH.) IN MALAYSIA

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*Foundation Flora Malesiana, Leyden*

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The genus is extremely poorly represented in the Malaysian area as compared with the wealth of species described from the African flora and with the relatively large number of species described from Asia and Australia. Most of the specimens collected in Malaysia belong to the widely distributed *P. corymbosa* (L.) Lamk, which is still of very limited occurrence in Malaysia. A Queensland species, *P. spirostylis* F. v. M., has once been reported from islands in Torres Straits.

The three other species are apparently local-endemics from the climatically dry Lesser Sunda Islands and I have been unable to match them with any of the described species from the Asiatic and Australian floras.

As the species of *Polycarpaea* are very similar in habit and vegetative characters, stress is laid upon clearly distinguishable flower details. In descriptions one should be careful in dissecting flowers: petals and stamens are connate only in sect. *Planchonia*; in herbarium specimens of other species they may stick sometimes together but are really free.

The stamens are in some species inserted on a scarios ring; the petals are inserted on this ring at the outer side. The parts of this ring just opposite the petals can develop into very minute, triangular acute or scale-like staminodial appendages, as is the case in sect. *Aylmeria*. These staminodes are easily overlooked, as must have been the case in the well-known widely distributed *P. corymbosa*<sup>1)</sup>, in which species I found minute, transversely rectangular or scale-like appendages opposite the petals, between and connate with the stamens. It is difficult to decide whether these minute organs are definitely homologous with staminodes or not. It may be that they are just parts of the scarios ring but occupy exactly the position where staminodial vestiges should be found. Possibly the presence of these staminodial appendages is not so valuable in the genus; if these organs have to be interpreted as staminodes, however, then *P. corymbosa* should, in my opinion, be transferred to sect. *Aylmeria*.

In *P. spirostylis* (§ *Planchonia*) and *P. sumbana* (§ *Polycarpaea*) staminodes are absent; in *P. zollingeri* and *P. timorensis* they are present, though of minute size and sometimes hardly visible.

In the description the term "petals" has for convenience's sake been

<sup>1)</sup> And in the Indo-Chinese *P. stylosa* Gagnep. which is closely related to *P. corymbosa*.

applied to the organs of the whorl succeeding the sepals. It has been demonstrated by MATTFELD (in FEDDE, Rep. Beih. 100, 1938, 147-164) that in the *Caryophyllaceae* the "petals" represent in all probability an outer whorl of staminodial nature and no true petals. Mattfeld considers the episepalous stamens with their (often present) staminal glands as tangentially split phyllomes homologous with the alternisepalous stamens with their "petals". Such a split phyllome consists of a stamen and two dorsal, mostly connate, stipules (staminal gland(s) or "petal(s)"). In the Malaysian species of *Polycarpaea* the glands of the episepalous stamens are absent, and of the whorl consisting of alternisepalous stamens with their accompanying "petals" the stamens are reduced to staminodes (§ *Aylmeria*) or absent.

The material on which this revision has been based is contained in the Herbarium Bogoriense and the Rijksherbarium. Of *P. zollingeri* (Fenzl) Bakker material was obtained from the Muséum d'Histoire Naturelle, Phanérogamie, Paris and Papuan material of *P. spirostylis* F. v. M. was borrowed from the Melbourne Herbarium. Sincere thanks are due to the directors of these Herbaria.

**Polycarpaea** Lantacck

Annual or perennial, dichotomously branched herbs, sometimes woody at the base. Leaves opposite, often with developed axillary buds which give the impression of the presence of (false) whorls. Stipules scarious. Inflorescences poor or rich-flowered cymes provided with scarious bracts. Sepals scarious, not keeled. Petals (by Mattfeld interpreted as staminodes) structurally similar to the sepals, but frequently toothed at the apex, sometimes (§ *Planchonia*) to varying degree connate mutually and with the filaments. Stamens 5 (or less), sometimes (§ *Aylmeria*) alternating with 5 minute staminodes. Style simple, stigma punctate to globular, or lobed. Capsule 3-valved.

KEY TO THE MALAYSIAN SPECIES

- 1. Petals connate in their lower half into a tube or cup (§ *Planchonia*) . . . . . 1. **P. spirostylis**
- 1. Petals free, at the base annularly adnate to the stamens (and staminodes if present).
  - 2. Sepals with a c.  $\frac{1}{2}$  mm broad, 3-nerved, pubescent, greenish median band not reaching the apex . . . . . 4. **P. zollingeri**
  - 2. Sepals almost entirely scarious or with a narrow glabrous purple midrib of various length.
    - 3. Midrib of the sepals reaching up to c. 1-1½ mm below the apex. Petals narrowly oblong, c. 2½-3 by  $\frac{1}{2}$ -¾ mm. Anthers oblong, c.  $\frac{1}{2}$  mm. Style c. 1¼-2 mm. . . . . 3. **P. sumbana**
    - 3. Midrib of the sepals absent or only visible at the base over c. 1 mm. Anthers orbicular, c.  $\frac{1}{3}$ - $\frac{1}{2}$  mm. Style  $\frac{1}{3}$ - $\frac{1}{2}$  mm.
    - 4. Sepals without a true midrib. Petals very small, c.  $\frac{1}{2}$ -1 mm long, top not bifid . . . . . 2. **P. corymbosa**
    - 4. Sepals with a midrib, visible at the base over 1mm. Petals larger, c. 1¼-2 mm long, top often bifid. 5. **P. timorense**

1. *Polycarpaea spirostylis* F. v. M. Rep. Bab. Exp. (1858) 8; Bth. Fl. Austr. 1 (1863) 165; F. v. M. Descr. Not. Pap. Pl. 2 (1886) 43; Bailey, Queensl. Fl. pt 1 (1899) 91; Domin, Bibl. Bot. Heft 69 (1925) 653.

Annual, c. 20–30 cm high. Stems slender, erect, glabrous. Internodes 2–2½ cm. Leaves sessile, linear c. 10–20 mm long, 1 mm broad, glabrous; apical mucro c. ½ mm. Stipules small, ovate-oblong, c. 1½–2 mm long, top acuminate. Capitulate cymes many-flowered, c. 3½ cm diam. Bracts ovate-oblong, boat-shaped, brownish striate, c. 3 by 1¼ mm, with a distinct midrib; top acute and lacerate; margin serrate; axil with some long soft hairs. Pedicels less than 1 mm long, flowers almost sessile. Sepals 5, scarious, ovate-oblong, acute, c. 6 by 2 mm; midrib disappearing c. 2 mm below the top. Petals 5, scarious, in their lower part connate with the stamens into a tube of c. 3½ mm; free slips entire, oblong-triangular with a rounded top, c. 1½ mm, curled outward. Stamens somewhat longer than the petals, filaments c. 5 mm, free parts c. 1½ mm; anthers broad elliptic, c. ⅔ mm long. Ovary very

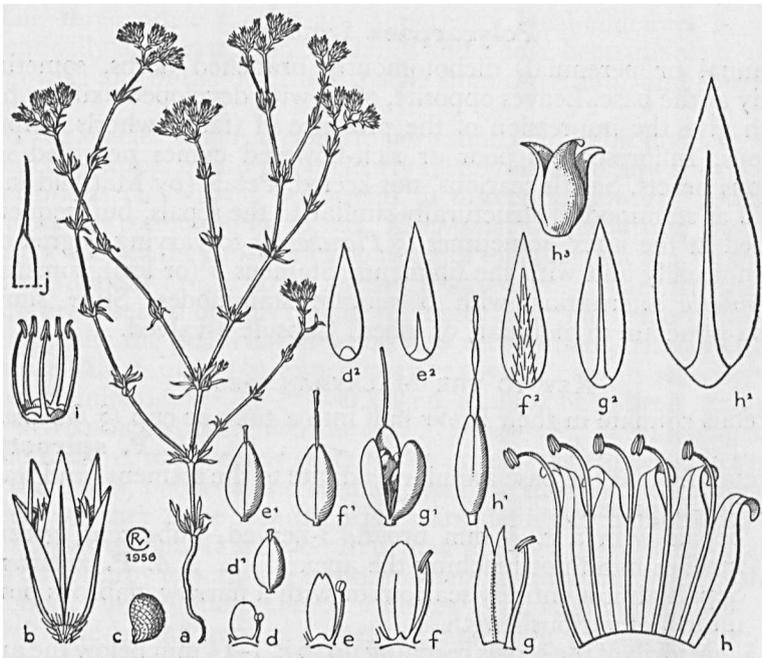


Fig. 1. Details of the five Malaysian species of *Polycarpaea*. a. Habit of *Polycarpaea sumbana* Bakker, nat. size (Iboet 51), b. flower,  $\times 6$ , c. seed,  $\times 13$ , — d, d<sup>1</sup>, d<sup>2</sup>, *P. corymbosa* (L.) Lamk, respectively showing in d. structure and insertion of stamen and staminal ring with petal, d<sup>1</sup>. fruit, d<sup>2</sup>. petal with indication of the non-scarious portion of the midrib, all  $\times 6$  (Curran & Merritt FB 16545), — e, e<sup>1</sup>, e<sup>2</sup>, *P. timorensis* Bakker ditto,  $\times 6$  (Walsh 351), — f, f<sup>1</sup>, f<sup>2</sup>, *P. zollingeri* (Fenzl) Bakker, ditto,  $\times 6$  (Zollinger HZ 1096), — g, g<sup>1</sup>, g<sup>2</sup>, *P. sumbana* Bakker, ditto,  $\times 6$  (Iboet 51), — h, h<sup>1</sup>, h<sup>2</sup>, *P. spirostylis* F. v. M., ditto, h<sup>3</sup>. dehiscent fruit, all  $\times 6$  (Hartmann in Melb.), — i. *P. timorensis* Bakker, stamens with staminal ring,  $\times 10$ , — j. *P. zollingeri* (Fenzl) Bakker, leaf tip,  $\times 6$ .

shortly stipitate, oblong, c. 2 mm, tapering at the top into a long spirally twisted caducous style c. 3 mm long; stigma punctiform. Capsule c. 1 mm stalked, ovate, c. 2-3 mm long, brown, when ripe, opening at the top with 3 triangular, recurving valves.

Distr. Queensland, Islands of Torres Straits, C. Hartmann, not yet reported from Papua proper.

This species is in Queensland renowned for its value as indicator of copper deposits and is frequently used by practical miners as a guide to that mineral (Bailey l.c.) a quality apparently shared with *P. glabra* White (Proc. R. Soc. Queensl. 37, 1926, 153).

Note. The specimen described above differs distinctly from the description in Bentham's Fl. Austr. It shows stems which are not woody at the base, shorter filaments, and a much smaller capsule. Domin, however, states that *P. spirostylis* is a very variable species. Another specimen from Australia (Winders 7397) differs in having bifid petals and filaments only slightly longer than the petals. I refrain from accomodating the Torres Straits specimen in a new infraspecific taxon.

2. **Polycarpæa corymbosa** (L.) Lamk, Tabl. Encycl. 2 (1797) 129; W. & A. Prod. (1839) 90; Bth. Fl. Austr. 1 (1863) 166; Hook. f. Fl. Br. Ind. 1 (1874) 245; F.-Vill. Nov. App. (1880) 15; Bailey, Queensl. Fl. 1 (1899) 92; Merrill, Philip. J. Sc. 5 (1910) Bot. 347; Domin, Bibl. Bot. Heft 69 (1925) 100; Merrill. En. Philip. 2 (1923) 139 — *Achyranthes corymbosa* Linne, Sp. Pl. (1753) 205.

Annual, c. 12-40 cm high. Stems slender, erect, pubescent; internodes c. 1-4 cm. Leaves sessile, linear, mostly c. 10 mm, but up to 20 mm long, less than 1 mm broad, glabrous; apical mucro c.  $\frac{1}{2}$ -1(-2) mm. Stipules ovate-oblong, c. 3-4 mm long, the c. 1 mm filiform apex included, c. 1 mm broad; margin not quite entire. Cymes rather dense, c. 2-6 cm diam. Bracts triangular-ovate from a truncate, stem-clasping base, c. 2-2 $\frac{1}{2}$  by 1-1 $\frac{1}{2}$  mm; top acute and lacerate with a few linear slips. Pedicels of the terminal flowers c. 2 mm, of the other flowers c. 1 mm or less, pubescent. Sepals 5, scarious, ovate-oblong, c. 1 $\frac{1}{2}$ -3 by  $\frac{3}{8}$ -1 mm; midrib hardly visible in the basal  $\frac{1}{4}$  part as a dark-coloured or -striate spot. Petals 5, scarious, brownish, narrowly elliptic to almost orbicular, very small, c.  $\frac{1}{2}$ -1 mm. Stamens shorter than the petals, inserted on a scarious ring; anthers orbicular, c.  $\frac{1}{8}$  mm. Staminodes oppositipetalous, very minute and hardly visible, perhaps only parts of the scarious ring. Ovary almost globular, very small, c.  $\frac{1}{2}$  mm; style very short, c.  $\frac{1}{6}$ - $\frac{1}{8}$  mm; stigma 3-lobed. Capsule elliptic, 3-valved, c. 1-1 $\frac{1}{2}$  by  $\frac{1}{2}$ - $\frac{3}{4}$  mm, brown. Seeds c. 6, reniform, yellowish-brown, c.  $\frac{1}{3}$  mm.

Distr. In the tropics from Africa to Australia, in Malaysia only known from the following localities.

Lesser Sunda Islands: P. Kisar, inland place E. of Wonreli, secondary vegetation, 5-200 m, Bloembergen 3879 (L).

Moluccas: Sula Isl., Taliabu, kampong Kapa: Atje (Exp. Hulstijn) 89 (BO,L).

Philippines: Luzon, Benguet Prov.: Curran & Merritt FB 16545 (L), Ramos & Edaño BS 37936 (BO); Merrill 4392 (BO,L); Ramos BS 5803 (BO,L). Mindanao: Cotabato Prov., Ala Valley, weed in rice fields, 1-1½ ft. tall, fls. silvery: J. V. Santos 4806 (L).

Open dry sandy places, dry slopes, etc. from sea-level up to c. 1300 m; locally sometimes abundant.

3. **Polycarpaea sumbana** nov. sp. (§ *Polycarpaea*).

Annua, c. 8-15 cm alta. Caulis tenuis, erectus, basi saepe ramosa, dense crispato-pubescent, glabrescens; internodia c. 1-2 cm. Folia sessilia, linearia, plana, sparse pubescentia, apice acuta mucrone c. ½ mm longo, 3-6 × ¾ mm, costa indistincta. Stipulae scariosae ovato-oblongae, acutae, apice irregulariter fimbriatae, c. 2½ × ¾ mm. Innovationes axillares frequenter adsunt. Cymae plerumque densae, c. 1-2 cm diam. Bractae scariosae, basi semi-amplexicaules, ovato-ellipticae, acute-acuminatae, margine minute serratae, c. 2½-3 × 1½ mm. Pedicelli 1 mm. Sepala 5, scariosa, ovato-oblonga, acuta, glabra, c. 3-4½ × 1-1½ mm, costa firma c. 1-1½ mm infra apicem evanescente. Petala 5, scariosa, libera, anguste oblonga, uninervia, c. 2½-3 × ½-¾ mm, apice 2-dentata, raro subdentata, dentibus ⅓-½ mm longis. Stamina 5, basi cum petalis in anulum conjuncta, libera, c. 2½-3 mm longa. Antherae c. ½ mm longae. Staminodia desunt. Ovarium ellipsoideum, c. 1-1¼ × ½ mm. Stylus filiformis, 1½-2 mm longus; stigma punctiforme. Capsula 3-valvata, ellipsoidea, c. 1¾ × ¾ mm. Semina c. 8, minuta, c. ½ × ¼ mm, subreniformia, dilute brunnea.

Distr. Endemic in the Lesser Sunda Islands.

Lesser Sunda Islands: E. Sumba, Mambesu, Iboet 51 (BO;L, type); Waikelo, Iboet 357 (BO), common dry limestone, conspicuous by its silvery appearance, 200 m, De Voogd 1993 (BO,L); Waingapu, cattle range subject to annual burning, 200 m, Monod de Froideville 2046 (BO,L), in pasture on shallow soil, fls. carmine red, Monod de Froideville 1331 (BO). P. Savu, on the coast between *Pandanus*. Bloembergen 3282 (BO,L).

4. **Polycarpaea zollingeri** (Fenzl) comb. nov.—*Aylmeria zollingeri* Fenzl ex Zoll. Syst. Verz. (1855) 141, nomen nudum; Nat. Tijd. Ned. Ind. 14 (1857) 163, descr.

Annual. Stems slender, erect, pubescent; internodes c. 1-1½ cm. Leaves sessile, narrowly elliptic to linear, 2-7 mm long and 1-2 mm broad, pubescent; apical mucro c. 1-2 mm. Stipules narrowly ovate-oblong, incl. the thread-like apex c. 4 by ¾ mm; top c. 2 mm thread-like acuminate; margin not quite entire. Cymes rather dense, c. 1½-3 cm diam. Bracts triangular-ovate with a truncate, stem-clasping base, c. 2½-3 by 1-1½ mm; top acute and lacerate with a few linear slips. Pedicels c. 1 mm, pubescent. Sepals 5, scarios, ovate-oblong, acute, c. 3½-4 by 1 ⅓ mm; central part c. ½ mm broad, herbaceous, appressed-hairy, disappearing c. 1 mm below the top, containing 3 anastomosing nerves, greenish. Petals 5, scarios, oblong-elliptic, top blunt and slightly erose or bifid, c. 1½-2½ by ⅔-1 mm; midrib clearly discernable,

disappearing c. 1 mm below the top. Stamens 5; filaments free, connate at the base with the petals and the staminodes, c. 1–2 mm; anthers oblong, c.  $\frac{1}{2}$ – $\frac{3}{4}$  mm long. Staminodes oppositipetalous, very minute, triangular-acute, or composed of faint lobes and hardly visible. Ovary ellipsoid, c. 1 by  $\frac{1}{2}$ – $\frac{3}{4}$  mm; style slender, c.  $\frac{1}{2}$ –1½ mm; stigma punctate. Capsule ellipsoid, 3-valved, c. 2 by 1 mm, the upper part brownish-striate. Seeds numerous, reniform, light brown, with dark brown spots, c.  $\frac{1}{4}$ – $\frac{1}{2}$  mm.

Distr. Endemic in the Lesser Sunda Islands.

Lesser Sunda Island: Sumbawa, Bima district, Mt Tambora, sandy places between 600 and 1800 m, fl. Aug., Zollinger HZ 1096 (BO; P, type). Flores, Endeh, common in a coconut plantation, fl. June, Rensch 973 (BO).

Note. The specimen Rensch 973 differs slightly from the type in having bifid petals and a shorter style ( $\frac{1}{2}$  mm instead of 1¼–1½ mm).

#### 5. *Polycarpaea timorensis* nov. sp. (§ *Aylmeria*).

Annual, c. 10 cm alta. Caulis tenuis, erectus, dichotomus, dense crispato-pubescent, glabrescent; internodia 1–2 cm. Folia sessilia, linearia, plana, 3–6 ×  $\frac{1}{2}$ – $\frac{3}{4}$  mm, apice acuta, mucrone  $\frac{1}{2}$ –1 mm longo; costa indistincta. Stipulae scariosae, uninerves, oblongae, 2 ×  $\frac{3}{4}$  mm, acutissime acuminatae, margine irregulariter incisae. Cymae densae, 1–2 cm diam. Bractae convexae, scariosae, basi semi-amplexicaules, ovato-oblongae, uninerves, acutae, 2–2½ × 1–1½ mm, margine irregulariter incisae. Pedicelli 1–2 mm. Sepala 5, scariosa, ovato-oblonga, acuta, glabra, c. 3 × 1 mm; costae pars conspicua 1 mm longa. Petala 5, scariosa, uninervia, libera, elliptico-oblonga, c. 1¼–2 ×  $\frac{1}{4}$ – $\frac{3}{4}$  mm, apice late rotundata, bidentata, vel irregulariter dentata. Stamina fertilia 5, basi cum petalis et staminodiis in annulum conjuncta, libera, c. 1½ mm, antheris c.  $\frac{1}{4}$ – $\frac{1}{2}$  mm, orbicularis. Staminodia 5, scariosa, squamiformia, oppositipetala, minuta. Ovarium ellipsoideum, c.  $\frac{2}{3}$  ×  $\frac{1}{2}$  mm; stylo brevissimo  $\frac{1}{4}$ – $\frac{1}{2}$  mm longo, stigmatibus trilobis. Capsula brevissime pedicellata, ellipsoidea, 3-valvata, c. 1½–2 ×  $\frac{3}{8}$ –1 mm. Semina c. 6, reniformia, c.  $\frac{1}{2}$  mm.

Distr. Endemic in the Lesser Sunda Islands.

Lesser Sunda Islands: W. Timor, Nenas, Mt Mutis, rare, 1250 m, M. E. Walsh 351 (BM, BO; L, type).

#### EXCLUDED

*Polycarpaea frankenioides* Presl, Rel. Haenk. 2 (1831) 6; F.-Vill. Nov. App. (1880) 15 is according to Merrill (En. Philip. 2, 1923, 135), who examined an original specimen in the Prague Herbarium, conspecific with the Aizoaceous *Glinus oppositifolius* (L.) DC.

*Polycarpaea marginata* Presl, Abh. Böhm. Ges. Wiss. V, 3 (1845) 571, repr. 141 = *Polycarpon indicum* (Retz.) Merr. Philip. J. Sc. 10 (1915) Bot. 302; En. Philip. 2 (1923) 139.—The reduced species was based on an Indian specimen (Helfer 303) and was not mentioned in the Flora of British India. From Presl's description it is clearly referable to *Polycarpon indicum*.