



Fig. 1. *Trigonistrum hypoleucum* Miq. Flowering twig, $\times 2/3$, *a*. flower, petals removed, *b*-*c*. petals, *d*. bag-shaped petal, *e*. the same, frontal view, *f*. fruiting tip of inflorescence, *g*. bracts with glands, *h*. winged partial fruit, *i*. opened, showing insertion of seed.

TRIGONIACEAE (C. G. G. J. van Steenis, Buitenzorg)

1. TRIGONIASTRUM

MIQ. Fl. Ind. Bat. Suppl. (1860) 394; B. & H. Gen. Pl. 1 (1862) 139; MIQ. Ann. Mus. Bot. L.B. 1 (1863) 142, *in clavis*; BENN. in HOOK. f. Fl. Br. Ind. 1 (1872) 208; BAILL. Hist. Pl. 5 (1873) 91; KING, J. As. Soc. Beng. 59, II (1890) 133; Ann. R. Bot. G. Calc. 5, 2 (1896) 135, t. 159; BOERL. Handl. 1, 1 (1890) 78; CHODAT, Bull. Boiss. 3 (1895) 136; BARTH, *ib.* 4 (1896) 481; E. & P. Nachtr. (1897) 209; RIDL. Fl. Mal. Pen. (1922) 141; ENDERT, Med. Boschb. 20 (1928) 65; LEMÉE, Dict. 6 (1935) 704 *excl. syn. Factorovskya* EIG.—*Isopterys* WALL. CAT. (1832) no 7261, *nomen, ex B. & H. l.c.*

Tree, wood vessels mostly solitary. *Leaves* simple, spread (on lateral branches), penninervous, entire, margin and leaf tip glandular; upper epidermis often double and provided with mucilaginous cells; midrib sulcate above. Stipules caducous. Indumentum of simple hairs. *Flowers* actinomorphic, bisexual, in axillary and terminal panicles; bracts with glandular margin. Sepals 5, free, nerved as the petals are, unequal, imbricate. Petals 5, free, very unequal, imbricate; posterior saccate with reflexed emarginate limb, lateral spatulate, spreading, anterior oblique, keel-like together, including at their base the genitals; entrance of the sac with one fleshy hairy concave gland (easily breaking into 2 parts). Stamens 6 monadelphous, tube split posteriorly, eventually with some loose minute teeth, minute upper part of filaments free; anthers oval, slightly emarginate at the base, 2-celled, opening with one slit, gaping; exine (judging from boiled fls) reticulate. Ovary hairy, easily falling into 3 parts as does the simple style; stigma small punctiform. Ovule pendulous solitary. *Fruit* composed of 3 easily detaching samaras. Seeds (*n.v.*) elongate, shortly hairy, exalbuminous; radicle very short.

Distr. Monotypic, confined to *W. Malaysia*, wrongly credited to New Guinea by LEMÉE, *l.c.*

Wood anat. HEIMSCH, Lilloa 8 (1941) 132.

Notes. This genus, which is the single representative of the family in Malaysia, was mostly included in the *Polygalaceae*, and though differing in several respects from the 2 other neotropical genera of the *Trigon.* by its spread leaves &c. it seems mostly allied to *Trigonia*. HALLIER *f.* suggested in passing¹ affinity with the *Rosac.-Chrysobal.* (1918) for which indeed some arguments could be advanced. In the herbarium it is sometimes confused with *Angelesia* which it resembles superficially in vegetative characters. It has also been compared with *Dichapetalaceae*. The glandular leaf margin, glandular-thickened leaf tip, sulcate midrib, and the indumentum are easy characters for distinction. The gland in the posterior petal could be interpreted both as a disk or as (a) metamorphosed stamen(s).

1. *Trigoniastrum hypoleucum* MIQ. *l.c.*; BENN. *l.c.*; CHODAT *l.c.*; FOXW. Mal. For. Rec. 2 (1922) 216; RIDL. *l.c.*; BAKER *f. J. Bot.* (1924/6) Suppl. 7, 143; MERR. Pl. Elm. Born. (1929) 132; BURK. Dict. (1935) 2182; incl. *var. oliganthum cum var. viride* AIRY SHAW, Kew Bull. (1940) 253.—*Isopterys penangiana* WALL. *ex* BENN. *l.c.*—Fig. 1.

Small to moderate-sized tree 6–30 m by 14–50 cm; wood hard, yellowish, fine-grained; bark exuding a yellowish, later turning reddish, gummy juice. Innovations hairy. *Leaves* oblong with cuneate base, apex acuminate, glandular-thickened, often \pm spatulate; petiole 4–7 mm, stout, sulcate; blade 8–18 by 3–6 cm; upper side often with a metallic hue *s.s.*; lower side whitish by a very thin arachnoid appressed indumentum consisting of

twisted hairs, interspersed with sclerenchymatic longer hairs; margin with minute impressed glands; side-nerves *ca* 5–6, reticulations prominent on both sides. Panicle leafy, 20–40 cm, lower bracts leafy, upper ones linear acute. *Flowers* white, fragrant; anthers pale yellow. Buds whitish *s.s.* Sepals *ca* 2 $\frac{1}{2}$ by 1 $\frac{1}{2}$ mm, ovate, acute, hairy. Saccate petal-base *ca* 2 mm, sometimes compressed, reflexed part *ca* 2 by 2 $\frac{1}{2}$ mm; base thickened; laterals unguiculate-spatulate, *ca* 3 $\frac{1}{2}$ –4 by 1 $\frac{1}{2}$ mm; anteriors 4–5 mm long, oblique-oblong. Staminal tube 1 mm high, filaments over $\frac{1}{4}$ mm free; anthers *ca* $\frac{1}{2}$ mm. Gland *ca* $\frac{3}{4}$ mm diam. Style 1 $\frac{1}{2}$ mm glabrous. Ovary $\frac{1}{2}$ mm high. *Samaras* pale or yellow green, connate over 1 $\frac{1}{2}$ –2 $\frac{1}{2}$ cm, with straight inner side 2 $\frac{1}{4}$ –3 $\frac{1}{2}$ cm long and rounded or lozenge-

(1) Med. 's-Rijks Herb. Leiden 37, p. 56.

shaped outer side, 1-1³/₄ cm broad. Seed not seen.

Distr. *Malaysia*: Sumatra, Malay Peninsula (incl. P. Penang), Borneo (incl. P. Laut).

Ecol. Evergreen non-inundated rainforest, scattered up to 1000 m, but mostly below 300 m; at the highest altitude found in sandy rainforest, differing slightly by blunter thicker leaves; *fl. fr.* Sept.-June.

Uses. The wood is little estimated.

Vern. *kikir*, *mangkudor* (SE. Borneo), *kaju bras*, *tinggiran batu* (Palemb.), *tinga batu* (Asahan), *marajali*, *mata pasak*, *suginara* (Mal. Pen.), apparently no fixed name.

Notes. The seedling grows out of the wing; the cotyledons are epigaic; the 1st pair of leaves is opposite.