A New Account of the Genus *Horsfieldia* (Myristicaceae), *Pt 2**

W.J.J.O. de WILDE
Rijksherbarium, Leiden, The Netherlands

EFFECTIVE PUBLICATION DATE: 31 AUG. 1985

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M. spherocarpa Wall., Pl. As. Rar. (1830) 79, t. 89. — *M. irya* var. *wallichii* King, Ann. Roy. Bot. Gard. Calc. 3 (1891) 309, pl. 141-*bis*, 3-5. — Type: *Wallich Cat. 6796* (K-W).

M. micrantha Wall., Cat. 6807 (1832), *nom. nud.* — Type: *Wallich 6807* (K).

M. lemanniana A. DC., Ann. Sci. Nat. Sér. 4, 4 (1855) 31, t. 4; Prod. 14, 1 (1856) 203. — *H. lemanniana* (DC.) Warb., Mon. Myrist. (1897) 326. — Type: *Lemann s.n.* (G, *n.v.*).

M. subglobosa Miq., Fl. Ind. Bat. Suppl. 1 (1861) 383. — *M. globularia* Bl. var. *subglobosa* (Miq.) Miq., Ann. Mus. Lugd. Bat. 1 (1864) 206 — *H. subglobosa* (Miq.) Warb., Mon. Myrist. (1897) 328 (for the original syntype only) — Type: Sumatra, *Diepenhorst Hb. 2148* (U), *Teysmann Hb. 3189* (U).

M. vrieseana Miq., Ann. Mus. Bot. Lugd. — Bat. 2 (1865) 49. — *M. irya* var. *longifolia* King, Ann. Roy. Bot. Gard. Calc. 3 (1891) 309, pl. 141-*bis*, 1-2. — Type: *de Vriese s.n.* (L).

H. labillardieri Warb., Mon. Myrist. (1897) 283, t. 21 f. 1-2. — *M. labillardieri* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 85. — Type: Java, Hb. — *Labillardiere s.n.*, male flowers (B, †; iso; FI, see note by Sinclair p. 89).

H. acuminata Merr., Phil. J. Sc. 17, 1920 (1921) 253; En. Phil. Fl. Pl. 2 (1923) 181. — Type: *de Mesa FB 27507* (PNH, *n.v.*, probably destroyed).

H. nunu Kanehira, Trop. Woods 29, 5 (1932) *nom. nud.;* Bot. Mag. Tokyo 46 (1932) 451; Fl. Micr. (1933) fig. 32; Enum. Micron. Plants, in J. Dept. Kyushu Imp. Univ. 4, 6 (1935) 319. — Type: *Kanehira 1303, 1304 (n.v.)*.

H. amklaal Kanehira, Bot. Mag. Tokyo 47 (1933) 670; Fl. Micr. (1933) 109, fig. 31, pl. 16. — Type: *Kanehira 1944* (FU, *n.v.*), *1978* (FU, *n.v.*), *2058* (FU, *n.v.*, iso: K & P), *2059* (FU, *n.v.*).

H. congestiflora A.C. Smith, J. Arn. Arb. 22 (1941) 64. — Type: *Brass 8010* (A, *n.v.;* iso: BM & L).

Tree 10-25(-40). Twigs terete or often drying flattened towards apex, usually thinly ridged, (2-)3-10(-30) mm diam., glabrescent, tomentum minute to conspi-

*Continued from Gdns' Bull. Sing. 37(2): 179.

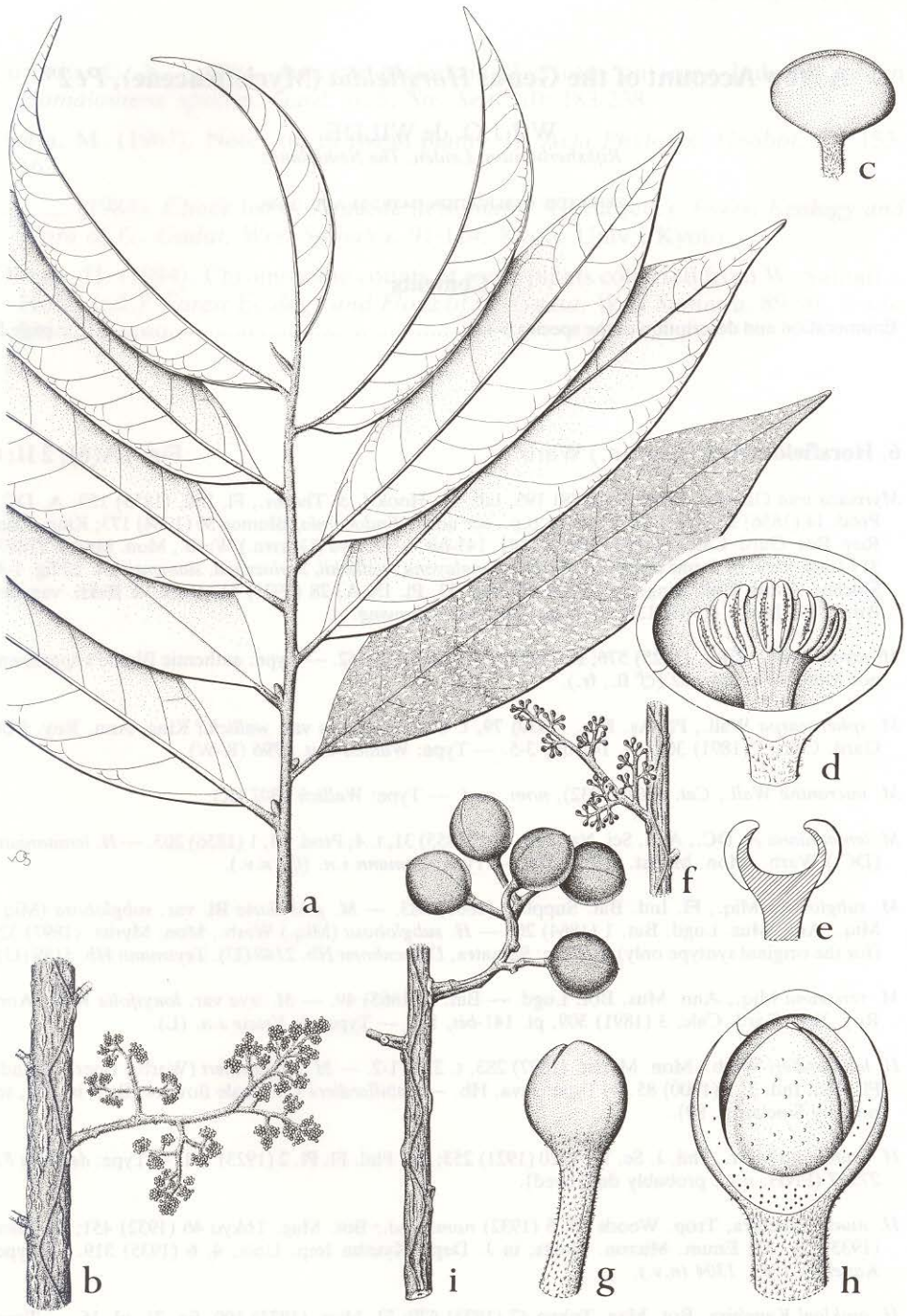

Fig. 6. *Horsfieldia irya* (Gaertn.) Warb.
a, leafy twig apex, note whitish blotched leaves, × ½; *b,* twig portion with male inflorescence, note ridged twig, × ½; *c,* mature male flower bud, lateral view, × 12; *d,* male flower, longitudinal section, showing androecium, × 25; *e,* androecium, longitudinal section, schematic, × 25; *f,* twig portion with female inflorescence, × ½; *g,* mature female flower, × 6; *h,* ditto, opened, showing glabrous ovary with minute 2-lipped stigma, × 12; *i,* twig portion with infructescence, note spherical fruits. — *a & b* from *NGF 22319; c-e* from *Kostermans 24385; f-i* from *FRI 3044.*

cuous (New Guinea and Pacific Isls.), grey to rusty, of mixed dendroid hairs 0.1-0.5(-1.0) mm; bark often coarsely striate, often ± blackish, when older not flaking; lenticels usually conspicuous. Leaves in 2 rows, abaxially often ± curved especially towards the tip, membranous, elliptic-oblong to lanceolate, 10-30(-35) × 3-7(-9) cm, base rounded to attenuate, tip acute-acuminate; upper surface drying dull greenish-brown to blackish-brown, usually finely pustulate with paler stipples and almost always with larger irregular whitish marks of unknown origin, lower surface early glabrescent to glabrous, without dark dots; midrib slender above, flattish; nerves 10-20 pairs, very thin and flattish above, inconspicuous, the marginal arches usually not distinct; tertiary venation forming a lax network, faint above, thin though distinct beneath; petiole 7-16 × 1.5-3(-4) mm; leaf bud c. 10(-15) × 2-3 mm, pubescent with hairs c. 0.1-0.5(-1.0) mm. Inflorescences densely tomentose with hairs 0.1-0.5(-1.0) mm long, persistent or glabrescent, in ♂: 3-4 times ramified, many-flowered, c. 4-18 × 3-7(-10) cm; in ♀: c. 2-6(-8) cm long, 2(-3) times ramified; common peduncle 0.5-4.5 cm long; bracts acutish, 1.5-4 mm long, caducous. Flowers in ♂ in clusters of 3-10, in ♀ usually solitary or a few together, perianth glabrous or at base glabrescent, perianth 2-valved; pedicel pubescent or glabrescent, at base not articulated. Male perianth subglobose or ± transversely ellipsoid, somewhat laterally compressed or not, c. 1.0-1.3(-1.5) × (1.0-)1.2-1.5(-2.0, Indo-China) mm, apical part broadly rounded, at base rounded or short-tapering; pedicel slender, (0-)0.1-1(-1.5) mm, inarticulate at base; perianth at anthesis cleft to c. ½-⅔, valves c. 0.2 mm thick. Androecium broadly obovoid, ± broadened transversely, c. 0.8-1.2 × 1.0-1.5 mm; anthers 6-9(-10), Indo-China), not closely touching, c. 0.5-0.8(-1.0) mm long, towards apex incurved and free for c. 0.2-0.3 mm, dorsally attached to the broadly concave, often ± saucer- or cup-shaped androphore c. 0.4-0.5 × (0.5-)0.6-1.0 mm, tapered towards the base. Female perianth obovoid or ellipsoid, c. 1.5-2.3 × 1.3-2.0 mm, at anthesis cleft to c. ¼-⅓, valves c. 0.3 mm thick, pedicel 1-4 mm long; ovary broadly obovoid, glabrous c. 1.2-1.5 × 1.0-1.3 mm, stigma minute, c. 0.05 × 0.1 mm. Fruits 2-8 per infructescence, globose, 1.5-2.2 cm diam., glabrous, with the surface finely granular, without larger tubercles or lenticels, drying dark brown to blackish, dry pericarp c. 1-2 mm thick; stalk 5-10 mm long, perianth not persisting.

Distribution. From Ceylon through Malesia to the Solomon Isls.: Ceylon, Burma, Andaman Isls., Nicobar Isl., S. Indo-China (Cochin-China), Cambodia, Thailand, Malaya, Singapore, Sumatra, Java, Borneo, Celebes, Moluccas, C.(?) & S. Philippines, New Guinea, Caroline Isls., Solomon Isls.; no collections seen from the Lesser Sunda Isl. and N. Philippines.

CEYLON: *Davidse & Sumithraarachi 8119; Gardner* (Hb. Hooker) *748; King's Coll.* (1884); *Kostermans 24385, 27202; Thwaites C.P. 221, 2620; Walker s.n.; Wall., Cat. 6804* (♂, part of the material of *M. exaltata,* not the lectotype); *Waas 1272; Worthington 487, 517, 576, 686, 1848, 6351.*

ANDAMAN Isls.: *Balakrishnan & Bhargava 3622; Kurz s.n.; Parkinson 1050.*

NICOBAR Isl.: *Nair 3512.*

BURMA: *Wallich 6804 C* (Moulmein, ♂ fls.; part of the original material of *M. exaltata,* not the lectotype).

THAILAND: *Kerr 4108 (A, B, C), 11419, 13883, 14252, 18599, 18907, 19036; Lakshnakara 615; Larsen* c.s. *FHB. 31253; Marcan 232, 720, 971, 1978; Maxwell 75-61; 75-1026; Put 623, 1580; Rabil 218, 273; Smith 348;* see further Sinclair's list (1975, p. 62).

CAMBODIA: *Poilane Ch. 158.*

VIETNAM (SOUTH): *Müller 1020; Pierre 5745; Poilane 769, Thorel 1186* (p.p., other specimens of the same number are the type of *H. thorelii*).

MALAYA: *Griffith 4357;* Kep. *FN 94710; Ridley 4957; Wallich 6807 — Kedah: Wyatt-Smith KFN 71179* — Perak: *FRI 3044; King's coll. 7447; Ridley 3043; SFN. 33240* — Kelantan: *Ridley 7206; Shah & Kadim MS 550* — Trengganu: *SFN 40739.* — Pahang: *Evans s.n.* — Selangor: *SFN 34145.* — Malacca: Kep. *FN 94710; Maingay 1292, 2944, 3075.* — Johore: *Corner 25856, 25964, 28493; Maxwell 80-142; Ridley 897, 11328.* — Penang (etc.): *Curtis 936;* Kep. *FN 80999; Ridley s.n.*

SINGAPORE: *Ridley 4814, 8957; SFN 339448, 40202; Sinclair s.n.* (1953).

SUMATRA: *Ashton 15361; b.b. E. 868, 5208, 21463, 28460; Buwalda 6804; Forbes 3197; Grashoff 1088; Horsfield s.n.; Praetorius s.n.; Rahmat si Toroes 3961* — Simeuluë Isl.: *Achmad 60, 362, 830, 1732* — Mentawai Isls. (Sipora): *Iboet 487, Ridley 14760* — Riau: *b.b. 20382.*

JAVA (W, C & E): *Backer 27971; b.b. 1177, Boerlage s.n.; Buwalda 3001A, 3076* (= *FRI. Ja. 4214*); *Coert 1489; Hoogerwerg a 1954; Junghuhn s.n., 33, 49, 875; Koorders 5211 β, 5213 β, 5215 β, 5224 β, 5265 β, 12274 β, 13493 β, 15521 β, 24784 β, 25392 β, 27479 β, 28353 β, 38882 β; Kostermans* (Unesco) *52, 19281; Soepadmo 279; Van Steenis 5274; Nengah Wirawan 429.*

BORNEO. Sarawak: *Haviland & Hose 3305, 3305B; S. 16805, 18120, 18864, 34153, 36084* — Brunei: *(Ashton) BRUN 5553* — Sabah: *Amdjah 1, 94, 846; Elmer 20013, 21032; Rajuyap A 463; SAN. 31, 18726, 21768, 30297, 34497, 47151, 75131, 84575, 90864* — W. Kalimantan: *Hallier 1021, 1043; Teysmann 8676, 8680, 8683* — C. Kalimantan: *Veldkamp 8256* — S. Kalimantan: *Korthals s.n.* — E. & SE. Kalimantan: *b.b. 2114, 19042, 25129, 29415, 34244; Kostermans 4006, 5047, 21226, 21456.*

CELEBES: *b.b. 22986; Forster* (?) *329*; Koorders *18157 β; Meijer 10139; Noerkas 305; Prawiroatmodjo & Soewoko 1777; Teysmann (11897).*

MOLUCCAS: *Atjè 33, 50; de Vogel 3807; de Vriese s.n., s.n.* (87).

PHILIPPINES. Palawan: *Elmer 12682, 12684; Merrill 9208* — (Luzon, Mindanao): *Cenabre FB 29146, 29176; Cruz FB 23887; Natividad FB 25751; (Ramos & Edano) BS 36770, 41198; Vidal 3567; Wenzel 3023.*

NEW GUINEA. Irian Jaya (West New Guinea): *Zippel s.n.; b.b. 22530, (Kostermans 127) 33354; BW 393, 873, 3288, 4436, 5165, 5348, 5838, 5840, (Schram BW) 6082* (in K), *6563, 6595, 7258, 10827, 11870; van Royen 4675, 5101* — Papua New Guinea: *Brass 8010; Craven & Schodde 776; Hartley* (TGH) *9738; Hollrung 657* (in P, not in K); *Hoogland 4213, 4650; LAE 74298; NGF 16320, 22319, 25577, 35309, 37574, 47300.*

CAROLINE Isls.: *Kanehira 1303, 2058; Masahiko Takamatsu 392; St. John 21446; Stone 1901.*

SOLOMON Isls.: *BSIP 39, 909, 910, 1663, 1664, 2014, 3668, 4743, 5286, 5788, 5855, 6037, 6119, 6948, 10614, 13211, 15441, 15806, 17057, 17275; Comins 355; Kajewski s.n., 2444.*

Ecology. A tall tree in primary and (old) secondary forest. Most frequent coastal or riverine, on alluvial (sandy, loamy, or clayey) soils, but also found more inland; 0-450 m. Mentioned mostly from wet or marshy localities at low altitudes, e.g., coastal swamp forest, sandy alluvium behind the beach, open, low marshy ground (with sago-palms), swamp forest, river banks below tidal limits, seasonal swamps, periodically inundated forest, coastal shrubberies (on limestone), river flood-plains with mud soil, etc., but also recorded from undulating country, and well-drained soils (e.g., in Ceylon and Solomon Isls.). From Ceylon recorded from the "dry zone". In Thailand in riverine evergreen forest. Flowers and fruits apparently throughout the year, but this is likely correlated with regional and local climatic conditions.

Vernacular names. Amklaal, Nunu (Palau Isls.); Aininiu, Ainynu (Kwara'ae lang., Solomon Isls.); more vernacular names will be published in Flora Malesiana.

Uses. Rare in record that fruits are edible; fruits recorded as eaten by monkeys in Ceylon.

NOTES

1. Fieldnotes. A tall tree with straight bole; crown described as with several big limbs each monopodially branched, or narrow and with slender drooping branches near the top; bole often recorded as fluted, or with prop roots, or, usually, with buttresses up to 3 m high, 2 m out, and up to c. 10 cm thick, but also recorded as without buttresses. Bark sometimes noted as smooth, often as fissured or cracked, or mostly as flaking or peeling off in small pieces; inner bark cream or whitish, to c. 7 mm thick; sapwood cream or whitish, ochreish, straw-coloured, or pinkish; heartwood absent or only slightly darker, pale brown; wood rather soft. Flowers yellow, dark yellow, or orange-yellow, once recorded as reddish; strongly sweet-scented, once recorded as unscented. Fruit yellowish, greenish orange, to orange-red, or red; the aril usually orange or orange-red, rarely recorded as red. Fresh fruit recorded as large, up to c. 2¾ cm diam. The seed is reported to contain an air chamber, facilitating dispersal by floating.

2. Variability. H. irya is a homogeneous species, well characterized by its small subglobose male flowers of c. 1 mm diam. (in Indo-China up to 1.6 mm diam.), with typical broad and deeply concave androecium with tapered, distinct (i.e., relatively large) androphore. The fruits (and seeds) are perfectly spherical, glabrous (ovary glabrous). The twigs are usually thinly ridged from petiole to petiole. Very characteristic are irregular whitish marks of unknown origin, almost always present on the older leaves. The leaves have a lax reticulation. Variation abounds in the tomentum: short-haired; sometimes seemingly glabrous specimens are predominant in Ceylon, SE. Asia, and W. Malesia and the Moluccas; in New Guinea and the Solomon Isls. most specimens have a conspicuous, often wooly, tomentum of hairs to c. 1 mm long on the twig apex, leaf bud, and inflorescences.

7. Horsfieldia spicata (Roxb.) Sinclair Fig. 1A(7); 7

Myristica spicata Roxb., Fl. Ind. 3 (1832) 847; (ed. 1874) 744; Warb., Mon. Myrist. (1897) 271 in obs. sub *H. smithii* Warb. — *H. spicata* (Roxb.) Sinclair var. *spicata,* Gard. Bull. Sing. 28 (1975) 112, 113, p.p. — Type: Roxburgh's description.

M. canariformis Bl., Rumphia 1 (1837) 190 — *H. canariformis* (Bl.) Merr., Interpret. Rumph. (1917) 230 — Based on: *Palala quarta, P. canariformis, P. dentaria* Rumph., Hb. Amb. 2, 10 (1741) 27 t. 8; see Sinclair, 1975, 162-165.

H. batjanica Warb., Mon. Myrist. (1897) 275, tab. 21, 1-4 — *M. batjanica* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 85 — Type: Introduced by Teysmann in hortus Bogor. (B, lost; iso: FI, *n.v.;* original tree still cultivated in Bogor, and collected sub *Kostermans 11186, Rastini (220), Sinclair 10035).*

H. roxburghii Warb., Mon. Myrist. (1897) 277, tab. 21, 1-2. — *M. roxburgii* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 85 — Type: *Smith* in Hb. Roxburgh (BM; B, BR, *n.v.;* ♀ fl., orig. Ternate); Culta in hortus Bog. (♂ fl., orig. Ambon) (B, FI, *n.v.;* lecto: P, tree still in cultivation in Bogor sub no. IV. G. 90, collected under *Sinclair 10037).*

H. parviflora auct. non (Roxb.) Sinclair: Sinclair, Gard. Bull. Sing. 28 (1975) 82, p.p.

Tree 2.5-20 m. Twigs terete, not ridged, towards the apex 2-4 mm diam., tomentum greyish, with hairs c. 0.1 mm or less, early glabrescent; bark striate, pale brown to whitish brown, usually contrasting with the blackish colour of dried

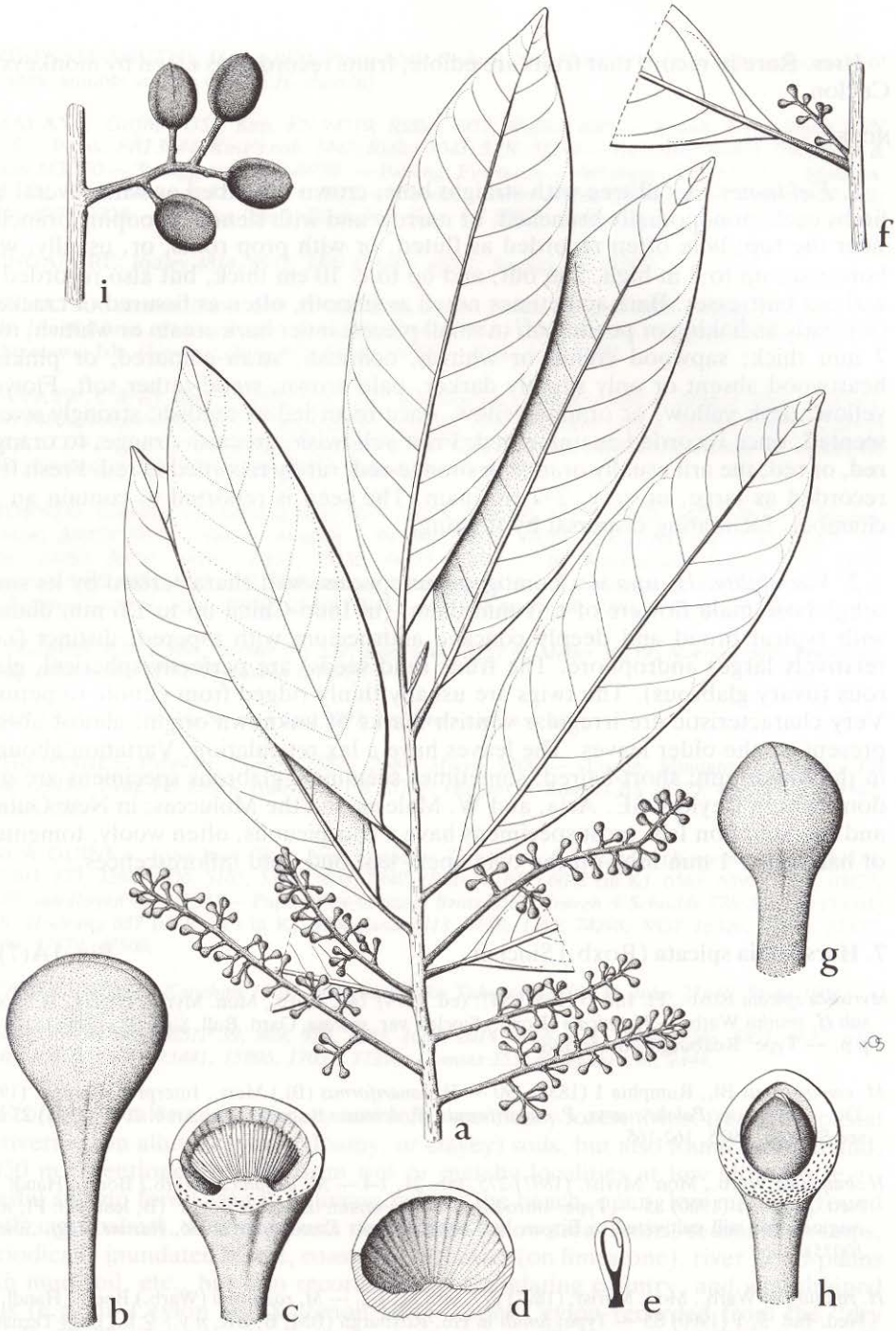

Fig. 7. *Horsfieldia spicata* (Roxb.) Sinclair
a, leafy twig with male inflorescences, × ½; *b,* mature male flower, lateral view, × 6; *c,* male flower, opened, showing androecium, × 6; *d,* male perianth, inner side, showing impression of androecium, × 6; *e,* androecium, longitudinal section, schematic, × 6; *f,* twig portion with female inflorescence, × ½; *g,* mature female flower, lateral view, × 6; *h,* ditto, opened, showing glabrous ovary and 2-lipped stigma, × 6; *i,* twig portion with infructescence, × ½. — *a-d* from *Beguin 1407; e* from *Teÿsmann s.n.* (Ambon); *f-h* from *Kostermans s.n.* (Hort. Bog. sub IV.H. 13); *i* from *de Vogel 3206.*

petioles and inflorescences, when older not flaking, usually with few coarse lenticels. Leaves in 2 rows, membranous, elliptic-oblong to oblong, 8-30 × 2.5-10 cm, base attenuate, top acute-acuminate, often densely speckled by paler irregular pustules of unknown origin, especially beneath; upper surface drying dull greenish brown to brown, lower surface with very minute scales as on the leaf bud, very early glabrescent, i.e., glabrous; without larger blackish dots, but often with dense, very minute, blackish dots; midrib flattish above; nerves 11-17 pairs, thin and flattish above, tertiary veins very thin, distinct or not on both surfaces; petiole 10-20 × 1.5-3 mm, drying blackish; leaf bud slender, c. 10 × 1.5-2 mm, densely pubescent with grey-brown hairs c. 0.1 mm long or less. Inflorescences drying blackish, usually slender, spike-like, early glabrescent, not ramified or the lateral branches only up to c. 2(-5) mm, common peduncle c. 1-3 cm, not many-flowered, in ♂: 4-10 × c. 1 cm, in ♀: c. 2-3 cm long; bracts bluntish, 0.5-1 mm, caducous. Flowers solitary or 2 together in ♀, up to 3 together in ♂, very early glabrescent; perianths 2-valved; pedicel glabrous (glabrescent), at base inarticulate. Male perianth ± obovoid or short-pear shaped, in lateral view the upper part subcircular to reniform, laterally rather compressed, about as long as broad or slightly broader than long, 2.3-3 × 3-3.5 mm, the upper part broadly rounded, base ± tapering into the much tapered pedicel 1.5-3 mm long; perianth at anthesis split to or nearly to the base, valves c. 0.2 mm thick. Androecium reniform, rather well compressed, upper part broadly rounded, at base broadly attached, 1.5-1.8 × 2.5 mm, androphore ± absent; anthers (12-)16-22, closely set, ± septate only in young state, free apices 0.1-0.4 mm, little to strongly incurved into the apical cavity which reaches to c. ¼-½(-¾, see notes). Female perianth subglobose, 2-2.5 × 2.2-2.8 mm, at base passing into the somewhat tapered pedicel 1.5-2.5 mm, at anthesis split to c. ½-⅔, valves 0.4-0.5 mm thick; ovary broadly ovoid, glabrous, c. 1.5 × 1.5 mm, stigma minute, faintly 2-lobed, c. 0.1 mm high. Fruits 1-5 per infructescence, short-ellipsoid, apex and base rounded, 1.5-2.0 × 1.2-1.8 cm, glabrous, drying blackish, without pustules, pericarp c. 1.5 mm thick; stalk 4-10 mm long; perianth not persisting.

Distribution. Moluccas: Morotai, Halmahera, Ternate, Bacan Isl., Ambon.

Cultivated (origin Bacan Isl., Ambon): *Kostermans 11186; Rastini (220); Sinclair 10035, 10037;* Hb. Hasskarl *s.n. (Teysmann s.n.,* 1868, orig. "E. Java").

MOROTAI: *Kostermans 1014, 1157, 1218, 1256; Lam 3499.*

HALMAHERA: *Pleyte 409,* p.p.; *de Vogel 3206, 3289, 3334, 3367, 3434, 3490, 3496, 4391, 4467.*

TERNATE: *Beguin 1407.*

BACAN: *b.b. 32787;* Hb. *Hance s.n.; de Vogel 3529, 3531, 3748.*

AMBON: *Buwalda 6141; Robinson 240, 1885; Teysmann s.n.* (1867).

Ecology. Alluvial soils, deep clay, soil rich in humus, and porous volcanic soil over schists; 0-1000 m. Flowers and fruits throughout the year.

Vernacular names. Anunu magilioro (Halmahera), Onguaka (Tobaro lang., Halmahera).

Uses. According to the label of *de Vogel 3206*, the outer bark, mixed with "Kuleman" (a different species of *Horsfieldia*), is used for curing hepatitis.

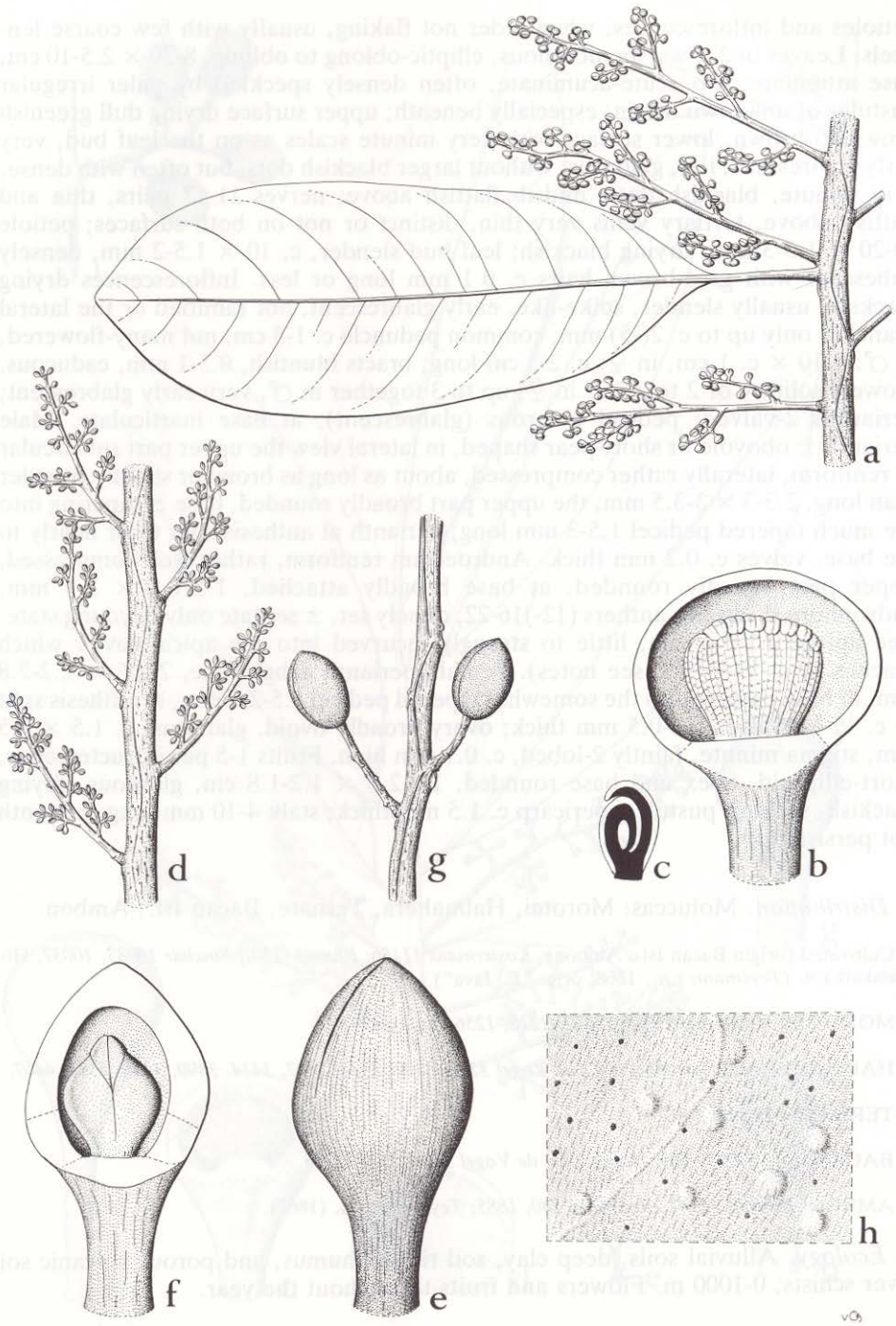

Fig. 8. *Horsfieldia inflexa* de Wilde
a, twig portion with male inflorescences, note lined twig, × ½; *b,* mature male flower, opened, showing androecium, × 12; *c,* androecium, longitudinal section, schematic, × 12; *d,* twig portion with female inflorescences axillary to fallen leaves, × ½; *e,* mature female flower, lateral view, × 12; *f,* ditto, opened, showing glabrous ovary with broad-lipped stigma, × 12; *g,* twig portion with infructescences, × ½; *h,* portion of lower leaf surface with scattered dark-coloured non-traumatic cork warts as blackish dots, × 12. — *a-c* from *LAE 52866,* type; *d-f* from *van Royen 3166; g & h* from *LAE 52862.*

NOTES

1. Fieldnotes. Flowers greenish-yellow or ochreish yellow. Mature fruit orange; aril bright red. Bark often recorded as unfissured, peeling off. Exudate watery, not or only slightly reddish coloured. Sapwood usually creamish, gradually passing into the darker coloured heartwood. Buttresses recorded as present and up to 50 cm out and high, or as absent.

2. This species is clearly recognizable at first glance by its spike-like inflorescences drying blackish, and by the pale twigs rather contrasting with the blackish colour of the dried petioles and the inflorescences. As presently circumscribed by me this species is used in a much narrower sense than accepted by Sinclair, who included also specimens from Celebes, Philippines, Lesser Sunda Isls., and Banda and Aru Isls., now referred by me to various different species.

3. Possibly its most closely related species is *H. moluccana.* Apart from the characters as used in the key, and pointed out in note 2, *H. spicata* differs from *H. moluccana* by its more membranous leaves. See also note 4.

4. Intermediate specimen. *Teysmann s.n.* (in L), from Ambon, is intermediate between *H. spicata* and the related *H. moluccana.* It has the diagnostic conspicuously pale twigs, contrasting with the blackish petioles and inflorescences, but these latter structures are rather ramified, not spicate, with ramifications at the base c. 6 mm long. The androecium of the flowers of this specimen are hollow for c. ¾ and the anthers at one side of the androecium curve into this apical cavity. Possibly the specimen is a hybrid.

5. Sinclair (1975, p. 122) discussed elaborately the typification of Roxburgh's name which is accepted here.

8. Horsfieldia inflexa de Wilde, *sp. nov.* Fig. 1A(8); 8

Horsfieldia species perianthiis masculis usque ad basin 2-valvibus atque antheris inflexis, ex affinitate gregis *H. sepikensem* et *H. moluccanam* amplectens, sed differt virgis valde porcatis atque foliis subtus punctatis. — Typus: *Streimann & Martin LAE 52866* (L).

Tree 10-21 m. Twigs distinctly ridged from petiole to petiole and distinctly angular especially in the apical portion, 2-5(-7) mm diam., early glabrescent, tomentum grey-brown, of hairs up to 0.1 mm; bark indistinctly striate, when older not flaking, lenticels abundantly present but usually not very conspicuous. Leaves in 2 rows, thinly chartaceous, elliptic-oblong to oblong, broadest at about or ± above the middle, 8-20 × 2.5-7.5 cm, base attenuate, tip bluntish to acute-acuminate; upper surface drying olivaceous to blackish brown, not or indistinctly pale-pustulate, lower surface early glabrescent and with ± regularly scattered dark brownish dots (lens × 10!); midrib above slender, flattish or slightly raised; nerves 8-13 pairs, above thin and flat, indistinct, beneath with the marginal arches fairly regular but indistinct; tertiary venation forming a rather lax network indistinct on both surfaces; petiole 14-30 × 1.5-2.5 mm; leaf bud 10-14 × 1.5-2 mm, with tomentum, hairs c. 0.1 mm long or less. Inflorescences glabrescent or with scattered minute scale-like hairs less than 0.1 mm; in ♂: 2(-3) times ramified, the primary branches rather spike-like, c. 3-10 × 1.5-4.5 cm, in ♀: 3-5 cm long; common peduncle 1-12 mm long; bracts elliptic, 1-3 mm long, with fimbriate margin, caducous. Flowers solitary or up to 4 together, glabrous; perianth 2-valved; pedicel glabrous, at base inarticulated. Male perianth subglobose, generally slightly

broader than long, not or but little laterally compressed, sometimes (together with the pedicel) slightly pear-shaped, c. 2.2-2.5 × 2.5-3 mm, upper part broadly rounded, lower part rounded or slightly tapering; pedicel 1-2 mm long, glabrous; perianth at anthesis split to almost reaching the base (c. 9/10), valves 0.2-0.5 mm thick, not collapsing on drying. Androecium bluntly quadrangular in outline, sometimes broader than long, broadly rounded above, laterally compressed, c. 1.5 × 1.5-2.0 mm; anthers 10-12(-14?), septate when young, c. 1.5-2 mm long, free apices c. 0.7-1.0 mm (i.e., anthers upper half free), at one side of the androecium strongly incurved into the hollow almost reaching the base; androphore 0-0.1 mm long. Female perianths ovoid-ellipsoid, c. 2.0-2.5 × 2 mm, cleft at anthesis to c. 2/3, valves c. 0.5 mm thick; pedicel 1-1.5 mm long; ovary ovoid, c. 1.5 × 1.2 mm, glabrous, stigma sessile, minutely 2-lobed, c. 0.2 mm broad. Fruits solitary or up to 6 per infructescence, ellipsoid, top rounded to subacute, base ± rounded, c. 2.0 × 1.4-1.5 cm, glabrous, drying dark brown, without or with small tubercles or lenticels only; dry valves c. 1.5 mm thick; stalk 2-6 mm long; perianth not persisting.

Distribution. Northern part of New Guinea. Irian Jaya: Vogelkop, Geelvink Bay, Jayapura; Northern Papua New Guinea: West Sepik.

NEW GUINEA. Irian Jaya (northern) (incl. Vogelkop, Japen Isl., Meos Noem): *Aet & Idjan* (exp. van Dijk) *389; b.b. 21812, 25724, 30376, 30617, 30945; BW (Schram) 6046, (Iwanggin) 10021, (Moll) 11672; Pleyte 736; van Royen 3166.* — Papua New Guinea (northern), West Sepik: *(Streimann & Martin) LAE 52862; 52866.*

Ecology. Primary and old secondary forest on alluvial soils, e.g., sandy clay, also in hilly forest, swamp forest; 0-400 m alt. Flowers throughout the year, fruits from September to November.

Vernacular names. Kamopi (Roberbai, Japen Isl.), Madak (Mooi lang., Vogelkop), Teenjak (Tehid lang., Vogelkop).

NOTES

1. Fieldnotes. Slender tree, buttresses absent. Bark shallowly longitudinally fissured, not or slightly peeling off; slash reddish brown, sapwood whitish red or cream, heartwood not differentiated. Flowers green, turning yellow, fragrant. Fruits yellowish-orange.

2. Besides a few species like *H. glabra* and *H. punctatifolia* from Western Malesia this is the only other *Horsfieldia* but the only one in New Guinea with specifically typical largish blackish dots on the lower leaf surface. These dots are apparently of the same nature as those in series *Punctatae* of the genus *Knema,* and have been identified as cork warts of non-traumatic origin.

3. Specimens of the present new species were included by Sinclair in his *H. spicata* var. *sepikensis* (Mkgf.) Sinclair, a taxon which is presently regarded as representing several distinct species, among which *H. sepikensis, H. moluccana* (var. *petiolaris*) and *H. olens.*

4. H. inflexa is obviously closely allied with *H. moluccana,* and can also be confused with the closely related species *H. angularis* and *H. basifissa.*

H. moluccana has generally rather pear-shaped male flowers (incl. pedicel), which may also be the case in certain specimens of our present *H. inflexa*, e.g., *BW 6046* from Vogelkop; *H. moluccana* differs, however, by its terete or only faintly lined twigs, and its non-punctate leaves. *H. inflexa* may resemble *H. moluccana* very much in the general shape and texture of the leaves, including the relatively long petioles. *H. angularis* differs by its non-punctate leaves, hairy flowers, the androecium with a central narrow crevice and its straight anthers. *H. basifissa* has, in contrast, terete or only faintly ridged twigs, differing further by various characters of the male flower including the androecium.

5. The speciments *BW 10021* and *b.b. 30617* from Japen Isl. resemble *H. parviflora* in their rather unbranched spike-like inflorescences; *H. parviflora* has more pronounced pear-shaped flowers and twigs which are paler and not angular. In most of the specimens of *H. inflexa*, the male inflorescences are distinctly ramified whereas the lateral branches are almost unbranched and are spike-like.

9. Horsfieldia moluccana de Wilde, *sp. nov.* Fig. 1A(9)

Horsfieldia olivaeformis Warb., Mon. Myrist. (1897) 352, t. 23 fig. 1-2; Markgraf, Bot. Jahrb. 67, 2 (1935) 152, p.p. — *Myristica olivaeformis* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 87 — Type: Irian Jaya, Sorong (Vogelkop), *Beccari 171* (FI, *n.v.*, identity not sure, see notes).

Horsfieldia species perianthiis masculis 2-valvibus pyriformibus atque antheris inflexis, eis *H. spicatae* similibus, ab eo differt virgis in sicco dense brunnescentibus atque inflorescentiis valde ramosis non spicatis. — Typus: *Kostermans 673 a* (L).

Tree, 8-20(-30) m. Twigs terete, not ridged, or sometimes slightly angular, towards the apex 2-5 mm diam., early glabrescent; tomentum with hairs 0.1-0.3 mm; bark striate, when older not flaking, lenticels conspicuous to inconspicuous. Leaves in 2 rows, thinly chartaceous, elliptic-oblong to oblong, (6-)8-25 × 2.5-8.5 cm, base attenuate, tip acute-acuminate; upper surface drying olivaceous to brown, usually minutely pale-pustulate, lower surface early glabrescent, without dark brown dots; midrib slender above, flat; nerves 6-15 pairs, above thin, flat, indistinct, beneath with the marginal arches indistinct; tertiary venation ± fine, indistinct on both surfaces; petiole 10-26 × 1-2 mm; leaf bud 6-12 × 1-2 mm, with hairs 0.1-0.3 mm. Inflorescences sparsely pubescent, hairs stellate, c. 0.1 mm or less, in ♂: (1-)2-3 times ramified (sometimes not or hardly ramified, i.e., spike-like, see notes), 5-11 × 2-5 cm, in ♀ up to 5 cm long; common peduncle 5-20 mm; bracts ± oblong, 1.5-4 mm long, thinly pubescent, caducous. Flowers from solitary to 4 together, glabrous; perianths 2-valved; pedicels glabrous, inarticulate at base. Male perianth (incl. pedicel) pear-shaped, laterally much to little compressed, about as broad as long to slightly broader than long, 1.5-2.5(-3) × 2.2-3.8 mm, upper part broadly rounded, the lower ⅓ tapering into the tapered pedicel 2-3(-3.5) mm; perianth at anthesis split to c. ⅔-⅘, valves 0.2-0.3 mm thick. Androecium laterally compressed, broadly transversely ellipsoid or kidney-shaped in outline, broadly rounded above, c. 1.1-1.5 × 1.4-2.8 mm; anthers (7-) 10-18, not septate, c. 1.5-2.0 mm long, free apices 0.1-0.5 mm, only at one side of the androecium strongly incurved; androecium hollow for at least ⅔; androphore 0-0.1 mm long. Female perianths broadly ovoid-ellipsoid, 1.8-2.2 × 2.0-2.2 mm, cleft at anthesis to ½-⅘, valves c. 0.3 mm thick; pedicel 2-2.5 mm long; ovary ovoid, glabrous, c. 1-1.5 × 1 mm, stigma sessile, minutely 2-lobed, c. 0.1 mm high. Fruits solitary or 2-6 per infructescence, ellipsoid, top rounded to subacute, 1.3-2.8 × 1.1-1.7 cm, glabrous, drying brown or blackish, without or with sparse tubercles; dry valves 1-2 mm thick; stalk 2-5 mm long; perianth not persisting.

Distribution. Northern Moluccas, West New Guinea.

NOTES

1. A variable species with 4 varieties, closely related to *H. spicata* and *H. tuberculata.* With *H. spicata* there occur a few specimens intermediate to var. *moluccana* discussed in the notes. *H. spicata* has the generally deeply asymmetrically incurved anthers in common with *H. moluccana,* but the former differs in the pale twigs and the (almost) spike-like male inflorescences. *H. tuberculata* has largely a solid staminal column, hollowed at the apex only for the upper ⅕-⅓. See further notes under the varieties.

2. Unfortunately I have not seen the type of *H. olivaeformis.* If it turns out to be identical with the present new species, it would then have priority. Sinclair lumped this name in his large concept of *H. spicata,* from which the present new species is segregated.

The type of *H. olivaeformis, Beccari 171,* has been described as having a glabrous ovary, the fruits rather narrow, c. 2.3 cm long and its pericarp thin, the leaf blades 10-15 cm and petioles almost 10-15 cm long. In fruit size it agrees with var. *robusta,* known from the same area, but the petioles in that are distinctly longer than those described for *H. olivaeformis.*

KEY TO THE VARIETIES

1a. Hairs of leaf bud rather woolly-rust pubescent, hairs 0.2-0.3 mm long. *Vogelkop: Fak-Fak* ..... **d.** var. **pubescens**

b. Hairs of leaf bud up to c. 0.1 mm 2

2a. Petioles 10-15 mm long. Male perianth 2.5-3 mm wide. *Morotai, Obi Isls.* ..... **a.** var. **moluccana**

b. Petioles (10-) 15-25 mm long, generally longer in proportion to the smaller blade. *New Guinea* 3

3a. Leaf blades 7-15 cm long. Fruits 1.3-1.8 cm long. Male perianth 2-2.5 mm wide ..... **b.** var. **petiolaris**

b. Leaf blades 13-23 cm long. Fruits 2.2-3.0 cm long. Male perianth 3.5-3.8 mm wide ... **c.** var. **robusta**

a. var. **moluccana** Fig. 1A(9)

Leaf blades 9-22 × 4-8 cm; petioles (8-)10-20 mm. Tomentum of leaf bud composed of hairs c. 0.1 mm long or less. Male perianths 2.0-3.0 × 2.7-3.3 mm, pedicel 2-3 mm long. Fruits c. 1.5 cm long.

Distribution. Northern Moluccas: Morotai, Obi Isls.

MOLUCCAS (Northern). Morotai: Tankilisan (exp. Kostermans) *250* (= *b.b. 33920*); *Kostermans 673a, 899, 1513, 7888; Lam 3459, 3510.* — Obi Isls.: *de Vogel 4099, 4105, 4111, 4121, 4137, 4193, 4240, 4253, 4298, 4303.*

Ecology. Well-drained forests on clayey soil, volcanic soil, alluvial soil rich in humus, also flat land just behind the mangrove; recorded from over limestone, or at base of serpentine-rock, or on very porous nickel-containing soil; 0-600 m alt. Flowers and fruits throughout the year.

Vernacular names. Gosora (Ternate lang.), Kulemàn (Morotai), Pala hutan (Malay lang.).

NOTES

1. Fieldnotes. Recorded as a straight tall tree, to 30 m. Bark peeling off or not. Once reported to have prop roots up to 1.5 m. Exudate from bark watery, turning pink, later turning brownish. Flowers yellow, once recorded as red.

2. Sinclair included a large part of the present taxon in his concept of *H. parviflora.* In the present revision *H. parviflora* is accepted in a narrower sense, and is mainly characterised by more roundish (not pear-shaped) male perianths, and by shorter petioles. *H. spicata* is closely related but differs in the paler colour of the dried twigs, the generally spike-like male inflorescences and the more membranous leaves. See also note 3.

3. Specimens intermediate to H. spicata. The male inflorescences of *de Vogel 4253,* from Obi Isls at sea level, are spike-like. In all other aspects, including chartaceous leaves, short and robust male perianths and brown twigs, it is identical with other material from there. *De Vogel 4193,* also from the same source, has the inflorescences almost spike-like and are thus reminiscent of those in *H. spicata.* Its leaves are membranous and it may be a hybrid; it was collected from a secondary regrowth at c. 200 m. alt. One should note that the lectotype of *H. roxburghii* Warb. (in this treatment, a synonym of *H. spicata*) is from a tree cultivated in Bogor Botanic Gardens, with Ambon as its provenance; it has inflorescences which are rather branched, not strictly spike-like and thus it looks intermediate between *H. moluccana* and *H. spicata.*

b. var. **petiolaris** de Wilde, *var. nov.*

Gemmae indumentum brevissimum, maxime c. 0.1 mm longum, petiolo proportione longo, 1-2 cm longo, foliorum pagina c. 7-15 cm longa, perianthiis masculis 2-2.5 mm latis, fructibus c. 1.5 cm longis. — Typus: *van Royen 5388* (L).

Leaf blades 6-15(-19) × 2.5-6.5(-7) cm; petioles proportionally long, 10-20 mm. Tomentum of leaf bud composed of hairs up to 0.1 mm long. Male perianth 1.5-2.2 × 2.2-2.4 mm and pedicel 2-3.5 mm long. Fruits 1.5-1.8 cm long.

Distribution. Irian Jaya: Vogelkop; Islands in Geelvink Bay (Noemfoer, Meos Waar, Japen Isl.); Waigeo Isl.

IRIAN JAYA: b.b. *30587, 32987; (Koster) BW 1018, 1201, 1283; BW 1295; (Kalkman) BW 6255; (Koster) BW 13535; van Royen 5388, 5396.*

Ecology. Locally common in forests on sandy or stony-clayey soils; *Calophyllum-Ficus* forest; 0-100 m. alt. Flowers and fruits throughout the year.

Vernacular names. Beterohooi (Manikiong lang.), Kamojer (Noemfoer lang.), Mbowak (Tehid lang.), Sebohongwa (Manikiong lang.).

Uses. Fruits once reported as edible and sour.

NOTES

1. Fieldnotes. Bark flaking. Flowers greenish. Fruits yellow or orange-yellow, seed aril red.

2. Sinclair included the specimens of var. *petiolaris* in his *H. spicata* var. *sepikensis* (Mkgf.) Sinclair; here I have, however, kept *H. sepikensis* as a separate species, characterized by a 3-valved perianth.

c. var. **robusta** de Wilde, *var. nov.*

Gemmae indumentum c. 0.1 mm longum, petiolis c. 1.5-2.5 cm longis, foliorum pagina 13-23 cm longa, perianthiis masculus c. 3.5 mm latis, fructibus c. 2.5 cm longis. — Typus: van Royen & Sleumer 6682 (L).

Leaf blades 12-22(-25) × 3.5-8(-9) cm; petioles 12-26 mm. Tomentum of leaf bud consisting of hairs c. 0.1 mm long. Male perianths 2.5-3 × 3.5-3.8 mm, pedicel c. 3 mm. Fruits 2.2-3.0 cm long.

Distribution. Irian Jaya: Vogelkop Penins.; Batanta Isl.

IRIAN JAYA: *(Moll) BW 9775; van Royen 3548; van Royen & Sleumer 6682.*

Ecology. Secondary and coastal forest, on limestone; 0-15 m. Flowers and fruits throughout the year.

Vernacular name. Kamore (Biak dial.).

NOTES

1. Fieldnotes. Bark flaking. Flowers yellow, fragrant. Fruits yellow.

2. Sinclair included the present variety in his *H. spicata* var. *spicata.* He has annotated on the type sheet *(van Royen* and *Sleumer 6682)* that it looked to him intermediate to *H. sepikensis* (in Sinclair's sense).

3. Var. *robusta* is a form similar to var. *petiolaris* but is coarser in all aspects: the leaves, flowers and fruits are all larger. It superficially resembles *H. tuberculata,* which differs in the generally shorter petioles, the androecium — the anthers not strongly inflexed into the cavity — as is the case in the present var. *robusta.*

d. var. **pubescens** de Wilde, *var. nov.*

Gemma lanata, e pilis c. 0.3 mm longis composita. — Typus: *Vink BW 15370* (L; iso: K).

Leaf blades (6-)8-14 × (2.5-)3-5 cm; petioles (9-)11-18 mm long. Tomentum of leaf bud ± woolly, composed of hairs 0.2-0.3 mm long. Flowers not seen. Fruits c. 1.3 cm long.

Distribution. Irian Jaya: Vogelkop Penins.

IRIAN JAYA. Vogelkop Penins.: *BW (Iwanggin) 5640, (Schram) 6153, (Iwanggin) 10153, (Vink) 15370.*

Ecology. Common in primary and secondary forest on clayey soil or sandy clay over limestone; 50-300 m. alt. Fruits in March and May.

Vernacular names. Kamorei (Biak lang.), Medak (Mooi lang.), Sĕmies, Simies (Maibrat lang.).

NOTES

1. Fieldnotes. Tree to 16 m; buttresses up to 1 m high, 0.5 m wide; bark strongly peeling. Inner bark reported as with much red and clear exudate. Wood white. Fruits light green. Most collections are from limestone.

2. This variety appears to be almost identical with the var. *petiolaris*, except for the more woolly tomentum. In *Horsfieldia*, usually the nature of the tomentum has appeared to be of taxonomic significance. Flowers are not known.

3. The bark of the older wood in the Kew duplicate of *BW 15370* is one that flakes strongly; that in the Leiden specimen and some other collections, of older twigs behind the leaves, is one that does not or flakes minimally.

4. Sinclair included the specimens of the present variety in his *H. spicata* var. *sepikensis* (Mkgf.) Sinclair, as those of the preceding variety.

10. Horsfieldia parviflora (Roxb.) Sinclair Fig. 1A(10)

Myristica microcarpa Willd. in Roem. & Usteri, Bot. Mag. 3, 9 (1790) 27; Sp. Pl. 4, 4, 2 (1806) 871 (excl. var. ß = 7. *H. spicata*, incl. var. γ). — Based on *Palala* "kitjil", *P. minima* Rumph.; var. γ based on *P. globularia* Rumph.; identity doubtful, see Sinclair 1975, p. 168-170.

M. parviflora Roxb., Fl. Ind. 3 (1832) 847; (ed. 1874) 744; Icones 2574. — *H. parviflora* (Roxb.) Sinclair, Gard. Bull. Sing. 28 (1975) 82. — Type: *Roxburgh's description and figure.*

M. tingens Bl., Rumph. 1 (1837) 190 — *Horsfieldia* sp. Merr., Int. Rumph. (1917) 231 — Based on *Palala minima, P. tertia, P. tingens* Rumph., Herb. Amb. 2, 10 (1741) 27, t. 7 f. A-B; see Sinclair 1975, p. 161.

M. globularia Bl., Rumphia 1 (1837) 191, t. 64, fig. 2 (non Lamk.) — *Pyrrhosa globularia* (Bl.) Hassk., Cat. Pl. Hort. Bog. (1844) 174 — *H. globularia* (Bl.) Warb., Mon. Myrist. (1897) 288, t. 21 (1-4). — *Palala globularia* (= *P. quinta*) Rumph., Herb. Amb. 2, 10 (1741) 28, t. 9 f. a-b (see Sinclair 1975, p. 165-167). — Type: *Blume's figure*, and *Zippel s.n.* (Ambon, "mas"), a sterile specimen.

M. bivalvis Hook.f., Fl. Brit. Ind. 5 (1886) 107; King, Ann. Roy. Bot. Gard. Calc. 3 (1891) 307, pl. 139. — *H. bivalvis* (Hook.f.) Merr., Phil. J. Sc. Bot. 2 (1916) (issued Jan. 1917) 271; Sinclair, Gard. Bull. Sing. 16 (1958) 379, fig. 32, pl. VIII B. — Type: *Murton 149* (K).

H. globularia var. *minahassae* Warb., Mon. Myrist. (1897) 617. — *H. minahassae* (Warb.) Koord., Fl. N.O. Cel. (1898) 70 — Type: *Koorders 18123 β* (BO), *18124 β* (BO), *18146 β* (BO, L), *18164 β* (BO; L, lecto).

Tree 10-20 m. Twigs in apical portion somewhat flattened but not angular, lower down terete, not ridged, 2-5(-10) mm diam., glabrescent from a minute tomentum composed of hairs c. 0.1 mm; bark finely striate, brown when older not flaking, lenticels smallish, abundant, not very conspicuous. Leaves in two rows, membranous, oblong-lanceolate to lanceolate, broadest at or slightly above the middle, 8-23 × 2.5-7.5 cm, base attenuate, top acute-acuminate; upper surface drying olivaceous to dark brown, dull, faintly finely paler punctate-pustulate or not (rarely with pale, irregularly shaped marks as in *H. irya*), lower surface early glabrescent,

without blackish dots; midrib flat above; nerves 10-15 pairs, flattish and inconspicuous above, marginal arches not distinct; tertiary venation indistinct, forming a rather fine network; petiole 6-16 × 1.5-2.5 mm; leaf bud slender, c. 6-13 × 1-2 mm, with hairs c. 0.1 mm long or less. Inflorescences with sparse to dense tomentum of hairs 0.1-0.3 mm; in both ♂ and ♀ 3-4 times ramified, many flowered, (4-)6-10 × 4-8 cm, common peduncle 1-2 cm long; bracts pubescent, elliptic to oblong, 2-5 mm long, caducous. Flowers in loose clusters of 2-4 each, perianths 2-valved, glabrous or in ♀ sometimes minutely pubescent at base, pedicels sparsely pubescent with the hairs c. 0.1 mm long or less, at base inarticulate. Male perianth ± obtriangular to transversely ellipsoid, somewhat laterally compressed, 2.2-3.0 × 2.5-4 mm, upper part broadly rounded, at base short-attenuate, rather firm, on drying not collapsing, often bright brown or with a grey-blue tinge; pedicel slender, 1-2 mm long. Perianth at anthesis cleft to c. ½-way, valves (0.1-)0.2-0.3 mm thick. Androecium transversely ellipsoid or ± obtriangular, only slightly or not laterally compressed, largely hollow, (1.0-)1.6-2.2 × 1.6-3.0 mm; anthers (18-)20-25, mutually completely connate, forming a thin-walled cup, the anthers (sometimes only of one side of the androecium) completely inflexed from their middle and reaching nearly to the bottom of the cup; free apices of anthers 0-0.1 mm; androphore rather narrow, (0-)0.1-0.3 mm long. Female perianth ellipsoid, c. (2.5-)3-3.5 × 2.5 mm, at anthesis cleft to c. ⅓, valves c. 0.3 mm thick, pedicel 1-2 mm, thinly pubescent with the hairs c. 0.1 mm; ovary ovoid-ellipsoid, c. 2-2.3 × 1.5 mm, glabrous, style and stigma minute, 2(-3)-lobed, 0.1-0.2 mm long. Fruits 2-10 per infructescence, ellipsoid to nearly globose, 1.1-1.6 × 1.0-1.3 cm, glabrous, finely granulate, not or hardly tuberculate, drying brown; dry valves 1-1.5 mm thick; stalk 2-4 mm; perianth not persisting.

Distribution. Celebes (incl. Kabaëna Isl.); Moluccas: Ceram, Ambon; running wild in the Gardens Jungle of the Botanic Garden, Singapore.

Cultivated. Java (Bot. Garden Bogor): *Forbes 1184a; Rastini 105,* (206), (223); *Woerjantoro 99.* — Singapore (Bot. Garden): *Ding Hou 134; Murton 149; Ridley s.n., 393; Furtado SFN 34818; Sinclair 7493.*

CELEBES: *b.b. 5432, 8459, 13748, 20754; Elbert 3457; Koorders 18146 β, 18164 β; Meijer 11286.*

CERAM: *Kuswata & Soepadmo 86, 236.*

AMBON: *Kuswata & Soepadmo 292; de Vriese & Teysmann s.n.; de Vriese s.n.; Zippel s.n.* ("mas").

Ecology. Forests; once recorded from sandy loam; 0-600 m alt. Flowers and fruits throughout the year.

Vernacular names. Kolantie, Niniwo (Celebes).

NOTES

1. Fieldnotes. Tree without buttresses. Bark smooth or fissured. Wood whitish. Flowers yellow, fragrant; anthers yellowish-white. Fruits ramiflorous, yellow to light brown. Aril bright red, once recorded as yellow (unripe?).

2. Variation. The male flowers of *Koorders 18146 β* (syntype of *H. globularia* var. *minahasae*), and those of e.g., *Ding Hou 134* (Bot. Garden Singapore) are relatively large, the perianths being as wide as c. 4 mm.

The androecium of *b.b. 13748* (N. Celebes) is relatively short, measuring c. 1 × 2.5 mm; its flower are small, c 3 mm in width.

Kuswata & Soepadmo 236, W. Ceram, has comparatively small fruits, c. 1.1 × 1.0 cm.

Elbert 3457 (Kabaëna Isl., limestone; S. Celebes) has rather large fruits, c. 1.6 cm long, with a distinct pseudo-stalk 1.5-2 mm long.

3. H. parviflora is easily distinguished by the smooth and rather inflated male perianths, which do not collapse on drying, are ± obtriangular to transversely ellipsoid in lateral view, and usually dry to a bluish or reddish-brown tinge. The androecium is largely hollow, inflated, cupshaped, composed of anthers connate along the whole length; the distal end from approximately ½-way curved into the androecium, almost reaching the bottom.

4. In Sinclair's sense, *H. parviflora* has a much wider circumscription than is accepted here. The material he included is here referred to various different species such as *H. obscurinervia* and the variable *H. laevigata.*

5. Typification. H. parviflora was described on a female specimen cultivated in the Botanic Gardens at Calcutta, and apparently no authentic material is preserved. Sinclair (p. 88, 122) discussed elaborately the identity of Roxburgh's descriptions.

Although named 'parviflora' because of the female flowers, our present species has male perianths of 2.5-4 mm wide, which is among the largest in *Horsfieldia.*

11. Horsfieldia obscurinervia Merr. Fig. 1A(11)

H. obscurinervia Merr., Phil. J. Sc. C. Bot. 12, 5 (1917) 265; En. Phil. Fl. Pl. 2 (1923) 182. — Type: *de Mesa & Magistrado FB 26503* (iso: K).

H. ramosii Merr., Phil. J. Sc. 17, 3 (Sept. 1920) (1921) 254; En. Phil. Fl. Pl. 2 (1923) 182. — Type: *Ramos BS 35047* (PNH, *n.v.* (iso: K).

Tree c. 11 m. Twigs terete, not ridged, 1.5-4 mm diam., glabrescent from a minute tomentum of greyish hairs less than 0.1 mm long; bark finely striate, when older not flaking; lenticels present, rather distinct. Leaves in two rows, chartaceous, oblong-lanceolate to lanceolate, 5-14 × 2-4 cm, broadest at or slightly above the middle, base attenuate, tip acute-acuminate; upper surface drying olivaceous to brown, ± glossy, lower surface early glabrescent, without larger dark dots; midrib flat above to slightly raised; nerves 7-15 pairs, slender, very inconspicuous on both surfaces, marginal arches very inconspicuous; tertiary venation hardly visible; petiole 6-15 × 1-1.5 mm; leafbud c. 6-10 × 1.5-2 mm, with hairs 0.1 mm long or less. Inflorescences sparingly pubescent or subglabrous with hairs c. 0.1-0.3 mm long; in ♂: 2-3 times ramified, rather few-flowered, c. 3-4 × 2-3 cm, common peduncle 5-10 mm; bracts and bracteoles not seen, caducous; ♀ inflorescences not seen. Flowers solitary or 2 or 3 together, perianths 2-valved, glabrous; pedicel glabrous, at base inarticulate. Male perianth subobtriangular, broadly rounded above, ± cuneate at base, c. 2 × 2.2 mm, rather firm, on drying not collapsing, bright brown, pedicel slender, c. 1 mm long; perianth at anthesis cleft to c. ½-way, valves 0.2-0.3 mm thick. Androecium ± obtriangular or obovoid,

narrowed to the base, only slightly laterally compressed, thickish, c. 1.5 × 1.2 mm, largely hollow; anthers 11 or 12 (i.e., 11 or 12 thecae on each side), almost completely connate, forming a firm thick-walled cup reaching to c. ⅔ of the androecium, the anthers at one side deeply inflexed into and almost completely filling the cup; free apices of anthers 0-0.1 mm; androphore narrow, short, c. 0.1 mm long. Female perianths not seen. Fruits 2-5 on once or twice ramified stalk, infructescences 2-3 cm long; fruits short-ellipsoid, 1.1-1.3 × 0.9-1.1 cm, almost glabrescent but with minute dendroid hairs at base (hence ovary pubescent), finely granulate, not tuberculate, drying (reddish) brown; dry valves 1-1.5 mm thick; stalk 2-5 mm; perianth not persisting.

Distribution. Philippines: Luzon.

PHILIPPINES: *de Mesa & Magistrado FB 26503; Ramos & Edano BS 33693; Ramos BS 35047.*

Ecology. On low hills at c. 20 m. Flowers in July, fruits November and December.

Vernacular name. Duguan.

NOTES

1. Fieldnotes. Small tree; flowers yellow.

2. Related to *H. parviflora* from the Moluccas on account of the almost similar flower structure; *H. parviflora* differs by its larger membranous leaves, larger male perianths of 2.5-4 mm width, more (18-25) anthers, thinner-walled and deeper androecium-cup, with the anthers usually inflexed at both sides of the androecium, and the glabrous ovary and fruit.

3. Sinclair (p. 83, 90) treated *H. obscurinervia* as a synonym of *H. parviflora.*

12. Horsfieldia ardisiifolia (DC.) Warb. Fig. 1A(12); 9

Myristica ardisiifolia A. DC., Ann. Sc. Nat. Bot. 4, 4 (1855) 31, t. 4; Prodr. 14, 1 (1856) 203 *(ardisiaefolia).* — *H. ardisiifolia* (DC.) Warb., Mon. Myrist. (1897) 274; Sinclair, Gard. Bull. Sing. 28 (1975) 3. — Type: *Cuming 1702* (iso: L).

H. warburgiana Elmer, Leafl. Phil. Bot. 3 (1911) 1061; Merr., En. Phil. Fl. Pl. 2 (1923) 183. — Type: *Elmer 12297* (iso: K & L, only the fruits, see the notes).

H. gigantifolia Elmer, Leafl. Phil. Bot. 9, 123 (1925) 3120, 3129; 10, 136 (1939) 3763, *nom. nud.* — Type: *Elmer 17220* (iso: L).

Tree 5-10 m. Twigs flattened in the apical part, 2-angular, lower down terete with two distinct ridges from petiole to petiole, 3-6(-13) mm diam., early glabrescent from the bright rusty tomentum composed of hairs 0.3-0.5(-0.8) mm long; bark rather smooth to striate, distinctly lenticellate; not flaking when older. Leaves in 2 rows, membranous, elliptic-oblong to oblong, 20-40 × 5.5-15 cm, base nearly rounded to attenuate, tip acute-acuminate; upper surface drying olivaceous to blackish-brown, finely minutely paler pustulate or not, lower surface early glabrescent except for some tomentum remaining on the midrib, consisting of rather coarse hairs 0.3-0.5 mm; larger dark dots absent; midrib fairly broad, flattish above; nerves 18-28 pairs, slender above, flattish, the marginal arches rather

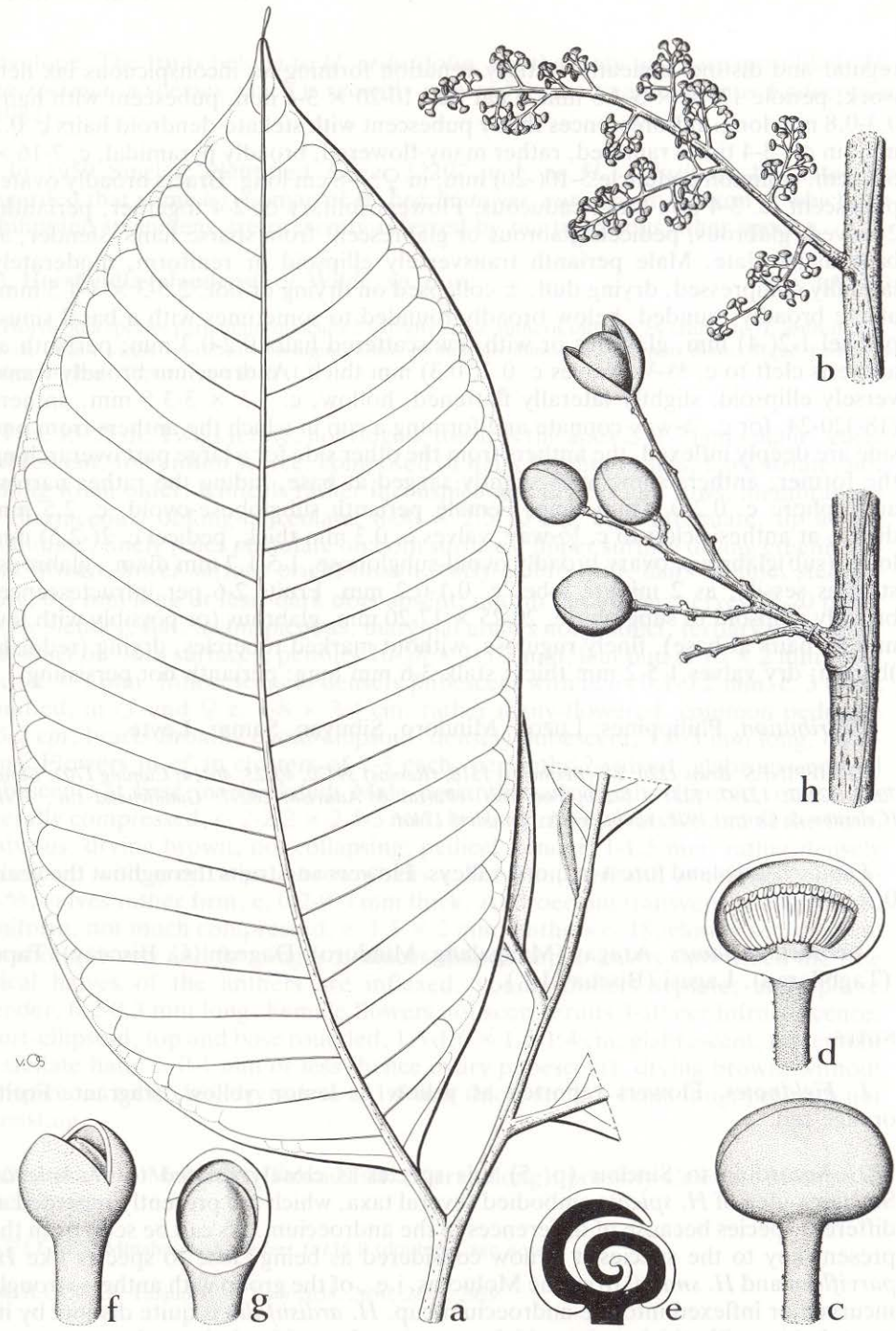

Fig. 9. *Horsfieldia ardisiifolia* (A. DC.) Warb.
a, leafy twig apex, note ridged twig, × ½; *b*, twig portion with male inflorescence in axil of fallen leaf, × ½; *c,* mature male flower, lateral view, × 6; *d,* ditto, opened, showing androecium, × 6; *e,* androecium, longitudinal section, schematic, × 12; *f,* mature female flower, lateral view, × 6; *g,* ditto, opened, showing glabrous ovary with minute stigmas, × 6; *h,* twig portion with infructescence with ripe fruits. — *a, Ramos BS 39770; b, Sulit PNH 6236; c-e, Elmer 12337; f & g, Elmer 17220; h, Conklin PNH 17461.*

regular and distinct beneath; tertiary venation forming an inconspicuous lax network; petiole 13-16 × 3-4.5 mm. Leaf bud 10-20 × 3-4 mm, pubescent with hairs 0.3-0.8 mm long. Inflorescences thinly pubescent with stellate-dendroid hairs c. 0.3 mm; in ♂: 3-4 times ramified, rather many-flowered, broadly pyramidal, c. 7-16 × 6-14 cm, common peduncle 5-10(-20) mm; in ♀: 4-8 cm long. Bracts broadly ovate, pubescent, c. 3-4 mm long, caducous. Flowers solitary or 2-4 together, perianths 2-valved, glabrous, pedicels glabrous or glabrescent from sparse hairs, slender, at base inarticulate. Male perianth transversely ellipsoid or reniform, moderately laterally compressed, drying dull, ± collapsed on drying or not, 2.5-3 × 4-4.5 mm, above broadly rounded, below broadly rounded to sometimes with a basal sinus; pedicel 1-2(-4) mm, glabrous or with few scattered hairs 0.2-0.3 mm; perianth at anthesis cleft to c. ⅘-⅚, valves c. 0.2(-0.3) mm thick. Androecium broadly transversely ellipsoid, slightly laterally flattened, hollow, c. 1.5 × 3-3.5 mm, anthers (18-)20-24, for c. ½-way connate and forming a cup in which the anthers from one side are deeply inflexed, the anthers from the other side for a large part overarching the former; anthers sometimes slightly sagged at base, hiding the rather narrow androphore c. 0.2-0.3 mm long. Female perianth subglobose-ovoid, c. 2.5 mm diam., at anthesis cleft to c. ½-way, valves c. 0.3 mm thick, pedicel c. 2(-2.5) mm long, (sub)glabrous; ovary broadly ovoid-subglobose, 1.5-1.7 mm diam., glabrous, stigmas sessile, as 2 minute lobes c. 0.1-0.2 mm. Fruits 2-6 per infructescence, broadly ellipsoid to subglobose, 20-25 × 17-20 mm, glabrous (or possibly with few minute hairs at base), finely rugulose, without marked tubercles, drying (reddish-)brown; dry valves 1.5-2 mm thick; stalk 3-6 mm long; perianth not persisting.

Distribution. Philippines: Luzon, Mindoro, Sibuyan, Samar, Leyte.

PHILIPPINES: *Brass 1220;* BS *(Bermejos) 1518, (Ramos) 39770, 40823, 46414; Cuming 1702; Elmer 7094, 12067, 12297, 12337, 17220;* For. Bur. *(Parras & Aduviso) 28297; Gaudichaud s.n.; PNH (Celestino & Castro) 1925, (Sulit) 6236; (Conklin) 17461.*

Ecology. Lowland forest in moist valleys. Flowers and fruits throughout the year; 0- c. 400 m.

Vernacular names. Aragay (Mangalang, Mindoro), Dagoan (C. Biscuay), Tapol (Tagbilaran), Lagasi (Biscuay Isl.).

NOTES

1. Fieldnotes. Flowers reported as yellow or lemon yellow, fragrant. Fruits orange-red.

2. According to Sinclair (p. 5) this species is closely related to *H. spicata.* Sinclair's idea of *H. spicata* embodied several taxa, which are presently regarded as different species because of differences in the androecium. As can be seen from the present key to the species it is now considered as being close to species like *H. parviflora* and *H. smithii* from the Moluccas, i.e., of the group with anthers strongly incurved or inflexed into the androecium-cup. *H. ardisiifolia* is quite distinct by its stout habit, with thick twigs which are winged or ridged, large leaves, coarse tomentum on the leaf bud, large male perianths (4-4.5 mm wide), broad androecium with the anthers deeply incurved and clasping each other.

3. Of the type of *H. warburgiana, Elmer 12297,* I have seen only two isotypes, in K and L. They are conspecific and consist of a leafy twig, and fruits in an attached

envelope. The fruits belong to *H. ardisiifolia,* but the leafy twigs are most likely *H. macrocoma,* a species which is recently referred by me to a new genus *Endocomia* (1984).

In 1959 Sinclair identified *Elmer 12297* in L as *H. ardisiifolia* but later he regarded that name a synonym of *H. brachiata* var. *sumatrana,* a taxon of which the Philippine specimens are presently referred by me to various other species.

13. Horsfieldia talaudensis de Wilde, *sp. nov.* Fig. 1A(13)

Horsfieldia species perianthiis masculis 2-valvatis atque antheris inflexis, ex affinitate *H. ardisiifoliae,* ab ea differt virgis teretibus non-angularibus, perianthio minore c. 2.5 mm diam. atque pedicellis pubescentibus. Typus: *Lam 2628* (L).

Tree 15-35 m. Twigs terete, not ridged, towards the apex 2-4(-7) mm diam., early glabrescent, tomentum scarce, composed of hairs 0.1 mm or less; bark striate, not flaking when older, lenticels rather inconspicuous. Leaves in 2 rows, membranous to chartaceous, oblong-lanceolate, 8-30 × 2.5-10 cm, base attenuate, tip acute-acuminate, finely paler pustulate on both surfaces; upper surface drying greenish to dark brown, lower surface bright brown, early-glabrescent, hairs minute, stellate-scaly, 0.1 mm long or less, dark dots absent; midrib flat above; nerves 12-20 pairs, above slender, flat, inconspicuous, marginal arches not distinct, tertiary veins thin, indistinct on both surfaces; petioles 10-18 × 1.5-3 mm, leaf bud c. 10 × 2 mm, with hairs c. 0.1 mm. Inflorescences densely pubescent with hairs 0.1-0.2 mm, c. 3 times ramified, in ♂ and ♀ c. 4-8 × 3-4 cm, rather many-flowered, common peduncle 1.5-2 cm; bracts broadly ovoid-ellipsoid, densely pubescent, 1.5-3 mm long, caducous. Flowers in ♂ in clusters of 2-3 each, perianths 2-valved, glabrous; pedicel pubescent, at base inarticulated. Male perianth transversely ellipsoid, only little laterally compressed, c. 2-2.2 × 2.5-3 mm, broadly rounded above and at the base, glabrous, drying brown, not collapsing; pedicel slender, 1-1.5 mm, rather densely pubescent with grey or pale brown hairs c. 0.1 mm; perianth at anthesis cleft to ⅔-⅘, valves rather firm, c. 0.2-0.3 mm thick. Androecium transversely ellipsoid to reniform, not much compressed, c. 1.5 × 2 mm; anthers c. 18, closely set, connate for about ½-way and forming a ± saucer-shaped cup or cavity into which the free apical halves of the anthers are inflexed; young anthers septate; androphore slender, 0.2-0.3 mm long. Female flowers not seen. Fruits 3-10 per infructescence, short-ellipsoid, top and base rounded, 1.5-1.6 × 1.3-1.4 cm, glabrescent, tomentum of stellate hairs c. 0.1 mm or less (hence ovary pubescent), drying brown, without conspicuous tubercles, dry valves c. 1.5 mm thick, stalk 3-4 mm long; perianth not persisting.

Distribution. Moluccas: Talaud Isls. (Karakelong); possibly Celebes: Minahassa (see notes).

CELEBES. Minahassa: *Koorders 18136* ß (doubtful, see notes).

MOLUCCAS. Talaud Isls.: *Lam 2638, 2650, 2811, 2929.*

Ecology. Old forest on mountain slopes; 70-200 m alt. Flowers in April, fruits in April and May.

Vernacular name. Larán'a.

NOTES

1. Fieldnotes. Tree to 35 m. Ripe fruits orange or brownish yellow.

2. Possibly endemic on the Talaud Isls. A species of the group with the androecium having strongly inflexed anthers, characterised by the firm, transversely ellipsoid to subglobose male perianth, by the anthers connate to c. ½-way, by hairy, short but slender pedicels, and by the pubescent ovary (thinly pubescent young fruit).

3. The specimen from the Minahassa (Celebes; *Koorders 18136* ß) is sterile but agrees vegetatively, in the leaf colour and texture, and very well with the fruiting specimens from Talaud Isls.

4. The specimens belonging to the present new species were included by Sinclair in *H. parviflora,* a species presently accepted in a much narrower sense.

14. Horsfieldia samarensis de Wilde, *sp. nov.* Fig. 1A(14)

Horsfieldia species perianthiis masculis 2-valvibus et antheris profunde inflexis, ex affinitate *H. ardisiifoliae* atque *H. talaudensis,* ab *H. ardisiifolia* differt virigis non-angularibus et floribus minoribus, ab *H. talaudensi* antheris inflexis solum ad umum androecii latus atque pedicellis perianthio longioribus. — Typus: *Gutierrez PNH 147374* (L).

Tree 5 m. Twigs terete, not ridged, towards the apex 1.5-3.5 mm diam., early glabrescent, tomentum minute, of greyish hairs less than 0.1 mm; bark finely striate, when older not flaking, lenticels rather inconspicuous. Leaves in 2 rows, membranous, oblong-lanceolate to lanceolate, c. 7-11 × 2-3 cm, base attenuate, tip acute-acuminate, not finely, paler pustulate: upper surface drying dull olivaceous, lower surface bright brown, early glabrescent, hairs sparse, less than 0.1 mm, without dark dots; midrib slightly raised above; nerves 10-13 pairs, above slender, flat, rather contrasting in colour; marginal arches on lower surface faint but rather regularly looping; tertiary venation inconspicuous on both surfaces; petioles c. 8-10 × 1-1.5 mm, leaf bud c. 10 × 1 mm, with hairs less than 0.1 mm. Inflorescences glabrescent or thinly pubescent by stellate scales c. 0.1 mm or less, rather slender, in ♂: 2-3 times ramified, 3-4 × 1.5-2.5 cm, rather few-flowered, common peduncle c. 1-1.5 cm; bracts not seen, caducous. Male flowers solitary or in loose clusters of 2 or 3 together; perianths 2-valved, glabrous, pedicels glabrous, at base inarticulate. Male perianth transversely ellipsoid, only slightly laterally compressed, 2-2.2 × 2.5-2.7 mm, above and below broadly rounded, drying brown, firm, not collapsing, glabrous; pedicel slender, (1.5-)2-3 mm long, glabrous; perianth at anthesis cleft to ⅔-⅘, the valves rather firm, 0.2(-0.3) mm thick. Androecium broadly obovoid to transversely short-ellipsoid, 1.2-1.3 × 1.4-1.5 mm, thickish, 0.8-0.9 mm thick; anthers 14 or 15, closely set, septate when immature, largely connate and forming a rather thick-walled saucer-shaped cup into which the anthers at one side inflect deeply nearly to the base, clasping and covering the other anthers, the inflexed parts of the anthers mutually free; androphore narrow, (0-)0.1 mm long. Female flowers and fruits not seen.

Distribution. Philippines: Samar Isl. (only known from the type).

Ecology. North slope, 600-800 ft. Flowers in May.

NOTES

1. Fieldnotes. Tree c. 5 m tall, dbh c. 6 cm. Inflorescence (flowers) green.

2. According to the flower structure related to *H. talaudensis,* but differing in several points. *H. talaudensis* is stouter, with male inflorescences stouter, more densely pubescent; its pedicels are shorter (shorter than the perianth) and densely pubescent, the perianth somewhat larger, the androecium with the anthers inflexed from both sides into the cavity.

3. The specimen on which the present new species is based was collected after Sinclair's revision.

15. Horsfieldia smithii Warb. Fig. 1A(15)

H. smithii Warb., Mon. Myrist. (1897) 270, t. 21, 1-3. — *Myristica smithii* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 87 — Type: *Smith s.n.* (1797, in BM sheet numbered 296) (iso: BM, K, L; LINN, B†, BR & G, *n.v.*).

Tree 10-20 m. Twigs in apical portion flattish and 2-angled, often somewhat yellowish, lower down subterete, with two distinct or faint ridges or lines from petiole to petiole, 2.5-5(-8) mm diam., glabrescent, minute tomentum with hairs 0.1 mm long or less; bark finely striate, when older not flaking, lenticels rather small and inconspicuous. Leaves in 2 rows, membranous, oblong-lanceolate, (10-) 15-30 × (4-) 5-10 cm, base attenuate, tip acute-acuminate; upper surface drying olivaceous to brown, with fine minute paler pustules or not, almost always with larger irregular whitish marks, lower surface early glabrescent, hairs 0.1 mm long or less; without dark dots; midrib above slender, flat; nerves 10-18 pairs, above thin and flat or slightly raised, inconspicuous, marginal arches not distinct; tertiary venation forming a rather lax network, indistinct; petiole 10-16 × 1.5-2.5 mm; leaf bud c. 10 × 2 mm with hairs c. 0.1 mm or less. Inflorescences with sparse to dense tomentum of hairs c. 0.1 mm or less; in ♂: (2-) 3-4 times ramified, many-flowered, c. 5-8 × 4-8 cm; in ♀: c. 2-3 cm long; common peduncle 5-15 mm; bracts not seen, caducous. Flowers 2-4 together, perianths and pedicels glabrous, perianths 2-valved; pedicel glabrous, at base inarticulate. Male perianth subcircular to distinctly transversely ellipsoid or slightly reniform, laterally compressed, dull and usually ± collapsed on drying, 2.5-3.0 × 3-4 mm, above broadly rounded, at base rounded, or subtruncate, or shortly tapering; pedicel slender, 1.5-2 mm; perianth at anthesis cleft to c. ⅔-¾, valves 0.1-0.2 mm thick. Androecium as viewed laterally from the broad side transversely ellipsoid, inflated, consisting of a bunch of anthers 1-1.5(-2.0) × 2.5-3.5 mm, and a sterile basal part or androphore, rather tapering, 0.5-0.8 mm long; anthers 12-15 (i.e., 12-15 thecae at both sides of the androecium), the thecae slender, mutually almost free, c. 1.5-2 mm long, their upper halves deeply curved into the cavity, which extends almost to the base of the androecium, the thecae subdorsally attached to the rim of the androphore only at the base. Female perianth ovoid-ellipsoid, 2-3 mm diam., at anthesis cleft to c. ½-way, valves c. 0.3 mm thick, pedicel c. 2 mm long, thinly pubescent; ovary globose-ovoid, c. 2 × 1.7 mm, glabrous, stigma c. 0.1 mm long or less. Fruits 1-3 per infructescence, ellipsoid, 1.5-2.0 (-3.0) × 1.4-1.6 cm, glabrous, drying brown, with scattered small tubercles or lenticels; dry valves 1.5-2 mm thick; stalk 3-5 mm long; perianth not persisting.

Distribution. Moluccas: Ceram, Banda, Damar Isls., possibly Ternate (see notes).

CERAM: Kornassi (exp. Rutten) *218; Rutten 1776.*

BANDA: Cult. hort. Bogor: Anon. *270* (anno 1901); *Forbes 1158* (anno 1880); *Koerniasih 42;* Banda, *Chr. Smith s.n. & 296* (May 1797).

DAMAR Isls.: *Riedel s.n.* (syntype *H. novoguineensis,* not the lectotype).

TERNATE: ? *Smith s.n.* (see the notes).

Ecology. Nothing known.

Vernacular names. Pohon lobi-lobi (Banda, Ceram), Pala oetan (Ceram).

NOTES

1. Fieldnotes. Flowers yellow, in May and October; fruits yellow with whitish dots, in October; 0-100 m alt.

2. Closely related to *H. palauensis, H. parviflora* and *H. ardisiifolia,* with which it shares the character of largely free thecae which are curved into the hollowed ± cup- or saucer-shaped androphore; the more or less incurved anthers of *H. irya* are reminiscent, but in this latter species the perianth is much smaller and the anthers are shorter and free at the apex for only c. 0.2 mm; in *H. moluccana* the male perianth is ± pear-shaped and the anthers are largely inter-connate.

3. The present species as well as related species like *H. parviflora, H. ardisiifolia,* and also *H. irya* and *H. moluccana* may have somewhat ridged or angular twigs, and in sterile or fruiting stages may be confused with species with typically ridged or winged twigs, e.g., *H. angularis,* and a few species confined to West Malesia.

4. With Warburg's key, *H. smithii* is keyed out (p. 262) in a group (series *Smithii*) which is characterized by 2-valved perianths, ridged twigs and interconnate anthers. However, in reality the anthers appear to be almost entirely or largely mutually free, with the long free portions of the thecae deeply curved into the ± bowl-shaped androecium.

5. Sinclair included the present species in his broad concept of *H. spicata,* the latter presently accepted by me in a much narrower sense, and regarded as distinct by the spicate male and female inflorescences, pear-shaped male perianths, erect uncurved anthers, etc.

6. The specimen from Damar Isls. *(Riedel. s.n.)* was determined by Sinclair as *H. parviflora* which in his notion is also a broad species and which I accept in a narrower sense. *H. parviflora* differs from *H. smithii* by the less distinctly ridged or lined twigs, the thicker male perianths which do not collapse on drying, the more rigid and broader (wider) androecium with the thecae only mutually free in the long incurved portions, and by the absence of irregularly shaped whitish marks on the leaves.

7. The specimens from Ternate (possible collected by Smith, Oct. 1801; in BM) bears immature female flowers with glabrous ovaries. The indumentum of the inflorescences is rather thick and woolly, and the specimen could well be *H. irya,* a species usually with similar whitish markings on the leaves.

16. Horsfieldia palauensis Kanehira Fig. 1A(16)

H. palauensis Kanehira, New Trees Micronesia I, in Bot. Mag. Tokyo 46 (1932) 452 ('palauense'); Fl. Micronesica (1933) 111, Fig. 33; Bot. Mag. Tokyo 47 (1933) 670, in the notes to *H. amklaal;* An Enumeration of Micronesian Plants, in J. Dept. Agric. Kyushu Imp. Univ. 4, 6 (1935) 319. — Type: *Kanehira 270* (♀), Palau Isls. (FU, *n.v.;* iso: BISH, FI; NTS, *n.v.*).

H. glabra auct. non (Bl.) Warb.: Kanehira, Bot. Mag. Tokyo 45 (1931) 280.

Tree 7-15 m. Twigs terete, lined from petiole to petiole, c. 3-4(-8) mm diam., early glabrescent, tomentum minute, with hairs c. 0.1 mm; bark striate, when older not flaking, lenticels minute and rather indistinct. Leaves in 2 rows, membranous to subchartaceous, oblong(-lanceolate) to lanceolate, 10-22 × 3.5-7 cm, base short-attenuate to rounded, tip obtuse to acute-acuminate; upper surface drying olivaceous brown to dark brown, not finely pustulate, sometimes with a few paler marks of irregular shape, lower surface early glabrescent from hairs 0.1 mm or less, without dark dots; midrib slender above, flat or slightly raised; nerves 10-20 pairs, thin and flat above, inconspicuous, marginal arches indistinct; tertiary venation forming a rather lax network, indistinct or invisible; petiole 10-16 × 1.5-2 mm; leaf bud c. 10 × 2 mm, with tomentum of hairs c. 0.1 mm or less. Inflorescences with sparse to dense woolly rusty tomentum with hairs 0.1-0.3 mm; in ♂ and ♀: 2-3 times ramified, rather few- to many-flowered, ± short, c. 3-6 × 2-4 cm; common peduncle 5-15 mm; bracts broadly ellipsoid, 2-3 mm long, caducous. Flowers 3-6 together, perianths glabrous, 2-valved, pedicels glabrescent or with sparse to ± dense tomentum of hairs 0.1-0.2 mm, inarticulate at base. Male perianth subobtriangular to transversely ellipsoid or kidney-shaped, rather distinctly laterally compressed, dull dark brown, c. 1.7-2.0(-2.3) × 2-2.5(-3.0) mm, above broadly rounded, at base subtruncate to short-cuneate; pedicel 0.5-1.0(-1.5) mm; perianth at anthesis cleft to c. ⅔-⅘, valves c. 0.2-0.3 mm thick. Androecium subellipsoid, c. 1.0-1.5 × 1.8-2.0(-2.5) mm, with a sterile basal part mainly consisting of the androphore, ± hollowed out and rather tapering, c. 0.5-0.6 mm long; anthers c. 8-13, i.e., c. 16-26 thecae and these mutually free for the upper ⅔ or more, c. 0.7-1.5 mm long, strongly incurved, the ones at one side of the androecium usually covering those of the other side. Female perianth broadly ellipsoid, c. 2.5-3.0(-3.5) × 2.2-3.0 mm, at anthesis cleft to c. ½-way, valves c. 0.3 mm thick, pedicel 1-2 mm long, ± sparsely pubescent with hairs c. 0.1 mm; ovary globose-ellipsoid or obovoid, c. 1.6-2.0 mm long, glabrous, stigma very minutely 2-lobed. Fruits 2-5 per infructescence, ellipsoid, 2.5-3.0 × 1.5-2.0 cm, glabrous, drying dark brown, without tubercles; dry valves c. 2-3 mm thick; stalk 2-5 mm; perianth not persisting.

Distribution. Caroline Isls.: Palau Isls.

PALAU ISLS.: *Hosokawa Takahide 6756; Kanehira 270, 1847, 1958, 1960, 2371; Masahiko Takamatsu 1205, 1668, Shearard & Spence 94; Tuyama s.n.,* 10 Sept. 1937, *9, 14, 15, 17, 19, s.n.* Aug. 1939.

Ecology. Locally abundant in primary lowland forest, usually not in the wetter localities and usually at somewhat higher altitudes; apparently not or only rarely in mangrove forest. Flowers and fruits throughout the year.

Uses. Pericarps edible, eaten by the natives.

NOTES

1. Fieldnotes. Flowers recorded as yellow or orange.

2. Closely related to *H. smithii* from the Moluccas, which differs chiefly by the larger male perianth, c. 3-4 mm wide, by the anthers which are all (i.e., not only from one side of the androecium) incurved towards the centre of the androecium, and by the generally somewhat thinner leaves with the lateral nerves on the upper surface flat or slightly raised. In *H. palauensis* the older leaves are somewhat chartaceous, above with the lateral nerves flat or sunken, and the tertiary venation very indistinct or even invisible.

3. Sinclair (pp. 112, 119, 124) treated the present species as a synonym of *H. spicata*. However, as understood by Sinclair, *H. spicata* appears to be a heterogeneous species which is in my present treatment divided among various different species. *H. spicata,* in the restricted and original sense, is a species presently regarded as confined to Celebes and the Moluccas.

4. As far as I know, only two species occur on the Palau Isls., *viz.* the widespread *H. irya* (syn. *H. amklaal, H. nunu*), and *H. palauensis,* an endemic species closely related to *H. smithii* from the Moluccas.

5. *Doubtful specimens.* Two sheets of *Takamatsu 1205,* in BISH, one female flowering and the other a fruiting specimen, somewhat deviate by the membranous leaves with rather distinct, slightly raised lateral nerves and venation.

17. Horsfieldia olens de Wilde, *sp. nov.* Fig. 1A(17)

Horsfieldia species perianthio masculo glabro fere ad basin 3-valvi, androecio elongato, ex affinitate *H. sepikensis,* ab ea differt virgis angularibus, perianthio minus elongatis, atque antheris haud profunde inflexis. — Typus: *NGF 31966* (L).

Tree 10-35 m. Twigs in apical portion distinctly quadrangular through ridges from both sides of the bases of the petioles, lower down stem merely ridged or lined, 2-4(-8) mm diam., early glabrescent from greyish to brown tomentum of hairs c. 0.1 mm; bark striate, when older not flaking, lenticels usually distinct. Leaves in 2 rows, chartaceous, oblong (to oblong-lanceolate), broadest at or above the middle, 7-14 × 2.5-6 cm, base attenuate, tip either rounded, or obtuse, or bluntly short-acute-acuminate, upper surface drying brown to blackish, without or with few whitish minute dots or pustules, lower surface early glabrescent, hairs minute, c. 0.1 mm or less, without blackish dots but irregularly shaped pustules of a different nature present; midrib raised above; nerves 7-10 pairs, above and below thin, flattish, and inconspicuous, the submarginal arches rather regularly shaped; tertiary venation forming a lax network, very faint on both surfaces; petioles relatively long and slender, 12-20 × 1.5-2 mm; leaf bud 6-10 × c. 1.5 mm, with hairs c. 0.1 mm long. Inflorescences glabrescent or with sparse tomentum of stellate hairs c. 0.1-0.2 mm, rather short and stout, 2-3 times ramified, common peduncle 1-10 mm long, rather many-flowered, in ♂ and ♀ (according to the infructescences): 2-6 × 1.5-4 cm, bracts not seen, caducous. Flowers in loose clusters of 3-5(-7) together; perianths 3-(or 4-) valved, glabrous; pedicels slender, glabrous, at base ± articulated or not. Male perianth broadly ellipsoid to globose, not angular, c. 1.8-2.3 mm diam., top and base rounded, pedicel not tapering, 2.5-4 mm long, glabrous; perianth at anthesis cleft to c. ⅝ or nearly to the base, valves c. 0.2 mm thick. Androecium ± obovoid, blunt-triangular, c. 1.5 × 1.0 mm (hence not completely filling the perianth); anthers c. 10-12, free apices c. 0.3-0.8 mm, incurved, those of one side clasping the others; column rather broad and solid, hollowed for the upper ¼ to ⅓; androphore rather broad, up to 0.1 mm long.

Female flowers not seen. Fruits 2-6 per infructescence, ellipsoid, 1.0-1.6 × 0.8-1.2 cm, top minutely pointed, base sub-attenuate, glabrous, without or with sparse small tubercles or lenticels, dry valves c. 1-1.5 mm thick; stalk 1-4 mm long; perianth not persistent.

Distribution. New Guinea: Irian Jaya, Digul (SE. New Guinea); Papua New Guinea, Western Prov.

NEW GUINEA. Irian Jaya: *(Bouman) BW 3234, (Nautje) 6530, 6608; Soegeng 413.* — Papua New Guinea, Western Prov.: *Lae 51821; NGF 8297, 31770, 31966.*

Ecology. Swamp edges, in fringes (with *Acacia*) of savanna and rain-forest; ridge forest, primary forest on level land inundated in the wet season, swampy forest on peaty soil; also in Myrtaceae-*Vatica-Campnosperma* forest on well-drained podsol-ground; 0-200 m alt. Flowers in June, fruits from February to August.

Vernacular names. Isasir, Jisasir, Jesaser (Asmat lang.), Selamae (Kunga dial.), Ma-tak (Kinuga Dist.).

NOTES

1. Fieldnotes. Once reported to have small stilt roots. Bark longitudinally fissured, brown or red-brown, or blackish brown, inside reddish, with some reddish exudate; reported to have a very offensive smell, or a strong disinfectant smell. Wood whitish to yellow. Leaves ± leathery, once recorded as bluish-green above. Flowers yellow. Fruits orange-yellow or orange, seeds orange or red.

2. Apparently closely related to *H. sepikensis*, one of the few other New Guinean species with 3-merous perianths. That species differs in its non-angular twig-apices, more elongate perianth, more slender inflorescences, membranous leaves, and apparently a different ecology. The present new species is mostly found in dry or wet habitats on poor peaty or podsolic soils.

3. Specimens of the present species were included by Sinclair (p. 125, 126) in *H. spicata* var. *sepikensis* (Mkgf.) Sinclair, a taxon which appears to be a heterogenous entity.

18. Horsfieldia sepikensis Markgraf Fig. 1A(18); 10

Horsfieldia sepikensis Markgraf, Bot. Jahrb. 67, 2 (1935) 147. — *Horsfieldia spicata* var. *sepikensis* (Mkgf) Sinclair, Gard. Bull. Sing. 28 (1975) 125, p.p. — Type: *Ledermann 8016* (B†; iso: SING, *n.v.*).

Tree 10-25 m. Twigs terete, faintly ridged or not, towards apex 2-4(-6) mm diam., early glabrescent, tomentum of hairs greyish brown, c. 0.1 mm long or less; bark striate, when older not flaking, lenticels rather small but distinct. Leaves in 2 rows, membranous, oblong to oblong-lanceolate, broadest usually at or above the middle, 8-17 × 3.5-6 cm, base attenuate, tip acute-acuminate with the very tip usually bluntish; upper surface drying dark brown, without minute whitish pustules, lower surface early glabrescent, minute hairs less than 0.1 mm, without blackish-brown dots; midrib above flattish or slightly raised; nerves 8-12 pairs, above thin and flat; tertiary veins forming a lax network, very faint on both surfaces; petiole relatively long, 15-24 × 1-2 mm, leaf bud c. 10 × 1 mm, with hairs

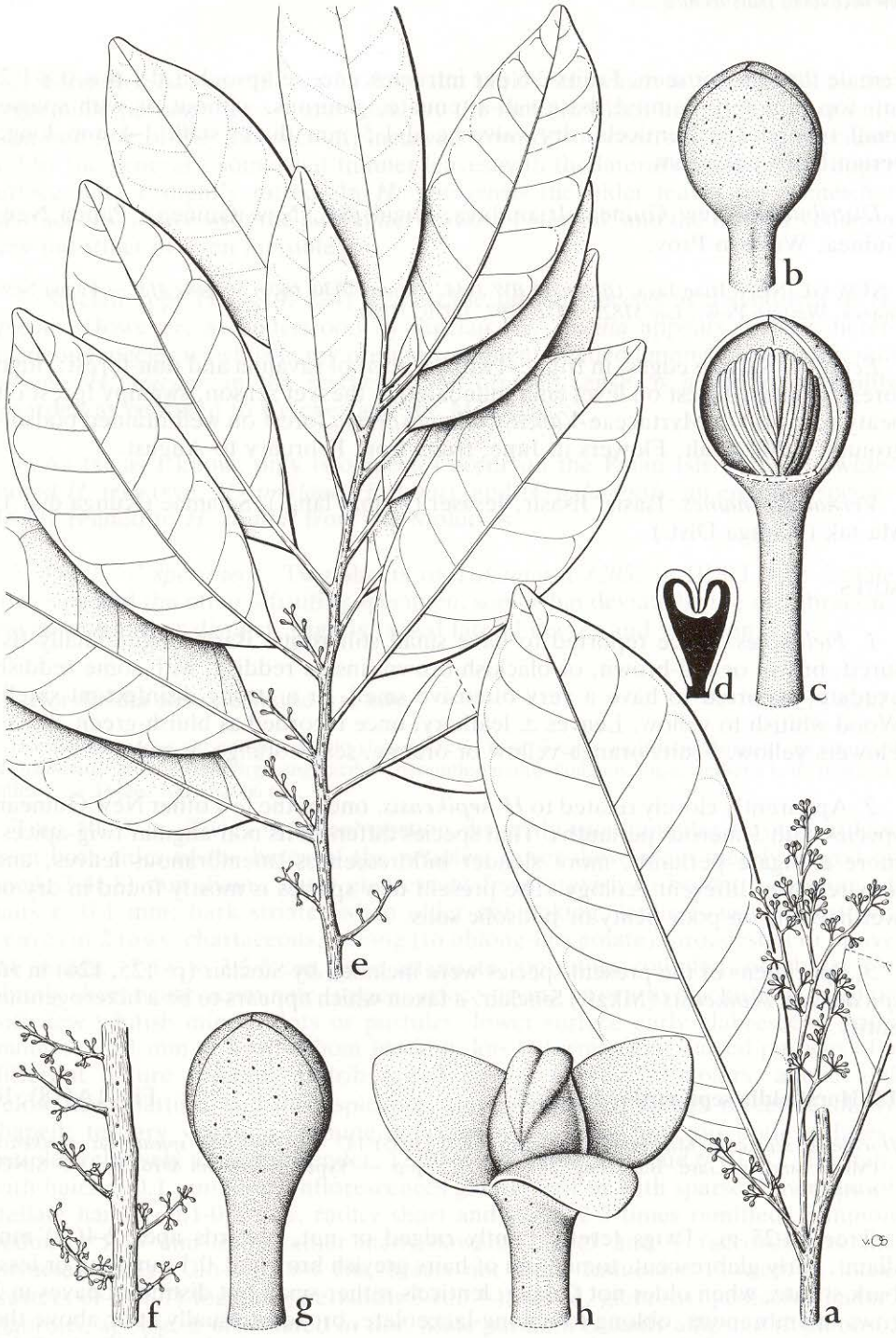

Fig. 10. *Horsfieldia sepikensis* Markgraf
a, twig portion with male inflorescence, × ½; *b*, mature male flower, lateral view, × 12; *c*, ditto, opened, showing androecium, × 12; *d*, androecium, longitudinal section, schematic, × 12; *e & f*, portions of female flowering twig, inflorescences axillary to leaves and fallen leaves, × ½; *g*, mature female flower bud, × 12; *h*, ditto, at full anthesis, showing glabrous ovary and large broadly 2-lipped stigmas, × 12. — *a-d*, from *Hoogland & Craven 10255; e-h*, *Hoogland & Craven 10237*.

less than 0.1 mm. Inflorescences glabrescent or with sparse hairs c. 0.1 mm, 2-3 times ramified, many-flowered, in ♂: 7-12 × 4-6 cm, in ♀: 2-4 × 1.5-2 cm, common peduncle c. 0.5-1.5 cm long; bracts not seen, caducous. Flowers in loose clusters of 2-7 together; perianths 3-(or 4-) valved, finely punctate, in mature bud rather angular (though perianths never tightly clustered), glabrous; pedicels glabrous, at base not articulated. Male perianth broadly ellipsoid-obovoid, ± 3-angular, c. 1.5-2.0 × 1.4-1.6 mm, at apex acutish, base ± attenuate, pedicel slender, not tapering, 2-3 mm long; perianth at anthesis cleft to c. 5/6, valves c. 0.1 mm thick. Androecium ± obovoid, ± bluntish 3-angular, c. 1.5 × 1-1.2 mm; anthers 12-14, tightly set, septate before maturity, free apices c. 0.2-0.5 mm long and these ± curved into the hollowed upper 1/3 part of the rather broad anther column (anthers at one side of the androecium in *Hoogland & Craven* 10255 mutually touching each other in a fish-bone pattern, see fig. 10) androphore 0-0.1 mm, rather narrow. Female perianth ellipsoid, c. 2.0 × 1.6-1.8 mm, 3- or 4-valved, cleft at anthesis almost to the base, valves c. 0.1-0.2 mm thick, pedicel 1.5-2 mm long; ovary ovoid, c. 1.5-1.8 × 1.2-1.5 mm, glabrous, style absent, stigmas relatively very large, consisting of two broad fleshy lobes c. 1.0 × 0.2 mm, only c. 0.1 mm high. Fruits not seen.

Distribution. Papua New Guinea: East Sepik Prov.

PAPUA NEW GUINEA. East Sepik Prov.: *Hoogland & Craven 10237, 10255; Ledermann 6738.*

Ecology. Primary and secondary forest, riverine forest; ridge forest; 0-50 mm. Flowers and fruits throughout the year.

Vernacular name. Bangera (Waskuk lang., Sepik).

NOTES

1. Fieldnotes. Flowers yellow.

2. A noteworthy species because of its predominantly 3-merous flowers, the only other species with 3- or 4-merous flowers in New Guinea being the ± related *H. olens*. Furthermore, the present species stands apart by its thick, conspicuous stigmas. It is in many cases reminiscent of a species of *Gymnacranthera,* but the New Guinean *G. paniculata* var. *zippeliana* differs in the nature of the hairs (on leaf bud, and flowers), by the hairy perianths, split at anthesis to only c. 1/2-way deep, by a hairy ovary, and a different texture and colour of the leaves (whitish below).

3. The fruits are reported by Markgraf in the original description as globose, c. 13-15 cm diam., the dry pericarp c. 2 mm thick; seed globose, c. 1 cm diam. I have not seen fruits of our present species, and the fruiting Ledermann-specimens formerly in the Berlin herbarium have probably all been destroyed.

4. I have not seen the isotype *Ledermann 8016* (♂), in SING. The flowers are described by Markgraf in the original description as being cleft to c. 1/2-way deep at anthesis. However, in the male and female specimens I saw have the perianths split to almost the base. *Ledermann 6738,* in K, a duplicate of one of the authentic collections cited by Markgraf, has good male flowers. See further under note 5.

5. Sinclair, who examined a duplicate of the holotype *Ledermann 8016* in SING,

accepts the present species as a variety under *H. spicata*, including specimens with 2-valved as well as with 3-valved perianths. In my opinion the 3-merous perianths are typical for the present species, which are endemic in the Sepik area, one which has no close relationship with *H. spicata* from the Moluccas.

6. Hoogland & Craven 10255 contains one flower with a 'double' androecium; the perianth is somewhat larger and has 4 valves. Female flowers are either 3- or 4-valved.

19. Horsfieldia sylvestris (Houtt.) Warb. Fig. 1A(19); 11

Myristica sylvestris Houtt., Nat. Hist. 2, 3 (1774) 340 — *Horsfieldia sylvestris* (Houtt.) Warb., Mon. Myrist. (1897) 337, t. 22 fig. 1-6; Sinclair Gard. Bull. Sing. 28 (1975) 142. — Type: not indicated.

M. salicifolia Willd. in Roem. & Usteri, Mag. Bot. 3, 9 (1790) 26; Sp. Pl. (4th ed.) 4, 2 (1806) 871; Roxb., Fl. Ind. ed. Carey (1832) 846 — Type: not known.

M. pinnaeformis Zipp. (msc.) ex Miq., Ann. Mus. Bot. Lugd.-Bat. 2, 1 (1865) 49 — Type: *Zippelius s.n.* (180) (L).

M. pendulina Hook.f., Fl. Brit. Ind. 5 (1890) 859; King, Ann. Roy. Bot. Gard. Calc. 3 (1891) 329, pl. 170 — Type: *Cantley s.n.* (A, CAL, *n.v.*; K).

M. edulis F.v.M., in sched. (Hb. v. Müller, d'Alberis 11, MEL, not seen).

H. sylvestris var. *villosa* Warb., Mon. Myrist. (1897) 341 — Type: *Beccari 696* (Fl, *n.v.*), *Warburg 20708* (A, B†, *n.v.*).

Tree 7-40(-60) m. Twigs stout, terete, hollow, in young innovations when dry ± angular or flattish, usually thinly ridged, 4-14(-20) mm diam., glabrescent from rusty ± woolly tomentum composed of hairs 0.3-1.0(-1.5) mm; bark faintly striate, when older not flaking, with coarse lenticels. Leaves in 2 rows, (thinly) chartaceous, lanceolate to lanceolate-linear, parallel-sided, (17-)20-45 × 3-7(-9) cm, base rounded to short-attenuate, tip long acute-acuminate; upper surface drying usually dull, greenish brown to dark brown, minutely pustulate or not, lower surface late glabrescent or with (partially) persistent or sub-persistent tomentum of mixed hairs 0.1-1(-1.5) mm; without dark brown dots; midrib flattish above, late-glabrescent; nerves 30-42 pairs, thin, above flat or sunken, beneath with distinct marginal arches; tertiary venation forming a lax network, distinct (and then the leaves ± bullate) or usually not distinct above; petiole short, 2-7 × (2-)3-5 mm, usually shortly winged, the lamina being decurrent; leaf bud generally stout, up to 8 cm long, densely woolly-pubescent. Inflorescences pubescent or late-glabrescent, hairs woolly, 0.5-1 mm long, in ♂: large, many-flowered, 3-5 times ramified, paniculate, 7-20(-30) × 4-10(-14) cm, in ♀: 4-10(-15) cm long; common peduncle 2-7 cm × 2-5 mm, at base with a few persistent bluntish cataphylls 2-4 mm long; bracts rather late-caducous, ± concave, (2-) 4-8(-16) mm long. Flowers in ♂ in loose clusters of 4-10 each, in ♀ up to 5 only; perianths 2-(or 3-) valved, often somewhat angular, glabrous or at base glabrescent, pedicels slender, glabrescent or with persistent tomentum of hairs c. 0.3 mm, at base inarticulate; flowers before anthesis, especially in ♂, densely packed into subglobose or ellipsoid glomerules 4-7 mm diam. wrapped in bracts. Male perianths obovoid to narrow-obovoid, or clavate, irregularly shaped and angular by being closely packed in bud, c. 1.5-2.1 × 0.5-1.3(-1.5) mm, at apex obliquely obtusish, towards base usually ± tapering into pedicel c. 0.2-1.5(-2) × c. 0.3 mm; perianth at anthesis split to c. ⅓-½-way, valves 0.1-0.3 mm thick, sometimes with a few pale dots. Androecium ellipsoid-oblong, c.

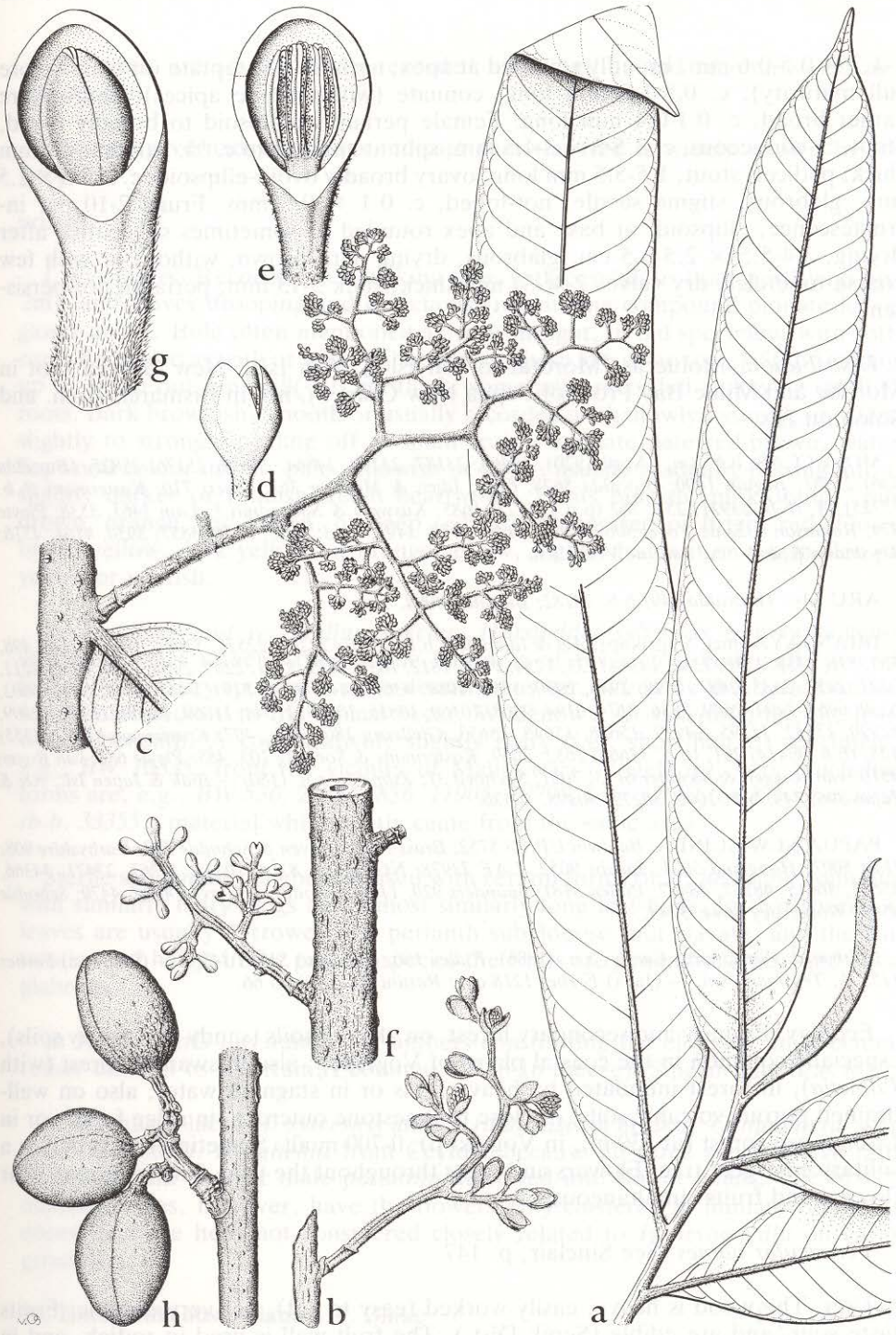

Fig. 11. *Horsfieldia sylvestris* (Houtt.) Warb.
a, leafy twig apex, × ½; *b & c,* twig portions with respectively immature and full-grown male inflorescences, note bracts in *b,* × ½; *d,* male flower, × 6; *e,* ditto, opened, showing androecium, × 12; *f,* twig portion with female inflorescence axillary to fallen leaf, × ½; *g,* female flower, lateral view, opened, showing glabrous ovary, note much larger size as compared with the male flowers, × 6; *h,* twig portion with infructescence with mature fruits. — *a, f, g, de Vogel 3069; b, de Vogel 3094; c-e, Craven 739; h, de Vogel 3370.*

1-1.2 × 0.5-0.6 mm, broadly rounded at apex; anthers 4-8, septate (at least before full maturity), c. 0.8-1.5 mm long, connate (without free apices); androphore rather broad, c. 0.1-0.4 mm long. Female perianths ellipsoid to broadly ovoid, stout, ± coriaceous, c. 3.5-5 × 3-4.5 mm, split at anthesis to c. ⅓, valves 0.7-1 mm thick; pedicels stout, 1.5-5.5 mm long; ovary broadly ovoid-ellipsoid, c. 2.5-3 × 2.5 mm, glabrous, stigma sessile, not-lobed, c. 0.1 × 0.5 mm. Fruits 2-10 per infructescence, ellipsoid, at base and apex rounded or sometimes subacutish after drying, 3.4-5.5 × 2.5-3.5 cm, glabrous, drying dark brown, without or with few coarse tubercles, dry valves 2-4(-5) mm thick; stalk 5-13 mm; perianth not persistent.

Distribution. Moluccas (Morotai to Kai Isls.), Aru Isls., New Guinea (not in Morobe and Milne Bay Prov. of Papua New Guinea), not in Bismarck Arch. and Solomon Isls.

MOLUCCAS: *b.b. s.n.* (April 1920), *16468, 23187, 23749, 24864, 24879, 25176, 25825, (Buwalda 636) 25981; Beguin 1400; Buwalda 5628, 6112; Idjen & Mochtar 362; Jaheri 710; Kostermans (b.b. 33725) 13, (b.b. 33921) 251, 767* (p.p.), *1123, 1685; Kuswata & Soepadmo 3; Lam 3463, 3538; Pleyte 379; Robinson 235; de Vogel 3069, 3094, 3114, 3370, 3491, 3713, 3765, 3815, 3857, 3930, 4164, 4518; Teysmann & de Vriese s.n.; de Vriese s.n.*

ARU Isls.: *(Buwalda 249) b.b. 25282; Buwalda 4994.*

IRIAN JAYA (incl. Vogelkop): *Aet & Idjan 487; b.b. 15901, 22268, 22532, 32682; BW 24, 343, 498, 533, 536, 1151, 1280, 1366, 1433, 1733, 1754, 1766, 1812, 1838, 1839, 2131, 2207, 2208, 2209, 2210, 2211, 2227, 2428, 2535, 2687, 2699, 2948, 2950, 3985, 4089, 4369, 4446, 4460, 5191, 5413, 5844, 5923, 6002, 6539, 6964, 7404, 7689, 7836, 8174, 9194, 9868, 10160, 10835, 10870, 11844, 11869, 11900, 11905, 12409, 12990, 13032, 13795, 14929, 15628, 15648, 15653; Gjellerup 180, 180b, 407; Kostermans (b.b. 33355) 128, (b.b. 33414) 201; (b.b. 33664) 2652, 2669; Kostermans & Soegeng 103, 485; Pleyte 686; van Royen 4510; van Roygen & Sleumer 6193, 7051; Soehoed 31; Zippelius s.n. (180) — Biak & Japen Isl.: Aet & Idjan 396, 749; b.b. 1009, 30272, 30393, 30570.*

PAPUA NEW GUINEA: *Baldwin UPNG 5752; Brass 7068; Craven & Schodde 739; Darbyshire 908; Hart 5007; Hoogland 5021; Jacobs 9052; LAE 73978; NGF 7153, 8214, 10353, 13267, 27471, 34366, 35623, 36015, 48157, 48467; Pullen 8181; Saunders 920, 1104; Schodde & Craven 4289, 4470; Schodde 4506; Womersley 3694, 3743.*

Cultivated: (Singapore) *Cantley s.n.* (1886), *Ridley 186, (Furtado) SING 34863* — (Sumatra) *Forbes 1155 A; Teysmann s.n.* — (Java) *Forbes 1218 c, e; Rastini 90; Sutrisno 66.*

Ecology. Primary and secondary forest, on alluvial soils (sandy and clayey soils), especially common in the coastal plains of Vogelkop; also in swampy forest (with *Pometia*), in forest inundated by heavy rains or in stagnant water; also on well-drained porous volcanic soils, or close to limestone outcrops, in ridge forest, or in *Castanopsis* forest (at 530 m., in Vogelkop); 0-700 m alt. Sometimes recorded as a solitary emergent tree. Flowers and fruits throughout the year. The trees may bear flowers and fruits simultaneously..

Vernacular names. See Sinclair, p. 147.

Uses. The wood is heavy, easily worked (easy to cut), not very durable. Fruits taste sour, and are edible (Sepik Dist.). The fruit wall is used in rodjak, and in manisan (a sweet pickle) (Moluccas). Extract of bark is used as a drug against "penyakit keputihan" by expecting women, also against hepatitis (Moluccas). The fruits are gathered and eaten by the Gogodala tribe, Western Distr., Papua; once reported as found planted at a former village site. Fruits eaten by birds (e.g., pigeons, parrots), apparently swallowed whole.

The trees are several times recorded as beautiful, and recommended as an ornamental.

The many vernacular names indicate that the tree is widely known by local people.

NOTES

1. Fieldnotes. Recorded as a striking tree, with pendulous branches (twigs up to 2m), and leaves drooping and distichous (resembling compound pinnate leaves), glossy above. Bole often mentioned as very straight, in old specimens with rotten core. Recorded as with or without buttresses; these low or up to c. 1.5(-2.5) m high, up to 1.5 m out, up to 8(-20) cm thick, sometimes recorded as having small stilt roots. Bark brownish, smooth or usually recorded as shallowly fissured, or often as slightly to strongly peeling off in small scales; exudate pale red-brown, watery. Sapwood colour usually pale yellowish or straw, usually gradually passing into the slightly darker or reddish-cream heartwood. Fruits pinkish, pink-orange, pink-brown, orange, red-brown, or deep red; aril orange-red or bright red. Flowers bright yellow, dark yellow, or orange-yellow, slightly fragrant or not; pollen pale yellow or whitish.

2. Variation and resembling species. Horsfieldia sylvestris is a homogenous species; it only rather varies in the hairiness of twigs, leaf-bud, and (juvenile) leaves. Very hairy specimens were described as var. *villosa* by Warburg, but many forms intermediate to the typical occur. Wildenow's *H. salicifolia* has the leaves woolly beneath. A comparatively slightly hairy (i.e., short-haired) specimen is, e.g., *BW 10835,* from the vicinity of Manokwari (Vogelkop); very much hairy forms are, e.g., *BW 536, 2535, 7836, 11905, 13795, b.b. 32682,* or *Kostermans 128 (b.b. 33355),* material which partly came from the same area.

Sterile specimens may be confused with certain forms of *H. hellwigii,* sometimes with similarly hairy twigs and almost similarly long leaf-buds. In that species the leaves are usually narrower, the perianth subglobose, not clavate, and the fruits smaller and hairy; in the present species the fruits are generally larger, and always glabrous.

In *H. sylvestris* the number of anthers constituting the elongate androecium is rather difficult to ascertain; I counted 4-8 (8-16 thecae), Sinclair had it as 8-10.

3. Warburg placed *H. sylvestris* and *H. ralunensis* in his sect. *Orthanthera,* which also included *H. iryaghedhi* from Ceylon, because all three species have rather elongated and angular male perianths clustered into flower heads. The first two named species, however, have the flowers only clustered in immature inflorescences, and are here not considered closely related to *H. iryaghedhi* on various grounds.

20. Horsfieldia australiana S.T. Blake Fig. 1A(20); 12

Horsfieldia australiana S.T. Blake, Austr. J. Bot. 2 (1954) 124, Pl. 5; Sinclair, Gard. Bull. Sing. 28 (1975) 6, pp., for the Australian specimens only. — Type: *S.T. Blake* (BRI; iso: SING, *n.v.*).

Tree 6-25 m. Twigs terete or lined or ridged towards the top 2-5(-12) mm diam., early glabrescent, tomentum pale brown to grey-brown, with minute hairs 0.1 mm

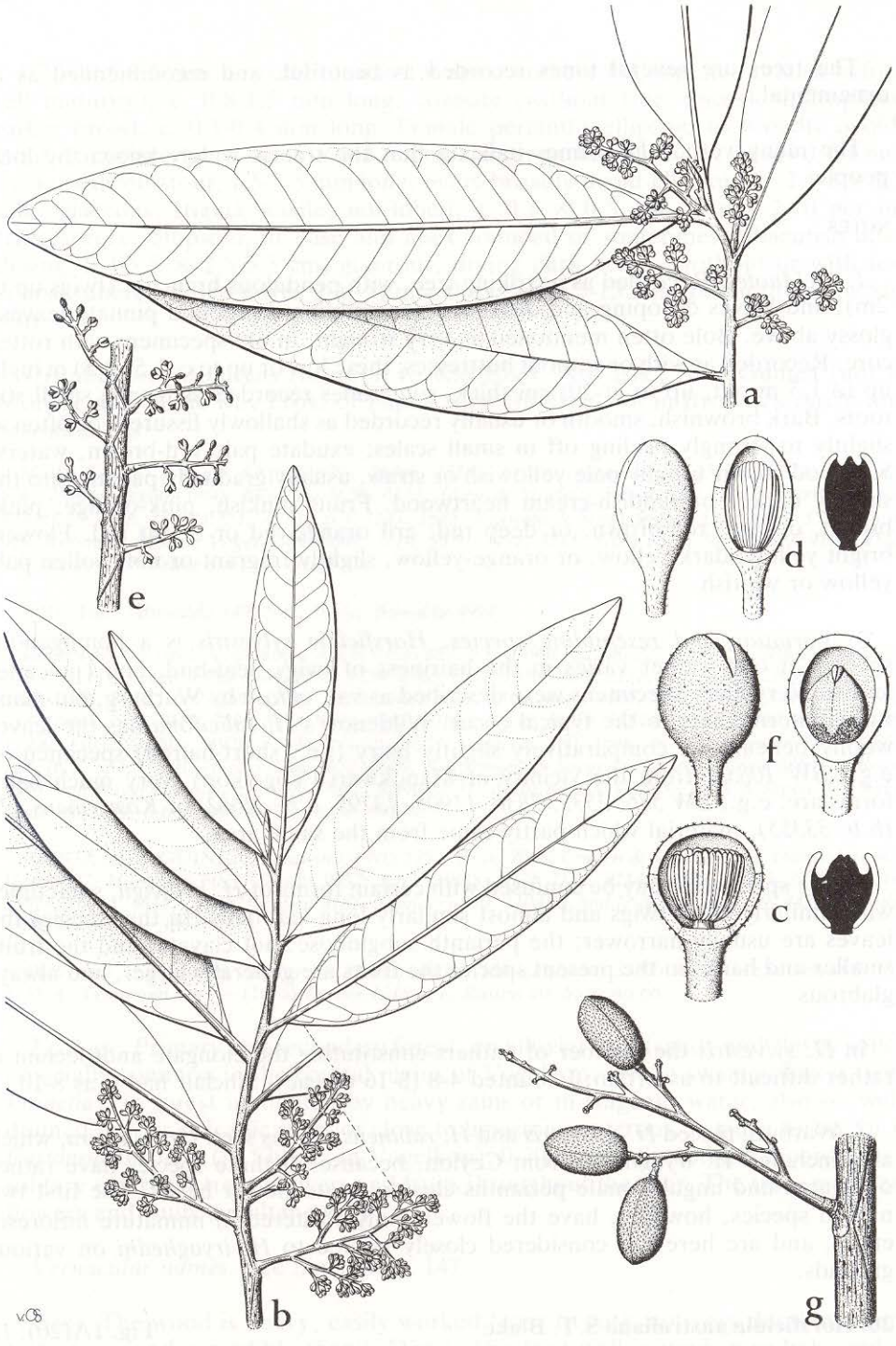

Fig. 12. *Horsfieldia australiana* S.T. Blake
a, twig portion with male inflorescences, twig not ridged, × ½; *b,* ditto, twig lined or ridged, × ½; *c,* opened male flower showing androecium and schematic longitudinal section of androecium, × 6; *d,* ditto of different specimen, mature male flower closed, opened, and schematic longitudinal section of androecium, × 6; *e,* portion of twig with female inflorescences axillary to fallen leaves, × ½; *f,* mature female flower and longitudinal section of the same, note pubescence at base of ovary, × 6; *g,* portion of twig with infructescence, × ½. — *a & c,* from *Dunlop 3585; b & d,* from *Hyland 2724; e & f,* from *Smith 11913; g,* from *Hyland 2551.*

or less; bark faintly striate, when older not flaking, lenticels usually conspicuous. Leaves in 2 rows, membranous or chartaceous, elliptic oblong to lanceolate, broadest at about the middle, or more or less parallel-sided and broadest below or above the middle, 10-24 × 3-7 cm, base attenuate, tip obtusish or acutish to acute-acuminate, often with bluntish tip; upper surface drying dull olivaceous to bright brown, not finely pale-pustulate, lower surface early glabrescent, hairs minute 0.1 mm or less, the midrib often rather reddish-brown and usually remaining sparingly minutely scaly-stellate hairy, lower surface without brown-black dots; midrib flattish to slightly raised above; nerves 10-17 pairs, above thin, sunken or flat, or slightly raised, beneath with the submarginal arches rather regularly looping but inconspicuous; tertiary veins forming a lax network, inconspicuous; petiole 3-7 × 1.5-2 mm, leaf bud 8-15 × 1-2 mm, with hairs c. 0.1 mm. Inflorescences sparsely to densely pubescent with hairs 0.1-0.2 mm long hairs, in ♂ and ♀: 2 or 3 times ramified, (1.5-) 3-8 × 2-5 cm, common peduncle 0.5-1.0 cm long; bracts elliptic to broadly triangular, acutish, 2-6 mm long, short-pubescent, caducous. Flowers in loose clusters of 2-6 (in ♀: 1-3) each; perianths 2-valved, rather sparsely pubescent with hairs 0.1 mm or less long, pedicels slender, thinly pubescent, at base inarticulate. Male perianth ellipsoid or subglobose, slightly laterally compressed, (2-)2.5-3.3 × (1.5-) 2-3.0 mm, above and below rounded, pedicel not tapering, 1-2 mm long; perianth at anthesis cleft to c. ½-way, valves c. 0.2 mm thick. Androecium moderately laterally compressed, above subtruncate to broadly rounded, below somewhat attenuate, (1.8-) 2.0 × 1.5-2.0 mm; anthers (10?-) 12-14, almost straight, the free portions at apex c. 0.1-0.2 mm long and these slightly or much incurved; the column rather wide, spongy, the apical ¼-½ broadly hollowed out but the basal portion more or less protruding into the upper part of the hollow; androphore rather narrow, 0.1-0.2 mm long. Female perianth ellipsoid, c. 2.5(-3) × 2.0(-2.5) mm, cleft at anthesis to c. ½-way, valves c. 0.2 mm thick, pedicel 1-2 mm long; ovary ovoid, c. 2.0 × 1.5 mm, towards base with dense tomentum of minute hairs 0.1 mm or less, style minutely 2-lobed, c. 0.2 mm broad. Fruits 3-8 per infructescence, ellipsoid, top rounded or faintly pointed, 1.8-2.2 × 1.1-1.4 cm, with the surface granulate and with or without a few coarse tubercles, glabrous except at the very base; dry pericarp c. 2 mm thick; stalk 2-4 mm long; perianth not persisting.

Distribution. Australia: Northern Territory, northern Queensland.

AUSTRALIA. Northern Territory: *Byrnes* NB *1259* (NT. 14918); *Dunlop 3585; Must & McKean B 687* — Queensland: *Hyland 2551, 2557, 2724, 3123, 5516; Smith 11762, 11913; Stocker 1043.*

Ecology. Riverine forest, gallery forest in gullies of sandstone areas, sheltered gorge forest, monsoon forest on sandy soils; 0-200 m alt. Flowers from August to October, fruits from September to January.

NOTES

1. Fieldnotes. Bark fissured or tessellated, usually flaky, stem often recorded as ± fluted, buttressed. Blaze exudate watery, red; blaze smells like ants. Wood whitish. Flowers yellow or orange, the female noted as strongly and sweetly scented (as the flowers of *Alocasia macrorhiza* or the fruits of *Passiflora edulis*); the males recorded as scentless.

2. Possibly two forms can be recognized, but the material at hand prevents a final decision. Specimens from Northern Territory, incl. the type and *Must & McKean B 687* (♂), *Dunlop 3585* (♂), *Byrnes NB 1259* (fr.), have the twigs not or only indistinctly ridged, the leaf blades rather elliptic-oblong (not oblong-lanceolate), possibly relatively longer petioles, the blades more of a membranous texture with ± prominent lateral nerves, and possibly the male perianth broader, i.e., broadly ellipsoid or subglobose. Specimens from Queensland have usually rather leathery leaves, usually with flattened or sunken lateral nerves, the blades usually more oblong-lanceolate, with shorter and broader petioles, and the twigs apparently more distinctly ridged or even winged. However, specimens which distract from this image exist, e.g., the sterile specimen *Hyland 3123* from Northern Terr. has an 'easternly' habit, or the sterile specimen *Smith 11762*, from Queensland, which has the leaves rather membranous and nerves prominent.

3. Sinclair accepted the present species as including specimens from New Guinea which are presently regarded as representing a separate new species, *H. sinclairii*.

21. Horsfieldia crux-melitensis Markgraf Fig. 1A(21); 13 a-c

Horsfieldia crux-melitensis Markgraf, Bot. Jahrb. 67, 2 (1935) 148; Sinclair, Gard. Bull. Sing. 28 (1975) 26 (cruxmilitensis) — Type: *Schlechter 19246* (B, *n.v.*; iso: K, L; E, G, NY, S, Z, *n.v.*).

Shrub or treelet 2-4 m. Twigs terete, not ridged, towards the apex 1.5-3(-4) mm diam., glabrescent, tomentum rusty, of hairs c. 0.1 mm; bark finely striate, when older not flaking, lenticels absent or inconspicuous. Leaves in 2 rows, membranous, elliptic to obovate-oblong, broadest usually above the middle, 12-27 × 5.5-11.5 cm, base attenuate, tip acute-acuminate; upper surface drying dark brown, without or with very minute paler dots, lower surface with persistent tomentum of rather sparse hairs (c. 0.1 mm) especially on the midrib, or late glabrescent, without dark dots, the nerves not contrasting in colour; midrib above slightly raised; nerves 10-15 pairs, sometimes with additional intercalary nerves, thin and flat above, much raised beneath, the submarginal arches distinct but not very regularly shaped; tertiary veins forming a lax, rather indistinct network; petiole 10-16 × 1.5-2.5 mm; leaf bud 7-12 × 1-2 mm, with hairs 0.1-0.2 mm. Inflorescences situated in between the leaves, woolly-pubescent with stellate-dendroid hairs 0.1-0.2 mm, 2(-3) times ramified, in ♂ and ♀: rather few-flowered, c. 1.5-5 × 1.5-4 cm, common peduncle 0.6-1.5 cm long; bracts c. 0.5 mm, pubescent, early caducous. Flowers solitary or up to 3 together; perianths 2-valved, with scattered stellate hairs c. 0.1(-0.2) mm, densest towards base, pedicels tapering, pubescent, at base inarticulate. Male perianth subglobose, gradually passing into the strongly thickened and tapered pedicel, together forming the long-clubshaped flower c. 9-11 × 2-3.2 mm; perianth broadly rounded above, somewhat laterally compressed, c. 2-3 × 2-3.2 mm, pedicel c. 7-8 × 2-3 mm, ± obconical, rather densely pubescent; perianth at anthesis split to c. ⅛-⅕, i.e., to 0.3-0.6 mm deep, valves c. 0.2-0.3 mm thick, the perianth-wall lower down c. 0.6-0.8 mm thick. Androecium a club-shaped body, the top ± rounded, c. 1.5-2.5 × 0.7-1.2 mm, with 3-5 stellately arranged, connate anthers at the apex, c. 0.2-0.3 mm long, androphore thick, subcylindrical, the surface ± wrinkled-bullate and more striate towards the base, glabrous; central column up to the apex solid. Female perianth and pedicel together forming an obconical flower similar to ♂ flowers, c. 8 × 3

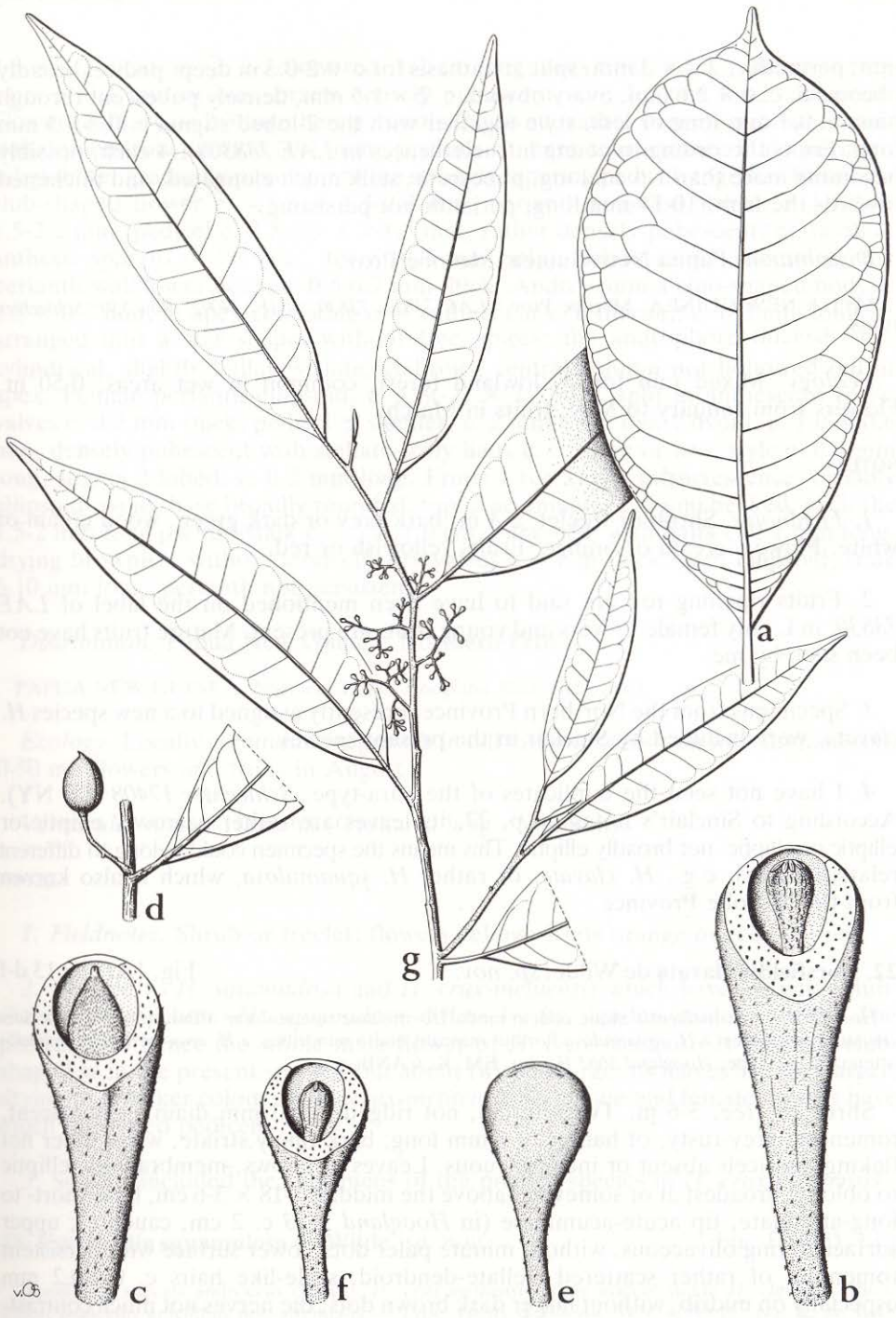

Fig. 13. *Horsfieldia crux-melitensis* Markgraf: *a*, leaf, × ½; *b*, opened male flower, showing club-shaped androecium, × 6; *c*, female flower, opened, showing pubescent ovary with minute narrow bilobed style, × 6. — *H. clavata* de Wilde: *d*, portion of twig with infructescence with mature fruit, × ½; *e*, mature male flower, lateral view, × 6; *f*, ditto, opened, showing club-shaped androecium, × 6. — *H. squamulosa* de Wilde: *g*, habit of leafy twig with male inflorescences. — *a & c*, from *LAE 73830; b*, from *Schlechter 19246* (type); *d*, from *Hoogland 3623; e & f*, from *Hoogland 3663* (type); *g*, from *Brass 7221*.

mm; perianth c. 2.2 × 3 mm, split at anthesis for c. 0.2-0.3 m deep; pedicel broadly obconical, c. 6 × 2.6 mm; ovary obvoid, c. 2 × 1.5 mm, densely pubescent through hairs c. 0.1 mm long or less, style together with the 2-lobed stigma c. 0.2-0.3 mm long. Fruits (according to young infructescences in *LAE 73830*) 1-4 each, possibly becoming more than 1.6 cm long, pubescent; stalk much elongated, and thickened towards the fruit, 10-14 mm long; perianth not persisting.

Distribution. Papua New Guinea: Morobe Prov.

PAPUA NEW GUINEA. Morobe Prov.: *LAE 73822, 73830; NGF. 24092; Rau 550; Schlechter 19246.*

Ecology. Mixed rain forest, lowland forest, common in wet areas; 0-50 m. Flowers from January to May; fruits in March.

NOTES

1. Fieldnotes. Shrub or treelet, 2-4 m; bark grey or dark green, wood cream or white. Flowers cream or orange. Fruits yellowish or red.

2. Fruits ripening red are said to have been mentioned on the label of *LAE 73830;* in L only female flowers and young fruits are present. Mature fruits have not been seen by me.

3. Specimens from the Northern Province, presently assigned to a new species *H. clavata,* were included by Sinclair in the present species.

4. I have not seen the duplicates of the para-type, *Schlechter 17408* (G, NY). According to Sinclair's notes on p. 27, its leaves are rather narrowly elliptic or elliptic or elliptic, not broadly elliptic. This means the specimen could belong to different related species, e.g., *H. clavata,* or rather *H. squamulosa,* which is also known from the Morobe Province.

22. Horsfieldia clavata de Wilde, *sp. nov.* Fig. 1A(22); 13 d-f

Horsfieldiae crux-melitensis atque eodem modo *Horsfieldiae squamulosae* affinis quoad androecium clavatum, sed differt a *H. squamulosa* floribus masculis multo minoribus, a *H. crux-melitensis* pedicellis attenuatis. — Type: *Hoogland 3663* (L; iso: BM, K; CANB, *n.v.*).

Shrub or tree, 3-6 m. Twigs terete, not ridged, 1.5-3 mm diam., glabrescent, tomentum grey-rusty, of hairs c. 0.1 mm long; bark finely striate, when older not flaking, lenticels absent or inconspicuous. Leaves in 2 rows, membranous, elliptic to oblong, broadest at or somewhat above the middle, 7-18 × 3-6 cm, base short- to long-attenuate, tip acute-acuminate (in *Hoogland 3523* c. 2 cm, caudate); upper surface drying olivaceous, without minute paler dots, lower surface with persistent tomentum of rather scattered stellate-dendroid, scale-like hairs c. 0.1-0.2 mm especially on midrib, without larger dark brown dots, the nerves not much contrasting; midrib slender above, raised; nerves 10-20 pairs (including some weaker intercalary nerves), above thin and flat or slightly raised, beneath much raised, with distinct, rather regularly looping submarginal arches; tertiary veins forming a lax, rather indistinct network; petiole 7-14 × 1-1.5 mm; leaf bud 7-10 × 1-1.5 mm, with hairs c. 0.1 mm. Inflorescences situated in between the leaves, delicate 1-2(-3) times ramified, lowest side branch from near the base, in ♂ rather many-flowered,

2-3 × 1.5-2 cm, in ♀: 2-3-flowered, 1-2 cm long; axes finely scaly-pubescent with hairs c. 0.1 mm or less; bracts densely pubescent, c. 1-1.5 mm long, caducous. Flowers solitary or 2-3 together; perianths 2-valved, rather densely pubescent with stellate-dendroid hairs c. 0.1 mm; pedicels at base inarticulate. Male perianth subglobose, gradually passing into the strongly tapering pedicel, together forming a club-shaped flower c. 4-5.5 × 1.5-2.2 mm; perianth rounded above, c. 1.5-2 × 1.5-2.2 mm, pedicel c. 2.5-3.5 × 1-1.5 mm, rather densely pubescent; perianth at anthesis split to c. 1/10 (i.e., for c. 0.2 mm only), valves c. 0.2 mm thick, the perianth-wall lower down c. 0.5-0.7 mm thick. Androecium a club-shaped body c. 1.5 × 0.7 mm, at apex consisting of 3 anthers (or c. 6 thecae;; c. 0.3 mm long, ± arranged into a star shape, without free apices; the androphore thickish subcylindrical, slightly bullate-striate, glabrous; central column not hollowed out at apex. Female perianth ellipsoid, c. 1.8(-2) × 1.2 mm, split at anthesis to c. ¼, valves c. 0.2 mm thick; pedicel ± slender, c. 2 mm long; ovary ovoid, c. 1.0 × 0.6 mm, densely pubescent with stellate-scaly hairs c. 0.1 mm or less, style c. 0.4 mm long, stigma 2-lobed, c. 0.2 mm long. Fruits 1 (or 2) per infructescence, broadly ellipsoid-ovoid, base broadly rounded, top ± acuminate, c. 2 mm beaked, excl. the 1.5-2 mm long pseudo-stalk c. 1.3 × 1.0 cm, pubescent with hairs c. 0.1 mm long, drying brownish, without lenticels; dry valves c. 1 mm thick; seed ellipsoid; stalk 6-10 mm long; perianth not persistent.

Distribution. Papua New Guinea: Northern Prov.

PAPUA NEW GUINEA. Northern Prov.: *Hoogland 3523, 3623, 3663.*

Ecology. Locally common in regrowth in tall lowland forest, on well-drained soil; 0-50 m. Flowers and fruits in August.

Vernacular name. Hamana (Orokaiva lang., Mumuni).

NOTES

1. Fieldnotes. Shrub or treelet; flowers yellow; fruits orange or red, aril red.

2. Related to *H. squamulosa* and *H. crux-melitensis* which have a similar club-shaped androecium. *H. squamulosa* differs by its slender, male pedicels. The pedicel, and hence the whole male flower of *H. crux-melitensis* is similarly club-shaped as in the present species, but about twice as large; its leaves are also larger, drying to a darker colour. In *H. crux-melitensis* both male and female flowers have much thickened pedicels.

3. Sinclair included the specimens of the present species in *H. crux-melitensis.*

23. Horsfieldia squamulosa de Wilde, *sp. nov.* Fig. 1A(23); 13 g

Horsfieldia species androecio clavato, *H. crux-melitensis* atque eodem mode *H. clavatae* affinis, differt pedicellis gracilibus non-attenuatis — Type: *Henty & Barlow NGF 42995* (L; iso: K; A, BRI, CANB, *n.v.*).

Shrub or tree, 1-10 m. Twigs terete, not ridged, towards the apex 1-3 mm diam., glabrescent, tomentum of minute rust-coloured hairs 0.1-0.2 mm long; bark finely striate, when older not flaking, lenticels fine and inconspicuous. Leaves in 2 rows,

membranous, elliptic to lanceolate, broadest at or above the middle or ± parallel-sided, 4-20 × 0.7-5 cm, base attenuate, tip up to 3.5 cm long, acute-acuminate, upper surface drying dark brown, with or without very minute paler dots, lower surface with persistent tomentum (especially on the midrib) or glabrescent, hairs 0.1-0.2 mm long or less, without larger dark brown dots, the nerves not contrasting in colour; midrib slender above and slightly raised; nerves 10-25 pairs, including some weaker intercalary ones, thin and flat above, much raised beneath, with the submarginal arches regularly looping or not, distinct or not; tertiary veins forming a lax network, distinct or indistinct; petiole 6-13 × 1-1.5 mm; leaf bud c. 10 × 1 mm with dark rust-coloured hairs 0.1-0.2 mm long. Inflorescences in between the leaves, 2(-3) times ramified (lowest branch 0-5 mm from the base), few to rather many-flowered, in ♂: c. 1.5-3 × 1-2 cm, in ♀ few-flowered, c. 1-3 cm long; axes woolly pubescent through stellate scaly or dendroid hairs 0.1-0.2 mm long; bracts pubescent, 0.5-1.5 mm long, caducous. Flowers 1-3 together; perianths 2-valved, stellate-scaly hairs scattered, densest towards the base; pedicel ± densely scaly-pubescent, at base inarticulate. Male perianth ellipsoid to broadly obovoid, 2.0-3.0. × 1.5-2.2(-2.4) mm, upper part rounded, at base long- to short-attenuate; pedicel 2-3.5(-6) mm, slender; perianth at anthesis split to c. ⅛-⅙ (c. 0.1-0.4 mm deep only), valves 0.1-0.2 mm thick, the perianth-wall lower down 0.5-0.8 mm thick. Androecium a cylindrical club-shaped body 1.5-2.5 × 0.5-0.8 mm, at apex consisting of 3-4 anthers (or 6-8 thecae) 0.3-0.5 mm (the anthers ± stellately arranged, with free apices 0-0.2 mm), and lower down a thickish sub-cylindrical androphore, in the upper ⅓-⅔ wrinkled-bullate or warted, in the lower ½-⅔ either minutely scaly-hairy or surface striate but glabrous; central column not hollowed out at apex. Female perianth broadly ellipsoid, 2-2.5 × 1.5-2.1 mm, split at anthesis to c. ¼-⅓, valves c. 0.2(-0.3) mm thick; pedicel 2-3.5 mm long; ovary ovoid, c. 1.5 × 1.2-1.4 mm, densely pubescent through stellate-scaly hairs c. 0.1 mm or less, style c. 0.2 mm long, stigma distinctly 2-lobed, 0.2-0.3 mm long. Fruits 1-3 per infructescence, broadly ellipsoid-ovoid, base rounded, top rounded to acutish, rostrum if present 1-3 mm, excl. the 1.5-5 mm long pseudostalk c. 1.0-1.6 × 0.7-1.1 cm, sparsely to densely pubescent through hairs c. 0.1 mm long, drying blackish, without lenticels; dry valves c. 0.5(-1.0) mm thick; seed ellipsoid; stalk 10-12 mm; perianth not persisting.

Distribution. Papua New Guinea: Morobe Prov., Northern Prov., Milne Bay Prov. (incl. Normanby Isl.), Western Prov.

PAPUA NEW GUINEA: *Brass 7221; Carr 16192; LAE 67148, 70239, 71160; NGF 23574, 28894, 31751, 31888, 34088, 38093, 42995, 46892; Pullen 8287; Schlechter 17408 (n.v.)*

Ecology. Scattered or locally plentiful shrub or small understorey tree, 1-6(-10) m in rain forest; on slopes and ridges, creek banks, edges of (sago) swamp forest. In Normanby Isl. in *Eucalyptopsis*-dominated forest, in New Guinea found associated in forest with dominant *Castanopsis*, or with *Lithocarpus*, *Anisoptera* and *Hopea*-dominant; 0-500 m. alt. Flowers and fruits throughout the year.

NOTES

1. Fieldnotes. Shrubs or treelets, recorded with the branches ± whorled, or horizontal. Bark smooth, grey-brown; red exudate; wood cream to straw. Flowers yellow. Ripe fruit orange to orange-red, aril bright red.

2. By the similar shape of the androecium closely related with *H. clavata* and *H. crux-melitensis*. Most collections were acquired after Sinclair's time. Only one specimen was included by Sinclair in *H. subtilis* var. *schlechteri*, which is presently again accepted as a separate species, *H. schlechteri*.

3. The androphore in *Pullen 8287*, from Milne Bay Prov., is glabrous, whereas those of the type specimen, and other specimens from Western Prov. are densely minutely scaly-hairy on the lower part of the androecium. It is possible that this difference has a taxonomical significance, but more material is needed to decide on it.

24. Horsfieldia ampla Markgraf

Horsfieldia ampla Markgraf, Bot. Jahrb. 67, 2 (1935) 148 — Type: (Sepik) *Ledermann 9639* (B, †, *n.v.*).

Small tree, 4-5 m. Twigs terete. Leaves large, cuneate-obovate, up to 40 × 16 cm, base ± attenuate, tip short-acuminate; nerves 16-18 pairs, straight, sharply raised beneath and connected before the margin. Petiole, 1 cm long. Inflorescences on the older wood, large, to 25 cm long and 10 cm wide, glabrescent, loosely flowered. Male flowers yellow, clavate, 4 × 2 mm (excl. pedicel?), the perianth 2-valved, split at anthesis to hardly ¼. Staminal column thick; anthers to c. 10, the androphore about as long as the anthers or slightly shorter.

Distribution. NE. New Guinea, Sepik Prov., Aprilfluss. Mountain slope near camp 18. Known only from the type.

Ecology. Dense, very humid forest, on mountain slope at 200-400 m alt. Male flowers date 12 November, 1912.

NOTES

1. This species is known only from the type. It is keyed out by Markgraf against *H. crux-melitensis*, with which it has in common the clavate flowers. In the key is mentioned that the perianth, other than the androecium, is largely hollow. He mentions in a note that the species is peculiar amongst the New Guinean Horsfieldias because of its large male flowers, which in other species are smaller and almost always broader than long, and hence that it is without close relatives.

2.. H. ampla was not mentioned by Sinclair.

25. Horsfieldia ampliformis de Wilde, *sp. nov.* Fig. 1B(25); 14

Horsfieldia species inflorescentiis masculis grandis, c. 30 cm longis, attamen pubescentibus, a *H. ampla* Markgraf differt perianthiis latioribus (c. 3 mm latis) atque antheris 7. — Type: (New Guinea, Sepik Dist.) *Hoogland & Craven 11085* (♂ fl.). (L; iso: K; A, BRI, CANB, LAE, US, *n.v.*).

Tree 5-8 m. Twigs stoutish, terete, when young thinly ridged, towards apex 4-7(-10) mm diam., early or late glabrescent, pubescence ± woolly, of hairs c. 0.2-0.5 mm long; bark coarsely striate, lenticellate, when older not flaking. Leaves in 2 rows, thickly membranous, elliptic-oblong to oblong, (18-)25-38 × (6-)7-13 cm, base short to long-attenuate, tip attenuate-acuminate; upper surface drying dark brown, lower surface early or late glabrescent or with subpersistent tomentum of rather scattered stellate hairs 0.2-0.5 mm long; larger dark brown dots absent;

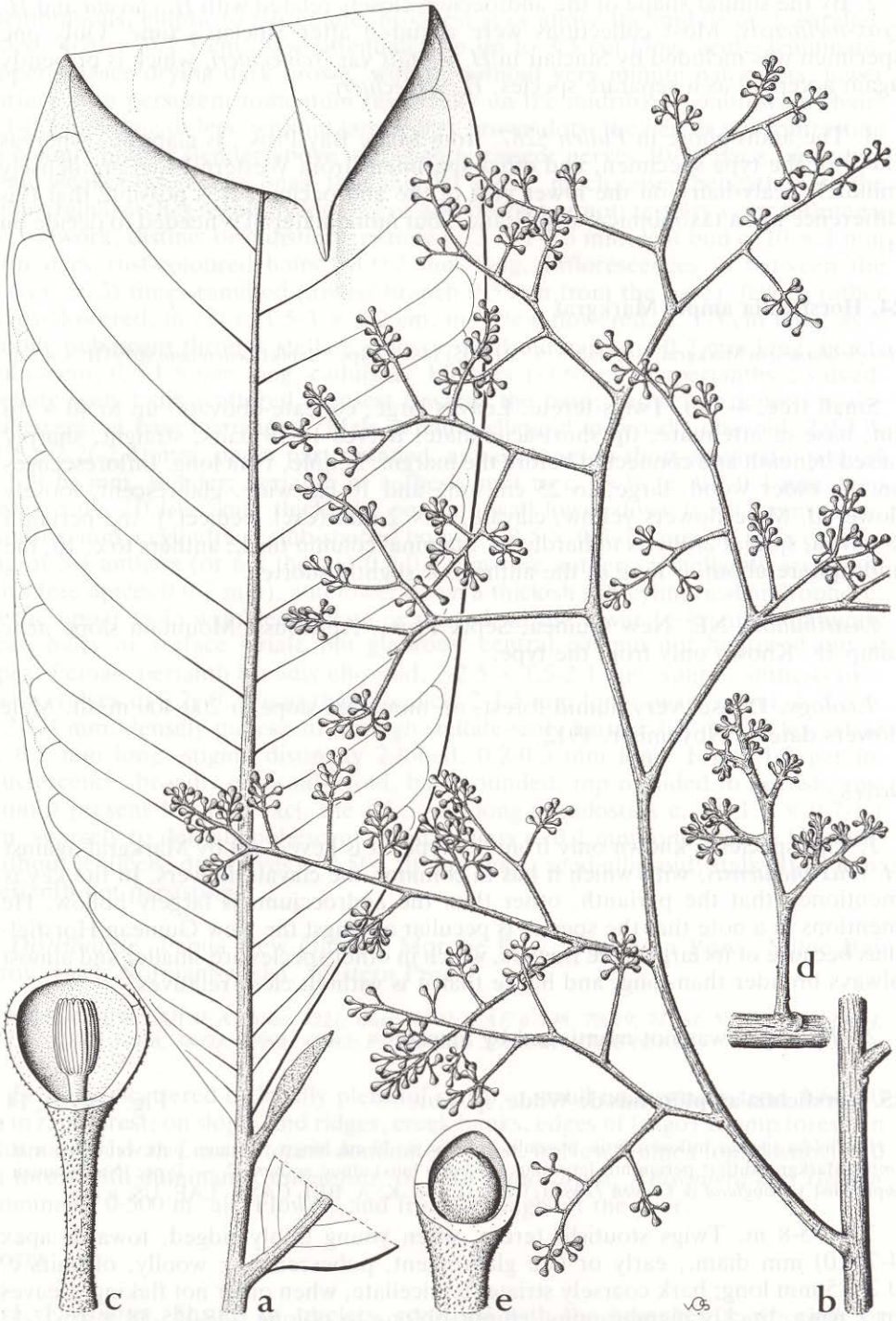

Fig. 14. *Horsfieldia ampliformis* de Wilde.
a, twig apex with leaves, × ½; *b*, portion of twig with male inflorescence axillary to fallen leaf, × ½; *c*, mature male flower, perianth opened, showing androecium, × 6; *d*, portion of twig with female inflorescence, × ½; *e*, female flower, opened, showing finely pubescent ovary and minute 2-lipped stigma. — *a-c*, from *Hoogland & Craven 11085; d & e*, from *Craven & Schodde 1463*.

midrib above ± slender, flattish; nerves 18-22 pairs, above thin, flat or sunken; the submarginal arches beneath not very prominent; tertiary venation forming a lax network, indistinct on both surfaces; petiole short, 4-6 × 3-4 mm; leaf bud 25-40 mm long, with hairs 0.2-0.5 mm. Inflorescences situated below the leaves, in ♂: large, many-flowered, 4-5 times ramified, c. 25-35 × 20-30 cm, common peduncle 40-50 mm; in ♀: c. 9-10 × 6-8 cm; all branches rather loosely pubescent with hairs 0.2-0.5 mm long; bracts (only seen in ♀) c. 5 mm long, caducous. Flowers 2-5 together in ♂ and ♀, flowers and pedicels loosely pubescent, hairs (0.1-)0.2-0.3 mm long, in ♀ the perianth glabrescent towards apex; perianths 2-valved; pedicel at base inarticulate. Male perianths broadly obovoid, laterally ± flattened, c. 3-3.3 × 3-3.2 mm, at apex obtuse to broadly rounded, at base shortly tapering into pedicel 2-4 mm long; perianth largely hollow, at anthesis split to c. ⅓, valves c. 0.3 mm thick. Androecium small, ± flattened, incl. androphore c. 2.5 × 1-1.2 mm, broadly rounded at apex; anthers 7, when young indistinctly septate, synandrium 1.5-1.8 × 1-1.2 mm, free apices of anthers 0.1-0.2 mm; androphore 0.8-1.0 × 0.5-0.6 mm; the column at apex narrowly hollowed for c. ¼-⅓. Female perianths broadly ovoid, c. 3 × 2.6-2.8 mm, split at anthesis to c. ⅔, valves c. 0.3 mm thick; pedicel 1-2 mm long; ovary broadly ovoid, c. 2-2.2 × 1.8-2.0 mm, densely pubescent with hairs 0.1 mm or less, stigma short, not or hardly lobed, c. 0.1 × 0.4 mm. Fruits not seen.

Distribution. Northern Papua New Guinea: Sepik Prov., Morobe Prov.

PAPUA NEW GUINEA. *Craven & Schodde 1463; Hoogland & Craven 11085.*

Ecology. Lower montane rainforest, 1200-1300 m alt. Flowers in April and August.

Vernacular name. Guma (Sepik Prov., Waskuk lang.).

NOTES

1. Fieldnotes. Small tree, c. 8 m high. Flowers medium green, yellow at anthesis.

2. Close to *H. ampla* Mkgf., a species of which I have seen no material. According to the description it differs by the more elongate, possibly glabrous, perianths c. 4 × 2 mm, the androecium with 10 anthers, and the glabrescent inflorescences. The present new species has in common with *H. ampla* the peculiarly long-stalked androecium and the large male inflorescences. *H. ampla* was collected at 200-400 m alt.

3. Known from a male and a female flowering specimen. The perianths of the female specimen, *Craven & Schodde 1463,* from Morobe Prov., are glabrescent in the upper half. This could also be *H. ampla* as well. Moreover, as the hairs on the leaf bud are slightly shorter than those of the male specimen it is difficult to distinguish *H. ampliformis* from the variable and widespread *H. laevigata.*

26. Horsfieldia angularis de Wilde, *sp. nov.* Fig. 1B(26)

Ramuli angulares vel biporcati, perianthio masculo subgloboso, 2-3 mm diam., basin versus pubescenti, 2-4-valvato fere usque ad basin, antheris 12-20, erectis, ovario pubescenti, fructibus breviter ellipsoideis, 1.7-2.0 cm longis, minute pubescentibus vel glabrescentibus. — Type: Vogelkop Penins., ♂

fl., *BW 5828* (L).

Tree 15-30 m. Twigs 2-angular from the two ridges from petiole to petiole, lower down subterete with two distinct ridges, 3-7(-10) mm diam., early glabrescent, tomentum grey-brown, with hairs 0.1 mm or less; bark striate, distinctly coarsely lenticellate, when older not flaking. Leaves in 2 rows, membranous to thinly chartaceous, oblong to oblong-lanceolate, broadest usually in the middle, 10-27 × 3-7.5 cm, base attenuate, tip acute-acuminate; upper surface drying pale to dark brown, often finely paler pustulate, lower surface glabrescent, hairs very minute grey stellate, less than 0.1 mm; without brown or blackish dots; midrib flattish or slightly raised above; nerves 12-15 pairs, above thin and flattish or slightly sunken; tertiary venation forming a lax network, faint; petiole 7-15 × 2-3 mm; leaf bud 10-15 × 2-2.5 mm, with hairs 0.1 mm. Inflorescences rather densely pubescent with hairs 0.2-0.3 mm; in ♂ and ♀: 2 or 3 times ramified, rather few-flowered, c. 3-4 × 2-2.5 cm, common peduncle 3-6 mm; bracts not seen, caducous. Flowers (in ♂) generally 2-4 together; perianths in ♂: 2-4-, in ♀: 2(-3)-valved, pubescent in the lower half with hairs 0.1(-0.2) mm long; pedicels pubescent, at base inarticulate. Male perianth in lateral view circular or slightly transversely ellipsoid, slightly or not laterally compressed, not collapsing on drying, 1.7-2.3 × 2.2-3.2 mm, above and at base (broadly) rounded, pedicel not tapering, 1-2 mm long; perianth at anthesis cleft to the base (c. 9/10), valves (0.2-) 0.3 mm thick. Androecium slightly laterally flattened (and in 3- or 4-valved flowers ± 3- or 4-angular in transverse section), above broadly rounded, 1.2-1.5 × 1.5-2.2 mm, anthers 12 (2-valved) to c. 20 (in 4 valved flowers), ± erect, not septate, free portions at apex up to 0.1 mm, central column at apex narrowly hollowed for (⅓-)½; androphore absent, the androecium ± broadly attached. Female perianth depressed globose, c. 2.5 × 3-3.2 mm, cleft at anthesis to c. ¾, valves 0.8-1.0 mm thick, pedicel 1-1.5 mm long; ovary ± depressed globose-ovoid, c. 1.2 × 1.5 mm, densely short-pubescent, style and stigma minute, minutely 2-lobed, c. 0.1 × 0.3 mm. Fruits 5-10 per infructescence, short-ellipsoid, 1.7-2.0 × 1.4-1.7 cm, pubescent at very base, with coarse paler-coloured lenticel-like tubercles; dry valves thick-woody, c. 3-5 mm thick; seed ellipsoid, stalk 3-5 mm long; perianth not persistent.

Distribution. New Guinea: Vogelkop Peninsula, subdist. Manokwari.

NEW GUINEA. Irian Jaya, Vogelkop: *BW 2340, 5828, 10922, 15752; Kostermans 2635; van Royen & Sleumer 6813* — Jayapura Dist. (doubtful): *b.b. 31124; BW 5340.*

Ecology. Primary forest; on clayey soils, locally common; 0-600 m alt. Flowers in February and August, fruits in February and October.

Vernacular names. Babijag (Karoon lang.), Bepoes (Hattam lang.), Betelohoi and Sebohonggwa (Manikiong lang.).

NOTES

1. Fieldnotes. Locally common in primary forest on the coastal plain, up to 600 m. in Kebar valley. Sometimes buttresses to c. 1 × ½ m. Bark sometimes fissured, or peeling off in small scales; with red exudate. Sapwood pale brown or white, heartwood not discernable or pinkish. Flowers greenish. Fruits yellow-brown or yellow, aril orange or red; fruit recorded as sour and edible.

2. The present new species is much related to *H. basifissa* of which the sterile specimens (presumed to belong to it) are difficult to identify since their twigs are rather ridged. *H. angularis* is distinguished from *H. basifissa* by (1) the more

strongly ridged and somewhat stouter twigs, (2) the more hairy and variably 2-4-valved flowers with thicker valves, (3) the hairy ovary, and the thinly pubescent ellipsoid fruits; the two species have in common thickish subglobose male (flower) perianths, which do not or hardly collapse on drying, and which at anthesis are cleft to the base.

3. Sinclair identified specimens as *H. polyantha,* a name presently considered a synonym of *H. laevigata;* specimens of the resembling *H. basifissa* were also identified by Sinclair as *H. polyantha.*

4. Two sterile specimens, with ridged twigs, *b.b. 31124* and *Karstel BW 5340,* from Jayapura Dist., Irian Jaya, probably belong to the present species.

27. Horsfieldia iriana de Wilde, *sp. nov.* Fig. 1B(27)

Horsfieldia novo-guineensis Warb., Mon. Myrist. (1897) 271, p.p., only the type of *H. iriana,* not the lectotype.

Myristica nesophila auct. non. Miq., Ann. Mus. Bot. I (1864) 206: Miq., Ann. Mus. Bot. II (1865) 49, p.p., as based on *Zipelius* (139 d), not the lectotype of *Myristica aruana* Bl. = *H. aruana.*

Ramuli angulati vel sulcati. Perianthium in fl. ♂ valvis 2 instructum. Androecium lateraliter compressum. Antherae erectae. Cum *H. aruana* comparibilis, sed differt pedicellis perianthio longioribus perianthoque sub anthesi usque ad basin fissum. — Type: *Zipelius (139 d)* (L; iso: K).

Tree c. 10(?) m. Twigs 2-angular from the two ridges between the petioles, lower down subterete but ridged, 3-5 mm diam., early glabrescent, tomentum grey-rusty, composed of hairs c. 0.2 mm long; bark rather smooth, when older not flaking; lenticels small, distinct. Leaves in two rows, thinly coriaceous, oblong-lanceolate, broadest at or above the middle, 17-28 × 4.5-8 cm, base long-attenuate, tip acute-acuminate; upper surface drying olivaceous, lower surface early glabrescent from stellate-scaly hairs 0.1-0.2 mm long, larger brown-blackish dots absent; midrib rather broad and flat above; nerves 13-16 pairs, thin and flat above; tertiary veins forming a lax network, slightly raised above but indistinct; petioles 6-11 × 2-3.5 mm; leaf bud slender, 10-15 × 1.5-2 mm, with hairs 0.1-0.2 mm long. Inflorescences in ♂: axillary to the lower leaves, sparsely pubescent with stellate hairs 0.2(-0.3) mm long, (2 or) 3(or 4) times ramified, rather many-flowered, 6-8 × 4-6 cm, common peduncle 5-10 mm long; bracts not seen, caducous. Flowers in loose clusters of 2-5, perianth 2-valved, largely glabrous but with some minute hairs towards the base; pedicels slender, sparsely pubescent, at base inarticulate. Male perianth in lateral view circular to slightly longitudinally ellipsoid, not or slightly laterally compressed, blackish brown, not collapsed on drying, 2.3-2.8 × 2.2-2.8 mm, subacute or narrowly rounded at the top, at base rounded, pedicel not tapered, slender, c. 2.5-3 mm long; perianth at anthesis cleft to ¾-⅚ deep, valves c. 0.2 mm thick. Androecium laterally compressed (flattened), c. 1.5 × 1.5-2 mm, (broadly) rounded above; anthers c. 10-14, erect, finely septate when young, free portions at apex 0.1(-0.2) mm long, column at apex narrowly hollowed for c. ¼; androphore absent. Female flowers and fruits not seen.

Distribution. SW. New Guinea (Irian Jaya), known only from the type.

Ecology. Nothing known; likely from coastal lowland forest.

NOTES

1. Only known from the type specimen, *Zipelius (139 d)* in L (K, iso). This specimen is part of the heterogenous Zipelius material which served for the description of *Myristica aruana* Blume and *Horsfieldia novo-quineensis* Warb., of which the typification is explained under *Horsfieldia aruana*. The syntype-specimens *Zipelius (139d)* were erroneously included by Sinclair in *H. polyantha* Warb. as accepted by him. This name is here considered a synonym of *H. laevigata*.

28. Horsfieldia aruana (Bl.) de Wilde, *comb. nov.* Fig. 1B(28)

Myristica aruana Bl., Rumphia 1 (1837) 191; Sinclair, Gard. Bull. Sing. 28 (1975), 112, 118, 119 122-124, in the synonymy of *Horsfieldia spicata* — *Palala aruana* Rumph., Herb.Amb. 7(Auct.)(1755), t. 24 — *H. novo-guineensis* Warburg, Mon. Myrist. (1897) 271, t. 23 fig. 1-3, p.p., for the lectotype only. — Lectotype: those specimens of *Zipelius s.n.* at L, annotated by Blume.

Tree c. 15m. Twigs 2-angular from the two ridges between the petioles, lower down subterete though also provided with 2 ridges, 3-5 mm diam., early glabrescent, tomentum minute, of hairs c. 0.1 mm long; bark striate, when older not flaking; lenticels small, inconspicuous. Leaves in two rows, membranous, elliptic-oblong, broadest at or above the middle, 15-29 × 5-9.5 cm, base attenuate, tip acute-acuminate, upper surface drying olivaceous to brown, lower (surface) early glabrescent, without larger brown-blackish dots; midrib flattish or slightly raised above; nerves 13-15 pairs, slender, flattish; tertiary veins forming a lax network, indistinct; petioles 10-15 × 1.5-2.5 mm, leaf bud c. 10 × 1.5 mm, with hairs c. 0.1 mm long. Inflorescences situated in between or below the leaves, sparsely pubescent by hairs c. 0.1 mm or less, in ♂: 3 or 4 times ramified, 5-8 × 4-5 cm, rather many-flowered, common peduncle 5-15 mm long; bracts not seen, caducous. Flowers in loose clusters of 2-5 each, perianth 2-valved, glabrous; pedicels slender, sparsely pubescent, inarticulated at base. Male perianth in lateral view circular to somewhat transversely ellipsoid, laterally compressed, blackish and collapsing on drying, 1.5-2 × 2-2.5 mm, top broadly rounded, base ± rounded, pedicel not tapering, slender, 1-1.5 mm long; perianth at anthesis cleft to c. ⅔-¾, valves c. 0.2 mm thick. Androecium much laterally compressed, c. 1.5 × 2.0 mm, above broadly truncate-rounded; anthers (c.) 14–18, finely septate when young, distal free portions 0-0.1 mm, anther column completely solid or almost so (see notes); androphore absent or up to 0.1 (-0.2) mm. Female flowers and fruits not seen.

Distribution. SW. New Guinea (Irian Jaya); possibly also Aru and Tanimbar Isls. (see notes).

TANIMBAR ISLS.: *b.b. 24414* (doubtful).

ARU ISLS.: *Buwalda 4969* (doubtful).

NEW GUINEA: Irian Jaya, SW.: *Zipelius s.n.* (in L, as annotated by Blume).

Ecology. Not known.

NOTES

1. Horsfieldia aruana with mature male flowers is only known from the lectotype, i.e., three unnumbered Zipelius collections in Leiden, which have membranous leaves, and which bear annotations by both Blume and Zippel "Myristica Sp. arb. 40-50, N. Guinea". Also deposited in Leiden are three duplicates of which two are unannotated. They form part of the syntype material including the Zippel-collections mentioned by Warburg under his *H. novo-guineensis;* see further, notes 2 and 3.

2. Warburg (p. 273) had rejected the name *Myristica aruana* Bl. and replaced it with a new name, *H. novo-guineensis* Warb., as he considered the type of *M. aruana* a mixture and dubious. Later he in turn conceived *H. novo-guineensis* as a very variable species (it being based on a number of specimens), not indicating a holotype, citing *M. aruana* Bl. p.p. and *M. nesophila* Miq. in its synonymy, Annales II (i.e, not the one in Annales I). *H. novo-guineensis* is presently referred to *H. irana*, a new species.

The specimens cited by Warburg for *H. novo-guineensis* (now the syntype) are the following: New Guinea (West), *Zipelius s.n.* (♂, several sheets of two different species); *Beccari 684* (♂, fr.), *116* (♂) — (East), Sepik, *Hollrung 657* (fr.) — Aru Isls., *Moseley s.n.* (fr.) — Dammar Isl., *Riedel s.n.* (fr.).

The Zipelius specimens are all in Leiden and represent two different species. Warburg (p. 273) had alluded to the difference. Part of it is now chosen to typify the presently accepted name *H. aruana* and to lectotypify *H. novo-guinensis* as explained in note 3.

The remaining material, marked *Zipelius (139d)* in Leiden (K, iso) is now accommodated in *H. irana,* the newly described species.

I have not examined the Beccari specimens. Sinclair referred *116* to *H. spicata* and *684* to *H. polyantha*. Of these two species I have presently quite different ideas.

Hollrung 657 was referred by Sinclair to *H. spicata* as well but I consider it to be *H. pilifera* or *H. laevigata* although its fruits are intermediate in size, 16-18 mm long, and the twigs tend to be ridged.

Sinclair had not mentioned *Moseley s.n.,* from the Aru Isls., in K, and I have not seen it.

Riedel s.n. from the Dammar Isls is *H. smithii*.

3. The name *M. aruana* Bl. was considered as dubious and rejected by Warburg (p. 273), being based on Rumph's "Palala aruana" (Herb. Amboin., Auct. p. 56) whereas he regarded the Zipelius specimens too different from Rumphius's descriptions. I agree with Sinclair (l.c.) who accepts Blume's name typified by the Zipelius collections (see note 1) as annotated by Blume at the Leiden Herbarium. Sinclair regarded the name *aruana*, thus typified, as synonymous with *H. spicata* in the wider sense. It will become clear that Warburg's new name "novo-guineensis" remains with "aruana" as lecto-typified by Sinclair (pp. 122 & 123). Of the Zipelius collections, Sinclair had cited them under the number of "(139d)" as being *H. iriana*, newly proposed by him.

4. Doubtful specimens are *Buwalda 4969* (K,L) from the Aru Isls. and *b.b. 24414* (L) from the Tanimbar Isls. The male flowers of both are immature and they may well belong to the type collection. Even more dubious is *b.b. 24414* as the stamen column of its androecium apppears to be open for nearly ¼ or ⅕, and irregular whitish blotches on its leaves are similar to those usually found in *H. irya* and *H. smithii*. The anther columns of *Buwalda 4969* are cleft to a depth of only 1/10. Sinclair identified this as *H. pilifera* (at Kew) and as *H. spicata* (at Leiden), and *b.b. 24414* as *H. irya*.

5. Distribution. Because of the doubts concerning *Buwalda 4969* discussed above and the reference by Blume to "Palala aruana", it cannot be ascertained that the present species occurs on the Aru Islands.

29. Horsfieldia subtilis (Miq.) Warb. Fig. 1B(29); 15 g, h.

Myristica subtilis Miq., Ann. Mus. Bot. Lugd.-Bat. 2,1 (1865) 50 — *Horsfieldia subtilis* (Miq.) Warb., Mon. Myrist. (1897) 286, t. 23 fig. 1-4; Markgraf, Bot. Jahrb. 67, 2 (1935) 152 — Type: *Zipelius* (78) (U; iso: K, L; S, *n.v.*).

For further synonyms see under the varieties.

Tree 2-10(-15) m. Twigs terete, not ridged, 1-3(-8) mm diam., early glabrescent, tomentum grey-brown, of hairs c. 0.1 mm long or less; bark finely striate, when older not flaking, lenticels fine, usually present. Leaves in 2 rows, membranous or as in var. *calcarea* ± chartaceous, elliptic to oblong-lanceolate, broadest usually at or above the middle, 6-25(-28) × 2-9(-9.5) cm, base attenuate, tip acute-acuminate; upper surface drying dull olivaceous to brown, with or without fine paler dots, lower surface very early glabrescent, hairs 0.1 mm or less; without larger dark-coloured dots, the nerves darker and contrasting in colour or not; midrib above flattish or slightly raised; nerves 6-16 pairs, above thin and flat or raised, beneath with the submarginal arches faint or distinct; tertiary veins forming a lax network, usually indistinct on both surfaces; petiole 5-13 × 1.2.5 mm; leaf bud 6-12 × 1.5-2 mm, with hairs c. 0.1 mm. Inflorescences in ♂ 1-2(-3) times ramified, common peduncle up to 10 mm long, rather few- to many-flowered, 2-8(-9) × 1.5-6 cm, in ♀: 2-5(-8) cm long; glabrescent or with sparse tomentum of scattered stellate-scaly hairs 0.1-0.2 mm long; bracts 0.5-2 mm long, glabrescent, with fimbriate margins, caducous. Flowers in loose clusters of 1-8(-10) each; perianths 2-valved, glabrous, pedicel slender, glabrous, at base not articulated. Male perianth in lateral view circular or more or less broadly transversely sub-elipsoid, or broadly ob-triangular, usually distinctly flattened, and collapsing on drying, 1.3-2.4 × 1.8-3 mm, upper part generally subtruncate or (broadly) rounded, at base subtruncate to short-cuneate, pedicel not tapering, slender, 1-3 mm long, perianth at anthesis split to c. ¼-⅓(-½), valves 0.1-0.2(in var. *acuta* up to ½) mm thick. Androecium laterally flattened towards the top, at base broadened and usually almost cylindrical, lateral view subquadrangular in outline, i.e., broadly rounded or subtruncate above, the androecium nearly filling the perianth, c. (0.7-)1-1.5(-1.7) × 1.4-1.6 mm; anthers (9-) 10-12, faintly septate when young, ± erect, free portions at apex up to 0.1 mm long, anther column at apex narrowly hollowed for c. ¼-⅓; androphore ± slender, distinct, 0.2-0.5 mm long, sometimes ± hidden by the sagged anthers. Female perianth broadly ellipsoid to ovoid, or subglobose, 1.8-2.5 × 2-2.5 mm, split at anthesis to c. ⅓, valves c. 0.2 mm (at base of perianth 0.3-0.6 mm) thick, pedicel 1-5 mm long; ovary avoid, 1.1-1.5 × 0.8-1.1 mm, glabrous, style with minutely bilobed stigma c. 0.2 mm long. Fruits (1-) 5-15 per infructescence, either globose or subglobose, 0.9-1.2(-1.3) × 0.8-1.1(-1.3) cm (pseudostalk up to 1 mm), or in some

varieties with larger ones rather ellipsold, 1.4-1.9 × 1.1-1.4 cm, with the top rounded to acutish, base rounded, without or with pseudostalk up to 3 mm; glabrous, drying blackish, without or with minute paler tubercles or lenticels; dry valves c. 1(-2) mm thick; seed subglobose to ellipsoid; stalk 1-7 mm; perianth not persisting.

Distrubution. Aru. Isls., the whole of New Guinea.

In order to accommodate a number of specimens with the fruits distinctly larger than the majority, local varieties are recognized.

KEY TO THE VARIETIES

1a. Male perianth 2-3 mm wide. Fruits globose or short-ellipsoid, 9-12(-13) mm long incl. pseudostalk 0-1 mm ..... **a.** var. **subtilis**

b. Male perianth c. 2.5-3 mm wide (always?). Fruits short-ellipsoid, 14-19(-20) mm long incl. pseudo-stalk 3 mm 2

2a. Leaves chartaceous, elliptic, 6-9 cm long. Pseudostalk of fruit 2-3 mm long. Limestone area, SW. Vogelkop Penins.; 200-300 m alt ..... **b.** var. **calcarea**

b Leaves coriaceous or membranous, elliptic-oblong, 10-22 cm long. Pseudostalk of fruit 0-3 mm long. Papua New Guinea; 600-1000 m alt 3

3a. Leaves membranous. Perianth (♀) glabrous inside ..... **c.** var. **aucta**

b. Leaves coriaceous. Perianth (♀) hairy inside ..... **d.** var. **rostrata**

a. var. **subtilis** Fig. 1B(29); 15 g, h

Horsfieldia subtilis var. *subtilis:* Sinclair, Gard. Bull. Sing. 28 (1975) 132.

H. aruensis Warb., Mon. Myrist. (1897) 284, t. 23 fig. 1-3; Markgraf, Bot. Jahrb. 67, 2 (1935) 154 — *Myristica aruensis* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 85 — Type: *Beccari s.n.* (*FI* Acc. Nos. *7622*, *7622 A-C*, *7623*, *n.v.*).

H. lauterbachii Warb., Mon. Myrist. (1897) 285, t. 23 fig. 1-2; Schumann & Lauterbach, Fl. Deutsch. Schutzgeb. (1900) 324; Pulle, Nova Guinea 8 (1912) 635; Markgraf, J. Arn. Arb. 10, 2 (1929) 213; Bot. Jahrb. 67, 2 (1935) 153 — Type: *Lauterbach 805* (B, † *BRSL*, *n.v.*).

H. ramuensis Warb. in K. Sch. & Laut., Fl. Deutsch. Schutzgeb., Nachtr. (1905) 266 — Type: *Rodatz & Klink 20, 24* (both B †).

H. globularia auct. non (Bl.) Warb.: K.Sch. & Laut., Fl. Deutsch. Schutzgeb. (1900) 324.

H. nesophila auct. non (Miq.) Warb.: Pulle, Nova Guinea 8 (1912) 635.

Leaves membranous, elliptic to oblong. Male perianths 1.8-3 mm wide. Fruits (sub)globose, c. 9-12(-13) × 8-11 mm, incl. the pseudostalk 0-1 mm long.

Distribution. As for the species.

ARU ISLS. *Buwalda 4970; Jensen 255.*

NEW GUINEA. Irian Jaya: *Aet 2, 313, 382: Aet & Idjan 554; Astarip 63, 715; BW 2362, 2464, 3517, 3518, 4340, 4761, 4834, 4837, 4942, 6056, 6235, 6796, 8377, 10278, 10628, 11388, 12255, 13524, 13576; Docters van Leeuwen 9122, 9611, 9698, 9767, 10702, 11066, 11067, 11222; Gjellerup 11, 273; Ijiri & Niimura 53; Kostermans 2668, 2670, 2686, 2802, 2903, 4744; Lam 770; Pymans 7383; Pleyte 1006; Pulle*

52, 1239; von Römer 676; van Royen 3473, 3560, 4017, 4745, (& Sleumer) 6694; Soegeng 366; Teÿsmann 7566; Versteeg 1140, 1568, 1612, 1616, 1814; Zipelius 78 — Papua New Guinea: *Brass 1414, 28938; Carr 11545, 11629, 12575, 12820, 16281; Craven & Schodde 840, 1012; Darbyshire 1024; Hartley T.G.H. 10710, 11328; Hoogland (& Womersley) 3245, 3503, 3617, 4208, 4583, (& Craven) 10475; Jacobs 9129, 9252; Kanis 1031; LAE 51573, 61106, 61231, 63002, 66272, 70255, 70256, 70455, 73949, 76136; NGF 3890, 4553, 8232, 10378, 13066, 13146, 16068, 16075, 17775, 18308, 18433, 18436, 23575, 24844, 31731, 32822, 33410, 35340, 35427, 35449, 35472, 41108, 41878, 43692, 43693; Pullen 1074, 7280, 7419, 8139; Schodde 2590, 2910, 2968, 3066; Womersley 3890, (& Simmonds) 5080.*

Ecology. Understorey tree of primary and secondary forests; dry and marshy forest, but often tidal (fresh water) or riverine; on alluvia, clayey soil, sandy clay, also on limestone or coral soils; 0-800 m. Flowers and fruits throughout the year. Stems once reported as inhabited by ants.

Vernacular names. Aitobi (Aru Isls.), Airawikoepata (West N.G., Tisa), Bendoei (Vogelkop, Hattam lang.), Boskomok (East N.G., Western Prov., Oriomo R.), Iinapo (Uruaruh lang., Gulf Prov.), Mag (E. N.G. Gulf Prov., Daru lang.), Mangaifa (Papua, Centr. Prov.), Njet (W. N.G., Kebar lang.), Oara (Papua, South Vieya), Peh (begie) (Div. South N.G., Digoel R., Awjoe lang.), Rengkèferèk (W. N.G., Beriat, Tahid land.), Rewwoh (W. N.G., Fak-Fak, Argoeni lang.), Roman (E. N.G., Pt. Moresby, Centr. Prov., Waria lang.), Suri (E. N.G., Sepik Prov., Waskuk lang.), Tabwi (E. N.G., Sepik Prov., Wagu lang.), Torua (E. N.G./Papua, North. Prov., Baruga lang.).

Uses. Once recorded that the leaves and twigs were burnt as a mosquito repellent.

NOTES

1. Fieldnotes. Low understorey tree, usually 3-5 m tall. Bole straight; bark greyish black or grey-brown, finely longitudinally fissured, with broadened lenticels. Branches often horizontal or drooping. Exudate pinkish, or colourless and turning reddish. Wood straw-coloured, usually mottled with reddish streaks. Perianth yellow, rarely orange-yellow. Fruits greenish-yellow, yellow, or (yellow) orange, aril orange or red.

2. Deviating specimens. Van Royen & Sleumer 6694 from a coral cliff near Mankokwari (Vogelkop) somewhat deviates in the relatively narrow perianth, ± longer than broad, c. 2.4 × 2.2 mm. *Versteeg 1612* from SW. New Guinea has relatively large fruits, c. 1.3 × 1.1-1.3 cm.

3. The type-variety as presently accepted largely agrees with Sinclair's *H. subtilis* var. *subtilis*. Of the other two varieties accepted by him, are var. rostrata (Mgkf.) and var. *schlechteri* (Warb.), the latter presently treated as a different species, distinguished by characters different from those used in his key to the varieties.

b. var. **calcarea** de Wilde, *var. nov.*

Differt a *H. subtilis* var. *subtilis* perianthiis masculis latioribus atque fructibus maioribus, c. 1.5-2 cm longis, stipitibus 2-3 mm longis, foliis chartaceis, usque ad 10 cm longis. — Type: *Vink BW 15270* (L; iso: K; A, BO, BRI, CANB, LAE & US, *n.v.*).

Leaves thinly chartaceous, elliptic, 6-9 × 2.5-4 cm, at the apex proportionally long-acute-acuminate for 1-1.5 cm. Male flowers not seen. Fruits ellipsoid, 17-19 ×

12-14 mm, incl. pseudostalk 2-3 mm long.

Distribution. West New Guinea, SW. Vogelkop Penins.

IRIAN JAYA. Vogelkop Penins.: *(Versteegh) BW. 7432; (Vink) BW. 15270.*

Ecology. Secondary forest on limestone rock with thin clay cover; 220-300 m alt. Fruits in March and May. Female flowers in May.

Vernacular name. Baiwach, Hafringee (Maibrat lang.).

NOTES

1. Recorded as a shrub, 5 m tall; rather common. Ripe fruits orange.

2. Judging from the aspect after drying, the pericarps of the fruits in *Vink BW 15270* suggested they were rather fleshy in the fresh state and drying left the pseudostalks distinct, c. 3 mm long.

c. var. **aucta** de Wilde, *var. nov.*

A *Horsfieldia subtilis* typica differt fructibus maioribus, a *H. subtilis* var. *calcarea* foliis maioribus membranaceis — Type: *Jacobs 8972* (L; iso: K).

Leaves membranous, elliptic-oblong, 11-20 × 3-7.5 cm, apex for 1-1.5 cm acute-acuminate. Male perianth obtriangular, c. 2.5-3 mm wide (always?). Fruits short-ellipsoid, 15-19(-20) × 11-15 mm including the up to 2.5-mm long pseudostalk.

Distribution. Papua New Guinea; possibly also near Manokwari, Vogelkop Penins., W. New Guinea (see notes).

NEW GUINEA. Irian Jaya, Vogelkop: *(Koster) BW 4340* (doubtful). Papua New Guinea: (Western Dist.) *NGF. 42815;* (S. Highlands) *Jacobs 8711, 8972, 9053, 9071, 9071-A;* (Central Distr.) *Kanis 1328.*

Ecology. Montane primary and secondary rain forest, on well-drained volcanic soil, or peaty soil; at 600-1000 m. Flowers in September and October, fruits from July to October.

NOTES

1. Shrub or low tree, 3-8 m. Male flowers fleshy, dark yellow. Fruits glossy orange, hard; aril dark orange, or red, at the base black.

2 The male flowers, known from *Jacobs 9071*, are stouter and have a thicker perianth as compared with those of var. *subtilis*. In *Jacobs 9071* the perianth is obtriangular, c. 3 × 3 mm, and split into 2 (or some into 3) valves only for the apical ⅕-¼; lower down, the perianth wall is thick-fleshy, c. 0.5 mm thick. On Jacobs *9071-A*, a collection from a nearby tree with fruits measuring c. 16 × 14 mm when dry, Jacobs had remarked that in the fresh state the "seed (is) half the diameter of the fruit". The dry seed measures about 14 mm, and probably was not or only slightly larger in the fresh state; this means that fresh fruits were about 3 cm diam., i.e., the dry ones in the herbarium have shrunk to half.

The inflorescences in *Jacobs 8711*, with submature fruits, are 8-9 cm long; these are stouter than generally found in the type variety.

3. Kanis 1328, from Moresby area, deviates by a more slender habit. *Koster BW 4340,* from near Manokwari, Vogelkop (West New Guinea) at an altitude of c. 150 m. probably does not belong here. Moreover, its fruits are c. 14 × 12 mm, considerably larger than all the rest seen of var. *subtilis* from the same area.

d. var. **rostrata** (Mkgf.) Sinclair

Horsfieldia subtilis var. *rostrata* (Mkgf.) Sinclair, Gard. Bull. Sing. 28 (1975) 136 — *Horsfieldia rostrata* Mkgf, Bot. Jahrb. 67, 2 (1935) 152 — Type: *Ledermann 8916* (B, †; iso: SING, *n.v.*).

Leaves chartaceous to coriaceous, cuneate-obovate, c. 9-13 × 2-4.5 cm, tip shortly acute-acuminate. Male flowers not known. Female perianth pilose inside (see notes). Fruits ellipsoid, top rostrate, c. 20 × 12 mm, including the 2-4-mm long pseudostalk.

Distribution. NE. Papua New Guinea: Sepik Prov., Etappenberg; known only from the type.

Ecology. Mossy montane forest with much *Agathis*, c. 850 alt. Female flowers and fruits in October.

NOTES

The holotype of *H. rostrata*, containing ♀ flowers and mature fruit, was lost in B; an isotype is in SING and was examined by Sinclair. He maintained *H. rostrata* as a variety under *H. subtilis*. According to him, the SING specimen contains a single infructescence with two fruits, each measuring c. 1.4-1.5 × 1 cm; the fruits have a c. 2-mm beak, and pseudo-stalks 3-4 mm long. According to this description the foregoing new var. *aucta* appears almost entirely identical with var. *rostrata.* However, Markgraf, l.c. p. 153, describes the perianth of the female flowers as pilose inside; the ovary and fruit as glabrous. The hairiness of the inner side of the perianth would render the *Ledermann 8916* collection highly remarkable, and consequently I have provisionally kept it as a separate taxon. The inner hairy surface of the perianth seems reminiscent of *Endocomia macrocoma*, but this has three perianth lobes.

30. Horsfieldia schlechteri Warb. Fig. 1B(30); 15 a-f.

Horsfieldia schlechteri Warb. in Schum. & Lauterbach, Nachtr. z. Fl. Deutsch. Schutzgeb. Südsee (1905) 267; Markgraf, Bot. Jahrb. 67, 2 (1935) 153 — *H. subtilis* var. *schlechteri* (Warb.) Sinclair, Gard. Bull. Sing. 28 (1975) 137 — Type: (Torricelli Mts.) *Schlechter 14500* (B, † iso: BM, K, P; BO, WRCL, G, *n.v.*).

Tree or shrub, 3-15 m. Twigs terete, not ridged, towards apex 1-4(-6) mm diam., early glabrescent, tomentum rusty-grey, with hairs c. 0.1 mm long; bark finely striate, when older not flaking; without or with few lenticels. Leaves in 2 rows, membranous or thinly chartaceous, elliptic-oblong to oblong-lanceolate, ± parallel-sided or note, 6-19 × 1.06-6.5 cm, base attenuate, tip acute-accuminate; upper surface drying olivaceous to dark brown, finely paler pustulate or not, lower surface early glabrescent, the hairs 0.1 mm or less, without larger brown dots, the

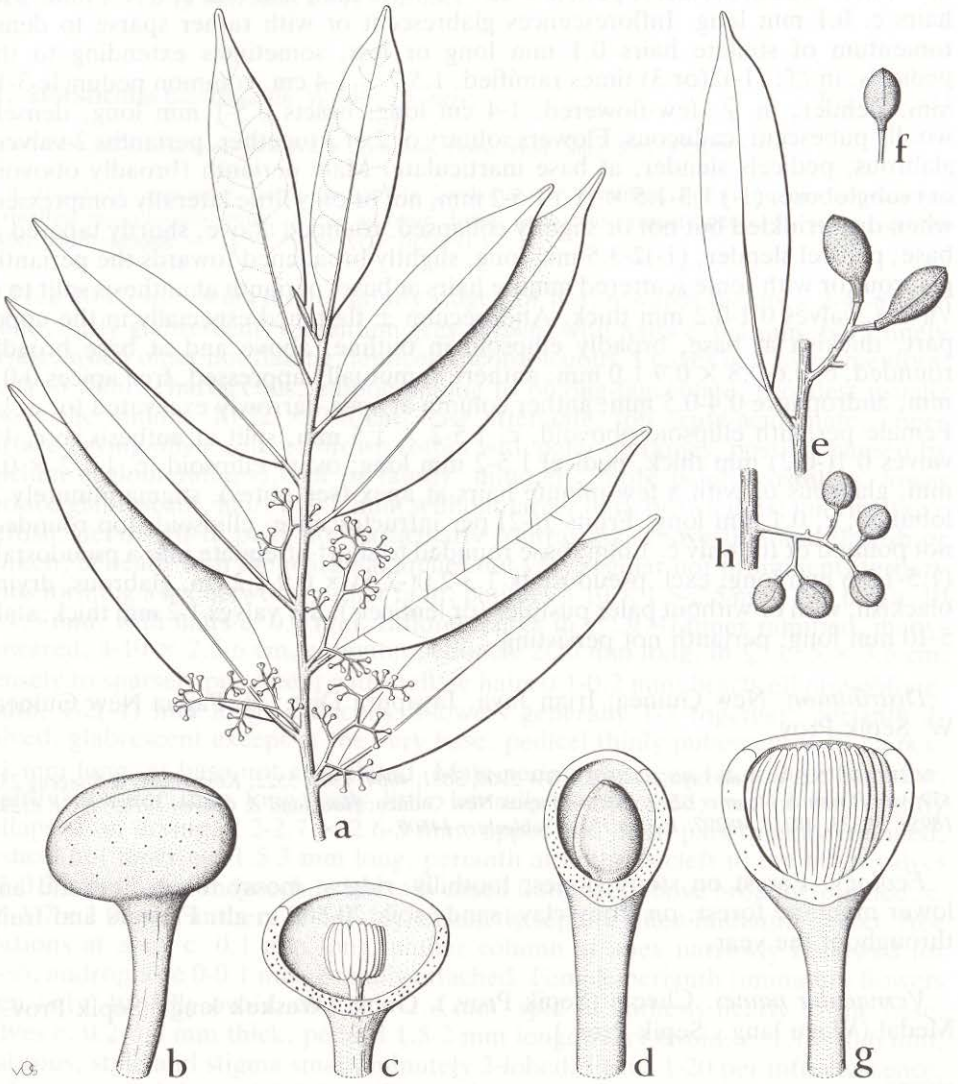

Fig. 15. *Horsfieldia schlechteri* Warb. *a*, leafy twig with male inflorescences, × ½; *b*, mature male flower, × 12; *c*, ditto, opened, showing stiped androecium, × 12; *d*, opened mature female flower, showing glabrous ovary, × 12; *e*, portion of twig with infructescence with mature fruits, × ½; *f*, mature fruit of a different specimen, × ½. — *Horsfieldia subtilis* Miq.) Warb. var *subtilis: g*, opened male flower, showing androecium, androphore hidden by the anthers, × 12; *h*, twig portion with mature infructescence. — *a-c*, from *Kostermans & Soegeng 359; d & e*, from *BW 4307; f*, from *BW 2900; g*, from *LAE 70256; h* from *Hoogland 3503*.

nerves little contrasting; midrib slender, raised from both surfaces; nerves 6-14 pairs, raised or flattish above, indistinct; tertiary veins forming a lax network very indistinct on both surfaces; petiole 5-12 × 0.7-1.5 mm; leaf bud c. 8 × 1 mm, with hairs c. 0.1 mm long. Inflorescences glabrescent or with rather sparse to dense tomentum of stellate hairs 0.1 mm long or less, sometimes extending to the pedicels; in ♂: (1-)2(or 3) times ramified, 1.5-7 × 1-4 cm, common peduncle 3-15 mm, slender; in ♀: few-flowered, 1-4 cm long; bracts 0.5-1 mm long, densely woolly pubescent, caducous. Flowers solitary or 2 or 3 together, perianths 2-valved, glabrous; pedicels slender, at base inarticulate. Male perianth (broadly obovoid or) subglobose, (1-) 1.3-1.5 × (1-) 1.5-2 mm, not or only little laterally compressed, when dry wrinkled but not or slightly collapsed, rounded above, shortly tapered at base; pedicel slender, (1-)2-3.5 mm long, slightly broadened towards the perianth, glabrous or with some scattered minute hairs at base; perianth at anthesis split to c. ⅓(-½), valves 0.1-0.2 mm thick. Androecium ± flattened especially in the upper part, thickish at base, broadly ellipsoid in outline, above and at base broadly rounded, c. 0.6-0.8 × 0.9-1.0 mm; anthers 8, mutually appressed, free apices 0-0.1 mm; androphore 0.4-0.5 mm; anther column at apex narrowly excavated for c. ⅕. Female perianth ellipsoid-obovoid, c. 1.5-2 × 1.5 mm, split at anthesis to c. ¼, valves 0.1(-0.2) mm thick, pedicel 1.5-2 mm long; ovary ellipsoid, c. 1-1.2 × 0.8 mm, glabrous or with a few minute hairs at apex (see notes), stigma minutely 2-lobulate, c. 0.1 mm long. Fruits 1(-2) per infructescence, ellipsoid, top rounded, not pointed or for only c. 1 mm, base rounded to short-attenuate into a pseudostalk (1.5-) 2-6 mm long, excl. pseudostalk 1.3-2.0(-2.5) × 0.9-1.2 cm, glabrous, drying blackish, with or without paler pustules (or lenticels), dry valves 1-2 mm thick; stalk 5-10 mm long; perianth not persisting.

Distribution. New Guinea: Irian Jaya, Jayapura Dist.; N. Papua New Guinea, W. Sepik Prov.

NEW GUINEA. Irian Jaya: *bb 25083; BW 2900, 3681, 4064, 4307, 5522; Kostermans & Soegeng 235, 359; van Royen & Sleumer 6219, 6455* — Papua New Guinea: *Hoogland & Craven 10703; NGF 13293, 18953, 39223, 48230, 48297; Pullen 1514; Schlechter 14500.*

Ecology. Forest on stony slopes, foothills, ridges; mossy forest, lowland and lower montane forest; on stony clay, sandy soil; 20-500 m alt. Flowers and fruits throughout the year.

Vernacular names. Cheem (Sepik Prov.), Guma (Waskuk lang., Sepik Prov.), Medal (Wagu lang., Sepik Prov.).

NOTES

1. Fieldnotes. Bark dark brown or blackish, with longitudinal fissures. Perianths yellow or orange-yellow. Fruits green-yellow, yellow, or (yellow-)orange; aril red.

2. BW4307 (Hollandia, 400 m) has markedly large fruits, c. 2.5 × 1.2 cm incl. the 5-6-mm long pseudostalk. The specimen *Kalkman 3681*, from the same area, at 50 m, has fruits c. 1.3 × 0.9 cm, with only a short pseudostalk (1-) 1.5 mm; its ovaries and very young fruits have a few minute hairs towards the apex; it approaches certain specimens of *H. subtilis*.

3. H. schlechteri, as accepted presently, largely agrees with Sinclair's *H. subtilis* var. *schlechteri*. However, specimens cited by him from outside the Jayapura/Sepik area are presently referred to *H. subtilis*.

31. Horsfieldia basifissa de Wilde, *sp. nov.* Fig. 1B(31)

Horsfieldia polyantha auct. non Warb.: Sinclair, Gard. Bull. Sing. 28 (1975) 95, p.p.

A Horsfieldia speciebus quoad perianthia 2-valvata sese similibus, differt ramulis non-cristatis, perianthiis masculis sub anthesi usque ad basin divisa, androecio excavato per ⅓-½, atque fructibus glabris (sub)globosis. — Type: *White NGF 10242* (L).

Tree 10-25 m. Twigs terete, faintly ridged or not, towards the apex 2-4(-8) mm diam., early glabrescent, tomentum grey-brown, with hairs c. 0.1 mm; bark finely striate, when older not flaking; lenticels inconspicuous. Leaves in 2 rows, membranous to thinly chartaceous, elliptic-oblong to oblong-lanceolate, broadest usually above the middle, 10-22 × 3-8 cm, base attenuate, top acute-acuminate; upper surface drying olivaceous to brown (often with paler markings, possibly caused by calcium agglomerations), not or faintly, minutely, more palely pustulate, lower surface glabrescent, hairs c. 0.1 mm; without larger dark brown dots; midrib above flattish; nerves 10-15 pairs not particularly contrasting, above thin and flattish or sunken, beneath with the marginal arches not very regular nor prominent; tertiary veins forming a lax network, rather faint; petioles 5-10 × 1.5-2.5 mm; leaf bud c. 10 × 1.5 mm, with hairs c. 0.1 mm. Inflorescences in ♂:3(-4) times ramified, many-flowered, 4-10 × 2.5-6 cm, common peduncle 2-20 mm long; in ♀: c. 5 × 3.5 cm; densely to sparsely pubescent with stellate hairs 0.1-0.2 mm; bracts elliptic-oblong, acute, 1-2(-4) mm long, caducous. Flowers generally 1-3 together; perianth 2-valved, glabrescent except at the very base, pedicel thinly pubescent with hairs c. 0.1 mm long, at base not articulated. Male perianth as seen laterally subcircular, slightly broader than long, only little laterally compressed, not or but slightly collapsed on drying, 2.2-2.7 × 2.6-3 mm, upper and basal part broadly rounded, pedicel not tapering, 1.5-3 mm long; perianth at anthesis cleft to the base, valves 0.1-0.2 mm thick. Androecium laterally much flattened, above broadly rounded, c. 1.5-1.7 x 2.0 mm; anthers 12-14(-16), distinctly septate when immature, erect, free portions at apex c. 0.1 mm long, anther column at apex narrowly hollowed for ⅓-⅔; androphore 0-0.1 mm, broadly attached. Female perianth (immature flowers seen only) broadly ovoid, c. 1.5 × 1.4 mm, split at anthesis nearly to the base, valves c. 0.2-0.3 mm thick, pedicel 1.5-2 mm long; ovary ovoid, c. 1.1 × 0.6 mm, glabrous, style and stigma small, minutely 2-lobed. Fruits 1-20 per infructescence, globose or subglobose, 1.1-1.4 cm diam., glabrous, drying light to dark brown, with or without coarse, paler-coloured lenticels or warts; dry valves c. 1.5-3 mm thick, of woody-granular structure; seed ellipsoid; stalk 3-4 mm; perianth not persisting.

Distribution. New Guinea: NE. Irian Jaya; N. Papua New Guinea (Sepik, Madang Prov.).

NEW GUINEA. Irian Jaya: *(Schram) BW 2665; (Kalkman) BW 3455* — Papua New Guinea: *Hoogland & Craven 10215; NGF 10242, 26953, 32824, Pullen 1896; Saunders 198, 958; Schlechter 18302; Womersley 3798, 3821, 3899.*

Ecology. Primary and secondary forest, marshy forest, locally common; also recorded from *Pometia-Intsia* forest on clays and marls; 0-200 m alt. Flowers in September, fruits in March, June, and October.

Vernacular names. Euoe (Sko lang., Hollandia); Ilis (Jal, Madang Prov.); Numba (Angorami, Sepik Prov.).

NOTES

1. Fieldnotes. Slender tree, branches horizontal. Flowers yellow; fruit green, turning orange.

2. Apart from *H. angulata* (see the notes under that species) it is possibly closely related to *H. parviflora*, because of the glabrous fruits. The fruits are globose, and often are very similar to those of *H. pilifera* or *H. sinclairii*; in these two species, however, the fruits are always hairy, at least towards the base. See also note 4.

3. Many of the specimens accepted in the present new species were identified by Sinclair (p. 97) as *H. polyantha*, with *H. novoguineensis* as a synonym. The specimens of the syntype of *H. polyantha, Beccari 7619, 7619 A*, not seen by me, however, most likely belong to *Knema laevigata.*

The syntypes of *H. novoguineensis* Warb. are very heterogeneous; the two lectosyntypes (Sinclair, p. 95), *Beccari 684* (not seen), and *Zipelius 139-d* belong to *H. iriana*; a third syntype, *Hollrung 657* (fruits) belongs to *H. pilifera* (a species close to *H. laevigata*) whereas other syntypes belong to yet other species.

4. The new species has much in common with *H. laevigata* var. *novobritannica*, which has the androecium also deeply hollowed inside; the latter has, however, a more hairy perianth. Of var. *novobritannica*, the female flowers are not known, but it has globose fruits larger than those of *H. basifissa*, and they are somewhat hairy at the base. The present new species is characterized by the subglabrous male flowers with a very deeply cleft perianth, glabrous ovary and glabrous globose fruits; it could be confused with *H. pilifera* and *H. sinclairii* which also may have globose fruits, but are never glabrous.

32. Horsfieldia sinclairii de Wilde, *sp. nov.*, Fig. 1B(32)

Horsfieldia erubescens Sincl., in sched. (Gard. Bull. Sing. 28, 1975, 6-7) — *H. australiana auct. non* S.T. Blake: Sinclair, Gard. Bull. Sing. 28 (1975) 6, p.p. — Type in sched.: *Womersley & Brass. NGF 8664* (SING, *n.v;* iso: BM, K, L; A, BO, BRI, CANB, LAE & NSW, *n.v.*

Perianthia mascula parva, subglobosa, c. 1.5-2 mm diam., glabra, sub anthesi usque ad ½ divisa, antheribus 6-10, androphoro usque ad c. ⅓ excavato, ovario pubescente, fructibus globosis vel breviter ellipsoideis, 1.5-2.5 cm longis, in siccitate nigrescentibus, pericarpio sicco 4-6 mm crasso. — Type: (*Streimann & Katik NGF 28886* (L, iso: K).

Tree, 4-25 m. Twigs terete, not ridged, towards apex 1.5-3(-6) mm diam., early glabrescent, tomentum brown, of hairs c. 0.1 mm; bark finely striate, when older not flaking; lenticels mostly inconspicuous. Leaves in 2 rows, membranous, elliptic-oblong to oblong-lanceolate, broadest at or above the middle, 6-14 × 1.7-4.5 cm, base attenuate, tip acute-acuminate, upper surface drying light to dark brown, sometimes with paler markings, minutely, more palely pustulate or not; lower surface glabrescent, hairs c. 0.1 mm, without larger dark brown dots, the nerves usually not much contrasting; midrib slender, flat above, often reddish tinged and contrasting below; nerves 6-14 pairs, thin and flat above, beneath inconspicuous, marginal nerve faint; tertiary veins forming a lax network, inconspicuous; petiole 6-15 × 0.8-1.5 mm, leaf bud 8-15 × 1-2 mm with hairs c. 0.1 mm long. Inflor-

escences *sparsely minutely hairy to subglabrous, hairs c. 0.1 mm; in ♂: many*-flowered, 2-4 times ramified, 2.5-8 × 1.5-6 cm, common peduncle 2-10 mm long; in ♀: up to 5(-10) × 4 cm; bracts 0.5-2.5 mm long, caducous. Flowers in loose clusters 2-5 each; perianths 2-valved (in some specimens a rather high percentage of 3-valved perianths), glabrous; pedicels slender, glabrous, at base inarticulate. Male perianth subcircular (rarely slightly broader than long), slightly laterally compressed, not or somewhat collapsed on drying, 1.1-2.0 × 1.5-1.8 mm, broadly rounded above, rounded to broadly rounded below, pedicel not tapering, slender, 0.6-1.5 mm long; perianth at anthesis cleft to c. ½-way, valves 0.1-0.2 mm thick. Androecium ± flattened, in lateral view broadly circular to subobtriangular, above broadly rounded, c. 0.6-1.4 × 1-1.3 mm; anthers 6-10, septate when immature, free portions at apex rather conspicuous, 0.1-0.3 mm long, the anther-bearing column at apex not or only moderately hollowed up to c. ⅓; androphore narrow, 0-0.3 mm long. Female perianth much larger than in ♂, c. 2-2.4 × 1.8-2.2 mm, ellipsoid-ovoid, at anthesis split to c. ⅓, valves c. 0.2-0.3 mm thick, pedicel c. 1 mm long; ovary globose, c. 1.6 mm diam., densely minutely pubescent, style ± absent, stigma distinctly 2-lobed, c. 0.2 mm long. Fruits 1-5(-10?) per infructescence, globose to short-ellipsoid, or obovoid, top rounded, base rounded or contracted into a pseudostalk up to 2mm, rather distinctly ridged or not, drying dark brown to blackish, 1.5-2.5 × 1.5-2.0 cm, glabrescent but often with remnants of tomentum towards base (lens!), with or without only a few coarse lenticels or tubercles; dry valves 4-6 mm thick, woody; stalk 1-4 mm long; perianth not persisting.

Distribution. Papua New Guinea: Madang Prov., Morobe Prov., Northern Prov., Milne Bay Prov. (incl. Fergussion Isl. and Normanby Isl.), Central Prov., Gulf Prov.

PAPUA NEW GUINEA: *Brass 21821, 21912, 21996, 21997, 25503; Carr 12398; Clemens 877; Hartley T.G.H. 9968, 10421; Hoogland 5139, 8957* (deviating); *Hoogland & Mc Donald 3516; Kanis 1107; LAE 60239, 67162, 68817, 70202, 70272, 72475; NGF 8247, 8664, 28886; Saunders 528; Schodde 5638, (& Craven) 4366* (deviating).

Ecology. Primary and disturbed lowland and mountainous rain forest, floodplain forest, on slopes, ridges, also along creeks on stony places. Understorey tree; found on *Castanopsis*-dominated ridge, and in *Anisoptera-Hopea*-dominated forest. Altitude 0-950 m. Flowers mainly in March, April & June, fruits mainly in July and October.

Vernacular names. Gaigihab (Dumpu; Madang Prov.), Hamana (Orokaiva lang., Mumini; Northern Prov.) Posiposi (Milne Bay Prov.), Saksak (Amele; Madang Prov.).

NOTES

1. Fieldnotes. Flowers creamy, yellow, or yellow-orange; twice recorded as fragrant. Fruits glossy green, turning yellow to orange. Once recorded as with buttresses 1 × 1 ft. Bark rough, fissured or peeling off in irregular flakes leaving concave depressions. Wood cream- or straw-coloured or brown. Bark with reddish exudate.

2. Relationship. Characterized by the slender twigs, smallish thin leaves with often reddish-tinged midrib beneath, small subglobose glabrous male perianths, the much larger female flowers with pubescent ovary, and the short-ellipsoid fruits drying dark brown or blackish, usually with 4-6-mm thick woody pericarp. The

fruits may be confused with those of *H. laevigata,* especially with those of certain specimens from SW. New Guinea, which have rather similar pericarps but much larger leaves. In the present species the fruits have often become quite glabrous, but younger fruits (and ovaries) are pubescent; often minute hairs can be seen close to the bases of old fruits.

3. The present new species was at first recognized by Sinclair, who named the sheets and in his manuscript as *H. erubescens.* A type *(NGF 8664)* was also designated. Shortly before his death Sinclair must have been of the opinion that his new species was conspecific with *H. australiana,* hence the use of *H. australiana* in the posthumous edition of his manuscript.

4. In general habit *H. australiana* resembles but differs in various ways, especially in the androecium.

5. The deviating specimens *Hoogland 8957* and *Schodde & Craven 4366*, both with male flowers, key out in the vicinity of *H. sinclairii,* but apparently are not conspecific. They rather agree with *H. sinclairii* in general appearance, but differ in their larger male flowers and in the pedicel being thinly minutely pubescent, also the basal part of the perianth in *Schodde & Craven 4366*. The latter collection is in these respects and in its rather elongate perianths reminiscent of *H. pilifera*, but for the larger flowers. *Hoogland 8957*, from Morobe Prov., c. 900 m, has male perianths subcircular in lateral view, c. 2.4 mm diam., cleft at anthesis to c. ⅓; there are c. 10 anthers, the pedicel is minutely sparingly pubescent. *Schodde & Craven 4366*, from Gulf Prov. at c. 300 m, has the male perianths rather elongate, c. 2.5(-3.0) × 1.8-2.0 mm, cleft at anthesis to c. ½-⅔, anthers c. 6 or 7, pedicel and basal part of perianth minutely pubescent. Probably these specimens represent separate taxa.

33. Horsfieldia psilantha de Wilde, *sp. nov.* Fig. 1B(33)

Perianthium masculum lateraliter compressum, aspectu laterali subcirculare, 2.5-3.5 mm diam., glabrum, pedicello gracili, haud attenuato. Infructescentiae usque as 15 cm longae, laxae, fructibus ellipsoideis, 17-22 mm longis, minute pubescentibus — Type: Long Island, ♂ fl., *Womersley NGF 43642* (L, iso: K).

Tree 5-25 m. Twigs terete, not ridged, towards the apex 3-6(-15, in fruiting twigs) mm diam., rather early glabrescent, tomentum reddish or grey-brown, composed of hairs c. 0.1-0.3 mm; bark finely striate, lenticellate, when older not flaking. Leaves in 2 rows, membranous, oblong-lanceolate to lanceolate, sometimes almost parallel-sided, 20-40 × 4.5-12.5 cm, base attenuate, tip acute-acuminate; upper surface drying olivaceous to green-brown, usually minutely pale-punctate; lower surface glabrescent or if leaves are younger, with scattered stellate hairs 0.1-0.3 mm on and near the midrib, without large dark dots, the nerves ± greenish or reddish brown; midrib above flattish; nerves 14-24 pairs, above thin and flattish, beneath with the submarginal arches rather distinct, not very regularly shaped; tertiary veins forming a lax network, indistinct; petiole 5-20 × 2-3.5 mm; leaf bud 20-25 × 2.5-3.5 mm, pubescent with hairs 0.1-0.3 mm. Inflorescences with rather thin woolly tomentum or stellate-dendroid hairs 0.2-0.4 mm; in ♂ and ♀ (when fruiting): 3 or 4 times ramified, many-flowered, 10-16 × 8-12 cm, common peduncle 10-40 mm; bracts not seen, caducous. Flowers in loose clusters of 2-5 each, perianths 2-valved, glabrous; pedicels slender, glabrous, at base inarticulate. Male perianth subcircular, somewhat laterally compressed, c.(2.0-) 2.5-3 × (2.5-)

3-3.5(-4) mm, upper part broadly rounded, basal part rounded to short-attenuate, pedicel not tapering, (2-)3-4(-4.5) mm long; perianth at anthesis split to c. ½-⅔; valves c. 0.2-0.3 mm thick. Androecium much laterally flattened, rounded-truncate above. 1.4-1.8 × (1.5-)1.8-2.0(-2.2) mm; anthers c. 12-14, mutually appressed, not septate, erect, apices free for c. 0.1 mm; androphore up to 0.2 mm; anther column at apex narrowly hollowed for c. ¼-½. Female flowers not seen. Fruits up to 10 per infructescence, ellipsoid, top and base obtuse to rounded, 1.7-2.2 × 1.2-1.7 cm, pubescent though sometimes hairs only remaining at the very base; hairs rusty, c. 0.2 mm long; pericarp drying brown, without or with scattered small or fine lenticels or wartlets, 1-2 mm thick; stalk 2-8 mm long; perianth not persisting.

Distribution. NE. New Guinea. Madang Prov.: Bagabag Isl., Long Isl; New Britian; New Ireland.

PAPUA NEW GUINEA. New Britain (W. & E.): *LAE 52132; NGF 21797, 21902, 30448, 41421* — New Ireland: *Sands et al. 2047* — Madang Prov., S. Bagabag Isl.: NGF 42229A — Long Isl: *LAE 55033; NGF 42361, 42390, 42398, 43640, 43642.*

Ecology. Forest (incl. beach), in shaded secondary forest; 0-200 m alt. Flowers in May and October, fruits throughout the year.

NOTES

1. Fieldnotes. Slender tree, branches often drooping, without or with a few buttress-roots. Bark blackish or dark grey-brown, longitudinally fissured; inner bark cream or pink, exudate pink or colourless; sap wood straw- or cream-coloured. Flowers orange-yellow. Fruit yellow to orange, aril orange.

2. Related species are *H. tuberculata, H. laevigata* and *H. whitmorei. H. tuberculata*, variable and wide-spread, has similarly glabrous flowers, but the shape of the perianth is more tapered at the base, while in the present species it is more circular in lateral view and at the base not or but slightly tapered: *H. tuberculata* furthermore has glabrous fruits and ovaries. *H. laevigata*, a variable and wide-spread species as well, always has pubescent perianths, though sometimes only scattered hairs are present; it usually has smaller leaves, and the fruits usually have many more and coarser lenticel-like tubercles. The leaves of *H. whitmorei*, from the Solomon Isls, sometimes have similarly, rather regularly looping, marginal nerves, and similar fruits, but the male perianth is smaller, only c. 2 mm diam. or less, the base pubescent, also the pedicels, and the perianth cleft at anthesis to c. 9/10. *NGF 41421*, particularly, from West New Britain, resembles *H. whitmorei* in general habit, especially in the marginal nerve and in leaf colour.

3. Good representative specimens in fruit are *LAE 55033* (from Long Isl) and *NGF 42229A* (Bagabag Isl).

4. Some of the specimens have similarly large, branched and spreading infructescences as are the male inflorescences (known only from the type). Female flowering specimens are not known.

34. Horsfieldia whitmorei Sinclair Fig. 1B(34); 16

Horsfieldia whitmorei Sinclair, Gard. Bull. Sing. 27, 1 (1974) 135 — Type: *Whitmore BSIP 1848* (SING; iso: K,L: LAE, *n.v.*).

Horsfieldia 'palewensis' (sphalm. *palauensis*) auct. non Kanehira: Whitmore, Guide For. Brit. Solom. Isl. (1966) 131, 186 in checklist.

Tree 8-25 m. Twigs terete, faintly ridged or not, 2-5(-7) mm diam., ± early glabrescent, tomentum often reddish-brown, composed of hairs 0.1-0.3(-0.4) mm; bark striate, when older not flaking; lenticels distinct or not. Leaves in 2 rows, membranous or rarely chartaceous, oblong to lanceolate, often almost parallel-sided, 9-30(-40) × 2-7(-9) cm, base short- to long-attenuate, tip acute-acuminate; upper surface drying dull brown to green brown, often minutely paler pustulate; lower surface largely glabrescent but often a few hairs remaining, hairs 0.1-0.4 mm, without larger brown dots, the nerves generally reddish-brown; midrib above flattish; nerves 18-26 pairs, above thin and sunken, beneath with the marginal arches very regular and distinct; tertiary veins forming a lax or fine network, distinct or not on both surfaces; petiole 10-15 × 1.5-3 mm; leaf bud 10-15 × 2 mm, with hairs 0.1-0.4 mm long. Inflorescences with dense grey to rusty, ± woolly tomentum with hairs 0.2-0.4 mm long, in ♂: 2-3 times ramified, many-flowered, (1.5-) 3-11 × 1-6 cm, common peduncle 2-20 mm; in ♀: 1.5-7 cm long; bracts 1-2.5 mm long, caducous. Flowers solitary or in loose clusters of 2-4, perianths 2- (rarely up to 4-) valved, glabrescent late and usually towards the base with some persistent tomentum of stellate hairs c. 0.2 mm long; pedicel slender, thinly pubescent, at base inarticulate. Male perianth subglobose, little to rather much laterally compressed (subcircular in outline), about as long as broad, 1.5-2 × 1.5-2.1 mm, upper and basal parts rounded; pedicel 0.8-2(-2.5) mm long; perianth at anthesis cleft to c. 9/10, valves 0.2(-0.4) mm thick. Androecium ± flattened, in lateral view rounded above, c. 0.8-1.2 × 1-1.3 mm; anthers (8-)10-12, suberect, mutually appressed, not septate, free apices up to 0.1(-0.2) mm long; androphore up to 0.2 mm long; anther column at apex narrowly hollowed for c. ¼-⅓. Female perianth ellipsoid or ovoid to obovoid, 2-2.5 × 1.5-2 mm, split at anthesis to c. ⅚, valves c. 0.4 mm thick, pedicel 0.5-3 mm long; ovary ovoid-ellipsoid, densely pubescent with hairs c. 0.1 mm, 1.2-1.5 × 0.8-1.2 mm, stigma sessile, 2-lobulate, c. 0.3 mm high. Fruits 1-8 per infructescence, ellipsoid, apex rounded, base rounded and usually short-contracted into the stalk, 1.7-2.5(-3.4) × 1.5-1.8(-2.0) cm, glabrescent but always with minute hairs c. 0.1 mm at base (lens!), drying orange-brown or brown, without or with few scattered minute tubercles; dry valves 1-2 mm thick; stalk 5-8 mm long; perianth not persisting.

Distribution. Solomon Isls.

SOLOMON ISLS: *Arifanata 2572; BSIP 427, 803, 970, 1124, 1332, 1405, 1537, 1848, 2273, 2582, 2811, 3035, 3052, 3218, 3318, 3406, 3481, 3679, 3745, 4045, 4046, 4096, 4230, 4834, 5539, 5569, 5617, 5905, 6230, 6724, 6787, 6900, 7565, 8166, 8362, 8455, 8659, 8916, 9090, 9224, 9427, 9558, 9697, 9955, 10205, 10256, 10574, 10802, 10978, 11179, 11237, 11408, 11586, 11618, 11714, 12264, 12383, 12523, 12637, 12782, 13038, 13063, 13235, 13442, 13520, 13360, 13777, 13982, 14088, 14126, 14368, 14475, 15611, 15860, 15864, 15924 (p.p.), 15967, 16033, 16294, 16364, 16604, 16907, 17370, 17494, 18497, 18694, 18842; Chapman 427; Hunt 2164; Kajewski 2022; NGF. 31097, 31370, 45611; Waterhouse 891-B: Whitmore 6112.*

Ecology. Primary and secondary forest, on a variety of soils; alluvial (sandy, clayey) soil, marshy soil, limestone, red soil, ultrabasic and igneous rock; on well-drained as well as on (periodically) flooded and marshy ground; not in mangrove; 0-850 m. Flowers and fruits throughout the year.

Vernacular name. Aininiu (Kwara'ae).

NOTES

1. Fieldnotes. Tree usually recorded as without buttresses, but low buttresses were noted for *BSIP 9090* Guadalcanal). Flowers pale, i.e., pale greenish, pale yellow, whitish-yellow, or ivory, strongly sweet scented. Fruits greenish, when fully ripe possibly a deeper orange.

Chapman BSIP 427 (New Georgia) has exceptionally rather chartaceous leaves.

Fruits measure exceptionally as large as 3.0-3.4 cm, e.g., in *BSIP 970, 9427* (Guadalcanal), *BSIP 15967* (Tetepari Isl.).

2. Related species. Sinclair (l.c.) extensively comments on the relationship and postulates its possible hybrid origin from the other two Solomon Isls. species *H. irya* and *H. spicata* (only p.p., is in my present treatment as *H. tuberculata*). In my opinion, however, the present species is particularly related to *H. laevigata* (which Sinclair erroneously included in *H. parviflora*), a wide-spread variable species which is 'replaced' by *H. whitmorei* in the Solomon Isls.; for differences see the key to the species. Besides *H. laevigata*, the species seems also particularly closely related to *H. psilantha*, under which further notes are presented.

35. Horsfieldia laevigata (Bl.) Warb. Fig 1B(35); 17 a-i.

Horsfieldia laevigata (Bl.) Warb., Mon. Myrist. (1897) 351, tab. 21, fig. 1-2 (excl. spec. Java) — *Myristica laevigata* Bl., Rumphia (1837) 191, t. 64, fig. 3, anal. 1-4; A. DC., Prod. 14, 1 (1856) 202); Miq., Fl. Ind. Bat. 1(2), 1 (1858) 65, p.p. — Type: (cult. Mauritius, ♀) *Commerson 238* (L; iso: P).

For further synonyms see under the varieties.

Tree 4-25 m. Twigs terete, faintly ridged or not, towards the apex 1.5-5(-9) m diam., early glabrescent, tomentum grey to brown, with hairs c. 0.1-0.2 mm; bark striate, when older not flaking; lenticels conspicuous or not. Leaves in 2 rows, membranous or thin-chartaceous, elliptic to oblong-lanceolate, broadest usually at or above the middle, 10-30 × (3-)4-12 cm, base attenuate, top acute-acuminate); upper surface drying dull olivaceous to dark brown, usually minutely paler pustulate, lower surface (largely) glabrescent, the hairs 0.1-0.2 mm, without larger brown dots, the nerves not or little contrasting in colour; midrib above flattish; nerves (10-) 12-30 pairs, above thin and flattish or slightly raised, beneath with marginal arches usually not very regular and faint; tertiary veins forming a lax network, faint or distinct but thin on both surfaces; petioles 5-15 × 1.5-3 mm; leaf bud 10-15 × 1.5-2 mm, with hairs 0.1-0.2 mm. Inflorescences subglabrescent or with rather dense to sparse scale-like stellate hairs 0.1-0.2(-0.5) mm; in ♂: 2-4 times ramified, many-flowered, 5-20 × 3-10 cm, common peduncle 10-40 mm; in ♀: c. 2-10 cm long; bracts 2-3 mm long, caducous. Flowers generally in loose clusters of 2-5 each; perianths 2- valved, sparsely to densely pubescent (densest towards the base) with hairs c. 0.1-0.2 mm long; pedicel not tapering, pubescent, at base not articulated. Male perianth as seen laterally subcircular (or sometimes slightly longer than broad, or rarely broader than long, e.g., in certain specimens from the Papuan Isls.; see notes), usually distinctly flattened, 1.7-2.8 (-3.0) × 1.7-3.0(-3.3) mm, upper and basal part rounded; pedicel slender, 1.5-3(-4) mm long; perianth at anthesis cleft to ½-¾ (-⅘, in certain specimens from the Papua Isls; see notes), valves (0.1-) 0.2-0.3 mm thick. Androecium laterally flattened, subquadrangular to ± reniform in outline, above broadly rounded to subtruncate, 1.1-1.5 × 1.1-1.8(-2.2) mm; anthers 9-16, usually distinctly septate, erect, free portions at apex up to

Fig. 16. *Horsfieldia whitmorei* Sinclair
a, twig portion with male inflorescences, × ½; *b*, male inflorescences, lower down on the same twig, × ½; *c*, mature male flower, × 12; *d*, ditto, opened, showing androecium, × 12; *e*, portion of twig with female inflorescence, × ½; *f*, female flower longitudinally opened, showing pubescent ovary, × 12; *g*, portion of twig with infructescence with mature fruits, × ½. — *a-d*, from *BSIP 16033; e*, from *BSIP 3035; f*, from *BSIP 13442; g*, from *BSIP 15611*.

0.2 or 0.4-0.6 (var. *novobritannica*) mm long, the anther column at apex narrowly hollowed for c. ¼(-½) or in var. *novobritannica* for c. 9/10; androphore up to 0.1(-0.2) mm, ± broadly attached. Female perianth broadly ellipsoid to globose, 2.5-3.1 × 2.8-3.1 mm, split at anthesis to c. ⅓-⅔, valves 0.3-0.5(-0.8) mm thick, pedicel 2-2.5 mm long; ovary ovoid or subglobose 2.0-2.3 × 1.7-2.2 mm, pubescent with hairs c. 0.1 mm long or less, style up to 0.3 mm long, stigma sessile, minute, hardly bilobulate, c. 0.1-0.2 mm. Fruits (1-)2-15 per infructescence, ellipsoid or rarely nearly globose, apex rounded to acutish, base rounded, (1.6-)1.8-2.8(-3.0) × 1.4-2.0(-2.2) cm, glabrescent but always with minute hairs c. 0.1 mm long at least at base (lens!), drying blackish or greyish-brown, usually with coarse, paler coloured tubercles or lenticels; dry valves 2-3 mm or 4-6 mm thick as in some forms from SW. New Guinea and New Britain; seed ellipsoid; stalk 3-6 mm long; perianth not persisting.

Distribution. Moluccas, New Guinea, Bismarck Arch. (see further under the varieties).

A variable, complex species, of which one prominent form is segregated here as a variety.

KEY TO THE VARIETIES

1a. Hairs on inflorescences 0.1-0.2(0.3) mm long, sometimes almost absent. Anthers at apex free for only c. 0.1-0.2 mm; stamen column hollowed for c. ¼(-½, or slightly deeper). Fruit generally ellipsoid, pericarp 2-3 mm thick when dry, rarely (SW. New Guinea) 4-6 mm thick. Moluccas, New Guinea, Papua Isls., Bismarck Arch. ..... **a.** var. **laevigata**

b. Hairs of inflorescences more woolly, c. 0.3-0.5 mm long. Anthers at apex free for c. 0.4-0.6 mm; the column hollowed for c. 9/10. Fruit generally subglobose or short-ellipsoid, pericarp 2-5 mm thick. New Britian ..... **b.** var. **novobritannica**

a. var. **laevigata** Fig. 1B(35); 17 a-e

Myristica nesophila Miq., Ann. Mus. Bot. Lugd. B t. I(2) (1864) 206, p.p. (excl. sp. from Batjan) — *Horsfieldia nesophila* (Miq.) Warb., Mon. Myrist. (1897) 281, t. 21 fig. 1-2 — Type: Ceram, *de Vriese s.n.* (♂) (L, lecto).

Horsfieldia polyantha Warb., Mon. Myrist. (1897) 281, t. 23 fig. 1-2; Sinclair, Gard. Bull. Sing. 28 (1975) 95 (for the greater part, incl. type) — *M. polyantha* Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 85 — Type: (Aru Isls., Wokam) *Beccari s.n.* (Acc. Nos. *7619, 7619-A*) (FI, *n.v.*).

Twigs in apical portion 2-5(-9) mm diam. Leaves 10-30 × 4-12 cm. Inflorescences with rather dense to sparse tomentum of hairs 0.1-0.2(-0.3) mm, sometimes almost glabrous. Male perianth 1.7-3.3 mm diam., at anthesis split to c. ½-¾(-5/6). Anthers (9-)10-16, free at apex for (0-)0.1-0.2 mm; anther column at apex hollowed for c. ¼(-½, or slightly deeper). Infructescence up to c. 10 cm long. Fruits ellipsoid, 18-28 mm long, drying blackish or brown, usually with coarse wart-like lenticels; pericarp 2-3(-6) mm thick.

Distribution. As the species (including New Britain).

MOLUCCAS. *Commerson s.n.* (Bourbon, 238 cult. Mauritius) — Halmaheira: *Idjan & Mochtar 191; Pleyte 141, 377, 409* (p.p.); *de Vogel 3437, 3498* — Bacan (Batjan): *de Vogel 3694* — Ceram: *b.b. 25845; Kornassi* (exp. Rutten) *996; de Vriese s.n.* — Aru Isls (Wokam): *Beccari s.n.* (FI Acc. Nrs. 7619, 7619A); *Buwalda 5015.*

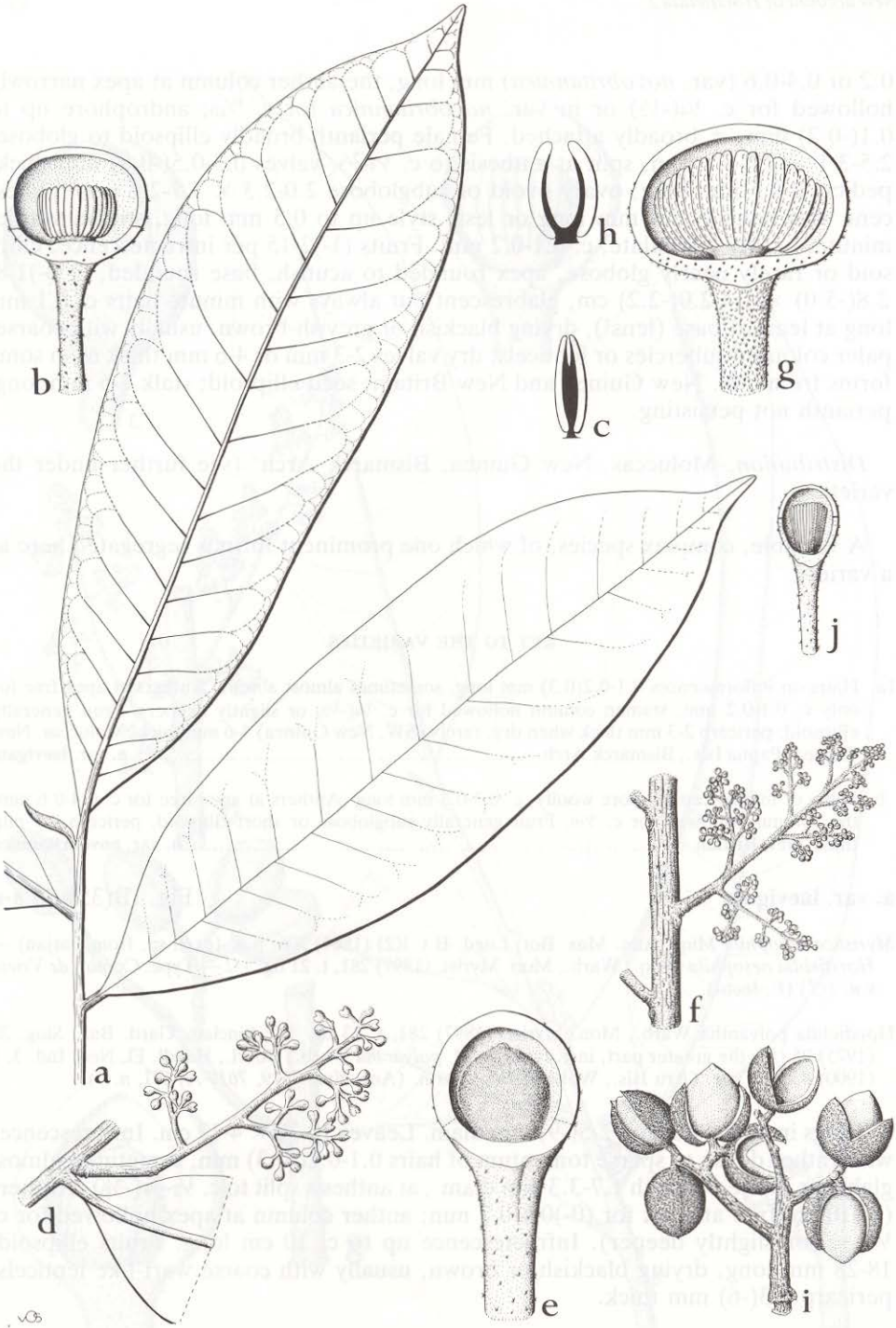

Fig. 17. *Horsfieldia laevigata* (Bl.) Warb. var. *laevigata: a,* twig apex with leaves, × ½; *b,* opened mature male flower, showing androecium, × 6; *c,* androecium, longitudinal section, schematic, × 12; *d,* portion of twig with female inflorescence, × ½; *e,* female flower, opened, showing finely pubescent ovary and minute 2-lobed stigma, × 6. — *Horsfieldia laevigata* var. *novobritannica* (Sinclair) de Wilde: *f,* portion of twig with male inflorescence, × ½; *g,* opened mature male flower, showing androecium, × 12; *h,* androecium, longitudinal section, schematic × 12; *i,* infructescence with mature fruits, × ½. — *Horsfieldia pilifera* Markgraf: *j,* opened male flower, showing androecium, × 6. — *a-c,* from *LAE 52086; d & e,* from *Commerson s.n.* (Ile de France) (type); *f-h,* from *Floyd 6430; i,* from *White NGF 10811; j,* from *Ledermann 6675.*

NEW GUINEA. Irian Jaya: *Aet* (exp. Lundquist) *348; b.b. 30563, 30595; Branderhorst 165;* BW *(Koster) 1003, 1022, 7149, (Schram) 14943; Doctors van Leeuwen 10623; Pleyte 688; von Römer 329; Soegeng 284* — Papua New Guinea: *Brass 1220, 24203; Craven & Schodde 874; Hartley 10147, 10707; Jacobs 9242; Kanis 1199; LAE 51683, 51841, 52030, 59069; NGF 2413, 2934, 7275, 14800, 17752, 19625, 20792, 24080, 28016, 42997, 46543, 48466, 48476; Rau 173; (Vinas) UPNG 3528* — Papuan Islands (Fergusson, Normanby, Woodlark): *Brass 28660; LAE 52577, 68761, 68871* — Bismarck Arch. (incl. Admiralty Isls): *LAE 51188, 52086, 52128, 53736, 63063, 66701; NGF 7039, 12980, 26659, 26785, 27303, 46030, 49511.*

Ecology. Primary and secondary rain forest on ridges and plains, riverine forest, swampy scrub and forest, edges of sago-swamps; on a great variety of soils, incl. black volcanic soil (Moluccas); 0-1000 m alt. Flowers and fruits throughout the year.

Vernacular names. Kawok-kawoe (Noemfoer Isl.), Kamojer (Noemfoer Isl.), Luhakon (Halmaheira), Peita (Western Prov., Papua, Oriomo dial.), Samgoot (Kebar lang., Vogelkop).

Uses. Fruits reported as edible; wood used for house construction (wood reported several times as of medium weight and hardness).

NOTES

1. Fieldnotes. Bole straight, without buttresses; bark often shallowly vertically fissured, not peeling off; branches horizontal, or drooping. Wood whitish or straw. Flowers (greenish or brownish yellow. Fruits yellow to orange, aril bright orange.

2. Variation. After the separation of var. *novobritannica* the remaining type-variety is still a very variable entity. The most marked variations are in the following features:

a. Leaf texture. The leaves are generally membranous, but certain specimens, especially some from New Britain, have rather leathery leaves so that the tertiary venation may be quite obscure.

b. Length of hairs of the tomentum on the leaf bud. Hairs in specimens from NW. New Guinea (incl. Vogelkop Penins.) may be somewhat longer and coarser than usual, and may be up to 0.3 mm long.

c. Twigs are usually terete, and not or hardly ridged in between the insertion of the petioles. A few specimens, e.g., *NGF 2430* (in fruit) from N. Prov. Papua, or *LAE 51683*, from Morobe Dist., have rather distinctly lined twigs; such specimens may be confused with species with typically ridged twigs, e.g., *H. iriana* or *H. angularis*.

d. The size and shape of the mature male perianth. Apparenttly all diameter sizes between 1.7-3(-3.3) mm can be found. Specimens of close affinity, with still smaller flowers, have been accommodated in the separate species *H. pilifera*. The shape of the perianth in lateral view is generally subcircular. Certain specimens, e.g., from the Papuan Isls and Gulf Dist. may have the perianth rather markedly broader than long, and these flowers may resemble those of, e.g., *H. spicata*. In specimens from the Moluccas the perianth is often slightly longer than broad.

e. The degree to which the male perianth opens at anthesis. In most specimens the perianth opens to c. ½-way to ⅔ deep; specimens from the Papuan Isls. (e.g., *Brass 28660, LAE 52577, 68871*), or the Bismarck Arch. (e.g., *LAE 53736, 63063)* may have male perianths split at anthesis to as deep as c. ⅘-⅚; this feature is reminiscent also of *H. spicata*. In these broad, deeply-splitting male flowers, the androecium is relatively broad, and rather reniform as seen laterally.

f. Number of anthers. This varies normally from 12 to 16. Some specimens deviate in having a relatively small androecium with apparently only 10(-12) anthers; e.g., in *Pleyte 141*, and other material from the Moluccas.

g. The thickness of the pericarp. A few specimens, especially from SW. New Guinea, e.g., *b.b. 30563, 30595, Aet 348,* have thick corky pericarps, 4-6 mm thick; these specimens perfectly agree in their leaves with var. *laevigata*.

3. In the drawing of the type specimen of *Myristica laevigata, Commerson 238,* a female specimen, the perianths are erroneously depicted as 3-valved by Blume in Rumphia 1; in the original specimen in L, from which the drawing was obviously made, all flowers have 2-valved perianths.

4. Some forms with larger and thick-walled fruits appear difficult to separate from *H. pachycarpa;* see the notes under that species.

5. Of *Jacobs 9242,* from E. New Guinea, mature fruits are in spirit. They are apparently similar in size to those in the fresh state, measuring c. 4 × 3.5 cm; the perianth at one side of the fruit (up to 15 mm) is much thicker than at the opposite side. On drying, these fruits had shrunk to c. 2.5 × 2 cm, with the pericarp only c. 5 mm thick, thus falling well within the sizes in dry material measured for *var. laevigata*.

b. var. **novobritannica** (Sinclair) de Wilde, *comb. nov.* Fig. 17 f-i

Horsfieldia hellwigii var. *novobritannica* Sinclair, Gard. Bull. Sing. 28 (1975) 54 — Type: *Floyd NGF 6430* (LAE, *n.v.;* iso: L, K; A, BRI, CANB, NSW, *n.v.)*

Horsfieldia novae-lauenburgiae Warb., Mon. Myrist. (1897) 278; K. Schum., Fl, Neu-Pomm. in Notizbl. Bot. Gart. Berlin 2 (1898) 117; K Schum. & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee (1900) 324; Markgraf, Bot. Jahrb. 67, 2 (1935) 151 — Type: Bismarck Arch., Neu Lauenburg Group, Ulu Isls., *Warburg 20713* (B †; G, iso, *n.v.;* identity not sure, see notes).

Horstieldia ralunensis auct. non Warb., Kanehira & Hatusima, Bot. Mag. Tokyo 52 (1938) 355 (specimen *Kanehira 3969 n.v.*).

Twigs in apical portion 2-6(-8) mm diam. Leaves (12-)17-30 × (3-) 5-8 cm. Inflorescences with rather dense woolly tomentum of hairs c. 0.3-0.5 mm long. Male perianth c. 1.8-2.0 × 2.2 mm, at anthesis split to c. ⅘. Anthers c. 14, almost completely filling the perianth, septate, at apex free for c. 0.4-0.6 mm; anther column from the apex hollow for c. 9/10. Infructescences up to c. 8 cm long. Fruits broadly ellipsoid to almost globose, 18-22 × 16-20 mm, drying grey-brown, with coarse wart-like lenticels; pericarp rather hard, 2-3(-5 mm, see notes) thick.

Distribution. Bismarck Arch.: New Britain.

NEW BRITAIN: *Floyd* (NGF) *6430, 6662; NGF 10040, 10811, 21731, 25504, 32622.*

Ecology. Primary and disturbed rain forest; 0-1000 m. Flowers in August, fruits throughout the year.

Vernacular names. La gele kuku (W. Nakaina), Nungan (S. New Britain).

NOTES

1. Fieldnotes. Fruits globose, golden brown, yellow, or orange at maturity.

2. Relationship. The var. *novobritannica,* of which the male flowers are only known from the type, deviates within *H. laevigata* by its androecium. This completely fills the perianth; at the apex the anthers are mutually free to almost halfway, and the column is hollow from the apex to c. 9/10 deep. The column is reminiscent of that in *H. irya,* and probably the variety originated by some hybridization with the latter. In this respect it can be mentioned that the inflorescences of *H. irya* from this region may be similarly woolly hairy, and also that the leaves of the type of the var. *novobritannica* show whitish markings, as found regularly in *H. irya.*

3. Vegetatively, the fruiting specimens resemble strongly the flowering type specimen, but one can not be quite sure whether all belong to the var. *novobritannica.* The fruits of *Floyd 6662* rather deviate as they are almost globose, c. 22 mm diam., and have a thick spongy pericarp c. 5 mm thick; this condition is possibly pathological.

4. On the label of *Floyd 6430,* the type, is commented that it is almost the same species as *Floyd 6410.* This is not so, as *Floyd 6410* is a good *H. hellwigii* var. *hellwigii.*

5. The identity of *H. novae-lauenburgiae* Warb. is not clear to me. The holotype *Warburg 20713* was burnt in B, but Sinclair (p. 116) has seen an istotype in G, enumerated under his broad conception of *H. spicata.* He has not commented on this specimen. I have not seen this isotype.

According to the original description the specimen is large-leaved, with rather persistent tomentum, the female inflorescences much-branched, the flowers 2-valved, ± pubescent, the ovary tomentose, and this may well point to Sinclair's *H. hellwiggi* var. *novobritannica,* the basionym of the present new combination. In Markgraf's opinion (p. 151) *H. novae-lauenburgiae* is close to *H. hellwiggii.*

36. Horsfieldia pilifera Mkgf. Fig. 1B(36); 17 j

Horsfieldia pilifera Markgraf, Bot. Jahrb. 67, 2 (1935) 154 — Type: Ledermann (B, †; iso: L)

Horsfieldia novoguineensis Warb., Mon. Myrist. (1897) 271, p.p., *Hollrung 657,* syntype; lectotype= *H. aruana.*

Tree (5-)10-20 m. Twigs terete, lined or faintly ridged or not, towards apex 1.5-4(-10) mm diam., early glabrescent, tomentum grey to brown, of hairs c. 0.1 mm; bark striate, when older not flaking; lenticels usually inconspicuous. Leaves in 2 rows, membranous, elliptic to oblong-lanceolate, broadest at about the middle, 7-27 × 2.5-8.5 cm, base attenuate, tip acute-acuminate; upper surface drying brown, usually minutely whitish pustulate, lower surface early glabrescent,

hairs stellate, 0.1 mm long, without larger brown dots, the nerves not particularly contrasting in colour; midrib flat or slightly raised above; nerves 7-16 pairs, above thin and flat, beneath with the marginal arches faint and not very regular; tertiary veins forming a lax network, faint on both surfaces; petioles 6-12 × 1.5-2.5 mm; leaf bud c. 10 × 1-2 mm, with hairs c. 0.1 mm long. Inflorescences sparsely to densely pubescent with rather woolly hairs 0.1-0.3 mm; in ♂: 2-4 times ramified, many-flowered, 5-12 × 4-8 cm, common peduncle 10-25 mm, in ♀: 4-12 cm long; bracts 1-2(-3) mm long, caducous. Flowers generally 2-5 together; perianth 2-valved, sparsely to densely pubescent with stellate hairs c. 0.1 mm long; pedicel slender, not tapering, finely pubescent, at base inarticulate. Male perianth, as seen laterally, subcircular or sometimes slightly transversely or longitudinally elliptic, laterally little to much flattened, (1.0-)1.2-1.8 × 1.2-1.8(1.9) mm, upper part broadly rounded, at base rounded to short-attenuate, pedicel 1-2 mm long; perianth at anthesis split to ⅓-½, valves c. 0.1 mm thick. Androecium flattened, subquadrangular in outline, above broadly rounded, 0.7-1.2 × 0.6-1.1 mm; anthers 8-10, (sub)erect, septate, free portions at apex up to 0.1 mm long, the anther-bearing column at the top narrowly hollowed for c. ⅕-¼; androphore up to 0.1 mm, broadly attached. Female perianth broadly ellipsoid c. 2.8 × 2.5 mm, cleft at anthesis to ½-⅔, valves 0.5-0.8 mm thick, pedicel c. 2 mm long; ovary globose to ovoid, c. 1.5 × 1.3 mm, pubescent with hairs c. 0.1 mm or less, style and stigmas minute, c. 0.1 mm long. Fruits (2-)5-20 per infructescence, globose to short-ellipsoid, top and base rounded, 1.1-1.6 × 1.1-1.6 cm, glabrescent but always with minute hairs persistent towards the base (lens!), drying bright to dark brown, without or with little larger paler tubercles; dry valves often somewhat woody, thickest at one side, 1-3 mm thick; seed ellipsoid; stalk 1-5 mm long; perianth not persisting.

Distribution. Northern half of New Guinea: Vogelkop, Japen Isl., Jayapura, Sepik, Madang, Morobe Prov.

NEW GUINEA. Irian Jaya: *bb. 30429, 30547, 30558; Brass 14014; BW (Koster) 1097, (Versteegh) 4811, (Schram) 6082, (Kalkman) 6245, (Versteegh & Vink) 8298* — Papua New Guinea: *Clemens 524, 635, 1710, 10825; Hartley T.G.H 11029; Hollrung 657; Hoogland 5139, (& Craven) 10275; Jacobs 9609, 9609A; LAE 52756, 73818; Ledermann 6675, 10450; NGF 28080; Schlechter 16933.*

Ecology. Primary and secondary rain forest; reported from sandy loam soil, mixed forest with *Anisoptera* at c. 100 m; 0-1000 m alt. Flowers and fruits throughout the year. Fruiting once reported as very prolific.

Vernacular names. Gaben (Morobe Dist.), Gefrah (Tehid lang., W. Vogelkop), Guma (Waskuk lang., Sepik Prov.), Mamgananieproi (Biak lang).

NOTES

1. Fieldnotes. Bark longitudinally fissured; sap watery, turning pink or red; wood straw to brown, of moderate weight and hardness. Flowers yellow. Fruits hard, glossy green, turning dark yellow, orange or red, aril orange-red.

2. Relationship. A species very close to *H. laevigata,* distinguished by the smaller male perianth, and smaller globose or subglobose fruits with or without but little coarser, paler-coloured lenticel-like tubercles. The male perianths rather vary in outline e.g., those of *Ledermann 6675* being rather lengthwise ellipsoid and c. 1.5 × 1.3 mm whereas those of *Ledermann 10450* (type) and *Clemens 1710* are ± transversely ellipsoid, measuring c. 1.2 × 1.6 mm and 1.5-1.8 × 1.5-1.9 mm respectively.

The female flowers of *Schlechter 16933(K)* only have been seen and described by me; the perianth is generally somewhat smaller than in *H. laevigata,* but the female flowers probably do not differ significantly in the two species.

Because of the fruits, which are sometimes globose, the present species may be confused with *H. basifissa,* one which has quite different male flowers.

3. Sinclair (p. 112) included the present species in *H. spicata* var. *spicata,* a very large taxon as conceived by him.

37. Horsfieldia lancifolia de Wilde, *sp. nov.* Fig. 1B(37); 18

Horsfieldia species foliis lanceolatis, 5-16 cm longis, perianthio masculo pyriformi, 2.5-3 mm longo, sparse pubescenti, antheris, 6-8, erectis, ovario pubescenti, fructibus ellipsoideis vel pyriformibus, 2.5-3.5 cm longis in siccitate, glabrescentibus. — Type: *b.b. Cel./II- 464* (L; iso: K: BO & SING, *n.v.*).

Tree, 10-30 m. Twigs terete, towards the apex 1-2.5(-5) mm diam., not or but faintly llined, glabrescent from tomentum composed of hairs 0.1 mm or less; bark finely striate, when older not flaking; lenticels smallish, not very conspicuous. Leaves in 2 rows, (thinly) chartaceous, oblong-lanceolate to lanceolate, broadest at or somewhat above the middle, 5-16 × 1.5-3.5 (-4.5) cm, base (long-)cuneate, tip acute-acuminate; upper surface drying olivaceous to brown, with or without small whitish marks (without larger irregularly-shaped whitish marks), lower surface early or late glabrescent, hairs c. 0.1 mm or less, provided or not with brownish dots and points of mixed sizes; midrib above flattish or slightly raised; nerves 9-17 pairs, thin, flat, and inconspicuous above, the submarginal arches ± regular in shape but indistinct; tertiary venation forming a rather lax network, inconspicuous; petiole slender, 10-20 × 1-1.5 mm; leaf bud 10-20 × 1.5-2 mm, with hairs c. 0.1 mm. Inflorescences with rather sparse tomentum of hairs 0.1-0.2 mm long, in ♂: 2 or 3 times ramified, not many-flowered, c. 5 × 3.5 cm, common peduncle c. 10 mm long, flowers solitary or 2 or 3 together; ♀ inflorescences short, 1-3 cm long, slightly ramified, 4-10-flowered; perianths 2-valved, rather sparsely pubescent with hairs 0.1 mm or less in length, pedicels pubescent through hairs 0.1-0.2 mm, at base inarticulate. Male perianth obovoid to pear-shaped, not much laterally compressed, drying blackish, not or little collapsed, 2.5-3 × 2.0-2.3 mm, above broadly rounded, at base tapering into the pedicel c. 1.5-2 mm long; perianth at anthesis cleft only for c. 1/6, valves (at base) thickish, c. 0.4-0.5 mm thick. Androecium (synandrium) long-obovoid, laterally flattened, 1.5-1.8 × 1.0-1.2 mm, above subtruncate; anthers 6-8, erect, free apices c. 0.3-0.4 mm; anther column solid, except for the apical portion in-between the free apices of the anthers; androphore rather slender, c. 0.6-0.8 mm long. Female perianth subglobose to obovoid, variable in size (see notes), 2-3 × (1.8-)2-3.5 mm, at anthesis cleft to c. ¼-⅙, valves (perianth) c. 0.4-0.8 mm thick, pedicel 1-2 or 3-4 mm long, pubescent with hairs 0.1-0.2 mm; ovary ovoid, 1.4-2.2 × 1.0-2.0 mm, densely minutely pubescent; style and stigma(s) minute, c. 0.1 mm. Fruits 1-4 per infructescence, ellipsoid, (and ± contracted at base) or pear-shaped (see notes), 2.5-3.5 × 1.8-2.4 cm, completely glabrescent, granulate or with small lenticels or tubercles, drying brown; dry valves thick-woody, 4-8 mm thick; seed broadly ellipsoid, c. 17 × 14 mm; stalk 3-10 mm long; perianth not persisting.

Distribution. Central and South Celebes.

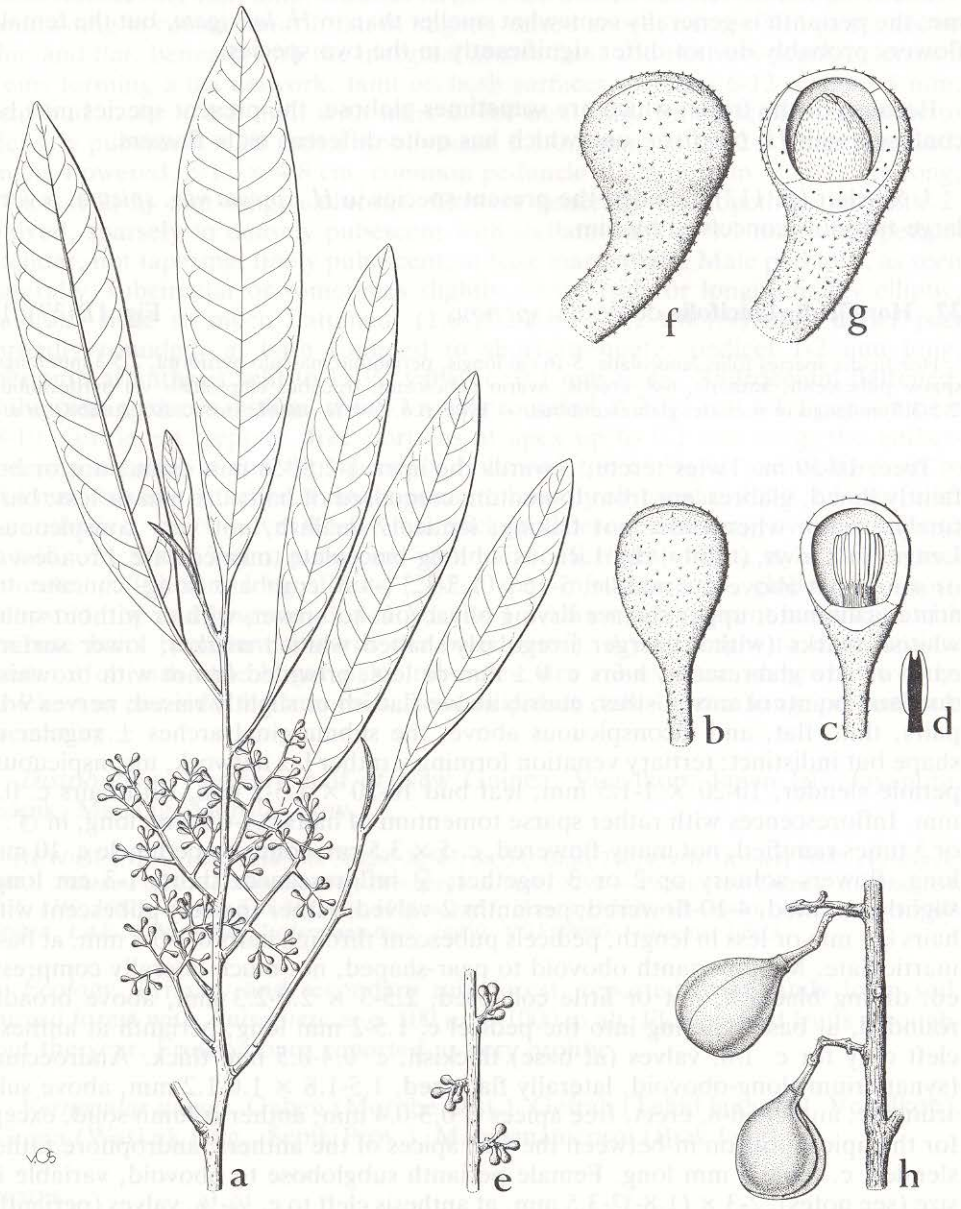

Fig. 18. *Horsfieldia lancifolia* de Wilde
a, habit of leafy twig with male inflorescences, × ½; *b,* mature male flower, lateral view, × 6; *c,* ditto, opened, showing androecium, × 6; *d,* androecium, longitudinal section, schematic, × 6; *e,* portion of twig with female axillary inflorescences, leaves fallen, × ½; *f,* mature female flower, lateral view, × 6; *g,* ditto, opened, showing finely pubescent ovary, × 6; *h,* portion of twig with infructescences with mature fruit, × ½. — *a-d,* from b.b. Cel./II-464 (type); *e-g,* from *de Vogel 5267; h,* from van *Balgooy 3973.*

CELEBES. Central: *van Balgooy 3142; de Vogel 5267* — South (-Central): *b.b. Cel./II-236, -404, -464; van Balgooy 3931, 3973, 4083; de Vogel 6243, 6287.*

Ecology. Forest on ultrabasic rock (iron, nickel), laterite, also limestone ridges; 200-1200 m alt. Flowers throughout the year; fruits from May to July.

Vernacular name. Tabenoe benoe (Malili area).

NOTES

1. Fieldnotes. Flowers buds brown; fruits glossy green, turning yellow-green to orange.

2. The ♀-flowering specimens *de Vogel 5267, van Balgooy 3142* (from Mt. Roroka Timbu, Central Celbes, 1100-1200 m alt.), and the one in fruit, *de Vogel 6243* (S. Celebes, N. of Lake Matano, c. 400 m.), differ from the rest of the material from both Central and S. Celebes by, respectively, much stouter flowers with larger ♀ perianths (3-3.5 mm diam.) and larger fruits, subellipsoid in shape, c. 3.5 cm long. In the other specimens the ♀ perianths are only c. 2-2.5 mm, and the fruits generally more pear-shaped, c. 2.5-3.0 cm long.

3. Sinclair identified the then-known specimens, including the type of the present new species, as *H. parviflora* (Roxb.) Sinclair. The new species is easily recognized among Celebes-Moluccan material by its pear-shaped male flowers, its largish fruits with thick pericarp, and its small, rather narrow leaves. The androphore is proportionally long as compared to other species.

38. Horsfieldia decalvata de Wilde, *sp. nov.* Fig. 1B(38)

Horsfieldia species floribus bivalvatis, *H. tuberculatae* atque *H. laevigatae* similis, ab eis differt floribus masculis breviter pyriformibus, perianthio tenuiter pubescenti, androcio compresso, antheris 6 apice non-incurvis, ovario pubescenti, fructibus subglobosis c. 1-1.2 cm diam., tenuiter pubescentibus. — Type: *Idjan & Mochtar 181* (L; iso: BO, *n.v.;* K).

Tree 10-15 m. Twigs subterete, towards the apex ± flattened and faintly ridged or not, 1.5-4(-9) mm diam., early glabrescent, tomentum brown, composed of hairs c. 0.1 mm; bark dull brown, finely striate, when older not flaking, lenticels small, not very conspicuous. Leaves in 2 rows, membranous, elliptic-oblong to oblong-lanceolate, 11-25 × 3.5-7 cm, base attenuate to long-attenuate, tip acute-acuminate; upper surface drying dark brown, lower surface early glabrescent, hairs c. 0.1 mm; without brown dots; midrib above flat; nerves c. 12-16 pairs, above thin and flattish, on lower surface with the marginal arches not very distinct; tertiary venation on upper surface as a fine network, ± distinct or not; petioles c. 5-10 × 1.5-2.5 mm; leaf bud slender, c. 6-10 × 1-2 mm, densely dull brown pubescent by hairs c. 0.1 mm long or less. Inflorescences c. 2(or 3) times ramified, in ♂: c. 4-6 × (1-)2-4 cm, in ♀ up to c. 2.5 cm long; branches subglabrescent tomentum minute with hairs c. 0.1 mm; common peduncle in male 1-2 cm; bracts and bracteoles not seen, caducous. Flowers in ♂ solitary or 2 or 3 together, minutely pubescent through hairs c. 0.1 mm long or less; perianths 2-valved. Male perianth subglobose to short-pear shaped, moderately laterally compressed, as long as it is wide, c. 2.3 × 2.3 mm, upper part broadly rounded, the lower half tapering into the tapering pedicel c. 1.5-2 mm long, short-pubescent, inarticulate at base;

perianth at anthesis cleft to c. ⅔, valves c. 0.2-0.3 mm thick. Androecium moderately flattened, in outline c. 1.6 × 1.4 mm, upper part rounded; anthers c.6 (i.e., c. 12 thecae with the connectives rather broad), not septate, c. 1.6 mm long, erect, not inflexed, free apical parts up to c. 0.1 mm; androphore up to c. 0.1 mm long; anther column cleft to c. ⅕-¼. Female flowers not seen; immature fruits (ovaries) densely finely pubescent. Fruits c. 2-5 per infructescence, short-ellipsoid to subglobose, c. 1.1-1.2 × 1.0-1.1 cm, minutely pubescent with hairs c. 0.1 mm or less, drying brown, with scattered small tubercles; dry valves c. 1 mm thick; stalk slender, c 4 mm long; perianth not persisting.

Distribution. Moluccas.

MOLUCCAS. Morotai: *Kostermans 767.* — Halmaheira: *Idjan & Mochtar 181.* — Ceram: *Buwalda 5627.* — Ambon: *Robinson 1878.*

Ecology. Forest at low altitudes, 0-100 m. Flowers in September, fruits from May to November.

Vernacular name. Sekukumailor (Halmaheira).

NOTES

1. Fieldnotes. Flowers recorded as brown, fruits yellow.

2. H. decalvata superficially resembles very much a number of species including wide-spread species like *H. moluccana, H. tuberculata* and *H. laevigata,* but our present new species is distinct by its finely pubescent, pear-shaped male flowers, erect anthers, pubescent ovaries, and finely pubescent, small subglobose fruits. *H. tuberculata* also has pear-shaped flowers which are generally glabrous, and it has larger, glabrous fruits. *H. laevigata* has the male perianth more spherical in outline, and the fruits much larger and pubescent. *H. moluccana* has incurved anthers and glabrous fruits. See also note 3.

3. In 1975 Sinclair determined the specimens (now assigned to the present species by me) as *H. parviflora*, a species, which in my present treatment differs in general habitat (pale twigs), quite different spike-like inflorescences (glabrous male flowers with different androecium; glabrous ovaries) and in its glabrous, larger fruits, which blacken on drying. In his description of *H. parviflora*, he erroneously accepted both the glabrous and the tomentulose condition of the ovaries for that species.

39. Horsfieldia tuberculata (K. Sch.) Warb. Fig. 1B(39); 19

Horsfieldia tuberculata (K. Sch) Warb., Mon. Myrist. (1897) 279, t. 23 f. 1-3; K. Sch., Notizbl. Bot. Gart. Berl. 2 (1898) 117; Schum. & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee (1900) 324; Markgraf, Bot. Jahrb. 67, 2 (1935) 151, p.p.; A.C. Smith, J. Arn. Arb. 22, 1 (1941) 62. — *Myristica tuberculata* K. Sch. in Schum. & Hollrung, Fl.. Kais.-Wilh. Land (1899) 46; Warb., Bot. Jahrb. 13, 3-4 (1891) 308. — Type: (Bat Isl. Admiralty Isls.) *Hollrung 848* (♂, Kaiser Wilhelms-Land) (B †; iso: K, L & P); *Kärnbach s.n.* (fr., B †).

H. novoguineensis var. *moseleyana* Warb., Mon. Myrist. (1897) 273; K. Schum. & Lauterbach, Fl. Deutsch. Schutzgeb. Südsee (1900) 324. — Type: *Moseley s.n.* (*B* †; iso: BM, K).

H. solomonensis A.C. Smith, J. Arn. Arb. 22, 1 (1941) 64. — Type: *Kajewski 1549* (A, *n.v.*; iso: BM, P; BO, BRI & G, *n.v.*).

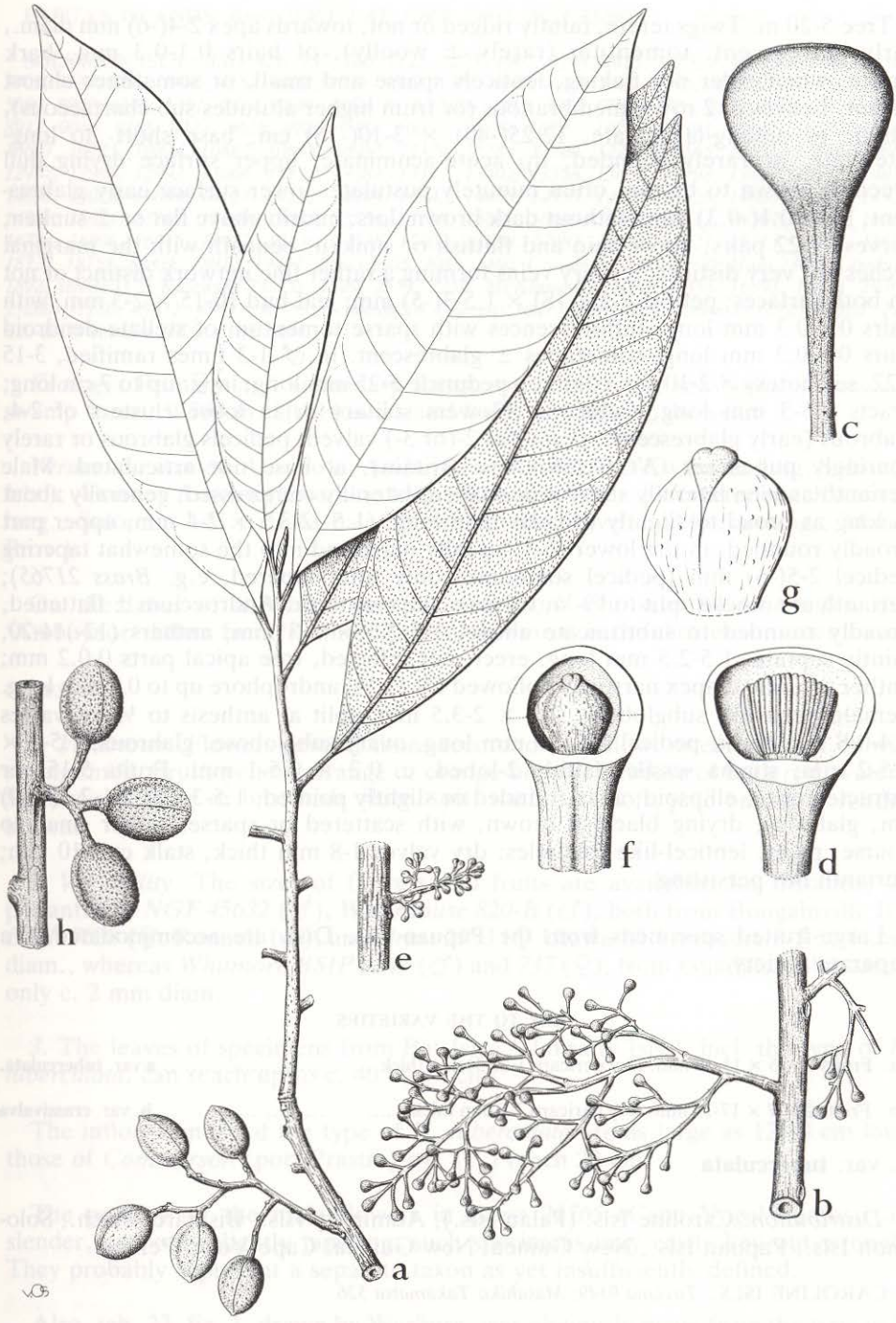

Fig. 19. *Horsfieldia tuberculata* (K.Sch.) Warb.
a, habit of leafy twig with infructescence, × ½; *b,* portion of twig with male inflorescences, × ½; *c,* mature male flower, lateral view, × 6; *d,* ditto, opened, showing androecium, × 6; *e,* portion of twig with female inflorescence, × ½; *f & g,* opened female flower and glabrous ovary with shallowly 2-lobed stigma, × 6 and × 12 respectively; *h,* twig portion with infructescence with mature fruits, × ½. — *a,* from *BSIP 14035; b-d,* from *Waterhouse 820-B; e-g,* from *BSIP 9628; h,* from *BSIP 10611.*

Tree 5-20 m. Twigs terete, faintly ridged or not, towards apex 2-4(-6) mm diam., early glabrescent, tomentum (rarely ± woolly), of hairs 0.1-0.3 mm, bark striate, when older not flaking, lenticels sparse and small, or sometimes almost absent. Leaves in 2 rows, membranous (or from higher altitudes sub-chartaceous), elliptic to oblong-lanceolate, 12-25(-40) × 3-10(-16) cm, base short- to long-attenuate, or rarely rounded, tip acute-acuminate; upper surface drying dull greenish brown to brown, often minutely pustulate, lower surface early glabrescent, hairs 0.1(-0.3) mm, without dark brown dots; midrib above flat or ± sunken; nerves 11-22 pairs, above thin and flattish or sunken, beneath with the marginal arches not very distinct; tertiary veins forming a rather fine network distinct or not on both surfaces; petiole 8-15(-18) × 1.5-3(-5) mm; leaf bud 10-15 × 2-3 mm, with hairs 0.1-0.3 mm long. Inflorescences with sparse tomentum of stellate-dendroid hairs 0.1-0.3 mm long, sometimes ± glabrescent, in ♂ 1-3 times ramified, 3-15 (-22, see notes) × 2-10 cm, common peduncle 5-25 mm long; in ♀: up to 7 cm long; bracts 0.5-3 mm long, caducous. Flowers solitary or in loose clusters of 2-4, glabrous (early glabrescent); perianths 2-(or 3-) valved; pedicels glabrous or rarely sparingly pubescent (*NGF 169*, New Britain), at base not articulated. Male perianth as seen laterally short-pear shaped, laterally compressed, generally about as long as broad to slightly broader than long, (1.5-)2-3.5 × 2-4 mm, upper part broadly rounded, in the lower ⅓-½ usually narrowed into the somewhat tapering pedicel 2-5(-6) mm (pedicel sometimes only little tapered, e.g. *Brass 21765*); perianth at anthesis split to ½-¾, valves c. 0.2 mm thick. Androecium ± flattened, broadly rounded to subtruncate above, 1.5-2.5 × 2-3 mm; anthers (12-)14-20, faintly septate, 1.5-2.5 mm long, erect, not inflexed, free apical parts 0-0.2 mm; anther column at apex narrowly hollowed for ⅕-⅓; androphore up to 0.2 mm long. Female perianths subglobose, 2-3 × 2-3.5 mm, split at anthesis to ½-⅔, valves 0.4-0.8 mm thick; pedicel 1.5-2.5 mm long, ovary subglobose, glabrous, 1.5-2 × 1.5-2 mm; stigma sessile, faintly 2-lobed, c. 0.2 × 0.5-1 mm. Fruits 5-15 per infructescence, ellipsoid, apex rounded or slightly pointed, 1.5-3.7 × 1.1-2.5(-3.0) cm, glabrous, drying blackish brown, with scattered or sparse, rather small to coarse, paler, lenticel-like tubercles; dry valves 1-8 mm thick; stalk c. 3-10 mm; perianth not persisting.

Large-fruited specimens from the Papuan Isls. Dist. are accommodated in a separate variety.

KEY TO THE VARIETIES

1a. Fruits 15-25 × 11-16 mm. Dry pericarp 1-2(-3) mm thick ..... **a** var. **tuberculata.**

b. Fruits 27-37 × 17-25 mm. Dry pericarp 3-8 mm thick ..... **b.** var. **crassivalva**

a. var. **tuberculata**

Distribution: Caroline Isls. (Palau Isls.), Admiralty Isls., Bismarck Arch., Solomon Isls., Papuan Isls., New Guinea: New Guinea: Cape Vogel Penins.

CAROLINE ISLS.: *Tuyama 9349; Masahiko Takamatsu 526.*

ADMIRALTY ISLS.: *LAE 53629, Hollrung 848; Moseley s.n.*

BISMARCK ARCH.: *Commerson s.n.; LAE 52150, 66532; NGF 169, 7944, 10981, 12329, 26574, 26621, 26737, 29680, 29683, 32227, 41370, 4140, 42280; Sands et al. 2975.*

PAPUA NEW GUINEA (mainland): *Brass 21765; Saunders 493; UPNG. 4035.*

PAPUAN ISLANDS: *Brass 28464; LAE 52607, 74575, NGF 25280.*

SOLOMON ISLS.: *BSIP 426, 737, 766, 1125, 1273, 1967, 2248, 2615, 2855, 3145, 3358, 3437, 3510, 3703, 3739, 3843, 3986, 4154, 4183, 4719, 4842, 4873, 4960, 4998, 5180, 5396, 5519, 5743, 5806, 5922, 5689, 5997, 6172, 6391, 6414, 6849, 6858, 7110, 7186, 7419, 7717, 7736, 7826, 8164, 8395, 8721, 8880, 8912, 9046, 9165, 9323, 9628, 9783, 9951, 10057, 10179, 10223, 10295, 10393, 10522, 10576, 10611, 10697, 10721, 10824, 10887, 10913, 10952, 11374, 11284, 11766, 12212, 12565, 12651, 12836, 12864, 12917, 12958, 12992, 13066, 13131, 13281, 13347, 13402, 13558, 13682, 13798, 13871, 13948, 14025, 14035, 14078, 14099, 14127, 14202, 14205, 14342, 14488, 14553, 14625, 14826, 14868, 14900, 14929, 14981, 15074, 15161, 15260, 15281, 15556, 15568, 15871, 16000, 16141, 16422, 16507, 16595, 16769, 16784, 16895, 16915, 16982, 17436, 17538, 17802, 17880, 17987, 18045, 18221, 18313, 18478, 18683, 18722, 18758, 18835, 18912, 19421; Brass 2605, 2983, 3460; Craven & Schodde 90; Hunt 2387; Kärnbach 1892, sterile* (L)*; Kajewski 74(75), 1549, 2554, 2710; McKinnon 7; NGF 16356, 16391, 16431, 19709, 25280, 31120, 45632, 45693, 45753; Schodde (& Craven) 3687, 4068; Waterhouse 35* (21275)*, 167, 178, 820-B: Whitmore 6022, 6188, 6290.*

Ecology. Primary and secondary forest; on coral rock, seashores, limestone, swamp forest; 0-700 m. alt. Flowers and fruits throughout the year.

Vernacular names. Abuino'o, Ambuino'o, Ambuynor (Kwara'ae lang, Solomon Isls.); Aininiu, Ainynu (Kwara'ae lang., Solomon Isls.); Kokotetepina (Kwara'ae lang., Solomon Isls.); Bale bale (New Britain); Pive'ar (Mbuke lang., Manus Prov.).

On the label of a Whitmore specimen from Choiseul Isl. is written that 'Ambuynor' differs from 'Aininiu' (= *H. whitmorei*) in the shorter, broader leaves.

NOTES

1. Fieldnotes. Flowers several times recorded as yellow, sweet scented or with strong smell. Fruits yellow, orange or orange-brown. Exudate of bark red, watery. Slash wood white or brownish white, soft; slash bark soft, pale brown or reddish brown.

2. Variability. The sizes of flowers and fruits are available; for instance, the perianths of *NGF 45632* (♂), *Waterhouse 820-B* (♂), both from Bougainville Isl., *BSIP 9628* (♀, Rennell Isl.), and *Brass 2983* (♀ Ulawa Isl.) measure 3-3.5(-4) mm diam., whereas *Whitmore BSIP 3843* (♂) and *737* (♀), from Guadalcanal measure only c. 2 mm diam.

3. The leaves of specimens from Bat Isl. (Admiralty Isls.), incl. the type of *H. tuberculata*, can reach up to c. 40 by 14 cm.

The inflorescences of the type of *H. tuberculata* are as large as 12-18 cm long, those of *Commerson* (port Prastin) *s.n.* (P.) reach 22 cm.

The pedicels of the male flowers in *Brass 21765* (Cape Vogel Penins.) are slender, and only slightly tapering; such specimens may easily key out wrongly. They probably represent a separate taxon as yet insufficiently defined.

Also, tab. 23, fig. 1, drawn by Warburg, was obviously made from the type in B; it does not show the perianths and pedicel as being much tapered but the latter is rather terete and slender.

On the other hand, I have examined the istotypes in K, L, and P and found them agreeing well with the description of the species as presently given.

b. var. **crassivalva** de Wilde, *var. nov.*

A varietate typica in fructibus maioribus 27-37 mm longis pericarpio sicco 3-8 mm crasso differt — Type: *Brass 28352* (L: K. iso).

Twigs rather stout, at apex (3-)4-5 mm diam. Leaf blades 25-35 × 10-12.5 cm. Male perianths c. 3 × 3.3 mm; androecium much flattened, c. 1.8 × 1.8 mm, anthers c. 12, free apices c. 0.1 mm long; androphore c. 0.1 mm long. Pedicels 3-6 mm. Fruits 27-37 × 17-25(-30) mm. Dry pericarp c. 3-8 mm thick.

Distribution. New Guinea, Louisiade Arch.: Misima Isl., Tagula Isl., Rossel Isl.: doubtful on San Cristobal (Solomon Isls.).

LOUISIADE ARCH.: *Brass 27648, 28143, 28352; Whitmore 6268* (San Cristobal, doubtful).

Ecology. Riverine rain forest at low altitudes, creek alluvium soil; 0-20 m.

NOTES

1 Fieldnotes. Subcanopy tree. Flowers yellow, very fragrant. Fruits to 5 cm diam., orange, ovoid or subglobose, keeled; aril pink.

2. Specimens belonging to the present variety generally have a stout habit with coarse twigs and large leaves, and have relatively large perianths; these sizes fall, however, within those accepted for the type variety.

3. The fruits of the type, *Brass 28352,* from Rossel Isl., at sea-level, are in the fresh state reported as subglobose and as large as 5 cm diam. Those of *Brass 27648* (Misima Isl.) measure c. 4.5 × 3.5 cm. A specimen from Rossel Isl. included in var. *tuberculata, Brass 28464,* has mature fruits, which when dried are only c. 18-22 mm. This was collected at c. 700 m alt.

4. The specimen *Whitmore 6268,* from San Cristobal is doubtful; it has stout leaves, the dry fruits measure c. 27 mm long, but the pericarp is only c. 2 mm thick. It probably belongs to var. *tuberculata.*

5. Specimens in fruit may be confused with *H. pachycarpa,* but this has minutely pubescent fruits (and pubescent ovaries), at least at the base towards the insertion of the stipe.

40. Horsfieldia corrugata Foreman Fig. 1B(40); 20 a-c

Horsfieldia corrugata Foreman, Contr. Herb. Austr. 10 (1974) 45, fig. 1. — Type: *Foreman & Lelean LAE 52461* (LAE, *n.v.;* iso: K, L; BRI, CANB, A, E & SING, *n.v.*).

Tree 5-12 m. Twigs terete, not ridged, towards the apex (3-)4-5(-12) mm diam., early glabrescent, tomentum minute greyish to rusty, of hairs c. 0.1 mm; bark striate, when older not flaking, lenticels present, coarse but usually not much contrasting in colour. Leaves in 2 rows, thinly coriaceous, elliptic-oblong, broadest at or above the middle, 12-29(-32) × 4.5-8.5(-10) cm, base attenuate, top acute-acuminate; upper surface drying dark brown, minutely pustulate or not, lower surface early glabrescent, without larger dark-brown dots; midrib slender to rather broad, flattish above; nerves 12-18 pairs, thin and flat above, beneath with the

Fig. 20. *Horsfieldia corrugata* Foreman: *a*, longitudinally opened male flower showing androecium, × 6; *b*, ditto, female flower, showing pubescent ovary and narrow 2-lobed style, × 6; *c*, fruit, × ½. — *Horsfieldia pachycarpa* A.C. Smith: *d*, leafy twig with infructescence, × ½; *e*, longitudinally opened male flower, showing androecium, × 6; *f*, ditto, female flower with pubescent ovary with shortly 2-lobed stigma, × 6; *g*, almost mature fruit, × ½. — *a*, from *Carr 14123; b*, from *LAE 60020; c*, from *Carr 14334; d*, from *LAE 62196; e*, from *LAE 51940; f*, from *Clemens 5378; g*, from *NGF 38895*.

marginal arches distinct or not, not very regularly looping; tertiary veins forming a lax network, indistinct; petiole 6-18 × 2-3.5 mm; leaf bud 10-20 × 1.5-3 mm, with hairs c. 0.1 mm. Inflorescences thinly pubescent with rusty stellate hairs c. 0.1 mm long or less; in ♂: 2 or 3 times ramified, rather slender, (4-)6-14 × 2-9 cm, in ♀ up to c. 5 cm long, common peduncle c. 10 mm; bracts pubescent, 1.5-4 mm long, caducous. Flowers (in ♂) solitary or in loose clusters of 2-5, glabrous or glabrescent from scattered hairs less than 0.1 mm; perianth 2-valved; pedicel ± tapering, thinly pubescent or glabrescent, at base inarticulate. Male perianths in lateral view subcircular, including the short-pear shaped pedicel, which is somewhat laterally compressed, about as broad as long, 3.0-3.5 × 3.0(-4.0) mm, the top broadly rounded, the lower half ± tapering into the thickish tapering pedicel (2-)3-4 mm long; perianth at anthesis splitting from ½ to nearly ⅔, valves c. 0.2 mm thick at apex, the perianth towards base only slightly thicker, often provided with a few coarse blackish-brown wart-like dots. Androecium thickish, not much laterally compressed, above broadly rounded, (1.5-)2.0-2.2 × 2.0-2.2(-3.0) mm, anthers 8-12, erect, not septate, c. 2 mm long, free apical parts 0.1-0.2 mm, androphore 0.2-0.3 mm long; anther column narrowly hollowed for c. ⅕-¼ at apex. Female perianth rather narrowly ovoid, almost glabrous, with a few coarse, dark-brown wart-like dots, c. 4.5 × 3 mm, cleft at anthesis to c. ¼-⅓, valves c. 0.3-0.4 mm thick, coriaceous; pedicel 4-5 mm long, very minutely scattered-pubescent; ovary ovoid, somewhat dented or corrugated, c. 2.5-3 × 2.5 mm, densely minutely pubescent with hairs less than 0.1 mm long, style and 2-lobed stigma glabrous, 0.8-1.0 mm long. Fruits 1(-4) per infructescence, ramiflorous, broadly ellipsoid to subglobose, somewhat flattened, 6-7.5 × 4.5-6.5 cm, at base contracted or not into a short pseudostalk, top acutish, coarsely flanged and corrugated, drying blackish brown, with scattered coarse paler-coloured tubercles, glabrescent, valves ± woody-corky, 10-20 mm thick; stalk 5-10 mm long; perianth not persisting.

Distribution. Papua New Guinea: Central Prov., Northern Prov., Milne Bay Prov.

NEW GUINEA. Papua New Guinea: *Carr 14123, 14334, Foreman & Lelean LAE 52461, 60020; NGF 41016, 46430; Pullen 5496.*

Ecology. Primary and secondary rainforest on slopes and ridges, fagaceous forest; at 1200-1900 m. Flowers and fruits from July to December.

Vernacular name. Sodowa (Port Moresby Dist.)

NOTES

1. Fieldnotes. Mountainous terrain; small tree; wood very light brown. Flowers yellow or orange. Fruits green, strongly wrinkled or corrugated, and strongly ridged. Aril orange.

2. I have not seen the male flowering material described by Foreman, but the male flowers of *Carr 14123,* not cited by him, agree with his description.

3. Those specimens of this species, not seen by Foreman, were identified by Sinclair as *H. spicata* var. *spicata (Carr 14334)* or *H. praetermissa* Sinclair, *in sched. (Carr 14123).*

4. When in flower, the specimens may be difficult to distinguish from, e.g., *H. pachycarpa* or *H. tuberculata.* Possibly the few coarse and conspicuous blackish-brown wart-like dots on the perianth, found in both ♂ and ♀ flowers, are characteristic for the species. Furthermore, the very large corrugated and ridged thick-valved fruits are very distinctive. Large, thick-valved fruits also occur in *H. pachycarpa, H. tuberculata* var. *crassivalva* or in certain forms of *H. laevigata,* but in our present species the fruits exceed those in size.

41. Horsfieldia pachycarpa A.C. Smith Fig. 1B(41); 20 d-g

Horsfieldia pachycarpa A.C. Smith, J. Arn. Arb. 22 1 (1941) 64 — Type: *Brass 610* (A, *n.v.*).

Horsfielda praetermissa Sinclair, *in sched. (Carr 13262,* etc.).

Tree; 5-25 m. Twigs terete, faintly ridged or not, towards the apex 3-5(-12) mm diam., early glabrescent, tomentum minute, with hairs c. 0.1 mm; bark coarsely striate, when older not flaking, lenticels usually coarse and distinct. Leaves in 2 rows, membranous or thinly coriaceous, elliptic-oblong to lanceolate, broadest below to above the middle, 17-30 × 4-11 cm, base attenuate, tip acute-acuminate; upper surface drying dark brown, usually minutely pustulate, lower surface early glabrescent, without larger dark-brown dots; midrib above slender to rather broad, flattish; nerves 14-18 pairs, above thin, flat, inconspicuous, beneath with the marginal arches distinct or not, not very regularly looping; tertiary veins forming a lax network, indistinct; petiole 6-12 × 2-5 mm, leaf bud 10-15 × 2-3 mm, with hairs c. 0.1 mm. Inflorescences subglabrous or with sparse stellate hairs 0.1-0.2(-0.3) mm, 2-4 times ramified, in ♂: 7-15 × 6-10 cm, in ♀ up to c. 10 × 4 cm, common peduncle 5-25 mm; bracts caducous, not seen. Flowers in loose clusters up to 5 each, thinly pubescent with hairs c. 0.1 mm, or glabrescent towards the apex; perianth 2-valved; pedicels thinly pubescent, at base not articulated. Male perianths short-pear shaped, laterally somewhat compressed, about as broad as long or slightly longer than broad, 2.5-3.2 × 2.8-3.2 mm, upper part bluntish to broadly rounded, the lower ⅔ more or less tapering into the thickish and much tapering pedicel 2-5 mm long; perianth at anthesis cleft to nearly ½, valves towards apex c. 0.2 mm thick, the perianth towards base usually thicker, ± firm-fleshy or coriaceous, 0.3-0.8 mm thick. Androecium ± laterally flattened, c. 1.8-2.1 × 1.1-1.8 mm, above broadly rounded, anthers 5 or 6, or 9 or 10, erect, not or hardly septate, c. 1.5-2 mm long, free apical parts c. 0.1-0.2 mm; androphore rather slender, 0.2-0.5 mm.; anther column at apex narrowly hollowed for c. ⅙-⅓. Female perianths ovoid-ellipsoid, 2.5-4 × 2.5-3.2 mm, split at anthesis to c. ⅓, valves 0.4-0.6 mm thick; pedicel 2-4 mm long; ovary ovoid, densely minutely pubescent, 2.5-3 × 1.8-2.5 mm, stigma sessile, minutely 2-lobed, c. 0.1 mm. Fruits 1-6 per infructescence, ellipsoid to broadly ellipsoid, often ± ridged towards the base, rounded or tapering into a short pseudostalk, apex rounded, (3.0-)3.5-4.5 × (1.8-) 2.0-3.0 cm, minutely pubescent towards the base, or glabrescent, drying blackish(-brown), usually with conspicuous coarse, paler-coloured lenticel-like tubercles; dry valves ± woody, (4-)5-10 mm thick; stalk 5-10 mm; perianth not persisting.

Distribution. New Guinea. West (Irian Jaya): Snow Mountains (Idenburg R., 1300 m); East: West Sepik Prov., Western Highlands, Eastern Highlands, Southern Highlands, Madang, Morobe, Central Provinces.

NEW GUINEA. West (Irian Jaya): *Brass 610, 12752.* — Papua New Guinea: *Carr 13262 (13362), 14146; Clemens 5378; H.O. Forbes (7) 192; LAE 51940, 60363, 60365, 62196, 65747; Manner & Street 307; NGF 21297, 29213, 29357, 32652, 38895, 47888.*

For deviating specimens see the notes.

Ecology. Primary and secondary montane forest, forest clearings, etc.; often on ridges; recorded from fagaceous and *Castanopsis-Lithocarpus* forest; (450-)1000-2000 m alt. Flowers and fruits throughout the year.

Vernacular names. Cheeweng (Maring), Kupgne (West Sepik), Mong-mong (Weng lang., West Sepik).

NOTES

1. Fieldnotes. A montane species; branches often horizontal. Bark shallowly vertically fissured; exudate watery, clear or ± reddish. Wood pink, cream, or whitish. Flowers yellow, fragrant. Fruits ramiflorous, glossy green turning yellow to orange, eaten by cus-cus.

2. Related and resembling species. Differs from *H. tuberculata* by the more thick-fleshy or woody-fleshy, largely pubescent perianth, and by the pubescent ovary and fruit.

Fruiting specimens may resemble *H. laevigata* much, which is obviously closely related. The male flowering specimens of the present species (*Carr 13262, 13362, 14146, LAE 51940, Manner & Street 307*) have, however, essentially differently shaped (± pear-shaped) flowers, and are of a more fleshy-woody consistency; those of *H. laevigata* being much more globose, with the pedicel more slender, not pear-shaped, and of a more membranous-herbaceous consistency.

Through the somewhat resembling male flowers *H. pachycarpa* appears related to *H. corrugata*, a species with much larger 'corrugated' fruits, from similar montane habitats. The flowers of *H. corrugata* are probably always provided with some large, thickened blackish dots, a character not seen in *H. pachycarpa.*

It should be remarked here that *H. tuberculata* var. *crassivalva* (from the Louisiade Arch.), a taxon only known from fruits which also have a thick pericarp, is very similar as well.

3. Deviating specimens. Rather many specimens in fruit deviate in the smaller sizes of female flowers and fruits, *viz. Carr 13901, Jacobs 8834, 9079, LAE 66790, NGF 37317, 41594, Robbins 624.* They are from Central Prov., W., E, and S. Highlands Prov., and West Sepik Prov.; all from well above 1000 m., except *Jacobs 9079* (600-700 m alt.). The female perianths measure about 2-2.8 × 1.8-2.3 mm; the fruits c. 2.5-3.5 × 1.7-2.0 cm, and have a thick woody pericarp. In size and general appearance these fruiting specimens seem intermediate to and often can hardly be distinguished from the common *H. laevigata.* However, the fruits of the mentioned specimens also completely link up with the generally larger fruits of *H. pachycarpa,* of which the male flowers are presumably essentially of a different shape and texture as those of *H. laevigata.* Future collectors should search in the field for male specimens which belong with certainty to the above-mentioned female collections.

4. Sinclair included most specimens of the present *H. pachycarpa* in his *H. spicata* var. *spicata; Car 14146* was identified provisionally as *H. praetermissa* Sinclair, *in sched.*, with the remark that better material is still required.

5. I have not seen the type specimen, *Brass 610 (A)* from Biriatabu at 450 m (Snow Mts. Dist.) but its description agrees well with the species as described presently. In P there is an isotype, without fruit.

42. Horsfieldia pulverulenta Warb. Fig. 1B(42)

Horsfieldia pulverulenta Warb., Mon. Myrist. (1897) 342, t. 23 fig. 1-2; Markgraf, Bot. Jahrb. 67, 2 (1935) 150 (sub *H. ralumensis)* — *Myristica pulverulenta* (Warb.) Boerl., Handl. Fl. Ned. Ind. 3, 1 (1900) 87 — *Horsfieldia hellwigii* var. *pulverulenta* (Warb.) Sinclair, Gard. Bull. Sing. 28 (1975) 56 p.p., excl. *Vink BW. 12194* = *H. leptantha* — Type: NW. New Guinea, Vogelkop Penins. (Andai, Mt. Arfak), *Beccari 759* (FI, *n.v.), 925* (FI, *n.v.*).

Horsfieldia hellwigi var. *hellwigii* x var. *pulverulenta* (Warb.) Sinclair, Gard. Bull. Sing. 28 (1975) 58 — Syntype: *Saunders 202* (L, lecto), *358, 398, 483* (L: CANB, *n.v.*).

Tree 15-25 m. Twigs terete, towards the top 4-10 mm diam., early to rather late glabrescent, tomentum dark rusty with hairs c. 0.5-1.2 mm, bark finely striate or not, when older not flaking, lenticels usually present. Leaves in 2 rows, coriaceous, elliptic to oblong-lanceolate, broadest usually at or below the middle, or ± parallel-sided, 14-35(-40) × 4-10.5(-13) cm, base rounded or short-attenuate, tip acute acuminate, often to 2(-3 in sapling shoots) cm, caudate; upper surface drying usually dull brown to olivaceous, minutely rugose-pustulate, lower surface late glabrescent or with persistent tomentum composed of ± evenly sized and spaced, rather harsh, dark brown hairs c. 1.0-1.5 mm long, when shed usually leaving thickened and rough hair bases, without brown dots; midrib above flattish, later glabrescent and usually with persistent tomentum towards base; nerves 11-30 pairs, generally rather straight, 50-70° with the midrib, c. 5-15 mm apart, thin and sunk above; beneath the marginal nerve with the arches usually very regular and prominent; tertiary venation rather lax, above well-visible and sunken, giving the blade often a ± bullate appearance; petiole 2-12 × 2.5-4.5 mm, not or hardly winged; leaf but stout, 3-6 cm long, with harsh hairs 1-1.5 mm long. Inflorescences woolly-pubescent with hairs 1-1.5 mm long, 2-3 times ramified, rather many-flowered, in ♀ and ♂: 4-10 × 2-9 cm, common peduncle up to 15 long; bracts (broadly) ovate, acutish, 3-5 mm long, caducous. Flowers ± solitary (in ♀) or in loose clusters of 2-6; perianths 2-valved, largely set with stellate(-dendroid) hairs 0.1-0.3 mm; pedicels slender, pubescent with coarse hairs 0.4-0.7 mm, at base inarticulate. Male perianths in lateral view subcircular, 1.5-3 × 3-4 mm, the basal part thick and coriaceous, the remainder collapsed when dry and perianth then often saucer-shaped or wrinked, at the apex just above the anthers, opening by a minute pore-like slit less than 1 mm wide; valves or apical part of perianth c. 0.2(-0.4) mm thick. Pedicels 2-3.5 mm long. Androecium consisting of a coriaceous ± ellipsoid column c. 0.8-1.1 mm long, with 2 small anthers, each 0.2(-0.3) mm at the apex. Female perianth broadly ellipsoid-ovoid, 3.8-4 × 3.5-4 mm, split at anthesis to c. ⅕-⅒, with a minute pore-like slit above the stigmas, valves c. 0.3-0.5 mm thick; pedicels (1.5-)3-5 mm long; ovary ovoid-subglobose, c. 2.5-3 × 2.5 mm, densely pubescent with hairs 0.1-0.3 mm; style erect, glabrous, 0.2-0.8 mm long; stigma 2-lobed, c. 0.2-0.3 mm long. Fruits c. 3-10 per infructescence, ellipsoid, top acute and sometimes acuminate, 3.0-5.0 × 2.0-3.0 cm, minutely pubescent at least at the base, valves woody-coriaceous, 4-7 mm thick, usually with paler, small or coarse lenticels or tubercles; stalk 2-7 mm long; perianth not persisting.

Distribution. New Guinea: Irian Jaya (Vogelkop, Jayapura, Geelvink Bay; Mimika, in the South), Papua New Guinea (West Sepik, East Sepik, Madang, Western; the Gulf Prov. specimen deviates.

NEW GUINEA. Irian Jaya: *b.b. 30514, 31098, (Lundquist 103) 32822; BW 2727, 2733, 6666, 9173, 9420, 11111; Doctors van Leeuwen 10479* — Papua New Guinea: *Darbyshire & Hoogland 8094; Katik W 2877; LAE 52930, 53567; NGF 27471, 34154, 34339, 45861, 45913, 48290; Saunders 202, 358, 398* — Deviating: Gulf Dist., *Schodde & Craven 4662* (see notes).

Ecology. Lowland primary and (old) secondary rain forest, ridge-side forest, swamp forest; on clay, stony-sandy soil; 0-500 m alt.; flowers and fruits throughout the year.

Vernacular names. Baa (Hollandia), Gumaga (E. Sepik), Ibuumkwaraf (Kemtoek lang., Hollandia), Patepa (Siere-Octa, SW. New Guinea), Poi (Pogatumo lang., Sepik Prov.), Sabobo (Orne lang., Mafoka, Sepik Prov.), Vionge (Nemo lang., Hollandia).

NOTES

1. Fieldnotes. Bole unbuttressed or with slight buttresses. Bark often strongly peeling in small, oblong, thin scales, black-brown or dark brown. Wood whitish or straw, moderately hard and heavy. Flowers yellow, greenish-yellow or pale orange-yellow. Fruit greenish, greenish-yellow, or yellow-brown; aril red.

2. The present species obviously belongs to the group with *H. hellwigii* which has stout twigs, the pubescence on the leaf bud and apex of twigs conspicuous, composed of coarse hairs (0.5-)1-1.5 mm long. It is very distinct by its woody perianths, usually collapsed in ♂ around the much 'reduced' androecium. This latter consists of an ellipsoid woody body, its apex with only 2 apparently much reduced anthers or thecae just below the apical pore-like slit of the perianth.

The female flowers are larger than those of *H. hellwigii.*

3. The late Dr. Muller of the Rijksherbarium investigated the pollen of *LAE 52930* and remarked: little pollen produced, 25-30 μ, boat-shaped with proximal side convex, exine 0.5 μ thick, very finely echinate, echinae 0.5 μ long. In comparison, the related *Horsfieldia hellwigii (Brass 25949)* produces abundant pollen, 30-40 μ, boat-shaped with convex proximal side, exine 1.5 μ thick, finely echinate, echinae 1 μ long.

4. Deviating specimen. The specimen *Schodde & Craven 4662,* from the Gulf Province, Papua, with ♂ flowers, deviates in its non-coriaceous leaves, the more woolly tomentum (not harsh) and the densely tomentose perianths. The perianths do not dry blackish brown as is usual in *H. pulverulenta*, but are instead, rather light brown and only slightly collapsed. The perianths contain a much reduced androecium, comparable to that found in *H. pulverulenta.* The marginal nerve of the leaves is looping very regularly, as in *H. pulverulenta.* The specimen may represent a separate taxon.

5. Sterile, dubious specimens. The sterile material cited below with rather membranous leaves, probably belong to the present species. For the greater part they might have been taken from sapling shoots. The tomentum is generally softer than

in a true *H. pulverulenta*. Often the leaves are long-caudate. They might belong to one of the other related species of the *H. hellwigii*-complex as well. Sinclair referred these specimens to a group of hybrids between *H. hellwigii* var. *hellwigii* and var. *pulverulenta*. The specimens are from the Madang district, NE. New Guinea: *Saunders 202, 358, 398,* and from Jayapura, Irian Jaya: *BW 6666, 9173.*

6. Sinclair accepted the present species as a variety under *H. hellwigii*.

He, however, did not cite the curious woody flowers with the apparently reduced androecium nor the differing female flowers.

7. I have not seen the syntypes; Sinclair enumerates them among several collections also seen by me, some of which, however, e.g., *Vink BW 12194* is presently referred to a new species, *H. leptantha*.

43. Horsfieldia leptantha de Wilde, *sp. nov.* Fig. 1B(43)

Ramuli validi, eoram apicibus atque gemmis praeditis pilis 0.5-1.0 mm longis. Perianthium masculum 2-valve, subglobosum, pubescens, in anthesi usque as ¾-⅚ divisum, valvis c. 0.2 mm crassis, androecii lateraliter compresso, antheris 10-14, erectis. Fructus breviter ellipsoidei, 2.0-2.4 cm longo, grosse tuberculati — Type: Irian Jaya, Fak-Fak, *Vink BW 12194* (L).

Tree 8-30 m. Twigs terete, towards the apex 4-8 mm diam., early to late glabresent, tomentum rusty, of hairs 0.5-1.0 mm long, bark finely or coarsely striate, when older not flaking; lenticels usually present. Leaves in 2 rows, membranous to chartaceous, elliptic to oblong-lanceolate, broadest usually in the middle, generally not parallel-sided, 13-35 × 5-13.5 cm, base (short-) attenuate, tip acute-acuminate, not caudate; upper surface drying dull brown to olivaceous, smooth or finely pustulate, lower surface rather early to late glabrescent or with persistent tomentum of stellate-dendroid rather woolly or 'mealy' hairs of mixed sizes, 0.5-1.0 mm long, when shed not leaving rough hair bases; without brown dots; midrib above flattish, glabrescent except towards base; nerves 10-20(-30?, see notes) pairs, usually at c. 45°-50° with the midrib, 5-20 mm apart, above thin and sunken or flattish, below, the arches of the marginal nerve not very regular, prominent or not; tertiary venation lax, distinct or not; petiole 5-12 × 2.5-4 mm, not winged; leaf bud stoutish, 2.5-5 cm long, with dense tomentum of hairs 0.5-1.0 mm long. Inflorescences woolly-pubescent with hairs 0.5-1.0 mm long, in ♂: rather many-flowered, 2 or 3 times ramified, c. 11 × 7 cm, common peduncle 5-20 mm long; flowers in loose clusters of 2-6 each, perianth 2-valved, completely pubescent with hairs 0.2-0.3 (-0.5) mm; pedicels slender, pubescent, at base inarticulate; bracts broadly elliptic, obtuse, 2-3 mm long. Male perianth in lateral view subcircular, c. 2.5 × 2.7-3 mm, somewhat laterally compressed, sub-membranous, not collapsing on drying; pedicel 1-1.5 mm long; perianth at anthesis split to ¾-⅚; valves c. 0.2 mm thick. Androecium laterally compressed, c. 1-1.3 × 1.3-1.6 mm, above broadly rounded-truncate, the column inside narrowly hollowed for c. ¼ (c. 0.3 mm), anthers 10-14, erect touching each other, somewhat septate when young, 1-1.1 mm long, free apices c. 0.2-0.3 mm, not or but faintly incurved; androphore ± 0. Female flowers not seen. Infructescences 6-12 cm long, branched. Fruits 2-8 per infructescence, broadly ellipsoid to subglobose (seed ellipsoid), apex obtuse or broadly rounded, 2.0-2.4 × 1.6-2.0 cm, largely glabrescent but with minute vestigial hairs towards the base, tubercles coarse, pale, lenticel-like, valves woody-coriaceous, 4-7 mm thick; stalk 5-10 mm long; perianth not persisting.

Distribution. New Guinea: Irian Jaya (Vogelkop, doubtful; Fak-Fak), Papua New Guinea (West Sepik).

Ecology. Secondary and primary forest, ridge forest, on clay soil over limestone; 0-600 m. Flowering and fruiting apparently not seasonal.

NEW GUINEA. Irian Jaya: *BW (Koster) 10763* (doubtful, see notes), *Vink 12194, (Moll) 12952; Pleyte 553; Pulle 343.* — Papua New Guinea: West Sepik, *LAE 52962; NGF 25241.*

NOTES

1. Fieldnotes. Bark recorded as greenish black; blaze with pinkish red serous sap.

2. The male perianths are deeply cleft, to c. ¾-⅚, much deeper than in the other species of the *H. hellwigii* complex. The fruits with their coarse lenticels and tubercles are strongly reminiscent of those in *H. laevigata;* there is likely to be a true close relationship with this species.

3. A doubtful sterile specimen from Vogelkop, *BW 10763,* is tentatively included in the present species, mainly because of its locality. It deviates by its numerous side-nerves, c. 30-33, which are almost parallel and depart from the midrib at an angle of c. 70°; the marginal nerve is distinct and loops very regularly, both characters predominant in the related *H. pulverulenta.* However, the tomentum on the lower leaf surface is rather mealy and is composed of hairs of rather mixed sizes, and the leaves are membranous in texture, not rough. The specimen might likewise belong to one of the other related species of the *H. hellwigii* complex.

44. Horsfieldia hellwigii (Warb.) Warb. Fig. 1B(44); 21

Myristica hellwigii Warb., Bot. Jahrb. 18 (1893) 192 — *Horsfieldia hellwigii* (Warb.) Warb., Mon. Myrist. (1897) 343; Markgraf, Bot. Jahrb. 67, 2 (1935) 150; A.C. Smith, J. Arn. Arb. 22, 1 (1941) 61; Sinclair, Gard. Bull. Sing. 28 (1975) 49 (for the type variety only) — Type: Finschhafen (Papua New Guinea), *Hellwig 416* (B, †, *n.v.*).

H. glabrescens Warb. in K. Schum. & Lauterbach, Fl. Deutsch. Schutgeb. Südsee (1900) 325 — Type: Papua New Guinea (Madang), *Tappendeck 74* (B, †; WRCL, seen by Sinclair).

Tree 5-30 m. Twigs stout, terete or rarely ± ridged, often hollow, towards apex (4-)5-15 mm diam.; early to late glabrescent from rusty woolly or felty tomentum of hairs 0.5-1.0(-1.5) mm long; bark finely or coarsely striate, when older not flaking; lenticels present, usually distinct. Leaves in 2 rows, membranous or rarely chartaceous, elliptic-oblong to oblong-lanceolate, broadest at or above the middle, or sometimes ± parallel-sided, 17-40(-50) × 5-14 cm, base ± rounded to (short-) attenuate, tip acute-acuminate (in New Britain specimens rarely short-caudate); upper surface drying usually dull olivaceous, minutely pustulate, lower surface late glabrescent or with persistent tomentum of hairs of mixed to subequal sizes 0.3-1.0 mm long, when shed not leaving thickened hair-bases; without brown dots; midrib above flat or slightly sunken, late glabrescent or usually with persistent tomentum towards base; nerves 12-33 pairs, thin, ± flat above, generally at an angle of c. 45° with the midrib, the marginal nerve with arches usually rather thin and ± irregular beneath; tertiary venation lax and thin, faint above; petiole (2-) 5-8

× 2.5-5 mm, not or hardly winged; leaf bud generally stout, 3-7 cm long, densely pubescent, hairs 0.5-1.5 mm long. Inflorescences woolly-pubescent, hairs 0.5-1.0 mm; in ♂: 3.5-15 × 2-10 cm, 2-3 times ramified, flowers in clusters of 3-6 each; in ♀ up to c. 8 × 5 cm, flowers in clusters of up to 4; common peduncle up to 30 mm; bracts elliptic to broadly ovate, acutish, 3-7 mm long, caducous; perianths 2- valved (flowers not known in var. *lignosa*), glabrous or early glabrescent except at base, pedicels pubescent by stellate-dendroid hairs 0.2-0.5 mm, at base inarticulate. Male perianths, as seen laterally, subcircular, 1.8-3.2 × 2.3-3.5 mm, somewhat laterally compressed, top and base broadly rounded, pedicel slender, 1-3(-4) mm; perianth at anthesis split to (⅓-) ½-⅔, valves c. 0.2 mm thick. Androecium (1.2-) 1.5-2 × (1.3-) 1.7-2 mm, laterally compressed to c. 0.8-1 mm thick, above ± broadly rounded-truncate, column c. 0.3-0.5 mm, narrowly hollowed for the upper c. ¼(-5), anthers (10-) 12-18 (i.e., 12-18 thecae at each side), erect, not septate, c. 1.2-2 mm long, completely sessile, mutually touching, free apices 0-0.1 mm, not incurved; androphore ± broad, up to 0.1 mm long. Female perianth subglobose or broadly ovoid, c. 2.8-3.5 × 3 mm, split at anthesis to ⅓-½, valves 0.2-0.3 mm thick; pedicel 1-2 mm long; ovary subglobose, c. 2 mm diam., densely pubescent with hairs 0.2-0.4 mm long, stigma largely sessile, faintly 2- lobed, c. 0.1 mm high. Fruits 3-15 per infructescence, subglobose or broadly ellipsoid to fusiform, top rounded or generally acutish (when dry), 1.2-2.8 × 1.0-1.8 cm, densely pubescent or partly glabrescent with hairs c. 0.5 mm, usually rather finely lenticellate-tuberculate, dry valves 1-3 mm, or in var. *lignosa* 4-8 mm thick; stalk 1-4 mm long; perianth not persisting.

Distribution. Papua New Guinea, New Britain and New Ireland; not yet found in Irian Jaya.

Ecology. Primary and secondary forest, regrowth; in primary forest an understorey or second storey tree, in secondary forest often common; lowland rain forest, ridge forest, also monsoon forest, gallery forest; on alluvial soils, also limestone; 0-1200 m. Flowers throughout the year, fruits predominantly from July to December.

Vernacular names. Apaap (Wanigela lang.), Camarngur (Lae subdist., Morobe), Fohja (Okema lang. Aku), Guma (Waskuk lang., Sepik Dist.), Hota (Garaina lang., Bulolo), Lagele Kuku (W. Nakanai, New Britain), Naufora (Talasea, New Britain), Mamasoh (Onjob lang., Koreaf), O'hènga (Orakaiva lang., Mumumi).

Uses. Fruits sometimes recorded as edible.

NOTES

1. Fieldnotes: Bole straight, unbuttressed, bark finely longitudinally fissured; crown narrow, dense; branches often tending to be whorled, horizontal, later on drooping; leaves drooping; wood rather soft and light, whitish or straw, heartwood pinkish. Flowers yellow. Fruits green turning yellow or orange, aril orange.

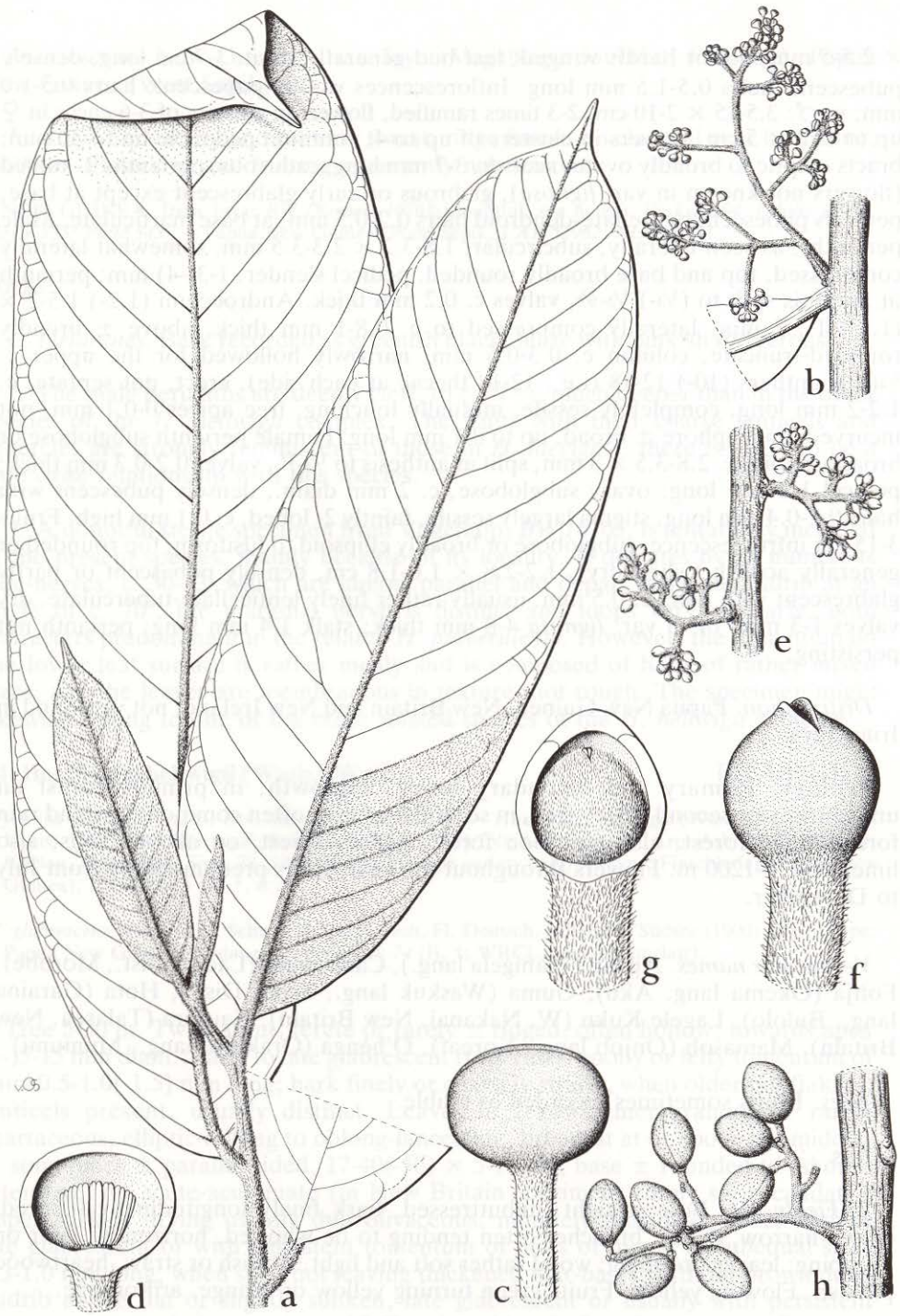

Fig. 21. *Horsfieldia hellwigii* (Warb.) Warb. var. *hellwigii*
a, apical portion of leafy twig, × ½; *b*, portion of twig with male inflorescence, × ½; *c*, mature male flower, lateral view, × 6; *d*, ditto, longitudinally opened, showing androecium, × 6; *e*, portion of twig with female inflorescences axillary to leaf-scars, × ½; *f*, female flower at anthesis, × 6; *g*, ditto, longitudinally opened, showing pubescent ovary and small bi-lipped stigma, × 6; *h*, infructescence with mature fruits. — *a*, from *NGF 26412; b-d*, from *NGF 4019; e-g*, from *Hoogland 3431; h*, from *LAE 67101*.

2. Taxonomy. The present species, here comprising three varieties, is largely identical with Sinclair's *H. hellwigii* var. *hellwigii.* Sinclair's var. *pulverulenta* (Warb.) and *his* var. *pulverulenta, Vink BW 12104,* are here referred to different species. Also, *H. ralunensis,* which Sinclair cited in the synonymy of *H. hellwigii* var. *hellwigii,* is presently accepted as a separate species. His var. *novobritannica* is presently partly, almost exclusively the type, referred to a variety of *H. laevigata.*

Horsfieldia hellwigii, as presently accepted, is still rather variable, especially in fruit size and shape; for some very small-fruited specimens and for specimens with conspicuously woody fruits, separate varieties are accepted.

KEY TO THE VARIETIES

1a. Fruit slightly asymmetrically subglobose; pericarp woody, 4-8 mm thick, the surface not wrinkled on drying ..... **c.** var. **lignosa**

b. Fruit subglobose, or ellipsoid, or fusiform; dry pericarp c. 2 mm thick, the surface usually somewhat wrinkled on drying 2

2a. Fruit broadly ellipsoid to nearly globose, 12-15 mm long ..... **b.** var. **brachycarpa**

b. Fruit broadly ellipsoid to fusiform, 16-28 mm long. ..... **a.** var. **hellwigii**

a. var. **hellwigii** Fig. 1B(44); 21

Lower leaf surface usually rather densely pubescent with hairs c. 0.3-1.0 mm. Male perianth (in bud) 2.2-3.2 × 2.4-3.5 mm, split at anthesis to ½-⅔. Anthers (12-)14-18. Fruit broadly ellipsoid to fusiform, 1.6-2.8 × 1.0-1.8 cm, pericarp 2-3 mm thick.

Distribution. As for the species.

NEW GUINEA. Papua New Guinea — Bismarck Arch. (New Britain, New Ireland): *Floyd 6410; Hoogland 3431; LAE 75366; NGF 10018, 10832, 24233, 26253, 26310, 27248; Sands et al. 2013; Waterhouse 877* — Main Island (Madang, Morobe, Northern, Milne Bay, Western, Central); *Brass 24386; Carr 11962, 13901; Clemens s.n.* (8.II. 1936), *78, 10908; Fallen et al. 282; Floyd & Hoogland 3813; Frodin UPNG 2139; Fryar 4019; Hartley TGH 9970, 10013; Hoogland 3256; 4386, 5210; LAE 67101; NGF 204, 857, 4019, 1617, 7331, 9677, 9681, 9770, 10540, 10981, 17129, 24003, 24329, 26412, 28553, 28776, 31697, 33857, 34154, 34339, 36304, 36773, 37656, 41170, 41421, 41823, 44388, 45861, 45921, 47431, 48290; Saunders 483; Womersley & Hoogland 5156* — Fergusson Isl. (Milne Bay Prov.): *Brass 25949; LAE 52558* — Deviating specimens: *LAE 66008* (Morobe Prov.); *NGF 40599* (W. New Britain); see notes.

NOTES

1. NGF 24233, from limestone at c. 1200 m, has rather chartaceous leaves.

2. The twigs are normally terete, and not or faintly ridged, in *NGF 37656* the twigs are very distinctly ridged in between the bases of the petioles.

3. Further deviating specimens: *NGF 40599* from W. New Britain, and *LAE 66008* from nearby Umboi Isl. rather differ one from the other, the former being much more pubescent. Both deviate from normal *H. hellwigii* var. *hellwiggi* by the rather more pear-shaped, i.e., at base more tapering male perianths. Possibly the specimens are a hybrid, e.g., with *H. tuberculata,* and they may appear to represent a separate taxon.

b. var. **brachycarpa** de Wilde, *var. nov.*

Differt a var. *hellwigii* fructibus siccis fere globosis, 12-15 mm longis, pericarpio 2 mm crasso — Type: *Lauterbach 1191* (L; iso: BRSL & S, n.v.).

Lower leaf surface rather sparsely hairy, the hairs c. 0.3 mm long. Male perianth c. 2 mm diam. (1.9 × 2.3 mm), split at anthesis to c. ⅓. Anthers 10-12. Fruits subglobose to broadly ellipsoid, 1.2-1.5(-1.7) × 1.0-1.3 cm; pericarp 1-2 mm thick.

Distribution. Papua New Guinea (Sepik, Madang, Morobe Prov.).

NEW GUINEA. Papua New Guinea (Northern): *Hoogland & Craven 10312; Lauterbach 1191; NGF 9146, 10258.*

Ecology. Twice collected in levee-forest; 0-100 m. alt.

NOTES

1. The original description of *H. hellwigii* was based on *Hellwig 416,* now lost. In his monograph of 1897, p. 344, Warburg mentions *Lauterbach 1191,* with fruits, as a specimen assigned to *H. hellwigii.* It was accepted later by Markgraf (p. 150) and Sinclair (p. 52) under *H. hellwigii.* Now it serves as type of my present new variety *brachycarpa.*

2. I have accepted *NGF 9146,* with male flowers, as belonging to var. *brachycarpa.* It has slightly smaller perianths and fewer anthers as compared with the type-variety.

c. var **lignosa** de Wilde, *var. nov.*

Differt a var. *hellwigii* fructibus siccis pericarpio lignoso 4-8 mm crasso — Type: Milne Bay Prov., *Leach LAE 56060* (L: iso: K; A, BISH, BO, BRI, CANB, SING, SYD, PHN & US, *n.v.*).

Lower leaf surface rather sparesely hairy, the hairs c. 0.2-0.3 mm long (on leaf buds c. 0.5 mm long). Flowers unknown. Fruits somewhat asymmetrically subglobose, slightly flattened or not, c. 1.6-1.9 cm diam (immature); pericarp very woody, 4-8 mm thick, the surface not wrinkled on drying, densely rusty tomentose with hairs c. 0.3(0.5) mm long.

Distribution. SE. Papua New Guinea: Central and Milne Bay Provinces.

Ecology. Lowland and mountainous forest, 300-1150 m alt. Fruits in June and September.

NOTES

1. One suspects the immature fruits in both cited collections as being diseased, e.g., infected by a gall, but on closer inspection all fruits seem healthy. The fruits of both collections are recorded as green.

2. The specimen *NGF 32401* has the lower leaf surfaces finely, iregularly, more darkly mottled; mottles are absent in the type. In the *NGF 32401* the older twigs are rather markedly ridged in-between the petiole scars.

3. The specimens cited were collected after Sinclair's revision *Horsfieldia.* Flowers are unknown; when these get collected, it may turn out that the present taxon can better be regarded as a separate species. Vegetatively it is very like the typical *H. hellwigii.*

45. Horsfieldia ralunensis Warb. Fig. 1B(45)

Horsfieldia ralunensis Warb., Mon. Myrist. (1897) 336; K. Schum., Notizbl. Bot. Gart. Berl.-Dahl. 2 (1898) 117; Sch. & Laut., Fl. Deutsch. Schutzgeb. Südsee (1900) 324); Markgraf, Bot. Jahrb. 67, 2 (1935) 150 — Type: New Britain (Neu Pommern), Gazelle Penins., Ralum, *Warburg 20709* (B, †, *n.v.*).

Tree 5-18 m. Twigs terete, towards apex 5-10 mm diam., early to late glabrescent from light rusty or yellow-brown tomentum with hairs 0.5-1.0 mm long, bark rather finely striate, when older not flaking; lenticels present but not distinct. Leaves in 2 rows, membranous, oblong-lanceolate to lanceolate, broadest towards the base or usually ± parallel-sided, 30-60 × 7-11 cm, base nearly rounded to (short-)attenuate, tip long acute-acuminate, usually 1-2 cm caudate; upper surface drying dull olivaceous, minutely, palely punctate-pustulate, lower surface with persistent tomentum of pale brown softish dendroid hairs of mixed sizes 0.5-1 mm, when shed, not leaving thickened rough hair bases; without brown dots; midrib flat above, glabrescent except at the very base; nerves 30-40 pairs, generally ± striaght, at an angle of 50-70° to the midrib, 8-15(-20) mm apart, thin and flat above; beneath, the marginal nerve rather distinct, not very regularly looping; tertiary venation lax, indistinct above; petiole 5-16 × 3-4 mm, not or hardly winged; leaf bud stout, 4-6 cm long, with dense velvety tomentum with hairs (0.5-) 1 mm. Inflorescences woolly pubescent, hairs 1-1.5 mm long, in ♂ and ♀: 2 or 3 times ramified, rather many-flowered, 4-15 × 3-10(-12) cm, common peduncle 5-50 mm long; bracts broadly ellipsoid, subacute, 5-10 mm long. Flowers in loose clusters of 3-6 each, perianth 2-valved, glabrous except at the very base, pedicels pubescent with hairs 0.3-0.8 mm long, at base inarticulate. Male perianths obovoid-ellipsoid, at apex acutish, c. 2-2.3 × 1.5-1.7 mm, pedicel 1(-2) mm long, perianth at anthesis split to c. ¼, valves c. 0.2 mm thick. Androecium c. 1-1.1 × 1.2-1.3 mm, ± laterally flattened, broadly rounded above, column at apex narrowly hollowed for c. ¼ (0.2-0.3 mm), anthers c. 10(-12), ± completely sessile, erect, mutually touching, c. 1-1.2 mm long, free apices c. 0.2 mm; androphore slender, 0.3-0.4 mm long. Female perianth obovoid, c. 4 × 2.5-3 mm, split at anthesis to c. ¼, valves c. 0.3 mm thick; pedicels 1-1.5 mm; ovary ovoid, c. 2 × 1.5 mm, densely pubescent with hairs c. 0.5 mm, style and stigmas minute, ± elongate, minutely 2-lobed, c. 0.2 mm long. Fruits 2-10 per infructescence, ellipsoid, top obtusish, base broadly rounded, 2.5-3.0 × 1.5-1.9 cm, pubescent, hairs c. 0.5 mm long, coarse, paler-coloured lenticel-like tubercles present, dry valves 3-5 mm thick; stalk 1-3 mm long; perianth not persisting.

Distribution. West and E. New Britain (Gazelle Penins.)

BISMARCK ARCH. New Britain: *LAE 52084; NGF 7060, 7092, 36304 A, 36773, 38152, 44388, Warburg 20709* (B, † *n.v.*).

Ecology. Lowland rain forest, recorded from well-drained pumice terrain, sandy soil, ridge forest, at edge of swamp; 0-100 m. Flowering and fruiting apparently not seasonal.

NOTES

1. Fieldnotes. A small or medium sized tapered understorey or subcanopy tree; bole straight, branches horizontal but drooping terminally; once recorded as slightly buttressed. Bark dark coloured, mottled, or with short vertical fissures. Wood straw, moderately soft. Flowers yellow. Inflorescences (with flowers) recorded as erect. Mature fruit green or brown-green.

2. Related to *H. leptantha, H. pulverulenta,* and *H. hellwigii,* the last also occurring on New Britain. Distinguished from *H. hellwigii* by the larger fruits, smaller and narrower male flowers (with a somewhat different androecium), and the generally more elongated leaves.

3. Sinclair included the present species in *H. hellwigii* var. *hellwigii.*

4. I have not seen the type, which was apparently lost in B, but Warburg notes that the anthers do not reach the top of the androecium and leave a sterile narrow appendix. This latter is at variance with the material seen by me.