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Carel C.H. Jongkind & Olivier Lachenaud

Abstract

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In preparing the treatment of the *Apocynaceae* for the Flore du Gabon, a number of taxonomic novelties were discovered. Ten new species are here described and illustrated, nine of which occur in Gabon: *Baijsea atrobrunnea* O. Lachenaud, *Hunteria maasiorum* Jongkind & E. Bidault, *Landolphia anthonii* Jongkind, *L. obovata* O. Lachenaud & Jongkind, *L. persooniana* O. Lachenaud & Jongkind, *L. verrucosa* Jongkind & O. Lachenaud, *Oncinotis gabonica* O. Lachenaud, *Pleiocarpa robusta* O. Lachenaud and *Voacanga cornuta* Jongkind. Seven of these species are endemic to the country, while *Landolphia anthonii* and *L. obovata* are also found in Cameroon. The remaining new species is *Tabernaemontana fragrans* Jongkind, which occurs from Guinea to Ghana and includes the West African material previously referred to *T. psorocarpa* (Pierre ex Stapf) Pichon. Additionally, five taxa are resurrected from synonymy, two of which are new combinations: *Baijsea congensis* (R.D. Good) Jongkind and *Voacanga lanceolata* (Stapf) Jongkind. Finally, a lectotype is designated for the name *Baijsea concinna*. Conservation status assessments are presented for the new species.

Résumé

JONGKIND, C.C.H. & O. LACHENAUD (2022). Nouveautés dans les Apocynaceae africaines. *Candollea* 77: 17–51. En anglais, résumés anglais et français. DOI: <http://dx.doi.org/10.15553/c2022v771a3>

Durant la préparation du traitement des *Apocynaceae* pour la Flore du Gabon, plusieurs taxons nouveaux ont été identifiés. Dix nouvelles espèces sont décrites et illustrées ici, dont neuf présentes au Gabon: *Baijsea atrobrunnea* O. Lachenaud, *Hunteria maasiorum* Jongkind & E. Bidault, *Landolphia anthonii* Jongkind, *L. obovata* O. Lachenaud & Jongkind, *L. persooniana* O. Lachenaud & Jongkind, *L. verrucosa* Jongkind & O. Lachenaud, *Oncinotis gabonica* O. Lachenaud, *Pleiocarpa robusta* O. Lachenaud et *Voacanga cornuta* Jongkind. Toutes sont endémiques du pays, sauf *Landolphia anthonii* et *L. obovata* qui existent aussi au Cameroun. La dernière nouvelle espèce est *Tabernaemontana fragrans* Jongkind, présente de la Guinée au Ghana et qui comprend les spécimens ouest-africains rapportés précédemment à *T. psorocarpa* (Pierre ex Stapf) Pichon. Cinq taxons précédemment mis en synonymie sont rétablis, dont deux sont des nouvelles combinaisons: *Baijsea congensis* (R.D. Good) Jongkind et *Voacanga lanceolata* (Stapf) Jongkind. Finalement, un lectotype est désigné pour le nom *Baijsea concinna*. Le statut de conservation de toutes les nouvelles espèces est évalué.

Keywords

APOCYNACEAE – *Baijsea* – *Hunteria* – *Landolphia* – *Oncinotis* – *Pleiocarpa* – *Tabernaemontana* – *Voacanga* – Africa – Gabon – New species – Taxonomy

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Introduction

Apocynaceae are a large, mostly tropical family of flowering plants with 378 genera and over 5000 species worldwide (ENDRESS et al., 2018). They are mainly characterised by having simple, entire leaves (usually opposite or verticillate and lacking stipules), hermaphrodite flowers, a sympetalous and (almost) actinomorphic corolla, stamens attached to the corolla in the same number as corolla lobes, and the presence of white latex (very rarely absent). Traditionally, the family *Apocynaceae* was treated as distinct from *Asclepiadaceae* and *Periplocaceae* (e.g. HUBER, 1963), but as a result of molecular phylogenetic studies these are now merged in a single family. Five sub-families were recognised by ENDRESS & BRUYNS (2000), namely *Rawolfioideae* and *Apocynoideae* (both corresponding to *Apocynaceae* s.str.), *Asclepiadoideae* and *Secamonoideae* (the former *Asclepiadaceae*) and *Periplocoideae* (the former *Periplocaceae*), but while the last three are monophyletic, the first two are not (SIMÕES et al., 2007); for this reason they are currently recognised as informal groups (ENDRESS et al., 2018). All the genera treated in this paper belong to *Apocynaceae* in the strict traditional sense.

The *Apocynaceae* s.str. from tropical Africa are relatively well-known thanks to regional treatments for West Africa (HUBER, 1963), the Zambesian region (LEEUEWENBERG & KUPICHA, 1985) and Eastern Africa (OMINO, 2002), as well as due to numerous generic monographs (e.g. DE KRUIF, 1985; LEEUEWENBERG, 1985, 1991; PERSON et al., 1992; VAN DILST, 1995; OMINO, 1996). Nevertheless, recent taxonomic work on the family framed in the *Flore du Gabon* series, has led to the discovery of several new species from West and Central Africa, ten of which are published here. Five other taxa that were treated as synonyms are resurrected, two of them representing new combinations. The species treated in this contribution belong to the genera *Baissea* A. DC., *Hunteria* Roxb., *Landolphia* P. Beauv., *Oncinotis* Benth., *Pleiocarpa* Benth., *Tabernaemontana* L. and *Voacanga* Thouars. All of them had been revised before, the most recent dating from the period 1985–1996. Since then, numerous new specimens have been collected, especially in Gabon.

Material and methods

The results presented in this paper are based on fieldwork carried out by the authors and several collaborators in Gabon, Liberia and Guinea, and on a morphological study of the herbarium material kept at BM, BR, BRLU, K, LBV, MO, P and WAG. The descriptions are based on the study of living material, herbarium specimens and material preserved in spirit. The genera and species are presented below in alphabetical order. The following abbreviations are used: fl. (flowering), fr. (fruiting), imm. fr. (immature fruits), st. (sterile, vegetative).

The conservation status of the new species was assessed following the IUCN Red List Categories and Criteria (IUCN, 2012, 2019). The Extent of Occurrence (EOO) and Area of Occupancy (AOO) were calculated using GeoCAT (BACHMAN & MOAT, 2012) with a cell size of 2 × 2 km. The number of ‘locations’ (as defined by IUCN, 2012) was calculated with regard to the main threats, such that a single location may encompass several occurrences.

Taxonomic treatment

Baissea

The genus *Baissea* is restricted to continental Africa and belongs to tribe *Baisseeae*, which also includes the genera *Motandra* A. DC., *Oncinotis* and *Dewevrella* De Wild. (ENDRESS et al., 2018). Characters of the tribe include a lianescent (or rarely suffrutescent) habit, small flowers with a right-contorted corolla aestivation, anthers tailed at base, presence of a disk, fruits in narrow paired follicles, and seeds with an apical tuft of hairs. Additional characters of *Baissea* are the subsessile stamens included in the corolla tube (or with only the tips exerted), anthers with straight and acute basal tails, and the absence of coronal appendages. The genus was revised by VAN DILST (1995), who recognised 18 species.

In the current paper a distinctive new species from Gabon, *Baissea atrobrunnea* O. Lachenaud, is described, and three species are resurrected from synonymy: *B. concinna* Stapf ex Hutch. & Dalziel, *B. congensis* (R.D. Good) Jongkind, and *B. subsessilis* (K. Schum.) Stapf ex Hutch. & Dalziel. The last two were previously included in *B. campanulata* (K. Schum.) De Kruif, while *B. concinna* was regarded as a synonym of *B. lane-poolei* Stapf.

Baissea atrobrunnea O. Lachenaud, **sp. nov.** (Fig. 1, 2).

Holotypus: GABON. Ngounié: Parc National de Waka, 1°06'23"S 11°09'49"E, 5.X.2007, fl. & fr., *Boussengui-Nongo* & *Bouango* 245 (LBV!; iso-: BR!, MO).

Baissea atrobrunnea O. Lachenaud resembles *B. subrufa* Stapf in its densely felted twigs and coriaceous leaves, but differs by its lower leaf surface being densely and persistently felted with chocolate-brown indumentum (a character unique in the genus), its longer pedicels (3.5–7 mm vs. 1.5–3 mm) and its lanceolate corolla lobes, 4–5 mm long and more than twice as long as the tube (vs. ovate, 1.1–2.2 mm long and 0.7–1.4 times as long as the tube).

Lianas 4 m tall, covered on most of its organs (except corolla and upper side of mature leaves) by a short and dense felt of dark brown more or less dendritic hairs (Fig. 2). *Branchlets* cylindrical, 1.5 mm wide, brown-felted. *Leaves* opposite; blade elliptic, 10–13.8 × 2.3–3.5 cm, acute at base, acute or shortly acuminate at apex, thickly coriaceous, densely brown-felted



Fig. 1. – *Baissea atrobrunnea* O. Lachenaud. **A.** Flowering branch; **B.** Flower; **C.** Calyx (with one lobe removed) and ovary; **D.** Corolla (opened) showing pistil and stamens inside; **E.** Corolla (opened) with stamens still attached to the pistil; **F.** Fruit. [Boussengui-Nongo & Bouango 245] [Drawing: A. Fernandez]

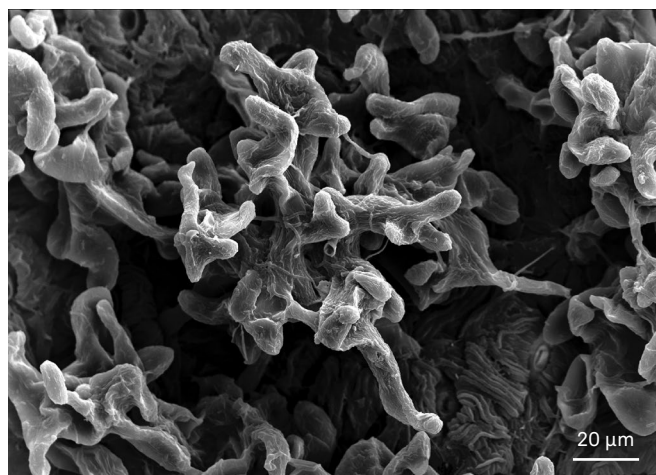


Fig. 2. – *Baissea atrobrunnea* O. Lachenaud. Detail of the lower leaf surface trichomes. [Boussengui-Nongo & Bouango 245] [SEM photo: I. van der Beeten]

on both sides when very young, upper side soon glabrescent and green, lower side with a persistent dark brown felt; midrib strongly impressed above, prominent below; secondary veins 4–6 pairs, widely spaced and strongly curved; tertiary veins hardly distinct; domatia absent; petiole 0.3–0.6 cm long, brown-felted. *Inflorescences* axillary and paired at nodes, laxly paniculate, 2–6.5 cm long, 10–25-flowered, brown-felted, branched from base; rachis 2–6.5 cm long, main branches 0.8–2.3 cm long; bracts minutely triangular, < 0.5 mm long, obtuse at apex. *Flowers* 5-merous; pedicel 3.5–7 mm long, brown-felted. *Calices* with 5 imbricate ovate lobes c. 0.7×0.6 mm, acute to obtuse at apex, brown-felted outside, glabrous inside, with c. 5 small colleters at base. *Corollas* yellowish-white; tube broadly infundibuliform, $1.5\text{--}2 \times 1\text{--}2$ mm, inside with 5 prominent ridges alternating with lobes, glabrous outside, inside with a ring of deflexed hairs above stamens; lobes lanceolate, $4\text{--}5 \times 0.7\text{--}1$ mm, obtuse at apex, glabrous; flower bud cylindrical, obtuse at apex. *Stamens* fully included, inserted 0.3 mm above base of corolla tube, subsessile; anthers 2×0.4 mm, acute at apex, glabrous except puberulous connective. *Pistils* included; ovaries truncated cone-like, 0.5 mm long, densely villose at apex, 2-carpellate; styles 1.2 mm long, glabrous, with narrowly cylindrical base 0.2 mm long, fusiform median part 0.3 mm long and subulate stigma 0.7 mm long. *Fruits* consisting of 2 narrow, almost cylindrical follicles $16.5\text{--}18.5 \times 0.6\text{--}0.8$ cm, densely brown-felted, forming a very obtuse angle with each other; pedicel woody and thickened. *Seeds* not seen.

Distribution, ecology and phenology. – Only known from the type collection in central Gabon (Waka National Park); habitat not recorded but presumably evergreen forests. It is not known whether the species is truly rare, since its area of origin is little-prospected; however, it is presumably very local, having not been found elsewhere in Gabon during recent inventories

(despite being readily recognisable on the field). Flowers and fruits were collected in October, corresponding to the onset of the first rainy season.

Conservation status. – *Baissea atrobrunnea* is endemic to Gabon and known from a single collection; its Extent of Occurrence (EOO) therefore cannot be calculated. Based on a 2×2 km cell size, its Area of Occupancy (AOO) is estimated as 4 km^2 , within the limit for “Critically Endangered” status under Criterion B2. Its only known occurrence is located within the Waka National Park, very close to the boundary of the park. With no precise data about its ecology, and considering that its area of origin is poorly explored, it is unclear whether the species is threatened or not, and it seems reasonable to include it in the “Data Deficient” [DD] category.

Notes. – This species is readily recognisable, even in the vegetative state, by its strongly discoloured leaves with a dark chocolate-brown underside; hence the specific name. Its closest relative is probably *Baissea subrufa* (see diagnosis for the similarities and differences). The peculiar indumentum of *B. atrobrunnea* and *B. subrufa*, which consists of inflated ramose hairs (Fig. 2) is also found in the morphologically related genus *Motandra*, and it is a question whether the two genera are really worth keeping separate. They differ chiefly in the shape of their anther-tails, which are straight and acute in *Baissea*, curved and obtuse in *Motandra*. *Oncinotis*, also closely related, has anthers similar to *Motandra* but differs from both genera by the presence of coronal appendages between the corolla lobes at the rim of the tube.

Baissea campanulata (K. Schum.) De Kruif in Agric. Univ. Wageningen Pap. 85(2): 40. 1985.

= *Oncinotis campanulata* K. Schum. in Bot. Jahrb. Syst. 23: 227. 1896.

Lectotypus (designated by VAN DILST, 1995: 102): CAMEROON. **Central Region:** Yaoundé, s.d., Zenker & Staudt 19 (BM [BM000925817]!; isolecto-: NY).

= *Baissea laurentii* De Wild., Not. Pl. Ut. Congo 2: 253. 1908. **Holotypus:** D.R. CONGO. **Province Orientale:** Romée, I.1906, fl., *M. Laurent 1362* (BR [BR0000008824615]!; iso-: BR [BR0000008825032, BR0000008824622]!, YBI [YBI169747992] image!).

= *Baissea goossensii* De Wild., Pl. Bequaert. 5: 417. 1932. **Holotypus:** D.R. CONGO. **Province Orientale:** Barumbu, V.1921, fl., *Goossens 1670* (BR [BR0000008824929]!; iso-: BR [BR0000008824653]!, MO-2415948 image!).

Distribution and ecology. – Widespread from Côte d’Ivoire to central D.R. Congo; occurs in forest edges, usually along rivers, up to elevations of 1200 m.

Notes. – *Baissea campanulata* is here considered in its narrow sense, excluding *B. congensis* and *B. subsessilis* that were both placed under synonymy by VAN DILST (1995). Differences between the three taxa are summarised in Table 1. *Baissea campanulata* is the most widespread of the three; its range locally overlaps with *B. subsessilis* in western Cameroon. No material has been seen from Nigeria; specimens from this country cited in the revision by VAN DILST (1995) correspond to *B. subsessilis*.

The inflorescences in *Baissea campanulata* can be terminal or axillary, often in the same branch; terminal inflorescences are always lax, while axillary ones are usually congested (but can be laxer, e.g. in *Le Testu 8852*, *L. Dubois 136* or *J. Léonard 1172*). Some specimens (*Breteler et al. 8944*, *M. Laurent 1362*, *J. Léonard 1172*, *Mandango 2879*) also show a remarkable dimorphism in size and shape of corolla lobes: the flowers from terminal inflorescences (and sometimes from the upper leaf axils) have remarkably long and narrow, almost linear corolla lobes up to 18 mm long, while those borne lower down on the twigs have the corolla lobes much shorter and triangular, not exceeding 5 mm long.

Baissea concinna Stapf ex Hutch. & Dalziel, Fl. West Trop. Afr. 2: 45. 1931.

Lectotypus (first-step designated by VAN DILST, 1995: 110; second-step designated here): **LIBERIA. Grand Bassa:** Grand Bassa (= Buchanan), 9.IV.1896, fl., *Dinklage 1630* (K [K000233867]!; isolecto-: A [A00078659] image!, K [K000233868, K000233869]!, Z [Z-000000982] image!).

Distribution and ecology. – Restricted to Liberia and southwestern Côte d'Ivoire (Fig. 3), where it occurs in wet evergreen forests near the coast.

Notes. – Both HUBER (1963) and VAN DILST (1995) treated this species as a synonym of *Baissea lane-polei*, but the two taxa differ in inflorescence characters and also in ecology. *Baissea concinna* has a lax inflorescence and most flower pedicels are > 4 mm long; it grows in wet evergreen forests near the coast. *Baissea lane-polei* has a congested inflorescence and flower pedicels up to 4 mm long; it grows in semideciduous forests or gallery forests, usually in hilly inland areas (Fig. 3).

The first author did see both species in the field in their current known distribution. Nevertheless, both species were never observed in the other forest areas of Liberia despite several visits.

VAN DILST (1995: 110) cited the holotype at K. Three specimens are deposited in K and the specimen K000233867 annotated “holotype” by van Dilst in 1993 is here formally designated as the lectotype.

Additional specimens examined. – **LIBERIA. Sino:** Greenville, 18.III.1948, fl., *Baldwin 11560* (K).

CÔTE D'IVOIRE. Tabou: 13 km NW of Tabou, 12.IV.1974, fl., *Breteler 7386* (WAG); close to Pata-Idié, 11.IV.2000, fl. bud, *Jongkind & Assi-Yapo 5081* (WAG).

Table 1. – Morphological comparison between *Baissea campanulata* (K. Schum.) De Kruif, *B. congensis* (R.D. Good) Jongkind and *B. subsessilis* (K. Schum.) Stapf ex Hutch. & Dalziel. Characters diagnostic for one species are in bold.

	<i>B. campanulata</i>	<i>B. congensis</i>	<i>B. subsessilis</i>
Indumentum of twigs	glabrous or with short sparse hairs	densely and shortly tomentose	densely villose
Indumentum of lower leaf surface	glabrous between nerves	glabrous between nerves (or rarely with very short sparse hairs)	villose all over (more densely so on nerves)
Leaf base	cordate to rounded	rounded to obtuse	cordate to rounded
Inflorescences	terminal and/or axillary, if axillary then usually congested	mostly axillary, always lax	mostly axillary, always lax
Colour of corolla	yellow or white, sometimes turning red	white turning red	white or pale yellow
Corolla tube shape	cylindrical or funnel-shaped	urceolate	funnel-shaped
Pubescence of corolla tube (outside)	densely pubescent (except base)	glabrous except below the sinuses of the lobes	glabrous except below the sinuses of the lobes (rarely with very sparse hairs between)
Length of corolla lobes [mm]	2–18 (flowers often dimorphic)	2.5–5	7–13
Distribution	Côte d'Ivoire to D.R. Congo	Gabon, Angola (Cabinda)	Nigeria, SW Cameroon

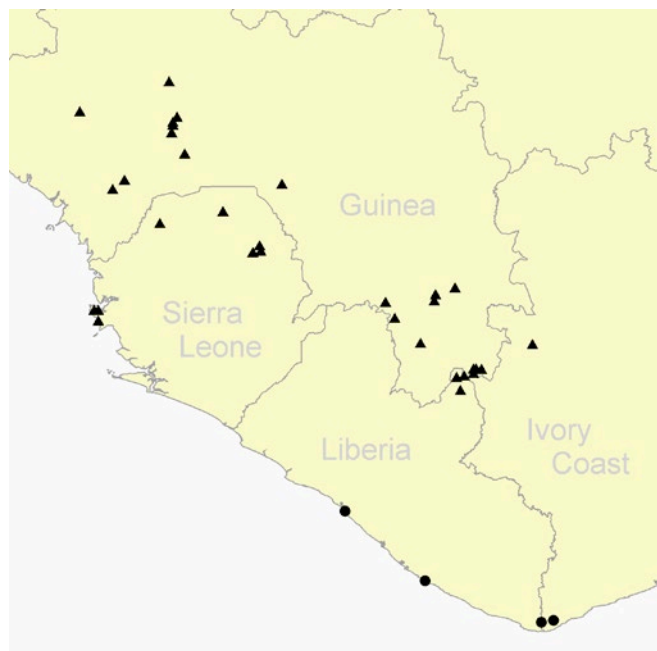


Fig. 3. – Distribution map of *Baissea concinna* Stapf ex Hutch. & Dalziel (circles) and *B. lane-polei* Stapf (triangles).

Baissea congensis (R.D. Good) Jongkind, **comb. nov.** (Fig. 4A).

= *Zygodia congensis* R.D. Good in J. Bot. 67 (Suppl. 2): 89. 1929.

Holotypus: ANGOLA. **Cabinda:** Lufo River, near Belize, 29.III.1919, fl., *Gossweiler* 7959 (K [K000233966]!; iso-: BM [BM000925816]!, COI [COI00070733] image!, MO-1302577 image!).

Distribution and ecology. – Restricted to Gabon (Ngounié and Nyanga provinces) and Angola (Cabinda), and probably Republic of Congo (where not collected yet); occurs in forest edges, often along rivers, at elevations of 10–640 m.

Notes. – This species, previously treated as a synonym of *Baissea campanulata* (see comments under the latter species) is resurrected here. Since it was originally described in *Zygodia* Benth., a genus synonymised with *Baissea* by PICHON (1948), the new combination is required.

Additional specimens examined. – GABON. **Ngounié:** 40 km E. of Mouila, along the road to Yeno, 28.XI.1984, fl., *Arends et al.* 501 (WAG, LBV); Sindara, 27.IX.1917, fl., *Le Testu* 2227 (BM, BR, P); *ibid.* loco, 22.III.1926, fl., *Le Testu* 5867 (BM, BR, P); Mbigou, 3.V.1925, fl., *Le Testu* 5415 (BM, BR, P); *ibid.* loco, 17.IV.1930, fl., *Le Testu* 8032 (BM, BR, P); Epambwa, 18.III.1927, fl., *Le Testu* 6427 (BM, BR, P); 50 km along Mouila-Yeno road, 31.III.1988, fl., *de Wilde & Jongkind* 9639 (BR, LBV, WAG). **Nyanga:** sur la route entre Mabanda et Ndendé, 9.IV.2018, fl., *Bidault et al.* 4363 (BR, G, MO, WAG); along Nyanga river, upstream from Mayonami, 16.III.1994, fl., *Wieringa et al.* 2495 (BR, G, K, LBV, P, WAG).

Baissea lane-polei Stapf in Bull. Misc. Inform. Kew 1915: 46. 1915.

Holotypus: SIERRA LEONE. **Western Area:** York Pass, 7.VII.1914, fl., *Lane-Poole* 322 (K [K000233866]!; iso-: GB).

Distribution and ecology. – A West African endemic, widespread in the hill ranges of Guinea, Sierra Leone (north and Freetown Peninsula), northern Liberia (Nimba area) and western Côte d'Ivoire (around Man) (Fig. 3); occurring in semideciduous or gallery forests up to elevations of 1400 m.

Notes. – This species is here considered in its narrow sense, excluding *Baissea concinna*, which is treated as a distinct species (see comments under it).

Baissea subsessilis (K. Schum.) Stapf ex Hutch. & Dalziel, Fl. West Trop. Afr. 2: 46. 1931.

= *Oncinotis subsessilis* K. Schum., Bot. Jahrb. Syst. 33: 321. 1903.

Lectotypus (designated by VAN DILST, 1995: 102): NIGERIA. **Lagos State:** Ishagama (Jorubaland), III.1899, fl., *Schlechter* 12310 (K [K000234015]!; isolecto-: AMD [AMD.25157] image!, BM [BM000925815]!, BR [BR0000008825087]!, G [G00009017, G00009018] images!, L [L0004439, L0004438] images!, P [P00413270, P00413271] images!, WAG [WAG0003984]!, Z).

Distribution and ecology. – Restricted to southern Nigeria and adjacent south-western Cameroon, occurring in lowland rainforest edges up to elevations of 250 m.

Notes. – This species, like *Baissea congensis*, was included in the synonymy of *B. campanulata* by VAN DILST (1995); see additional comments under the latter species. It can be separated from both *B. congensis* and *B. campanulata* by its much hairier stems and leaves (see Table 1). Its distribution locally overlaps with that of *B. campanulata* in Cameroon, but is widely separated from that of *B. congensis*.

Additional specimens examined. – NIGERIA. **Cross River State:** Eko-Esai, 18.III.1977, fl., *Ariwaado* 699 FHI 88762 (WAG); Iyamoyong Forest Reserve, 12.V.1959, fl., *Binuyo* FHI 41294 (BR, WAG). **Ogun State:** Ijebu Igbo, 24.IV.1949, fl., *Ejiofor* FHI 26114 (BR, K). **Oyo State:** Gambari, 9.V.1966, fl., *van Eijnatten* 1475 (WAG); Gambari, 15.V.1974, fl., *Gbile* FHI 73085 (P). CAMEROON. **South-West Region:** S of Baro Village, 31.III.1988, fl., *D.W. Thomas et al.* 7468 (MO, WAG).

Hunteria

The genus *Hunteria* was revised by OMINO (1996), along with the closely related genera *Picalima* Pierre and *Pleiocarpa* Benth. These genera, together with *Gonioma* E. Mey., form



Fig. 4. – *Baissea congensis* (R.D. Good) Jongkind: **A**. Flowers. *Hunteria maasiorum* Jongkind & E. Bidault: **B**. Leaves from above; **D**. Inflorescence. *Landolphia obovata* O. Lachenaud & Jongkind: **C**. Branch with almost mature fruits. [A: Bidault et al. 4363; B, D: Bidault et al. 5144; C: Bidault et al. 1398] [Photos: E. Bidault]

the tribe *Hunterieae* (ENDRESS et al., 2018). The members of this tribe are trees or shrubs displaying left-contorted corolla aestivation, absence of corona, anthers included and fertile to the base, absence of disk, and fleshy fruits with separate carpels. The great similarity between *Hunteria*, *Picalima* and *Pleiocarpa* suggests the need of merging them, though in the absence of phylogenetic data we have followed the traditional classification. *Hunteria* differs from *Picalima* by its smaller fruits with fleshy (not hard) pericarp, its seeds with membranaceous (not coriaceous) testa and cotyledons lacking secondary veins, and its sepals imbricate only in bud stage (vs. imbricate even at anthesis) (OMINO, 1996). Differences with *Pleiocarpa* are discussed under the latter.

A new species of *Hunteria* is described here based on recent collections from Gabon. The genus now includes 13 species, all of which are African except for *H. zeylanica* (Retz.) Gard. ex Thw. that reaches Asia (OMINO, 1996; ENDRESS et al., 2018).

Hunteria maasiorum Jongkind & E. Bidault, **sp. nov.** (Fig. 4B, D, 5).

Holotypus: GABON. **Estuaire:** entre Kinguélé et Tchimbélé, au sud de Makaban, le long de la Bangouï, 0°31'N 10°17'E, 320 m, fl., 28.X.2020, *Bidault et al. 5144* (MO!; iso: BR!, BRLU!, G!, LBV!, MA!, P!, WAG!).

Hunteria maasiorum Jongkind & E. Bidault resembles *H. simii* (Stapf) H. Huber in its laxly umbellate inflorescences, oblong monocarps ending in a long beak, and leaves with well-spaced and curved lateral veins, but differs by its conspicuously longer calyx lobes (4.5–6 mm vs. 1–1.3 mm), longer corolla lobes (12–16 mm vs. 7–12 mm) and larger seeds (17–24 × 11–13 × 5–8 mm vs. 11–15 × 6.5–8.5 × 5.5–6.5 mm).

Shrubs or *treelets*, up to 5 m tall. *Leaves* glabrous; blade elliptic, 17.5–25 × 6.8–10 cm, acute at base, acuminate at apex, slightly coriaceous; midrib narrowly channelled above; secondary veins 8–10 pairs, often with 1–3 less conspicuous secondary veins in between, ascending and slightly curved, forming a submarginal vein and an angle of 45–60° with midrib; tertiary venation inconspicuous; petiole 10–15 mm long. *Inflorescences* terminal, sometimes axillary, glabrous except for corolla, umbellate, 3–10-flowered, with a peduncle 3–5 mm long. *Flowers* 5-merous, with pedicels 4–10 mm long. *Calyx* lobes 4.5–6 × 1–2 mm, gradually narrowing from base to apex, glabrous, with a row of small colleters inside at base, slightly spreading. *Corollas* white, in bud up to 28–30 mm long, glabrous outside; tube in open flower 16–21 × 2–4 mm, almost cylindrical with a slight widening at level of stamens, inside with sparse hairs around pistil head; lobes overlapping to the left, 12–16 × 3–7 mm, spreading, rounded at apex, entirely glabrous. *Stamens* included, inserted towards upper third of corolla tube; anthers 1.7–2.1 × 0.8–1 mm, subsessile, glabrous.

Pistils c. 7 mm long, glabrous, not reaching base of stamens; ovary ovoid, c. 2 × 1 mm, style c. 3.7 mm long, pistil head ovoid with stigmatic apex, c. 1.3 × 0.7 mm. *Fruits* yellowish, smooth, glabrous, of two separate mericarps divergent at an angle of 180°, mericarp c. 7 × 2 cm, bluntly acuminate at apex. *Seeds* smooth, variable in shape but all flattened and more or less angular, 17–24 × 11–13 × 5–8 mm; embryo c. 1 cm long.

Etymology. – *Hunteria maasiorum* is named after Paul Maas and Hiltje Maas-van de Kamer, who discovered the species during an expedition to Gabon in 2011.

Distribution, ecology and phenology. – This species is endemic to the south-west of the Cristal Mountains in northern Gabon (Fig. 6), where it occurs in the understory of wet evergreen forests, both mature and degraded, at elevations of 35–330 m. It appears to favour rocky areas with an open understory, often along rivers, but has also been collected on drained soils. Flowers have been collected in October and November, and fruits in November, corresponding to the main rainy season.

Conservation status. – *Hunteria maasiorum* is known from seven collections made between 2011 and 2021, all from the Monts de Cristal area, in Gabon. All the occurrences are considered extant considering the still important forest cover in those areas, and the recent dates of collection. Based on a 2 × 2 km cell size, the AOO of this species is estimated as 28 km², below the upper threshold for “Endangered” status under Criterion B2. The EOO is calculated as 62 km², below the upper threshold for “Critically Endangered” status under Criterion B1. Two collection sites are located within the Monts de Cristal National Park, sector Mbé. Two other occurrences are located within a logging concession, and are threatened by activities linked with logging, inducing a decline in its habitat quality. Two collection sites, situated outside the National Park at its southern tip, are within the construction site of a planned hydro-electric project, and therefore threatened by it. We expect this location will disappear in the future. One collection site situated within the NP is nonetheless within the projected inundated area resulting from the dam project. It is therefore also threatened by it, and expected to disappear in the future. The other site located within the Monts de Cristal NP does not show any evidence of threat. The last site is situated outside the NP, between a road and a power line, and is threatened by the maintenance of those infrastructures that involves a degradation of its habitat quality. As a consequence, these six occurrences represent four locations (sensu IUCN 2019), with regard to the most serious plausible threat (hydro-electric projects), under the upper limit for “Endangered” status. We infer a past, current, and future continuous decline in the extent and quality of habitat consequently to all the threats above mentioned. We also infer a future decline in

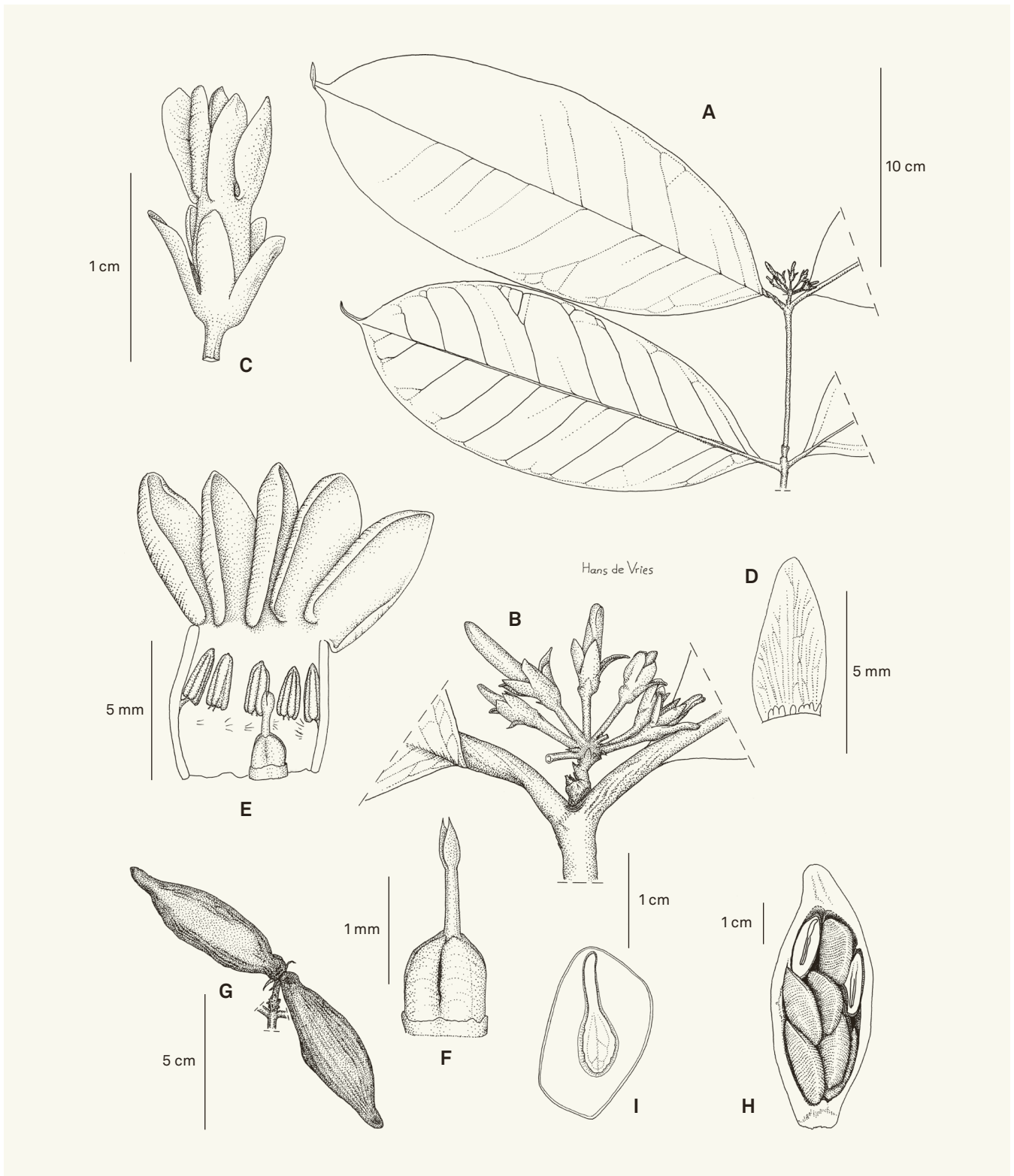


Fig. 5. – *Hunteria maasiorium* Jongkind & E. Bidault. **A.** Branch with flowers in bud; **B.** Inflorescence; **C.** Flower bud; **D.** Calyx lobe (inside) showing colleters; **E.** Flower bud (opened); **F.** Pistil in bud; **G.** Fruit and petioles of nearest leaves; **H.** Carpel in fruit showing seeds, cross section; **I.** Seed showing embryo, cross section. [A–F: Maas et al. 9964; G–I: Maas et al. 10415] [Drawing: H. de Vries]

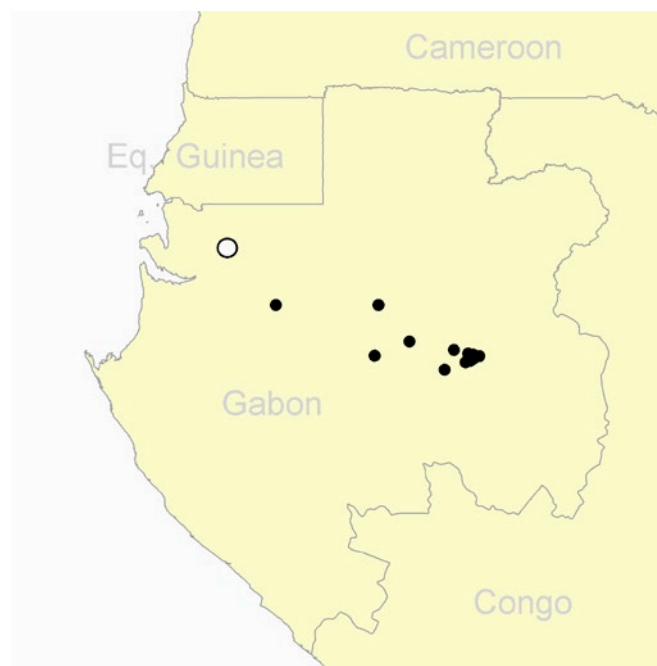


Fig. 6. – Distribution map of *Hunteria maasiorum* Jongkind & E. Bidault (open circle) and *Pleiocarpa robusta* O. Lachenaud (closed circles). The open circle includes all cited collections of *H. maasiorum*.

the EOO, AOO, number of locations and number of mature individuals of this species, due to the hydro-electric project. This species is thus assigned a status of “Endangered” [EN B1a b(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)].

Notes. – This is a very distinctive species when fertile, with its large calyx and corolla (the largest recorded in the genus) and narrow beaked mericarps. Its closest relative is presumably *Hunteria simii*, which in addition to the differences mentioned in the diagnosis has a widely separate distribution, being found from Sierra Leone to Côte d’Ivoire. Other species of *Hunteria* have a much smaller corolla (tube \leq 13 mm long, lobes \leq 8.8 mm long) and calyx lobes (\leq 2.5 mm long), and mericarps globose to broadly ovoid (although fruits of *H. densiflora* Pichon and *H. myriantha* Omino are not yet known). In addition, most of them have the secondary leaf veins more numerous and almost straight, forming a broader angle with the midrib; except for *H. myriantha* and *H. hexaloba* (Pichon) Omino which are similar to *H. maasiorum* in this respect.

In the flowering stage, *Hunteria maasiorum* could be mistaken for *Petchia africana* Leeuwenb., which has a very similar inflorescence, calyx and corolla, except that the latter is bright yellow. The leaves of *P. africana* are more abruptly cuspidate at the apex and have more numerous secondary leaf veins (12–20 pairs) forming an almost straight angle with the midrib. The long moniliform mericarps of *Petchia* are very different from those of *Hunteria*.

In vegetative characters, *Hunteria maasiorum* is very similar to *H. hexaloba* and *Pleiocarpa robusta* (described below), but these two species have the leaf midrib not channelled above but somewhat prominent. They also differ in their sessile flowers, much smaller calyx, and shortly ovoid mericarps.

Additional specimens examined. – GABON. **Estuaire:** Monts de Cristal, Kingué, vallon à l’Ouest de la Mbé, 0°24’03”N 10°15’18”E, 19.IV.2021, fl., Bidault et al. 5326 (LBV, MO); Monts de Cristal, site du chantier du barrage hydroélectrique de Kingué Aval, 0°23’N 10°14’E, 19.XI.2020, st., Klein et al. 38 (BRLU, LBV); Monts de Cristal, à l’est de la route Kingué-Andok Foula, 106 m, 0°24’N 10°14’E, 24.X.2020, fl. buds [very young], Lachenaud et al. 3139 (BRLU, LBV, MO); Parc National de Monts de Cristal, road L108 from Kingué to Tchimbélé, 0°29’N 10°17’E, 327 m, 24.X.2011, fl. bud, Maas et al. 9964 (LBV, WAG); side road at km 46 of road from Kougoulu to Méla, 0°33’N 10°15’E, 21.XI.2011, fr., Maas et al. 10415 (LBV; WAG); Monts de Cristal, bords de la route de Kingué Aval, 0°25’N 10°15’E, 34 m, 26.XI.2020, st., MBG Transect 6360 (BRLU).

Landolphia

Landolphia is a genus with 60 species, including the new species published here, and is endemic to Africa and Madagascar (VAN DILST, 1999; ENDRESS et al., 2018). It belongs to tribe Willughbeieae, subtribe Landolphiinae, a group of climbing (or rarely suffrutescent) plants with left-contorted corolla aestivation, absence of corona, anthers included and fertile to the base, syncarpous ovaries, and fleshy fruits with albuminate seeds. *Landolphia* is by far the largest genus in this group; most other genera of the subtribe appear to be little more than satellites of *Landolphia*, and their position in relation to the latter needs further investigation, which is outside the scope of this paper.

The last revision of *Landolphia* for continental Africa was published almost 30 years ago (PERSOON et al., 1992) and many new specimens have been collected since. A review of the material from Atlantic Central Africa resulted in the discovery of four new species, which are described here. Two of them are based on recent collections not seen by the authors of the last revision; the other two, *L. verrucosa* Jongkind & O. Lachenaud and *L. obovata* O. Lachenaud & Jongkind, had previously been mistaken for *L. owariensis* P. Beauv. and *L. glandulosa* (Pellegr.) Pichon, respectively. The latter species, treated here in its strict sense, is a rare Gabonese endemic, and a new description of it is presented since that in PERSOON et al. (1992) is largely based on material here referred to *L. obovata*. *Landolphia owariensis* remains a very widespread and common species, for which PERSOON et al. (1992) presented an accurate description.

Landolphia anthonii Jongkind, sp. nov. (Fig. 7).

Holotypus: GABON. **Woleu-Ntem:** 0.5 km E of Tchimbélé, 27.IV.1990, fl., Wieringa 778 (WAG [WAG.1610518]!; iso-: BR [BR0000014318498]!, E, K, LBV [LBV0000844]!, MO).

Landolphia anthonii Jongkind resembles *L. incerta* (K. Schum.) J.G.M. Pers. with its axillary inflorescences, very short corolla tube (1.7–2 mm), long and narrow corolla lobes, and glabrous stems and leaves; but it has a more compact inflorescence, the anthers are not long acuminate but rounded at apex, the leaves are gland-dotted and with more prominent lateral veins below and the midrib of the leaf is channelled above, not prominent (when dried). In these characters it resembles *L. ferrea* J.G.M. Pers., *L. glabra* (Pierre ex Stapf) Pichon and *L. persooniana* O. Lachenaud & Jongkind, but these species have a much longer corolla tube (6–13 mm).

Lianas large with tendrils and white latex. *Branches* smooth except for scattered and inconspicuous lenticels; branchlets 1–2 mm thick, glabrous, smooth. *Leaves* opposite, glabrous; blade narrowly elliptic or ovate, 6.5–9.5 × 2–3 cm, coriaceous, cuneate or rounded at base, caudate at apex, glandular dots conspicuous on lower leaf surface (1–4 per cm²), blackish when dried; midrib channelled above, prominent below; 12–17 pairs of secondary veins, forming an almost straight angle with

midrib, alternating with (slightly) fainter parallel veins and connected by a slightly looping submarginal vein; tertiary venation laxly reticulate, invisible above and not very conspicuous below; petiole 4–6 mm long. *Inflorescences* axillary, cymose and highly contracted, up to 1.5 cm long (flowers included), 5–7-flowered, glabrous; peduncle up to 3 mm long; bracts triangular to ovate, < 1 mm long, ciliate. *Flowers* 5-merous; pedicel 1–1.5 mm long, glabrous. *Calyx* lobes imbricate, triangular to ovate, c. 1 × 1 mm, acute to obtuse at apex, ciliate, green. *Corollas* white, yellow in bud; tube 1.7–2 mm long, ± cylindrical, glabrous on both sides; lobes 9–12 × 1.5–2 mm, hairy at base inside. *Stamens* subsessile, about half as long as corolla tube and inserted around mid-height, anthers almost 1 mm long, glabrous. *Pistils* 1.3–2 mm long, glabrous, ovary c. 1 mm long, ovoid with several longitudinal ridges, style absent or very short, pistil head c. 0.3 mm long with annular base and short stigmoid apex. *Fruits* unknown.

Etymology. – This species is named after Anthonius J.M. Leeuwenberg (1930–2010), who first identified its type as

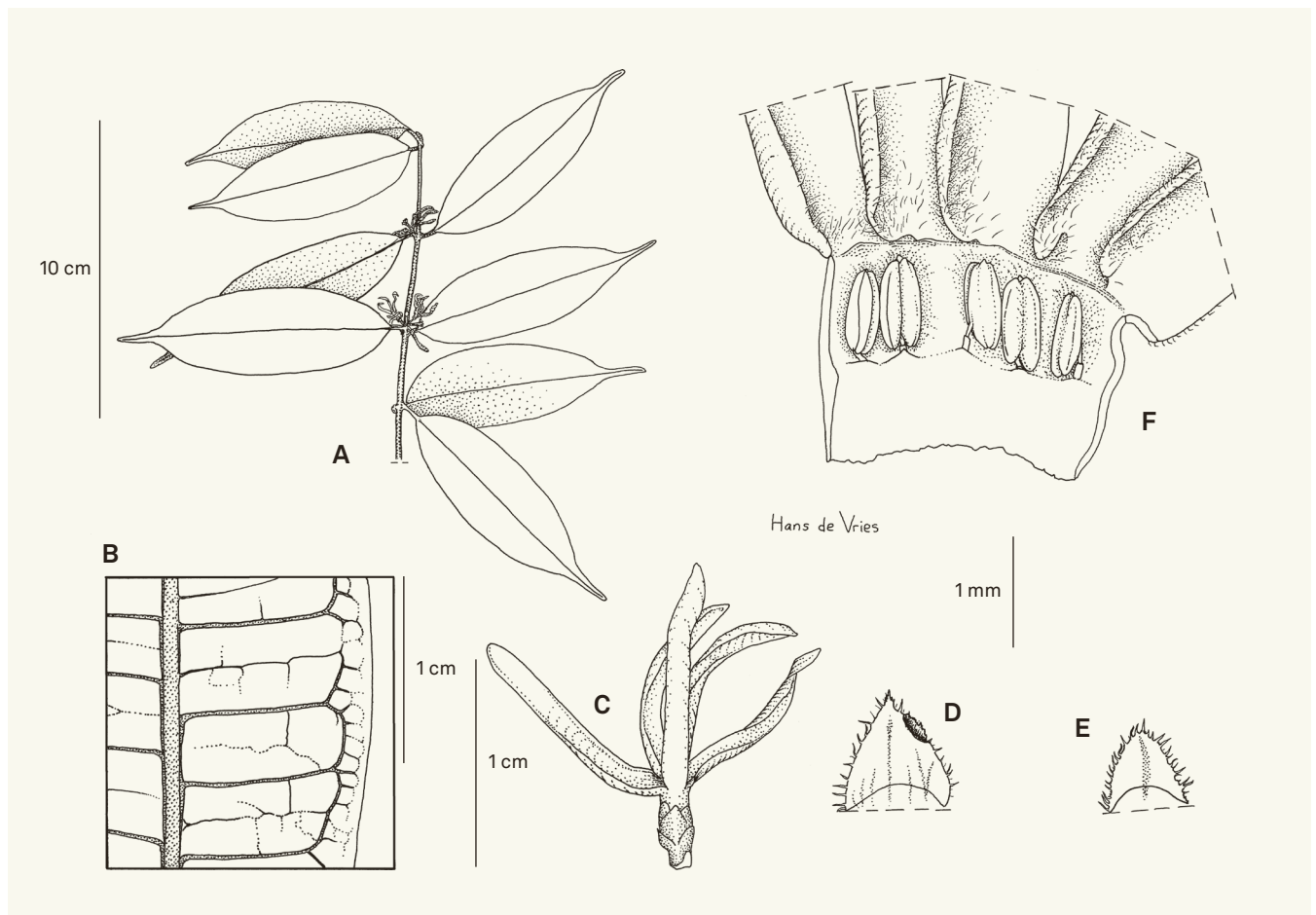


Fig. 7. – *Landolphia anthonii* Jongkind. A. Flowering branch; B. Leaf from below; C. Flower; D. Calyx lobe, inside; E. Bract, inside; F. Flower, opened. [Wieringa 778] [Drawing: H. de Vries]

a probable new species in 1992. Leeuwenberg was the leading expert on African *Apocynaceae* in his time, and contributed many generic revisions that have greatly advanced our knowledge of the family.

Distribution, ecology and phenology. – Occurs in the hill ranges of southern Cameroon (Akom II area) and Gabon (Cristal Mountains, Chaillu Massif) (Fig. 8A), in wet evergreen forests, at elevations of 500–1000 m. Flowers have been collected in March, April and July.

Conservation status. – *Landolphia anthonii* occurs in mid-altitude forests (500–1000 m) in Cameroon and Gabon, and is known from four collections representing four distinct localities. Considering the still important forest cover in the areas where it was collected, we consider that these sites are still extant. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 16 km², which falls within the limits for the “Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) is calculated as 15,687 km², which falls within the limit for “Vulnerable” status under Criterion B1. The only occurrence in Cameroon is in a protected area, Campo-Ma’an National Park. The three occurrences in Gabon are not protected (although one is very close to the limits of Monts de Cristal National Park, where the species may well occur) and have all been exposed to past and present forest exploitation; whether this represents a threat to the species is unclear, since

little is known of its ecological requirements, and many liana species (including other *Landolphia*) may actually benefit from moderate levels of forest disturbance. Also, as a tall liana with small flowers, the species is likely to be undercollected. With the two most remote localities more than 500 km apart this is even more likely. According to the limited data available at this moment, and using the IUCN criteria, we cannot reach a realistic threat category, and therefore *L. anthonii* is included in the “Data Deficient” [DD] category.

Notes. – The corolla tube of this species is among the shortest recorded in the genus, resembling that of *Landolphia incerta* (see the diagnosis for differences). However, in vegetative characters *L. anthonii* is closer to *L. ferrea*, *L. glabra* and *L. persooniana*; all four species share small (usually < 10 cm long), glabrous leaves with the midrib channelled above and the lateral veins inserted almost at a right angle, and also highly contracted inflorescences and very slender corolla lobes (their differences are summarised in Table 2). The distinction between *L. anthonii* and *L. glabra* is difficult in absence of flowers, although twigs of the latter are usually more strongly lenticellate. It is not known if there are additional differences in the fruits, since those of *L. anthonii* are not known; the label of *Tchouto et al.* 2853 mentions green fruits, but none are present on the WAG sheets.

Table 2. – Morphological comparison between *Landolphia anthonii* Jongkind, *L. ferrea* J.G.M. Pers., *L. glabra* (Pierre ex Stapf) Pichon and *L. persooniana* O. Lachenaud & Jongkind. Characters diagnostic for one species are in bold.

	<i>L. anthonii</i>	<i>L. ferrea</i>	<i>L. glabra</i>	<i>L. persooniana</i>
Twigs	glabrous	glabrous (rarely hairy on newest shoots)	glabrous	sparsely to densely hirsute
Older branches	dark brown, lenticels very sparse, otherwise smooth	orange-brown to grey , lenticels dense, bark strongly fissured	dark brown, lenticels dense and conspicuous, otherwise smooth	grey to dark brown, lenticels inconspicuous, otherwise smooth
Glandular dots on lower leaf surface	present	absent	present or absent	present
Corolla tube length [mm]	1.7–2	9.2–13	6–10.8	5.5–8
Corolla tube indumentum (outside)	glabrous	glabrous	glabrous	dense, short ascending hairs
Corolla tube indumentum (inside)	glabrous	hairy at the level of the anthers	hairy at the level of the anthers	hairy at the level of the anthers
Corolla lobe length [mm]	9–12, much longer than tube	4.9–11, shorter than tube	4.7–13, usually shorter than tube (rarely longer)	9.5–18, longer than tube
Ovary	glabrous	densely pilose	densely pilose	pilose at apex only
Style [mm]	absent or very short	5.5–9.7, hairy (apex sometimes glabrous), abruptly narrowing from ovary	4.6–7.2, hairy, very gradually narrowing from ovary	2.5–2.7, glabrous

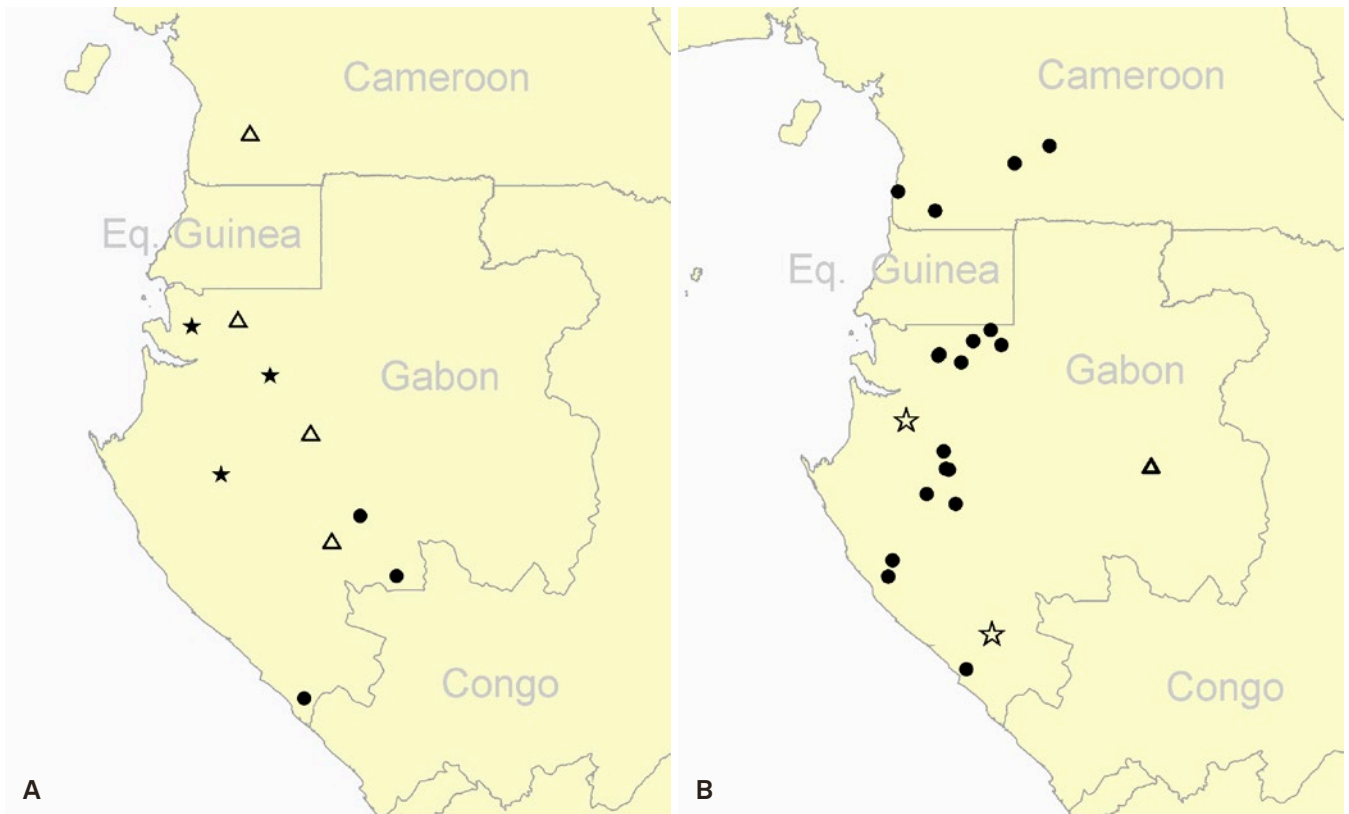


Fig. 8. – Distribution maps. **A.** *Landolphia anthonii* Jongkind (triangles), *L. persooniana* O. Lachenaud & Jongkind (circles) and *L. verrucosa* Jongkind & O. Lachenaud (stars). **B.** *Landolphia glandulosa* (Pellegr.) Pichon (stars), *L. obovata* O. Lachenaud & Jongkind (circles) and *Oncinotis gabonica* O. Lachenaud (triangle).

Additional specimens examined. – CAMEROON. **South Region:** Campo-Ma'an area, Efoulan, Ongongo and Nkolomekok hills in Akom II area, 2°44'43"N 10°31'48"E, 1000 m, fl., 25.IV.2000, *Tchouto Mbatchou et al.* 2853 (WAG).

GABON. **Ngounié:** Bordamur logging concession, 0°41'S 11°13'E, 600 m, 1.III.2009, fl., *Stévant et al.* 3150 (BR, MO); Mts. Du Chaillu, 5 km SE of confluence of Ogoulou and Ogoudou Rivers, 1°53'S 11°28'E, 660 m, 8.VII.1989, fl. bud, *Wilks 1978* (MO, WAG).

Landolphia glandulosa (Pellegr.) Pichon in Mém. Inst. Fr. Afr. Noire 35: 170. 1953.

≡ *Carpodinus glandulosa* Pellegr. in Bull. Mus. Nat. Hist. Nat. 31: 465. 1925.

Holotypus: GABON. **Nyanga:** Tchibanga, 7.I.1915, fl., *Le Testu 1968* (P [P00105629]!; iso-: BM [BM000925662, BM000925663] images!, BR [BR0000008858825]!, E [E00193155] image!, K [K000233288] image!, LISC [LISC002907] image!, P [P00105630, P00105631]!).

Lianas large. *Branchlets* 2–3 mm thick, dark brown with conspicuous paler lenticels, glabrous or sparsely puberulous at nodes. *Leaves* opposite; blade obovate, 4.8–12 × 2.2–5.2 cm, acute at base, rounded or acuminate for up to 1 cm at apex, glabrous, rather shiny, drying olive green to olive brown, glandular

dots conspicuous on lower leaf surface (1–4 per cm²), blackish to reddish when dried; midrib impressed above, raised below; 6–10 pairs of curved and conspicuously looping secondary veins; tertiary venation laxly reticulate; petiole 3–5 mm, glabrous, with numerous colleters in its axil. *Inflorescences* 1–2-flowered, axillary, fasciculate. *Flowers* 5-merous; pedicel ≤ 1 mm long, tomentose; bracteoles 2, opposite, at base of calyx, narrowly elliptic to narrowly obovate, 2.5–3 × 1–1.3 mm, obtuse to acute at apex, concave, puberulous outside, glabrous inside. *Calyx* lobes imbricate, suborbicular to broadly ovate, about as long as wide, 3.3–4 × 3.3–4 mm, slightly unequal (outer lobes smaller), rounded to emarginate at apex, thickened at base, glabrous except ciliate margin, inside with several basal colleters. *Corollas* creamy white; tube c. 14 × 1 mm (at base), 2.3 mm around anthers and 2 mm at throat, cylindrical at base, then broadening in upper third and slightly constricted at throat, glabrous outside, sparsely pubescent inside in upper third; lobes overlapping to left, lanceolate, c. 9 × 2.3 mm, ciliate on right margin, otherwise glabrous. *Stamens* 2.5 mm long, inserted around upper ¼ of tube, included; filaments 0.5 mm long; anthers c. 2 × 0.5 mm, acute at apex, glabrous, their tips reaching c. 0.5 mm below throat. *Pistils* c. 12.3 mm long; ovary 1.5 × 1 mm, obovoid, densely pilose; style cylindrical, 9 mm

long, glabrous; pistil head ± cylindrical, 0.8 × 0.8 mm; stigmatic apex cylindrical, 1 × 0.5 mm. *Fruits* dull white with faint greenish tinge, obovoid, rounded at apex, 6.5 × 4.5 cm, glabrous, strongly wrinkled in dry state, pulp yellow. *Seeds* irregularly ellipsoid and compressed.

Distribution, ecology and phenology. – Endemic to Gabon, only known from two localities in Estuaire (Remboué River) and Nyanga (Tchibanga) provinces (Fig. 8B); presumably in lowland evergreen forests, but no precise ecological information is available from the collectors. Flowers and fruits have both been collected in January.

Notes. – This species is here considered in its strict original sense (PELLEGRIN, 1925: 465, as *Carpodinus glandulosa* Pellegr.); only three collections have been seen, of which *McPherson 15106* is the first with fruits. It has long been confused with the much more frequent *Landolphia obovata*, and with another, undescribed species from Cameroon, represented by the specimens *Letouzey 11153* and *D.W. Thomas 4297*. Apart from the type and these two Cameroonian collections, all specimens cited by PERSOON et al. (1992) belong to *L. obovata*. Their descriptions include characters of the three species, while the line drawing entirely represents *L. obovata*. All three species share lenticellate stems, leaves gland-dotted below with widely spaced and ascending secondary veins, reticulate tertiary venation, congested axillary inflorescences, and moderately large

corollas that are glabrous outside or pubescent only on the margin of the lobes; differences between them are summarised in Table 3.

Other specimens studied. – GABON. Estuaire: S of Estuaire du Gabon along Remboué River, British Gas site, 0°12'S 10°01'E, 11.I.1991, fr., *McPherson 15106* (BR, LBV, WAG); *ibid.* loco, fl., *McPherson 15107* (LBV).

Landolphia obovata O. Lachenaud & Jongkind, **sp. nov.** (Fig. 4C).

Holotypus: GABON. Woleu-Ntem: Crystal Mountains, Tchimbélé, 0.5 km NE of dam, 19.III.1990, fl. & fr., *Wieringa 713* (3-part specimen: WAG [WAG.1611082, WAG.1611083, WAG.1611084]!; iso-: BR [BR0000014305115]!, C, K, LBV [LBV0000704]!, MO, PRE).

Landolphia obovata O. Lachenaud & Jongkind is distinct from other species in the genus by its obovate leaves with a narrowly cordate base and conspicuous glandular dots on the lower surface, and its broadly obovoid fruits with a thick transverse ridge near the top.

Lianas up to 20 m long (at least). *Branches* greyish to dark brown with paler lenticels becoming very conspicuous on old branches; branchlets 2–4 mm thick, brown, pubescent to puberulous with short patent hairs or rarely glabrous. *Leaves* opposite; blade obovate, 4–14.5 × 2–7.5 cm, narrowly cordate or auriculate at base, obtuse to acuminate at apex with acumen

Table 3. – Morphological comparison between *Landolphia glandulosa* (Pellegr.) Pichon and species previously treated under it. *Landolphia* sp. is based on *Thomas 4297* and *Letouzey 11153*. Characters diagnostic for one species are in bold.

	<i>L. glandulosa</i>	<i>L. obovata</i>	<i>L. sp.</i>
Indumentum of twigs	glabrous (or puberulous at nodes only)	pubescent (rarely glabrous)	glabrous
Indumentum of lower leaf surface	glabrous	pilose to puberulous, at least on veins	glabrous
Petiole length [mm]	3–5	2–10	13–17
Leaf shape	obovate	obovate	elliptic or very slightly obovate
Leaf base	acute	cordate or auriculate	acute
Leaf apex	acumen < 10 mm long	acumen < 8 mm long	acumen 10–15 mm long
Inflorescences	1–2-flowered	3–8-flowered	1–2-flowered
Flowers	sessile or with pedicel < 1 mm long	with pedicel 1–4 mm long	sessile
Calyx lobes	glabrous except ciliate margin	ciliate and pubescent outside in the centre	ciliate and pubescent outside in the centre
Corolla tube length [mm]	c. 14, exceeding lobes	6–9, shorter than lobes	c. 16, exceeding lobes
Fruits	longer than broad, without apical cap	broader than long, with apical cap	?
Distribution	Gabon	Cameroon (South Region) and Gabon	Cameroon (Littoral & South-West Regions)

≤ 0.8 cm long, coriaceous and dark green when fresh, drying dark brown above and dark brown to olive green below, above glabrous or sparsely pilose at base of midrib, below sparsely pilose with erect hairs ≤ 0.2 mm long or sometimes puberulous on veins only, glandular dots conspicuous on lower leaf surface (1–5 per cm²), blackish when dried; midrib impressed above, raised below; 6–8(–10) pairs of curved and conspicuously looping secondary veins; tertiary venation reticulate, prominent or not; petiole 2–10 mm, glabrous or pubescent like branches. *Inflorescences* 3–8-flowered, axillary, fasciculate or in highly contracted cymes; peduncle up to 4 mm long, densely tomentose; bracts triangular to narrowly obovate, 0.8–1 × 0.3–0.5 mm, acute to obtuse at apex, concave and thickened dorsally, tomentose outside, glabrous inside. *Flowers* 5-merous; pedicel 1–4 mm long, tomentose or pubescent; bracteoles 2, under calyx, similar to bracts. *Calyx* lobes imbricate, elliptic to broadly ovate, 1–1.5 times as long as wide, 2–2.5 × 1.3–2.2 mm, acute to rounded at apex, keeled and thickened at base, otherwise membranaceous, outside pubescent in central area and glabrous elsewhere, ciliate on margin, inside with basal colleters. *Corollas* pale green outside and white inside; tube 6–9 × 1–2 mm (at base), 2–2.5 mm around anthers and 1.5–2 mm at throat, glabrous outside, inside with very sparse hairs around insertion of stamens; lobes lanceolate, 9–17 × 2–4 mm, ciliate at least on basal auricle. *Stamens* c. 2 mm long, inserted towards upper ¼ of tube, included; filaments 0.5 mm long; anthers 1.5 × 0.6 mm, acute at apex, glabrous, their apex almost reaching throat. *Pistils* 6.3–7.3 mm long; ovary c. 2 mm long, with glabrous cylindrical base 0.7 × 0.9 mm and pilose ovoid apex, 1.3 × 1.3 mm; style cylindrical, 3–4 mm long, glabrous; pistil head ellipsoid or oblong, 0.8 × 0.5–0.7 mm, more or less ciliate at apex; stigmatic apex cylindrical, 0.5–0.8 × 0.2–0.3 mm. *Fruits* glaucous green when young, orange when mature, broadly obovoid (length ≤ width), 4.6–8 × 5.6–8 cm in vivo, rounded or retuse at apex, near apex with a 1–2 cm wide transverse ridge, smooth or somewhat bumpy, 5–15-seeded, wall 0.5–1.5 cm thick, pulp orange with sweet taste. *Seeds* irregularly ovoid or ellipsoid, often laterally compressed, 18–23 × 13–17 × 10–13 mm; cotyledons (irregularly) ovate or elliptic, undulate.

Distribution, ecology and phenology. – This species occurs in the South Region of Cameroon, and in Gabon where it is relatively widespread in the western half of the country (but apparently absent along the coast); it should also be expected in Equatorial Guinea (Fig. 8B). It grows in primary and secondary forests, up to elevations of 535 m. Flowers have been collected from November to May (once in bud in September), i.e., most of the year except for the main dry season; fruits in January, March, June, September and November.

Conservation status. – *Landolphia obovata* occurs in lowland forests in Cameroon and Gabon and is known from 20 collections representing 18 localities. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 72 km², below the threshold for “Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) is calculated as 101,384 km², well above the threshold for “Vulnerable” status under Criterion B1. Two of its sites are located within a protected area, the Campo-Ma’an National Park in Cameroon. Most of the remaining sites are in forestry, oil and mining concessions and are therefore exposed to some level of habitat degradation due to these activities. However, in view of its relatively wide distribution (the 18 occurrences represent 16 locations in the sense of IUCN) the species is assessed as “Least Concern” [LC]. It is, furthermore, likely to be more widespread than records suggest.

Notes. – This species is rather distinctive, even in the vegetative state, by its obovate leaves with glandular dots and cordate base, and also by the shape of its fruits. It is relatively frequent, and has been well-represented in herbaria for a long time, but rather surprisingly PERSOON et al. (1992: 78–79), in their otherwise excellent revision of African *Landolphia*, treated it as *L. glandulosa* (see additional comments under the latter species and Table 3 for differences). The specimen Leeuwenberg et al. 13588 was mistakenly cited as 12588 in their revision.

In addition to *Landolphia glandulosa*, this species could be mistaken for *L. jumellei* (Pierre ex Jum.) Pichon, which has leaves of a similar shape but lacking glandular dots and is generally much hairier, and *L. dulcis* (Sabine) Pichon (s.l.), which leaves are also frequently subcordate at base and gland-dotted, but more elliptic and either glabrous or with longer hairs; both species also have quite different flowers and fruits.

Additional specimens examined. – CAMEROON. **South Region:** TDC, 10.XII.1991, fl., *F. Hallé 4336* (P, WAG); km 48 route Sangmélima-Yaoundé, Mvoutessi I, 17.XII.1986, fl., *Lejoly 86/1107 & Lisowski B-3587* (BR); W of the recently reconstructed road from Ebolowa to Minkok, on bank of fast streaming creek, fr., 6.VI.1975, *J.J.F.E. de Wilde 8275A* (BR, MO, WAG); Campo Reserve, near the village Ebianemeyong, bank of Ntem River, 11.XII.1998, fl., *J.J.F.E. de Wilde et al. 12148* (WAG).

GABON. Estuaire: Concession SEEF, 0°31'N 10°41'E, 2.XI.2017, fl. bud & fr., *Bidault et al. 3497* (BR, BRLU, MO, P, WAG). **Moyen-Ogooué:** zone de Mabounié, à 45 km au sud-ouest de Lambaréné, rive nord de la rivière Ngounié, 13.XI.2013, imm. fr., *Bidault et al. 1272* (BR, MO, P, WAG); zone de Lambaréné, à 50 km au sud de la ville, à 15 km au sud-est du lac Ezanga, 22.XI.2013, imm. fr., *Bidault et al. 1398* (MO, P, WAG); Mabounié, between the Ngounié River and the camp, 7.V.2012, fl. bud, *Stévert & Droissart 4402* (LBV, MO, WAG); near Bellevue, 9.VI.1987, fr., *D.W. Thomas 6651* (BR, LBV, MO, WAG). **Ngounié:** Fougamou, 16.II.1924, fl., *Le Testu 6390* (BR, P, WAG). **Ogooué-Maritime:** Rabi, 31.III.1990, fl., *Breteler et al. 9691* (BR, LBV, P, WAG); 30 km S of Rabi, near Echira River, 28.XI.1989, fl. & imm. fr., *J.J.F.E. de Wilde et al. 9831* (BR, LBV, WAG). **Nyanga:** along a forest exploitation track near the Doussa River, 7.XII.1986, fl. bud, *J.J.F.E. de Wilde et al. 9208* (BR, LBV, P, WAG). **Woleu-Ntem:** 30 km of Abanga R. to the east, 15.IX.1985, fl. bud & imm. fr., *Leeuwenberg et al. 13549* (BR, LBV, P,

WAG); S of Medouneu, 40 km E of SEF Camp, 17.IX.1985, fl. bud & fr., *Leeuwenberg et al. 13588* (BR, LBV, P, WAG); c. 15 km NW of forestry camp Oveng, 8.II.1987, fl. bud., *Reitsma & Reitsma 2934* (LBV, WAG); Crystal Mountains, 1.5 km NE of Tchimbélé, 5.I.1990, imm. fr., *Wieringa 358* (BR, C, K, LBV, MO, PRE, WAG); 0.5 km E of Tchimbélé, 27.IV.1990, fl., *Wieringa 780* (BR, C, LBV, MO, WAG).

Landolphia persooniana O. Lachenaud & Jongkind, **sp. nov.** (Fig. 9A, B, 10).

Holotypus: GABON. Ngounié: Site Ramsar de Birougou, 20 km au N de Malinga, village Mbomo, rive Est de la Bibaka, 2°16'49"S 12°13'53"E, 669 m, 20.III.2018, fl., *Bidault et al. 3927* (MO!; iso-: BR!, BRLU [BRLU0027468]! + spirit!, LBV!, P!, WAG!).

Landolphia persooniana O. Lachenaud & Jongkind resembles *L. subrepanda* (K. Schum) Pichon in its congested axillary inflorescences, leaf midrib channelled above and secondary veins inserted almost at a right angle, corolla pubescent outside with a tube 5.5–8 mm long, anthers acute at apex, ovary pilose at apex, style glabrous and long tapering pistil head, but has corolla lobes 9.5–18 mm long and exceeding the tube (vs. 2.8–6.9 mm long, shorter than tube).

Lianas at least 12 m long, with tendrils and white latex. *Twigs* 1–2.5 mm thick, grey to dark brown, sparsely hirsute or sometimes densely hairy, with inconspicuous brown lenticels. *Leaves* opposite; blade elliptic, 4–10 × 1.3–4.7 cm, base rounded to slightly narrowly cordate near petiole, apex abruptly acuminate to caudate for 1–1.5 cm, coriaceous, glossy, dark green above, beneath dark green with pale green midrib, glabrous or with very sparse hairs on midrib below, glandular dots conspicuous on lower leaf surface (2–5 per cm²), blackish when dried; midrib channelled above; 8–15 pairs of almost straight secondary veins, inserted at an almost straight angle to midrib, alternating with (slightly) fainter parallel intersecondary veins and forming conspicuous loops 1–2.5 mm from leaf margin; tertiary veins rather laxly reticulate and not very conspicuous below; petiole 2–7 mm long, sparsely hirsute. *Inflorescences* axillary, subsessile, cymose and highly contracted, 1–10-flowered, bracts ovate, c. 0.5 mm long, appressed hairy outside, glabrous inside. *Flowers* 5-merous, fragrant; pedicel 1–1.5 mm long, with sparse and short appressed hairs, 2 bracteoles at apex of pedicel; flower bud up to 21 mm long. *Calyx* lobes imbricate, narrowly ovate to triangular, 1–1.5 × 0.5–1 mm, acute to obtuse at apex, ciliate and sparsely pubescent outside on exposed parts, light green. *Corollas* pale greenish yellow; tube 5.5–8 × 1–1.2 mm, slightly inflated around stamens, densely pubescent with short ascending hairs outside, inside sparsely hairy from insertion of stamens to throat; lobes linear, 9.5–18 × 0.5–2 mm, glabrous or with very sparse hairs on margin, white. *Stamens* included, inserted slightly above middle of tube, filaments c. 1 mm long, glabrous, anthers 1.8–2 mm long, glabrous or with a few hairs on back and with a tuft of hairs at apex; pistil 4.5–5 mm

long, ovary c. 0.8 mm long, cylindrical, glabrous at base and villose at apex, style 2.5–2.7 mm long, glabrous; stigmatic head 1.2–1.5 mm long. *Fruits* unknown.

Etymology. – This species is named after Johannes (Hans) G.M. Persoon, previous monographer of African *Landolphia*, who recognised its first collection as possibly new in 2013.

Distribution, ecology and phenology. – Endemic to the Mayombe and Chaillu massifs in southern Gabon (and probably adjacent Republic of Congo) (Fig. 8A), occurring in secondary forest edges, and secondary forests near rivers, at elevations of 90–740 m. All three specimens in flower have been collected in March, during the short dry season.

Conservation status. – *Landolphia persooniana* is endemic to Gabon and occurs in low- to mid-altitude evergreen forests; it is known from three collections representing three distinct localities. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 12 km², which falls under the threshold for “Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) is calculated as 7,696 km² which falls under the threshold for “Vulnerable” status under Criterion B1. The three known occurrences represent three subpopulations. None of them are included within protected areas. Two localities are within logging concessions; whether this represents a threat to the species is unclear, since little is known of its ecological requirements and many liana species (including other *Landolphia*) may actually benefit from moderate levels of forest disturbance. The species is also likely to be undercollected since it is a tall liana, flowering high in the canopy. With the limited data available at this moment, and using the IUCN criteria, we cannot reach a realistic threat category, and therefore *L. persooniana* is included in the “Data Deficient” [DD] category.

Notes. – In most of its characters this species is very close to *Landolphia subrepanda* (Fig. 9A–C), but the corolla proportions are quite different (see diagnosis above). The leaves of *L. subrepanda* are quite variable but tend to be larger (usually > 10 cm long), often more obovate, with the lateral veins more pronounced than in *L. persooniana*, and almost always lack glandular dots on the lower side (exceptionally these are present in *Le Testu 6353*). It is not known if there are additional differences in the fruits, since those of *L. persooniana* have not been collected.

The new species also resembles *Landolphia anthonii*, *L. ferrea* and *L. glabra*, which have quite similar leaves, inflorescences, and corolla lobes, but differs from all by its pilose twigs and its corolla tube which is pubescent outside (Table 2); the corolla tube and style are also much longer than in *L. anthonii*. Finally, it also resembles *L. robustior* (K. Schum.)



Fig. 9. – *Landolphia persooniana* O. Lachenaud & Jongkind: **A, B**. Leaves and inflorescence. *Landolphia subrepanda* (K. Schum.) Pichon: **C**. Inflorescence. *Landolphia verrucosa* Jongkind & O. Lachenaud: **D**. Fruiting branch from above. *Pleiocarpa robusta* O. Lachenaud: **E**. Surface of a dried monocarp covered with domed warts. *Pleiocarpa mutica* Benth.: **F**. Surface of a dried monocarp. [A, B: Bidault et al. 3927; C: Bidault et al. 1407; D: Lachenaud et al. 1518; E: Doucet 448; F: de Koning 5788] [Photos: A–C: E. Bidault; D: O. Lachenaud; E, F: I. van der Beeten]

J.G.M. Pers. in its inflorescences and flowers, but the latter has glabrous twigs with peeling bark, leaves lacking glands and intersecondary veins, with lateral veins more ascending and the midrib flat or prominent above, and the corolla tube glabrous inside and pubescent inside for most of its length (only above stamen insertion in *L. personiana*).

Additional specimens examined. – GABON. Ngounié: 22 km on the road Moukabou to Mbigou, 1°40'S 11°47'E, 740 m, 15.III.2013, fl., *Wieringa et al. 7454* (WAG! + spirit!). Nyanga: Région de Kaye au sud du Massif du Mayombe, 3°38'33"S 11°09'44"E, 31.III.2012, fl., *Boupya et al. 685* (BRLU!, LBV, MO).

Landolphia verrucosa Jongkind & O. Lachenaud, **sp. nov.** (Fig. 9D, 11).

Holotypus: GABON. Ngounié: collines au sud-est du Lac Ezanga, 1°10'S 10°19'E, 100 m, 21.XI.2013, fr., *Lachenaud et al. 1518* (2-part specimen: BRLU [BRLU0024324]! + spirit!; iso-: BR [BR0000024390620]!, LBV!, MO-6910313, P, WAG [WAG.1963405]!).

Landolphia verrucosa Jongkind & O. Lachenaud resembles *L. owariensis* and *L. mannii* Dyer with its terminal and densely cymose inflorescences, leaves with secondary veins forming conspicuous loops and much more prominent than the densely reticulate tertiary venation, and medium-sized corolla with lobes shorter than the tube. It differs from both species by the folded and twisted ridges on the fruit, and the usually subcordate (vs. acute to rounded) leaf base. It is further separated from *L. owariensis* by its corolla that is completely glabrous inside (vs. pubescent in the throat) and from *L. mannii* by its corolla lobes that are pubescent outside on the whole surface (vs. glabrous on the part covered in bud).

Lianas up to 30 m long, exuding white latex. *Branchlets* 2–4 mm thick, dark brown with pale lenticels, shortly velutinous with ± curly hairs. *Leaves* opposite; blade (3.5–)6.5–15 × (2–)3.8–6.5 cm, elliptic to slightly obovate, subcordate or rarely rounded at base, gradually narrowing into a short acumen or rarely obtuse at apex, papery, drying dark brown to greyish above and pale

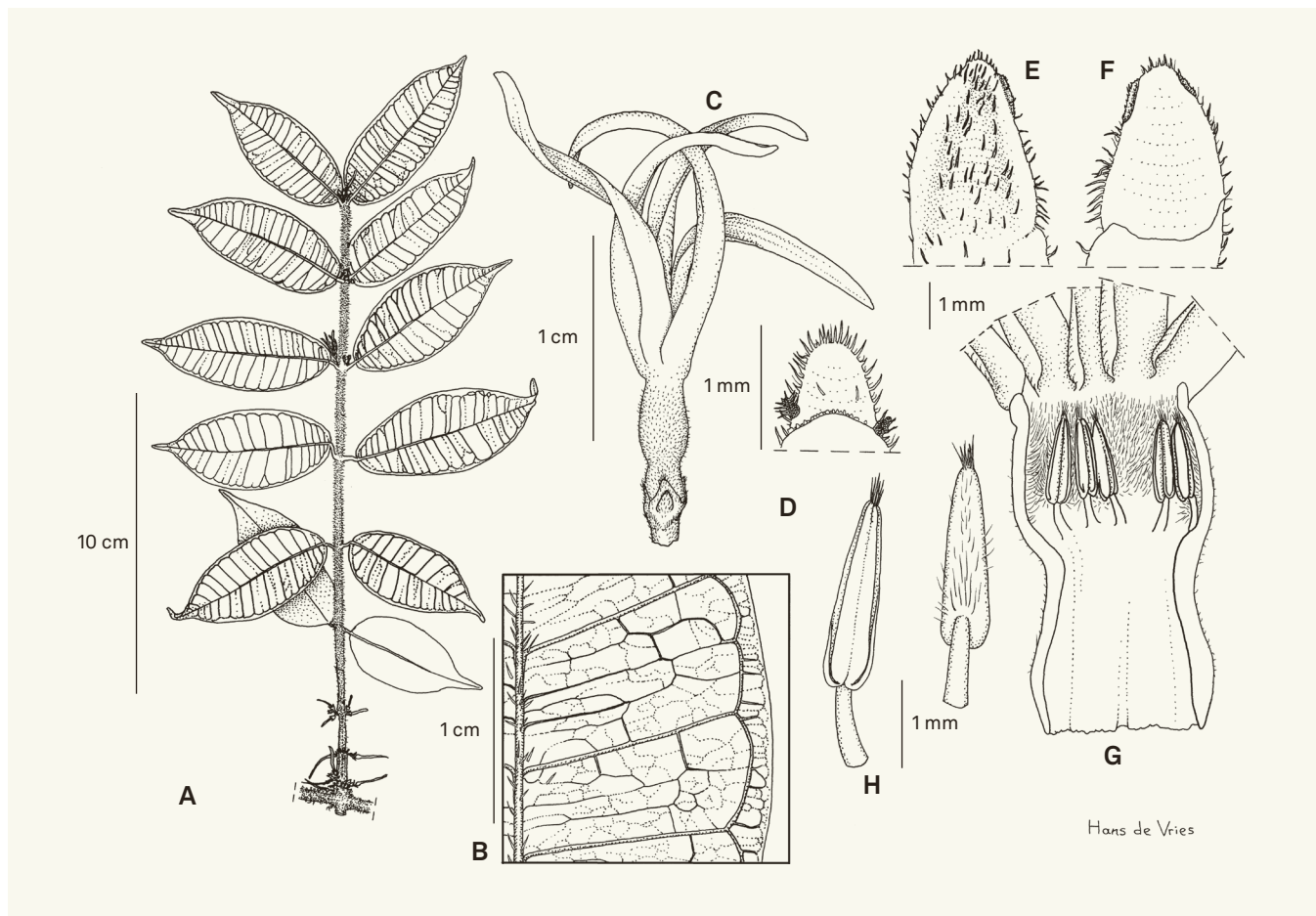


Fig. 10. – *Landolphia personiana* O. Lachenaud & Jongkind. **A.** Flowering branch; **B.** Leaf from below; **C.** Flower; **D.** Bract, inside; **E.** Calyx lobe, outside; **F.** Calyx lobe, inside; **G.** Corolla, opened; **H.** Stamen, inside; **I.** Stamen, outside. [*Wieringa et al. 7454*] [Drawing: H. de Vries]

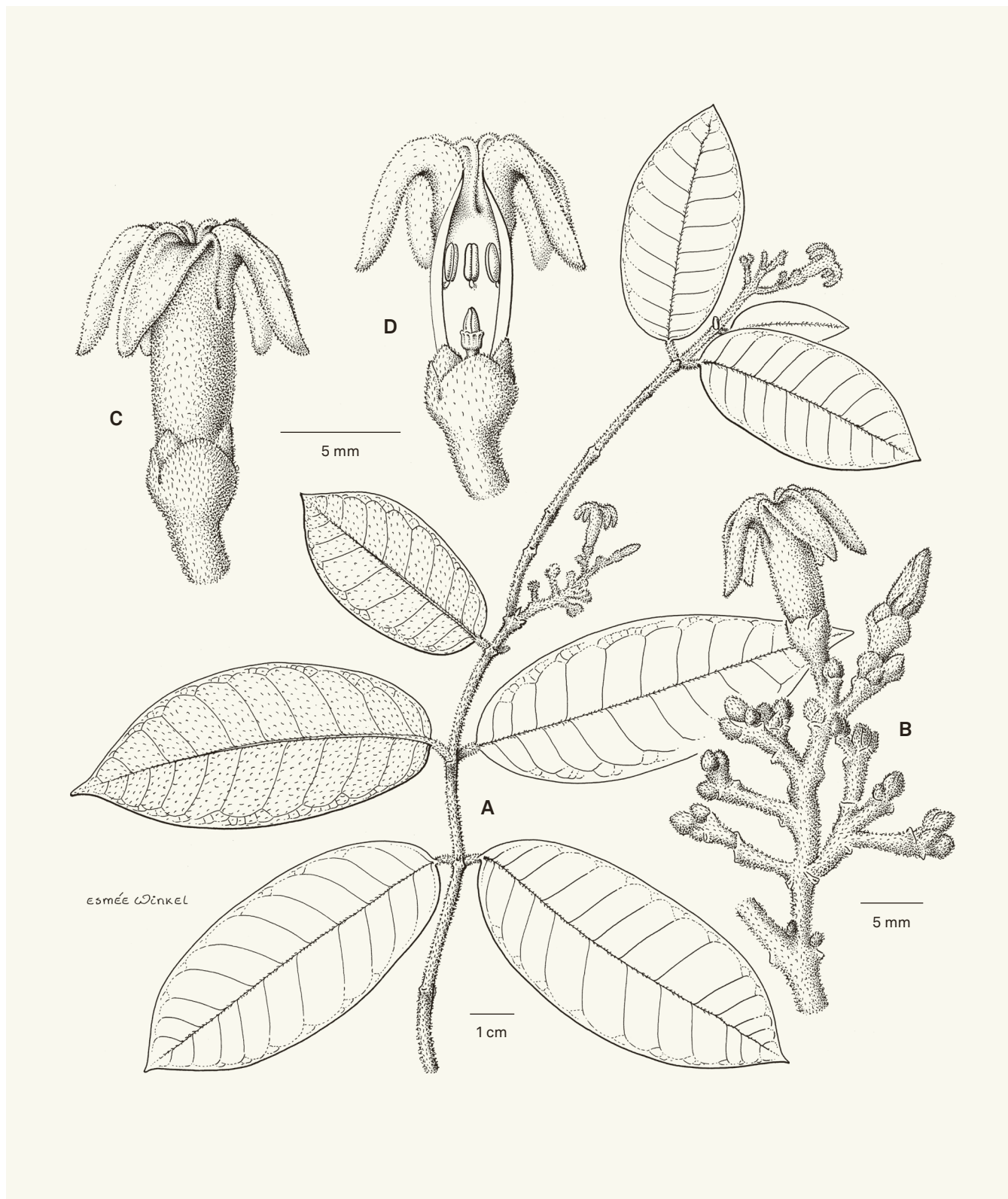


Fig. 11. – *Landolphia verrucosa* Jongkind & O. Lachenaud. **A.** Flowering branch; **B.** Inflorescence; **C.** Flower; **D.** Flower (opened) showing stamens and pistil. [Breteler et al. 11133] [Drawing: E. Winkel]

grey-brown below, usually glabrous above except minutely puberulous veins, below densely tomentose on veins and with very sparse short hairs between them (denser on very young leaves), glandular dots absent; midrib impressed above, raised below; 9–15 pairs of secondary veins, slightly impressed above and very prominent below, inserted at a very broad angle to midrib and ending in a conspicuous looping intramarginal vein 2.5–5 mm from margin; tertiary venation reticulate, dense but not prominent, conspicuously darker in vivo, forming areolae c. 0.5 mm in diam.; petiole 3–7 mm long, pubescent like twigs. *Inflorescences* terminal, cymose, 2–5 cm long, many-flowered, usually clearly but shortly branched, sometimes longer and slightly tendril-like, velutinous; peduncle up to 0.5 cm long; bracts broadly ovate, 1.5–2.5 × 1–2 mm, acute at apex and slightly carinate dorsally, velutinous outside, glabrous inside, caducous. *Flowers* 5-merous, with velutinous bracteoles embracing calyx; pedicel 1–2 mm long, velutinous. *Calyx* lobes broadly ovate, c. 2 × 1.7–3 mm, rounded at apex, velutinous. *Corollas* more or less succulent, brownish outside, dark cream coloured inside, tube c. 7 × 3 mm, almost cylindrical, velutinous outside, glabrous inside, lobes 8–9 × 3 mm, first erect then bending outward, entirely velutinous outside but less densely than tube, appressed hairy inside. *Stamens* included, subsessile, inserted at 3.5–4 mm above base of corolla; anthers 1.5 mm long, glabrous. *Pistils* 2.5–3 mm long, not reaching anthers. *Fruits* subglobose to obovoid, c. 4 cm in diam., surface folded in twisting ridges and bumps, very pale green or brown (probably not fully mature), glabrous. *Seeds* not seen.

Distribution, ecology and phenology. – This taxon is endemic to Gabon (Estuaire, Moyen-Ogooué and Ngounié provinces; Fig. 8A) and occurs in wet evergreen lowland forests, at elevations of 60–80 m. Flowers have been collected in April, and fruits in November.

Conservation status. – *Landolphia verrucosa* is endemic to Gabon and occurs in lowland evergreen forests; it is known from three collections representing three distinct localities. Due to the recent dates of collection, we consider that all of the recorded occurrences are extant. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 12 km², which falls under the threshold for “Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) is calculated as 7,677 km², which falls under the threshold for “Vulnerable” status under Criterion B1. The three occurrences represent three subpopulations. None of the sites are within protected areas. Two of them are in current logging concessions; whether this represents a threat to the species is unclear, since little is known of its ecological requirements and many liana species (including other *Landolphia*) may actually benefit from moderate levels of forest disturbance. The species is also likely to be under collected since it is a tall liana, flowering high in the

canopy. With the limited data available at this moment, and using the IUCN criteria, we cannot reach a realistic threat category, and therefore *L. verrucosa* is included in the “Data Deficient” [DD] category.

Notes. – *Landolphia verrucosa* closely resembles the much more common and widespread *L. owariensis* and *L. mannii*, especially in the flowering stage, but differs by the characters mentioned in the diagnosis. Its earliest collection, *Louis et al.* 271, was cited under *L. owariensis* by PERSOON *et al.* (1992: 221). The characteristic ornamentation of the fruits of *L. verrucosa* is unique among Central African *Landolphia* (though fruits of a few species are unknown yet). The West African *Landolphia nitidula* J.G.M. Pers. also has verrucose fruits, but is otherwise a very dissimilar species because of its glabrous, obovate leaves and axillary inflorescences.

The characters of the pistil of *Landolphia verrucosa* remain partly unknown, due to insect damage on the only open flower available.

Additional specimens examined. – GABON. Estuaire: c. 7 km E of N’Voum, 24 km NE of Ntoum, 1.XI.1983, fr., *A.M. Louis et al.* 271 (LBV, WAG). Moyen-Ogooué: 5–30 km NNW of Ndjolé, 27.IV.1992, fl., *Breteler et al.* 11133 (BR, K, LBV, S, WAG).

Oncinotis

The genus *Oncinotis* is closely related to *Baissea* (see above) and *Motandra*, which it resembles very much in fruit and vegetative characters. It differs from both by the presence of five coronal appendages in the corolla throat between the lobes, and from *Baissea* also by its anthers with curved and obtuse basal tails. *Oncinotis* was revised by DE KRUIF (1985) and has eight species (including the new species described here), seven of which are found in continental Africa and one in Madagascar. Differences between the six Central African species of *Oncinotis* are presented in Table 4. The remaining continental species is the West African *O. nitida* Benth., easily recognised by its numerous secondary leaf veins (13–25 pairs).

Oncinotis gabonica O. Lachenaud, **sp. nov.** (Fig. 12).

Holotypus: GABON. Ogooué-Lolo: Bambidie, c. 30 km E of Lastoursville, 10.VIII.2000, fl., *F.J. & B.J.M. Breteler* 15574 (2-part specimen: WAG [WAG.1662404]! + spirit!; iso-: LBV!, MO).

Oncinotis gabonica O. Lachenaud differs from its congeners by its relatively long corolla tube (4–5 times as long as the calyx) and short lobes (the tube/lobes ratio about 2:1) and its almost glabrous leaves with conspicuous tuft domatia in the main vein axils and dense subparallel tertiary veins. Other species of *Oncinotis* have the corolla tube 1–3.5 times as long as the calyx, the corolla lobes 0.7–2 times as long as the tube, the leaves either

villose below or if glabrous with domatia of the pit type (or absent), and the tertiary leaf veins laxer and usually reticulate.

Lianas woody with slender stem. *Branchlets* cylindrical, 1 mm thick, with short and moderately dense fulvous indumentum of simple crisped hairs c. 0.3 mm long. *Leaves* opposite; blade narrowly obovate to narrowly elliptic, 9–15.5 × 3.6–5.3 cm, acute at base, abruptly acuminate for 0.8–1.2 cm at apex, thinly papery, glabrous except domatia and very sparse simple hairs on midrib and secondary veins below, drying olive green; midrib impressed on upper side, prominent below; secondary veins 7–11 pairs, strongly curved and forming prominent loops 2–3 mm from leaf margin; tertiary veins dense, subparallel, prominent and concolorous on lower leaf surface; domatia present as conspicuous tufts of rufous hairs in main vein axils; petiole 0.5–1 cm long, pubescent on upper side with same indumentum as twigs and bearing a pair of colleters at junction with leaf blade, glabrous on lower side. *Inflorescences* axillary and paired at nodes, thyrsoid, 1.5–3.4 cm long, with indumentum similar to twigs but denser; peduncle 0.5–1.5 cm long, rachis 0.7–1.2 cm long, main branches 0.2–0.5 cm long; bracts minute, narrowly triangular, 0.5–1.2 × 0.2–0.5 mm, pubescent. *Flowers* 5-merous; pedicel

1–2 mm long, with short fulvous crisped hairs. *Calyces* purplish, with 5 imbricate ovate lobes, 1–1.2 × 0.5–0.7 mm, obtuse to subacute at apex, pubescent outside, glabrous inside. *Corollas* purplish outside and pale brownish-green inside; tube narrowly infundibuliform, 4–5 × 1.8–2 mm, slightly constricted at apex, covered outside (except at very base) with short patent or slightly retrorse hairs, villose inside with slightly retrorse hairs from insertion of stamens to throat; lobes overlapping to right, narrowly elliptic, 2–2.5 × 0.7–1 mm, rounded at apex, pubescent outside like tube on part exposed in bud, glabrous inside; flower bud fusiform, obtuse at apex; throat with 5 erect appendages 0.5–0.8 × 0.2 mm, alternating with lobes. *Stamens* fully included, inserted c. 1 mm above base of corolla tube, subsessile; anthers 2.3 × 0.4 mm, basally with rounded caudicles, acuminate at apex, glabrous. *Pistils* included; ovaries ± cylindrical, 0.7 mm long, pubescent at apex, 2-carpellate; disk annular, 0.5 mm high, glabrous; styles included, 1.5 mm long, glabrous, fusiform and inflated in median part, attenuate at apex and shortly bifid for 0.25 mm. *Fruits* unknown.

Distribution, ecology and phenology. – Only known from the type locality in east-central Gabon (Fig. 8B), where it was collected once in secondary lowland evergreen forest. Its area of

Table 4. – Morphological comparison between the Central African species of *Oncinotis* Benth. Characters diagnostic for one species are in bold.

	<i>O. gabonica</i>	<i>O. glabrata</i>	<i>O. gracilis</i>	<i>O. hirta</i>	<i>O. pontyi</i>	<i>O. tenuiloba</i>
Twig indumentum	shortly pubescent	glabrous	villose, hairs mostly simple	villose, hairs mostly branched	glabrous to puberulous	puberulous to sparsely villose
Leaf texture	papery	coriaceous	papery	papery	coriaceous	papery
Leaf pubescence	glabrous (except domatia and veins below)	glabrous (or veins sometimes puberulous below)	villose below (sometimes also above), hairs mostly simple	both sides villose, hairs mostly branched	glabrous (or midrib sometimes puberulous below)	glabrous or sparsely pubescent below (and sometimes on midrib above)
Tertiary veins	dense, subparallel	lax, reticulate	lax to rather dense, reticulate	lax, reticulate	very lax, reticulate	lax, reticulate to subparallel
Domatia	conspicuous hair tufts	pits, ciliate or not, or absent	hair tufts, often obscure	hair tufts, often obscure	conspicuous ciliate pits (rarely absent)	conspicuous ciliate pits
Sepal length [mm]	1–1.2	1.5–3.6	0.9–2.2	1.2–2.6	0.8–2.1	1.2–3.2
Corolla tube length [mm]	4–5	2.5–4.7	2.5–3.2	2.7–3	2.2–3.8	2.5–3.8
Corolla tube/calyx ratio	4–5	1.1–1.4	1–3.5	1–1.6	1.6–3.1	1.1–2.4
Corolla lobes [mm]	2–2.5 × 0.7–1	2.3–5.8 × 0.9–2.5	3.2–6.2 × 0.7–1.5	2.3–2.8 × 0.8–1.2	1.7–5.8 × 1–1.7	4.2–7.3 × 0.7–1.5
Corolla lobe/tube ratio	c. 0.5	1–1.8	1–2	0.7–1.1	0.8–1.7	1.3–1.9
Corolla lobe length/width ratio	c. 2.5	2–2.7	(2.1–)2.6–6.9	1.9–3.1	1.5–4.7	3.5–6.5

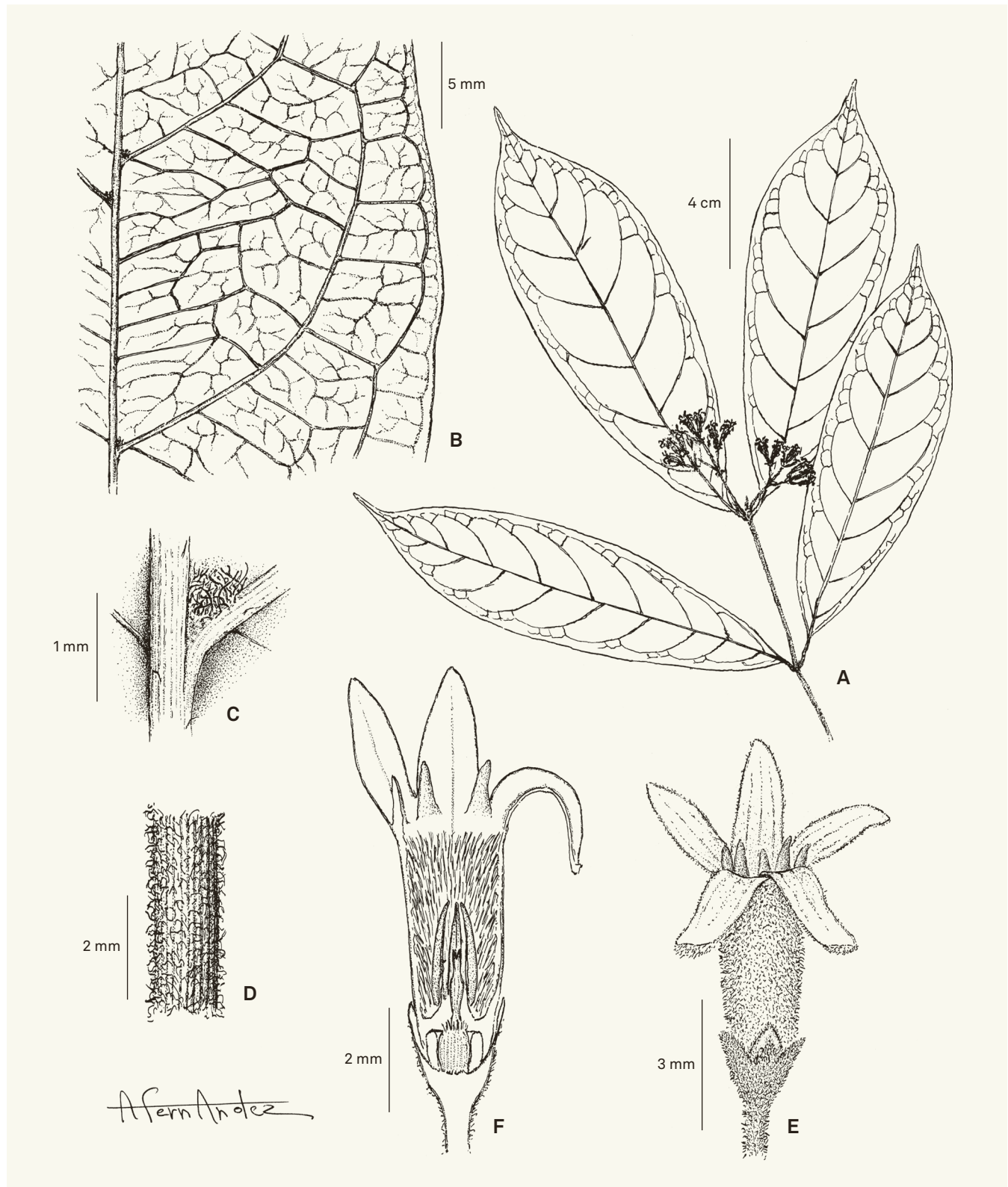


Fig. 12. – *Oncinotis gabonica* O. Lachenaud. A. Flowering branch; B. Leaf from below showing venation; C. Domatia; D. Young branch; E. Flower; F. Flower (opened) showing pistil and anthers.
[Breteler et al. 15574] [Drawing: A. Fernandez]

origin is relatively well-explored, and in the absence of further records the species is certainly rare in that area. Flowers have been collected in August, during the main dry season.

Conservation status. – This species is known from a single collection that represents one occurrence and one population. Due to the important forest cover in the area, we consider this occurrence as extant. Based on a 2×2 km cell size, its Area of Occupancy [AOO] is estimated as 4 km^2 , which falls under the threshold for “Critically Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) cannot be calculated. The only known occurrence is located within an active logging concession. It is unclear whether logging itself represents a current threat to the species, since little is known of its ecological requirements, and many liana species (including other *Oncinotis*) may benefit from moderate levels of forest disturbance. However, considering the species’ apparently very restricted range, other activities related to the concession (such as the building of roads or other infrastructures) may represent a future threat. *Oncinotis gabonica* is therefore assessed as “Vulnerable” [VU D2].

Pleiocarpa

The genus *Pleiocarpa* belongs to tribe *Hunterieae* (ENDRESS et al., 2018) and is closely related to *Hunteria* (see above) and *Picalima*. It was revised by OMINO (1996) together with these two genera, from which it differs by the absence of colleters inside the sepals, the pistil head which is subglobose to oblong without a stigmatic apex, and the 2–5-carpellate ovaries (vs. always 2-carpellate).

The genus is restricted to tropical Africa and includes seven species, including the one described here. Despite its small size, it is quite difficult taxonomically, since some of the species are very variable and difficult to separate; however, the new species is a well-defined one, which characters are quite constant. Another new species of *Pleiocarpa* occurs in Gabon, but is represented by fruiting material only (*Lachenaud et al.* 2567); it differs from other *Pleiocarpa* by its suffrutescent rhizomatous habit, and smooth, narrowly ovoid, rostrate monocarps. More material is needed before it can be described.

Pleiocarpa robusta O. Lachenaud, **sp. nov.** (Fig. 9E, 13).

Holotypus: GABON. Ogooué-Lolo: right bank of Ogooué R. near Lastoursville, c. $0^{\circ}50'S$ $12^{\circ}41'E$, 21.IX.1970, fl. & imm. fr., *Breteler 6558* (BR [BR0000014550201]!; iso-: LBV!, WAG [WAG.1620439, WAG.1620438, WAG.1620437]! + spirit!).

Pleiocarpa robusta O. Lachenaud resembles *P. mutica* Benth. in its uniovulate carpels, otherwise not found in the genus, and in corolla characters, but has secondary leaf veins prominent and strongly curved (vs. very weak and almost straight) and fruits covered with small domed warts, while those of *P. mutica* are smooth *in vivo* and minutely wrinkled when dried. It also

resembles *P. rostrata* Benth., especially in vegetative characters, but the latter species has 3–4(–6) ovules per carpel and larger fruiting mericarps, $20\text{--}50 \times 15\text{--}25 \text{ mm}$ as opposed to $(9\text{--})15\text{--}18 \times 7\text{--}11 \text{ mm}$ in *P. robusta*.

Shrubs 1–2 m tall, branched, with white latex. **Twigs** glabrous, 1–2.5 mm thick, blackish, \pm angled and longitudinally striate when dried, somewhat lenticellate. **Leaves** glabrous; blade elliptic, $12.5\text{--}25 \times 3.8\text{--}11.5 \text{ cm}$, acute at base, abruptly caudate for 1.5–3 cm at apex, coriaceous, slightly shiny, drying olive green to greyish above, pale grey-green to olive-brown below; midrib prominent in centre and sulcate laterally on upper side, prominent on lower side; secondary veins 6–14 pairs, well-marked and conspicuous, moderately ascending, bullate above and strongly prominent below, anastomosing $< 1 \text{ mm}$ from leaf margin; tertiary veins forming a transversely stretched network, rather dense and prominent above in dry state, laxer and less conspicuous below; petiole 0.7–1.7 cm long, wrinkled when dried, upper side canaliculate with margins almost touching each other. **Inflorescences** terminal or axillary, glomerulate, sessile, 4–10-flowered; bracts minute, ovate, $1\text{--}1.8 \times 0.8\text{--}1.2 \text{ mm}$, rounded at apex, glabrous. **Flowers** 5-merous, fragrant; pedicel 0–1 mm, glabrous. **Calyces** glabrous, divided almost to base, lobes imbricate, elliptic to ovate, $1.5\text{--}1.8 \times 1.3 \text{ mm}$, rounded or obtuse at apex, without colleters inside. **Corollas** white; tube $15\text{--}16 \times \text{c. } 1 \text{ mm}$ (at mid-height), slightly swollen at base (1.5 mm broad) and at apex (1.3 mm broad) which is \pm pentagonal, glabrous outside, papillose inside around stamens and sparsely villose for c. 6 mm below their insertion; lobes narrowly elliptic, $5\text{--}6 \times 2\text{--}3 \text{ mm}$, laterally auriculate at base, rounded at apex, overlapping and contorted to left, glabrous on both sides. **Anthers** included, sessile, inserted c. 2 mm below mouth of tube with their apex almost reaching throat, narrowly ovate, c. $1.6 \times 0.8 \text{ mm}$, acute or obtuse at apex, glabrous. **Pistils** included, reaching just under base of stamens; ovaries glabrous, with 5 carpels c. $1 \times 0.4 \text{ mm}$, uniovulate; styles c. 12 mm long, glabrous; stigma swollen, ovoid, c. 1 mm. **Fruits** dark green when young, orange when mature, with 5 free carpels, these obovoid to ellipsoid, $(9\text{--})15\text{--}18 \times 7\text{--}11 \text{ mm}$, acute at apex, glabrous, surface densely covered with domed warts, sometimes with irregular larger warts. **Seeds** obovoid, one per carpel, c. $11 \times 6.5 \text{ mm}$.

Distribution, ecology and phenology. – This species is endemic to Gabon, where it is restricted to the middle Ogooué valley between Ndjolé and east of Lastoursville; it appears to be rare in the west of its range, but relatively frequent in the east (Fig. 6). It occurs in lowland evergreen forests on drained soils, at elevations of 250–500 m. Flowers have been collected in January, July and September–October; immature fruits from September to January, mature from March to May.

Conservation status. – *Pleiocarpa robusta* is endemic to Gabon and occurs in lowland evergreen forests; it is known from 16 collections representing 16 localities. All occurrences are considered still extant, due to the recent dates of collection and the important forest cover still present in the areas. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 64 km², which falls under the threshold for “Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) is calculated as 9,032 km², which falls under the threshold for “Vulnerable” status under Criterion B1. The 16 occurrences represent 4–7 subpopulations. None of them are included within protected areas, but the species is likely to be present in Lopé and Ivindo National Parks, since it has been collected not far from their borders. Most of the occurrences (15) are located within logging concessions, one occurrence near Ndjolé is not included in a concession, but was collected near an access road. All the 16 sites are threatened by logging, which suggests a decline of the extent and quality of habitat of this species. Two of them, which are in the same logging concession near Booué, are additionally threatened by a road building project, which is expected to cause a decline in the extent and quality of habitat and number of individuals; they represent a single location (sensu IUCN). The occurrence near Ndjolé represents another location. Three occurrences are included into three different logging concessions, and therefore represent three different locations. Ten occurrences are located within a single logging concession, east of Lastoursville; one is in a conservation zone within the concession and represents one location, the other are in exploited areas and represent a second location. Consequently, the 16 occurrences represent seven locations, with regard to the most serious plausible threat (logging). We infer a past, present and future continuing decline of the extent and quality of the habitat of this species and number of individuals. *Pleiocarpa robusta* therefore qualifies for “Vulnerable” [VU B1ab(iii,v)+2ab(iii,v)].

Notes. – This species has previously been mistaken for *Pleiocarpa mutica*, from which it differs by the characters mentioned in the diagnosis like the small domed warts on the fruit carpels (Fig. 9E, F); it is also generally more robust in all its parts (hence the specific name) but the dimensions overlap widely. The maximum size of the leaves of *P. mutica* (29.5 × 11.4 cm), as well as those of the corolla tube (22 mm long), lobes (13 × 4.3 mm) and style (16 mm long) mentioned in the description by OMINO (1996: 142), presumably refer to another taxon, since we found these dimensions to be consistently smaller in *P. mutica* s.str. (see Table 5). From the three Gabonese collections cited under *P. mutica* by OMINO (1996: 146), two are *P. robusta* (*Breteler* 6558 and 13338) while the third is *P. brevistyla* Omino (*Breteler & van Raalte* 5635). Three other specimens, *McPherson* 17968, *Nguema Miyono* 1879 & *Wieringa* 856, two of them collected after the revision, are

now representing *P. mutica* for Gabon. *Pleiocarpa mutica* occurs from Sierra Leone to Gabon and appears to reach its southern limit in the Monts de Cristal in north-western Gabon; its range is thus separate from that of *P. robusta*, which occurs in central and east-central Gabon.

The identity of a single fruiting collection from south Cameroon, *J.J.F.E. de Wilde* 8150A, is uncertain for the moment since it resembles *Pleiocarpa robusta* in fruit ornamentation but *P. mutica* in leaf characters; complementary material is needed to solve its status.

In addition to *Pleiocarpa mutica*, the new species may be confused with *P. rostrata* and *Hunteria hexaloba* that are both very similar in vegetative characters, and with *Pleiocarpa picralimoides* (Pichon) Omino; differences between all these taxa are summarised in Table 5. It must be noted that *P. rostrata*, as currently delimited, is exceedingly variable in the size of its flowers and fruits, and in the shape and ornamentation of the latter; it may quite probably consist of more than one taxon. The main range of *P. rostrata* is in Nigeria and Cameroon; a single collection from Gabon, *Le Testu* 8871, cited by OMINO (1996), appears to be correctly identified, though quite distant geographically from the rest and occurring within the range of *P. robusta* (from which it differs by its pluriovulate carpels and larger corolla).

Additional specimens examined. – GABON. **Moyen-Ogooué:** 15 km NE of Ndjolé, 0°07'S 10°49'E, 31.I.1991, fl. bud, *de Wilde & Sosef* 10323 (LBV, WAG). **Ogooué-Ivindo:** 3 km SE de Booué, 0°08'S 11°57'E, 13.VI.1987, fl., *Wilks* 1574 (WAG); Forêt des Abeilles, autour du camp 1, concession forestière CFAD, 0°08'S 11°58'E, 21.II.2021, fr., *Paradis et al.* 302 (MO). **Ogooué-Lolo:** c. 30 km NE of Lastoursville, forest exploitation on right bank of Ogooué River, 12.IV.1990, fr., *Breteler et al.* 9898 (WAG); c. 30 km E of Lastoursville, road to l'Ogooué, 7.V.1992, fr., *Breteler et al.* 11358 (WAG + spirit); c. 14 km NE of Bambidie, 17.X.1994, fl. bud, *Breteler et al.* 13338 (WAG); Bambidie, c. 30 km E of Lastoursville, 0°44'S 12°58'E, 9.XI.1999, imm. fr., *Breteler* 15421 (BR, LBV, WAG); Forêt des Abeilles, Station de la Makandé, 0°40'39"S 11°54'35"E, 1.XI.1996, imm. fr., *Doucet* 448 (BR); E of Lastoursville, near Bambidie, C.E.B. chantier, 0°46'S 13°03'E, 21.IX.1996, fl. buds, *McPherson* 16660 (BR, LBV, WAG); E of Lastoursville, near Bambidie, C.E.B. chantier, 0°46'S 13°00'E, 23.IX.1996, fl., *McPherson* 16669 (LBV); Bambidi, axe Lastoursville-Ndangui, 0°45'S 12°58"E, 21.V.2003, fr., *Nziengui et al.* 518 (LBV); environs du village Voubooué, Forêt des Abeilles, 29.VIII.1983, fl., *Sita* 5177 (LBV); Concession CEB, Réserve de Milolé, 0°36'52"S 12°47'17"E, 15.III.2017, fr., *Texier et al.* 913 (BRLU, MO); 33 km ENE of Lastoursville, 6 km on CEB exploitation road B, 0°42'S 13°0'E, 14.XI.1994, imm. fr., *Wieringa et al.* 3175 (WAG); c. 30 km ENE of Lastoursville, 15 km on forestry road from Bambidie to Akieni, 0°39'S 12°56'E, 29.I.2008, imm. fr., *Wieringa et al.* 6262 (BR, LBV, MO, WAG).

Tabernaemontana

Tabernaemontana is a pantropical genus of more than 120 species of trees, shrubs and lianas, and belongs to tribe *Tabernaemontaneae*, subtribe *Tabernaemontaninae* (ENDRESS et al., 2018). The genus is closely related to *Voacanga*, both having in common a dichotomous branching pattern, petioles connate at base into a short ochrea, corolla lobes contorted to the left,

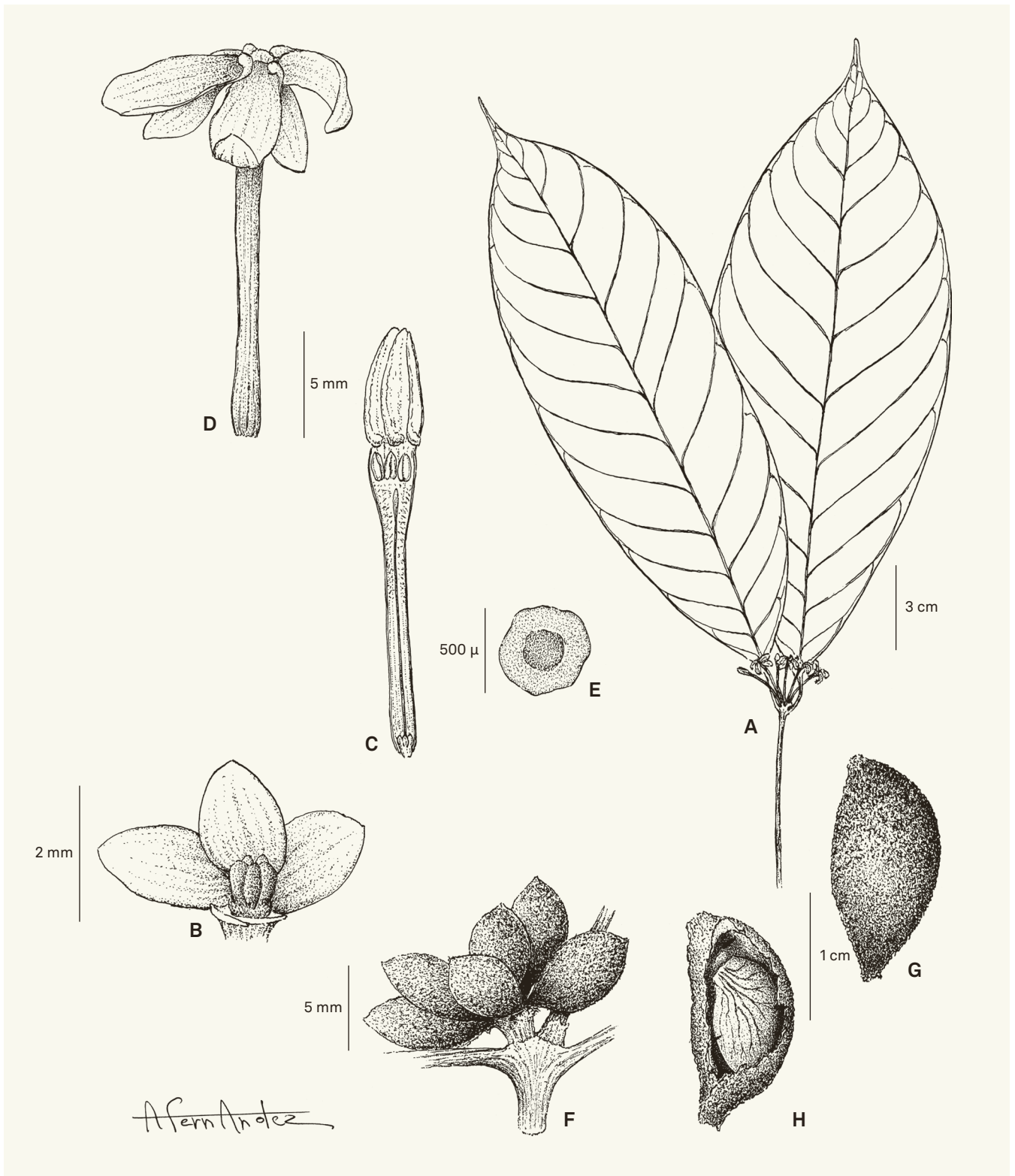


Fig. 13. – *Pleiocarpa robusta* O. Lachenaud. **A.** Flowering branch; **B.** Calyx and ovary (two sepals removed); **C.** Flower bud (longitudinal section); **D.** Corolla; **E.** Flowering carpel (cross-section); **F.** Infructescence; **G.** Fruiting carpel; **H.** Fruiting carpel (part of pericarp removed) showing the single seed.

[A–E: Breteler 6558; F: Breteler et al. 15421; G, H: Wieringa et al. 6262] [Drawing: A. Fernandez]

absence of a corona, anthers included or with only the very tip exerted and tailed at base, fleshy fruits with two usually separate carpels, and arillate seeds. The two genera differ by their corolla lobes which are inflexed in bud in *Tabernaemontana* vs. not inflexed in *Voacanga*, the pistil head which is free from the anthers in *Tabernaemontana* vs. coherent with the anthers (and therefore shed with the corolla) in *Voacanga*, and the calyx which is persistent in *Tabernaemontana* and caducous in *Voacanga*.

The Old World species of *Tabernaemontana* were revised by LEEUWENBERG (1991), who recognised 18 species in continental Africa. A new West African species, previously misidentified as *T. psorocarpa* (Pierre ex Stapf) Pichon, is described here.

***Tabernaemontana fragrans* Jongkind, sp. nov.** (Fig. 14A, F).

Holotypus: LIBERIA. **Gbarpolu:** 9 km E of Yoma, 20 km NE of Bomi Hills, fl., 6.VIII.1962, *Leeuwenberg 4881* (2-part specimen: WAG [WAG.1672632, WAG.1672633]!; iso-: B, BR [BR0000014349065]!, EA, HBG, K!, MO, P [P04256880] image!, UC).

Tabernaemontana fragrans Jongkind resembles *T. psorocarpa* (Pierre ex Stapf) Pichon in its climbing habit, relatively small flowers, and inflorescences with a distinct peduncle (0.5–4 cm

long) but differs by its more narrowly ovoid fruits that are yellow to orange at maturity and angled to narrowly winged (vs. bumpy and pale bluish-green, not winged), its calyx lobes not longer than broad (vs. distinctly so) and its slightly larger corolla with a tube 13–18 mm long and lobes 13–20 mm long, the latter pubescent only on the left margin (vs. tube 9–14 mm long and lobes 7–17 mm long, the latter puberulous on both sides towards the base).

Lianas at least up to 20 m long, twining, latex white. *Branchlets* glabrous. *Leaves* of a pair equal or sometimes unequal, glabrous; blade 6–15 × 1.2–5.5 cm, elliptic to narrowly oblong, acute at base, acuminate at apex, dark green above, pale glaucous-green below; midrib prominent above; 6–9 pairs of hardly prominent secondary veins; tertiary venation inconspicuous; petiole 4–20 mm long. *Inflorescences* terminal (often becoming lateral due to sympodial growth of twigs) and usually paired, in umbelliform cymes, 3–10-flowered, glabrous; peduncle 5–40 mm long; bracts deciduous. *Flowers* 5-merous, with sweet scent; pedicel 8–19 mm long, glabrous. *Calyces* greenish, lobes round to broadly ovate, 2–2.5 × 2–2.5 mm, ciliate. *Corollas* white, glabrous outside, in bud lobes forming

Table 5. – Morphological comparison between *Pleiocarpa robusta* O. Lachenaud and similar species. Characters diagnostic for one species are in bold. Note: we found the ovary of *P. mutica* to be occasionally 2-carpellate (Jongkind et al. 11771, Liberia) which has not been previously reported in the literature.

	<i>Hunteria hexaloba</i>	<i>Pleiocarpa mutica</i>	<i>Pleiocarpa picralimoides</i>	<i>Pleiocarpa robusta</i>	<i>Pleiocarpa rostrata</i>
Leaf blade [cm]	10.3–21 × 4.5–11.3	5–20 × 1.9–8	12–19 × 4–7.5	12.5–25 × 3.8–10.7	10.6–28 × 3.8–11.3
Secondary veins	7–10 pairs, prominent, strongly curved	9–12 pairs, weak and almost straight	11–18 pairs, weak, straight or slightly curved	6–14 pairs, prominent, strongly curved	7–12 pairs, prominent, strongly curved
Colleters inside the sepals	present	absent	absent	absent	absent
Corolla tube length [mm]	6.5–7	10–22	?	15–16	12–32
Corolla lobes [mm]	7.5 × 1.8	4–13 × 1.7–4.3	?	5–6 × 2–3	5.5–26 × 4–15
Position of anthers	around mid-height of corolla tube	near apex of tube	?	near apex of tube	near apex of tube
Style length [mm]	1.7–1.8	7.9–16	?	c. 12	6.5–11
Ovary	2-carpellate	(2)–3–5-carpellate	4–5-carpellate	3(–5)-carpellate	5-carpellate
Carpels	c. 6-ovulate	1(–2)-ovulate	c. 4-ovulate	1-ovulate	3–4(–6)-ovulate
Mericarp size (dry state) [mm]	25–27 × 18–20	9–18 × 7–15	14–30 × 9.5–16	(9–)15–18 × 7–11	20–50 × 15–25
Mericarp apex	acuminate	acute to rounded	acute	acute	beaked to rounded
Mericarp surface	smooth	smooth (slightly wrinkled when dry)	verrucose	finely verrucose with domed warts	smooth to strongly verrucose
Distribution	NW Gabon	Sierra Leone to NW Gabon	coastal SW Gabon to Cabinda	EC Gabon	SE Nigeria, Cameroon, EC Gabon



Fig. 14. – Fruit carpels of *Tabernaemontana* L.: A. *Tabernaemontana fragrans* Jongkind; B. *Tabernaemontana psorocarpa* (Pierre ex Stapf) Pichon. C. *Tabernaemontana glandulosa* (Stapf) Pichon. Flowers of *Tabernaemontana*: D. *Tabernaemontana psorocarpa*; E. *Tabernaemontana glandulosa*; F. *Tabernaemontana fragrans*.

[A: Leeuwenberg 12277, Côte d'Ivoire, spirit; B: Bidault et al. 3540, Gabon; C: Jongkind 12639, Liberia; D: Bidault 3540, Gabon; E: Jongkind 12639, Liberia; F: Bidault et al. 3274, Guinea] [Photos: A, C, E: C. Jongkind; B, D, F: E. Bidault]

a comparatively wide ovoid or subglobose head with a blunt apex; tube 13–18 × 4 mm, ± cylindrical with inflated base, slightly twisted or not, inside with rather sparse hairs from insertion of stamens to throat; lobes 13–20 × 4–5.5 mm, lanceolate, ciliate on left margin, otherwise glabrous. *Stamens* included, inserted 3–4 mm above base of corolla tube; anthers c. 5 mm long, glabrous. *Pistils* 4–6 mm long, glabrous, reaching base of anthers; ovary cylindrical, c. 1.5 mm long, with two separated carpels; style c. 1.7 mm long, linear; pistil head 1.5–1.8 mm long, with a ring at base. *Fruits* of two separate and widely divergent mericarps, each up to 7 × 4.5 cm, narrowly ovoid and dorsoventrally compressed, with 3 narrow wing-like ridges, otherwise smooth, glabrous, yellow to orange.

Distribution, ecology and phenology. – This species is found in south-eastern Guinea, Liberia, Côte d'Ivoire and Ghana in forest up to elevations of 580 m (Fig. 15A). It is not known from the drier, semi-deciduous forests in Côte d'Ivoire and Ghana. Flowers have been collected mostly from June to December, once in March; fruits in November–December and March–April.

Conservation status. – The Extent of Occurrence (EOO) of *Tabernaemontana fragrans* is estimated as 129,500 km², well above the threshold for “Vulnerable” status under Criterion B1. It is known from c. 19 subpopulations. Based on a 2 × 2 km cell size, its Area of Occupancy (AOO) is estimated as 60 km², below the threshold for “Endangered” status under Criterion B2. The main threat to this species is from the ongoing clearance of forests for agriculture, plantations and mining in all four countries where it is found. A very substantial part of the forests in these countries is already gone (CILLS, 2016) and on several places where the species was collected there is no forest anymore today. However, the number of subpopulations is almost surely an underestimation since most of its range in Liberia is hardly explored. *Tabernaemontana fragrans* is known from several forest reserves and it is also likely to occur in protected areas like Tai National Park and Sapo National Park. It is also known to grow in secondary forests. The species is here assessed for the moment as “Near Threatened” [NT] because of the ongoing clearance of the forests, even in some of the protected areas, using the IUCN Red List Categories and Criteria (IUCN, 2012).

Notes. – In the flowering stage this species closely resembles *Tabernaemontana psorocarpa*, and most of its collections were included by LEEUWENBERG (1991) in the latter, which was supposed to have a disjunct distribution between West and Central Africa. The fruits of West African specimens, treated here as *T. fragrans*, are however quite different from those of Central African specimens, including the type of *T. psorocarpa* (Fig. 14A, B), and there are also more subtle differences in

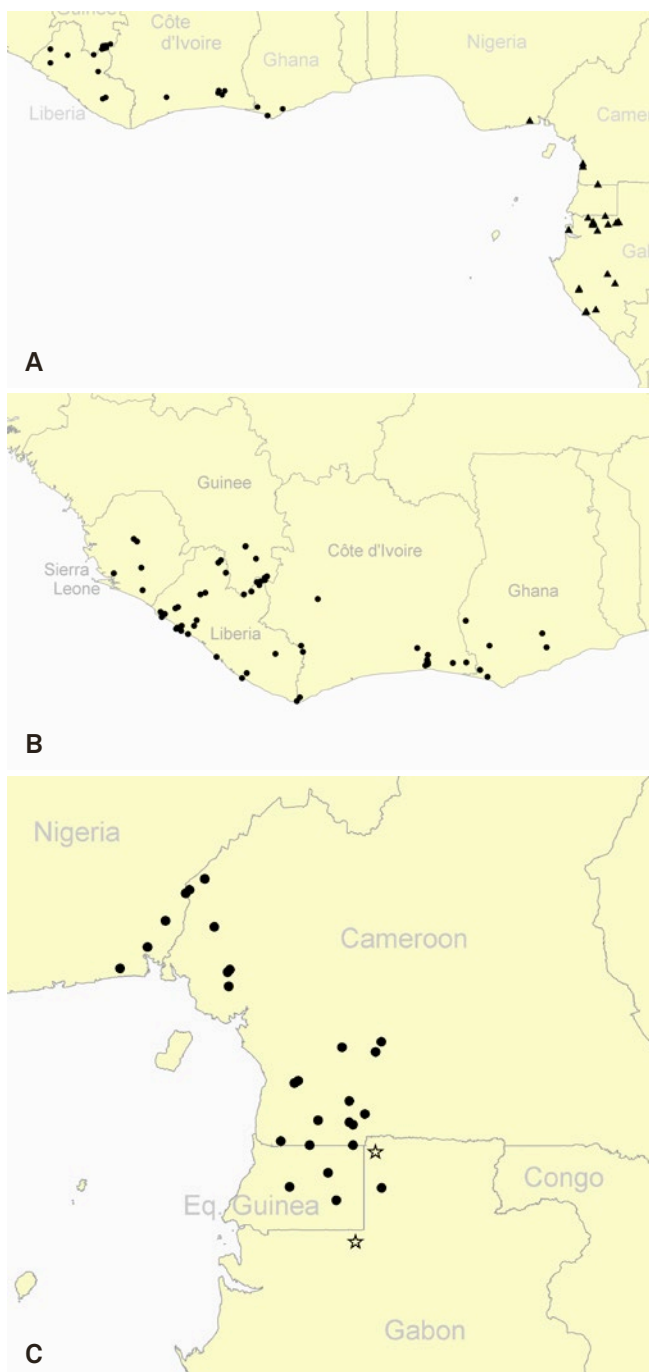


Fig. 15. – Distribution maps. A. *Tabernaemontana fragrans* Jongkind (circles) and *T. psorocarpa* (Pierre ex Stapf) Pichon (triangles). B. *Voacanga bracteata* Stapf. C. *Voacanga cornuta* Jongkind (stars) and *V. diplochlamys* K. Schum. (circles).

the flowers (Fig. 14D, F). On the other hand, fruiting specimens of *T. fragrans* resemble *T. glandulosa* (Stapf) Pichon (Fig. 14A, C), the only other climbing *Tabernaemontana* species occurring in western Nigeria, which has much larger

flowers (Fig. 14E). The differences between the three species are summarised in Table 6.

In the revision of Old World *Tabernaemontana* (LEEUWENBERG 1991: 62, fig. 15) the depicted fruits of *T. psorocarpa* s.l. are mixed and presented as mature and immature fruits from the same plant. After studying the spirit material kept at WAG it became clear that the “immature” fruit in this illustration corresponds to *T. fragrans* (Leeuwenberg 12100) from Côte d’Ivoire, while the “mature” fruit corresponds to *T. psorocarpa* s.str. (J.J.F.E. de Wilde et al. 23/83) from Gabon. The photograph on the next page of the revision (LEEUWENBERG 1991: 63, photo 3), showing fruits of Leeuwenberg 11440, is from another *Tabernaemontana* species, currently under study.

Additional specimens examined. – GHANA. **Western Region:** Subiri Forest Reserve, Daboase, 4.VI.1974, fl., *Enti 1348* (BR, WAG); Ankasa River Forest Reserve, 15.VII.1995, fl., *Harder et al. 3462* (MO, WAG); Axim, III.1934, fr., *Irvine 2395* (GC, K); Awiabo, XI.1928, fl., *Vigne FH 1467* (GC, K, P).

CÔTE D’IVOIRE. **Agnéby:** 10 km E of Yakassé Mé, 15.IV.1980, imm. fr., *Leeuwenberg 12100* (BR, K, MO, PH, S, WAG); Forêt de Yapô, 2.XI.1981, fl. & fr., *Leeuwenberg 12277* (WAG). **Bas-Sassandra:** 25 km SW of Guéyo, 29.III.1962, fl., *Leeuwenberg 3774* (BR, P, WAG).

LIBERIA. **Gbarpolu:** Gola Forest, 1.XII.2005, fr., *Jongkind et al. 7062* (BR, WAG); Yeh River, 3.2 km above junction with St. Paul River, fl., 9.X.1926, *Linder 999* (A, K, P). **Nimba:** versant oriental Nimba, 9.X.1969, fl., *Adam 24113* (MO, P); route du Mont Tokadeh, 10.X.1971, fl., *Adam 26262* (MO, P); Yuelliton Road, 19.X.1964, fl., *Adames 665* (K, P, UPS); Ganta, 17.IX.1947, fl., *Baldwin 9300* (K, MO); Tappeta area, 19.IX.1965, fl., *P.P.C. van Meer 175* (BR, WAG). **Sinoe:** E of Greenville-Zwedru road, 26.IX.2013, fl., *Jongkind et al. 12158* (BR, K, MO); N of Sapo National Park, 27.IX.2013, fl., *Jongkind et al. 12167* (BR, FHO, K, MO, P).

GUINEA. **Nzérekoré:** Nimba Mountains, 23.IX.2017, fl., *Bidault et al. 3274* (BRLU, K, MO, P, SERG); Nimba Mountains, Forêt de Gbié, 17.XII.2008, fl., *Haba & Bilivogui 19* (WAG); Nimba mountains, near Tuo, 6.VII.2008, ster., *Nimba Botanic Team WD 489* (WAG).

Voacanga

Voacanga is a Paleotropical genus of trees and shrubs, belonging to tribe *Tabernaemontaneae*, subtribe *Tabernaemontaninae* (ENDRESS et al., 2018) and closely related to *Tabernaemontana* (see above). The genus was last revised by LEEUWENBERG (1985), who recognised 12 species, seven of which occur in Africa (one of them also in Madagascar) and five in Asia.

Some of the African species as currently delimited are very variable, in particular *Voacanga bracteata* Stapf, supposedly a widespread species with a disjunct distribution in West and Central Africa. A reexamination of herbarium material showed that collections included in this species by LEEUWENBERG (1985) represent four different taxa. One of them is endemic to West Africa and represents *V. bracteata* s.str. Central African specimens previously referred to that species belong in majority to two taxa elevated here at specific rank, *V. lanceolata* (Stapf) Jongkind (= *V. bracteata* var. *lanceolata* Stapf) and *V. diplochlamys* K. Schum.; a complete description of the latter is presented here since the original one (SCHUMANN 1895: 149) is extremely brief. Finally, the type of *V. micrantha* Pichon, included in *V. bracteata* by LEEUWENBERG (1985), is also distinct from the aforementioned species and probably represents *V. psilocalyx* Pierre ex Stapf.

Apart from these changes, the new species *Voacanga cornuta* Jongkind from Gabon is described. The genus now includes 15 species, 10 of which are African. In addition, CHEEK et al. (2004: 245) mentioned a “probably new species” of *Voacanga* (*Voacanga* sp. 1) from south-west Cameroon, the material of which we have not seen; it apparently differs from most other species of the genus by its connate carpels (also found in *V. chalotiana* Pierre ex Stapf).

Table 6. – Morphological comparison between *Tabernaemontana fragrans* Jongkind, *T. glandulosa* (Stapf) Pichon and *T. psorocarpa* (Pierre ex Stapf) Pichon. Characters diagnostic for one species are in bold.

	<i>T. fragrans</i>	<i>T. glandulosa</i>	<i>T. psorocarpa</i>
Stems	glabrous	minutely puberulous to glabrous	glabrous
Calyx lobes	suborbicular to broadly ovate (length ≤ width)	elliptic or ovate, longer than broad	elliptic or ovate, longer than broad
Corolla tube length and colour [mm]	13–18, white	50–80 , (pale) green	9–14, (pale) green
Corolla lobe length [mm]	13–20	25–50	7–17
Indumentum of corolla lobes	glabrous except left margin	glabrous or puberulous basally	puberulous basally on both sides
Fruit shape	narrowly ovoid, narrowly winged, otherwise smooth (Fig. 14A)	narrowly ovoid and broadly winged, otherwise smooth (Fig. 14C)	broadly ovoid, bumpy, not winged (Fig. 14B)
Fruit colour	yellow to orange	yellow to orange	pale bluish-green
Distribution	Guinea to Ghana	Sierra Leone to Ghana	Nigeria to Gabon

Voacanga bracteata Stapf in Bull. Misc. Inform. Kew 1894: 22. 1894 (Fig. 16A, B).

Lectotypus (designated by LEEUWENBERG, 1985: 22): SIERRA LEONE. **Southern Prov.:** River Bagroo, IV.1861, fl., *Mann 858* (K [K000233603]!)

Distribution and ecology. – Sierra Leone, south-eastern Guinea, Liberia, Côte d'Ivoire and Ghana (Fig. 15B), growing in forest from near sea-level to elevations of 610 m.

Notes. – This species is here regarded as a West African endemic; specimens from Central Africa and Nigeria referred to *Voacanga bracteata* by LEEUWENBERG (1985) belong to *V. lanceolata* (mostly), *V. diplochlamys* and *V. psilocalyx*. Differences between the four species are summarised in Table 7. An unusual character of *V. bracteata* and *V. lanceolata*, not seen in other species of the genus, is that their corolla lobes change, during flowering, from spreading and cream coloured to reflexed and shiny brown (the corolla seeming still to expand in this process) (Fig. 16C).

Voacanga cornuta Jongkind, **sp. nov.** (Fig. 17).

Holotypus: GABON. **Woleu-Ntem:** Nzec, 9.XI.1933, fl., *Le Testu 9385* (BR [BR0000014685156]!; iso-: P [P03859514, P03859516, P03859517] images!, WAG [WAG.1667822]!).

Voacanga cornuta Jongkind resembles *V. pachyceras* Leeuwenb. by the shape of its fruits and the presence of a short dense indumentum on the lower side of the leaves, but differs by its smaller calyx (10 mm long vs. 15–22 mm long) and shorter corolla lobes (7–8 × 3.5 mm vs. 10–22 × 4–15 mm).

Treelets (?). *Twigs* cylindrical, glabrous. *Leaves* opposite, entire; blade 7–18 × 1.5–6 cm, narrowly elliptic or oblong, attenuate at base, acuminate at apex, glabrous above, beneath with many inconspicuous, colourless, tiny, erect hairs; 7–9 pairs of main lateral veins, tertiary venation inconspicuous; petiole 1–2 cm long, with tiny hairs below. *Inflorescences* terminal and paired, few-flowered, peduncle slender, 3.5–7 cm long, with scattered tiny hairs; bracts up to 7 × 5 mm, glabrous, apex rounded. *Flowers* 5-merous; pedicel 5–6 mm long, (almost) glabrous. *Calyces* 10 mm long, colleters scattered inside tube, lobes 5 mm long and wide, acute to rounded at apex. *Corollas* exceeding calyx, tube c. 21 × 4 mm, lower half conspicuously twisted, gradually narrowed to throat, glabrous outside, inside with a pubescent belt from a few mm above base to insertion of stamens, lobes 7–8 × 3.5 mm, elliptic with rounded apex, glabrous, spreading, in bud forming an almost conical head c. 2 times as long as wide, with a blunt apex. *Stamens* included but apex close to corolla mouth, glabrous, anthers c. 5.5 mm long, subsessile, sagittate at base, acuminate at apex. *Pistils* 9 mm long, glabrous; ovary c. 1 mm high, with two



Fig. 16. – *Voacanga bracteata* Stapf: **A.** Inflorescence showing the inside of the calyx with more or less scattered colleters near the base; **B.** Fruits. *Voacanga lanceolata* (Stapf) Jongkind: **C.** Inflorescence including flower with reflexed, brown lobes. [A: Jongkind 14161; B: Jongkind 13349; C: Droissart 1627] [Photos: A, B: C. Jongkind; C: V. Droissart]

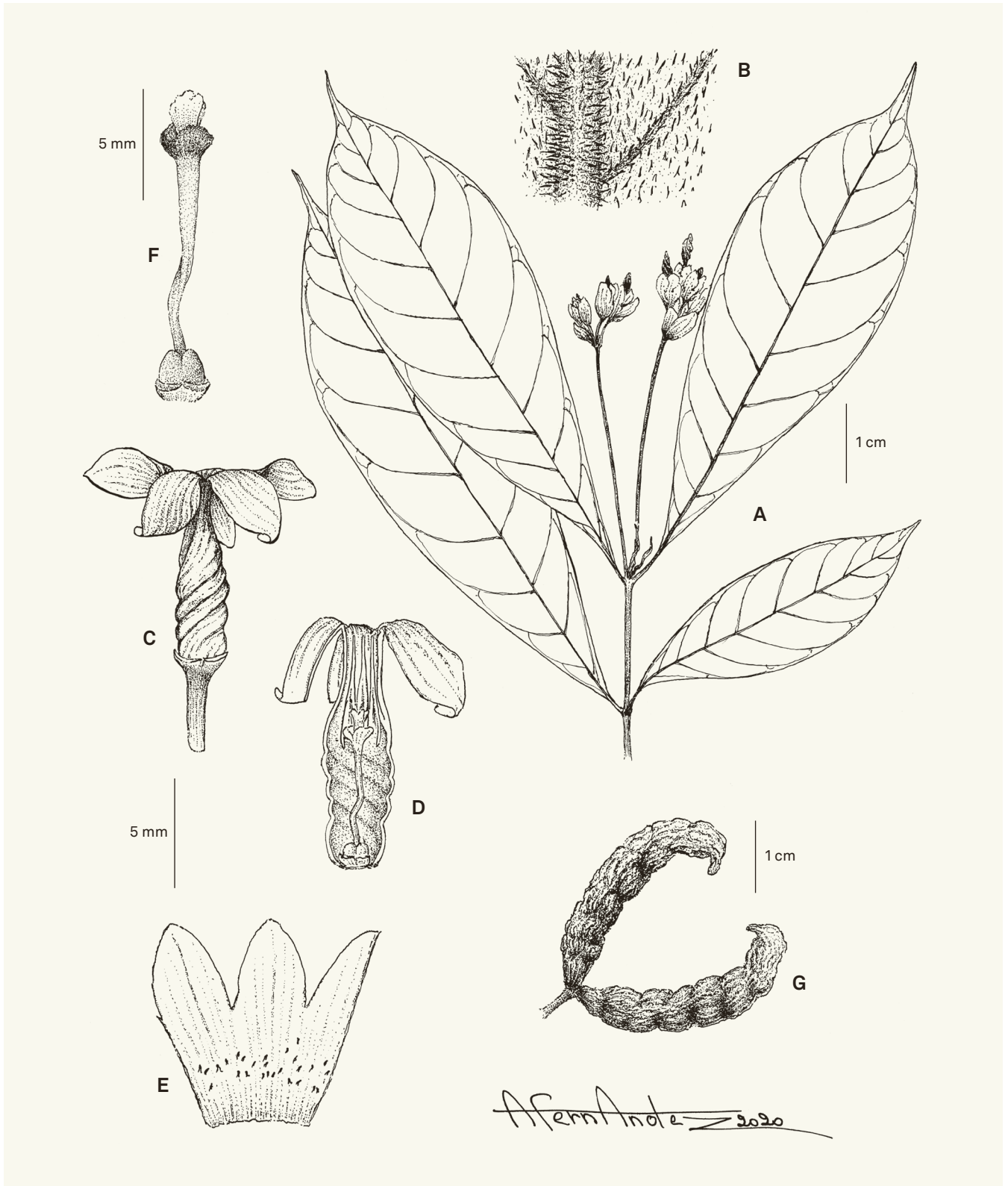


Fig. 17. – *Voacanga cornuta* Jongkind. **A.** Flowering branch; **B.** Leaf from below showing indumentum; **C.** Flower (longitudinal section, calyx removed); **D.** Flower (opened) showing stamens and pistil; **E.** Calyx, inside showing colleters; **F.** Pistil; **G.** Fruit. [A–F: *Le Testu* 9385; **G:** *Le Testu* 9040] [Drawing: A. Fernandez]

free carpels; disk annular; pistil head with a ring connecting it to stamens. *Fruits* of two separate, narrowly ellipsoid, mericarps; mericarps 3–5 × 0.6–1 cm, acute at apex, many seeded, glabrous. *Seeds* dark brown, obliquely ellipsoid, 6.5–8 × 3 mm, with a minute tuberculate structure.

Distribution, ecology and phenology. – This species is only known from north-eastern Gabon, but might be expected in adjacent Cameroon and Equatorial Guinea (Fig. 15C); the habitat is not recorded, but presumably, corresponds to lowland evergreen rainforests. Flowers have been collected in November, during the main rainy season, and fruits in March, during the second dry season.

Conservation status. – *Voacanga cornuta* is known from two collections made in the 1930s in north-eastern Gabon, representing two occurrences, both of which are considered still extant since forest cover is still present in these areas. Based on a 2 × 2 km cell size, its Area of Occupancy [AOO] is estimated as 8 km², which falls under the threshold for “Critically Endangered” status under Criterion B2. Its Extent of Occurrence (EOO) cannot be calculated. The two occurrences represent two subpopulations. One occurrence is located within a logging concession, and is threatened by forestry, that induces a decline in its habitat extent and quality. The other occurrence near Bitam is threatened by small scale agriculture, urbanisation and industrial oil palm plantations that are occurring in the area, all of which also inducing a decline in the extent and quality of its habitat. The two occurrences represent two locations (sensu IUCN, 2019) with regard to the most serious plausible threats (small-scale agriculture, urbanisation and industrial oil palm plantations). We infer a past, present and future continuing decline in the habitat extent and quality of this species. Therefore, *V. cornuta* qualifies for an “Endangered” status [EN B2ab(iii)]. New searches are required in its area of occurrence to better document its distribution and state of conservation. The absence of recent collections would be explained when *V. cornuta* proves to be an understory species of the closed forests that is not growing in roadsides or near forest edges.

Notes. – This species closely resembles *Voacanga pachyeras*, which in addition to characters listed in the diagnosis also differs in its distribution, being only known from D.R. Congo with its closest occurrences c. 900 km to the south-east of the range of *V. cornuta*.

The two collections of *Voacanga cornuta* were not previously recognised as conspecific. The flowering specimen *Le Testu 9385* was cited in the revision of *Voacanga* (LEEUEWENBERG, 1985) as *V. psilocalyx*, which differs from *V. cornuta* in its glabrous leaves and broader, widely divergent mericarps. The fruiting specimen *Le Testu 9040* was cited in the *Tabernaemontana* revision (LEEUEWENBERG, 1991) as *T. hallei* (Boiteau) Leeuwenb. This

latter species has a glabrous lower leaf surface, almost sessile inflorescences, and a shorter calyx with free sepals persistent under the fruit; its corolla is also much larger (similar to that of *T. glandulosa* illustrated in Fig. 14E) and therefore any confusion is unlikely in the flowering stage.

Additional specimen examined. – GABON. **Woleu-Ntem:** Bitam, 17.III.1932, fr., *Le Testu 9040* (BR, P, WAG).

Voacanga diplochlamys K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4(2): 149. 1895.

Lectotypus (designated by LEEUEWENBERG, 1985): CAMEROUN. **South-West Region:** Barombi, 11.III.1889, fl., *Preuss 14* (K [K000233602]!).

= *Voacanga talbotii* Wernham, Cat. Pl. Oban: 63. 1913.

Holotypus: NIGERIA. **Cross River State:** Oban, fl., *Talbot 1624* (BM [BM000925740]!).

Shrubs or treelets, 2–6 m tall, with abundant white latex. *Twigs* cylindrical, 1–3.5 mm thick, glabrous, soon covered with dark brown bark. *Leaves* opposite, entire; blade elliptic to narrowly oblong, 6–22 × 2–9.5 cm, cuneate at base, gradually acuminate at apex, glabrous above, minutely puberulous on midrib and lateral veins below; midrib channelled above, prominent below; secondary veins (8–)10–16 pairs, ascending and almost straight, forming inconspicuous loops close to margin; tertiary veins invisible or very lax; petiole 1–2 cm long, minutely puberulous. *Inflorescences* terminal, solitary or paired, umbellate to laxly cymose, ± drooping, 5–12 cm long, 4–20-flowered, densely puberulous, with peduncle 4–9 cm long and ramifications up to 2.5 cm long; bracts usually persistent at anthesis, sometimes caducous, ovate to obovate, 6–8 × 3–6 mm, acute to rounded at apex, puberulous outside. *Flowers* 5-merous; pedicel 4–8 mm long, glabrous to densely puberulous. *Calices* pale green, 12–19 mm in diam., tube campanulate, 5–6 × 5.5–7 mm, glabrous or puberulous at base outside, provided inside with a discontinuous band of colleters around mid-height, lobes elliptic to obovate, 4–8 × 3–8 mm, rounded at apex, spreading or (usually) reflexed at anthesis, glabrous. *Corollas* yellow, 7–10 mm in diam., tube 10–12 × 5 mm, slightly longer to slightly shorter than calyx, constricted at throat and a little above mid-height, strongly twisted especially in upper half, glabrous outside, inside with dense band of short appressed pubescence below anthers, lobes obovate, 3.5–7 × 2.5–4 mm, 1.4–1.75 times as long as broad, rounded at apex, patent or reflexed at anthesis, glabrous; anthers included with their tips just reaching corolla throat, attached on corolla tube at around ⅓ of its length from base, subsessile, sagittate, c. 4 mm long, acute at apex, glabrous, with straight tails, coherent and forming a cone around pistil head. *Pistils* 8–10 mm long; ovary ± hemispherical, c. 1.7 mm long, glabrous, with two free carpels closely appressed against

each other; disk annular, c. 1 mm long; style glabrous, c. 6 mm long, narrowly cylindrical, pistil head with saucer-shaped base c. 0.7×2 mm and pentagonal domed apex c. 0.7×1.2 mm. *Fruits* (immature) green, consisting of two separate mericarps, these obovate, $3-4 \times 2.2-2.5$ cm, rounded at apex, glabrous.

Distribution, ecology and phenology. – This species occurs in south-eastern Nigeria, Cameroun, Equatorial Guinea (Rio Muni) and north-eastern Gabon (Fig. 15C) and grows in primary evergreen and secondary regrowth forests, at elevations of 150–760 m. Flowers have been collected mostly from January to March, and in September and October; immature fruits in April, May and October.

Notes. – This species was included by LEEUWENBERG (1985) in the synonymy of *Voacanga bracteata*, and the specimen *Brenan 9300* was also cited under the latter by CABLE & CHEEK (1998). However, the two taxa differ in numerous characters (Table 7) and may be separated even in the vegetative state. The corolla of *V. diplochlamys* is always reported by collectors to be yellow, and thus does not seem to turn brown after anthesis as in *V. bracteata* and *V. lanceolata*. The inflorescence bracts of *V. diplochlamys* are usually persistent at anthesis,

as in *V. bracteata*, but may occasionally be caducous. Fruits are still imperfectly known, only three immature ones have been seen (*Cheek 11571*, *Esono 17*, *Etuge & Thomas 27*).

Additional specimens examined. – NIGERIA. **Akwa Ibom State:** Eket district, 1912–13, fl., *Talbot s.n.* (BM [2 sheets]). **Cross River State:** Old Calabar, s.d., fl., *Robb s.n.* (BM).

CAMEROUN. Central Region: Ndanan 1–Ndangan 1, 9.III.2004, fl., imm. fr., *Cheek 11571* (BR, K, WAG); c. 5 km S of M'Balmayo, 2.II.1964, fl., *W.J.J.O. de Wilde & de Wilde-Duyffes 1801* (BR, K, P, WAG); Makak, X.1938, fl. & imm. fr., *Jacques-Félix 2260* (P); c. 10 km S of M'Balmayo, 9.III.1978, fl., *J. Lowe 3565* (K). **South Region:** 72 km on the road from Ebolowa to Ambam, 16.I.1975, fl., *J.J.F.E. de Wilde 7905A* (MO, WAG); Akonetye, 17.I.1978, fl., *Koufani 60* (P, WAG); près Ngom, 40 km SSE Ebolowa, 2.II.1970, fl., *Letouzey 9968* (BR, K, P, WAG); c. 2 km S of Kwambo and 6 km WSW of Bipindi, 19.I.1987, fl., *Manning 1461* (MO, WAG); Nkoemvone, 13.II.1963, fl., *Raynal 9594* (P); Campo-Ma'an area, Onoyong, 18.III.2001, fl., *Tchouto Mbatchou ONOX 85* (WAG); Campo-Ma'an area, Mvini, 19.II.2000, fl., *Tchouto Mbatchou 2625* (WAG); Bebai, Campogebiet, 30.X.1908, fl., *Tessmann 601* (K); Bipindi, 1911, fl., *Zenker 4163* (BM, G, K). **South-West Region:** Mbalange N.A. Forest Reserve, Southern Bakundu, 16.I.1956, fl., *Binuyo & Daramola FHI 35051* (K, P); Banga, S Bakundu F.R., 11.III.1948, fl., *Brenan 9300* (K); near Ngombombeng village, N of Nyassosso, 31.IV.1986, imm. fr., *Etuge & Thomas 27* (BR, WAG); R.F. d'Ejagham, 29.IX.1984, fl., *Onana 85* (P, WAG); R.F. d'Eyujock, 14.II.1985, fl., *Onana 182* (P, WAG); Abonando, 15.III.1902, fl., *Rudatis 14* (K); near Kumba, 17.II.1985, fl., *Thomas & Nemba 4394* (K, MO, P, WAG).

Table 7. – Morphological comparison between *Voacanga bracteata* Stapf, *V. diplochlamys* K. Schum., *V. lanceolata* (Stapf) Jongkind and *V. psilocalyx* Pierre ex Stapf. Characters diagnostic for one species are in bold.

	<i>V. bracteata</i>	<i>V. diplochlamys</i>	<i>V. lanceolata</i>	<i>V. psilocalyx</i>
Twigs	pale grey	dark brown	pale grey-buff	pale grey-buff
Petiole and lower side of leaf veins	glabrous	puberulous	glabrous	glabrous
Secondary leaf veins	6–10 pairs	(8–)10–16 pairs	6–10 pairs	(4–)6–12 pairs
Inflorescences	glabrous	puberulous	glabrous	glabrous
Colleters inside calyx tube	forming a more or less dense band near the base	forming a sparse band around mid-height	forming a dense band near the base (Fig. 16C; Leeuwenberg 1985: 23, fig. 2, 4)	forming a sparse band around mid-height or near the base
Calyx lobes	erect	spreading or (usually) reflexed	erect or oblique	erect
Shape of corolla lobes	< 1.5 × longer than broad, obovate	1.4–1.75 × longer than broad, obovate	< 1.5 × longer than broad, obovate	(1.5–)2–4 × longer than broad, elliptic to narrowly obovate
Colour of corolla lobes	pale yellow turning dark brown	yellow, not turning brown	pale yellow turning dark brown	white to pale yellow, not turning brown
Orientation of corolla lobes	reflexed at maturity	reflexed at maturity	reflexed at maturity	patent, or reflexed only at apex
Fruit colour	yellow to orange	?	pale green to cream-coloured	yellow to orange
Monocarp shape	half moon-shaped	obovate	subglobose	half moon-shaped to ovoid
Distribution	Sierra Leone to Ghana	Nigeria to Gabon	Nigeria to D.R. Congo	Nigeria to D.R. Congo

EQUATORIAL GUINEA. **Centre Sur**: c. 700 m from ECOFAC-Hotel, 1.III.1998, fl., *J.J.F.E. de Wilde et al. 12046* (WAG). **Wele-Nzas**: Piedra Nzás, 23.V.1998, imm. fr., *Esono 17* (BRLU); entre Nsuameyong et inselberg Akuom, 16.I.1998, fl., *Obama & Lejoly 413* (BRLU).

GABON. **Woleu-Ntem**: Oyem, 21.IX.1933, fl., *Le Testu 9399* (BM, P, WAG).

Voacanga lanceolata (Stapf) Jongkind, **comb. et stat. nov.** (Fig. 16C).

= *Voacanga bracteata* var. *lanceolata* Stapf, Fl. Trop. Afr. 4(1): 161. 1902.

Lectotypus (designated by LEEUWENBERG, 1985: 22): **CAMEROUN. Central Region**: Yaoundé, 1896, fl., *Zenker 694b* (K [K000233768]!; isolecto-: S image!, WU image!).

Distribution and ecology. – A widespread and relatively common species in south-eastern Nigeria, Cameroun, Equatorial Guinea, Gabon, Republic of Congo and Democratic Republic of Congo, in forests up to elevations of 1200 m.

Notes. – This species, originally described as a variety of *Voacanga bracteata*, is here elevated at species rank; for more information see the Notes section under *V. bracteata*.

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