

A REVISION OF THE GENUS SARCOLOBUS (ASCLEPIADACEAE)

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SUMMARY

A complete revision of the genus *Sarcolobus* is given with a key to the four species. The genus is shown to possess both coronal and non-coronal species and to have seeds with or without a coma. A new species is described, *S. oblongus* Rintz. *S. peregrinus* is reduced to *S. globosus* subsp. *peregrinus* nov. stat.

SARCOLOBUS R. Brown

Sarcolobus R. Br., Mem. Wern. Soc. 1 (1809) 34; Wall., As. Res. 12 (1818) 566, t. 4 & 5; Roem. & Sch., Syst. Veg. 6 (1820) 58; Wight, Contr. (1834) 47; Schltr., Bot. Jahrb. 50 (1914) 159.

Twining lianas 2–5 m long, glabrescent; stems and branches terete, hollow, at maturity forming a papery bark. *Leaves* opposite. *Petiole* grooved, the groove often lined with short hairs; digitiform glands both in the axil and at the apex of the petiole. *Blade* coriaceous, ovate, elliptical or oblong, occasionally linear-lanceolate in *S. carinatus*; base cuneate to obtuse-cordate; apex acute to retuse, apiculate to short-acuminate; margins entire; secondary veins arching or parallel. *Inflorescence* a pedunculate spirally-elongating raceme; the peduncle simple or with 1 or 2 short branches near the apex; each pedicel subtended by a pair of ovate bracts. *Sepals* ovate, the margins ciliate, each axil with 1–5 oblong flattened glands. *Corolla* subrotate or shallowly campanulate, the lobes ovate with ciliate margins, imbricate to the right; corolline corona of 5 truncate ridges in the throat alternate with the lobes and separated from the staminal corona by a narrow cleft, or none. *Gynostegium* capitate; staminal corona of 5 truncate lobes at the base of the stamen tube and opposite the stamens, contiguous with the corolline ridges, or none; anther wings curving beneath the stigma, appendages not covering the apex of the stigma. Twin-pollinia borne horizontally; the corpuscle linear, narrow; caudicles narrower than the corpuscle, the lower 1/3–1/2 geniculate, as long as or longer than the corpuscle, curved back perpendicularly to the corpuscle; pollinia flat, obovate. *Carpels* with short styles; stigma deeply 5-angled, flat; the center with a papillose spherical knob and 5 narrow ridges radiating from it to the apex of the angles. *Fruit* ellipsoid or ovoid; pericarp fleshy. *Seeds* obovate, winged, flat, with or without a coma; embryo with endosperm.

Distribution. From Sambalpur and the Sundarbans in NE. India to Haiphong in Indo-China, through most of the Malesian region and extending to the

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Carolines, Yap, the Solomons, and New Caledonia; not reported from the Lesser Sunda Is. but possibly there and in NE. Australia and Hainan as well. Four species are recognized.

E c o l o g y . Restricted to coasts and areas of brackish water; on mud in mangrove and swamp forests and on sand and coral beaches scrambling over strand vegetation.

T a x o n o m y . The genus formerly consisted of 17 described species and 8 undescribed binomials. It has never been subject to taxonomic investigation beyond the narrow limits of local floras and, though some synonymy has been suggested, little has been confirmed.

There are 2 morphological inaccuracies associated with *Sarcolobus* in the literature. In the original description of the genus and in most subsequent literature, the flowers are characterized as being without a corona. This holds true for *S. retusus*, *S. oblongus*, and *S. globosus*, subsp. *globosus* p.p., but both *S. carinatus* and *S. globosus* subsp. *peregrinus* have distinct corolline and staminal coronas. The corolline corona of *S. carinatus* was noted by Wallich (l.c.) in his original description of the species and later by Griffith (Notul. 4, 1854: 55). Neither author, however, included this character in his illustration of the plant (Wall., l.c.; Griff., Ic. Pl. As., 1854: t. 405) and it subsequently seems to have been forgotten. It is not mentioned by Hooker, Prain, or Schumann though they deal with the species. The staminal corona was completely overlooked.

Schlechter (Fedde Rep. 3, 1907: 308) was the first to note the presence of the staminal corona and he used it to describe several new species. He did not, however, notice the corolline corona. This is particularly puzzling since the 2 structures are contiguous and readily apparent in dried material.

Though Brown made no mention of the seeds in his original description, later authors, notably Hooker, King & Gamble, and Schlechter, characterized the genus as having seeds without a coma. This character holds true for *S. carinatus* and *S. globosus* but the seeds of *S. retusus* have a definite, though a proportionately small, coma.

Many characters within the genus show wide variation. Leaf shape and size are especially variable on *S. carinatus* and *S. retusus* and petiole length of same-sized leaves varies widely on *S. globosus*. Corolla size and color are variable for all species and there is wide variation in the corolla vesture of *S. globosus* subsp. *globosus*. The most reliable characters within the genus are: the shape of the gynostegium, the presence or absence of the double corona, the shape of the twin-pollinia, the shape of the fruit, and the presence or absence of a coma on the seeds.

The 4 species of *Sarcolobus* can be separated into 2 pairs based on the shape of the gynostegium and the twin-pollinium. There are 2 forms of gynostegium. In *S. globosus* and *S. oblongus* the gynostegium has deep narrow anther wings which curve back beneath the stigma and downward to a position about halfway down the stamen tube. In *S. carinatus* and *S. retusus* the anther wings are also narrow but extend back beneath the stigma to end abruptly at the stamen tube without curving downward. In the latter case, the short anther wings give the gynostegium a particularly capitate appearance.

There are 2 forms of twin-pollinium. In *S. globosus* and *S. oblongus* the caudicles are long arching with only slightly enlarged geniculate lower arms. The pollen masses themselves are angled or curved upward above the caudicles. In *S. carinatus* and *S. retusus* the caudicles are proportionately shorter and thicker than in the

above-mentioned form and the geniculate lower arm is considerably enlarged. The pollen masses are joined parallel to the caudicles.

The taxonomic value of the corona within the genus lies in showing differences and not affinities. In each of the 2 pairs delineated above, there is one species with coronas and one species without. Were it not for the presence of this structure, the flowers in *S. oblongus* and the 2 subspecies of *S. globosus* would differ mainly in corolla vesture and in *S. carinatus* and *S. retusus* mainly in size.

Between genera, however, the corona does suggest affinities. *Sarcolobus* is related to *Gymnema* R. Br. by its similar, though less well-developed, corolline corona and by a similar corolla. The 2 genera have different gynostegia, stigmas, and twin-pollinia which keep them distinct.

The relationship between *Sarcolobus* and *Gymnema* is not as close as that between *Sarcolobus* and *Gongronema* Decne. *Gongronema nepalense* (Wall.) Decne. is strikingly intermediate between the 2 genera in possessing twin-pollinia with geniculate caudicles and a stigma nearly identical to that of *S. retusus*. It differs from *Sarcolobus* in coronal, gynostegial, and follicular characters which link it to *G. filipes* Kerr, a species also with geniculate caudicles, and with other members of *Gongronema*.

Sarcolobus also shows close affinities to *Dorystephania* Warb., a monotypic genus intermediate between it and *Pentasacme* Wall. The single species, *D. luzonensis* Warb., has both the twin-pollinium and the stigma typical of *Sarcolobus* but differs in coronal and vegetative characters, which strongly link it to *Pentasacme*.

Uses. Only a single taxon, *S. globosus* subsp. *globosus*, has been subject to chemical and economic investigation. Its uses have been summarized by Greshoff (Nutt. Ind. Pl., 1895: 75, t. 20) and Burkill (Dict. Econ. Prod. Mal. Pen. 2, 1935: 1965). The bark and seeds contain a poisonous resin, sarcolobid, and are used to poison dogs, wild pigs and tigers. The successful use of this poison seems to have played a part in the eradication of tigers from Java. The dried and powdered parts are mixed with the bait of the animals and causes vomiting and paralysis prior to death. The poisonous resin is water soluble and so enables the pericarp to be eaten locally by people after it is steeped in salt water for 3–4 days. In addition, the leaves are occasionally eaten with curry or can be ground into a paste with *Aleurites* nuts as a remedy for either rheumatic fever or dengue fever.

KEY TO THE SPECIES

- 1a. Anther wings ending abruptly at the stamen tube: 2.
- b. Anther wings curving halfway down the stamen tube. 3.
- 2a. Double corona present; fruit with 4 keels 1. *S. carinatus*.
- b. Double corona absent; fruit without keels 2. *S. retusus*.
- 3a. Leaf bases obtuse to shallowly cordate; secondary veins arching 3. *S. globosus*.
- b. Leaf bases cuneate; secondary veins parallel 4 *S. oblongus*.

1. *Sarcolobus carinatus* Wall. — Fig. 1.

S. carinatus Wall., As. Res. 12 (1818) 570, t. 5; List (1831) no. 4467; Wight, Contr. (1834) 47; Hooker f., Fl. Brit. Ind. 4 (1885) 28; Prain, Beng. Pl. (1903) 514; Haines, Bot. Bihar & Orissa 4 (1922) 555; Kerr in Craib, Fl. Siam. En. 3, 1 (1951) 18. — Type: India, Wallich 790 (C).

S. sp. Griff., Notul. 4 (1854) 55; Griff., Ic. Pl. As. (1854) t. 405; Hooker f., Fl. Brit. Ind. 4 (1885) 28. — Based on *Griffith s.n.* from Mergui, Burma (K).

Stems orange-brown, to 3 m long, becoming 3–5 mm in diam.; nodes with a ring of short erect hairs. *Petiole* (0.3–)0.5–1(–1.2) cm long, the groove pubescent. *Blade* thick coriaceous, dull green above, pale below, elliptical, obovate, linear or lanceolate, (2–)2.5–5(–8.5) by 0.5–1(–2.8) cm; base cuneate, apex acute; secondary veins arching, scarcely visible above, distinct below. *Flowers* 1–6 on racemes to c. 5 mm long; peduncles mostly simple, rarely with a single branch, (0.2–)0.4–0.6(–1) cm long; pedicels 0.2–0.3(–0.5) cm long. *Corolla* shallowly campanulate, 0.6–1 cm in diam., glabrous, pale yellow or green, with rows of brown or purple dots on the lobes. *Gynostegium* with the anther wings ending abruptly at the stamen tube; corolline and staminal coronas present; twin-pollinia with corpuscles c. 0.2 mm long. *Fruit* ellipsoid, to c. 7 × 3 cm; base cuneate; apex beaked, with 4 longitudinal undulate keels c. 2 mm high, 2 on the dorsal side running nearly the length of the follicle and 2 on the ventral side running only halfway; surface smooth, pericarp c. 3 mm thick. *Seeds* c. 1.3 × 1 cm, without a coma.

Distribution. From Sambalpur in NE. India, along the coast of Burma to the Andaman Is. and both sides of the Isthmus of Kra; not reported from Indo-China or Malesia.

Ecology. Blooming specimens collected from Feb. to Aug., fruits collected in June.

INDIA. Orissa: Sambalpur, *Mooney 3406* (K). — Bengal: Sundarbans, *Clarke 33368c* (G), *Wallich 790* (C); Bodhara, *Prain s.n.* (G); Mutlah, *Clarke 16827* (NA); Chittagong, *Griffith 3772* (K); Srimai, *Cowan 402* (E, K); Noakali, *Clarke 6613* (K), *Sinclair 3127* (E).

BURMA. Rangoon, *Scott s.n.* (L). — Tenasserim: Mergui, *Griffith s.n.* (K), *Parker 2682* (K).

ANDAMAN IS. Wright Myo, *Balakrishnan & Bhargava 3605* (L).

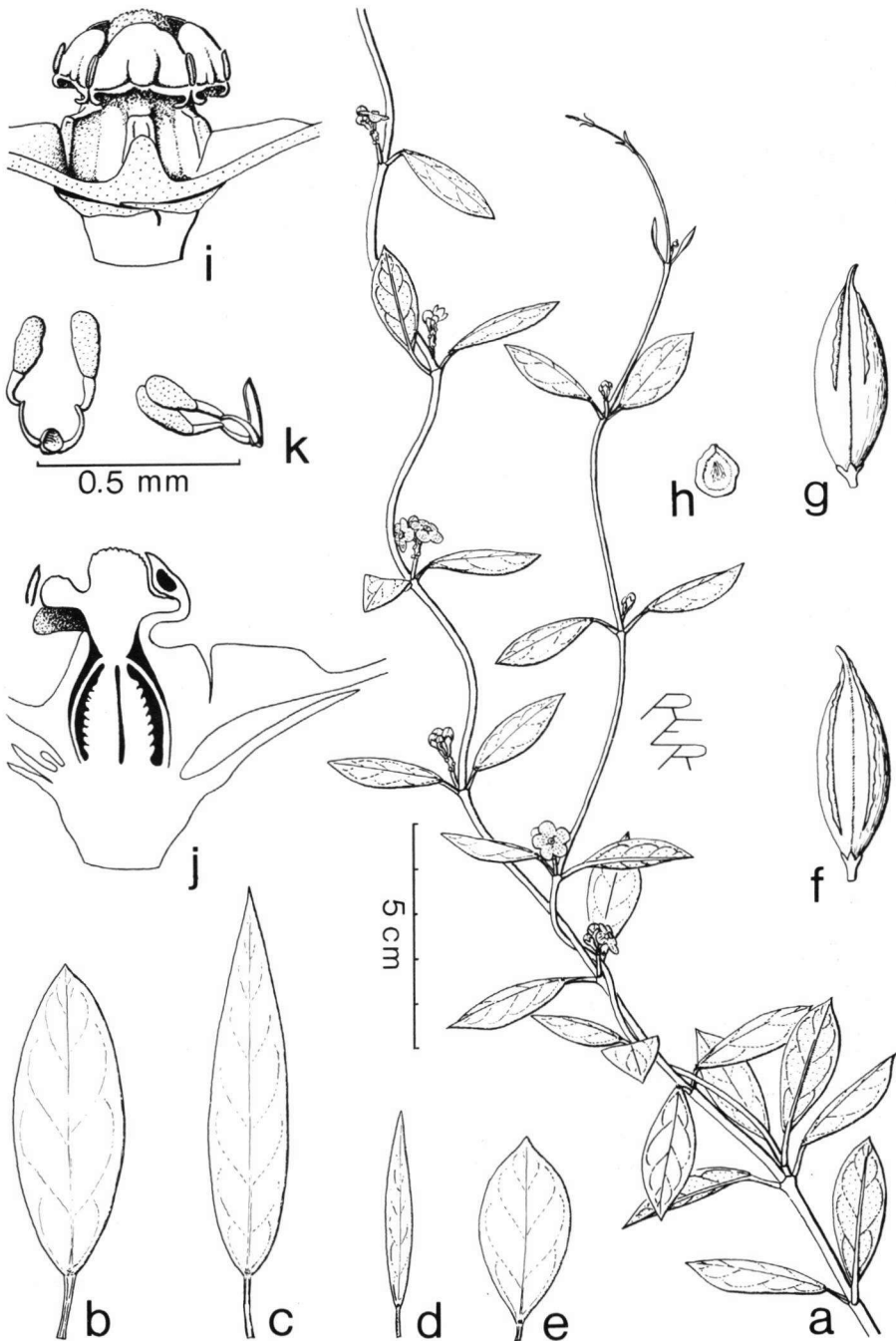
THAILAND. Surat: Lang-suan, *Kerr 17044* (BM, E, K, L).

Vernacular. India. Bengal: *baoli-lata*.

Notes. The leaf variation between specimens of *S. carinatus* is very striking. Specimens from NE. India and Burma have elliptical to obovate leaves c. 3–6 cm long while those from the Isthmus of Kra in Thailand have linear-lanceolate leaves c. 4–8 cm long. No variation was noted in the flowers.

S. carinatus is closely related to *S. retusus*. It differs in having leaves with mostly cuneate bases and acute apices rather than obtuse bases and retuse or obtuse apices, a double corona, a fruit with 4 equally-spaced keels rather than none, and seeds without a coma. The present geographical distributions of the 2 species do not overlap but are widely separated: *S. carinatus* from India to Thailand and *S. retusus* from Celebes to New Caledonia:

Fig. 1. *Sarcolobus carinatus* Wall. — a. habit; b–e. leaf variations; f. fruit in dorsal view; g. fruit in ventral view; h. seed; i. gynostegium, and double corona with corolla cut away; j. gynostegium, and double corona in median sectional view; k. twin-pollinia in bottom and side views. (a, i–k. *Clarke 16827*; b. *Clarke 6613*; c. *Kerr 17044*; d. *Kerr 19021*; e. *Griffith 3772*; f–h. *Mooney 3406*).



2. *Sarcolobus retusus* K. Sch. — Fig. 2.

S. retusus K. Sch. in K. Sch. & Hollr., Fl. Kais. Wilh. Land (1889) 109; Valetton, Pl. Papuanæ 10 (1907) 49; Schltr., Bot. Jahrb. 50 (1914) 159. — Type: New Guinea, Finschhafen, *Hollrung* 2 (K).
S. ciliolatus Warb., Bot. Jahrb. 13 (1891) 408. — Type: Moluccas, Aroe & Kei Is., *Warburg* 21317 (A).
Tylophora sulphureus Volkens, Bot. Jahrb. 31 (1902) 473. — *S. sulphureus* (Volkens) Schltr., Bot. Jahrb. 50 (1914) 160. — Type: Caroline Is., *Volkens* 347 (BO).
S. quinquangularis Schltr., Fedde Rep. 3 (1907) 309; Valetton, Pl. Papuanæ 10 (1907) 50. — Type: Amboina, *Warburg* 17498 (K).
S. submucronatus Warb., Fedde Rep. 3 (1907) 309. — Type: Bismarck Arch., Mioko I., *Warburg s.n.* (n.v.).
S. lifuensis Guill., Bull. Soc. Bot. Fr. 74 (1927) 929. — Type: Loyalty Is., Lifou, *Balansa* 2405 (P).

Stems pale brown, to 5 m long, becoming 5 mm or more in diam.; nodes mostly glabrous. *Petiole* (0.6–)1–1.5(–2.3) cm long, the groove pubescent. *Blade* yellow to dark green above, pale below, elliptical, (3–)4.5–6(–10) by (1.5–)2.5–4(–6.5) cm; base shallowly cordate, obtuse or rarely cuneate; apex retuse, obtuse, or rarely acute; secondary veins arching. *Flowers* 1–5 on racemes to 2 cm long; peduncle mostly simple, rarely with a single branch, (0.1–)0.8–1.5 cm long; pedicels (0.3–)0.5–1(–1.5) cm long. *Corolla* shallowly campanulate, (0.4–)1–1.5 cm in diam., glabrous, mostly yellow or brown, with or without longitudinal brown stripes on the lobes. *Gynostegium* clearly delimited from the corolla by a slightly raised and thickened 5-lobed base; no corolline or staminal corona; anther wings ending abruptly at the stamen tube below the stigma; twin-pollinia with corpuscles 0.2–0.3 mm long. *Fruit* ovoid, to c. 6 × 2.5 cm; base obtuse, unequal; apex acute; surface smooth, brown; pericarp c. 6 mm thick. *Seeds* c. 1 × 0.7 cm with a coma c. 2 cm long.

Distribution. From the Carolines to Celebes and through the Moluccas to Timibar; through New Guinea to the Solomons, New Caledonia, and the Loyalty Is.; probably in N. Australia.

Ecology. Blooming specimens collected mostly in March, June, and Sept.; fruits collected in March, April, June, and July.

CAROLINE IS. Korrör: *Kanehira & Hatusima* 4397 (A). — Yap: *Kanehira* 72 (NY), *Tuyama* 7216 (K), *Volkens* 347 (BO).

CELEBES. N. Peninsula: Teling Boelagi, *Kaudern* 514 (L). — E. Peninsula: G. Sojo, *Rachmat* 719 (BO).

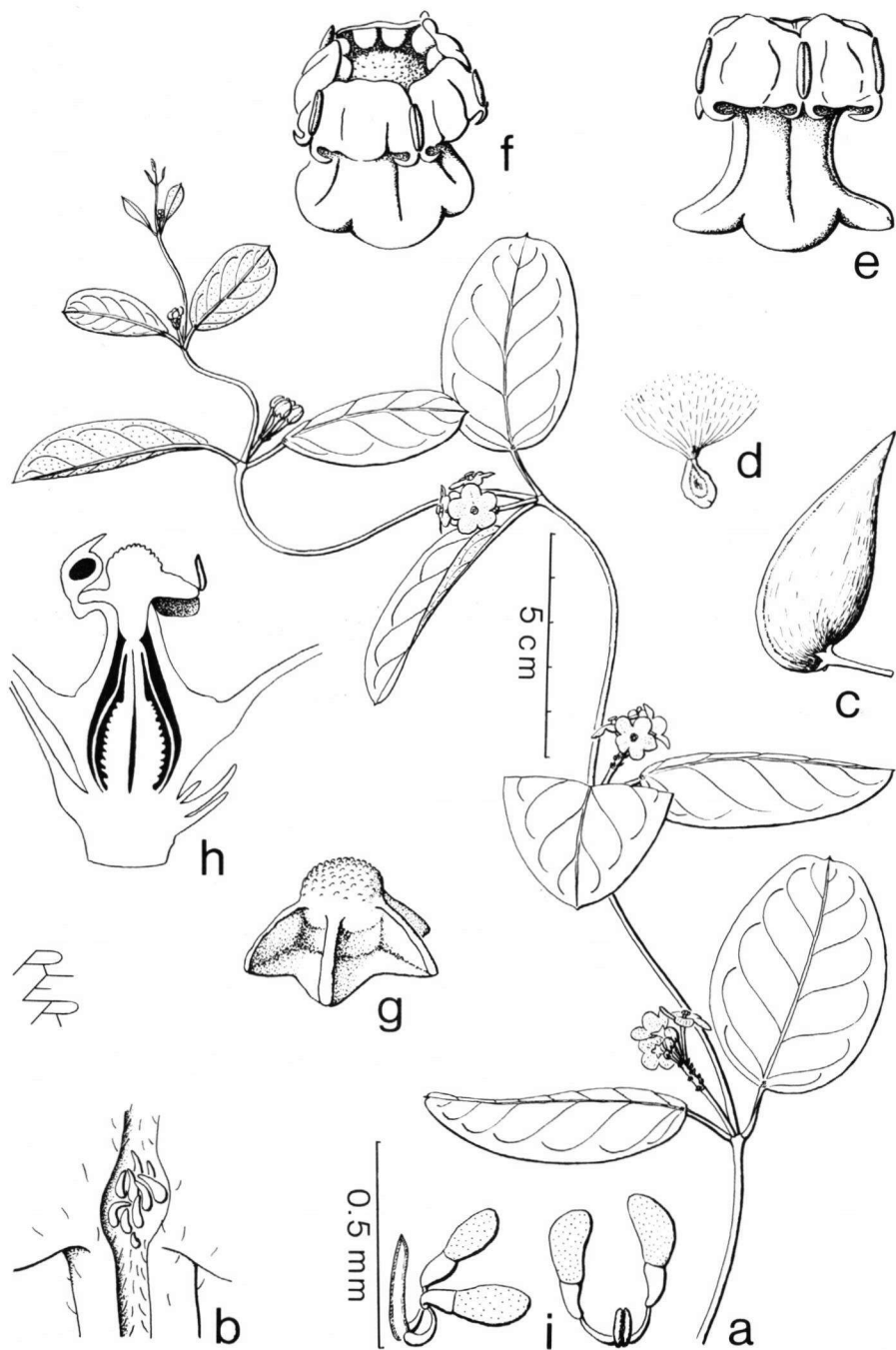
MOLUCCAS. P. Morotai: *Kostermans* 1569 (L). — Halmaheira: K. Dudinga, *Idjan & Moehar* 399 (L). — P. Ternate: *Forsten s.n.* (L). — Soela Is.: P. Sanana, T. Baleha, *Bloembergen* 4382 (BO). — Ceram: *Kornasi* 849 (L, U); T. Siputeh, *Kornasi* 1212 (L, U). — Amboina: *Warburg* 17498 (K). — Kei Is.: *Jaheri* 30 (BO), *Jensen* 28 (BO, L), *Warburg* 21317 (A), 21318 (E). — Tanimbar Is.: P. Jamdena, *Buwalda* 4410 (L).

NEW GUINEA. (Incl. *Goodenough* I. and *Sudest* I.): many collections.

BISMARCK ARCH. New Britain: *Henty & Frodin* NGF 27258 (LAE); Awul, *Sayers* NGF 21996 (E, LAE). — New Ireland: *Cooe & Cropley* NGF 29664 (E, LAE), *Peekel* 224 (B). — Dyaul I.: *Koei* 1868 (LAE). — Mussau I.: *Koei & Olsen* 1287 (LAE).

SOLOMON IS. Oema I.: *Mauriasi* BSIP 13810 (K, L, LAE). — Ganongga I.: *Mauriasi* BSIP 14432 (L, LAE). — S. Cristoval I.: Waimamura, *Brass* 2562 (BO). — Ulawa I.: Tonaho, *Comins* 305 (K). — Bellona I., *Sirute'e* BSIP 9619 (L, LAE).

Fig. 2. *Sarcolobus retusus* K. Sch. — a. habit; b. glands at base of leaf; c. fruit; d. seed with coma; e. gynostegium; f. gynostegium in oblique view to show the anthers and stigma; g. stigma; h. gynostegium in median sectional view; i. twin-pollinia in side and top views. (a, b, e—g. *Koei & Olsen* 1287; c, d. *Streimann* NGF 44269; h, i. *Franc* 3107).



NEW CALEDONIA. *Baumann-Bodenheim* 14800 (P), *Franc* 1063 (BO, K, L, NY, P), *Franc* 3107 (BM), *Vieillard* 974 (P). — I. des Pins, *Virot* 975 (A, P).

LOYALTY IS. Lifou I., *Balansa* 2405 (P). — Maré I., *Virot* 1581 (P).

Vernacular. Moluccas. Soela Is., Mèô bot. — Solomon Is., Kwara'ae language, *kwalosufia*, *sautalau*.

Notes. *S. retusus* is the only species within the genus to have seeds with a coma. This very obvious character seems to have been missed because the type and the types of the synonyms are all without fruits. The few specimens with fruits have only unopened ones which seem never to have been investigated.

Two of the synonyms can be considered as minor variations within the species. Specimens of '*S. lifuensis*' have shortened internodes 1–2 cm long with smaller and thicker leaves and smaller fruits. Specimens of '*S. sulphureus*' have thin broadly-elliptical yellowish leaves and entirely yellow flowers without brown strations.

In addition, two specimens from Ceram also represent curious variations. *Kornasi* 849 is a diminutive plant with peduncles 1–3 mm long and flowers 4–5 mm in diam. but is especially noteworthy in having leaves with acute, rather than obtuse, apices and in having the base of the gynostegium expanded into a broad thickened ring. The form of the gynostegium and twin-pollinium, however, agrees well with the species, and leaves no doubt as to its identity. *Kornasi* 1212, the second specimen from Ceram, is a larger plant with the peduncles and flowers as in the species but the base of the gynostegium is slightly enlarged and the leaves show both apical forms.

An examination of flowers from the type specimen of '*S. quinquangularis*' did not reveal the staminal corona mentioned by Schlechter in the original description. When the gynostegium of *S. retusus* is dried, it frequently shrinks to form 5 longitudinal ridges opposite the stamens, the precise location for a staminal corona. Perhaps, Schlechter mistook this artifact for a true corona.

There are 3 specimens of *S. retusus* at Leiden labelled *S. rotundifolius* Decne.: *Wichmann* 95, *Forsten* s.n. and *HLB* 898, 171–226. I can find no record of this binomial having been published.

3. *Sarcolobus globosus* Wall.

For synonymy see under the subspecies.

Stems pale brown, to 5 m long, becoming 5 mm or more in diam; nodes mostly glabrous. *Petiole* 1–4 cm long, the groove pubescent. *Blade* glossy green above, pale below, ovate or elliptic, rarely obovate, (5–)6–10(–12) by (2.5–)3–5(–6.5) cm; base obtuse to shallowly cordate; apex acute to obtuse; secondary veins arching. *Flowers* 1–23 on racemes to c. 1 cm long; peduncle simple or with 1 or 2 branches near the apex, 0.5–3.7 cm long; pedicels 0.5–1.2 cm long. *Corolla* subrotate or shallowly campanulate, 1–1.8 cm in diam., glabrous to densely pubescent inside. *Gynostegium* with the anther wings curving halfway down the stamen tube; corolline and staminal corona present or absent; twin-pollinia with corpuscles c. 0.4 mm long. *Fruit* globose, to c. 10 × 7 cm; base unequal; surface smooth to rough-reticulate, brown to purple; pericarp to c. 12 mm thick. *Seeds* 2–2.6 × 1.5–1.8 cm, without a coma.

Distribution. In two more or less geographically separated subspecies from NE. India through Indo-China and Malesia to the E. coast of New Guinea.

Notes. Subspecies are designated because the taxa are nearly identical vegetatively but show a geographical segregation on several floral characters. The distributions of the two subspecies overlap in Sumatra, Vietnam, and Borneo with intermediates known from the latter two areas. The flowers in *Pierre 386 & 4519*, *Talmy 90* (all from Vietnam), and *Winkler 3449* (from Borneo) have small but well-formed coronas and pubescent corollas of a shape intermediate between the two subspecies.

The subspecies differ in:

- a) the peduncles. In subsp. *globosus* they have 1 or rarely 2 branches near the apex, so each peduncle bears 2 or 3 racemes, whereas in subsp. *peregrinus* the peduncles are mostly unbranched and bear a single raceme.
- b) the corolla. In subsp. *globosus* it is subrotate and partially or wholly pubescent inside but in subsp. *peregrinus* it is shallowly campanulate and mostly glabrous inside.
- c) the double corona. Absent or poorly developed in subsp. *globosus*, but well-developed in subsp. *peregrinus*.

KEY TO THE SUBSPECIES

- a. Corolla subrotate; double corona absent or poorly developed
a. subsp. *globosus*.
- b. Corolla campanulate; double corona present, well developed
b. subsp. *peregrinus*.

a. subsp. *globosus* — Fig. 3 h.

S. globosus Wall., As. Res. 12 (1818) 568, t. 4; List (1831) no. 4468; Wight, Contr. (1834) 47; Ic. Pl. Ind. Or. (1848) t. 1273; Hasskarl, Flora 40 (1857) 100; Hooker f., Fl. Brit. Ind. 4 (1885) 27; King & Gamble, J. As. Soc. Beng. 74, 2 (1908) 536; Koorders, Exkurs, Fl. Java 3 (1912) 88; Burkill, Dict. Econ. Prod. Mal. Pen. 2 (1935) 1965; Kerr in Craib, Fl. Siam. En. 3, no. 1 (1951) 18. — Type: India, Sundarbans, Wallich 789 (C).

S. banksii Roem. et Schult., Syst. Veg. 6 (1820) 58; Miq., Fl. Ind. Bat. 2 (1857) 501; Back. & Bakh. f., Fl. Java 2 (1965) 258. — Type: Java, Prinsen I., Banks & Solander s.n. (BM).

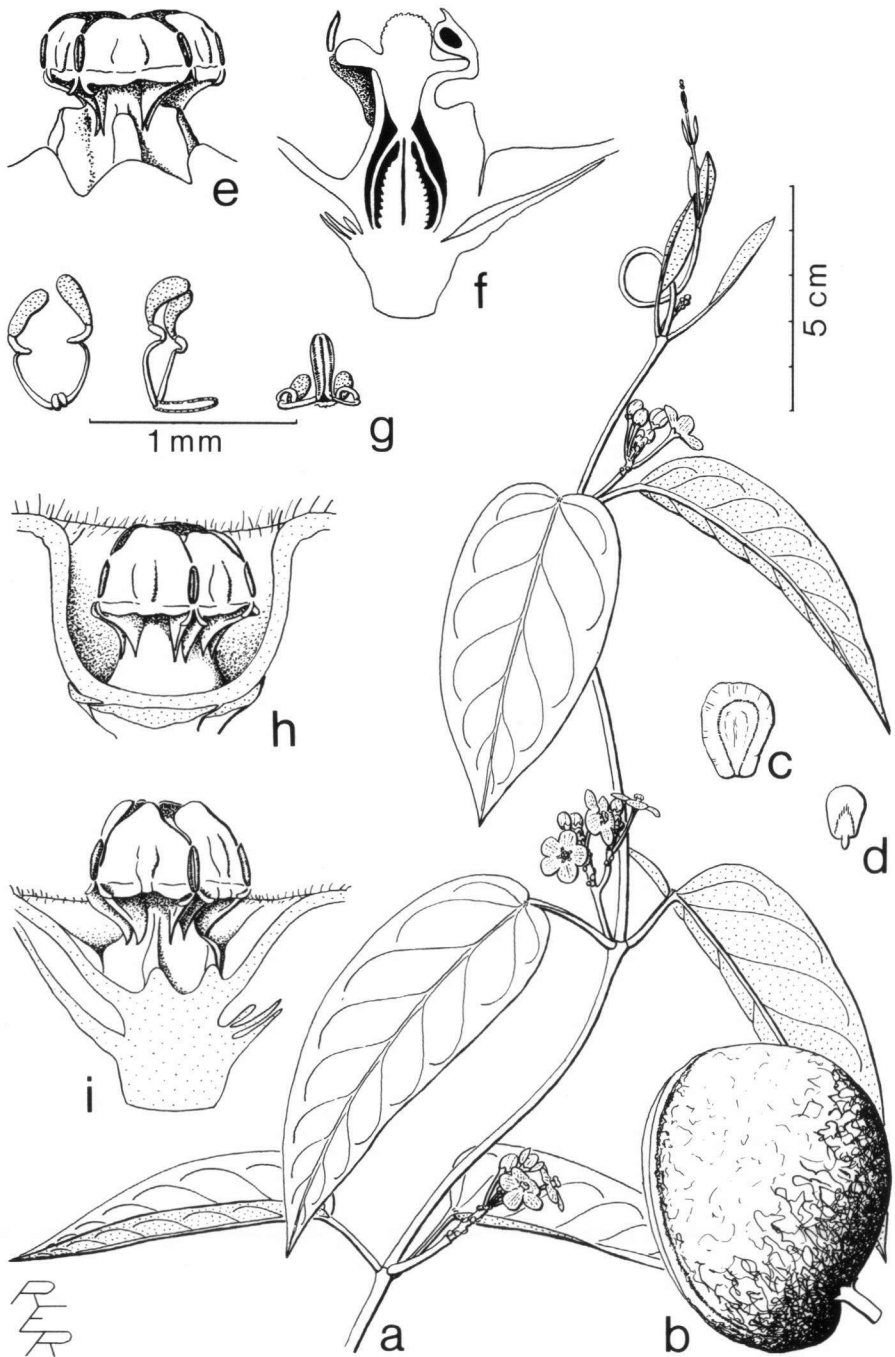
Gymnema? finlaysonii Wight, Contr. (1834) 46. — *Gongronema? finlaysonii* Decne., in DC. Prodr. 8 (1844) 625; Kerr in Craib, Fl. Siam. En. 3, 1 (1951) 19. — Type: Thailand, Finlayson 403 (n.v.).

S. carinatus Griff., Notul. 4. (1854) 53; Ic. Pl. As. (1854) t. 410, nom. ill. non. Wall. (1818) — Type: Malaya, Malacca, Griffith 3773 (K).

S. narcoticus Span. ex Miq., Fl. Ind. Bat. 2 (1857) 502; Greshoff, Nutt. Ind. Pl. (1895) 75, t. 20; Back. & Bakh. f., Fl. Java 2 (1965) 258. — Type: Java, Pekalongan, Spanoghe (n.v.).

S. spanoghei Miq., Fl. Ind. Bat. 2 (1857) 502. — *S. narcoticus* var. *pauciflorus* Span. ex icon. no. 5 ined. (L), nomen in Miq., Fl. Ind. Bat. 2 (1857) 502; Greshoff, Nutt. Ind. Pl. (1895) 75, t. 20. — Type: Java, Pekalongan, Spanoghe (n.v.).

Petiole 1–2 (–3.3) cm long. Flowers 10–20 (–23) on a peduncle mostly with a single branch near the apex; pedicels 0.5–1 cm long. Corolla subrotate; tube glabrous, c. 1 mm long, 1–1.5 cm in diam.; throat and lobes sparsely to densely pubescent inside with white hairs, the hairs longest at the throat, becoming progressively shorter toward the apex of the lobes, imbricate portion of the lobes glabrous, pale green, white, or yellow-brown, with longitudinal brown or purple stripes on the lobes. Corolline and staminal corona not present or, if staminal corona present, the lobes not well-developed.



Distribution. From the Sundarbans in NE. India to Burma, Thailand, and Indo-China (Saigon); in Malesia common along both coasts of the Malay Peninsula, in Sumatra where it is not well known, in Java along all coasts, and at Banjarmasin in SE. Borneo.

Ecology. Blooming all year, fruits collected in May, June and Sept.

INDIA. Bengal: c. 10 collections.

BURMA. Tenasserim: Kalegeik Res., Lacey 2955 (E, K); Mergui, Griffith s.n. (K).

THAILAND. Krungtep: 8 collections.

VIETNAM. Baudouin s.n. (P), Germain s.n. (P), Talmy 90 (P). — Saigon: d'Alleizette 4820 (L), Pierre 4519 (P). — Bien Hoa: Thorel s.n. (P). — Cho Quan: LaFèvre 439 (P). — Go Cong: Pierre 386.

MALAY PENINSULA. Kelantan, Gimlette s.n. (SING). — Perak: Scortechini 127a (K); Telok Anson, Md Haniff SFN 14171. — Pahang: K. Bruas, Ridley 1513 (SING). — Malacca: Anders s.n. (P), Griffith 3773 (K). — Johore: Batu Pahat, Ridley 1121 (K); Mawai, Corner 25355 (K, SING), 28324 (BO, SING); S. tebrau, Ridley 13405 (BM), 13485 (K).

SINGAPORE. Hullett 32 (K, SING), Ridley s.n., 5745, 6044 (SING); Serangoon, Ridley 11640 (SING); P. Ayer Chawan, Sinclair 5840 (E, L).

BORNEO. Kalimantan: Banjarmasin, S. Barito, Winkler 3449 (L).

SUMATRA. Deli-Atjeh border, Bangham 638 (A, NY); Batu Bagra, Yates 1874 (NY).

JAVA. Coert 702 (L). — W. Java: c. 20 collections. — C. Java: Banjoemas, Backer 31447 (BO), von Wülffing 24 (BO); Pekalongan, Backer 16517 (BO). — E. Java: c. 10 collections.

Vernacular. India, Bengal: *Baoli-lata*. — Thailand: *Tao hua ling*. — Malaya: *Akar pelir kambing*, *Akar kambing-kambing*, *Buah pitis-pitis*. — Java: *Walikambing*.

Notes. Corolla vestiture varies from nearly glabrous to densely pubescent. In Griffith 3773 the lobes are glabrous and the throat has only scattered hairs; in Banks & Solander s.n. the lobes are uniformly pubescent with well-spaced hairs; in Hullett 32 and Scortechini 127a the hairs are short but closely spaced; and in Clarke 21584 the entire corolla is densely pubescent with comparatively long hairs.

There are 2 reported variations in flower color. In Roxburgh 6 the flowers are said to be orange red and in Hooker f. (Fl. Brit. Ind. 4, 1885: 28) they are said to be pale purple.

Both corolline and staminal coronas are generally absent in subsp. *globosus* but poorly developed staminal coronas do occasionally occur. In Banks & Solander s.n. there are very small and easily overlooked staminal corona lobes. With structures of this size it is often hard to say whether they are the result of shrinkage, or of equal size in vivo, but the consistency of their occurrence argues for the latter. In addition, in the Banks & Solander specimen there are 3 comparatively broad longitudinal stripes on each corolla lobe instead of the 10 fine stripes more commonly encountered on flowers of this subspecies. In all other respects, however, it is the same.

Four unpublished binomials exist. The Banks & Solander specimen was given the name *Cynanchoides drupacea* by Solander in his *Plantae Javanenses* (MS. in BM)

Fig. 3. *Sarcolobus globosus* subsp. *peregrinus* (Blanco) Rintz. — a. habit; b. fruit; c. seed; d. embryo; e. gynostegium and double corona; f. gynostegium and double corona in median sectional view; g. twin-pollinia in top, side, and front views. — *S. globosus* subsp. *globosus* Wall. — h. Gynostegium with corolla cut away, intermediate form. — i. Gynostegium and small double corona with corolla cut away. (a, e—g. Beccari 699; b—d. Merrill, Sp. Blancoanae no. 1016; h. Korthals s.n.; i. Winkler 3449).

followed by a lengthy Latin description. A second specimen labelled *Herb. Torner, Prince's I., prope Javam* (BM) is named *Cynanchum drupacea*. Two sheets of *Teysmann s.n.* bear the name *S. dichotomus* and *Koorders 29601b* bears the name *S. horsfieldii*.

b. subsp. *peregrinus* (Blanco) Rintz, nov. stat. — Fig. 3.

Asclepias peregrina Blanco, Fl. Filip. (1837) 207; ed. 2 (1845) 146; ed. 3 (1877) 262. — *S. peregrinus* Schltr., Fedde Rep. 13 (1915) 564; Merr., Sp. Blancoanae (1918) 315, no. 1016. — Neotype designated by Schlechter: Philippines, Luzon, Bataan Prov., Limay. *Merrill 7477* (NA).
S. multiflorus K. Sch. & Laut., Fl. Schutzgeb. (1901) 509. — Type: New Guinea, Finschhafen, *Lauterbach 443* (B).
S. beccarii Warb., Fedde Rep. 3 (1907) 308. — Type: Borneo, Sarawak, *Beccari 699* (K).
S. warburgii Schltr., Fedde Rep. 3 (1907) 310. — Type: N. Celebes, Amurang, *Warburg 15848* (n.v.).
S. minor Schltr., Beih. Bot. Centralbl. 34, 2 (1917) 3. — type: Celebes, Toli-Toli, *Schlechter 20715* (n.v.).

Petiole (1—)1.5—2.5(—4) cm long. *Blade* with the apex acute to obtuse, conspicuously apiculate. *Flowers* 5—9 on peduncle 0.8—1.5 cm long; apex mostly simple, rarely with a single branch; pedicels 0.8—1.2 cm long. *Corolla* shallowly campanulate, 1.2—1.8 cm in diam., glabrous inside, yellow-green with red-brown longitudinal stripes on the lobes. *Corolline and staminal corona* well-developed.

Distribution. From the Mentawi Is. off W. Sumatra to Borneo and the Philippines; up to Haiphong in Vietnam; through the Moluccas and New Guinea; absent from Malaya and Java.

Ecology. Blooming specimens collected mostly in March and Sept., fruits collected in July and Dec.

VIETNAM. Hué: *Squires 357* (BO, E, K, SING). — Tonkin: Ha-coi, Wong Mo Shan, *Tsang 29623* (BO).

LAOS? N. of Se Lampau, *Harmand 246* (P).

SUMATRA. Bungus Bay, *Meyer 7331* (L). — **Mentawi Is.:** Siberot I., *Boden-Kloss 14537* (BM, K), *Iboet 206* (BO, L); Sikabalan, *van Borssum-Waalkes 2693* (L). — Simaloer I., *Achmad 366, 999* (BO, L).

BORNEO. Sarawak: Kuching, *Anderson S 25523* (L), *Beccari 699* (K). — Kalimantan: Bungawan, *Md. Taha 3738* (SING); Berau: T. Redil, *Kostermans 21006* (L); E. Kutai: Samarinda, *Kostermans 4813* (BO); Tikoeng, *Amdjah 961* (BO).

PHILIPPINES. Luzon: Casiguran, *Ramos & Edano BS 45373* (C, NY, P); Bataan, *Merrill BS 1016* (K); Limay, *Merrill 7477*; Quezon, Quinayangan, *Escritor BS 20765* (K). — Leyte: Tacloban, *Wenzel 1684* (K, NY). — Sulu: Tawitawi Is., *Ramos & Edano BS 44035* (B, K, NY).

CELEBES. Minahasa, *Koorders 19640b* (BO); Pasang Kajoe, *Rachmat 173* (BO, L).

MOLUCCAS. P. Patjan: Inggau R., *Nedi 103* (BO, L).

NEW GUINEA. v. Römer 204 (BO), *Weinland 144a* (B, BO, SING); Finschhafen, *Lauterbach 443* (B); Fly R. delta, *Brass 8131* (BM); Orati R., *Womersley & Simmonds 5061* (LAE); Oriomo R., *Grey & White NGF 10424* (LAE), *Streimann & Leleq NGF 18429* (LAE).

Vernacular. Celebes, Pasang Kajoe: *Sasa*. — Moluccas, P. Batjan: *Lapi-Lapi*.

Notes. Although *S. peregrinus* is based on Merrill and Schlechter's interpretations of Blanco's work, all specimens of Merrill's *Sp. Blancoanae no. 1016* are without flowers; several have fruits. Vegetatively, they are good matches for *Merrill 7477*.

Both *S. minor* and *S. warburgii* are placed here with reservations. I did not see the types nor any specimens bearing these names and I include them here on the basis of

the original descriptions, which are fairly good matches for this subspecies. However, since Schlechter also described *S. quinquangularis* on the basis of a non-existent corona, his descriptions are of dubious reliability.

The type specimen of *S. multiflorus* (Lauterbach 443) bears an immature fruit with undeveloped seeds. The immaturity of the fruit may account for its elliptical, rather than to-be-expected globose, shape.

Harmand 246 is typical overall of subsp. *peregrinus*, even to the simple peduncles, but it has the corolla pubescent inside. The locality attributed by Harmand to his specimen, i.e. 'N. of Se Lampau, Laos', however, is probably an error as I have no other records occurring so far from tidal influences.

There are 3 unpublished binomials for this subspecies. *Korthals s.n.* is labelled *S. glandulosus*; *Wenzel 1684* and *Merrill 7477* are both labelled *S. incrassatus* Schltr.; and *S. celebicus* Schltr. is cited by Schlechter himself (Beih. Bot. Centralbl. 34, 2, 1917: 4) as having been published but I can find no record of it. I include it here on its supposed affinity with *S. minor*.

4. *Sarcolobus oblongus* Rintz, *sp. nov.* — Fig. 4.

Planta scandens. Caulis teres circiter 8 mm diametro. *Folia* petiolis 2–3 cm longis; laminis oblongis, 10–20 × 4–5.5 cm, basibus cuneatis, apicibus obtuso acuminatis. *Inflorescentiae* pedunculis simplicibus, 0.2–0.4 cm longis. *Corolla* subrotata, tubo circiter 2 mm longo, circiter 1.5 cm diametro. *Gynostegium* tubo staminis 2 plo longiore quam alis staminorum; sine corona; pollinaria corpusculis circiter 0.4 mm longis.

T y p u s : *L. J. Brass 6278* (A; iso: BM, L) Papua New Guinea. Western Division: Daru I., along the coast in mangroves, March 5, 1936.

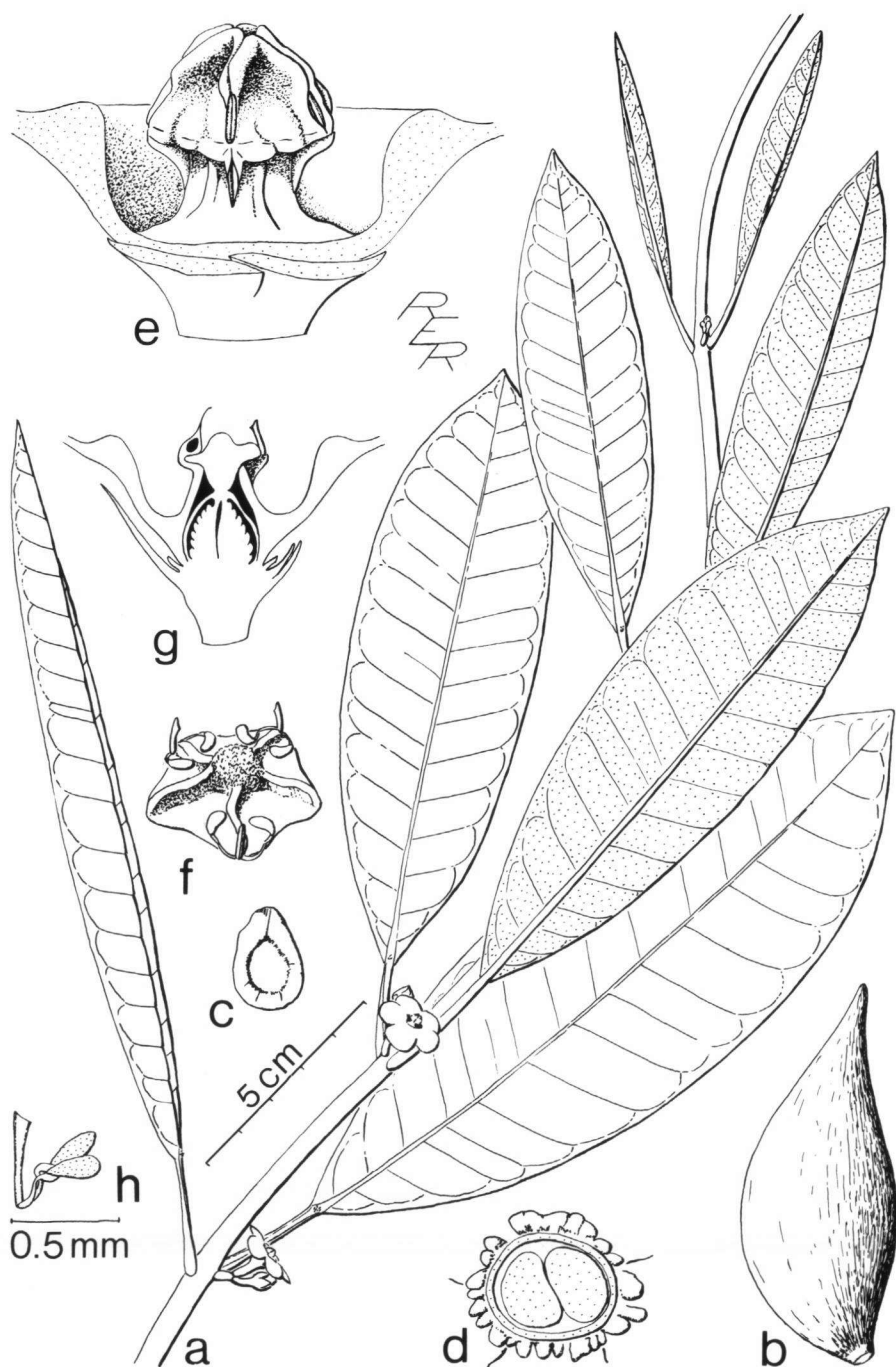
Stems glabrous, pale green to dark brown, 2 m or more long, becoming 8–10 mm in diam. *Petiole* 2–3 cm long, the groove glabrous. *Blade* dull dark green above, pale below, oblong, 10–20 × 4–5.5 cm; base cuneate; apex obtuse-acuminate; secondary veins straight, parallel, arching near the margins. *Flowers* 1–5 on racemes to 1 cm long; peduncle simple, 0.2–0.4 cm long; pedicels *c.* 0.4 cm long. *Calyx* with a ring of truncate glands inside. *Corolla* subrotate; tube *c.* 2 mm long, *c.* 1.5 cm in diam., glabrous, purple-brown inside, pale green outside. *Gynostegium* with the anther wings curving halfway down the stamen tube; corolline and staminal corona absent; twin-pollinia with corpuscles *c.* 0.4 mm long. *Fruit* ovoid, *c.* 8 × 4 cm, base unequal, surface smooth; pericarp *c.* 5 mm thick. *Seeds* *c.* 2–2.5 × 1.3–1.6 cm, without a coma; 80–100 per follicle.

D i s t r i b u t i o n . Known only from the southern coast of Papua New Guinea near the Fly and Purari R. deltas.

E c o l o g y . Blooming specimens collected in Feb. and March.

PAPUA NEW GUINEA. Western Division: Daru I, *Brass 6278*, *Streiman & Lelean NGF 18424* (K); Gulf Division: Purari R. delta, *Schodde & Craven 4489* (CANB, L.).

N o t e s . *S. oblongus* differs from all other members of the genus in the larger size of its stems and leaves and in the oblong shape of the latter. The venation of *S. oblongus* is also distinct with the secondary veins mostly parallel and arching only near the margins, rather than arching entirely as in the other 3 species.



In floral structure, *S. oblongus* is similar to *S. globosus* subsp. *globosus* in having a subrotate corolla and anther wings curving halfway down the stamen tube. It differs from the latter in its entirely glabrous and somewhat shallower corolla and in its less revolute anther wings.

The epithet refers to the shape of the leaves. I used it in honor of L. J. Brass who chose the name but did not publish it.

DOUBTFUL AND EXCLUDED SPECIES

The type specimen of *S. pierrei* Cost., i.e. *Pierre 4379* from Mt. Dihn, Baria, Vietnam (Cost., Fl. Gén. I-C 4, 1912: 76), is sterile. A drawing attached to the sheet shows a flower which seems to belong to *Gongronema*. It has a broad shallow staminal corona and a conical non-stellate stigma; the twin-pollinium is not figured.

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Fig. 4. *Sarcolobus oblongus* Rintz. — a. habit; b. glands between calyx and corolla, stippled areas are the base of the corolla tube and the two carpels; c. gynostegium with the calyx and corolla cut away; d. gynostegium in median sectional view; e. stigma in oblique view with three twin-pollinia in position; f. twin-pollinium. (a, d–h. Brass 6278; b, c. Streimann & Lelean NGF 18424).