PASSIFLORACEAE (W.J.J.O. de Wilde, Leyden)

Mostly climbing herbs or lianas with axillary tendrils, rarely erect herbs, shrubs or small trees, glabrous or hairy, in Mal. not spiny. Branching usually by a supra-axillary serial bud. *Leaves* (mostly) spirally arranged, simple or compound, pinni-nerved or palminerved, entire or lobed; petiole or blade-base often with 1–many glands, and often glands on margin and lower surface of the blade. Stipules present. *Inflorescences* essentially axillary, cymose, sessile or peduncled, 1–many-flowered, ending in (a) tendril(s) or not. Bracts and bracteoles mostly small. *Flowers* often stiped, articulate to the pedicel, actinomorphic, bisexual or functionally unisexual (either with staminodes or a vestigial ovary, and then plants mostly dioecious) or polygamous. Perianth mostly 2–seriate, mostly persistent, the segments free or partially connate (*Adenia p.p.*), inserted on the rim of the saucer- or cup-shaped or tubiform hypanthium. *Sepals* (4–)5(–6), imbricate. *Petals* (4–)5(–6), mostly imbricate. *Corona* inserted on the hypanthium, mostly a complicated structure, composed either of filaments, hairs, or appendages, or membranous, annular, or composed of scales (disk), or in addition with 'septa' (*Adenia p.p.*), rarely corona absent (*Adenia p.p.*). *Stamens* 4–10, inserted mostly at the base of the hypanthium, or on an androgynophore (mostly hypogynous), (mostly) opposite the sepals; filaments free or partially connate into a tube; anthers 2–celled, longitudinally dehiscent, sometimes apiculate. *Ovary* superior, subsessile or on a gynophore or androgynophore, 1–celled, 3(–5)–carpellate; placentas 3(–5), parietal; ovules many, anatropous; integuments 2; styles 1 or 3(–5), very short to distinct, sometimes partially connate; stigmas ± globose, or capitate, or papillate, or much divided. *Fruit* a loculicidally 3(–5)–valved capsule, or berry-like. *Seeds* mostly numerous, mostly compressed, often beaked, enveloped by a (membranous or juicy) aril; funicles often distinct; testa crustaceous (coriaceous), mostly striate, reticulate or pitted; endosperm (copious) horny; embryo straight; cotyledons foliaceous. *Cf.* HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 470–507.

Distribution. About 10 genera and 500 *spp.*, almost entirely confined to the tropics: in America *c.* 350 *spp.* (mainly *Passiflora*, a few species in *Dilkea*, *Mitostemma*, *Tetrastylis*), in Africa (incl. Madagascar) *c.* 110 *spp.* (mainly *Adenia c.* 80 *spp.*, *Tryphostemma c.* 20 *spp.*, *Deidamia*, incl. *Efulensia*, *c.* 6 *spp.*, *Crossostemma*, incl. *Schlechterina*, 2 *spp.*), in Asia and Australia *c.* 40 *spp.* (*Passiflora c.* 20 *spp.*, *Adenia* 14 *spp.*, *Hollrungia* 1 *sp.*, *Tetrapathaea* 1 *sp.* in New Zealand).

The two largest genera are each distributed in two continents, *viz Passiflora* in America and Australasia (S. & SE. Asia, Malesia, NE. & E. Australia, W. Pacific islands), and *Adenia* in Africa, Madagascar, SE. Asia, and Queensland.

In addition the tribe *Pariopsieae* is now arbitrarily reckoned to the *Passifloraceae* and excluded from the *Flacourtiaceae*. They are all woody, erect plants and occur in the palaeotropics, only one species being represented in Malesia. See SLEUMER, Bull. Jard. Bot. Brux. 40 (1970) 49 and DE WILDE, Blumea 19 (1971) 99. The characters by which this tribe differs from *Passifloraceae* in the strict sense are here not incorporated in the family circumscription. See further below under Taxonomy.

Ecology. Mostly heliophilous climbers at low and medium altitude, *Adenia kinabaluensis* at *c.* 2000 m on Mt Kinabalu; in Andean Peru *Passiflora mixta* up to 3500 m. Usually scattered, only the introduced *Passiflora foetida* sometimes very common in thickets.

Pollination. Most genera are monoecious with bisexual flowers, *Passiflora* having a marked protandry; *Adenia* is monoecious or dioecious, or polygamous. Functionally unisexual flowers occur in *Adenia*, *Hollrungia*, and in the New Zealandian *Tetrapathaea.*

Pollination by bumble-bees and kolibris is known from American *Passifloras*; for a number of narrow-flowered species of *Adenia* (Mal. *spp.*!) pollination by (small) insects is likely. Some African *Adenias* have fragrant flowers.

Morphology. The axillary tendrils in sterile shoots replace the axillary inflorescences; inflorescences are essentially cymose and the first flower or first 3 flowers of the lowest triad may be replaced by (a)

tendril(s). Sometimes the cyme has become monochasial or is deformed by partial concaulescence, or the cymes reduced to 1–3 flowers are contracted into raceme- or panicle-like inflorescences (*Passiflora racemosa*). Ramification of the plant takes place through the serial bud.

Studies dealing with the inflorescences and tendrils of *Passifloraceae* have been made by HARMS (Bot. Jahrb. 24, 1897, 163–178), CUSSET (Bull. Soc. Bot. Fr. 115, 1968, 45–61), and myself (Thesis, 1971, 16–17).

With *hypanthium* in the flower descriptions is meant the usually cup-shaped basal part, which bears on its margin the tepals (mostly free; sepals in *Adenia* are often partially united into a calyx tube) and the corona (mostly filamentous). Lower down in the hypanthium various types of a disk may be found, mostly annular, in *Adenia* mostly consisting of 5 scale-like or strap-shaped appendages.

The leaves mostly bear (often large) nectarial glands on petiole and blade.

Seedlings of extra-Malesian species (*Passiflora*, *Adenia*) are depicted by LUBBOCK (Seedlings 1, 1892, 582–593) and DE WILDE (Thesis, 1971, 24, fig. 4).

Phytochemistry. Many members of the family are toxic. The toxic constituents are still incompletely known. Most species of *Adenia* and *Passiflora*, and *Deidamia clematoides* and *Barteria fistulosa* (of the *Paropsieae*) release appreciable amounts of prussic acid on wounding. They contain the gynocardin-like glucosides deidaclin (first named deidamin) and barterioside and, most probably, also gynocardin itself (TANTISEWIE *c.s.* Pharm. Weekblad 104, 1969, 1341; PARIS *c.s.* C. R. Ac. Sc. Paris 268 D, 1969, 2804; CLAPP *c.s.* J. Am. Chem. Soc. 92, 1970, 6378). The occurrence of this highly characteristic type of cyanogenic glucosides points to a rather intimate relationship between *Passifloraceae* and *Flacourtiaceae-Pangieae*. Besides cyanogenic glucosides other toxic principles seem to be present in some members of the family; a toxalbumin, modeccin, was reported as a constituent of *Adenia* (= *Modecca*) *digitata*.

Notwithstanding their often toxic nature several species of *Passiflora* produce edible 'Passion Fruits' (see PURTHI, Advances in Food Research 12, 1963, 203–282; MARTIN & NAKASONE, Econ. Bot. 24, 1970, 333–343).

Leaves and stems of the non-cyanogenic, temperate American species *Passiflora incarnata* are used in medicine as a sedative drug; Herba Passiflorae contains harman and related simple indolic alkaloids. Such alkaloids are also present in other species of *Passiflora*. The phenolic constituents of Passifloraceous plants are still very incompletely known.

The so-called tannin cells of plant anatomists seem to contain catechins and leucoanthocyanins rather than true tannins. True tannins are lacking in the family or at the most are present in small amounts. Leaf flavonoids are represented by glucosides of kaempferol and quercetin (but not of myricetin) and especially by C-glykoflavones like saponaretin (= isovitexin), vitexin and orientin.

On the whole our knowledge of chemical characters of *Passifloraceae* is still very restricted. However, the common occurrence and the very peculiar nature of the gynocardin-like cyanogenic glucosides accentuate a Flacourtiaceous relationship. For a summary of phytochemical literature and references see HEGNAUER, Chemotaxonomie der Pflanzen 5 (1969) 293–298. — R. HEGNAUER.

Anatomy. See HARMS, Bot. Jahrb. 15 (1893) 548–633 and METCALFE & CHALK, Anat. Dicot. 1 (1950) 674.

Uses. Various *Passifloras* are ornamental or have edible fruit. *Adenias* are sometimes used as fish poison. Because of the showy flowers or edible fruits many species are cultivated in the tropics and subtropics and frequently run wild. Most species are nitrophilous or ruderal and are found in secondary vegetation. Many species are easily propagated either by seeds or cuttings. See HEYNE, Nutt. Pl. (1927) and BURKILL, Dict. (1935).

Taxonomy. Related to *Flacourtiaceae* to which the tribe *Paropsieae* (shrubs or trees) forms a transitional group. Recent anatomical evidence (AYENSU & STERN, Contr. U.S. Nat. Herb. 34, 1964, 45–73) and palynological studies (PRESTING, Pollen et Spores 7, 1965, 194–247; SPIRLET, *ibid.* 7, 1965, 249–301; PACQUÉ, ined.) point to a closer relationship of *Paropsieae* with *Passifloraceae* than with *Flacourtiaceae*.

Bibliographical note. In my monograph of the genus *Adenia* published in the Med. Landbouwhogeschool Wageningen 71–18 (1971) 1–281 I have also alluded to many general aspects of the family. This study is referred to as my 'Thesis'.

KEY TO THE GENERA

1. Climbing plants with tendrils.
 2. Androgynophore long; flowers bisexual; styles long, stigmas ± globular, smooth; anthers versatile. **1. Passiflora**
 2. Androgynophore 0 or short; flowers unisexual or polygamous; styles rather short, stigmas finely lobed or divided.
  3. Corona 0 or consisting of fine hars; disk glands 5, lingulate or strap-shaped; anthers narrow, erect, basifixed; flowers unisexual . . . . . **2. Adenia**
  3. Corona double: outer corona consisting of 2–3 rows of filaments, inner corona ('operculum') laciniate; disk 0 or as a faint annulus at bottom of hypanthium; anthers broad, deeply sagittate, versatile; flowers (functionally) polygamous . . . . . **3. Hollrungia**
1. Erect shrubs or small trees. No tendrils. See Fl. Mal. I, 5 (1954) 13 . . . . . **4. Paropsia**

1. PASSIFLORA

LINNÉ[1], Gen. Pl. ed. 5 (1754) 410; Sp. Pl. 1 (1753) 955; DC. Mém. Soc. Phys. Genève 1, 2 (1822) 434; Prod. 3 (1828) 322; BL. Rumpia 1 (1837) 169; ROEM. Syn. Mon. 2, Pepon. (1846) 131, 165; BENTH. Fl. Austr. 3 (1866) 311; BENTH. & HOOK. *f.* Gen. Pl. 1 (1867) 810; MAST. Trans. Linn. Soc. 27 (1871) 593; Fl. Bras. 13 (1872) 531; in Hook. *f.* Fl. Br. Ind. 2 (1879) 599; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 86; F. M. BAILEY, Queensl. Fl. 2 (1900) 686; GAGN. Fl. Gén. I.-C. 2 (1921) 1016; HALL. *f.* Med. Rijksherb. 42 (1922) 5; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 495; CRAIB, Fl. Siam. En. 1 (1931) 742; KILLIP, Field Mus. Publ. Bot. 19, 1 (1938) 1–613 (American *spp.*); BACK. & BAKH. *f.* Fl. Java 1 (1963) 289; CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 106; HUTCH. Gen. Fl. Pl. 2 (1967) 370.

Climbers (in Mal.). *Leaves* (mostly) spirally arranged, very rarely (sub)opposite, simple or (extra-Mal.) compound, entire or lobed, pinni- or palminerved; petiole with or without glands. Stipules (in Mal.) minute. *Inflorescences* sessile or peduncled, 1–many -flowered, with or without a simple tendril; flowers rarely collected into pseudoracemes. Bracts (in Mal.) small. *Flowers* bisexual, 5-merous; hypanthium saucer-shaped to cylindrical. *Sepals* and *petals* mostly free, often highly coloured; petals often resembling the sepals, membranous, (extra-Mal.) sometimes absent. *Corona* composed of a mostly complicated outer corona, and mostly a flat or plicate inner corona; nectary ring annular, within the operculum, or absent; disk at the base of, or on the androgynophore, or absent (in Australian *spp.*). Sexual organs on a distinct androgynophore. *Stamens* 5(–8), free filaments at first erect, later on mostly reflexed; anthers dorsifixed, versatile, elliptic to linear. *Ovary* globose to fusiform, sessile or stalked; styles 3(–4), (in Mal.) free, long; stigmas capitate. *Fruit* mostly indehiscent, ± baccate, often with coriaceous exocarp, globose to (rarely) fusiform.

Distr. About 370 *spp.*, of which *c.* 350 in the New World and *c.* 20 *spp.* in Indo-Australia and the West Pacific.

The genus is absent in Africa. The species described from Madagascar (*P. calcarata* MAST.) and the Mascarene Is. (*P. mauritiana* THOUARS and *P. mascarensis* PRESL) pertain to early introduced species from America, the first most likely *P. subpeltata* ORTEGA, the latter two being *P. alata* DRYAND.

Ecol. Rather low climbers, in primary and secondary forests, scrub and savannahs, below 1800 m, rather rare, under everwet climatic conditions except *P. moluccana* which prefers a seasonal climate.

Uses. A number of species is introduced as ornamentals or for the edible fruit with delicate flavour. Edible are *e.g. P. edulis* SIMS (Purple granadilla), *P. laurifolia* L. and *P. quadrangularis* L. (Marquesa, Grenadilla). Uses and vernaculars of various *Passifloras* are given by HEYNE, Nutt. Pl. 2 (1927) 1142–1144; OCHSE (& BAKH.) Fruit & Fruitculture (1931) 99–103; Ind. Groenten (1931) 575–581; BURKILL, Dict. 2 (1935) 1704–1706; ALLEN, Mal. Fruits (1967) 134–142.

Taxon. HARMS (1925) accepted 21 sections, KILLIP (1938) 22 subgenera and many sections and series for the New World.

The indigenous Old World species all belong to *sect. Decaloba* in the sense of HARMS, a section also represented in America. These species do not fit, however, into the section as conceived by KILLIP for the American species.

Within *sect. Decaloba* three groups can be distinguished.

Group 1 is characterized by creamy or white flowers less than 5 cm ø. To this group belong all continental SE. Asian species and *spp.* 1–3 in this work. A. P. de CANDOLLE (1828) knew of this group only *P.*

(1) The synonymy of the group of indigenous Old World species is given under *sect. Decaloba*. Other synonyms of *Passiflora* are: *Cieca* MEDIK., *Murucuja* [TOURN.] MEDIK., *Granadilla* [TOURN.] MEDIK., *Tacsonia* [TOURN.] JUSS., *Anthactinia* BORY, *Asephananthes* BORY, *Monactineirma* BORY, *Decaloba* (DC.) ROEM., *Astrophea* (DC.) ROEM., *Dysosmia* (DC.) ROEM., *Rathea* KARSTEN. For further information one is referred to *e.g.* HARMS (1925), KILLIP (1938) and HUTCHINSON (1967).

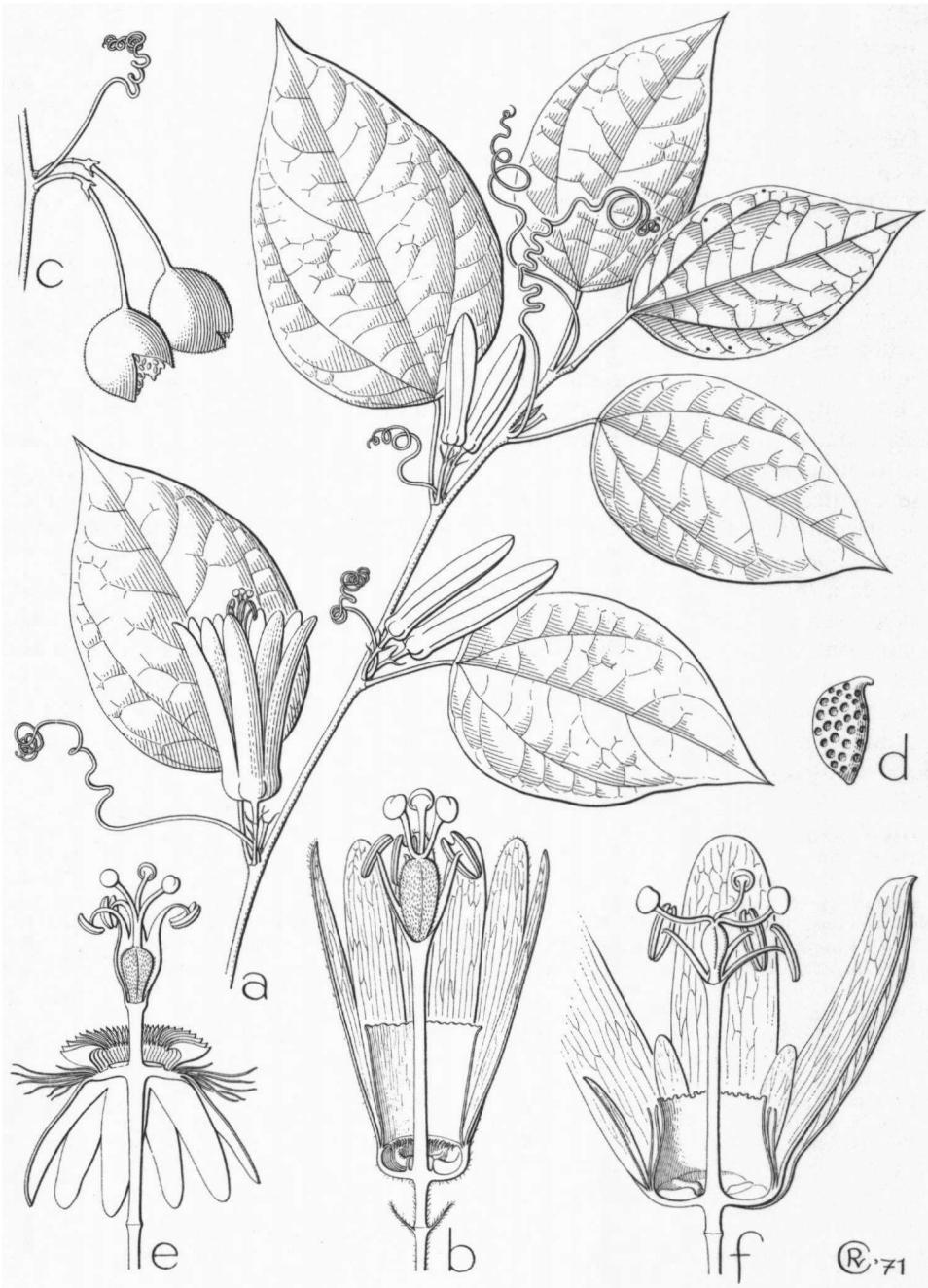

Fig. 1. *Passiflora hollrungii* K.SCH. *a.* Habit, × ½, *b.* flower in longitudinal section, nat. size, *c.* fruits, × ½, *d.* seed, ×6. — *P. perakensis* HALL. *f.e.* Flower in longitudinal section, ×2. — *P. aurantia* FORST. *f. var. aurantia. f.* Flower in longitudinal section, nat. size (*a* BRASS 32290, *b* CARR 14428, *c–d* SAYERS 21268, *e* RAHMAT SI TOROES 51, *f* BRASS 27591).

moluccana and *P. leschenaultii* which he referred to *sect. Polyanthea*, reduced to a subsection of *sect. Decaloba* by HARMS (1925) and CUSSET (1967).

HARMS created two other new sections among the continental SE. Asian species, *viz sect. Octandranthus* to fit *P. octandra* GAGN. with 6–8 stamens and *sect. Anomopathanthus* for *P. cochinchinensis* SPRENG. with (sub)opposite leaves, both species from Indo-China. These two species are, however, very related to *P. perakensis* and *P. moluccana.*

Group II is characterized by large, pinkish, orange or red flowers 5–10 cm ø; the outer corona filamentous, the inner corona tubiform. To this group belong 4 species confined to New Guinea, Australia and the SW. Pacific. This group was formerly accommodated in a genus *Disemma*; HARMS reduced this to *sect. Decaloba subsect. Eudecaloba.*

Group III is allied to group II but differs in having blue flowers in which the outer corona is tubiform and the inner corona small and incised. This comprises only one species, *P. hollrungii*, from New Guinea.

Though these groups reflect affinity within the Old World species of *sect. Decaloba*, it appears to me that they should not be given separate taxonomic rank.

Chromosomes. Of some tens of American species chromosomes have been counted; this yielded the numbers 2n = 12, 18 and 20, the most common number being 18. BEAL (Austr. Pl. 6, 1970, 13–14) revealed that the three native Australian species *P. aurantia*, *P. herbertiana*, and *P. cinnabarina*, are all 2n = 12, adding that this would point to their primitiveness.

Notes. I am confronted with the situation that of *Passiflora* in Malesia there are few indigenous and many introduced species, quite a few of which have run wild, sometimes profusely so, which causes confusion to collectors and their field notes. The five commonest among these are *P. foetida* L., *P. suberosa* L., *P. edulis* SIMS, *P. mollissima* (H.B.K.) BAILEY, and *P. mixta* L. *f.*

Under these circumstances it appeared out of proportion to study critically all these introduced species at the same level as the indigenous ones.

Therefore, two keys are presented, one for the native species and one for the introduced ones. It is not possible to separate these by a single character; therefore several forks of the first key refer to the second key containing the introduced species.

As a native New Guinean species occurs far into the Pacific (*P. aurantia*) I have included in the key also the two other Australasian species.

KEY TO THE MALESIAN & AUSTRALASIAN-PACIFIC SPECIES

1. Bract and bracteoles distinct, (sub)foliaceous, forming an involucre. See Key to introduced species
1. Bracts and bracteoles minute, setaceous or linear, mostly scattered, not involucre-like.
 2. Hypanthium long, mostly bowl-shaped or infundibuliform or tubiform. See Key to introduced species
 2. Hypanthium rather shallow, ± saucer-shaped.
  3. Operculum (inner corona) not plicate. . . . . See Key to introduced species
  3. Operculum (inner corona) plicate, mostly with crenulate, or crispy or laciniate edge.
   4. Petals absent . . . . . See Key to introduced species
   4. Petals present.
    5. Inflorescences mostly shortly peduncled, (1–)3–30-flowered; flowers 2–4½ cm ø (sepals 10–20 mm), tepals (creamy–) white, outer corona filaments in 2 rows.
     6. Petiole without glands. . . . . See Key to introduced species
     6. Petiole provided with glands (Group I).
      7. Leaves shallowly 3-lobed, each lobe distinctly mucronate, leaf-base also with 2 mucros. See Key to introduced species
      7. Leaves without distinct mucros.
       8. Petiolar glands at apex or in upper ⅓ of petiole. . . . . **1. P. moluccana**
       8. Petiolar glands situated in the lower ⅔ of the petiole.
        9. Filament connate for the lower ⅓–½, enveloping the ovary; ovary hairy; leaf top acute. **2. P. perakensis**
        9. Filaments above androgynophore ± free; ovary glabrous; leaf truncate or ± 2–3-lobed. **3. P. sumatrana**
    5. Inflorescences sessile, 1–2-flowered; flowers 5–10 cm ø (sepals (20–)25–50 mm), tepals pink to red, or bluish; outer corona filaments in 1 row or connate into a tube.
     10. Outer corona filamentous, inner corona (operculum) tubiform, 5–15(–20) mm, reddish or whitish; flowers pinkish to orange or red (Group II).
      11. Blade-base or petiole with glands.
       12. Plant pubescent, rarely glabrescent; glands often ± stiped; tops of leaf lobes ± acute; corona filaments whitish, inner corona distinctly plicate with shallowly lobulate-crenulate edge. Australia: Queensland, New South Wales . . . . . **P. herbertiana**

12. Glabrous; glands sessile, flat; tops of leaf lobes acute, rounded, or emarginate; corona filaments purplish red, inner corona ± wrinkled in the upper half, with shallowly lobulate-crenulate edge. Australia, Norfolk I. . . . . **4. P. aurantia**
11. Blade-base or petiole without glands (extra-Malesian).
13. Gynophore long; outer corona filaments whitish, longer than the whitish inner corona which has a densely fine-fimbriate edge. Australia: Victoria. . . . . **P. cinnabarina**
13. Gynophore short; outer corona filaments purplish red, about as long as or shorter than the inner corona, which has a shallowly lobed edge. Australia, Norfolk I. . . . **4. P. aurantia**
10. Outer corona broadly tubiform, 20–30 mm, purple-blue, inner corona small, incised, 1–2 mm; flowers bluish (Group III) . . . . . **5. P. hollrungii**

KEY TO INTRODUCED SPECIES

1. Bracts and bracteoles conspicuous, forming an involucre.
2. Involucral bracts finely and deeply divided; plant densely glandular hairy; flowers 2½–5 cm ø; petals white; corona filaments ± purplish; fruit subglobose, *c.* 2 cm ø, yellow to orange; variable, a common weed; 0–1500 m. . . . . **P. foetida** L.
2. Involucral bracts not divided.
3. Involucral bracts partially connate in a tube; flowers ± pinkish, with hypanthium 6–9 cm long.
4. Bracts to 4 cm, connate up to halfway; fruit ellipsoid, 7–12 cm, edible; ornamental and cultivated for the fruit; 500–2500 m . . . . . **P. mollissima** (H.B.K.) BAILEY
4. Bracts to 5 cm, connate for ± ¾; fruit ellipsoid, to 6 cm; occasionally cultivated (closely related to, and hybridizing with *P. mollissima*) ; 500–2000 m. . . . . **P. mixta** LINN. *f.*
3. Involucral bracts free or shortly connate at base; hypanthium less than 3(–4) cm.
5. Flowers pink or red, pending on up to 20 cm long pedicels; hypanthium 2–4 cm; fruit ± fusiform, longitudinally ribbed, to *c.* 12 cm, edible; also cultivated as ornamental; New Guinea, locally running wild; *c.* 2000 m. . . . . **P. antioquiensis** KARST.
5. Pedicels much shorter.
6. Leaves pinnately nerved, not lobed.
7. Stems 4-angular or -winged.
8. Petioles 6-glandular; stipules (lanceolate-) ovate, more than 1 cm wide; flowers 7–10 cm ø, purple-red; corona filaments banded, purple-white; fruit 12–30 cm long, edible; cultivated, sometimes escaped; to 1000 m . . . . . **P. quadrangularis** L.
8. Petioles 2–4-glandular; stipules lanceolate-linear, less than 1 cm wide; flowers 10–12 cm ø; corona filaments variegated with red, purple and white; fruit 8–10 cm long; occasionally cultivated as an ornamental. See also *P.* × *alato-coerulea* LINDL., below; 0–1000 m. **P. alata** DRYAND.
7. Stems not winged.
9. Stipules thread-like, *c.* ½ cm; leaves ellipsoid to oblong, coriaceous; flowers *c.* 8 cm ø, flushed with purple or purple-dotted; corona filaments purple with white cross-bands; fruit ovoid, 5–8 cm long, edible; frequently cultivated, 0–1000 m. . . . . **P. laurifolia** L.
9. Stipules foliaceous; leaves herbaceous.
10. Glands on petiole thread-like or long-cavate; leaves deeply cordate; flowers 6–9 cm ø, white or pale pinkish; corona filaments banded; fruits ovoid, 6–8 cm long, edible; locally cultivated and escaped; 0–1000 m . . . . . **P. ligularis** JUSS.
10. Glands on petiole wart-like, sessile; leaf base ± cordate, rounded or acute.
11. Involucral bracts very large, extending beyond the flower, acute-acuminate; stipules lanceolate, longly acuminate, 1–1½ cm; flowers *c.* 10 cm ø, mottled purple-red; corona filaments banded; fruit *c.* 4 cm ø; ornamental, sometimes escaped; 0–1000 m . . **P. maliformis** L.
11. Involucral bracts not extending beyond the flower, obtuse; stipules linear-subulate, 5–6 mm; flowers *c.* 10 cm ø, white and pinkish; corona filaments purplish banded; fruit globose, 3–6 cm ø; sometimes cultivated; 0–1000 m. . . . . **P. nitida** H.B.K.
6. Leaves palmately nerved, mostly lobed or partite.
12. Stipules lanceolate or filiform; involucral bracts serrate-denticulate.
13. Petiole with wart-like glands at apex; flowers 4–6 cm ø.
14. Plant glabrous; involucral bracts 1½–2 cm; petals white, corona filaments white with purple base; fruit ellipsoid, 4–6 cm long, purplish, sometimes yellow; cultivated and profusely escaped; 0–2000 m . . . . . **P. edulis** SIMS[1]

(1) According to MERRILL, Sp. Blanc. (1918) 276 and En. Philip. 3 (1923) 118 this introduced species has twice been described by BLANCO from the Philippines, *viz* as *P. minima* BLCO, Fl. Filip. (1837) 647, *non* L. 1753 and *P. serrulata* BLCO, *ibid.* ed. 2 (1845) 452; *ibid.* ed. 3, 3 (1879) 50, t. 414, *non* JACQ. 1767.

14. Plant pilosulous; involucral bracts *c.* 1 cm; petals white or lavender, corona filaments mostly purplish or pinkish; fruit up to 5 cm ø; sometimes cultivated; *c.* 1500 m . . **P. incarnata** L.
13. Glands at base of petiole; flowers *c.* 10 cm ø, red; plant ferruginous-tomentose; fruit ovoid, *c.* 5 cm long; 0–1000 m . . . . . **P. vitifolia** H.B.K.
12. Stipules foliaceous; involucral bracts (sub)entire.
15. Stipules 1–2 cm long, falcate, mostly dentate.
16. Glands on petiole wart-like, subsessile, *c.* 1 mm long; flowers white, lilac or purplish, 6–8 cm ø.
17. Leaves (3–)5(–9)-lobed, incisions nearly to the base; fruit ovoid to subglobose, *c.* 6 cm long; mostly ornamental; 0–2000 m . . . . . **P. caerulea** L.
17. Leaves 3–5-lobed, incisions to about ¾ of the blade.
18. Stem 4-angular; leaf 3-lobed, the lobes broad; *Passiflora* '*Impératrice Eugénie*'; ornamental; 0–2000 m . . . . . **P. × alato-caerulea** LINDL.
18. Stem terete; leaves 3–5-lobed, the lobes narrower; ornamental and escaped; 0–2000 m. **P. caeruleo-racemosa** SABINE
16. Glands on petiole filiform, 1–2 mm; flowers red, *c.* 6.8 cm ø; fruit not known; ornamental. **P. kermesina** LINK & OTTO
15. Stipules large, 1½–4 cm, straight, entire; flowers 4–5 cm wide, white; sepals ½–1 cm horned; fruit 2½–4 cm ø, with thick pericarp; ornamental and locally profusely escaped (India, Philippines, Queensland); 0–1000 m . . . . . **P. subpeltata** ORTEGA

1. Bracts and bracteoles inconspicuous (filiform or linear), or caducous before anthesis; no involucre.
19. Flowers red, arranged in pending racemes; involucral bracts caducous before anthesis; flowers red, *c.* 7 cm ø; fruit narrowly ovoid, 5–7 cm; ornamental; 0–2000 m. . . . . **P. racemosa** BROT.
19. Flowers 1 or more in the axils of normal leaves; flowers greenish yellow or white, not red.
20. Flowers small, 1–1½ cm ø, apetalous, pale greenish; fruit a purple-black berry, 1–1¼ cm ø; variable, commonly established; 0–1500 m. . . . . **P. suberosa** L.
20. Flowers more than 1½ cm ø, provided with petals.
21. Leaves herbaceous, 2- or 3-lobed, not truncate.
22. Plant finely hairy.
23. Flowers 1–2 per inflorescence; leaves 2-lobed; flowers 2–6 cm ø; fruit ± fusiform, hexagonal, 5–6 cm; locally escaped in W. Java; 100–1000 m. . . . . **P. capsularis** L.
23. Flowers 4–8 per inflorescence; leaves 3-lobed. flowers 3–4 cm ø; fruit globose, *c.* 1½ cm ø (not yet observed in Old World specimens); occasionally cultivated; 0–1000 m. **P. holosericea** L.
22. Plant glabrous; leaves 3-lobed.
24. Leaves variegated; lower surface with 2 large glands near the base of the midnerve; petiole without glands; flowers 3–4 cm ø; fruit *c.* 2 cm ø, glaucous; ornamental; 0–500 m. **P. trifasciata** LEM.
24. Leaves not variegated, without glands at base of midrib; petiole with glands; flowers *c.* 2½ cm ø; fruit subglobose, purple, *c.* 2½ cm long; occasionally cultivated; 0–1500 m. **P. gracilis** JACQ.
21. Leaves ± coriaceous, 2-lobed or hemi-orbicular or obreniform, top truncate, lower surface with 2 rows of glands; flowers *c.* 3 cm ø; fruit globose, 1–2 cm ø; locally cultivated and escaped; 0–1000 m. . . . . **P. biflora** LAMK

Section Decaloba

DC. Mém. Soc. Phys. Genève 1, 2 (1822) 435; Prod. 3 (1828) 325; G. DON, Gen. Syst. 3 (1834) 49. — *Sect. Decaloba subsect. Eudecaloba* MAST. Trans. Linn. Soc. 27 (1871) 632 (under *subg. Plectostemma*); HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 88; *ibid.* ed. 2, 21 (1925) 499.

Sect. Polyanthea DC. Mém. Soc. Phys. Genève 1, 2 (1822) 435; Prod. 3 (1828) 322. — *Sect. Decaloba subsect. Polyanthea* (DC.) ENDL. Gen. Pl. (1839) 926; MAST. Trans. Linn. Soc. 27 (1871) 630, 642 (under *subg. Plectostemma*); HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 88; *ibid.* ed. 2, 21 (1925) 498; CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 107.

Disemma LABILL. Sert. Austr. Caled. (1824) 78, t. 79; DC. Prod. 3 (1828) 332; G. DON, Gen. Syst. 3 (1834) 56; SPACH, Hist. Nat. Vég. Phan. (1838) 276; VAN HOUTTE, Hort. 2 (1847?) t. 11 ('*Distemma*'); ROEM. Syn. Mon. 2, Pepon. (1846)

131, 188; MAST. Trans. Linn. Soc. 27 (1871) 626, 630; MIQ. Fl. Ind. Bat. 1, 1 (1855) 699; SEEM. Fl. Vit. (1865) 96.

Blephistelma RAF. Fl. Tellur. 4 (1836) 103.

Anthactinia (*non* BORY) ROEM. Syn. Mon. 2, Pepon. (1846) 190.

Sect. Octandranthus HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 506. — *Sect. Decaloba subsect. Octodranthus* (HARMS) CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 108.

Sect. Anomopathanthus HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 506. — *Sect. Decaloba subsect. Anomopathanthus* (HARMS) CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 108.

Sect. Hollrungiella HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 501.

Distr. About 70 *spp.* in the tropical and subtropical Americas according to KILLIP, some 20 *spp.* in Indo-Australia and SW. Polynesia.

Notes. I have refrained from drawing a sectional description, as this would have necessitated close examination of diagnostic characters of both the American and Asian species, which would necessarily lead too far in considering a re-evaluation of the infrageneric systematy of the genus, leading me beyond the scope of this regional revision.

1. Passiflora moluccana REINW. *ex* BL. Bijdr. (1826) 938.

See for references and synonymy under the varieties.

Climber to 6 m, sparsely to densely short-hairy. *Leaves* spirally arranged or distichous, rarely subopposite (in extra-Mal. mostly subopposite), entire (very rarely faintly 3-lobed), mostly (sub) coriaceous, glossy above, dull pale green, densely velutinous to (sub)glabrous beneath, lanceolate (in juvenile shoots) to elliptic or ovate, top acute to obtuse or rounded, sometimes retuse or up to 1 cm acuminate, base obtuse to (sub)cordate, 5–16 by (1–)1½–10 cm, pinninerved; nerves 3–8 pairs; petiole ¾–3 cm. *Glands* on lamina (in Mal.) 2–5 pairs, ½–2 mm ø; petiolar glands 2, 1–3 mm ø, always in the upper half of the petiole. Stipules *c.* 1 mm. *Inflorescences* sessile, (2–)4–10(–15)-flowered, with a central tendril, the two lateral partial inflorescences up to 1 cm stalked; pedicels ½–2½ cm; bracts and bracteoles linear, acute, mostly hairy, 2–6 mm. Tendrils 5–20 (–25) cm. *Flowers* pubescent to subglabrous outside, 3–4½ cm ø; stipe 5–20(–25) mm; hypanthium saucer-shaped, 2–3 by 6–9 mm. *Sepals* lanceolate(-triangular), subacute to obtuse, 10–20 by 4–6 mm. *Petals* lanceolate, obtuse, (sub)entire, 10–18 by 2–5 mm. *Corona* double, outer corona consisting of a rather dense row of filaments 10–18 mm and a somewhat lower inserted row of short filaments 1–3 mm, inner corona a rather stiff, densely plicate 'collar' 1½–2 by 1½–2½ mm, with finely serrate-laciniate edge, curving inward towards a low fleshy rim-like disk ¼–½ mm high. Androgynophore 5–10 mm. *Filaments* ± subulate, (5–)6–10 mm; anthers elliptic(-oblong), obtuse, 3–4½(–5) by 1½–2 mm. *Ovary* (sub) sessile, globose to ellipsoid, glabrous to densely hairy, 2–4 by 1½–3 mm; styles 3, 5–8 mm; stigmas (½–)1 mm ø. *Fruits* 1–3 per inflorescence, globose to ellipsoid, 2–3 by 1½–2½ cm, glabrous or hairy; pericarp coriaceous, *c.* 1 mm ø. *Seeds c.* 30–50, suborbicular to obovoid, 3½–4½ by 3–4 by 1½ mm, 7–9 small pits per ø.

Distr. Indo-China, S. China, in *Malesia*: Philippines (Luzon), Java, Lesser Sunda Is., S. Celebes, Moluccas. Fig. 2: 1a–b.

Ecol. Prefers apparently a seasonal climate; 0–900 m.

Notes. After comparison of the Malesian material of *P. horsfieldii* with a large amount of specimens of *P. cochinchinensis* from the Asian continent and Hainan, there appeared to be only one differentiating character, *viz* the mostly subopposite leaves in the latter species; this is of course insufficient for distinction.

Field notes. In fresh flowers the sepals are greenish white, the petals white, corona filaments yellowish with purple-brown base, inner corona purplish brown. Fresh fruits are greenish.

KEY TO THE VARIETIES

1. Petiolar glands inserted at (2–)3–8 mm from the blade-base. Leaves ± coriaceous or herbaceous, velutinous to (sub)glabrous beneath. Ovary (sub)glabrous, rarely pubescent. Fruit (sub)glabrous. . . . . **a. *var.* moluccana**
1. Petiolar glands at the apex of the petiole at 0–3 mm from the blade. Leaves mostly coriaceous, velutinous beneath. Ovary densely pubescent. Fruit thinly hairy. **b. *var.* teysmanniana**

a. *var.* moluccana. — *P. moluccana* REINW. *ex* BL. Bijdr. (1826) 938; Rumphia 1 (1837) 169, t. 51; DC. Prod. 3 (1828) 323; G. DON, Gen. Syst. 3 (1834) 47; WALP. Rep. 2 (1843) 221; MAST. Trans. Linn. Soc. 27 (1871) 631; BRITTEN in Forbes, Wand., App. 6 (1885) 506; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 88; *ibid.* ed. 2, 21 (1925) 498; MERR. Philip. J. Sc. 11 (1916) Bot. 294; HALL. *f.* Med. Rijksherb. 42 (1922) 6. — *Anthactinia moluccana* ROEM. Syn. Mon. 2, Pepon. (1846) 190.

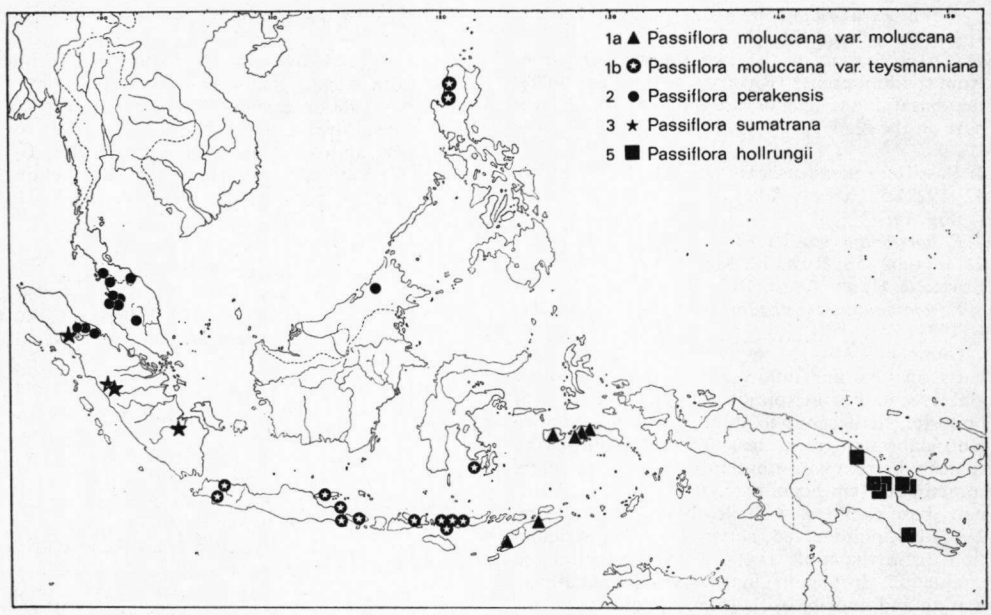

Fig. 2. Distribution of various *Passiflora* species, extra-Malesian localities of *P. moluccana var. teysmanniana* omitted.

— *Disemma moluccana* MIQ. Fl. Ind. Bat. 1, 1 (1855) 699.

P. moluccana var. timorensis BL. Rumphia 1 (1837) 169, t. 51 A; MAST. Trans. Linn. Soc. 27 (1871) 631. — *P. timoriana* SPAN. Prod. Fl. Timor., *Icon. ined.*, Linnaea 15 (1841) 207, *Icon. ined.* t. 76, *nom. nud.* — *Anthactinia timorensis* ROEM. Syn. Mon. 2, Pepon. (1846) 191. — *Disemma timoriana* MIQ. Fl. Ind. Bat. 1, 1 (1855) 700; BRITTEN in Forbes, Wand. *etc.*, App. 6 (1885) 506.

Leaves spirally arranged, ovate to oblong, apex obtuse to acute-acuminate, subcoriaceous to herbaceous (membranous when dry), pale green or ± glaucous, glabrous or subglabrous, or hairy only near the nerves beneath. *Glands* on the petiole at 3–8 mm from the blade. Petioles 1½–3 cm. Bracts and bracteoles, flower stipe, hypanthium and outer side of sepals more or less hairy to (sub)glabrous. *Flower* stipe 5–11 mm. Anthers 3–4 mm. Ovary (sub)glabrous, sometimes hairy. *Fruits* (sub)-glabrous.

Distr. *Malesia*: Lesser Sunda Is. (W. & E. Timor), Moluccas (Buru, Ceram, Ambon, Haruku I.). Fig. 2: 1a.

Ecol. *Fl.* mostly July(-Nov.).

b. *var.* **teysmanniana** (MIQ.) DE WILDE, *comb. nov.*

P. pallida (*non* L.) LOUR. Fl. Coch. 2 (1790) 527. — *P. cochinchinensis* SPRENG. Syst. Veg. 4, Curae post. (1827) 346.

P. horsfieldii BL. Rumphia 1 (1837) 170, t. 52, 1–4; WALP. Rep. 2 (1843) 221; TEYSM. Nat. Tijd. N. I. 11 (1856) 178; MAST. Trans. Linn. Soc. 27 (1871) 631; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 88; *ibid.* ed. 2, 21 (1925) 498; HALL. *f.* Med. Rijksherb. 42 (1922) 6; BACK. & BAKH. *f.* Fl. Java 1 (1963) 291; CUSSET, Adansonia 7 (1967) 375, 381. — *Anthactinia horsfieldii* ROEM. Syn. Mon. 2, Pepon. (1846) 191.

Disemma horsfieldii MIQ. Fl. Ind. Bat. 1, 1 (1855) 700. — *Disemma horsfieldii var. teysmanniana* MIQ. *l.c.*

P. horsfieldii var. elbertiana HALL. *f.* Med. Rijksherb. 42 (1922) 6.

P. ligulifolia MAST. Trans. Linn. Soc. 27 (1871) 632.

P. hainanensis HANCE, J. Bot. 16 (1878) 227.

P. philippinensis ELM. Leafl. Philip. Bot. 1 (1908) 326; MERR. En. Philip. 3 (1923) 118.

Leaves spirally arranged, distichous, sometimes partly subopposite, coriaceous, ovate or elliptical to lanceolate, apex mostly obtuse, often retuse, dark green above, pale green to glaucous green, velutinous beneath. *Glands* on the petiole at 0–3 mm from the blade, rarely partially on the blade. Petiole ½–2(–2½) cm. Bracts and bracteoles, and flower stipe, hypanthium and outer side of sepals more or less densely hairy. *Flower* stipe 7–20 mm. Anthers 3–5 mm. Ovary densely hairy. *Fruits* thinly hairy.

Distr. Indo-China, S. China (Hainan), in *Malesia*: Java (W. & E.; Madura I.), Lesser Sunda Is. (Bali, Sumbawa, Flores), SE. Celebes (Kabaëna I.), Philippines (Luzon). Fig. 2: 1b.

Ecol. Stony slopes, scrub, open forest, teak forest, 0–900 m. *Fl.* March–June, *fr.* Sept.–Nov.

Vern. Java: *rambuset*, Md., *prabuset*, *p. moto*, J; Luzon: *quachal*, Ig.

Note. In one of the two known collections from the Philippines (RAMOS & EDANO BS 38098) the basal blade glands are situated for a large part on the blade.

2. Passiflora perakensis HALL. *f.* Med. Rijksherb. 42 (1922) 5; CUSSET, Adansonia 7 (1967) 375, 381. — **Fig. 1e.**

P. horsfieldii (*non* BL.) KING, J. As. Soc. Beng. 71, ii (1902) 50; RIDL. Fl. Mal. Pen. 1 (1922) 839; BURK. & HEND. Gard. Bull. S. S. 3 (1925) 378.

P. horsfieldii var. distans CRAIB, Fl. Siam. En. 1 (1931) 743.

Climber 2–10(–15) m; sparsely, rather stiff-hairy on stem and inflorescential branches, often glabrescent. *Leaves* spirally arranged, rarely subopposite, herbaceous to thinly coriaceous, above (sub)glabrous, green, beneath (sub)glabrous to sparsely hairy, ovate-elliptic to oblong, top acute, sometimes 1 cm acuminate, (0–)1–3 mm mucronate, base rounded or shallowly cordate, 5–18 by 2½–9 cm, pinninerved, nerves 4–8 pairs, reticulation distinct; petiole 1–4(–5) cm. *Glands* on the lamina in 2–7(–8) pairs, in two rows about halfway margin and midrib, ½–1½ mm ø; petiolar glands 2, opposite, 1–3 mm ø, ± halfway to ¼ from the base of the petiole. Stipules minute, linear, *c.* 1 mm. *Inflorescences* sessile, 4–20-flowered, with a central tendril, the two lateral main branches up to 15 mm stalked; pedicels 1–2(–3) cm; bracts and bracteoles linear, acute, with finely hairy margin, 1–2½ mm. Tendrils 8–20 cm. *Flowers* thinly hairy to glabrescent, 2–3(–3½) cm ø; stipe 5–15(–22) mm; hypanthium saucer-shaped, *c.* 2 by 7–10 mm. *Sepals* lanceolate, obtuse, 10–15(–20) by (3–)4–5 mm. *Petals* lanceolate, obtuse, 8–15 by 3–4 mm. *Corona* double; outer corona filaments 6–10 mm, often strongly sinuate, inner filaments (1–)2–3 mm; inner corona 2–3 by 2–3 mm, as a densely plicate 'collar', with finely serrate edge, ± curving inwards over the *c.* ⅓ mm high disk. Androgynophore 5–6(–7) mm. *Filaments* connate into a ± inflated or cup-shaped tube entirely enveloping the ovary, (3–)5–10(–11) by 2–3 mm, free part of filaments 3–5 mm; anthers oblong, obtuse, 2½–4 (–5) by 1–1½ mm. *Ovary* on gynophore up to 1½ mm, ellipsoid to obovate, hirsute, 2–4(–5) by 1½–2(–2½) mm; styles 3, free or up to 3 mm connate; style arms 3–7 mm; stigmas 1–1½ mm ø. *Fruits* 2–7 per inflorescence, globose to ellipsoid, (1½–)2–2½ by 1½–2 cm, thinly hispid; pericarp coriaceous, *c.* 1 mm ø. *Seeds c.* 40–70, obovate, *c.* 4–4½ by 3½–4 by 1½ mm, 6–9 pits per ø.

Distr. S. Thailand, in *Malesia*: Sumatra (East Coast Res.), Malay Peninsula (Kedah, Perak, Pahang), and North Borneo (Keningau Distr. SAN 65383). Fig. 2: 2.

Ecol. Rain-forests, 0–1000 m. *Fl.* Sept.–April, *fr.* mainly May.

Notes. Closely related to *P. siamica* CRAIB (*P. octandra* GAGN.), which has also partly connate filaments, but in which the leaves are distinctly hairy also on the upper surface and which has (5–)6–8 stamens.

Field notes. Leaves bluish green or glaucous underneath. Sepals greenish, petals white, corona filaments white or greenish yellow, ± mottled at base, inner corona purplish; ovary purplish or pale green, androgynophore pale green, filaments and styles and stigmas green, anthers yellow. Fruits (bluish-)green, pericarp fleshy. Seeds blackish, arils juicy, ± colourless, of a flat taste.

3. Passiflora sumatrana BL. Rumphia 1 (1837) 170; MAST. Trans. Linn. Soc. 27 (1871) 631. — *Anthactinia sumatrana* ROEM. Syn. Mon. 2, Pepon. (1846) 191. — *Disemma sumatrana* MIQ. Fl. Ind. Bat. 1, 1 (1855) 700.

Climber 5–15 (?) m, glabrous to glabrescent. *Leaves* spirally arranged, thinly coriaceous, glabrous, ovate-elliptic, mostly ± semi-orbicular, apex truncate to 3-lobed, mostly 1–2 mm mucronate, rarely acutish, base rounded to broadly cordate, 6–12 by 5–13 cm, sub-5-plinerved and with 1–2 pairs of smaller nerves higher up, ascending or straight, the upper two main nerves ending in the lobes, reticulation distinct; petiole 2–6½ cm. *Glands* on lamina absent or 1–2, small, ½–1 mm ø, submarginal in the sinusses between the lobes; petiolar glands 2, 1–2 mm ø, at 1/5–1/3 from the base. Stipules linear, ½(–1) mm. *Inflorescences* sessile with a central tendril, the two lateral main branches up to 8 mm stalked, 2–14-flowered; pedicels 5–15 mm; bracts and bracteoles linear, acute, ½–1½ mm. Tendrils 10–20 cm. *Flowers* glabrous, 3–4 cm ø; stipe *c.* 8–12 mm; hypanthium saucer-shaped, *c.* 2½ by 7 mm. *Sepals* lanceolate, 13–15 by 4–6 mm, with a minute subapical horn or wart *c.* ½ mm. *Petals* lanceolate, 10–13 by 3 mm. *Corona* double, outer corona filaments 5–8 mm, inner filaments 2–3 mm; inner corona 2 by 2–2½ mm, consisting of a densely plicate, ± inward curving 'collar' with subentire edge; disk *c.* ¼ mm. Androgynophore 7–8 mm. *Filaments* free, *c.* 7 mm; anthers oblong, obtuse, *c.* 4 by 1½ mm. *Ovary* sessile, ellipsoid, glabrous, *c.* 4 by 1½ mm; styles free, *c.* 7 mm; stigmas 1–1½ mm ø. *Fruits c.* 1–4 per inflorescence, subglobose to ellipsoid, (2–)2½ by 2 cm, glabrous; pericarp coriaceous, ½–1 mm ø. *Seeds c.* 60, obovate, *c.* 4½ by 3 by 1½ mm, 6–8 pits per ø.

Distr. *Malesia*: West Central Sumatra (Tapanuli, West Coast Res.). Fig. 2: 3.

Ecol. Forests, 1600–1800 m.

Notes. The species is closely related to *P. assamica* CHAKRAVARTY, *P. burmanica* CHAKRAVARTY, *P. wilsoni* HEMSLEY, *P. jugorum* W. W. SMITH and *P. celata* CUSSET from continental SE. Asia.

Field notes. According to an unpublished water-colour drawing of a KORTHALS specimen (in L) the sepals are pale greenish, the petals white, androgynophore, filaments and styles greenish, anthers yellow, ovary dirty-green, corona filaments pale yellowish with purplish base, inner corona purplish.

4. Passiflora aurantia FORST. *f.* Fl. Ins. Austr. Prod. (1786) 621.

a. ***var.*** **aurantia.** — *P. aurantia* FORST. *f.* Fl. Ins. Austr. Prod. (1786) 621 (*n.* 336); CAV. Diss. 10 (1790) 457; WILLD. Sp. Pl. 3, 1 (1800) 620; SPRENG. Syst. Veg. 4, Curae post. (1827) 250; ANDREWS, Bot. Rep. 5 (1803) t. 295; MAST. Trans. Linn. Soc. 27 (1871) 634; F. v. M. Fragm. Phyt. Austr. 9 (1875) 68; K. SCH. Bot. Jahrb. 9 (1888) 211; K. SCH. & HOLLR. Fl. Kais. Wilh. Land. (1889) 82; K. SCH. & Laut. Fl. Schutzgeb. (1901) 456; WARB. Bot. Jahrb. 13 (1891) 384; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; *ibid.* ed. 2, 21 (1925) 500; Bot. Jahrb. 15 (1893) 581 (anat.); F. M. BAILEY, Queensl. Fl. 2 (1900) 689; HECKEL, Ann. Mus. Col. Marseille II, 10 (1912) 272, t. 30; GUILLAUM. J. Arn. Arb. 12 (1931) 262; Fl. Nouv. Caléd. (1948) 224; Ann. Mus. Col. Marseille 55/56 (1948) 37; Mém. Mus. Hist. Nat. Paris. sér. B, Bot. 8 (1959) 148; *ibid.* 8 (1962) 270; RECHINGER, Denkschr. Wien. Akad. Wiss. 85 (1910) 314; LLOYD & AIKEN, Bull. Lloyd Libr. *n.* 33 (1934) 75; BEAL, Austr. Pl. 6 (1970) 13, photogr. — *Murucuja aurantia* PERS. Syn. Pl. 2 (1807) 222; SPRENG. Syst. Veg. 3 (1826) 43. — *Disemma aurantia* LABILL. Sert. Austr. Caled. (1824) 78, t. 79; DC. Prod. 3 (1828) 332; G. DON, Gen. Syst. 3 (1834) 56; SPACH, Hist. Nat. Vég. Phan. (1838) 276; HOOK. in Curtis, Bot. Mag. (1845) t. 4140; ROEM. Syn. Mon. 2, Pepon. (1846) 188. — *Blephistelma aurantia* RAF. Fl. Tellur. 4 (1836) 103. — *Distemma aurantiacum* LEMAIRE, Ill. Hortic. 14 (1867) Misc. 57. — Fig. **1f.**

P. glabra WENDL. Coll. Plant. 1 (1805) 55, t. 17, *non* MILL. 1768; MAST. Trans. Linn. Soc. 27 (1871) 634; F. v. M. Fragm. Phyt. Austr. 9 (1875) 69. — *P. adiantum* WILLD. En. Hort. Berol. 2 (1809) 698; SPRENG. Syst. Veg. 3 (1826) 42. — *P. adiantifolia* KER-GAWL, Bot. Reg. 3 (1817) t. 233; LAWRENCE, Passionfl. (1802) t. 11; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; Bot. Jahrb. 15 (1893) 581 (anat.). — *Murucuja adiantifolia* SWEET, Hort. Brit. ed. 1, pt 2 (1826) 355. — *Disemma adianthifolia* DC. Prod. 3 (1828) 333; G. DON, Gen. Syst. 3 (1834) 56; SPACH, Hist. Nat. Vég. Phan. (1838) 277; ROEM. Syn. Mon. 2, Pepon. (1846) 188; LEMAIRE, Ill. Hortic. 14 (1867) Misc. 57 ('*Distemma adiantifolium*').

Murucuja baueri LINDL. Coll. Bot. (1821) t. 36. — *Disemma baueriana* ENDL. Prod. Fl. Norfolk (1833) 66; G. DON, Gen. Syst. 3 (1834) 56 ('*baueri*'); WALP. Rep. 2 (1843) 221; ROEM. Syn. Mon. 2, Pepon. (1846) 188–189; LEMAIRE, Ill. Hortic. 14 (1867) Misc. 57. — *P. baueriana* MAST. Trans. Linn. Soc. 27 (1871) 634; HARMS, Bot. Jahrb. 15 (1893) 581 (anat.).

Disemma coccinea DC. Prod. 3 (1828) 333, *non P. coccinea* AUBL. 1775; G. DON, Gen. Syst. 3 (1834) 56; SPACH, Hist. Nat. Vég. Phan. (1838) 277; LEMAIRE, Ill. Hortic. 14 (1867) Misc. 57. — *P. banksii* BENTH. Fl. Austr. 3 (1866) 312; MAST. Trans. Linn. Soc. 27 (1871) 634; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; *ibid.* ed. 2, 21 (1925) 483, 500; Bot. Jahrb. 15 (1893) 581 (anat.); BRITTEN, Ill. Austr. Pl. *etc.* 2 (1901) 42, t. 129; DOMIN, Bibl. Bot. Heft. 89 (1928) 986–987. — *P. aurantia var. banksii* F. M. BAILEY, Queensl. Agric. J. 26 (1911) 315; *ibid.* 27 (1911) 66; Compr. Cat. Queensl. (1913) 220, f. 191.

Disemma brachystephanea F. v. M. Fragm. Phyt. Austr. 1 (1858) 56. — *P. brachystephanea* BENTH. Fl. Austr. 3 (1866) 312; MAST. Trans. Linn. Soc. 27 (1871) 634; F. v. M. First Syst. Census (1882) 76; Second Syst. Census (1889) 128; F. M. BAILEY, Syn. Queensl. Fl. (1883) 199; Cat. Pl. Queensl. (1890) 20; Queensl. Fl. 2 (1900) 689; Compr. Cat. Queensl. (1913) 220; MOORE, Handb. Fl. N. S. W. (1893) 254. — *P. banksii var. brachystephanea* DOMIN, Bibl. Bot. Heft. 89 (1928) 987.

Disemma caerulescens SEEM. Bonplandia 10 (1862) 366.

Disemma barclayi SEEM. Fl. Vit. (1865) 96. — *P. barclayi* MAST. Trans. Linn. Soc. 27 (1871) 634; DRAKE DEL CASTILLO, Ill. Fl. Ins. Mar. Pacif. (1890) 175; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; PARHAM, Pl. Fiji Is. (1964) 111.

Disemma storckii SEEM. Fl. Vit. (1865) 96. — *P. storkii* DRAKE DEL CASTILLO, Ill. Fl. Ins. Mar. Pacif. (1890) 175; PARHAM, Pl. Fiji Is. (1964) 111.

Disemma vitiensis SEEM. Fl. Vit. (1865) 96. — *P. vitiensis* MAST. Trans. Linn. Soc. 27 (1871) 634; DRAKE DEL CASTILLO, Ill. Fl. Ins. Mar. Pacif. (1890) 175; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; GIBBS, J. Linn. Soc. Bot. 39 (1909) 148, *excl. specim. Samoensis*; TURRILL, J. Linn. Soc. Bot. 43 (1915) 23; PARHAM, Pl. Fiji Is. (1964) 112.

P. samoënsis (*non* EXELL) YUNCKER, Bern. P. Bish. Mus. Bull. 220 (1959) 193.

Climber to 6 m, glabrous or glabrescent, rarely finely pubescent (distinctly pubescent in *var. pubescens*). Serial buds sometimes developed into minute shoots. *Leaves* spirally arranged, herbaceous, rarely coriaceous, broadly ovate to suborbicular in outline, 3(–5, especially in some New Caledonian specimens)–lobed in the upper part, sometimes 3(–5)–dissected, rarely entire, top acute or mostly obtuse or rounded, sometimes retuse, often up to 1 mm mucronate, base subacute to shortly cordate, (1½–)2½–10 by (2–)4–13 cm, 3(–5)–plinerved with 2–6 pairs of smaller nerves higher up, main nerves straight, ending in the lobe tips; reticulation distinct; lobes ½–5 cm, narrow to broad; petiole 1–4 cm. *Glands* on lamina ¼–½ mm ø, 2–35 scattered between the main nerves; petiolar glands 2 (outside Mal. rarely 0 and absent in *var. pubescens*), flat to ± crateriform, ½–2 mm ø, in upper half of petiole, usually close to the blade, rarely (*var. samoënsis*) in the lower half. Stipules linear, *c.* ½ mm. *Inflorescences* sessile, 1(–2?)–flowered; pedicels ½–2 cm, bracteoles (2–)3, linear acute, 1–3 mm. Tendrils 7–20 cm. *Flowers* glabrous, 4½–8(–10) cm ø; stipe 1½–5(–7) mm; hypanthium saucer-shaped, 3–4 by (8–)10–17 mm. *Sepals* lanceolate, (sub)acute, keeled, (2–)2½–4½ by ½–2 cm. *Petals* oblong to lanceolate, acute to obtuse, (0–)5–15 by 3–5 mm. *Corona* double,

outer corona filaments slender, rather spaced, (5–)8–12(–18) mm (± as long as the inner corona; inner corona tubular, membranous, 7–15(–20) mm long, gradually narrowed and ± wrinkled towards the 7–12 mm wide throat, with a shallowly lobed undulate paler edge; disk 0. Androgynophore 20–35 mm. *Filaments* 7–11 mm, free or up to 2 mm connate at base; anthers lanceolate, obtuse, 5–10 by 1½–3 mm. *Ovary* stalked, 1–2½ mm, (ob)ovate-ellipsoid, glabrous or glabrescent, 2½–6 by 1½–3(–3½) mm; styles free, (5–)7–10 mm; stigmas (1–)1½–3 mm ø. *Fruit* subglobose to ellipsoid, 2½–5 by 2½–4½ cm; pericarp coriaceous, *c.* ½ mm ø thick. *Seeds c.* 100–200, obovate, 2½–3 by 2–2¼ by 1–1½ mm, 4–6 pits per ø; embryo *c.* 1½–2 mm, cotyledons ellipsoid, broadly obtuse, *c.* 1¼ by 1 mm.

Distr. Australia, SW. Pacific, and *Malesia*: East New Guinea, Thursday I., Louisiades, Queensland, Lord Howe I., Norfolk I., New Caledonia, New Hebrides, Fiji, Tonga, Niue I. Fig. 3: 4a.

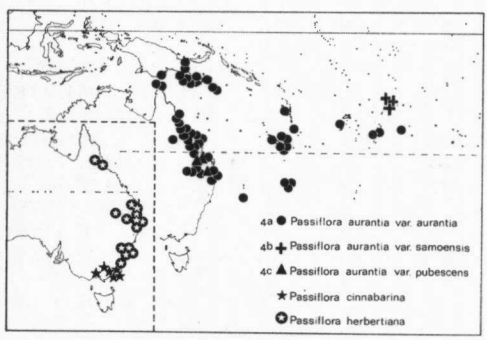

Fig. 3. Distribution of various *Passiflora* species.

Ecol. (Coastal) scrub, monsoon scrub, (rain-) forest edges and regrowths, forest clearings, limestone cliffs, on sandy and loamy soils, 0–500(–1250) m. *Fl.* Jan.–Dec. (New Guinea), *ditto*, but mainly May–June & Oct. (Australia); *var. samoensis fl.* May–Aug.

Notes. Some specimens from New Caledonia with (± deviating) 5-palmate(–lobed) and rather coriaceous leaves, and with rather small flowers, are included in the type variety.

Field notes. Fresh flowers are described as follows. Sepals, corona, androgynophore: orange, salmon, pink, flesh-coloured or pale red, turning deep (bright) red with age; petals: whitish, creamy, to reddish; corona-filaments deep red; fresh fruits are reported as (pale) greenish.

KEY TO THE VARIETIES

1. Petiole provided with glands.
 2. Glands in the upper half of the petiole; laminal glands not (only) approximate to the nerve bases. . . . . **a. *var.* aurantia**
 2. Glands in the lower ¼ of the petiole; laminal glands rather approximate to the nerve bases. Samoa. . . . . **b. *var.* samoënsis**
1. Petiole without glands.
 3. Plant glabrous; sometimes with minute petiolar glands. Norfolk I. **a. *var.* aurantia**
 3. Plant (incl. ovary) finely pubescent. Australia. **c. *var.* pubescens**

b. *var.* samoënsis (EXELL) DE WILDE, *comb. nov.* — *P. samoënsis* EXELL, J. Bot. 63 (1925) 203; CHRISTOPHERSEN, Bern. P. Bish. Mus. Bull. 128 (1935) 153. — Fig. 3: 4b.

c. *var.* pubescens F. M. BAILEY, Queensl. Agric. J. 26 (1911) 315, t. 31 f. 2; Compr. Cat. Queensl. Pl. (1913) 220, f. 191–bis. — *P. baileyana* DOMIN, Bibl. Bot. Heft 89 (1928) 433. — Fig. 3: 4c.

Passiflora cinnabarina LINDL. Gard. Chron. (1855) 724; OLIV. in Curtis, Bot. Mag. 97 (1871) t. 5911; MAST. Trans. Linn. Soc. 27 (1871) 634; F. v. M. Fragm. Phyt. Austr. 9 (1875) 68; LINDL. J. R. Hort. Soc. Lond. n.s. 4 (1877) 134; DOMIN, Bibl. Bot. Heft 89 (1928) 433; YOUNG, Rec. Auckl. Inst. Mus. 7 (1970) 148, f. 9–11.

? *Disemma muelleriana* REGEL, Index Sem. Hort. Petrop. (1866) 101. — ? *P. muelleriana* MAST. J. R. Hort. Soc. Lond. n.s. 4 (1877) 133.

? *Distemma eglandulosum* LEMAIRE, Ill. Hortic. 14 (1867) Misc. 56.

Distr. Australia (Victoria). Fig. 3.

Passiflora herbertiana KER-GAWL, Bot. Reg. 9 (1823) t. 737; SPRENG. Syst. Veg. 3 (1826) 41; LODDIGES, Bot. Cab. 14 (1828) t. 1364; BENTH. Fl. Austr. 3 (1866) 311; MAST. Trans. Linn. Soc. 27 (1871) 634; F. v. M. Fragm. Phyt. Austr. 9 (1875) 68; HARMS, Bot. Jahrb. 15 (1893) 581 (anat.); in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89; F. M. BAILEY, Queensl. Fl. 2 (1900) 688; Compr. Cat. Queensl. Pl. (1913) 220. — *Murucuia herbertiana* SWEET, Hort. Brit. ed. 1, pt 2 (1826) 355. — *Disemma herbertiana* DC. Prod. 3 (1828) 332; G. DON, Gen. Syst. 3 (1834) 56; DECNE, Herb. Timor. Descr. (1835) 123 (= Nouv. Ann. Mus. 3: 451); SPACH, Hist. Nat. Vég. Phan. (1838) 276; SPAN. Linnaea 15 (1841) 207; ROEM. Syn. Mon. 2, Pepon. (1846) 189; MIQ. Fl. Ind. Bat. 1, 1 (1855) 701; LEMAIRE, Ill. Hortic. 14 (1867) 57; BRITTEN in Forbes, Wand., App. 6 (1885) 506.

P. verruculosa WEINMANN, Syll. Plant. Ratisb. 1 (1824) 228; STEUD. Nom. ed. 2, 2 (1841) 276 ('*verrucosula*'); ROEM. Syn. Mon. 2, Pepon. (1846) 177; MAST. Trans. Linn. Soc. 27 (1871) 639.

P. biglandulosa CALEY, in Hb. Lambert, *nom. nud.* — *Disemma herbertiana var. caleyana* DC. Prod. 3 (1828) 332; G. DON, Gen. Syst. 3 (1834) 56. — *Disemma caleyana* ROEM. Syn. Mon. 2, Pepon. (1846) 189. — *P. herbertiana var. caleyana* MAST. Trans. Linn. Soc. 27 (1871) 634.

P. distephana F. v. M. *ex* HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 89, *nomen.*

Distr. Australia (Queensland and New South Wales). Fig. 3.

Note. The record of this species from Timor by DECAISNE, SPANOGHE, MIQUEL, and BRITTEN, *ll.cc.* is an erroneous localisation of an Australian collection, as Dr. H. HEINE kindly informed me that

in the Decaisne Herbarium at Paris there are 3 identical specimens, 2 apparently wrongly labelled with the provenance 'Timor', the 3rd one marked to come from 'N. holl. port jackson'.

5. Passiflora hollrungii K. SCH. Bot. Jahrb. 9 (1888) 211; K. SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 82; HARMS, Bot. Jahrb. 15 (1893) 581; K. SCH. & LAUT. Fl. Schutzgeb. (1901) 456; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 501; JERMY & SAYERS, J. R. Hort. Soc. 92, 3 (1967) 121. — **Fig. 1a–d.**

Climber to *c.* 10 m, sparsely to densely greyish pubescent. *Leaves* spirally arranged, herbaceous, hairy especially on and near the nerves beneath, broadly ovate to elliptic(-oblong), entire, top acute or up to 1 cm acuminate, up to 2 mm mucronate, base cordate to rounded, up to 2 mm peltate, 5–14 by 3–9½ cm, 3(–5)-plinerved, the nerves arching towards the apex, larger veins often ± trabeculate; petiole 2–4 cm. *Glands* on lamina 1–5 submarginal on either side, ¼–½(–1) mm ø, petiolar glands 0. Stipules linear, *c.* ½ mm. *Inflorescences* sessile, 1–2-flowered, either with a tendril or not; pedicels ¾–1½ cm; bracteoles 3, linear, 1½–4 mm, rather near the articulation. Tendrils 6–25 cm. *Flowers* (sub)glabrous; stipe 5–12 mm; hypanthium bowl-shaped, 3–4 by 9–12 mm. *Sepals* lanceolate, subacute to obtuse, ± hairy at the top, 4–5 by ½–¾(–1) cm. *Petals* lanceolate, acute, 3½–4½ cm by 4–6 mm, membranous, glabrous. *Corona* double, outer corona erect, tubular to ± skirt-shaped, ± fleshy, 2–3 cm, with up to ¼ mm deep irregularly undulate-lobed edge; inner corona 1–2 mm high, curved inward, stiff, up to halfway laciniate into acute teeth; both coronas inserted on the rim of the hypanthium; disk fleshy, annular sharp-edged, *c.* 1 mm high near the base of the androgynophore, connected by 5 low septa to the hypanthium. Androgynophore 2½–4 cm. *Filaments* 7–12 mm; anthers lanceolate, bluntly *c.* ½ mm apiculate, shortly sagittate at base, 8–9 by 2–3 mm. *Ovary* 2 mm stalked, densely pubescent, obovate-ellipsoid(-oblong), 5–7 by 3–4 mm; styles free, 5–7½ mm; stigmas *c.* 2 mm ø. *Fruit* subglobose to ellipsoid, sometimes ± fusiform, excluding stipe 2½–3½ by 2–2½ cm; pericarp coriaceous, *c.* 1 mm ø, sparsely to densely pubescent. *Seeds* *c.* 100–200, obovate-oblong, 2–2½ by 1–1¼ by 2/3 mm, 3–5 pits per ø; embryo 1½–2 mm, cotyledons obovate, broadly obtuse, *c.* 1 by 2/3 mm.

Distr. *Malesia*: East New Guinea. Fig. 2 : 5.

Ecol. Secondary forest, scrub, 1000–1700 m.

Fl. fr. mainly Oct., once in May and July.

Vern. *Gamoogaka mamerga*, Finisterre Mts.

Notes. In a single leaf I have found one minute petiolar gland at 2 mm below the blade.

Field notes. Sepals and petals of fresh specimens are reported as lavender or pale bluish green or greyish purple, the corona (tube) as purple-blue to deep purple or blackish; filaments, styles and stigmas (pale) green. Ripe fruit green with a fine white pubescence.

2. ADENIA

FORSK. Fl. Aegypt.-Arab. (1775) 77; ENGL. Bot. Jahrb. 14 (1891) 374; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 83; *ibid.* ed. 2, 21 (1925) 488; HALL. *f.* Med. Rijksherb. 42 (1922) 8; CHAKRAVARTY, Bull. Bot. Soc. Beng. 3 (1951) 68; HUTCH. Gen. Fl. Pl. 2 (1967) 373; DE WILDE, Thesis, Med. Landb. Hogeschool Wagen. 71–18 (1971) 1–281. — *Modecca* [RHEEDE, Hort. Mal. 8 (1688) t. 20–23] LAMK, Encycl. Méth. Bot. 4 (1797) 208; DC. Prod. 3 (1828) 336; BENTH. & HOOK. *f.* Gen. Pl. 1 (1867) 813. — *Microblepharis* (W. & A.) ROEM. Syn. Mon. 2, Pepon. (1846) 133, 200. — *Erythrocarpus* ROEM. *l.c.* 133, 204.

Unarmed climbers (in Mal.), often with tubers. *Leaves* (in Mal.) simple, entire or lobed, pinni- or palminerved; apex of petiole or blade-base with 1–2 glands, sessile or on auricles. Stipules (in Mal.) minute. *Inflorescences* mostly stalked, few- to many-flowered, often with 1(–3) tendrils, rarely collected into raceme-like short-shoots. Bracts small. *Flowers* unisexual (plants mostly dioecious), in ♂ with vestigial ovary, in ♀ the stamens reduced to ± subulate staminodes (rarely bisexual in Afr.), mostly greenish to yellowish; hypanthium saucer- to cup-shaped, or tubiform, sometimes 5-saccate. *Sepals* (4–)5(–6), free or partially connate into a calyx tube. *Petals* (4–)5(–6), free or partially connate with the calyx tube, greenish, creamy, or white, mostly smaller than the sepals. *Corona* mostly a simple laciniate membrane or composed of hairs, sometimes fleshy, situated at the transition of hypanthium and sepals (or calyx tube), or absent. Disk mostly composed of 5 strap-shaped or clavate often outward curved appendages, opposite the sepals, inserted near mostly the bottom of the hypanthium. Androgynophore 0, rarely short.

Stamens 5, (in Mal.) inserted at the base of the hypanthium, free or partially connate into a filamental tube, the tube often connected with the hypanthium by septa opposite the petals; anthers narrow, mostly acute or acuminate, erect, basifixed. *Ovary* subsessile, globose to fusiform; styles 3(–5), free or connate, distinct or not; stigmas finely lobed to papillate or ramified. *Capsule* 3–valved, (in Mal.) coriaceous or woody.

Distr. About 92 *spp.* in 6 sections in tropical and subtropical Africa (*c.* 60 *spp.*), Madagascar (*c.* 20 *spp.*) and SE. Asia, Malesia, and N. & NE. Australia, in the Pacific east to the Solomon Is. (*A. heterophylla*). Especially in Africa and Madagascar quite a number of local endemics.

Ecol. The genus occurs in a wide range of habitats, varying from rain-forest to savannahs and almost desert conditions where most species have more os less succulent stems. In Africa and Madagascar a number of species have striking, swollen main stems or tubers; some are thorny or spiny.

In Malesia up to 1500(–2000) m, in everwet forest, except *A. heterophylla* which prefers seasonal climatic conditions. Malesian species are medium-sized to large lianas, but *A. penangiana* is usually a small climber of but a few metres.

Morph. & Taxon. In most species the filaments are in the basal part united into a (short) tube, whereas this tube is connected by septa with the hypanthium, opposite the petals. In some members of *sect. Microblepharis* and *sect. Blepharanthes* the thus formed apartments are ± bulging, forming a 5-saccate hypanthium in which the 5 disk glands are situated.

As pointed out in my monograph (DE WILDE, Thesis 1971, 27–36), 6 sections are recognized, mainly based on the flower structure, and sustained by characters found in the position of the glands on the leaves. In many species the sepals (and often also the petals) are partially connate into a tube; and this condition is considered as an advanced state against free sepals.

The Indo-Malesian species belong to 3 sections: (i) *sect. Microblepharis* (Africa, Madagascar, SE. Asia; *A. penangiana* in Malesia), (ii) *sect. Blepharanthes* (Africa, SE. Asia; not in Malesia), and (iii) *sect. Erythrocarpus* (most Malesian *spp.*). *Sect. Microblepharis*, with free sepals and petals, is considered as primitive; *sect. Erythrocarpus* as relatively derived because of the tubiform flowers with partially connate sepals and petals, the absence of the corona, and the basal blade-glands situated on auricles at the top of the petiole.

As to the leaf glands 3 types are distinguished: (i) glands at blade-base 2, or by connation (reduction) 1, sessile at the very blade-base, or on auricles at the transition of blade and petiole or at the top of the petiole; (ii) blade-glands on the lower surface of the blade scattered or in ± fixed places; in lobed leaves often corresponding with the sinusses between the lobes; (iii) marginal glands, mostly very small, at the end of a small vein, in some species on teeth.

In all Indo-Malesian species the fruits are red, and the funicles of the seeds are longer than in all other African or Madagascan species.

Heteroblasty and heterophylly. As in many lianas the leaves of most *Adenias* are very variable, and in many species lobed as well as entire leaves are found. Also in juvenile forms the leaves may be quite different in shape and in presence or position of the glands, as compared with the adult stage. In adult *A. cordifolia*, for instance, the basal glands of the cordate, ovate leaves are situated in two distinct, separate, hollowed auricles lateral at the top of the petiole, whereas in the juvenile stage these auricles are absent, and the blade of a peculiar lunate- or 3-lobed shape with mostly peltate base, with or without 1–2 very small glands.

KEY TO THE SPECIES

1. Sepals free (flowers ± campanulate). Corona present. Leaves with 1–2 mm wide peltate base; basal glands 2, free or contiguous. *Sect. Microblepharis*. . . . . **1. A. penangiana**
1. Sepals largely connate (flowers ± tubiform). Corona absent. Leaves not peltate; basal glands 2, on 2 auricles at the transition of petiole and blade. *Sect. Erythrocarpus*[1].
2. Calyx lobes (1–)1½–3 mm, reflexed in anthesis. Leaves entire or lobed, suborbicular to lanceolate in outline, with cordate to acute base, 5–25 cm long. Gland-bearing auricles shallowly concave, more or less adnate to the blade, sometimes ± peltately connate.
3. Stipe of ♂ flowers 4–15 mm; ♂ flowers including stipe (10–)15–25(–30) by 1½–5(–7½) mm. Flower buds oval to obovate. Fruits ellipsoid to oblong; dry pericarp coriaceous. Leaves entire or lobed. **2. A. heterophylla**

(1) Two species of this section, *viz. A. cardiophylla* (MAST.) ENGL. and *A. viridiflora* CRAIB which occur outside Malesia in the Himalayan-Indochinese region, are not entered in the key. They are closely allied to *A. heterophylla*, but distinguished by the thick pericarp, which is 5–20 mm ø at the valve sutures.

3. Stipe of ♂ flowers 1–4(–8) mm. Flower buds ovate. Fruits subglobular or ± fusiform; dry pericarp woody. Leaves entire.
   4. ♂ Flowers including the 1½–4(–8) mm long stipe 9–15 by 2–3½ mm. Anthers (4–)4½–7 by ¾–1¼ mm. Leaves suborbicular, ovate or obovate to oblong-lanceolate, palmati- to pinninerved, with acute-acuminate to rounded base and obtuse to acute, up to *c.* 1 cm acuminate apex; when dry green to dark brown above, pale brownish or greenish to whitish beneath. Glands at blade-base restricted to the auricles. Fruits globular or ± fusiform; the valves ½—3 mm thick. . **3. A. macrophylla**
   4. ♂ Flowers including the 1–1½ mm long stipe 7–9 by 4(–5) mm. Anthers 3–4 by 1 mm. Leaves ovate to ovate-elliptic, sub-3–5-plinerved, with cordate to broadly rounded base and ½–1½ cm acuminate apex; when dry dark brown at both surfaces. Glands at blade-base large, extending beyond the auricles on the blade. Fruits globular, with *c.* 3 mm thick valves. . . . . **4. A. kinabaluensis**
2. Calyx lobes 1–2 mm, erect in anthesis. Leaves entire, ovate to oblong, with deeply cordate to subtruncate base, 2½–10(–17) cm long. Gland-bearing auricles hemiglobular, deeply concave, ± separate from the blade, not peltately connate.
   5. Fruits fusiform, ± 3(–6)-angular; valves when dry hard-coriaceous, 1–1½ mm thick. ♂ Flowers including the 10–20 mm long stipe 18–35 by 1½–3(–4) mm. . . . . **5. A. cordifolia**
   5. Fruits globular, not ribbed; dry valves ± woody, (1–) 1½–2½ mm thick. ♂ Flowers including the 9–10 mm long stipe 16–18 by 2½–3 mm . . . . . **6. A. crassa**

1. Section Microblepharis

(W. & A.) ENGL. Bot. Jahrb. 14 (1891) 376; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 84; *ibid.* ed. 2, 21 (1925) 492; HALL. *f.* Med. Rijksherb. 42 (1922) 8, *p.p.* — *Modecca subg. Microblepharis* W. & A. Prod. 1 (1834) 353. — *Microblepharis* ROEM. Syn. Mon. 2, Pepon. (1846) 133, 200. — *Modecca sect. Microblepharis* ENDL. Gen. Pl. (1839) 928; MIQ. Fl. Ind. Bat. 1, 1 (1856) 702, *quoad bas.*; BENTH. & HOOK. *f.* Gen. Pl. 1 (1867) 813; MAST. in Hook. *f.* Fl. Br. Ind. 2 (1879) 601.

Sepals free. Petals free. Hypanthium about as long as wide. Corona present.

Distr. Africa (9 *spp.*), Madagascar (1 *sp.*), SE. Asia and *Malesia* (5 *spp.*).

1. Adenia penangiana (WALL. *ex* G. DON) DE WILDE, Blumea 15 (1967) 266.

See for references and synonymy under the varieties.

Climber or creeper to 6 m, with tuberous rootstock. *Leaves* herbaceous to coriaceous, entire, ovate-elliptic to linear, top acute, up to 2 cm acuminate, base rounded, rarely subacute, (1½–)2–16 by (¼–)½–7½ cm, pinninerved; nerves 5–12 pairs; petiole (⅓–)½–3½ cm. *Glands* at blade-base 2, free or contiguous, ½–1½ mm ø, situated on the mostly slightly 2-lobed, up to 5 mm broad peltate base; blade-glands up to ½ mm ø, 0–9 at either side, situated marginal or rarely submarginal *Inflorescences* up to 10 cm peduncled, rarely (sub)-sessile in short-shoots up to 3 cm; in ♂ up to 30-flowered, often cincinnate, in ♀ 1–3-flowered; tendrils 0–3, ½–1 cm. Sterile tendrils simple or 3-fid, 1–10 cm, sometimes ending in adhesive disks. Bracts and bracteoles triangular to oblong, acute, ½–1½ mm. Plants dioecious or monoecious. — ♂ *Flowers* including the 1–7 mm long stipe 8–17 by 1–4 mm, the sepals spreading in anthesis up to *c.* 10 mm wide. Hypanthium cup-shaped, 1–2(–3) mm; calyx tube 0(–2) mm. Sepals free or nearly so, oblong to lanceolate-linear, acute to obtuse, 4½–15 mm. Petals elliptic to oblong, ± unguiculate, obtuse to subcute, 4–10 by 1¼–3 mm, finely serrulate. Filamentsa 2½–3½ mm, connate for 1–2½ mm. Anthers 2–3½ by ½–¾ mm, obtuse to subacute, up to 1 mm apiculate. Septa 1–2 mm high. *Corona* composed of fine hairs or a finely laciniate membrane 0.1–½ mm. Disk glands ½–1 mm. — ♀ *Flowers* including the 1–3(–5) mm long stipe 6–16 by 1–2½ mm. Hypanthium cup-shaped ½–1½ mm. Calyx tube 0. Sepals oblong to lanceolate-linear, acute to obtuse, 4–10 mm. Petals elliptic to oblong, obtuse, 2–5 by ¾–1¼ mm, ± finely serrulate. Staminodes 1–1½ mm, connate for ¼–½ mm. Septa ¼–½ mm high. Corona hairs ¼–½ mm. Disk glands *c.* ½ mm. Pistil 3½–6 mm; gynophore *c.* ½ mm; ovary ellipsoid to oblong, 2–3 by 1¼–1½ mm; styles connate for up to ½ mm, style-arms 1–2 mm; stigmas finely papillate, each *c.* 1 mm ø. *Fruit* 1, ellipsoid to oblong, top obtuse to subacute, excluding the 2–25 mm long gynophore (1¾–)2–5½(–6) by 1¼–3 cm; pericarp (dry) coriaceous, ¼–½ mm. *Seeds* (3–)5–15 subglobular or flattened or subtriangular, 5–11 by 5–11 by 3–4 mm, smooth or grooved or variously pitted; embryo 5–9 mm; cotyledons suborbicular, sometimes obliquely truncate, 5–9 by 5–8 mm.

Distr. Nicobar Is., Peninsular Thailand, in *Malesia*: Malay Peninsula and Sumatra. Fig. 7.

Notes. Beside inflorescences in the axils of

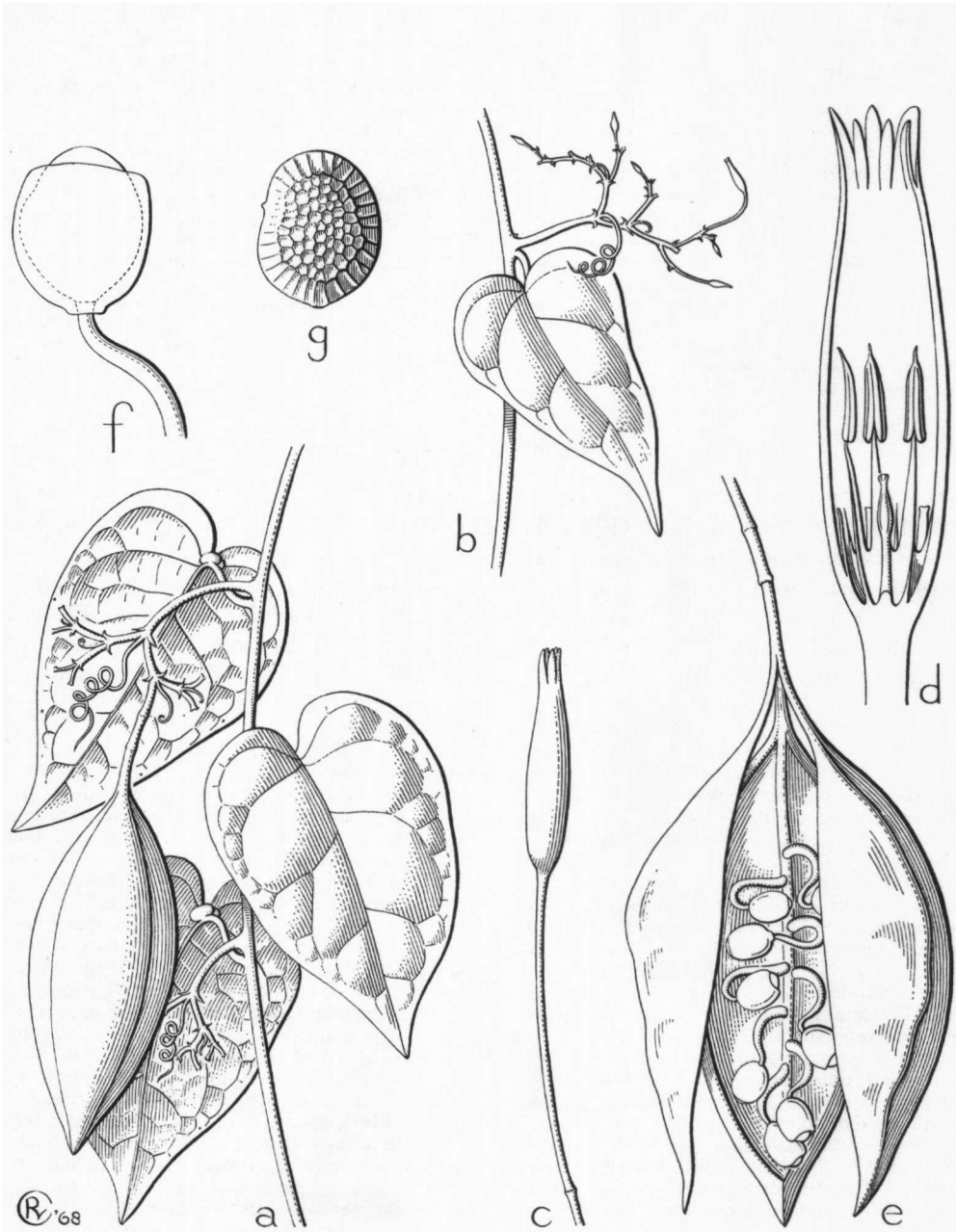

Fig. 4. *Adenia cordifolia* (BL.) ENGL. *a.* Branch with infructescence, ×⅔, *b. ditto* with ♂ inflorescence, ×⅔, *c.* ♂ flower, ×2, *d.* ♂ flower in longitudinal section, ×4, *e.* fruit, ×⅔, *f.* seed with aril, ×2, *g.* seed, ×2 (*a* ALVINS 2288, *b–d* RIDLEY 10197, *e–f* BLUME 2030, in spirit, *g* BECCARI 2155).

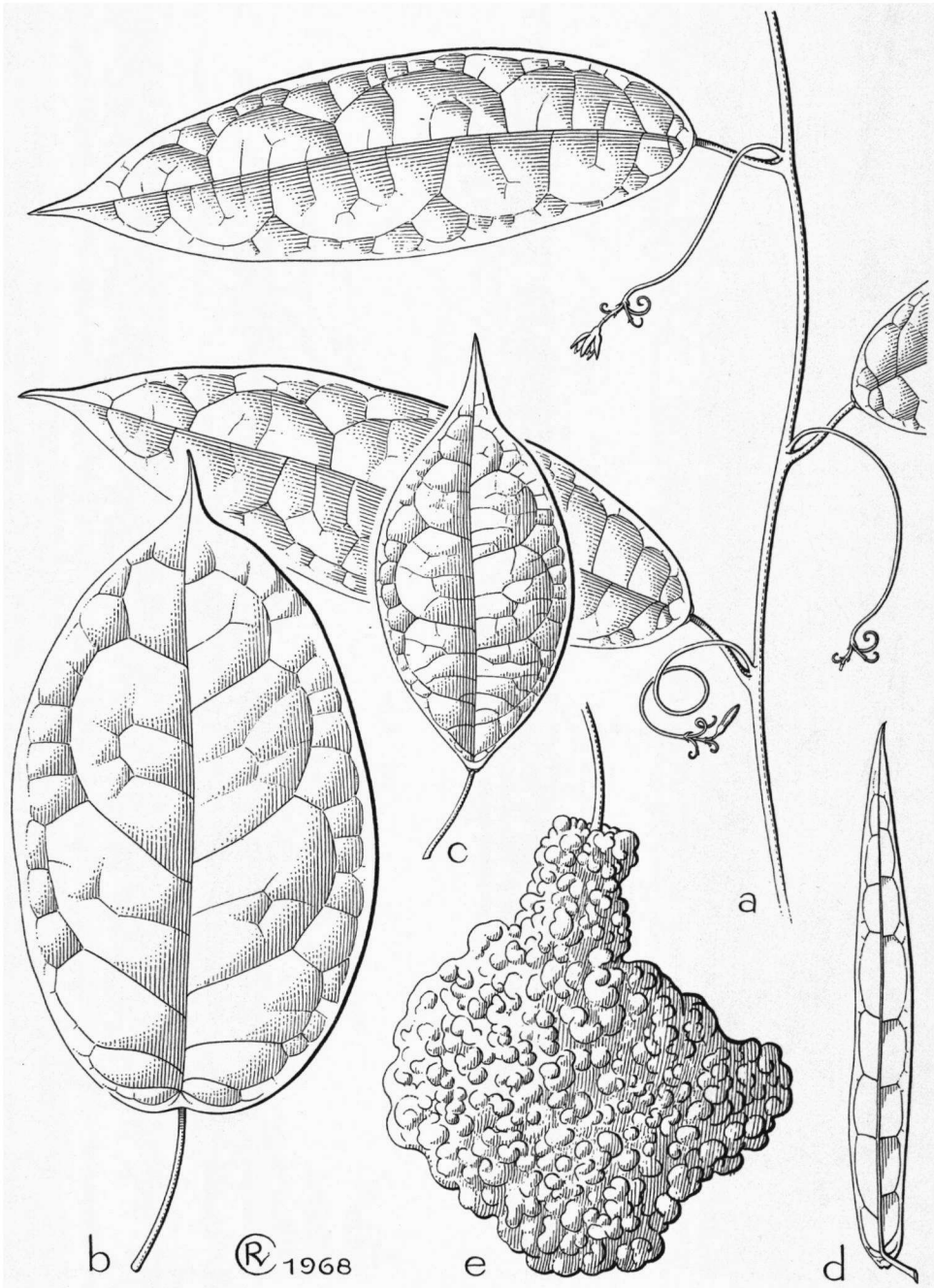

Fig. 5. *Adenia penangiana* (WALL. *ex* G. DON) DE WILDE *var. penangiana*. *a*. Habit, *b–c*. leaves from above. — *Ditto var. parvifolia* (PIERRE *ex* GAGN.) DE WILDE. *d*. Leaf from beneath, *e*. tuber; all × ⅔ (*a* RAHMAT SI TOROES 2329, *b* MARADJO 158, *c* BECCARI 4409, *d* HANIFF & NUR 7497, *e* HENDERSON *s.n.*).

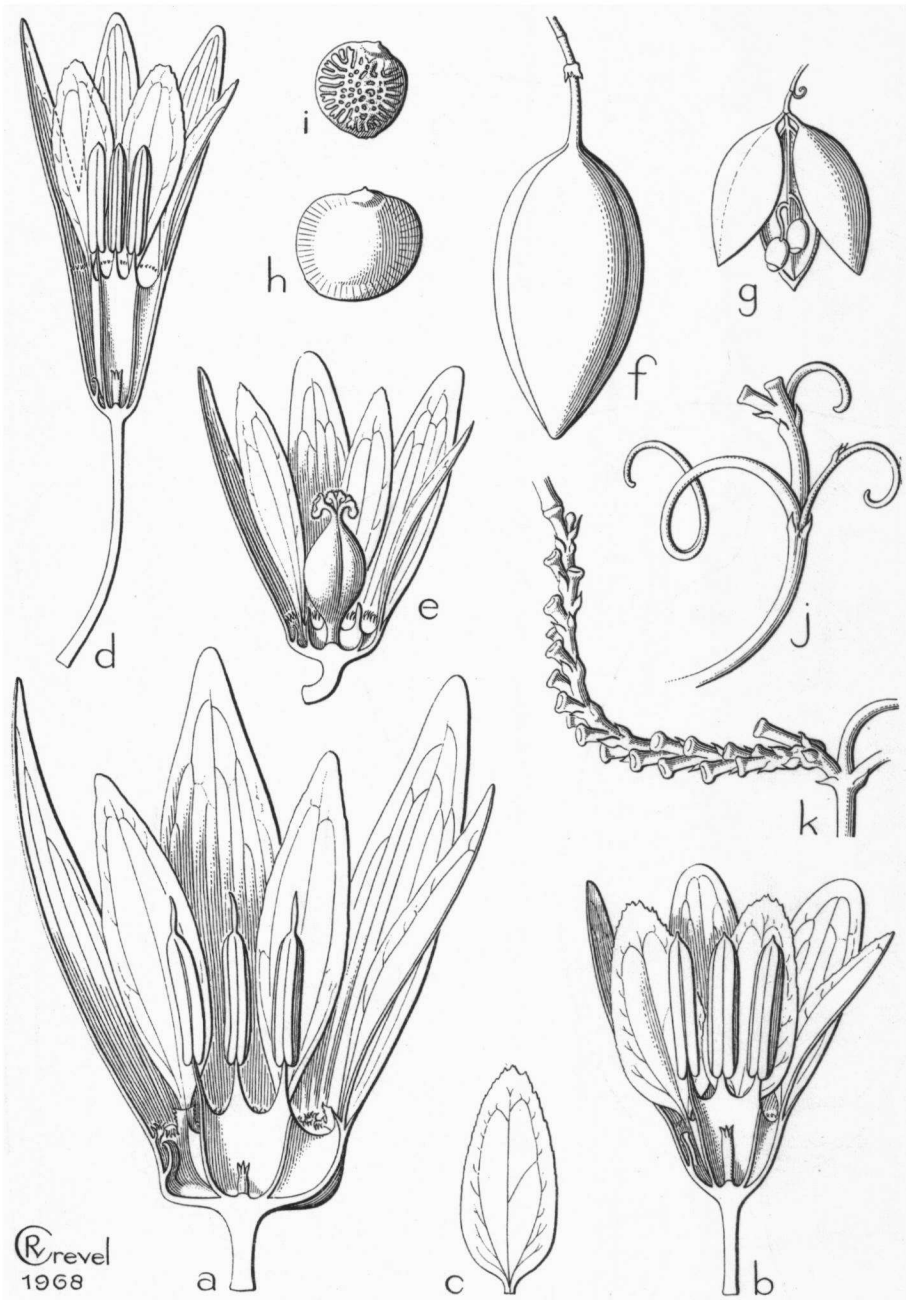

Fig. 6. *Adenia penangiana* (WALL. *ex* G. DON) DE WILDE *var. penangiana*. *a–b*. ♂ Flowers in longitudinal section, ×6, *c*. petal, ×6, *e*. ♀ flower in longitudinal section, ×6, *f*. fruit, ×⅔, *h*. seed, ×2, *j*. detail of inflorescence with tendrils, ×4, *k*. detail of inflorescence, ×4. — *Ditto var. parvifolia* (PIERRE *ex* GAGN.) DE WILDE. *d*. ♂ Flower in longitudinal section, ×6, *g*. fruit, ×⅔, *i*. seed, ×2 (*a* LÖRZING 6832, *b–c*, *j* RAHMAT SI TOROES 2329, *d* HANIFF & NUR 7497, *e* MEIJER 3196, *f* JELINEK 148, *g*, *i* CORNER SFN 37889, *h* HANIFF 3909, *k* CURTIS 3504).

normals leaves sometimes (sub)sessile inflorescences arranged in short-shoots are found. These short-shoots develop from the serial bud in the axils of the sterile tendrils, and later on often grow through into normal shoots.

Sometimes monoecious specimens with ♂ and ♀ flowers in different inflorescences are found in *var. parvifolia.*

A variable species in which arbitrarily two varieties are recognized; most of the specimens from limestone in Peninsular Thailand belong to *var. parvifolia.*

KEY TO THE VARIETIES

1. Fruit 3–6 cm, gynophore 4–25 mm. Seeds flattened, 7½–11 mm ø, shallowly pitted. Hypanthium 1½–3½ (–4) mm wide. Anthers (2½–) 3–3½ mm, up to 1 mm apiculate. Leaves never linear . . . . . **a. *var.* penangiana**
1. Fruit 1¾–4 cm, gynophore 2–5 mm. Seeds globular to flattened, 4–7 mm ø, smooth or shallowly pitted. Hypanthium 1–2 mm wide. Anthers 2–3(–3½) mm, up to 0.2 mm apiculate. Leaves sometimes lanceolate-linear. **b. *var.* parvifolia**

a. *var.* penangiana. — *A. penangiana* (WALL. *ex* G. DON) DE WILDE, Blumea 15 (1967) 266; Thesis (1971) 84, 88, f. 9–10. — *Passiflora penangiana* WALL. [Cat. (1829) *n.* 1233, *nom. nud.*] *ex* G. DON, Gen. Syst. 3 (1834) 55; MAST. Trans. Linn. Soc. 27 (1871) 631. — *Anthactinia penangiana* ROEM. Syn. Mon. 2, Pepon. (1846) 192. — *Disemma penangiana* MIQ. Fl. Ind. Bat. 1, 1 (1855) 700. — *Modecca nicobarica* KURZ *ex* TRIM. J. Bot. 13 (1875) 326; J. As. Soc. Beng. 45, ii (1876) 132; MAST. in Hook. *f.* Fl. Br. Ind. 2 (1879) 603. — *A. nicobarica* KING, J. As. Soc. Beng. 71, ii (1903) 52; RIDL. Fl. Mal. Pen. 1 (1922) 840, *pro maj. parte*; HALL. *f.* Med. Rijksherb. 42 (1922) 9; HEND. Gard. Bull. S. S. 4 (1928) 264, *p.p.*; J. Str. Br. R. As. Soc. 17 (1939) 47, *p.p.*; CRAIB, Fl. Siam. En. 1 (1931) 747, *incl. var. obliqua* CRAIB; MERR. Contr. Arn. Arb. 8 (1934) 110; CHAKRAVARTY, Bull. Bot. Soc. Beng. 3 (1951) 65. — *A. catharinae* MERR. Contr. Arn. Arb. 8 (1934) 110, t. 7. — **Fig. 5 a–c, 6 a–c, e–f, h, j–k.**

Climber to *c.* 6 m. *Leaves* broadly ovate-elliptic to (ob)lanceolate, top mostly distinctly acuminate, base rounded, rarely subacute, 3½–16 by 1–7½ cm. (Sub)marginal glands present or not. *Inflorescences* peduncled for ½–10 cm. — ♂ *Flowers* including the 1–5 mm long stipe 8–17 by 1½–4 mm. Hypanthium 1½–2 mm. Calyx tube 0. Sepals oblong to lanceolate, 5–13 mm. Petals 4–10 mm. Filaments 2½–3½ mm, connate for 1–2 mm. Anthers (2½–)3–3½ mm, up to 1 mm apiculate. Corona-filaments (0.1–)⅓–½ mm. — ♀ *Flowers* including the 1–5 mm long stipe 6–16 by 1½–2½ mm. Hypanthium 1–1½ mm. Calyx tube 0. Sepals 5–9 mm. *Fruit* excluding the 4–25 mm long gynophore 3–6 by 1½–3 cm. *Seeds* flattened, nearly smooth or shallowly or pitted, 7½–11 mm ø.

Distr. Nicobar Is., Peninsular Thailand, in *Malesia*: Malay Peninsula and N. & Central Sumatra. Fig. 7: 1a.

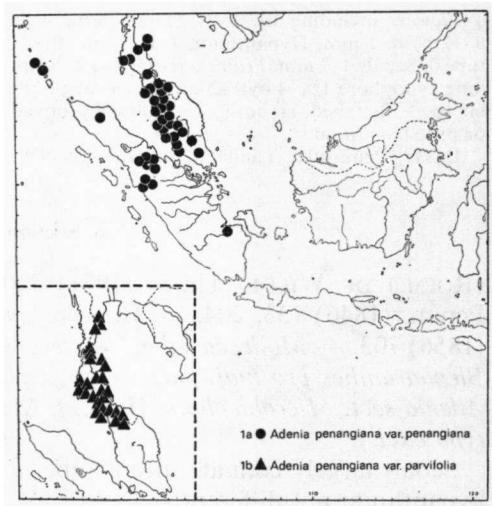

Fig. 7. Distribution of *Adenia penangiana* (WALL. *ex* G. DON) DE WILDE.

Ecol. Forest and scrub, sometimes on limestone, 0–1200 m. *Fl. fr.* Jan.–Dec.

Notes. The fruits of most specimens have a long gynophore, of at least 1 cm; specimens from the Taiping-area (Mal. Pen.), however, often have rather short-stiped fruits.

Fresh flowers are green or greenish yellow, fruits yellowish red to brilliant cinnamon.

b. *var.* parvifolia (PIERRE *ex* GAGN.) DE WILDE, Thesis (1971) 84, 89, f. 9–10. — *A. parvifolia* PIERRE *ex* GAGN. Bull. Mus. Hist. Nat. Paris 25 (1920) 127; Bull. Soc. Bot. Fr. 65 (1918) 76–77 (fl. morph.); Fl. Gén. I.–C. 2 (1921) 1028, f. 113, 8–13; CRAIB, Fl. Siam. En. 1 (1931) 748, *incl. var. insularis et var. nervosa*; CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 149, t. 2 f. 7, t. 5 f. 13–16; Adansonia 7 (1967) 373, 383. — *A. nicobarica* (KURZ) KING *ex* RIDL. J. Str. Br. R. As. Soc. 59 (1911) 106; BURK. & HEND. Gard. Bull. S. S. 3 (1925) 378. — *A. angustisepala* CRAIB, Kew Bull. (1930) 406; Fl. Siam. En. 1 (1931) 745; CUSSET, Adansonia 7 (1967) 372, 383. — *A. linearis* CRAIB, Kew Bull. (1930) 407; Fl. Siam. En. 1 (1931) 747; CUSSET, Adansonia 7 (1967) 373, 383. — **Fig. 5 d–e, 6 d, g, i.**

Climber or creeper up to 2 m, growing from a tuber. *Leaves* ovate-oblong to lanceolate-linear, top longly acute or acuminate, base rounded, (1½–)2–13 by ¼–4½ cm. Marginal glands absent. *Inflorescenses* either in short-shoots or in the axils of normal leaves, up to 4 cm peduncled. — ♂ *Flowers* including the 3–7 mm long stipe 8–15 by 1–2 mm. Hypanthium 1½–3½ mm. Calyx tube 0–2 mm. Sepals lanceolate to linear, 4–8 mm. Petals 4–5 mm. Filaments 2½–3½ mm, connate for 1½–2½ mm. Anthers 2–3(–3½) mm, up to 0.2 mm apiculate. Corona-hairs 0.1–0.3 mm. —

♀ *Flowers* including the 1–3(–5) mm long stipe 8–12 by 1–2 mm. Hypanthium 1–1½ mm. Calyx tube 0. Sepals 4–7 mm. *Fruit* excluding the 2–5 mm long gynophore 1¾–4 by 1–2 cm. *Seeds* subglobular to ± flattened, smooth or shallowly grooved or pitted, 4–7 mm ø.

Distr. Peninsular Thailand, in *Malesia*: NW. Malay Peninsula (Perlis, Kedah, Langkawi Is.). Fig. 7: 1b.

Ecol. Limestone hills, ridges, 0–600 m. *Fl. fr.* mostly Sept.–Jan.

Note. Fresh flowers recorded as greenish or greenish yellow, fruits as greenish turning bright red.

2. Section Erythrocarpus

(ROEM.) DE WILDE, Thesis (1971) 209. — *Erythrocarpus* ROEM. Syn. Mon. 2, Pepon. (1846) 133, 204. — *Modecca subg. Erythrocarpus* MIQ. Fl. Ind. Bat. 1, 1 (1856) 703. — *Modecca subg.* '*Modeccae verae*' (*incl. sect. Microblepharis et sect. Blepharanthes pro maj. parte, typo excl.*) MIQ. Fl. Ind. Bat. 1, 1 (1856) 702. — *Adenia sect. Microblepharis* HALL. *f.* Med. Rijksherb. 42 (1922) 8, *pro maj. parte, typo excl.*).

Sepals largely connate into a tube. Petals largely connate with the calyx tube; hypanthium not differentiated. Corona absent.

Distr. SE. Asia and *Malesia* (7 *spp.*).

2. Adenia heterophylla (BL.) KOORD. Exk. Fl. Java 2 (1912) 637; DE WILDE, Thesis (1971) 212.

See for references and synonymy under the subspecies and varieties.

Climber to 30 m. *Leaves* membranous (herbaceous) to coriaceous, entire to 5-partite, orbicular to ovate to lanceolate, top rounded to acute, up to 3 cm acuminate, base acute to cordate, (3½–)5–25 by (1½–)2½–19 cm, 3–5(–7)-plinerved to pinninerved by 4–10 pairs of nerves, margin entire or up to ½ cm dentate; lobes triangular to lanceolate, up to 15 cm; petiole 1–10 cm. *Glands* at blade-base 2, 1–4 mm ø, on two auricles 2–6 mm ø at the apex of the petiole, ± adnate with the blade, either ± connate over the apex of the petiole or not; blade-glands 0–2 pairs, ½–2 mm ø, submarginal; marginal glands minute, 0–25 at either side. *Inflorescences* peduncled up to 20 cm, rarely in short-shoots, in ♂ up to 40-flowered, in ♀ (1–)2–4(–8)-flowered; tendrils 1(–3), 1–5 cm. Sterile tendrils simple, rarely 3-fid, up to 25 cm. Plants sometimes monoecious with ♂ and ♀ flowers mixed in one inflorescence. Bracts and bracteoles narrowly triangular, acute, ½–1½ mm. — ♂ *Flowers* tubiform to urceolate, including the 3–15 mm long stipe (10–)15–25(–30) by 1½–5(–7½) mm. Hypanthium including calyx tube 5–12(–14) mm, fleshy. Calyx lobes triangular, acute to subobtuse, 1–3 mm, reflexed, inserted near the throat of the calyx tube. Petals narrowly triangular to lanceolate, subacute, 2–4 mm, reflexed. Filaments 1–4 mm, connate for ¼–3 mm, inserted at the base of the hypanthium, or on an androgynophore up to 4 mm. Anthers 3–5 mm, subacute, up to ½ mm apiculate. Septa 1–3 mm high. Corona 0. Disk glands 1–3 mm. — ♀ *Flowers* tubiform, including the 1–6(–10) mm long stipe (6–)7–18(–22) by 3–5(–6) mm. Hypanthium including calyx tube (4–)6–13 mm. Calyx lobes elongate triangular, subacute, 1–2½ mm. Petals oblong to lanceolate, (sub)acute, 2–4 mm, inserted near the throat of the calyx tube. Staminodes 1–3 mm, connate for up to 1½ mm. Septa ½–2 mm high. Corona 0. Disk glands ½–2½ mm. Androgynophore up to 2½ mm. Ovary 1–3½ mm stiped, subglobose to oblong, 3–5 by 2–3 mm, 3(–5)-carpellate; styles 3(–5), ½–1 m up to halfway connate; stigmas papillate, each *c.* 1½ mm ø. *Fruits* 1–3(–4), ellipsoid to oblong-lanceolate, sometimes ± 3-ribbed, base and top obtuse or acute, excluding the (½–)1–3(–4) cm long gynophore 2–13 by 1¾–4½ cm; pericarp coriaceous, 1–3 mm ø, when fresh ± fleshy, yellowish to bright red. *Seeds* 10–60, orbicular to obliquely triangular, (4–)5–10 by 4½–10 by 2½–3½ mm, pitted, sometimes muricate; embryo 4–8½ mm; cotyledons orbicular to ovate, emarginate or truncate at one side, or shallowly 3-lobed, 4–7½ by 4–7 mm.

Distr. From the Andaman Is., Indo-China and S. China through *Malesia* to N. Australia, east to the Solomon Is., absent in Sumatra, Malaya, and Borneo. Fig. 8.

Ecol. In a variety of habitats in forest and scrub. The species shows as a whole a distinct preference for seasonal climatic conditions and is absent in Sumatra, the Malay Peninsula and Borneo. *Fl. fr.* Jan.–Dec., but mostly in the rainy season.

The species is usually dioecious, but not rarely monoecious specimens occur with ♂ and ♀ flowers in one inflorescence.

The tubular, narrow-throated flowers suggest pollination by insects.

Uses. The plant as a whole, and especially the fruit, is reported as poisonous, and used as poison for hunting; the juicy aril is sometimes mentioned as sweet and edible, whereas POILANE reported for Indo-China that the leaves are eaten by the Mois.

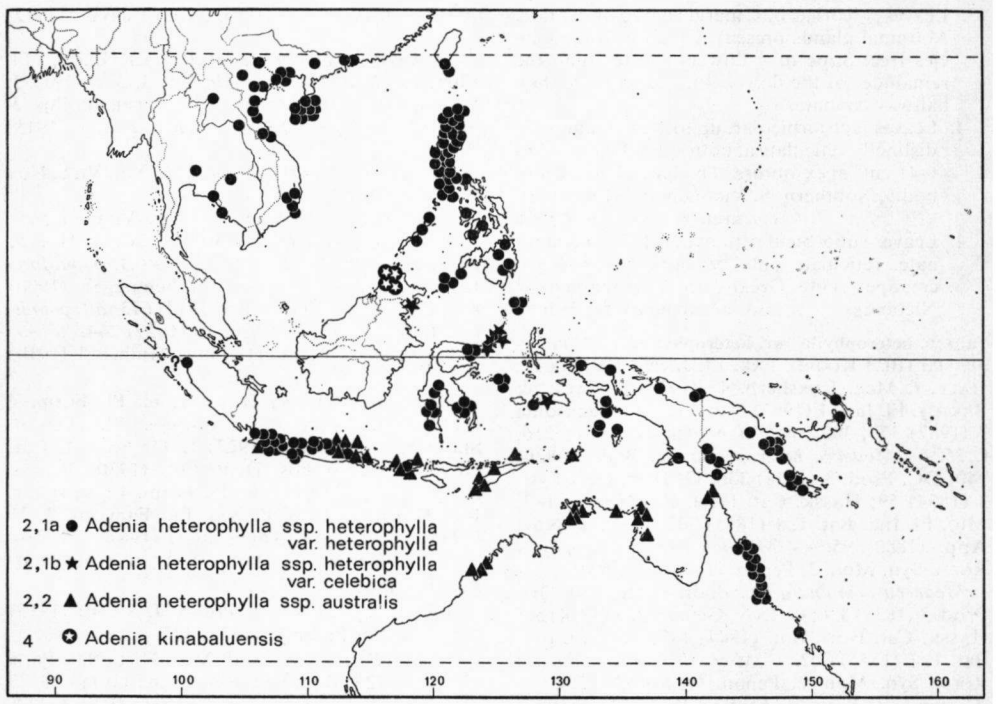

Fig. 8. Distribution of *Adenia heterophylla* (BL.) KOORD. and *A. kinabaluensis* DE WILDE.

In the Philippines a decoction of the root is a remedy for stomach trouble.

Vern. (*Areuj*) *patok manok*, S, *kabelo*, Kangean, *sasariwu*, *tatanaru warawo*, Talaud; Philippines: *binoyok-bóyok*, *melóng-uák*, *salapong*, Tag., *saka-sáka*, *s.-ti-uák*, Ilk., *tababayung-uák*, Sulu, *nomad-nomad*, Palawan, *tabungau*, Mindoro, *tambal baya* (*s*), Pint.-Sbl.; *daun bobok*, Tanimbar, *malasibi*, NE. New Guinea.

Notes. *Modecca heterophylla* BL. and the synonym *M. acuminata* BL., the oldest two names available, are both of 1826. The epithet *heterophylla* is chosen because of the current misinterpretation of specimens from the Malay Peninsula which belong to a different species, *A. macrophylla*, under the name *Adenia acuminata* (*non* BL.) KING.

A variable species, in which rather arbitrarily four largely allopatric subspecies — one of which with two varieties — are recognized. Two of the subspecies do not occur in the Malesian region, but these have been entered in the key.

KEY TO THE SUBSPECIES AND VARIETIES

1. Stipe of ♀ flowers (1–)2–6 mm, in fruit (1–)3–13 mm. Gynophore in fruit 8–30 mm. Fruits (4–)6–13 cm, mostly with acute apex. Stipe of ♂ flowers 5–15 mm, as long as to longer than the remainder of the flower. Leaves orbicular to lanceolate-linear in outline with cordate to acute base, palmately to pinninerved, venation distinct or not . . . **1. *ssp.* heterophylla**
2. Leaves subherbaceous to coriaceous, orbicular to lanceolate(-linear), entire to deeply 5–lobed, base cordate to acute, nerves palmate to pinnate, margin entire or dentate. Gland-bearing auricles well marked off from the blade, glands limited to the auricles. **a. *var.* heterophylla**
2. Leaves strongly coriaceous, ovate-oblong to oblong, entire, base rounded to subacute, nerves pinnate, margin entire. Gland-bearing auricles broadly adnate with the blade, the glands extended on the blade. **b. *var.* celebica**

1. Stipe of ♀ flowers *c.* 1 mm, in fruit 1–2 mm. Gynophore in fruit 3–13 mm. Fruits 2–7 cm. Stipe of ♂ flowers 3–8 mm, as long as to shorter than the remainder of the flower. Leaves orbicular to ovate in outline, with cordate to truncate base, mostly palmately nerved, venation distinct beneath.
3. Leaves mostly membranous, margin entire. Marginal glands mostly absent. Gland-bearing auricles ± peltately connate, sometimes free. Stipe of ♂ flowers about as long as the remainder of the flower. Filaments connate about halfway. Fruits 4–7 cm, apex obtuse. **2. *ssp.* australis**

3. Leaves ± coriaceous, margin entire or dentate. Marginal glands present. Gland-bearing auricles free. Stipe of ♂ flowers shorter than the remainder of the flower. Filaments more than halfway connate.
4. Leaves (sub)orbicular, up to 1 cm acuminate, distinctly reticulate at both sides. Fruits 2–3½ (–4) cm, apex obtuse. Thailand, Laos, Cambodia, southern S. Vietnam (Cochinchina). *ssp.* **arcta** (CRAIB) DE WILDE
4. Leaves suborbicular to ovate, 1–2 cm acuminate, reticulate only beneath. Fruits 4½–7 cm, apex acute. Great Coco I., Andamans & Nicobars. . . . *ssp.* **andamanica** DE WILDE

1a. *ssp.* heterophylla *var.* heterophylla. — *A. heterophylla* (BL.) KOORD. Exk. Fl. Java 2 (1912) 637; HALL. *f.* Med. Rijksherb. 42 (1922) 8; BACK. & BAKH. *f.* Fl. Java 1 (1963) 289; CUSSET, Adansonia 7 (1967) 373, 382; DE WILDE, Thesis (1971) 216, f. 35. — *Modecca heterophylla* BL. Bijdr. (1826) 940; DC. Prod. 3 (1828) 336; G. DON, Gen. Syst. 3 (1834) 59; HASSK. Cat. Hort. Bog. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 702; F.–VILL. Nov. App. (1880) 95. — *Microblepharis heterophylla* ROEM. Syn. Mon. 2, Pepon. (1846) 133, 200.

Modecca acuminata BL. Bijdr. (1826) 940; DC. Prod. 3 (1828) 336; G. DON, Gen. Syst. 3 (1834) 59; HASSK. Cat. Hort. Bot. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 702. — *Microblepharis acuminata* ROEM. Syn. Mon. 2, Pepon. (1846) 133, 200. — *A. acuminata* KING, J. As. Soc. Beng. 71, ii (1903) 55, *quoad basionym*; KOORD. Exk. Fl. Java 2 (1912) 637; HALL. *f.* Med. Rijksherb. 42 (1922) 11; BACK. & BAKH. *f.* Fl. Java 1 (1963) 289; CUSSET, Adansonia 7 (1967) 372, 383.

Passiflora parviflora BLCO, Fl. Filip. ed. 1 (1837) 647, *non* SWARTZ, 1788. — *Modecca parviflora* BLCO, Fl. Filip. ed. 2 (1845) 453, *non* G. DON, 1834; *ibid.* ed. 3, 3 (1879) 52; MERR. Philip. J. Sc. 10 (1915) Bot. 331. — *A. parviflora* CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 145, t. 2 f. 1, t. 5 f. 3–12, t. 7 f. 5–6, *quoad basionym, spec. p.p., nom. illeg.*; Adansonia 7 (1967) 373, 383.

Passiflora zucca BLCO, Fl. Filip. ed. 1 (1837) 648. — *A. zucca* MERR. Sp. Blanc. (1918) 276; En. Philip. 3 (1923) 117; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 472, 492.

Passiflora coccinea BLCO, Fl. Filip. ed. 1 (1837) 650, *non* AUBL. 1775, *nec* BANKS & SOLAND. *ex* BENTH. 1867. — *Modecca coccinea* BLCO, Fl. Filip. ed. 2 (1845) 453; *ibid.* ed. 3, 3 (1879) 53; MERR. Philip. J. Sc. 1 (1906) Suppl. 100. — *A. coccinea* MERR. Philip. J. Sc. 3 (1908) Bot. 421; Fl. Manila (1912) 337; Philip. J. Sc. 10 (1915) Bot. 331.

Modecca lobata (*non* JACQ.) HASSK. Cat. Hort. Bog. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 703.

Modecca kardiocarpa HASSK. Cat. Hort. Bog. (1844) 187; WALP. Rep. 5 (1846) 774; ROEM. Syn. Mon. 2, Pepon. (1846) 203; MIQ. Fl. Ind. Bat. 1, 1 (1855) 703. — *A. cardiocarpa* KOORD. Exk. Fl. Java 2 (1912) 637.

Modecca oblonga HASSK. Cat. Hort. Bog. (1844) 187; WALP. Rep. 5 (1846) 774; ROEM. Syn. Mon. 2, Pepon. (1846) 203; MIQ. Fl. Ind. Bat. 1, 1 (1855) 703. — *A. oblonga* KOORD. Exk. Fl. Java 2 (1912) 637.

Modecca trilobata (*non* ROXB.) BLCO, Fl. Filip. ed. 2 (1845) 452; *ibid.* ed. 3, 3 (1879) 52; F.–VILL. Nov. App. (1880) 95; MERR. Philip. J. Sc. 1 (1906) Suppl. 100 ('*triloba*'); *ibid.* 10 (1915) Bot. 331.

Modecca cardiophylla (*non* MAST.) F.–VILL. Nov App. (1880) 95.

Modecca palmata (*non* LAMK) F.–VILL. *l.c.*

Modecca populifolia (*non* BL.) K. SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 83. — *A. populifolia* (*non* BL.) K. SCH. & LAUT. Fl. Schutzgeb. (1900) 456; PULLE, Nova Guinea 8 (1912) 673 (*aff. populifolia*); WHITE, J. Arn. Arb. 10 (1929) 244.

Momordica sp., PULLE, Nova Guinea 8 (1910) 405.

Modecca formosana HAYATA, Ic. Pl. Form. 4 (1914) 8, f. 1–2; ITO, Ill. Formos. Pl. (Taiwan Shokubutu Dzusetu) (1927) t. 11; SASAKI, Cat. Govt. Herb. Formos. Dept. For. (1930) 362. — *A. formosana* HAYATA, Ic. Pl. Form. 4 (1914) 8, f. 1–2; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 492; CUSSET, Adansonia 7 (1967) 373, 384.

A. longifolia MERR. Philip. J. Sc. 10 (1915) Bot. 330; En. Philip. 3 (1923) 117.

A. palmatifolia MERR. Philip. J. Sc. 10 (1915) Bot. 330; En. Philip. 3 (1923) 117.

A. chevalieri GAGN. Bull. Mus. Hist. Nat. Paris 25 (1920) 126; Bull. Soc. Bot. Fr. 65 (1918) 76–77 (fl. morph.); Fl. Gén. I.–C. 2 (1921) 1030, f. 114, 1–5; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 490; CRAIB, Fl. Siam. En. 1 (1931) 746; MERR. & CHUN, Sunyatsenia 1 (1934) 73; CHUN, *ibid.* 1 (1934) 276; MASAM. Fl. Kaitan. (1943) 216; WANG, Acta Phytotax. Sin. 6 (1957) 237; CHUN, CHANG & CHEN, Fl. Hainan. 1 (1964) 467, f. 258; CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 140, f. 2, t. 5 f. 20–23, t. 7 f. 2–3; Adansonia 7 (1967) 372, 383.

A. cordifolia (*non* BL.) GAGN. Fl. Gén. I.–C. 2 (1921) 1025; Bull. Soc. Bot. Fr. 65 (1918) 76–77 (fl. morph.).

A. nicobarica (*non* KURZ) GAGN. Fl. Gén. I.–C. 2 (1921) 1028; CUSSET, Fl. Camb., Laos & Vietn. 5 (1967) 148, t. 2 f. 3.

A. maclurei MERR. Philip. J. Sc. 21 (1922) 349; Lingn. Sc. J. 5 (1927) 133.

A. diversifolia HALL. *f.* Med. Rijksherb. 42 (1922) 10.

A. sumbawana HALL. *f. l.c.*

A. pandurata HALL. *f. l.c.* 12; HOLTH. & H. J. LAM, Blumea 5 (1942) 215.

A. pinnatisecta (*non* CRAIB) PHAM-HOANG-HÔ, Fl. Vietn. (1960) 148, f. D.

Leaves up to 3 cm acuminate, 3½–25 by 1½–19 cm; petiole 1–10 cm. *Gland*-bearing auricles peltately connate over the top of the petiole or not. — ♂ *Flowers* including the 7–15 mm long stipe 15–30 by 2–5(–7½) mm. — ♀ *Flowers* including the (1½–)2–6 mm long stipe (10–)12–18 by 2–6 mm. *Fruit* excluding the 8–30(–40) mm long gynophore (4–)6–13 by 2½–4½ cm; flower stipe below the

withered perianth (1½–)3–13 mm. *Seeds* (5–)6–10 mm ø.

Distr. Tropical SE. Asia to the Solomons and Queensland, in *Malesia*: Central Sumatra (once), Java, Lesser Sunda Is. (once, Sumbawa), Philippines, Celebes, Moluccas, New Guinea (also Bismarcks). Fig. 8: 2–1a.

Ecol. Forest and scrub, often in secondary vegetation, growing on a variety of soils, sand, clay, silt, rocks, *etc.*, 0–1000 m, in New Guinea to 2000 m.

Distinctly preferring a seasonal climate, hence absent from Peninsular Thailand, the Malay Peninsula, Borneo, and Sumatra. In the latter island there is a single, old collection (KORTHALS 682b), which might have been mislocalized and could have come from Java. In islands with a mosaic-climate also found in everwet parts, *e.g.* in West Java, the Philippines, Celebes and New Guinea, possibly facilitated through devastation.

Notes. *Var. heterophylla* is a variable entity in which a number of intergrading local forms (paramorphs) have been described as species. For a discussion of the synonymy, with argumentation, see my Thesis (1971) 219.

Flowers are sometimes 4-merous, with 4 calyx lobes. HAYATA (1914) mentioned for the type specimen of *A. formosana* 4–5-carpellate ovaries; 4 or 5 carpels are also occasionally found in *A. macrophylla*.

In specimens from the Philippines several times galled, club-shaped flowers were found.

Field notes. Leaves are often reported as very glossy; the flowers as greenish, creamy or yellowish; ripe fruits as often ± 3(–6)-angular, yellow to bright red; seeds blackish covered by a whitish aril.

1b. *ssp.* heterophylla *var.* celebica (KOORD.) DE WILDE, Thesis (1971) 220, f. 35. — *Modecca celebica* KOORD. Minah. (1898) 638, 478. — *A. celebica* KOORD. in Koord.-Schum. Syst. Verz. 3 (1914) 90.

Leaves up to 1½ cm acuminate, 5–16 by 3–7(–9) cm; petiole (½–)1–5 cm. *Gland*-bearing auricles not peltately connate, broadly adnate with the auricles, the glands partly extending on the blade. — ♂ *Flowers* including the 5–11 mm long stipe 12–22 by 1½–3 mm. — ♀ *Flowers* including the (1½–)2–5 mm long stipe 10–13 by 2–3½ mm. *Fruit* fusiform, excluding the 10–20 mm long gynophore 5–8 by 2–3 cm; flower stipe below the withered perianth (1½–)2–6 mm. *Seeds* 5–6 mm ø.

Distr. *Malesia*: N. Borneo (E. Sabah: Elphinstone Bay), Celebes (North Peninsula), Moluccas (Ceram). Fig. 8: 2–1b.

Ecol. Up to *c.* 200 m. *Fl.* Febr., March, Sept., *fr.* March, Sept.

2. *ssp.* australis (R. BR. *ex* DC.) DE WILDE, Thesis (1971) 220, f. 35. — *Modecca australis* R. BR. *ex* DC. Prod. 3 (1828) 337; G. DON, Gen. Syst. 3 (1834) 59; ENDL. Ic. Gen. Pl. (1838) t. 114–115; ROEM. Syn. Mon. 2, Pepon. (1846) 203; SCHNITZL. Ic. 3 (1851) t. 197; BENTH. Fl. Austr. 3 (1866) 312; F. v. M. Fragm. Phyt. Austr. 9 (1875) 69; First Syst. Census (1882) 76; Second Syst. Census (1889) 128; F. M. BAILEY, Syn. Queensl. Fl. (1883) 200; Cat. Pl. Queensl. (1890) 20; Queensl. Fl. 2 (1900) 689; Compr. Cat. Queensl. Pl. (1913) 220, f. 192; DOMIN, Bibl. Bot. Heft 89 (1928) 987. — *A. australis* ENGL. Bot. Jahrb. 14 (1891) 376; HARMS, *ibid.* 15 (1893) 572–573; in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 85; *ibid.* ed. 2, 21 (1925) 492; EWART & DAVIES, Fl. North. Terr. Austr. (1917) 196; SPECHT, Rec. Am.-Austr. Exp. Arnhem Land 3 (1958) 262.

Modecca populifolia ZIPP. *ex* BL. Rumphia 1 (1837) 168, t. 50; SPAN. Linnaea 15 (1841) 207; WALP. Rep. 2 (1843) 222; MIQ. Fl. Ind. Bat. 1, 1 (1855) 703; MAST. in Hook. *f.* Fl. Br. Ind. 2 (1879) 603; BRITTEN in Forbes, Wand. *etc.*, App. 6 (1885) 506; F. M. BAILEY, Queensl. Agr. J. 1, 3 (1897) 228; Queensl. Fl. 2 (1900) 690; Compr. Cat. Queensl. (1913) 220, f. 193. — *Erythrocarpus populifolius* ROEM. Syn. Mon. 2, Pepon. (1846) 204. — *A. populifolia* ENGL. Bot. Jahrb. 14 (1891) 376; HARMS, *ibid.* 15 (1893) 573, 553 (anat.); in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 85; *ibid.* ed. 2, 21 (1925) 492; HALL. *f.* Med. Rijksherb. 42 (1922) 9; RIDL. Disp. (1930) fig. frontisp.

Leaves up to 1 cm acuminate, entire or lobed, 5–18 by 3–15 cm; petiole 1–5½ cm. *Gland*-bearing auricles mostly peltately connate over the top of the petiole. — ♂ *Flowers* including the 5–8 mm long stipe 11–18 by 2–3½ mm. — ♀ *Flowers* including the 1–1½(–2) mm long stipe 6–8 by 2–3 mm. *Fruit* with obtuse apex, excluding the 3–13 mm long gynophore 4–7 by 2–3 cm; flower stipe below the withered perianth 1–2 mm. *Seeds* 4–7 mm ø.

Distr. N. Australia, in *Malesia*: E. Java, Lesser Sunda Is. (incl. also Tanimbar Is.), Fig. 8: 2–2.

Ecol. Scrub vegetation in a seasonal climate, monsoon forest, 0–150 m, mostly on sandy or calcareous soils near the coast. *Fl. fr.* (Java) mainly Febr.–May, in Lesser Sunda Is. & Australia March–Dec.

3. Adenia macrophylla (BL.) KOORD. Exk. Fl. Java 2 (1912) 637; DE WILDE, Thesis (1971) 226, f. 34.

See for references and synonymy under the varieties.

Liana to 25 m, at base up to 15 cm ø. *Leaves* (sub)coriaceous, entire or up to ½ cm lobed in upper half, suborbicular to oblong-lanceolate or (ob)ovate, top (sub)obtuse to acute, up to 1½ cm acuminate, base acute-acuminate, or rounded or subcordate, (4–)5–21 by (1½–)2½–12 cm, 3–5 subplinerved or ± pinninerved; nerves 3–5(–10) pairs, arching towards the top; petiole ½–7½ cm. *Glands* at blade-base 2, 1–4 mm ø, entirely or largely situated on two semi-orbicular auricles 1½–5 mm ø at the apex of the petiole; blade-glands 0–4(–6), ¼–1 mm ø, submarginal in the upper half of the blade; marginal glands 0–25 at either side. *Inflorescences* peduncled for up to 14 cm, sometimes subsessile in short-shoots up to 25 cm, lax or condensed, in ♂ up to 150-flowered, in ♀ 2–10-flowered, tendrils 0–3, up to 4 cm long. Sterile tendrils simple or 3-fid, up to 20 cm. Bracts

and bracteoles narrowly triangular, acute, ½–1 mm. Flower buds ovate, not ellipsoid. — ♂ *Flowers* narrowly tubiform-urceolate, including the 1½–4 (–8) mm long stipe 9–15 by 2–3½ mm. Hypanthium including calyx tube tubiform-urceolate, fleshy, 5½–9 mm. Calyx lobes triangular to oblong, subobtuse, 2–2½(–3) mm, reflexed. Petals oblong-lanceolate, obtuse to subacute, subentire, 2½–4 by 1–1½(–2½) mm, inserted at or near the throat of the calyx tube. Filaments 1–1½ mm, connate up to ½ mm, inserted at the base of the hypanthium. Anthers 4–7 mm, ± tapering to above, subacute, ⅓–1 mm apiculate. Septa 0–⅓ mm high. Corona 0. Disk glands ½–1 mm. — ♀ *Flowers* tubiform-campanulate, including the ¼–1 mm long stipe 5–7 by 2½–3 mm. Hypanthium including calyx tube 3–4 mm. Calyx lobes 2–4 mm. Petals 2–3 mm, inserted near the throat of the calyx tube. Staminodes *c.* 1 mm. Septa 0. Corona 0. Disk glands *c.* 1 mm. Pistil 4–6 mm; gynophore 1–2 mm. Ovary subglobose to ovoid, 1¾–2½ by 1½–2½ mm; styles ½–¾ mm, ± free; stigmas irregularly lobed, each *c.* 1½ mm ø. *Fruit* 1–2(–3?), globose to broadly ovoid, base rounded, top rounded to subacute, or fruit ± fusiform, excluding the (7–)10–30 mm long gynophore 2–6(–6½) by 1½–5 cm; pericarp coriaceous to woody, ½–3 mm thick. *Seeds* 15–40, ± orbicular, 5–10 by 5–10 by 2½–4 mm, ± muricate and pitted; embryo 5–8 mm; cotyledons ovate to elliptic, often emarginate at one side, 4½–7½ by 4–6 mm.

Distr. *Malesia*: Sumatra, Malay Peninsula, W. & Central Java, Borneo. Fig. 9.

Ecol. Rain-forest; see further under the varieties.

Uses. Fruits several times recorded as poisonous. According to various authors the roots and leaves are medicinal. According to HEYNE (Nutt. Pl. 1927, 1142) the bark is used for spinning threads for fishing tackle in Sumatra's West Coast. JACOBS (*n.* 5003) mentioned: 'The wood smells a bit of HCN; vessels contain potable water'.

Vern. *Akar gělumpong, a. lěmpudu gajah, a. lupok, a. měrapoh, a. saut, a. sianun dundang, a. timon dandang, děrik-děrik, měntimun gajah mèrah, m. pajah, pedendang*, Mal. Pen.; *akar djala, a. talun tungang, andor sidari, lakom gadjah, sautan*, Sumatra; *olor bauwo dotan, o. lawis*, Simalur I.; *areuj guntang, patok manok*, J; *lantiong*, Anambas Is.; *buah ěmpěrah*, Iban; *gurtah*, Sarawak; *akar pětjah tutuban*, Brunei; *barabah, takup*, Dusan, Sabah.

Notes. The fruits are sometimes 4-carpellate. Often larva feeding on the pollen are found. Deformed galled flowers occur regularly. Flowers are once reported as odorless; the urceolate flowers enclosing the anthers, however, suggest entomogamy.

Field notes. Fresh flowers are yellow or lemon, sometimes 'waxy', sometimes reddish spotted inside, or orange at the base; pollen bright yellow to orange-yellow. Fresh fruits are red, when dry orange-brown or purplish; the funicles in fresh fruits are pinkish, the arils whitish.

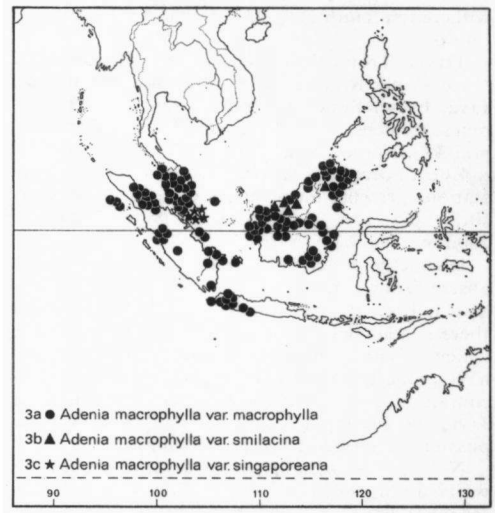

Fig. 9. Distribution of *Adenia macrophylla* (BL.) KOORD.

KEY TO THE VARIETIES

1. Fruit globular to ovoid. Leaves mostly greenish beneath.
   2. Leaves suborbicular to lanceolate, palmately to pninnerved. Fruit (2–)3–6(–6½) cm; gynophore (10–)15–30 mm; valves (½–)1–3 mm thick . . . . . **a. *var.* macrophylla**
   2. Leaves suborbicular to ovate, 3–5–(sub)plinerved. Fruit 2–3 cm; gynophore *c.* 10 mm; valves ½–1 mm thick.. . . **b. *var.* smilacina**
1. Fruit (ovate-)oblong, ± fusiform; valves *c.* 1 mm thick. Leaves oblong to lanceolate, ± pninnerved, mostly whitish green beneath. **c. *var.* singaporeana**

a. *var.* macrophylla; DE WILDE, Thesis (1971) 229, f. 34. — *A. macrophylla* (BL.) KOORD. Exk. Fl. Java 2 (1912) 637; HALL. *f.* Med. Rijksherb. 42 (1922) 12; BACK. & BAKH. *f.* Fl. Java 1 (1963) 289; CUSSET, Adansonia 7 (1967) 373, 384. — *Modecca macrophylla* BL. Bijdr. (1826) 939; DC. Prod. 3 (1828) 337; G. DON, Gen. Syst. 3 (1834) 59; HASSK. Cat. Hort. Bog. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 702. — *Microblepharis macrophylla* ROEM. Syn. Mon. 2, Pepon. (1846) 202.

? *Modecca dubia* ROXB. [Hort. Beng. (1814) 49, *nom. nud.*] Fl. Ind. ed. Carey 3 (1832) 135.

Modecca quintuplinervia MIQ. Fl. Ind. Bat. 1, 1 (1855) 1093; Sum. (1860) 132, 333. — *A. quintuplinervia* HALL. *f.* Med. Rijksherb. 42 (1922) 16.

Modecca palmata (*non* LAMK) KURZ, Nat. Tijd. N. I. 27 (1864) 168.

Modecca sp. RIDL. Trans. Linn. Soc. Bot. II, 39 (1893) 304.

A. acuminata (*non* BL.) KING, J. As. Soc. Beng. 71, ii (1903) 55; RIDL. Fl. Mal. Pen. 1 (1922) 841; RENDLE, J. Bot. (1924) Suppl. 43; BURK. & HEND.

Gard. Bull. S. S. 3 (1925) 378; BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 31; HEND. Gard. Bull. S. S. 4 (1928) 264; BURK. Dict. 1 (1935) 48; RIDL. Kew Bull. (1938) 112; MASAM. En. Phan. Born. (1942) 506; HEND. Mal. Nat. J. 4 (1949) 153, f. 147; CUSSET, Adansonia 7 (1967) 372, 383.

A. clementis MERR. Philip. J. Sc. 13 (1918) Bot. 95; En. Born. (1921) 413; Univ. Cal. Publ. Bot. 15 (1929) 210; RIDL. Kew Bull. (1938) 112; HEINE in Fedde, Rep. 54 (1951) 242; Pfl. Clemens Kinabalu (Thesis) (1953) 68.

A. longipedunculata MERR. Philip. J. Sc. 13 (1918) Bot. 96; En. Born. (1921) 413.

A. grandifolia RIDL. J. Fed. Mal. St. Mus. 10 (1920) 136; Fl. Mal. Pen. 1 (1922) 842.

A. borneensis HALL. *f.* Med. Rijksherb. 42 (1922) 13; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 492; RIDL. Kew Bull. (1938) 112.

A. borneensis var. microcarpa HALL. *f.* Med. Rijksherb. 42 (1922) 16.

A. palmata (*non* LAMK) STEEN. Bull. Jard. Bot. Btzg. III, 12 (1932) 165.

Leaves thinly to thickly coriaceous, pale green to grey-green beneath, entire or shallowly lobed, suborbicular or ovate to lanceolate, top rounded to acute, up to 1 cm acuminate, base acute-acuminate to broadly rounded, 4–21 by 1½–12 cm, 3(–5)-plinerved and 1–2 pairs of lesser nerves from the midrib, or ± pinninerved; petiole ½–6(–7½) cm. *Glands* at blade-base confined to the auricles; submarginal glands (0–)1–2(–3) pairs; marginal glands 5–25 at either side. *Inflorescences* peduncled up to 14 cm. *Fruit* globular to ovoid, excluding the (10–)15–30 mm long gynophore (2–)3–6(–6½) by (1½–)2–5 cm; pericarp thickly coriaceous to woody, (½–)1–3 mm thick. *Seeds* 7–10 mm ø.

Distr. *Malesia*: Sumatra, Malay Peninsula, W. & Central Java, Borneo. Fig. 9: 3a.

Ecol. Primary and secondary forest, peat swamp forest, swamp edges; recorded from sand, loam, 'red' soil, sandstone, sandy loam soil with lime, rich yellow soil, podsolized sands, peat; 0–1000 (–1500) m. *Fl. fr.* mostly April–Dec.

Note. Some small-fruited, pale-leaved specimens from Java resemble *var. singaporeana*.

b. *var.* smilacina (HALL. *f.*) DE WILDE, Thesis (1971) 230, f. 34. — *A. smilacina* HALL. *f.* Med. Rijksherb. 42 (1922) 17; RIDL. Kew Bull. (1938) 112.

Leaves thinly coriaceous, pale green beneath, entire, suborbicular to ovate, top acute, ½–1 cm acuminate, base broadly rounded, mostly shortly acuminate, 6–12 by 3–9 cm, 3–5-(sub)plinerved; petiole 2–7 cm. *Glands* at blade-base ± extending beyond the auricles on the blade; submarginal glands 0; marginal glands *c.* 5 at either side of the blade. *Inflorescences* peduncled for (1–)6–13 cm. *Fruit* globular to ovoid, excluding the *c.* 10 cm long gynophore *c.* 2–3 by 1½–2 cm; pericarp coriaceous, ½–1 mm thick. *Seeds* 5–7 mm ø.

Distr. *Malesia*: Sarawak and NE. Borneo. Fig. 9: 3b.

Ecol. Forests and forest-edges, secondary forest; rich yellow soil; low altitude. *Fr.* July–Oct.

Notes. The leaves resemble those of *A. kinabaluensis*.

The fruits are reported as sea-green turning bright red.

c. *var.* singaporeana (WALL. *ex* G. DON) DE WILDE, Thesis (1971) 231, f. 34. — *Passiflora singaporeana* WALL. [Cat. (1829) *n.* 1232, *nomen*] *ex* G. DON, Gen. Syst. 3 (1834) 55; STEUD. Nom. ed. 2, 2 (1841) 276 ('*sengaporeana*'); MAST. Trans. Linn. Soc. 27 (1871) 631. — *Anthactinia singaporeana* ROEM. Syn. Mon. 2, Pepon. (1846) 192. — *Modecca singaporeana* MAST. in Hook. *f.* Fl. Br. Ind. 2 (1879) 601; RIDL. J. Str. Br. R. As. Soc. 33 (1900) 87. — *A. singaporeana* ENGL. Bot. Jahrb. 14 (1892) 376; KING, J. As. Soc. Beng. 71, ii (1903) 55; RIDL. Fl. Mal. Pen. 1 (1922) 841; HEYNE, Nutt. Pl. (1927) 1142; BURK. Dict. 1 (1935) 48; KENG, Ord. & Fam. Mal. Seed Pl. (1969) 76, f. 41.

Leaves thickly coriaceous, grey-green to whitish green beneath, entire, (obovate-)oblong to lanceolate, top acute, up to ½ cm acuminate, base acute to rounded, 5–15 by 1¾–7(–8) cm, faintly 3-plinerved and (1–)2–4 pairs of nerves from the midrib; petiole ½–2½ cm. Glands at blade-base confined to the auricles; submarginal glands 0–1(–2) pairs; marginal glands 3–10 at either side of the blade. *Inflorescences* peduncled for up to 6 cm. *Fruit* (ovate-)oblong, ± fusiform, excluding the (7–)10–25 mm long gynophore 2½–6 by 1½–2½ cm; pericarp thickly coriaceous or woody, *c.* 1 mm thick. *Seeds* 6–9 mm ø.

Distr. *Malesia*: southern Malay Peninsula (Johore), Singapore. Fig. 9: 3c.

Ecol. Forest edges; low altitudes. *Fl.* Sept.–March, *fr.* Jan., July–Oct.

4. Adenia kinabaluensis DE WILDE, Thesis (1971) 225, f. 35.

Liana up to 20 m. *Leaves* thinly-coriaceous, brownish when dry, entire, ovate to ovate-elliptic, top acute, 1–1½ cm acuminate, base cordate to broadly rounded, 6–14 by 3½–11 cm, 3(–5)-plinerved and with 1(–2) pair(s) of strong nerves from near the base of the midrib, arching towards the top; petiole (1½–)2–6 cm. *Glands* at blade-base 2, elliptic to reniform, 2–4 mm long, mainly on two auricles at the apex of the petiole but extending on the blade to or beyond the insertion of the basal nerves; blade-glands 0; marginal glands minute, 0–5 at either side of the blade. *Inflorescences* peduncled for 2–12 cm, in ♂ up to 30-flowered, in ♀ 2–5-flowered; tendrils 1(–3), ½–3 cm. Sterile tendrils up to 15 cm. Bracts and bracteoles elongate triangular, acute, ½–1 mm. — ♂ *Flowers* urceolate, including the 1–1½ mm long stipe 7–9 by 4(–5) mm. Hypanthium including calyx tube urceolate, fleshy, 4–5 mm. Calyx lobes elongate triangular, subobtuse, 2–2½ mm, reflexed in anthesis. Petals oblong-lanceolate, subobtuse, *c.* 3 mm, inserted near the throat of the calyx tube. Filaments 1–1¼ mm, free, inserted at the base of the hypanthium. Anthers 3–4 mm, acute, 0.1–0.3 mm apiculate. Septa 0. Corona 0. Disk glands *c.* 1 mm. — ♀ *Flowers* not known. *Fruit* 1–2, globose,

excluding the 20–30 mm long gynophore 3½–4 by 3½–4 cm; pericarp woody, (2–)3 mm. *Seeds c.* 15, suborbicular, 8–10 by 8–9 by 2–2½ mm, pitted; embryo 7–8 mm; cotyledons ovate, deeply emarginate at one side, *c.* 7½ by 7 mm.

Distr. *Malesia*: N. Borneo (Sabah: Mt Kinabalu region). Fig. 8: 4.

Ecol. Montane forest, 1500–1800 m.

Note. The leaves resemble those of *A. macrophylla var. smilacina* and certain broad-leaved forms of *var. macrophylla*, but differ by the usually cordate base, the basal glands which extent onto the blade, and by the brown colour and different texture when dry. The ♂ flowers are smaller. The fruits resemble thick-valved forms of *A. macrophylla var. macrophylla*.

5. Adenia cordifolia (BL.) ENGL. Bot. Jahrb. 14 (1891) 376; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 84; *ibid.* ed. 2, 21 (1925) 490; KOORD. Exk. Fl. Java 2 (1912) 637; HALL. *f.* Med. Rijksherb. 42 (1922) 11; HEYNE, Nutt. Pl. (1927) 1142; MERR. Un. Cal. Publ. Bot. 15 (1929) 210; RIDL. Kew Bull. (1938) 112; MASAM. En. Phan. Born. (1942) 506; BACK. & BAKH. *f.* Fl. Java 1 (1963) 289; CUSSET, Adansonia 7 (1967) 372, 383; DE WILDE, Thesis (1971) 232, f. 34, 36. — *Modecca cordifolia* BL. Bijdr. (1826) 939; DC. Prod. 3 (1828) 336; G. DON, Gen. Syst. 3 (1834) 59; BL. Rumphia 1 (1837) 167, t. 49 f. 1–7; HASSK. Cat. Hort. Bog. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 702. — *Microblepharis cordifolia* ROEM. Syn. Mon. 2, Pepon. (1846) 202. — Fig. 4.

Modecca obtusa BL. Bijdr. (1826) 939; DC. Prod. 3 (1828) 336; G. DON, Gen. Syst. 3 (1834) 59; BL. Rumphia 1 (1837) 166, t. 48 f. 1–10; HASSK. Cat. Hort. Bog. (1844) 187; MIQ. Fl. Ind. Bat. 1, 1 (1855) 702. — *Microblepharis obtusa* ROEM. Syn. Mon. 2, Pepon. (1846) 200. — *A. obtusa* ENGL. Bot. Jahrb. 14 (1891) 376; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 84, f. 30 A–E; *ibid.* ed. 2, 21 (1925) 489, 492, f. 223; KOORD. Exk. Fl. Java 2 (1912) 637; HALL. *f.* Med. Rijksherb. 42 (1922) 11; STEEN. Acta Bot. Neerl. 15 (1966) 41.

A. populifolia var. pentamera KING, J. As. Soc. Beng. 71, ii (1903) 54; RIDL. Fl. Mal. Pen. 1 (1922) 841.

A. quadrifida MERR. Philip. J. Sc. 13 (1918) Bot. 94; En. Born. (1921) 413; HARMS in E. & P. Nat. Pfl. Fam. ed. 2, 21 (1925) 492; MASAM. En. Phan. Born. (1942) 506.

A. vespertilio HALL. *f.* Med. Rijksherb. 42 (1922) 8; MASAM. En. Phan. Born. (1942) 506.

A. sp. BARTLETT, Pap. Mich. Ac. Sc. 6 (1926) 31.

A. populifolia (*non* BL.) RIDL. Kew Bull. (1926) 66; *ibid.* (1938) 112; HEND. Gard. Bull. S. S. 4 (1928) 264; BURK. Dict. 1 (1935) 48; MASAM. En. Phan. Born. (1942) 506.

Liana to 20(–50?) m. *Leaves* herbaceous to subcoriaceous, pale to glaucous green beneath, entire, broadly ovate to oblong, top obtuse to acute, up to 1 cm acuminate, base rounded to deeply cordate, 2½–10(–17) by 1½–6(–9) cm, 3–5-plinerved and with 2–10 pairs of lesser nerves from the midrib, arching towards the top; petiole ½–3(–4½) cm. *Glands* at blade-base 2, 1–2½ mm ø, in two deeply hollowed hemispherical auricles 2½–4½ mm ø at the apex of the petiole; blade-glands 0–6, ¼–1 mm ø, submarginal; marginal glands minute, 0–8 at either side. *Inflorescences* peduncled up to 5½ cm, in ♂ up to 60-flowered, in ♀ 3–5-flowered, tendrils 0–3, ½–2½ cm. Sterile tendrils 3–5(–7)-fid, up to 10 cm, sometimes ending in adhesive disks. Bracts and bracteoles narrowly triangular, acute, ½–1 mm. — ♂ *Flowers* narrowly tubiform-urceolate, including the 10–20 mm long stipe 18–35 by 1½–3(–4) mm. Hypanthium including calyx tube tubiform-urceolate, ± narrowed at the throat, fleshy leathery, 8–12(–14) mm. Calyx lobes elliptic-oblong, obtuse to subacute, 1–2(–2½) mm, (sub)erect in anthesis. Petals oblong-lanceolate, obtuse to subacute, 1–2 mm, inserted in the throat of the calyx tube. Filaments (1½–)2–5 mm, connate for 1–2 mm, inserted at the base of the hypanthium. Anthers 3–4 mm, acute, up to ½ mm apiculate. Septa 1–2 mm high. Corona 0. Disk glands 1–2 mm. — ♀ *Flowers* tubiform(-urceolate), including the 4–10 mm long stipe 12–18 by 2½–3 mm. Hypanthium including calyx tube *c.* 7 mm. Calyx lobes *c.* 1½ mm. Petals *c.* 1½ mm, inserted at or near the throat of the calyx tube. Staminodes 1–1½ mm, ± connate at base. Septa *c.* ½ mm high. Corona 0. Disk glands *c.* 1 mm. Pistil 5–6 mm; gynophore *c.* 1 mm; ovary ellipsoid *c.* 4–4½ by 2½ mm; styles *c.* ½ mm, free; stigmas ± papillate, each *c.* 1 mm ø. *Fruit* 1–2, ellipsoid-oblong, fusiform, ± 3-angular, top acute, up to 1 cm acuminate, excluding the 5–10(–15) mm long gynophore (4½–)5–8(–9) by 1½–3½ cm; pericarp woody-coriaceous 1–1½ mm. *Seeds* 10–30, orbicular to reniform, 7–8½ by 8–10 by 4–4½ mm, pitted; embryo 7–9 mm; cotyledons ovate-elliptic,

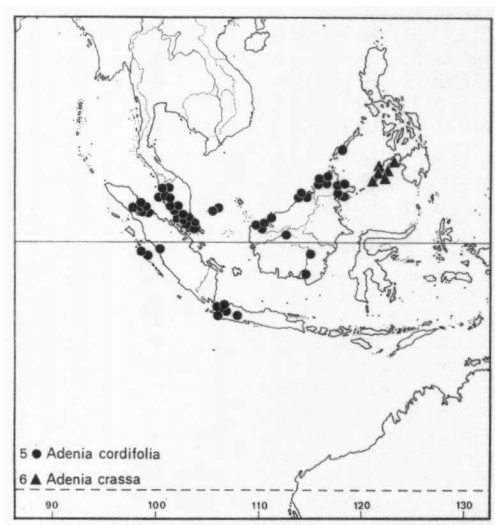

Fig. 10. Distribution of *Adenia cordifolia* (BL.) ENGL. and *A. crassa* MERR.

broadly emarginate at one side towards the top, 7–9 by 5½–6½ mm.

Distr. *Malesia*: Sumatra, Malay Peninsula, W. Java, Borneo, Philippines (Palawan: MERRILL 806, sterile). Fig. 10: 5.

Ecol. Rain-forest, thickets, forest clearings, peat swamp forest; 0–1200 m. *Fl. fr.* Jan.–Dec., mostly *fl.* Sept.–March, most *fr.* Nov.

Because of the narrow-urceolate flowers, entirely enclosing either the stamens or the pistil, pollination is likely effected by small insects (moths?).

Uses. The roots and fruits are known as poisonous; leaves and stems have medicinal properties.

According to HEYNE the branches are resistant to humidity and therefore used as binding material under water.

Vern. *Akar kail*, M, *layang-layang* (Kedayan), Mal. Pen.; *andor loting*, Asahan; *areuj babalingbingan*, *a. patok manok*, *a. tjalingtjing*, S.

Notes. Most records from the Philippines concern the related *A. crassa*.

Juvenile forms are often found creeping on open places, on tree trunks and rocks, and are provided with typical lobed or lunate leaves with more or less peltate blade-base; *A. vespertilio* is a juvenile from with lunate leaves.

Occasionally 4-merous ♂ flowers are found; once a ♀ flower with a 4-carpellate pistil; once a ♀ flower with 8 staminodes. *A. quadrifida* is based on a specimen in which part of the flowers have 4 calyx lobes.

Modecca cordifolia and *M. obtusa* date both from 1826. *M. obtusa* was listed first in the synonymy of *A. cordifolia* by KOORDERS, 1912.

Often galled flowers or slightly deformed flowers with an insect larva within are found.

Field notes. Fresh flowers are reported as pale greenish to yellow, when dry they are often inside reddish brown spotted; fresh ripe fruits are bright glossy red.

6. Adenia crassa MERR. Philip. J. Sc. 10 (1915) Bot. 331; En. Philip. 3 (1923) 117; DE WILDE, Thesis (1971) 235, f. 34. — *A. quadrifida* (*non* MERR.) MERR. En. Philip. 3 (1923) 117.

Climber to 10 m. *Leaves* herbaceous, entire or shallowly toothed in the lower half, ovate-elliptic to oblong, top longly acute or faintly acuminate up to 3(–5) cm, base cordate, 3–15 by 1½–9½ cm, 3–5-plinerved and 1–3 pairs of lesser nerves from the midrib; nerves often ± reddish tinged; petiole ¾–3½ cm. *Glands* at blade-base 2, 1–2½ mm ø, in two deeply hollowed auricles 2½–6 mm ø at the apex of the petiole; blade-glands 0–2, *c.* ½ mm ø, submarginal; marginal glands minute, 0–5 at either side. *Inflorescences* peduncled for 1½–6 cm, in ♂ up to 30-flowered, in ♀ 2–5-flowered; tendrils 0, or 1 or 3, ½–2½ cm. Sterile tendrils up to 10 cm, in juvenile forms 3-fid, ending in small adhesive disks. Bracts and bracteoles narrowly triangular to oblong, acute, ½–1 mm. — ♂ *Flowers* narrowly tubiform-urceolate, including the 9–10 mm long stipe 16–18 by 2½–3 mm. Hypanthium including calyx tube narrowed to the throat, rather fleshy (not leathery), 6–7 mm. Calyx lobes elongate triangular, subacute, 1–1¼ mm, suberect in anthesis (not reflexed). Petals elongate triangular, acute, 1–1¼ mm, inserted at the throat of the calyx tube. Filaments *c.* 3 mm, connate for 1½–2 mm, inserted at the base of the hypanthium. Anthers 3–3¼ mm, obtuse. Septa *c.* 1½ mm high. Corona 0. Disk glands 1–1½ mm. — ♀ *Flowers* ± urceolate, including the 2½–3 mm long stipe 8–10 by 3 mm. Hypanthium including calyx tube 4–4½ mm. Calyx lobes triangular, subobtuse, *c.* 1 mm. Petals oblong, *c.* 1¼ mm, inserted at the throat of the calyx tube. Staminodes *c.* 1 mm, connate at base for *c.* ½ mm. Septa *c.* ½ mm high. Corona 0. Disk glands *c.* ½ mm. Pistil *c.* 5½ mm; gynophore *c.* 1 mm; ovary subglobose, *c.* 3 by 2½ mm; styles connate for *c.* ½ mm, style-arms *c.* ½ mm. Stigmas papillate-laciniate, each *c.* 1 mm ø. *Fruit* 1, subglobose, excluding the 10–15 mm long gynophore 5–6 by 4½–5 cm; pericarp woody-coriaceous, inside ± spongy, 1½–2½ mm thick. *Seeds* 30–40, suborbicular, *c.* 7½ by 7½–8 by 2½–3 mm, pitted; embryo *c.* 7 mm; cotyledons ovate, broadly emarginate at one side towards the top, *c.* 6½ by 5½ mm.

Distr. *Malesia*: Philippines (Sulu Is., Basilan I., W. Mindanao: Zamboanga Prov.). Fig. 10: 6.

Ecol. Forest and forest-edges; 0–500 m. *Fl.* Sept.–Dec., *fr.* Aug. & Jan.

Vern. *Sabugok*, Basilan I.

Uses. According to GORDON (PNH 82005) the fleshy arils are edible.

Notes. Related to *A. cordifolia*, but distinguished by the stronger 3–5-plinerved leaves and the subglobose, thick-valved fruits.

Leaves of juvenile specimens are deeply 3-lobed with a much reduced middle lobe, and the base ± peltate.

Field notes. Fresh flowers are pale (greenish) yellow, when dry finely purple-red spotted; fresh fruits are shining red.

3. HOLLRUNGIA

K.SCH. Bot. Jahrb. 9 (1888) 212; BOERL. Handl. 1 (1890) 571; HARMS, Bot. Jahrb. 15 (1893) 578 (anat.); in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 79, 86; *ibid.* ed. 2, 21 (1925) 484, 494; STEEN. Reinwardtia 1 (1952) 480; Acta Bot. Neerl. 15 (1966) 40–44, f. 1–7; HUTCH. Gen. Fl. Pl. 2 (1967) 370.

Liana. *Leaves* simple, entire, pinninerved; petiole with or without glands; stipu-

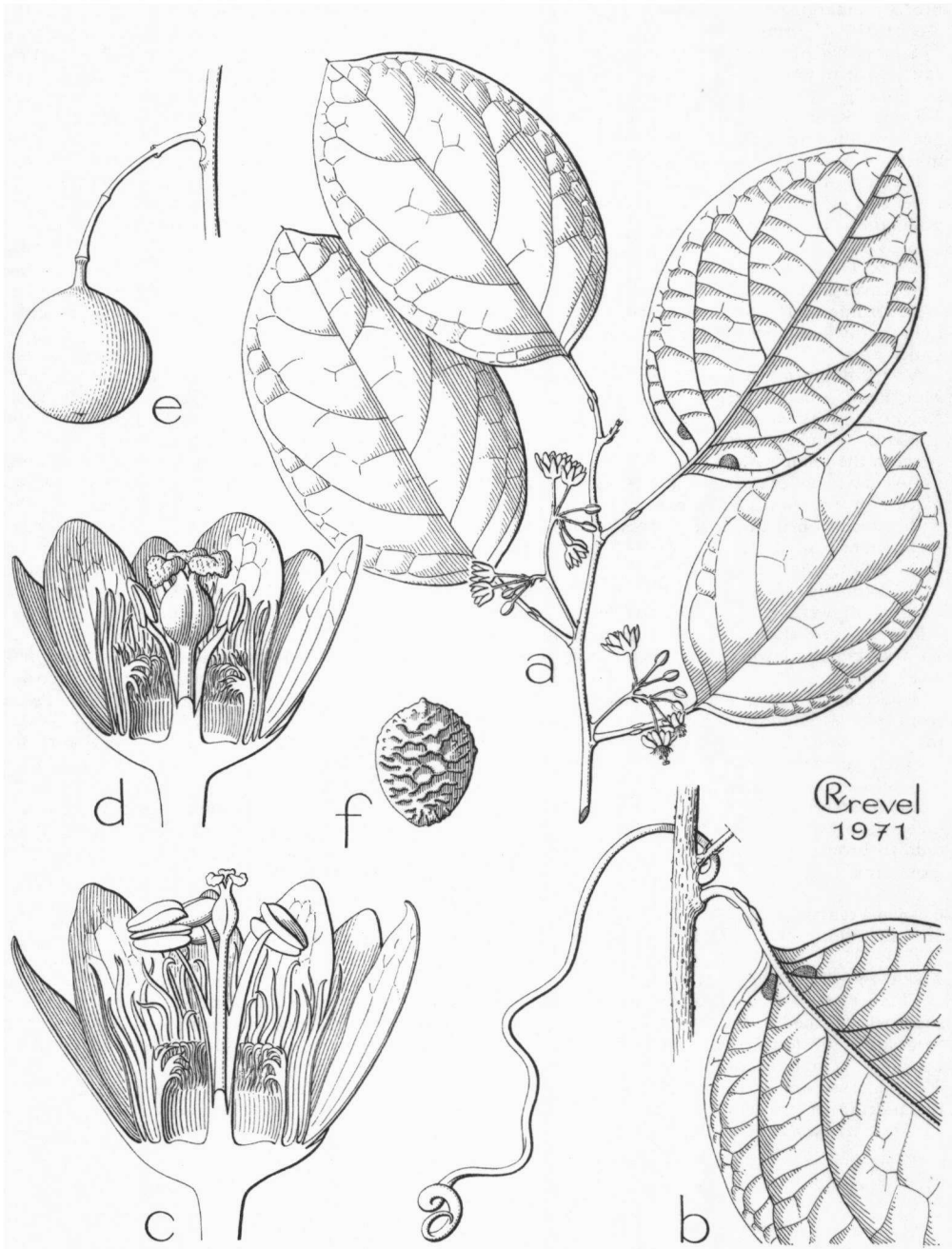

Fig. 11. *Hollrungia aurantioides* K. SCH. *a.* Habit of ♀ specimen, × ½, *b.* detail of node, showing axillary tendril and serial, supra-axillary ramification, × ½, *c.* ♂ flower in longitudinal section, ×4½, *d.* ♀ flower in longitudinal section, ×4½, *e.* fruit, × ½, *f.* seed, ×2½(*a*, *d* BSIP 4071, *b* BRASS 3283, *c* BRASS 27551 *e* KAJEWSKI 1915, *f* KAJEWSKI 1913).

les minute. *Inflorescences* axillary or slightly supra-axillary, shortly peduncled, 1–15-flowered, mostly without a tendril. Bracts minute. *Flowers* polygamous (bisexual or functionally unisexual). Hypanthium saucer-shaped. Sepals and petals free; sepals 5, greenish; petals 5, resembling the sepals, white, membranous. Corona double; outer corona consisting of 2(–3) rows of filamental appendages, inner corona an erect tube with complicatedly folded, curved and laciniate edge; nectary ring or disk obscure, at the bottom of the hypanthium. Androgynophore ½–2 mm. Stamens 5, filaments free or connate to more than halfway into a tube enveloping (not connate with) the gynophore. Anthers ellipsoid-sagittate, blunt, ± dorsifixed, ± versatile. Gynophore 1½–6 mm. Ovary subglobose to ellipsoid; styles 3, *c.* ½ mm, free; stigmas lobed-papillate. *Fruit* globose, pericarp coriaceous to woody.

Distr. *Malesia*: monotypic, from the Moluccas eastwards to the Solomons.

Ecol. Rain-forest, from the lowland up to *c.* 1700 m.

Taxon. Distinctly related to the monotypic genus *Tetrapathaea*, from New Zealand, which differs by 4-merous flowers and the absence of a separate inner corona.

1. Hollrungia aurantioides K. SCH. Bot. Jahrb. 9 (1888) 212; HARMS in E. & P. Nat. Pfl. Fam. 3, 6a (1893) 86, f. 25 E–F; *ibid.* ed. 2, 21 (1925) 495, f. 218 E–F; K. SCH. & HOLLR. Fl. Kais. Wilh. Land (1889) 82; K. SCH. & LAUT. Fl. Schutzgeb. (1901) 456; MERR. & PERRY, J. Arn. Arb. 24 (1943) 210; *ibid.* 29 (1948) 160; *ibid.* 30 (1949) 44; STEEN. Reinwardtia 1 (1952) 480; Acta Bot. Neerl. 15 (1966) 40–44, f. 1–7. — *Passiflora moluccana* (*non* BL.) MERR. & PERRY, J. Arn. Arb. 30 (1949) 44. — **Fig. 11.**

Liana to 45 m. Serial buds distinct, with acute bud-scales (cataphylls) ½–1 mm. *Leaves* subcoriaceous, elliptical to lanceolate, top subobtuse to acute, up to 1 cm acuminate, sometimes 1–2 mm mucronate, base rounded to acute-acuminate, 7–23 by 3–12 cm, pinninerved; nerves 4–6(–8) pairs, arching to above, the basal nerves weaker; petiole 1½–4 cm. *Glands* on lamina 0 or 1–2(–6), mostly ± paired, either at the very blade-base, or halfway the lower nerves or scattered, large but often inconspicuous, flat, roundish or irregular in shape, 2–6 mm ø; glands on petiole 0 or 1(–2) pairs, inserted halfway or mostly at *c.* ⅓ (and ⅔) from the base, ½–2 mm ø. *Inflorescences* axillary or up to 5 mm supra-axillary, 1–10(–15)-flowered; peduncles ½–6 cm, pedicels 1–5(–10) mm; bracts and bracteoles narrowly triangular, acute, ½–1 mm. Tendrils 0 or rarely the central flower replaced by a 1–5 cm long tendril; sterile tendrils 10–15 cm, sparse, in the axils of leaves. — ♂ *Flowers* 15–20 mm ø; stipe 14–20 mm. Hypanthium saucer-shaped, 3–5 mm wide. Sepals lanceolate, 8–10 by 3–4 mm, obtuse. Petals 7–9(–10) by 3–3½ mm, (sub)entire, obtuse. Corona double; outer corona ± spreading, consisting of densely set appendages in 2(–3) rows, 2–9 mm, the outer longest; inner corona an erect membranous tube with complicatedly folded and inward curved much divided (laciniate) upper ⅓, 2½–4 mm high, 3–5(–6) mm wide. Disk entire, flat or sometimes irregularly wrinkled, covering the bottom of the hypanthium, 2–3½ mm ø, *c.* ½ mm thick. Androgynophore ½–2 mm. Filaments flat, 5–6 mm, free or up to 4 mm connate into a tube; anthers elliptic, obtuse, (1½–)2–3 by (1–)1½–2½ mm, the filaments dorsally attached to the filaments, but anthers sagittate and toppled over in anthesis. Gynophore 2–6 mm; vestigial ovary oblong, ± 3-angular, smaller than the anthers, 1–1½ by ½–⅔ mm, vestigial stigmas sessile, ± brush-shaped, each *c.* ½ mm ø, or as a single irregular disk, *c.* 1 mm ø. — *Flowers* as ♂ flowers but ovary ellipsoid, subcircular in cross-section, 1¼–2½ by 1–2 mm. Styles *c.* ½ mm; stigmas papillate, each ½–1 mm ø. — ♀ *Flowers* as ♂ and ☿ flowers or smaller, 10–20 mm ø; stipe 8–18 mm. Sepals and petals 5½–8(–10) mm. Outer corona filaments 1½–5 mm, inner corona 2–3 mm high; disk as in ♂ flowers. Androgynophore ½–1½ mm. Filaments 2–4 mm, free or up to 1 mm connate; vestigial anthers 1–1½ by ½(–1) mm. Gynophore 1–2 mm; ovary ellipsoid to subglobose, 1½–2 by 1–2 mm; styles *c.* ½ mm; stigmas papillate, each 1–2 mm ø. *Fruits* 1–2, globose, excl. the (5–)10 mm long gynophore 2–4½ cm ø; pericarp thickly coriaceous to woody, 1–4 mm thick, greenish yellowish when fresh, sometimes ± fleshy inside. *Seeds* 15–50 ellipsoid-obovate, 5½–7 by 4–6 by 2–3 mm, 5–7 pits or grooves ø; embryo 4–6 by 3½–5½ mm; cotyledons obovate, subtruncate, 3(–5)-plinerved; radicle *c.* 3/8 mm.

Distr. *E. Malesia*: Moluccas (Ternate), W.–E. New Guinea, New Britain (Wiriai Subdistr.), New Ireland (inland from Lavongai), Misima I., Solomon Is. (Bougainville, Shortland, Ronongo, New Georgia, Santa Ysabel, Santa Ana, Rennell). Fig. 12.

Ecol. Primary and secondary rain-forest, locally common; 0–1700 m. *Fl. fr.* Jan.–Dec.

Vern. *Aa*, Vogelkop (Maibrat lang.).

Notes. Polygamous, apparently largely (func-

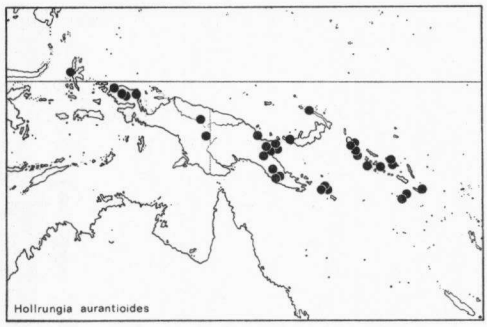

Fig. 12. Distribution of *Hollrungia aurantioides* K. SCH.

tionally) dioecious. The ♂ and ☿ flowers are usually somewhat larger than the ♀ flowers. In ♂ flowers always a distinct vestigial ovary is present, in ♀ flowers stamens with distinct, reduced, sterile anthers. In one specimen (CLEMENS 5435) some of the ♀ flowers contained beside 4 reduced anthers one well-developed fertile anther.

In the flowers a short androgynophore is always present; the filaments are either free or to a various degree connate into a tube enveloping the gynophore.

The variability in the flowers as well as in the size of the fruits and the place and presence or absence of glands suggested that several taxa might be involved (VAN STEENIS, 1966); a thorough investigation of the flowers of the rather abundant recently collected specimens, however, proved that all the material belongs to a single species.

In the original description the stigma was erroneously described as single, undivided, cap-shaped, but it appeared (VAN STEENIS, 1966) that this was due to the young stage of the flowers in the type material.

Australasian *Passifloras* differ by the absence of a distinct gynophore and by the globular or club-shaped stigmas. In *Adenia* the corona is absent or composed of but a single row of short hairs, whereas the disk is composed of 5 separate lingulate or strap-shaped appendages; the anthers are narrow; petiolar glands are absent or restricted to auricles at the very top of the petiole.

Field notes. The bark is green with brown corky lenticels, in old specimens dark brown, fissured. Slash: wood soft whitish cream, bark soft, reddish brown. Big sterile tendrils reported as present only on the main stems, not on the fruiting lateral branches. Leaves glossy. The flowers are greenish white or yellow-green; sepals pale green or greenish yellow, petals white; outer corona filaments whitish yellow; inner corona yellow-green, tipped yellow; filaments white or greenish; anthers yellow; ovary green; stigmas yellow-green. Once recorded with faint smell, once with nasty smell (♂ fl.). The fruits are light green or yellowish green.