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A REVISION OF ISONEMA R. Br.  
AND PYCNOBOTRYA Benth.  
(APOCYNACEAE)

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## INTRODUCTION

The present publication is a monograph of the genera *Isonema* and *Pycnobotrya*. It is based on the study of herbarium material as well as material on spirit in Wageningen. The material of *I. buchholzii* was poor, lacking fruits.

It was possible to trace all type specimens in both of these genera. A new key to the species of *Isonema* is added; *Pycnobotrya* is considered to be monotypic.

## HISTORY OF THE GENUS ISONEMA R. Br.

In 1810 R. BROWN described the monotypic genus *Isonema*, based on a collection of SMEATHMAN, but he failed to name the type species. ROEMER & SCHULTES (1819) provided the combination *I. smeathmannii*. In 1886 ENGLER published a second species *I. buchholzii*, while the third species was described by STAPP (1898).

The present author maintains these three species.

## GEOGRAPHICAL DISTRIBUTION

*Isonema* is restricted to West and Central Tropical Africa, from Senegal to Zaïre. The most widely distributed species *I. smeathmannii* occurs from Senegal to Ghana. *I. buchholzii* is restricted to Nigeria and Cameroun, while *I. infundibuliflorum* occurs in Cameroun, Gabon and Zaïre. Although *I. buchholzii* and *I. infundibuliflorum* both occur in Cameroun, their areas of distribution do not overlap.

## RELATIONSHIP TO OTHER GENERA

When ROBERT BROWN proposed *Isonema* in the *Apocynaceae*, he placed it between *Holarrhena* and *Vallaris*. REICHENBACH (1828) referred it to the *Echiteae* Rchb. (1828: 133) and his view was followed by many authors including A. DE CANDOLLE (1844: 415) and ENDLICHER (1838: 584). Much later SCHUMANN (1895: 183) placed *Isonema* in the *Parsonsieae* A. DC. (1844) and this century PICHON (1950: 50) referred it to the *Nerieae* Rchb. (1837) into the subtribe *Amphineuriinae* Pichon (1950: 55) (French description only). This subtribe should be called *Neriinae* as it comprises the type genus of the *Nerieae*. PICHON proposed 9 subtribes in the *Nerieae*, ZWETSLOOT (1981) concurred, although he arranged them differently. The present author considers 8 of the 9 subtribes as natural, while the *Neriinae* form a kind of rest group as already indicated by PICHON (1950: 55). Next to *Isonema* PICHON's *Amphineuriinae* consisted of the genera *Amphineurion*, *Dewevrella*, *Nerium* and *Pottsia*. *Amphineurion* was segregated

by PICHON from *Aganosma*, but TSIANG & LI (1977) reversed this decision as the differences between both genera were too trivial. *Deweivrella* is characterized by very long filaments which are twisted around the style. The flowers of *Nerium* possess a corona and long pubescent appendages on the apex of the anthers. *Pottsia* shows some resemblance with *Isonema* in the shape of the anthers, but less so in that of corolla, filaments and fruits. *Isonema* differs very much from the preceding genera by the presence of unilateral appendages to the corolla lobes.

The present author hopes that in future, *Isonema* can be removed into the neighbourhood of genera that show a more obvious relationship.

## CYTOLOGY

In co-operation with J. C. ARENDS & F. M. VAN DER LAAN, a somatic chromosome number of  $2n = 22$  was found for a specimen of *I. smeathmannii*. This analyzed plant was grown from seed, collected by OLDEMAN in Ivory Coast in 1964, and flowered in the greenhouse of Wageningen (voucher *Van Veldhuizen* 24).

## GENUS DIAGNOSIS OF ISONEMA R. Br.

*Isonema* R. Br., 1810: 63; Barling, 1830: 204; G. Don, 1837: 78; Endlicher, 1838: 584; Spach, 1839: 503; De Candolle, 1844: 415; Bentham & Hooker f., 1876: 712; Schumann, 1895: 184; Stapf, 1902: 187; Hutchinson & Dalziel, 1931: 49; Pichon, 1950: 53; Huber, 1963: 69; non Cassini, 1817 (which is Compositae).

Type species: *I. smeathmannii* Roem. & Schult.

Sarmentose or lianescent *shrubs* or *lianes*, 1–20 m high. Bark dark brown to black or dark violet, with or without latex, sometimes only present in the roots. Branchlets terete. *Leaves* decussate and those of a pair equal, petiolate; petiole grooved, with many colleters in the groove all over its length, of which the two at the end are bigger and resemble small horns. *Inflorescences* few- to many-flowered, terminal and in the axils of the apical leaves, occasionally axillary in *I. smeathmannii*; lower bracts mostly soon caducous, and often with colleters in the axils. Flowers 5-merous. *Sepals* fleshy, erect, free, imbricate, broadly ovate, outside pubescent, inside glabrous, with 5 groups of 2–4 (–5) colleters, alternating with the sepals. *Corolla* cylindrical at the base and widening into a saucer-shaped portion or infundibuliform, outside minutely pubescent with ordinary and some glandular hairs, inside glandular-puberulous, except for the basal 1–2 mm, on both sides; lobes oblong, acute at the apex, entire with or in *I. smeathmannii* sometimes without, a subapical undulate appendage, outside wholly or only on the base minutely pubescent, inside glandular-puberulous. *Stamens* exserted, inserted at the base of the widened portion of the corolla, curved, filaments short, outside glabrous, inside at the base of the anthers with

a dense tuft of hairs, sticking to the basal glabrous part of the clavuncula, below it on the filament and also on the filament ridges in the tube, which are about 3 mm long, long white, stiff, recurved hairs, which are more dense on the basal knob of the ridge, forming a ring-shaped belt in the middle of the tube; anthers narrowly triangular, whitish, acuminate at the apex, sagitate at the base, with revolute margins, conniving into a cone, 2-celled, introrse, fertile at the apex for 1/3 of the their length. *Pistil*: ovary of two free carpels, globose, gradually narrowed into the style; in each carpel one adaxial placenta with many ovules; style inserted on the apex of the carpels, filiform, sometimes slightly wrinkled at the apex, glabrous; clavuncula composed of two rings above each other: the basal glabrous, thin, recurved, sticking to the hairs at the base of the anthers, and the apical woolly and disk-shaped; stigma two-lobed. *Fruit* composed of two follicles, which are connate at the base, widely spreading, cylindrical, tapering towards the apex, obtuse at the tip, rusty-brown, velvety, opening with a longitudinal slit at the adaxial side, many-seeded. *Seed* with a deciduous basal coma and a apical coma directed towards the apex of the carpel, fusiform, 1.5–2.2 cm long, hemi-orbicular on section, flattened towards the apex and base; hilum raised; basal coma small, 1.5–2.0 cm long, only present in fruit; apical coma large, spreading, 3–4 cm long, hairs simple.

## KEY TO THE SPECIES

1. – Branchlets minutely puberulous or glabrous; leaves beneath with short hairs (domatia) in the axils of the secondary veins; glabrous above; inflorescence lax; corolla tube almost cylindrical . . . . . **I. buchholzii**  
 – Branchlets pubescent; leaves beneath pilose or pubescent, especially on the main veins . . . . . 2
2. – Leaves glabrous above; secondary veins 6–9; inflorescence lax; corolla tube infundibuliform . . . . . **I. infundibuliflorum**  
 – Leaves above pilose to pubescent on the costa; secondary veins 4–6; inflorescence congested; corolla tube cylindrical . . . . . **I. smeathmannii**

**1. *Isonema buchholzii* Engl.**, 1886: 340; Stapf, 1902: 189; Hutchinson & Dalziel, 1931: 49; Guinea López, 1946: 349; Huber, 1963: 69. **Fig. 1; Map 1**

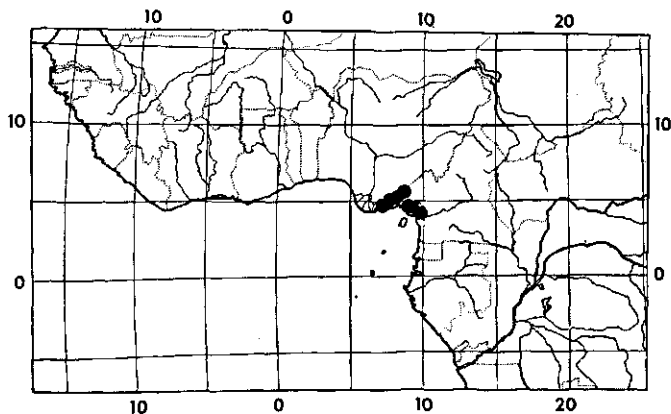
Types: Cameroun, near Mungo, *Buchholz Oct. 1874* (holotype not seen, destroyed in B); Cameroon R. (= Wouri R.) *Mann 2211* (K. lectotype, was cited as second collection with original publication).

Climbing *shrub* or liane, 3–6 m high. *Branches* terete, dark violet. Branchlets minutely puberulous, soon glabrous. *Leaves* shortly petiolate; petiole 3–9 mm long, minutely puberulous; blade coriaceous, elliptic to obovate, 1.2–2.3 × as long as wide, 4.8–10 (–16) × 3.2–5.3 cm, acuminate with an obtuse tip at the apex, obtuse to rounded at the base, equal-sided, glabrous above, beneath in



FIG. 1. *Isonema buchholzii* Engl.: 1. flowering branch,  $2/3 \times$ ; 2. petiole with colleters,  $2 \times$ ; 3. domatium in the axil of a secondary vein,  $2 \times$ ; 4. flower,  $4 \times$ ; 5. opened flower,  $4 \times$ ; 6. calyx with colleters,  $4 \times$ .—(1–3. Letouzey 14760; 4–6 Van Meer 1214).

the axils of the main veins, mostly in the basal part, with a few short hairs (domatia), revolute at the margin; costa and the other veins impressed above, prominent beneath; secondary veins 4–5 on each side; tertiary venation reticulate. *Inflorescences* thyrsoid, lax, 11.5–19 × 9–16 cm, very minutely pubescent. Lower bracts narrowly ovate, up to 5 mm long, and soon caducous, mostly with colleters in the axils; other ovate and about 2 mm long. Peduncle light-green to yellowish, 2–4.5 cm long; pedicels pinkish 3–7 mm long. Flowers fragrant. *Sepals* dark green at the base, lighter towards the apex, broadly ovate, unequal, 1.6–2.2 × as long as wide, 2–2.2 × 1–1.2 cm, outside minutely pubescent, inside glabrous, with 5 groups of 2–4 green glands and alternating with the sepals. *Corolla* outside pinkish-yellow, pink or white (see Note), in the mature bud 7–8 × as long as the calyx, 14–16 mm long; tube 4–5 × as long as the calyx, 8.5–10 mm long, composed of an almost cylindrical portion, 2–2.5 mm wide, widening towards the throat for about 1 mm, and a saucer shaped portion at the apex which is 1–2 mm wider, outside minutely pubescent, which is more dense at the apex 4–5 mm, inside glandular-puberulous below the filament ridges; lobes pink, 4–7.5 × 1.5–3 mm, outside minutely appressed-pubescent, inside with minute glandular hairs; with an undulate subapical appendage, 1.2–4 × 1.2–3 mm. *Stamens* exerted for 2–2.5 mm; filaments 0.8–1 mm long, filament ridges 2.5–3 mm long; anthers whitish, 2.9–3.1 × 0.9–1.1 mm, fertile at the apex for 1.1–1.3 mm. *Pistil* 10–12 mm long; ovary 1–1.5 × 1–1.2 × 0.7–0.8 mm, tomentose for 0.25–0.75 of its length from the apex; in each carpel 7–8 series of 6–9 ovules; style filiform, 8–10 mm long; clavuncula: the lower ring 0.3–0.5 mm high, at the base 0.6–0.9 mm in diameter and the apex one third of that; the upper 0.5–0.7 × 0.2–0.4 mm; stigma composed of two oblong about 0.2 mm long lobes, one sometimes shorter than the other. *Fruits* unknown.



MAP 1. *Isonema buchholzii* Engl.

Distribution: Nigeria and Cameroun.

**Ecology:** Mainly in wet places, together with *Raphia*. Also in secondary vegetation.

**Specimens examined:**

NIGERIA: Cross River State: Imo R. (fl. Dec.) *Onochie* FHI 40444 (K); near Ikot Ekpene (fl. Apr.) *Van Meer* 1214 (WAG); km 50 Oron – Eket Road (fl. Jan.) *Talbot* 3027 (BM, K, NBG, Z); Calabar (fl. May) *Daramola* 9 May 1965 (K); Ikom (fl. June) *Latilo* FHI 31844 (K, P); sin. loc. (fl. Apr.) *Thompson* 16 (K); (fl.) *Talbot* 106 (BM).

CAMEROON: Kumba (Johann-Albrechtshöhe) (fl.) *Staudt* 481 (COI, K, P, S), 744 (A, BM, E, G); Abo R. (fl. Apr.) *Letouzey* 14760 (P, WAG); 5 km NE of Douala (fl. May) *Letouzey* 14930 (WAG); Wouri R. (Cameroun R.) (fl.) *Mann* 744 (GH, K, P, WAG), 2211 (K, lectotype).

**Note:** ENGLER describes the corolla as white, only in *herb.* *Latilo* FHI 31844 the flowers are noted as being white.

**2. *Isonema infundibuliflorum* Stapf, 1898: 306; De Wildeman & Durand, 1899: 103; 1900: 40; 1901: 154; Schumann, 1900: 308; Stapf, 1902: 188; De Wildeman, 1908: 251.**

**Fig. 2; Map 2**

**Type:** Zaïre, sin. loc., *Dewèvre* 554 (K: holotype; isotype: BR).

Sarmentose *shrub* or liane, 1–2 m high, up to 5 m long. Trunk 2 cm in diameter or more. *Branches* dark brown to black, glabrescent, branchlets minutely pubescent. *Leaves* shortly petiolate; petiole 4–6 mm, minutely pubescent; blade ovate, elliptic, or oblong, 2–3 × as long as wide, 8–19 × 3.7–7.7 cm, acuminate and with an acute tip at the apex, rounded to cordate at the base and equal-sided; parchmentaceous, somewhat glossy, above glabrous, beneath pilose, especially on the costa and secondary veins, which are impressed above and prominent beneath; secondary veins 6–9 (–12) on each side. *Inflorescences* thyrsoid, lax, 9.5–16 × 6–14 cm, minutely pubescent. Bracts ovate about 2 mm long, soon caducous. Peduncle 3–5.7 cm long; pedicels 5–7 mm long. *Sepals* dark green, paler at the apex, broadly ovate, 1.8–2.5 × as long as wide, 2.5–3.3 × 1.2–1.6 mm, outside minutely pubescent, less so towards the thinner margins, inside glabrous, with 5 groups of 2–4 (–5) glands and alternating with the sepals. *Corolla* dark red, inside in the throat with 10 white longitudinal stripes, in the mature bud 5–6 × as long as the calyx and 15.5–19 mm long; tube infundibuliform, at the apex pale green, 9–11 mm long, at the base 1.5–2 mm wide, at 0.25 of its length 2.5–3 mm wide, from there much more widened and at the mouth 4–6 mm wide, outside minutely pubescent with ordinary and some glandular hairs, inside glandular-puberulous; lobes reddish, yellow at the apex, 6–8 × 3–4 mm, outside with a minute pubescence, inside glandular-puberulous, with a large undulate sub-apical appendage, 2–4 × 3–4.5 mm. *Stamens* exerted for only 0.5–1 mm; filaments 0.9–1 mm long; anthers 2.8–3.8 × 1–1.2 mm, fertile at the apex for 1.2–1.5 mm. *Pistil* 9–10.2 mm long; ovary 1.2–1.5 × 1–1.2 × 0.6–0.8 mm, at the apex sparsely pilose; in each carpel 8–10 series of 7–9 ovules; style 8–9 mm long; clavuncula: the lower ring 0.4–0.5 mm high, at the base 0.9–1 mm in diameter, and at the apex one third of that; the upper

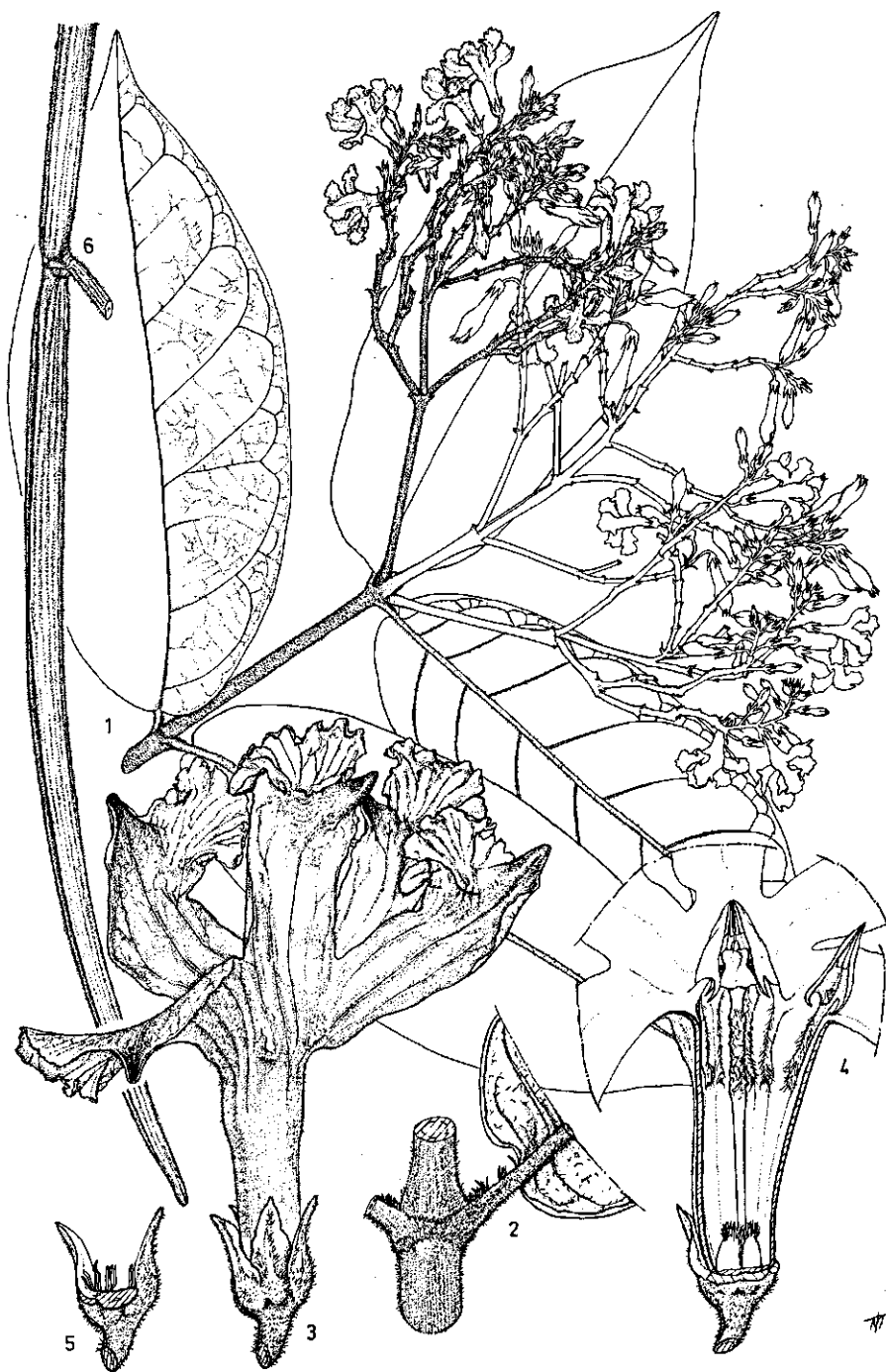
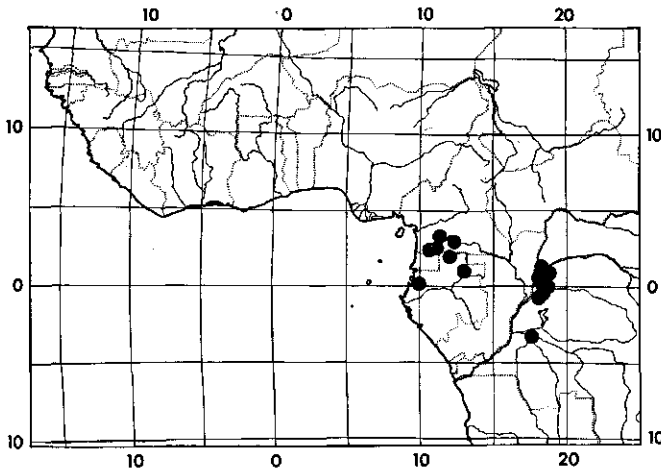


FIG. 2. *Isonema infundibuliflorum* Stapf: 1. flowering branch,  $\frac{2}{3} \times$ ; 2. petiole with colleters,  $2 \times$ ; 3. flower,  $4 \times$ ; 4. opened flower,  $4 \times$ ; 5. calyx with colleters,  $4 \times$ ; 6. fruit,  $\frac{2}{3} \times$ . —(1–5 J. J. de Wilde 8234; 6. Leemans 240).



0.5–0.6 × 0.2–0.3 mm; stigma composed of two oblong about 0.2 mm long lobes. *Fruit*: follicles 15–19 cm long. *Seed* fusiform, apical 3–3.5 cm long; puberulous (? see Note); basal coma 1.5–2 cm long; apical 3–3.5 cm long.



MAP 2. *Isonema infundibuliflorum* Stapf

**Distribution:** Central Africa: Cameroun, Gabon, and Zaïre.

**Ecology:** Rain forest and secondary vegetation, often near rivers.

**Vernacular names:** ZAÏRE: *Bosere* (Lokundu).

#### Specimens examined:

CAMEROON: near Ngolebang (fl. May) *Asonganyi* 13 (WAG); Nyong R., 40 km SE of Yaoundé (fl. Jan.) *Breteler et al.* 2543 (BR, P, WAG); Bitye, Dja R. (fl. Sept.) *Bates* 1771 (K, P); km 14 Ebolowa-Ambam Road (fl. May) *J. J. de Wilde* 8234 (WAG); 24 km WSW of Ambam, Mboro R. (fl. Febr.) *Letouzey* 10059 (K, P).

GABON: Woleu-Ntem (fl. March) *Le Testu* 9037 (BM), 9091 (BM, BR); Bélinga (fl. June) *N. Hallé* 3991 (P); Libreville (fl.) *Cooway* s.n. (LD).

ZAÏRE: Equateur: Bomana, Giri R. (fl., fr.) *Sapin* anno 1912 (BR, K); *ibid.* (fl. March) *Evrard* 5875 (BR, K); near Mbandaka, Ikelemba R. (fl.) *Lebrun* 809 (A, BR, G); near Mbandaka (= Coquilhatville) (fl. July) *Lebrun* 626 (BR, K); Mbandaka (fl. July) *Schlechter* 12602 (B, BM, BR, G, K, L<sup>++</sup>, MO, P, WAG, Z); Eala (fl. Aug.) *Corbisier Baland* 1655 (BR), (fl., fr. Febr.) 2000 (BR, K); *ibid.* (fl. Jan.) *Lebrun* 6779 (BR, K, MO); *ibid.* (fl. fr.) *Leemans* 316 (BR, WAG); *ibid.* (fl. June) *Pynaert* 1462 (BR); *ibid.* (fl. Nov.) *Strauss* 1554 (BR); Kombo, Ruki R. (fl. June) *Ghesquière* 2825 (BR, P); *ibid.* (fl. Dec.) *Dubois* 243 (BR); between Bikoro and Bokatola (fl. May) *Germain* 8425 (BR, P); Bikoro, Tumba L. (fl., fr. Oct.) *Chauvard* 36 (= *Thonet* 36) (BR); Tumba L. (fl. March) *Evrard* 3787 (BR), 3858 (BR, K); *sin. loc.* (fl.) *De Giorgi* 265 (BR); (fl.) *Dewèvre* 554 (BR, K, type); (fl. May) *Flamigni* 180 (BR); (fl., fr.) *Leemans* 240 (BR, K).

<sup>++</sup> seen by LEEUWENBERG.

**Note:** Only two numbers examined, with immature seeds which were attacked by fungi. (*Leemans* 240 (K), *Corbisier Baland* 2000 (BR)).

**3. *Isonema smeathmannii*** Roem. & Schult., 1819: 401; Bentham, 1849: 450; Stapf, 1902: 188; Pobéquin, 1906: 147; Chevalier, 1920: 419; Hutchinson & Dalziel, 1931: 49; Dalziel, 1937: 373; Irvine, 1961: 625; Huber, 1963: 69; Berhaut, 1971: 391.

**Fig. 3; Map 3; Phot. 1**

Type: Sierra Leone, sin. loc. *Smeathman s.n.* (BM, holotype).

Sarmentose *shrub*, often lianescent, 2–5 m high and up to 20 m long. Trunk 2 cm in diameter or more. *Branches* dark brown to black with white lenticels. *Branchlets* with rusty-brown pubescence. *Leaves* shortly petiolate; petiole 3–7 mm long, hirt-pubescent, blade oblong to narrowly obovate, 1.9–3.0 × as long as wide, 4–12 × 2.3–4.8 cm, acuminate to apiculate at the apex or in leaves near the base of the branchlets often obtuse, rounded or emarginate, at the base rounded to cordate and equal- or unequal-sided, coriaceous, above pilose to pubescent on the costa, beneath pilose to pubescent, especially on the main veins; costa and other veins impressed above, prominent beneath as the reticulate tertiary venation; secondary veins 4–6 on each side. *Inflorescences* occasionally axillary, thyrsoïd, 5.5–27.5 × 2.3–6.5 cm, densely pubescent; lower bracts leafy, with colleters in the axils; upper small, ovate to very narrowly elliptic, acuminate, densely pubescent. Peduncle 1.1–6.7 cm long; pedicels 3–5 mm long. *Sepals* brownish-green to dark brown, broadly ovate, with an ochraceous tip, sometimes slightly unequal, 1.1–1.6 × as long as wide, 1.8–2.5 × 1.2–2.0 mm, outside pubescent, glabrous near the margin, inside glabrous, with 5 groups of 2–3 glands, which are 1 mm long. *Corolla* outside yellow-green to -brown, in the mature bud 6–8 × as long as the calyx, 12–18 mm long; tube 4–5 × as long as the calyx, 7–10.5 mm long, composed of a cylindrical 1.5–2.2 mm wide, and at the apex with a saucer-shaped portion, which is 1–2 mm wider, outside pubescent with ordinary and some glandular hairs, inside minutely glandular-pubescent and at the base for 1 mm glabrous; lobes inside red-brown to pink-red and with four yellow longitudinal stripes from the base to 1/3 of the length, 4.5–6 × 2–3.2 mm, outside mainly at the base yellowish-pubescent with ordinary and glandular hairs, with or without a small undulate sub-apical appendage at the right side, which is yellow at the margin, 0.5–1 × 1–2 mm. *Stamens* exerted for 3–4.5 mm; filaments 1.2–2 mm long, filament ridges in the tube 2.5–3.8 mm long; anthers whitish, turning greyish, narrowly triangular, 3.0–3.5 × 0.8–1.1 mm, fertile at the apex for 1.1–1.3 (–1.6) mm. *Pistil* 9.1–13.0 mm long; ovary 0.8–1.2 × 0.8–1.2 × 0.5–0.9 mm, glabrous at the base, pennicellate at the apex; in each carpel 6–10 series of 6–7 ovules; style 8.5–12 mm long; clavuncula: the lower ring 0.2–0.3 mm high, at the base 0.6–0.8 mm in diameter, and at the apex one third of that; the upper 0.6–0.8 × 0.2–0.3 mm; stigma composed of two oblong about 0.2 mm long lobes. *Fruit*: follicles 11–20 × 0.5–0.8 cm, rusty-brown, velvety. *Seed* laterally compressed, with a minute honeycombe-like structure, fusiform, 18–22 × 2–3.5 mm; most hairs of the basal coma directed downwards, about 2 cm long and a few directed upwards along the seed, about half as long as the seed.

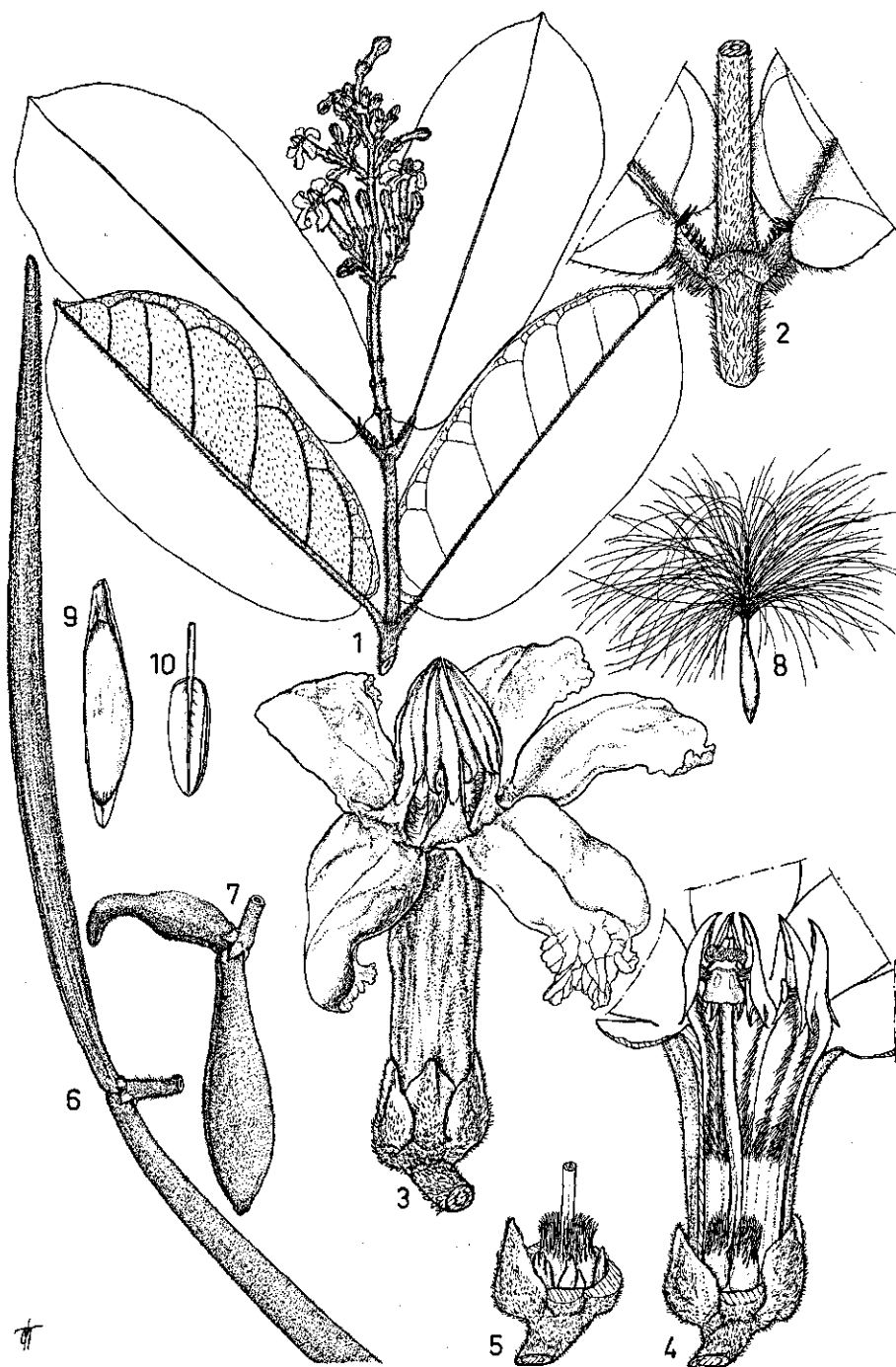
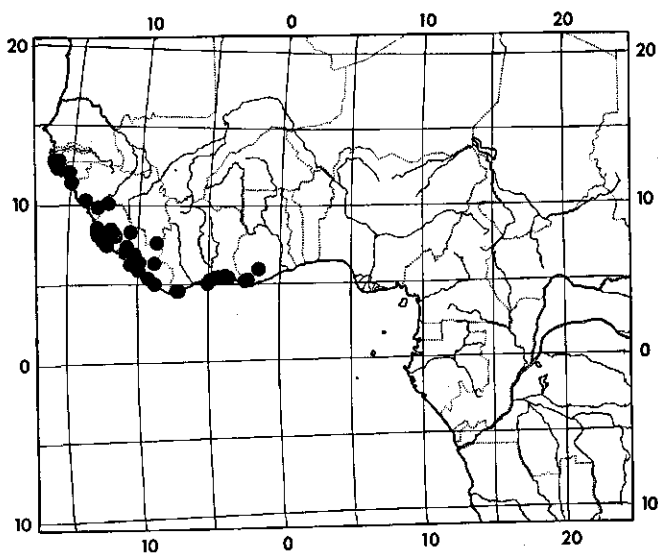


FIG. 3. *Isonema smeathmannii* Roem. & Schult.: 1. flowering branch,  $2/3 \times$ ; 2. petiole with colleters,  $2 \times$ ; 3. flower,  $4 \times$ ; 4. opened flower,  $4 \times$ ; 5. calyx with colleters,  $4 \times$ ; 6. fruit,  $2/3 \times$ ; 7. young fruit,  $2/3 \times$ ; 8. seed,  $2/3 \times$ ; 9. detail seed,  $2 \times$ ; 10. embryo,  $2 \times$ .—(1–2. Zwetsloot 1; 3–7. Beentje 274; 8–10. Jansen 1749).



MAP 3. *Isonema smeathmannii* Roem. & Schult.

Distribution: West Africa: Senegal to Ghana.

Ecology: Bush or forest, mainly near the coast.

Uses: The young leaves are said to be used as a vegetable in Sierra Leone.

Vernacular names: SIERRA LEONE: *Afaut*, *Boote*, *Bubote*, *Epal*, *Leveng*, *Kpakula* (teste: Thomas 1138, 6817, 7086).



PHOT. 1. *Isonema smeathmannii* Roem. & Schult., habit. (Beentje 274, Phot. H. J. BEENTJE).

Meded. Landbouwhogeschool Wageningen 83-4 (1983)

# Specimens examined:

SENEGAL: Diantèm, *Berhaut* 6257 (BR, P); Ossouye Region, *Berhaut* 7174 (P), 7241 (BR, M, P); sin. loc. *Berhaut* 7027 (BR, P).

GUINEE BISSAU: between Suzana and São Domingo, *Espirito Santo* 2291 (COI, LISC, LISJC, WAG); Bissau Safim, *Espirito Santo* 1905 (COI, K, LISC, LISJC, WAG); between Cumura and Bor, *Espirito Santo* 1879 (BR, COI, K, LISC, LISJC, MO, P, WAG); Prabis, *Espirito Santo* 1826 (COI, LISC, WAG).

GUINEA: Pongo R., *Heudelot* 912 (BM, FI-W, K, P); Kindia, *Adam* 26769 (MO); *ibid.*, *Pobeguini* 1285 (A, BR, K, P); near Friguabé, *Chevalier* 25588 (P, WAG); *ibid.*, *Chillou* 498 (C); sin. loc. *Chevalier* 12475 (P), *Maclaud* Dec. 1898 (P).

SIERRA LEONE: Petifu Creek, *Pelly* 423 (FHO); Rowala, *Thomas* 1138 (A, B); Port Loko Creek, *Scott Elliot* 5814 (BM, K, MO); Kumrabai, *Thomas* 6817 (S), 7086 (Z); Kundu, *Smythe* 255 (K); Guma Dam, *Hepper* 2506 (K, MO); Hamilton, *Morton and Jarr* SL 1657 (K, MO, WAG); Ronietta, *Thomas* 5420 (K), 5573 (W, WAG); Waterloo, *Lane Poole* 301 (K); Njala, *Deighton* 662 (K), 1747 (BM, K); Samu, *Scott Elliot* 4305 (BM, K, MO); Baiima R. Banks, *Deighton* 5332 (B, K, P), 5772 (K); Bagru R., *Mann* 824 (K, P); Victoria, *Thomas* 9048 (BM), 9241 (K), 9335 (LD); Bonthe, *Adames* 45 (K); Sherbro Island, *Dalziel* 943 (BM, K, MO); *ibid.* *Hunter* 49 (BM, MO); sin. loc., *Afzelius* s.n. (UPS); *Marmo* 4 (K); *Smeathman* s.n. (BM, type); *Thomas* 6262 (B), 7158 (A), 9182 (P), 9341 (A).

LIBERIA: Yèkepa, *Adam* 28707 (WAG); Bomi Hills, *Bos* 1944 (BR, K, P, WAG), 2064 (BR, K, P, WAG); *ibid.*, *Breteler* 5429 (WAG); *Goll* 99 (WAG); *ibid.* *Jansen* 793 (WAG), 1454 (WAG); *ibid.*, *Van Meer* 67 (WAG); Dobli Island, *Bequaert* 24 (A, K); Gibi Mt., *Jansen* 1749 (WAG); Tapeta, *Bos* 2708 (BR, WAG); Brewerville, *Baldwin* 10364 (K), 10979 (K, MO); *ibid.*, *Barker* 1236 (K); *ibid.*, *Dinklage* 2721 (A); Barclay Mt., *Dalziel* 8120 (E, K, P); Monrovia, *Baldwin* 5836 (K, MO, NY), 10988 (K, MO), 13502 (K, MO), 14191 (K, MO); *ibid.*, *Dinklage* 2164 (B), 2898 (P, Z); *ibid.*, *De Gier & Goll* 302 (WAG); *ibid.*, *Kunkel* 236 (WAG), 240 (WAG); *ibid.*, *Van Meer* 276 (BR, MO, WAG); *ibid.*, *De Wit* 9106 (WAG); Roberts field, *Baldwin* 13204 (K), Paynesville Arboretum, *Voorhoeve* 93 (WAG), 270 (WAG); Harbel, *Baldwin* 13210 (K, MO); *ibid.*, *Harley* 2124 (K); Buchanan, *Adam* 16045 (P), 270 (WAG), 25386 (MO), 26106 (MO), 27858 (MO); *ibid.*, *Dinklage* 1802 (A, B), 2048 (A); *ibid.*, *Vogel* 65 (K); Sehnkwehn (Sangwin), *Baldwin* 11308 (K, MO, WAG); Sinoe, *Jansen* 1117 (WAG); *ibid.* *Whyte* anno 1904 (BM, K); sin. loc., *Barker* 1338 (K); *Carter Cook* 203 (A, BR, NY); *Millen* 199 (K).

IVORY COAST: E of Tabou, *Beentje* 838 (WAG); *ibid.* *Leeuwenberg* 12301 (WAG); Grand Lahou, *Pobeguini* 10 (P); 4 km NNW of Jaqueville, *Beentje* 667 (WAG); Dabou, *Chevalier* 17215 (P, WAG); *ibid.*, *Roberty* 13618 (G); Agnèby, *Aké Assi* 8887 (UCJ, WAG); *ibid.*, *Chevalier* 17164 (P, WAG); near Ngaty, *Beentje* 525 (WAG); 8 km E of Dabou, *Versteegh and Den Outer* 111 (WAG); Nièki, *Roberty* 12450 (G, Z); Adiopodoumé, *Beentje* 1 (WAG), 2 (WAG), 3 (WAG), 274 (WAG), 275 (WAG), 276 (WAG); *ibid.*, *Dekker* 3 (WAG); *ibid.*, *Geerling and Bokdam* 290 (BR, WAG), 333 (BR, MO, WAG); *ibid.*, *F. Hallé* 19-5-1955 (P); *ibid.*, *Leeuwenberg* 4185 (K, P, WAG); *ibid.*, *Oldeman* 441 (BR, K, P, WAG); *ibid.*, *Roberty* 14266 (G, Z), 15486 (G); *ibid.*, *J. J. de Wilde* 91 (WAG); *ibid.*, *W. J. de Wilde* 418 (K, P, WAG); *ibid.*, *Zwetsloot* 1 (WAG); Bakré Lake, *Miège* 20-5-1965 (G); Abidjan, *Chevalier* 15539 (P), 15545 (P), 15603 (P), 19603 (P); Azito, *Frédoux* 689 (G); Vridi Canal, *Garnier* 277 (K, NY); Vridi, *Roberty* 14226 (G, MO, Z); Port Bouet, *Maire* 23-7-1944 (P); *ibid.*, *W. J. de Wilde* 345 + 345A (BR, K, P, UC, WAG, Z); N of Aghien, *Beentje* 512 (WAG); 2 km S of Aghien, *Beentje* 500 (WAG); Bingerville, *Chevalier* 17825 (P); Moosou, *Aké Assi* 15131 (UCJ, WAG); *ibid.*, *J. and A. Raynal* 13570 (BR, P); Abouabou Forest, *Leeuwenberg* 2693 (BR, COI, FHO, K, L, MO, UC, WAG, Z); *ibid.*, *Oldeman* 233 (BR, COI, K, LD, MO, P, W, WAG, Z); *ibid.*, *J. J. de Wilde* 3156 (A, BR, K, P, WAG); Grand Bassam, *Aké Assi* 15127 (UCJ, WAG); *ibid.*, *Breteler* 5967 (WAG); *ibid.*, *Versteegh and Den Outer* 152 (MO, WAG); *ibid.*, *W. J. de Wilde* 470 (BR, K, P, WAG); Ono Lagoon, *Hedin* 5-12-1930 (P); sin. loc., *Farmer* 370 (BM, K).

GHANA: Mpataba, *Enti* GL42667 (MO); Atoabo, *Irvine* 2346 (FHO); Bronikrom, *Hall and Naboch* 46621 (WAG); sin. loc., *Burton* s.n. (K).

Note: This species is flowering during the whole year.

## HISTORY OF THE GENUS *PYCNOBOTRYA* Benth.

Bentham published *Pycnobotrya nitida* in HOOKER's *Icones* and cited BENTHAM & HOOKER f., *Genera Plantarum* even which page number for the genus publication. The first paper came out in April and the second in May 1876.

The only other species described in *Pycnobotrya* was *P. multiflora* (1902). It was reduced into synonymy of the type species by HUBER in 1963. This view is followed by the present author.

## RELATIONSHIP TO OTHER GENERA

BENTHAM (1876) placed *Pycnobotrya* in the tribe *Echitideae*, more appropriately to be considered as subfamily *Echitoideae* (= *Apocynoideae*). He was followed by SCHUMANN (1895) and STAPF (1902). MARKGRAF (1947) placed it in the subfamily *Plumerioideae*, after having studied fruiting material of *herb. Zenker 3021a*. In his publication the fruits are described for the first time. They resemble very much those of the American genus *Aspidosperma* Mart. & Zucc. Besides of this, he observed that the anthers do not stick to the clavuncula as was supposed by BENTHAM and STAPF.

PICHON (1948) came independently to the same conclusion when studying the *Echitoideae*. Consequently he placed *Pycnobotrya* in the new subtribe *Aspidospermatinae* of the tribe *Plumerieae*.

LEEUWENBERG (1980) and the present author agree with this concept, both consider the *Aspidospermatinae* to be a natural taxon, and therefore they decided to validate it, as PICHON published it with a French description only.

**Aspidospermatinae Pichon ex Leeuwenberg et Van der Ploeg**, subtribus *Plumeriearum* Endl. (1838), nova; Pichon 1950; 195 (French description only).

Arbores, vel frutices erecti, vel alte scandentes. Folia opposita, alternata vel verticillata. Sepala libera vel basi connata, corollae multo breviora. Corollae tubus parie basi non incrassata et lobi basi saepe subauriculati et aestivatione sinistorsa. Ovarium superum vel fere superum. Semina glabra, plerumque alata.

Type genus: *Aspidosperma* Mart. et Zucc.

5 genera:

- Diplorhynchus* Welw. ex Fic. et Hiern (1 species in tropical Africa)
- Pycnobotrya* Benth. (1 species in tropical Africa)
- Aspidosperma* Mart. et Zucc. (about 50 species in tropical America)
- Microplumeria* Baill. (1 species in South America)
- Geissospermum* Allem. (1–3 species in South America)

## ETYMOLOGY

The generic names means inflorescence and is derived from the Greek words: πυκνός, dense, and βότρυς, grape or inflorescence. The latin epithet nitida, shining, refers to the leaves.

## DESCRIPTION

**Pycnobotrya** Benth., 1876b: 715; Schumann, 1895: 162; Stapf, 1902: 202; Markgraf, 1947: 118; Pichon, 1950: 155; Huber, 1963: 68.

Type species: *Pycnobotrya nitida* Benth.

**Pycnobotrya nitida** Benth., 1876a: 72, t. 1183; Stapf, 1902: 202; Markgraf, 1947: 118; Pichon, 1950: 155; Huber, 1963: 68. **Fig. 4; Map 4; Phot. 2**

Type: Gabon: Mount John, Kongui R., Mann 1809 (K, holotype; isotypes: GH, P, S, W).

Heterotypic synonym: *P. multiflora* Schum. ex Stapf, 1902: 203; Huber, 1963: 68. Type: Cameroun: Bipindi, Zenker 1274 (K, lectotype; isotypes: BM, BR, E, G, GOET, HGB, M, NY, P, S, W, WU, Z).

A large *liane*, up to 40 m high climbing in trees; latex white, turning pale yellow. Trunk up to 12 cm in diameter; bark dark brown to black when dry, smooth; *branches* terete, dark red-brown; branchlets rusty-pubescent when young, glabrescent. *Leaves* opposite or ternate, shortly petiolate, inserted on distinct leaf cushions; petiole 3–7 mm long, above glabrous, beneath with short curled hairs, with some minute glands in the axils; blade coriaceous, narrowly elliptic, 2.5–4 × as long as wide, 8–15 × 2–5 cm, acuminate with an obtuse tip, apiculate, or obtuse at the apex, cuneate at the base, dark green, glossy, with a paler or whitish midrib and glabrous above (reddish when young), beneath very pale green, glabrous or especially on the midrib pubescent with short curled hairs, and dotted with many black glands; secondary veins many, straight, parallel, inconspicuous, slightly prominent beneath when dry. *Inflorescences* terminal, and in the axils of the apical leaves, paniculate, first ramifications lax, other congested, 3–15 × 2–20 cm, many flowered, rusty-tomentose; bracts ovate to very narrowly elliptic, those near the base up to 6 mm long, with very minute glands in the axils; peduncle 1–5 cm long, pedicels 1–3 mm long. *Flowers* 5-merous, actinomorphic, or with only the sepals unequal, fragrant. *Sepals* pale green or pale yellowish, ovate, obtuse, free or nearly so, unequal, 1.2–2 × as long as wide, 0.75–1.3 × 0.45–1.0 mm, outside pubescent to tomentose, inside glabrous, without colleters, entire, ciliate, imbricate in bud. *Corolla* dark pink, usually turning paler at anthesis, with or without a pale yellow throat, 5–7 × as long as the calyx, 5–7 (–9) mm long; tube campanulate, 1.3–1.8 (–2) × as long as the calyx (only seen from outside; it seems to be as long as the calyx because of the auricles of the lobes at the base), 1.4–2 × 0.4–0.6 × 1.2–1.6

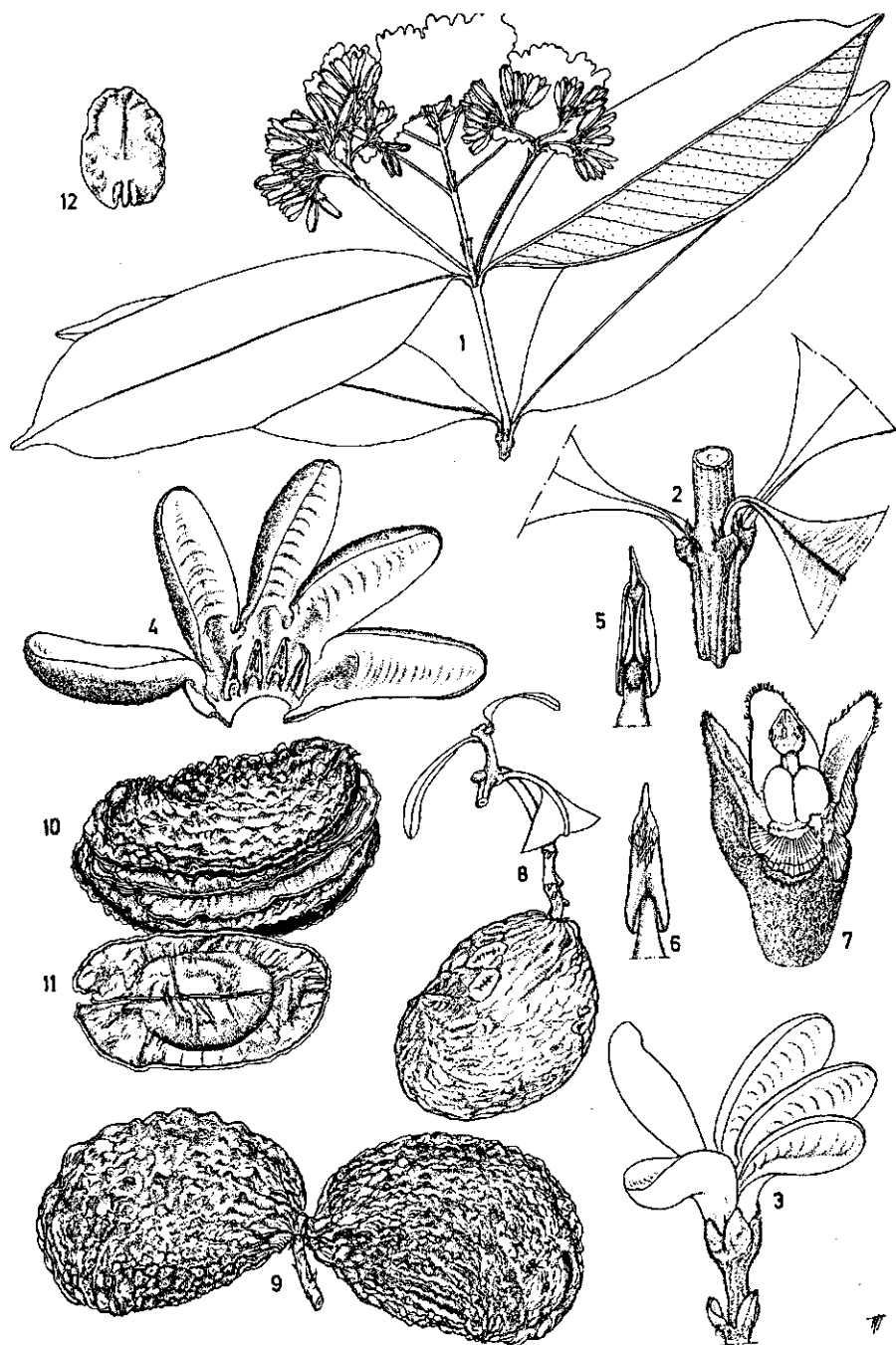
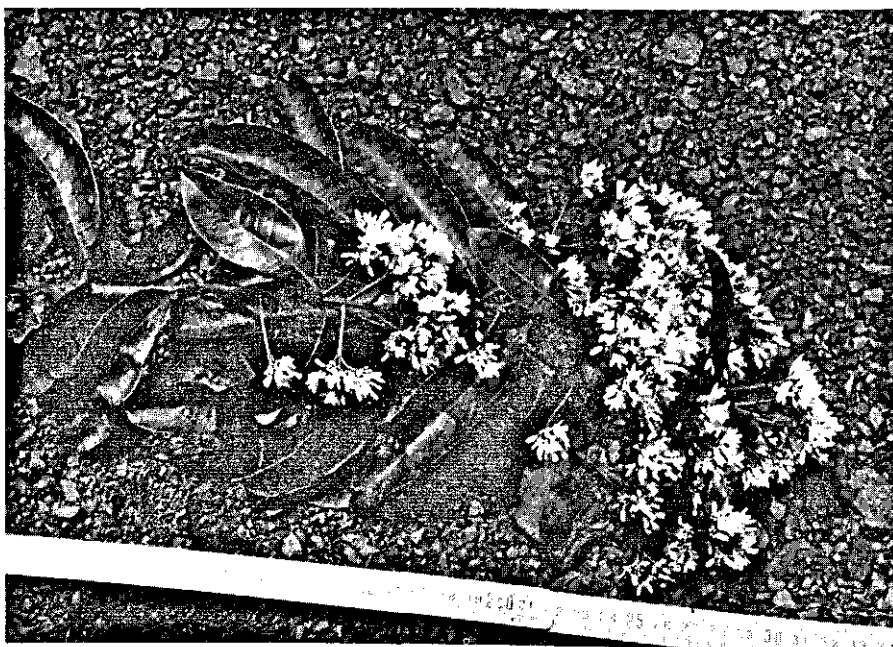


FIG. 4. *Pycnobotrya nitida* Benth.: 1. flowering branch,  $2/3 \times$ ; 2. detail of branch, showing ternate leaves,  $2 \times$ ; 3. flower,  $6 \times$ ; 4. opened flower,  $6 \times$ ; 5. stamen, adaxial side,  $20 \times$ ; 6. stamen, abaxial side,  $20 \times$ ; 7. pistil,  $18 \times$ ; 8. immature fruit,  $2/3 \times$ ; 9. fruit,  $2/3 \times$ ; 10. open fruit, with four seeds,  $2/3 \times$ ; 11. seed,  $2/3 \times$ ; 12. embryo,  $2/3 \times$ .—(1. Zenker 279; 2. Zenker 2063; 3–8, 12. Bretelet & De Wilde 472; 9. Louis 14322; 10–11. Tisserant 1127).

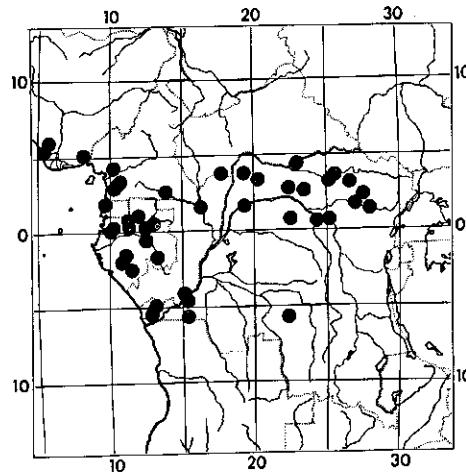


mm, glabrous, inside with 5 prominent ridges from the mouth towards the base and there each dividing in two less prominent ridges behind the base of the filament; lobes 3.1–5.2 (–7.2)  $\times$  1.5–2.5 mm, oblong, obtuse at the apex, upcurved at the left side, pubescent with glandular hairs on both sides, contorted and overlapping to the left, spreading. *Stamens* included, inserted at the apex of the narrow basal portion of the corolla tube, about 0.2–0.3 mm from the base; filaments flattened, glabrous, 0.1–0.18 mm long; anthers narrowly triangular, 1.0–1.15  $\times$  0.18–0.21 mm, basifixed, auriculate at the base, acuminate at the apex; the top and the basal part are sterile, both about 0.3 mm long; the locules about 0.4 mm long; the foot of the connective flat, inside with a papillose cushion in the centre and with a few short hairs at the base, outside with a few longer hairs, only at the fertile part. *Pistil* 0.6–0.9 mm long; ovary subglobose 0.3–0.5  $\times$  0.24–0.33 mm, composed of two free carpels; ovules 4 in each carpel, 2-seriate, adaxial; style inserted barely below the apex of each carpel, very short, 0.13–0.18 mm long; clavuncula globose, 0.12–0.16  $\times$  0.15–0.18 mm, minutely papillose; stigma conical, bifid, 0.06–0.15 mm long, glabrous. *Fruit* composed of two free follicles, which are widely spreading, shaping an angle of about 180°, outside green to dark brown when mature, 1.5  $\times$  as long as wide, 4.5–7  $\times$  3–4.5  $\times$  0.5–1.5 cm, obliquely elliptic, laterally compressed, outside with longitudinal curved lines, becoming straight and more prominent towards the abaxial side, when young undulate, warty when open and dry, inside shiny and wrinkled, two-valved, dehiscent at the adaxial side, 1–4 seeded. *Seed* flat, straightly or



PHOT. 2. *Pycnobotrya nitida* Benth., flowering branch. (Caballé 265, Phot. G. CABALLÉ).

obliquely oblong, in two alternating rows of one or two as in *Aspidosperma marcgravianum* Woods., 4–6 × 2.5–3.2 × 0.1 cm; surrounded by a papery wing, diaphanous except for the margin, 0.2 mm thick, at the base and apex 1–1.5 cm and laterally 0.4–0.6 cm wide; funicle 1.5–2 cm long; raphe running over the middle of the grain; embryo white, oblong, 2.5–3 × 1.7–2 cm, rounded at the top, auriculate at the base; radicle 0.5 cm long, between the auricles of the cotyledons.



MAP. 4. *Pycnobotrya nitida* Benth.

Distribution: West en Central Africa, from Nigeria to Zaïre at low altitudes.

Ecology: Forest, often on river banks.

Uses: Only reported to be used as vegetable, teste: *Reygaert 221, 269.*

Vernacular names: CENTRAL AFRICAN REPUBLIC: *Kalabe* (Lisongo). ZAÏRE: *Babua* (Emba); *Boïla la Ngema* (Turumbu).

#### Specimens examined:

NIGERIA: Benin City (fl. Mar.) *Leeuwenberg 11298* (WAG); Sapoba (fl.) *Kennedy 1951* (A, FHO, K), 2085 (BR, K, P), 2258 (FHO); Calabar (fl. Aug.) *Chevalier 13628* (BM, BR, G, P, WAG); sin. loc (fl.) *Kennedy 185* (FHO).

CAMEROON: Ndokniok (fl. Jan.) *Letouzey 11019* (BR, P, WAG); Eséka (fl. Jan.) *W. J. de Wilde and B. E. de Wilde-Duyffes 1734* (P, WAG); Bella (fl. Jan.) *Letouzey 4187* (P, WAG); Bipindi (fl. Dec.) *Zenker 55* (BM), (fl. Febr.) 279 (B, BOL, BR, C, G, GH, LD, MO, NY, P, UC, WAG); the WAG sheet is in part *Cyclocotyla congolensis*, for which part here proposed 279a), (fl.) 1274 (BM, BR, E, G, GOET, HBG, K, M, NY, P, S, W, WU, Z, lectotype of *P. multiflora*), (fl.) 2063 (paratypes of *P. multiflora*: BM, COI, E, G, GOET, K, M, MO, P, S, W, WU, Z), (fl.) 2891 (BM, BR, E, G, GOET, HGB, K, M, MO, P, S, W, WU, Z), (fl., fr.) 3021a (BM, BR, COI, E, G, HGB, K, M, P, S, W, Z); Lobé R. (fl. Febr.) *Bos 3999* (WAG); Zoulabot III (fl. Febr.) *Letouzey 11899* (BR, HGB, K, P, WAG).

CENTRAL AFRICAN REPUBLIC: Oubangui R. (fl. Mar.) *Tisserant* 3743 (P, WAG); Boukoko (fl. Aug.) *Tisserant* 127 (BM, P), (fl. April) 895 (BM, P), (fl. June) 1003 (BM, P), (fl. Sept.) 1127 (BM, P), (fl. Nov.) 1225 (BM, BR, P, WAG), (fl. Mar.) 1399 (BM, BR, LISC, P, WAG), (fl. Jan.) 1985 (BM, BR, P, WAG).

EQUATORIAL GUINEA: Rio Muni: Bata (fl. May) *Dinklage* 1220 (HGB); Alen (fl. Sept.) *Bates* 585 (G, P).

GABON: 22 km NE of Asok (fl. Aug.) *Breteler and J. J. de Wilde* 78/251 (WAG); Mitzié (fl. May) *Le Testu* 9162 (BM, BR, LISC, P, WAG); Gazi (fl. Sept.) *Le Testu* 8887 (BM, P); near Asok (fl. Aug.) *Breteler and J. J. de Wilde* 78/231 (WAG); Bélinga (fl. Oct.) *Caballé* 265 (P, WAG); Makokou (fl. Oct.) *Hladik* 2615 (P); Djoua (fl. Sept.) *Le Testu* 8913 (BM); km 7 Lalara-Ndjolé Road (fl. Aug.) *Breteler and J. J. de Wilde* 78/472 (WAG); Kango (fl. Oct.) *Chevalier* 26833 (P); Akondjo (fl. Oct.) *Chevalier* 27024 (P), 27112 (P); Latoursville (fl. Apr.) *Le Testu* 7167 (BM, BR, LISC, K, P); Linzoumou (fl. May) *Le Testu* 8076 (BM, BR, P, WAG); Tsango (fl. Sept.) *Le Testu* 6045 (BM, BR, LISC, K, P); Upper Ngounié R. (fl.) *Walker* 8 (P); Maghounga (fl. Apr.) *Le Testu* 5281 (BM, BR, P); Péca (fl. Apr.) *Le Testu* 6482 (BM, BR, LISC, P, WAG); Mivengué (fl. July) *Le Testu* 2029 (B, BM, BR, P); Mount John, Kongui R. (fl.) *Mann* 1809 (GH, K, P, S, W, type); sin. loc. *Pobeguin s.n.* (P).

CONGO: near Ouessou, *Bouquet* 1569 (P); near Brazaville, *Chevalier* 27344 (P); Djoumouna R., *Hallé* 1864 (P).

ZAÏRE: Equateur: Ubangi (fr. Aug.) *Gilbert* 1785 (BR, MO, K); Karawa (fl. Dec.) *Lebrun* 1895 (BR, P, WAG); Boyasageze (fl. Mar.) *Evrard* 566 (BR); Dundusama (fl. Apr.) *Reygaert* 269 (BR), 221 (BR); Yambata (fl.) *De Giorgi* 1708 (A, BR, G); Bakakata (fl. Sept.) *Evrard* 4806 (BR, K); Mongongo (fl. Nov.) *Jespersion* Nov. 1907 (BR). Haut Zaïre: Bas Uele, *De Wolf* 781 (BR); Bambesa (fr. July) *Gérard* 1574 (BR, M), (fl. Febr.) 3525 (BR), (fl. Febr.) 4412 (BR, WAG), (fl. Jan.) 4759 (BR), 4886 (BR), (fl. Febr.) 5511 (BR, WAG), (fr. Aug.) 5745 (BR); *ibid.* *Vrijdag* 193 (BR); Titule (fl. Apr.) *Lebrun* 2642 (BR, WAG); Poko (fl. May) *Seret* 856 (BR); Mobwasa (fl. Febr.) *Lemaire* 106 (BR); Ambôko (fl. Apr.) *Claessens* 437 (BR, K); Bomili (fl. Apr.) *Claessens* 409 (BR, K); Penghe (fl. Febr.) *Bequaert* 2320 (BR); km 29 Kisangani-Bengamisa R., *Lisowski* 44405 (BR); Yangambi (fl. Dec.) *Louis* 781 (BR, C, K), (fl. Febr.) 3318 (BM, BR, C), (fl. Febr.) 3350 (BR, K, MO, NY, P), (fl. Apr.) 3738 (BR), (fl. Apr.) 3783 (BR), (fr. July) 4362 (BR, K, P), (fl., fr. July) 5620 (BM, BR, C, MO, NY), (fl. Aug.) 5703 (BM, BR, C, P), (fl. Oct.) 6402 (BR, FHO, MO, NY); the MO sheet is in part *Cryptolepis sanguinolenta*, for which part here proposed no. 6402a), (fl., fr. Dec.) 7002 (B, BR, C, MO, P), (fl. July) 7147 (BR, NY, S), (fl., fr. Aug.) 10789 (BR, C, K, MO, P), (fl. Mar.) 8342 (BR), (fl. March) 13893 (BR, UC), (fl. March) 14322 (BR, FHO), (fl.) 14536 (BR); *ibid.* (fl. Dec.) *Donis* 3266 (BR, K); *ibid.* (fr. July) *A. Leonard* 882 (BR, K), (fl. July) 949 (BR, WAG); *ibid.* (fl. March) *Lisowski* 47953 (BR); *ibid.* (fl. Febr.) *Yafunga s.n.* (BR); *ibid.* (fl. March) *Menavanza* 123 (K). Bas-Zaïre: Kimuenza (fl.) *Gillet* 2050 (BR); *ibid.* (fl. Oct.) *Evrard* 6960 (BR); Tshobo (fl. Aug.) *Goossens* Aug. 1919 (BR); Tshela (fl. Aug.) *Breyne* 5 Aug. 1975 (BR); Luki (fl. July) *Donis* 1877 (BR); Kingemba, *Pauwels* 1763 (BR). Kasai occidental: Mulenda R. (fl. Oct.) *Liben* 1788 (BR); Kananga (fr. Jan.) *Liben* 2357 (BR, WAG); Sankuru R., *Van de Bossche* 176 (BR).

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