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Taxonomic Revision of *Neostenanthera* (Annonaceae)

Maximiliano Fero,[1,2,3] Carlos Aedo,[1] Francisco Cabezas,[1] and Mauricio Velayos[1]

[1]Real Jardín Botánico, CSIC, Plaza de Murillo 2, 28014 Madrid, Spain.
[2]Facultad de Medio Ambiente, Universidad Nacional de Guinea Ecuatorial, Avenida Hassan II s/n, Apdo. 661 Malabo, Equatorial Guinea.
[3]Author for correspondence (maxisogosote@gmail.com)

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Abstract*—Neostenanthera* (Annonaceae) is a genus of five species of trees, shrubs, and under-shrubs spread throughout west and central tropical Africa and endemic to the Guineo-Congolian region. It occurs in a wide range of habitats from swampy areas to high rainforests and from almost sea level to 900 m. *Neostenanthera* can be distinguished from other related genera (e.g. *Boutiquea*) by its stipitate fruits with ellipsoid or fusiform monocarps, the stipes articulated under the monocarps. In the present revision, five species are accepted (*N. gabonensis, N. hamata, N. myristicifolia, N. neurosericea*, and *N. robsonii*). A dichotomous key is provided, as well as detailed descriptions of the genus and for each species, discussions on morphology and taxonomy. Distribution maps and drawings of the species are also provided.

***Keywords*—**Africa, articulated stipes, endemic, monocarps, morphology, rainforest.

Neostenanthera Exell is a genus of trees, treelets, shrubs, and under-shrubs distributed throughout west and central tropical Africa, from Guinea (Conakry) to the Democratic Republic of Congo. It occurs in a wide range of habitats from swampy areas to high rainforests and from almost sea level to 900 m. Comprising five species, *Neostenanthera* can be considered endemic to the Guineo-Congolian region.

Neostenanthera flowers are bisexual, solitary or fascicled, extra-axillary, supra-axillary (rarely axillary), ± leaf-opposed and cauliflorous, on short, simple or arbuscle-like peduncles. The perianth consists of three valvate sepals, and six valvate petals arranged in two whorls of three segments each, the internal smaller than the external. Petals are divided into a ± orbicular and spoon-shaped basal part, and an apical part elliptic to lanceolate, with a gradually attenuate, straight or reflexed, caudate apex (Le Thomas 1969; Van Heusden 1992; Kessler 1993). The fruits are apocarpous, with numerous monocarps on ± long stipes (Van Setten and Koek-Noorman 1992).

Neoestenanthera species were first included in the genus *Oxymitra* (Blume) Hook. f. & Thomson and later transferred to *Stenanthera* (Oliv.) Engl. & Diels (Engler and Diels 1900).

The first species of the genus was *Oxymitra hamata* Benth. (Bentham 1862). Oliver (1868) published *Oxymitra myristicifolia* Oliv., which he recognized in section *Stenanthera* due to differences between their internal petals and those of the other species. The third species attributable to the genus was *Oxymitra gabonensis* Engl. & Diels (Engler and Diels 1899).

Engler and Diels (1900) transferred all the species previously recorded under *Oxymitra* sect. *Stenanthera* (*O. gabonensis*, *O. hamata*, and *O. myristicifolia*) to the new genus *Stenanthera* (Oliv.) Engl. & Diels, and in 1901 recorded these three species in their monograph of African plant families. Over the next 30 yr several additional species were recognized in this genus, including *Stenanthera pluriflora* De Wild. (De Wildeman 1903), *S. neurosericea* Diels and *S. platypetala* Engl. & Diels (Engler and Diels 1907), *S. macrantha* Mildbr. & Diels (Diels 1915), *S. bakuana* A. Chev. ex Hutch. & Dalziel (Hutchinson and Dalziel 1927), and *S. yalensis* Hutch. & Dalziel ex G.P. Cooper & Record (Cooper and Record 1931), completing the total number of nine species.

Exell (1935) proposed *Neostenanthera* as a new name since *Stenanthera* had been previously used by Robert Brown (1810) for a genus in the family *Epacridaceae*. He newly described *Neostenanthera micrantha* Exell and transferred the species of *Stenanthera* to *Neostenanthera*, except *S. yalensis*, later included by Hutchinson and Dalziel (1936). Pellegrin (1949) cited five species of *Neostenanthera* in Gabon. Fries (1959) recognized ten species in the genus. Aubréville (1959) synonymized *N. yalensis* (Hutch. & Dalziel ex G.P. Cooper & Record) Hutch. & Dalziel under *N. hamata* (Benth.) Exell and *N. bakuana* (A. Chev. ex Hutch. & Dalziel) Exell under *N. gabonensis* (Engl. & Diels) Exell.

Le Thomas (1965) described a new genus, *Boutiquea* Le Thomas, with a single species, *B. platypetala* (Engl. & Diels) Le Thomas, based on the collection of *Zenker 2877*, previously included in *Neostenanthera* as *N. platypetala* (Engl. & Diels) Pellegr. This lone species of *Boutiquea* can be distinguished from *Neostenanthera* by its wider, expanded external petals and its sessile monocarps. These are divided by a thickened transverse ledge at the widest part of the monocarp into a conical apical and a hemispheric basal region. These monocarps are clearly distinct from the stipitate and fusiform or ellipsoid fruits of *Neostenanthera*. In 1969, Le Thomas synonymized *N. pluriflora* (De Wild.) Exell under *N. myristicifolia* (Oliv.) Exell and *N. micrantha* under *N. gabonensis*.

These species cited of *Neostenanthera* were included in the major African floras and checklists**:** (Chevalier 1920; Hutchinson and Dalziel 1927; Aubréville 1936, 1959; Boutique 1951; Keay 1952, 1954; Tisserant and Sillans 1958; Paiva 1966, 1983–84; Le Thomas 1969; Adam 1971; Gosline et al. 2011; Essou 2006; Hawthorne and Jongkind 2006; Klopper et al. 2006; Sosef et al. 2006; Lisowski 2009a, 2009b; Gosline et al. 2011).

Van Heusden (1992) included *Neostenanthera* in the *Xylopia* L. group, together with *Boutiquea* Le Thomas, *Cananga* (DC.) Hook. f. & Thomson, *Goniothalamus* (Blume) Hook. f. & Thomson, *Richella* A. Gray and *Xylopia*, based on the valvate sepals and petals, internal petals usually smaller than external ones, stamens usually indurate, and often septate anthers.

The aim of this study is to provide a comprehensive monograph of the genus *Neostenanthera*. Since Fries (1959), no complete revision of the genus has been done. The other references mentioned above were all regional and did not analyze the genus from a broad perspective. We have studied most of the available collections within *Neostenanthera* and present a complete revision of this endemic African genus.

Materials and Methods

This revision is based on 267 herbarium specimens with their duplicates when available, from the following herbaria: A, B, BM, BR, BRLU, C, E, F, FHO, G, GH, HBG, K, L, LD, LISC, M, MA, MO, NY, PH, PRE, S, U, US, WAG, WIS, and Z. Additional alcohol-preserved specimens from WAG were also studied. Curators from COI, GB, GOET, H, and NBG kindly responded to our request for loans, but were unable to find or send the specimens requested. Digital photographs from B, M, and NY were examined and type specimens from P were checked online at http://plants.jstor.org.

Forty-seven quantitative characters were recorded using a Mitutoyo CD-15DCX digital caliber (Tokyo, Japan) for at least 20 specimens of each species when available. Each character was analyzed for its minimum, maximum, lower and upper quartile using the STATISTICA package (www.statsoft.com).

An Ms ACCESS database was created from the information on the labels of the specimens studied. The list of numbered collections, the specimens examined, and a file with coordinates used to produce distribution maps were generated from this database using ArcView ver. 3.2 (ESRI, Redlands, California).

Quantitative and qualitative characters were used in the key and descriptions. Minimum and maximum values are in parentheses and the lower and upper quartile values are between parentheses. The combination of morphological characters has served to distinguish species, with flowering and fruiting specimens easily recognized. Sterile material is more difficult to separate in some species (e.g. *N. gabonensis* and *N. hamata*) as a result of overlapping characters and variability.

Information on uses, vernacular names, and languages of the names is included when available from labels or literature.

Results

Morphology—Habit—The species of *Neostenanthera* range from under-shrubs to trees. The tallest individuals are found in *N. hamata* and *N. robsonii*, which can reach a height of 25 m. Information obtained from labels indicates that shrubs and treelets are more common in the genus. The trunk of *Neostenanthera* is generally straight, cylindrical, and without buttresses. The taxonomic value of this character is not clear due to the overlap observed.

Indumentum—The indumentum seems to be homogeneous throughout the genus and consequently of little taxonomic value. All species show only one type of hairs: simple (Metcalfe and Chalk 1950, Payne 1978), eglandular, whitish or most commonly ferrugineous. Ferrugineous hairs are sometimes yellowish to reddish. According to Aleykutty and Inamdar (1980), the eglandular hairs of Annonaceae are simple, filiform, multicellular, and uniseriate. Hairs are scattered and ± appressed in almost all organs, except the old branches and the glabrous trunk. Crystalline deposits, which were discovered via preliminary analysis using scanning electron microscopy, are also found on the abaxial surface of leaves, but their nature was not examined and therefore remains unknown pending further investigation.

Leaves—Leaves of *Neostenanthera* are alternate, simple, without stipules, petiolate, and variable in shape from elliptic-oblong to lanceolate, oblanceolate, or obovate-oblong. The base is cuneate to obtuse or rounded and similar in all species. The apex of *N. gabonensis* is caudate, and in *N. hamata* long-acuminate, while in the other species it is acute to acuminate or attenuate. The adaxial surface is generally glabrous or glabrescent and puberulous on the midrib and secondary veins, while the abaxial surface is puberulous. According to Guyot (1993), Annonaceae are markedly homogeneous in their paracytic stomata; all *Neostenanthera* species display this feature.

Inflorescence—Flowers are solitary in *N. hamata* and *N. neurosericea*, while they are fascicled in groups of 2–8 in *N. robsonii*. In contrast, this feature is variable in *N. gabonensis* and *N. myristicifolia*, which usually show flowers fascicled in groups of 2–4, although they can be solitary in some cases. Peduncles are simple in all species, except in *N. robsonii*, where they are arbuscle-like. *N. robsonii* develops flowers on stems and on leafless branches. In the remaining species of the genus, flowers are on the leafy branches, extra-axillary, supra-axillary, or ± leaf-opposed, and more rarely on leafless branches. Bracteoles are persistent, fragile, small, acute-acuminate, and pubescent.

Calyx—All species of *Neostenanthera* have three sepals, valvate, free, and triangular to triangular-ovate or orbicular, small, thin, puberulous to glabrescent. There are only a few differences in size without taxonomic value.

Corolla—All species of *Neostenanthera* have six petals, valvate, free, borne in two whorls of three, unequal with the external petals longer than the internal ones. Petals are divided into a basal, ± orbicular region and an apical, lanceolate or elliptic region with hairs on both surfaces, except the basal segment, which is sometimes glabrous or glabrescent adaxially. In *N. hamata* the external petals are lanceolate and sometimes reflexed apically, much longer than the internal ones. *Neostenanthera robsonii* has fleshy external petals, with an elliptic transverse section, while in *N. gabonensis*, *N. myristicifolia*, and *N. neurosericea* the transverse section is ± linear. The internal petals are apically connivent over the reproductive organs (Van Heusden 1992; Saunders 2012), contiguous from the base in *N. gabonensis*, but not in other species of the genus. Petals of mature flowers are useful for distinguishing species.

Androecium—Stamens of *Neostenanthera* are numerous and sessile. Anthers are transversely septate with an expanded connective. For most species the connective is relatively narrow, but in *N. gabonensis* and *N. myristicifolia* it is notably wider (Figs. 1c , 1d).

Gynoecium—Carpels of *Neostenanthera* are numerous, free, and hairy. The style is cylindrical and glabrous.

Fruit—Species of *Neostenanthera* have an apocarpous fruit. Monocarps are usually ellipsoid and smooth, except in *N. gabonensis* where they are fusiform and longitudinally ribbed. They are similar in size in all species, shortly apiculate, and with stipes articulate under the monocarps. Stipe length is variable in the genus; *N. hamata* has the longest stipes and *N. gabonensis* the shortest, with some overlap that limits its taxonomic value. The origin of the stipe (receptacle vs. carpel) was not investigated here, but Johnson (1989) indicates that in *N. hamata* it is receptacular, and therefore refers to these stalks as carpophores rather than stipes.

Seeds—Species of *Neostenanthera* have one seed per monocarp, basal, vertical, ellipsoid or fusiform, smooth, sometimes with several wings (e.g. *N. gabonensis*) with a papyraceous wall, and ruminate and oily endosperm (Van Setten and Koek-Noorman 1992). Additional details concerning the endosperm tissue were not investigated.

Phenology—Information recorded from labels indicates that almost all *Neostenanthera* species were collected in flower and in fruit from January to December.

Pollination—Information on pollination of *Neostenanthera* is limited. According to Saunders (2012), the floral biology of the genus suggests that it shares a similar pollination system with *Goniothalamus*. Studies in this related genus revealed small curculionid and/or nitidulid beetles as pollinators in some species. This information coincides with Silberbauer-Gottsberger et al. (2003) and Thien et al. (2009, who indicate

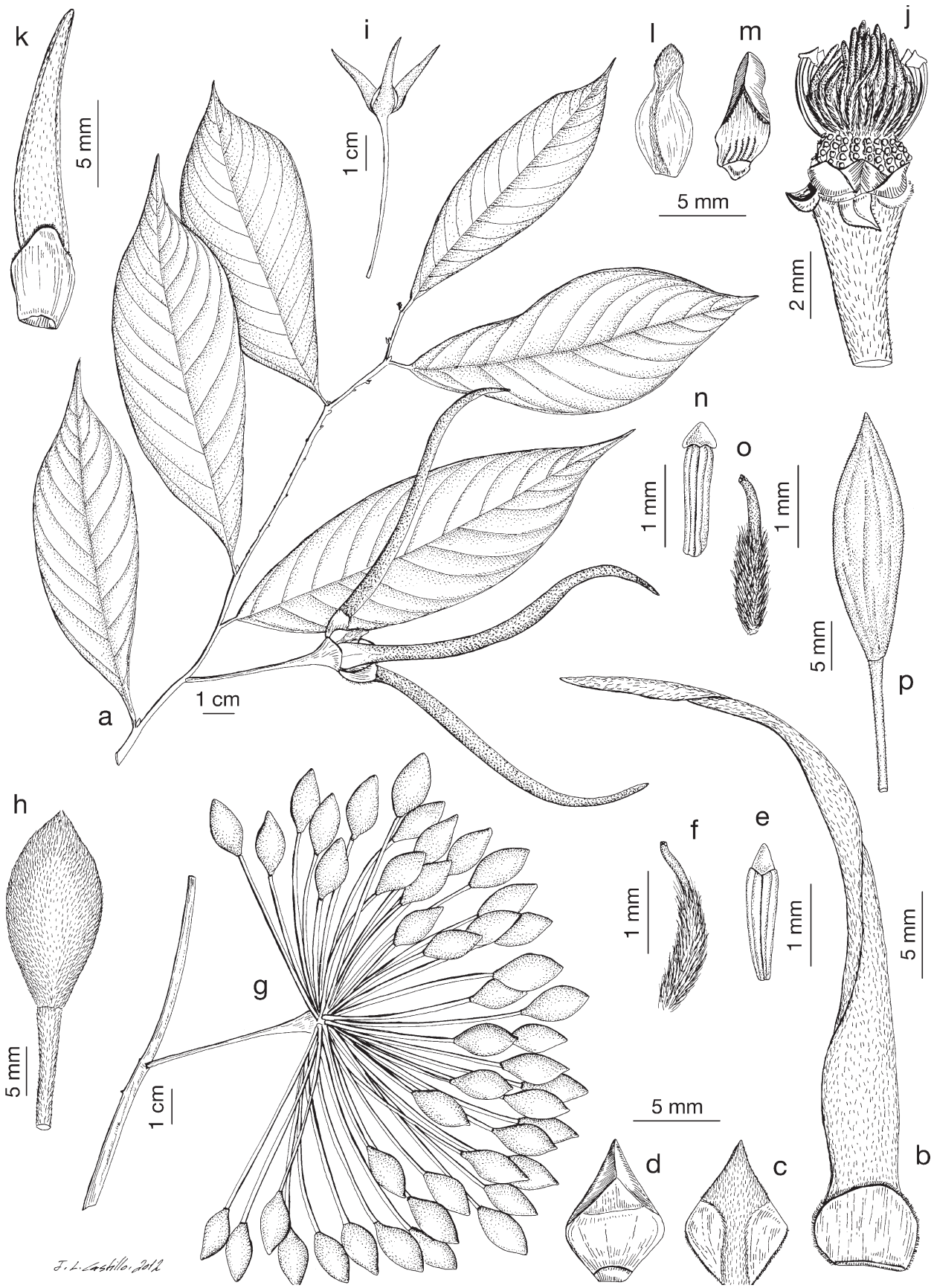

Fig. 1. *Neostenanthera hamata*. a. Flowering branch. b. External petal (adaxial surface). c. Internal petal (abaxial surface). d. Internal petal (adaxial surface). e. Stamen. f. Carpel. g. Fruiting branch. h. Monocarp. - *Neostenanthera gabonensis*. i. Flower. j. Flower (petals and part of stamens removed). k. External petal (adaxial surface). l. Internal petal (abaxial surface). m. Internal petal (adaxial surface). n. Stamen. o. Carpel. p. Monocarp. Based on: a–f, *J. de Koning 4795* (WAG-56714); g–h, *C. C. H. Jongkind & Assi-Yapo 4978* (WAG-13112); i–o, *J. de Koning 41* (WAG-5759); p, *N. Hallé 2316* (BR-568380).

that most Annonaceae are pollinated by beetles, particularly the genera with a prolonged and tongue-shaped anther connective.

Distribution and Habitat—*Neostenanthera* is spread throughout western and central tropical Africa, and it is endemic to the Guineo-Congolian region. Most species grow in primary and secondary forests, in swampy areas, or near water sources. Two species, *N. gabonensis* and *N. myristicifolia*, are widely distributed in the area, from Liberia to Gabon, and from Benin to the Democratic Republic of Congo, respectively. *Neostenathera hamata* is restricted to western Africa, from Guinea to Ghana, *N. neurosericea* is only reported from southern Cameroon, and *N. robsonii* is present in Cameroon, Equatorial Guinea, and Gabon.

Taxonomic Treatment

Neostenanthera Exell, J. Bot. 73(Suppl. 1): 5. 1935, substitute name.- *Oxymitra* sect. *Stenanthera* Oliv., Fl. Trop. Afr. 1: 32. 1868. *Stenanthera* (Oliv.) Engl. & Diels, Notizbl. Königl. Bot. Gart. Berlin 3(23): 57. 1900, non R. Br., 1810.—TYPE: *Oxymitra hamata* Benth. (lectotype, designated by Hutchinson, Bull. Misc. Inform. 1923: 259).

Treelets, trees, shrubs or under-shrubs; old branches glabrous to glabrescent and young branches pubescent to puberulous or glabrescent, with ± appressed, ferrugineous, eglandular hairs. Leaves alternate, entire, simple. Leaf lamina elliptic-oblong to lanceolate or obovate-oblong, papyraceous or coriaceous, base cuneate to obtuse or rounded, apex acuminate or long-acuminate, attenuate, acute, or caudate, upper surface glabrescent, glabrous, or puberulous with scattered, ± appressed, yellowish to whitish, eglandular hairs, especially on the midrib and secondary veins, greenish, dark-green, glaucous, or brown; lower surface puberulous, with scattered, ± appressed, yellowish, eglandular hairs, greenish to glaucous or yellow-green; midrib raised on the lower surface, secondary veins penninerved; petiole circular in cross-section, ± canaliculate, puberulous to pubescent, with ± appressed, ferrugineous, eglandular hairs. Flowers bisexual, solitary or in fascicles of 2–8, extra-axillary, supra-axillary, or ± leaf-opposed, sometimes cauliflorous; flowering peduncles simple or arbuscle-like, puberulous, with ± appressed, ferrugineous, eglandular hairs or glabrescent to glabrous; flowering pedicels slender or thickened, widened apically, puberulous or pubescent, with ± appressed, ferrugineous, eglandular hairs; bracteoles 1, puberulous, with ± appressed, ferrugineous, eglandular hairs or glabrescent to glabrous. Sepals three, valvate, free, triangular-ovate or semiorbicular, acute to acuminate, thin, puberulous to glabrescent, with ± appressed, yellowish, eglandular hairs on both sides, greenish to yellowish. Petals six, valvate, free, in two whorls of three, unequal, external petals longer than the internals; external petals with a ± narrow apical part and an expanded basal part, puberulous to glabrescent, with yellowish, ± appressed, eglandular hairs on the abaxial side, rather thick, greenish to yellowish or whitish; basal part suborbicular and spoon-shaped, puberulous or glabrescent to glabrous, with yellowish to whitish, ± appressed, eglandular hairs adaxially; apical part elliptic to lanceolate, with a gradually attenuate, straight or reflexed, caudate apex, puberulous with yellowish to whitish, eglandular hairs or densely white-villous, especially on the margins adaxially; internal petals rather thick, greenish to yellowish or whitish, contiguous along entire length or separate at their base, glabrous or puberulous with ± appressed, ferrugineous, eglandular hairs abaxially; basal part ± orbicular and spoon-shaped, pubescent to glabrescent, with whitish, eglandular hairs, sometimes glabrous adaxially; apical part acute, acuminate, or with an expanded and inwardly curved apex, glabrous to glabrescent or pubescent, with whitish to yellowish, eglandular hairs, especially on the margins adaxially. Receptacle convex, widened. Stamens 75–244; anthers subsessile, basifixed, linear, extrorse, locellate transversely, clear brown to dark-brown; connective prolonged above anthers, triangular, ± widened, glabrous or hairy, with yellowish, eglandular hairs. Carpels 23–144, free; ovary cylindrical to ovoid, densely brown or white-villous; ovule 1; style cylindrical, straight, slightly curved, or geniculate, glabrous; stigma not differentiated. Fruits usually solitary or 2–8 in fascicles; fruiting pedicels glabrescent to glabrous, with yellowish, eglandular hairs. Monocarps 6–144, ellipsoid or fusiform, with obtuse to acute base and short- or long-apiculate apex, apiculum with wall crustaceous, smooth or longitudinally ribbed, pubescent to puberulous or glabrescent, with ± appressed, ferrugineous, eglandular hairs, yellowish to dark-brown. Seed 1, ellipsoid or fusiform, wall papyraceous, smooth, sometimes with several wings; endosperm oily and ruminate.

Key to the Species of Neostenanthera

1. Flowering peduncles ramified (arbuscle-like); flowers usually cauliflorous, sometimes on leafless branches, rarely on the leafy branches ..... 5. *N. robsonii*
1. Flowering peduncles not ramified (simple); flowers extra-axillary, supra-axillary, or ± leaf-opposed 2
2. Flowering pedicels slender; internal petals contiguous at the base; monocarps fusiform, longitudinally ribbed ..... 1. *N. gabonensis*
2. Flowering pedicels thickened; internal petals separate at the base; monocarps ellipsoid, smooth 3
3. Flowers usually in fascicles of 2–4 ..... 3. *N. myristicifolia*
3. Flowers solitary 4
4. External petals lanceolate, apex often reflexed ..... 2. *N. hamata*
4. External petals elliptic, apex straight 5
5. Flowering pedicels (5.3)8–9.8(11.3) mm long; carpels 45–48 ..... 4. *N. neurosericea*
5. Flowering pedicels (12.2)19.8–27.3(38) mm long; carpels 67–109 ..... 3. *N. myristicifolia*

1. Neostenanthera gabonensis (Engl. & Diels) Exell, J. Bot. 73(Suppl. 1): 6. 1935. *Oxymitra gabonensis* Engl. & Diels, Notizbl. Königl. Bot. Gart. Berlin 2: 297. 1899. *Stenanthera gabonensis* (Engl. & Diels) Engl. & Diels, Notizbl. Königl. Bot. Gart. Berlin 3: 57. 1900.—TYPE: GABON. Munda, Sibange Farm, 26 Aug. 1880, *H. Soyaux 117* (lectotype designated by Le Thomas, 1969: 196, B!; isolectotypes: K!, P image!, Z!).

Stenanthera bakuana A. Chev. ex Hutch. & Dalziel, Fl. W. Trop. Afr. 1: 56. 1927. *Neostenanthera bakuana* (A. Chev. ex Hutch. & Dalziel) Exell, J. Bot. 73(Suppl. 1): 6. 1935.

—TYPE: IVORY COAST. Région de Bingerville, Abibjean [Abidjan], Dabou, 1905, *A. Chevalier 15429* (holotype: P image!).

Neostenanthera micrantha Exell, J. Bot. 73(Suppl. 1): 5. 1935.—TYPE: ANGOLA. River N'Zanza, Mayumbe, 19 Jan. 1919, *J. Gossweiler 7753* (holotype: BM?; isotypes: B image!, COI image!, K!, LISC!, M image!, NY image!).

Shrubs, under-shrubs or treelets, rarely trees (1.5–)2–4(–6) m tall; trunk with diameter at breast height (dbh) ca. 5 cm; old branches glabrous and young branches pubescent. Leaf lamina (5.2–)8.9–17.1(–20.9) × (2.3–)3.7–5.9(–7.1) cm, obovate-oblong to oblanceolate; base cuneate to slightly rounded, apex (2.5–)10.7–18.2(–37.5) mm long, caudate to long-acuminate, upper surface puberulous to glabrescent, especially on young leaves, greenish, lower surface puberulous, greenish to glaucous; secondary veins (8–)10–12(–17); petiole (2.6–)3.7–7.1(–12.9) mm long, (0.7–)0.9–1.2(–1.7) mm in diameter, puberulous. Flowers usually solitary, rarely 2-fascicled, extra-axillary or supra-axillary; flowering peduncles 1–3.7 × 1–1.7 mm, simple, not ramified, puberulous; flowering pedicels (31.3–)39.3–54.3(–71.7) mm long, slender, puberulous; bracteoles ca. 0.1 × 0.1 mm, puberulous. Sepals (0.5–)0.9–1.4(–1.8) × (0.7–)1.1–1.4(–1.7) mm, triangular-ovate, acute to acuminate, puberulous. External petals (7.1–)17.7–26.3(–46.5) mm long, with ± narrow apical part and expanded basal part [basal/apical length ratio = (0.1–)0.2–0.3(–0.9)], puberulous abaxially; basal part (3–)4.3–5.6(–7) × (3.5–)3.8–4.9(–5.3) mm, suborbicular and spoon-shaped, glabrescent to glabrous adaxially; apical part (4.1–)12.9–22(–40.6) × (1–)2.3–3.8(–5.9) mm, lanceolate, with gradually attenuate apex, densely white-villous, especially on margins adaxially. Internal petals (3.1–)6.7–8.7(–9.8) mm long, contiguous along entire length, glabrous, except on median line abaxially; basal part (2.6–)4.1–5.3(–6.9) × (3.7–)3.9–4.2(–5.4) mm, densely pubescent, especially on margins adaxially; apical part (0.5–)1.9–3.8(–4.5) × (1.2–)1.5–2.3(–3.4) mm, with expanded and inwardly curved apex, densely pubescent adaxially. Stamens 75–103, (1.8–)2.1–2.7(–2.9) mm long; anthers (1–)1.3–1.8(–2.2) × 0.2–0.5 mm; connective prolonged above anthers (0.5–)0.6–0.8(–1.5) mm, puberulous. Carpels 23–38, (2.1–)2.3–2.9(–3.5) × (0.2–)0.3–0.5(–0.6) mm; style (0.5–)1–1.3(–1.5) mm long, geniculate. Fruit solitary, (4.5–)5–7.6(–9.2) cm in diameter; fruiting peduncles 1.5–1.9 cm long; fruiting pedicels (2.9–)3.1–4.5(–6.1) cm long. Monocarps (6–)13–21(–24), (18.1–)19.2–23.6(–26.2) mm long, (5.6–)6.4–8.7(–11.8) mm in diameter, fusiform, with acute base and apex apiculum (0.5–)1.6–2.7(–4.1) mm long, longitudinally ribbed, puberulous; monocarp stipes (3.2–)8.4–12(–20.4) mm long, (0.8–)0.9–1(–1.4) mm in diameter [monocarp/stipe length ratio = (1.1–)1.8–2.5(–6.4)]. Seeds (13.4–)14.4–17.6(–22.2) mm long, (4.7–)5.4–6.2(–6.9) mm in diameter, fusiform. Figure 1i–p.

Phenology—Flowering and fruiting have been reported throughout the year.

Distribution and Habitat—*Neostenanthera gabonensis* occurs among the undergrowth in primary closed forests, slopes, secondary forests, near river, river banks, and swampy (*Rhaphia*-swamp) areas from 15–620 m. It is found in west and central tropical Africa, from Liberia to west and central Gabon, with a gap from Togo to Cameroon (Fig. 2).

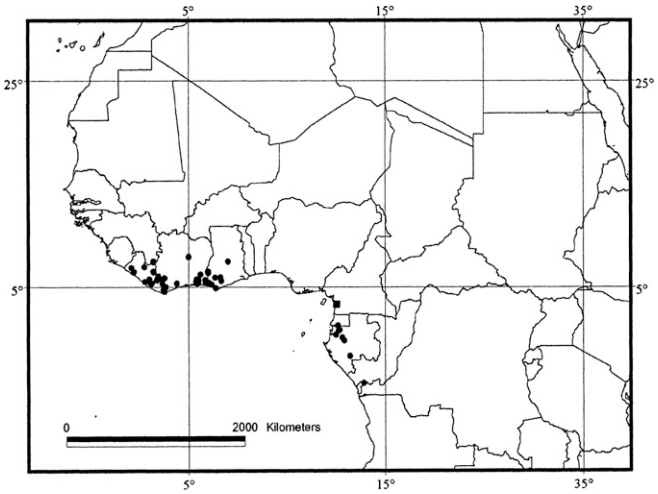

FIG. 2. Distribution of Neostenanthera gabonensis (circles) and Neostenanthera neurosericea (square).

Vernacular Names—Liberia: *Blahn* (Bassa) (Cooper and Record 1931). Ivory Coast: *Fravéfou* (Aboisso) (Aubréville 1959).

Uses—In Liberia, snuff is made from the dried leaves and it is inhaled to cure a type of nasal tumour (Cooper and Record 1931; Burkill 1985).

Specimens Examined—EQUATORIAL GUINEA. Centro Sur: 7 km ENE d'Okuamkos [Ocuamcos], 1°6′ N, 10°11′ E, 8 Jul 1988, *C. Wilks 1745* (WAG).

GABON. Estuaire: NNW of Méla, 0°35′ N, 10°15′ E, 29 Aug 1978, *F. J. Breteler & J. J. F. E. de Wilde 370* (BR, MO, U, WAG); Monts de Cristal, 0°37′ N, 10°21′ E, 31 Jan 1968, *N. Hallé & J. F. Villiers 4799* (LISC); Cristal Mountains, 7 km along the road from Tchimbélé to Kinguélé, 0°37′ N, 10°21′ E, 18 Jan 1983, *J. J. F. E. de Wilde et al. 42* (BR, C, MO, WAG); Monts de Cristal, Tchimbélé Dam région, 0°37′ N, 10°21′ E, 26 Sep 2000, *G. McPherson 18006* (MO); Munda, Sibange Farm, 0°35′ N, 9°45′ E, 15 Jan. 1881, *H. Soyaux 165* (K!, Z!). Moyen-Ogooue: Abanga, 0°6′ S, 10°38′ E, 6 Jan 1963, *N. Hallé 2316* (BR); Mboumi, concession de (SHM), bord de route du camp Mboumi, 0°25′ S, 10°5′ E, 13 Aug 1999, *Y. Issembe 164* (WAG). Ngounié: 4 km on the road from Lebamba to Yéno, 01°58′ S, 11°25′ E, 9 Feb 1991, *J. J. de Wilde & M. S. M. Sosef 10446* (WAG).

GHANA. Ashanti: near Amuni, 7°32′ N, 1°1′ W, Jul 1928, *C. Vigne 1275* (FHO). Central: Dunkwa, 5°57′ N, 1°46′ W, *G. K. Akpabla 870* (S). Western: Bia Reserves, along borderline between Bia National Parc and Bia Production Reserve, near Camp 15, 6°32′ N, 3°2′ W, 13 Nov 1993, *C. C. H. Jongkind et al. 1300* (BR, MA, PRE, WAG); Ankasa Game Reserve, following footpath right just after entrance going parallel with Ankasa R., 5°13′ N, 2°39′ W, 20 Mar 1995, *C. C. H. Jongkind & D. K. Abbiw 2155* (MO); Bia National Park and Production Reserve, 15 km to end of present road construction, 22 km south from Adufua Game and Wildlife Camp, 6°22′ N, 3°1′ W, 2 Mar 1996, *M. Merello et al. 1360* (MO); Agun, 5°56′ N, 2°19′ W, Aug 1928, *C. Vigne 1308* (FHO); Axim, 4°52′ N, 2°16′ W, Oct 1928, *C. Vigne 1507* (FHO); Ankasa Forest Reserve, 5°14′ N, 2°4′ W, Dec 1933, *C. Vigne 3173* (A, FHO, GH, MAD, WIS); Ben-East F.R., 5°36′ N, 1°42′ W, Dec 1940, *C. Vigne 4752* (FHO, US).

IVORY COAST. Agnéby: Réserve Botanique de Yapo, 5°44′ N, 4°8′ W, 12 Nov 1980, *L. Aké Assi 11725* (G); Yapo, 5°44′ N, 4°8′ W, 10 Nov 1960, *L. Aké Assi s. n.* (G); Yapo-Nord, 5°44′ N, 4°8′ W, 16 Mar 1962, *L. Bernardi 8688* (G); 45 km N of Abidjan, Abbe forest, 5°4′ N, 4° W, 22 Nov 1968, *F. J. Breteler 6086* (WAG); Agboville, Forêt du Yapo, 5°44′ N, 4°8′ W, 6 Nov 1991, *C. Chatelain & H.G. Téhé CC753* (G); Agboville, forêt de l'Abbé, 5°42′ N, 4° W, 13 Nov 1991, *C. Chatelain & H. Téhé* CC777 (WAG); 3 km N of Abbé along the road to Abengourou, 5°4′ N, 4° W, 22 Jan 1970, *J. de Koning 41* (WAG); Abidjan, Yapo Forest, 5°44′ N, 4°8′ W, 17 Jan 1974, *J. de Koning 3113* (WAG); Forêt de Yapo, 40 km N of Abidjan, 5°44′ N, 4°8′ W, 31 Oct 1958, *A. J. M. Leeuwenberg 1822* (WAG); 2 km E of km 44 of Abidjan-Adzopé road, 5°22′ N, 4°1′ W, 27 Jul 1970, *A. J. M. Leeuwenberg 7965* (WAG), 29 Jul 1970, *A. J. M. Leeuwenberg 7980* (K, WAG); Agboville, Yapo, 5°44′ N, 4°8′ W, 4 Dec 1981, *N. Stäuble NS1013* (G); Sous-préfecture

Azaguié, Forêt du Yapo, 5°45′ N, 4°1′ W, 1991, *H. Téhé HGT1876* (G), 1991, *H. Téhé HGT2085* (G); Aouabo, 6°14′23″N, 3°47′ W, 14 May 1969, *Th. Thijssen 11* (WAG); Forêt de Yapo, 5°44′ N, 4°8′ W, 28 Sep 1956, *J. J. F. E. de Wilde 587* (WAG), 11 Oct 1956, *J. J. F. E. de Wilde 698* (WAG), 24 Dec 1956, *J. J. F. E. de Wilde 1023* (WAG). Bas-Sassandra: Forêt du Taï, 5°45′ N, 7°4′ W, 9 Jan 1976, *L. Aké Assi 13210* (G); 13 km NW of Tabou, 4°3′ N, 7°24′ W, 12 Apr 1974, *F. J. Breteler* 7392 (BR, MO, WAG); Tabou, FC de la Haut Dodo, 4°57′24″N, 7°17′42″W, 7 May 1999, *C. C. H. Jongkind et al. 4570* (WAG); Tabou, along the road from Olodio to Clodio, 4°43′48″N, 7°29′ W, 7 Apr 2000, *C. C. H. Jongkind & J. Assi-Yapo 4941* (WAG); Tabou, along road via Irputou to Cavally, 4°41′ N, 7°31′24″W, 8 Apr 2000, *C. C. H. Jongkind & J. Assi-Yapo 4977* (WAG); 61 km N of Sassandra, W of Niapidou, 5°19′ N, 6°1′ W, 26 Jan 1959, *A. J. M. Leeuwenberg 2567* (WAG). Lagunes: Forêt du Téké, 5°33′ N, 4°3′ W, 18 Feb 1967, *L. Aké Assi 10873* (G); Forêt du Téké, Adzopé-Abidjan, km 73, 5°33′ N, 4°3′ W, 11 Feb 1969, *P. Bamps 2046* (BR); Forêt du Téké, Abidjan-Adzopé, km 31, 5°33′ N, 4°3′ W, 14 Feb 1969, *P. Bamps 2058* (BR); Forêt du Téké, 5°33′ N, 4°3′ W, 11 Feb 1970, *P. Bamps 2440* (BR, WAG); 6 km N of Anyama, 5°33′ N, 4°3′ W, 22 May 1975, *H. J. Beentje 301* (WAG); in silvis loci Teké (32 km circiter ad sept. Abidjanii) et per viam ad locum L'Abbé, ad locum Yapo Sud, denique ad Yapo Nord, 5°33′ N, 4° W, 23 Feb 1962, *L. Bernardi 8183* (G); ORSTROM, Adiopodoumé, 5°2′ N, 4°7′ W, 24 Feb 1962, *L. Bernardi 8248* (G); Banco Forest Reserve, 5°23′ N, 4°3′ W, 20 Jun 1975, *W. J. van der Burg 623* (WAG); Abidjan, 5°25′ N, 4°2′ W, 21 Sep 1964, *G. Cremers 279* (BR); Abidjan, Adiopodoumé, ancien jardin botanique, 5°19′ N, 4°8′ W, 10 Jan 1990, *L. Gautier & C. Chatelain LG1536* (G); Forest of Téké, 30 km N of Abidjan, on the right side of the road to Adzopé, 5°33′ N, 4°3′ W, 19 Jan 1970, *J. de Koning 7* (WAG); Abidjan, Banco Forest Reserve, 5°23′ N, 4°3′ W, 18 Jan 1973, *J. de Koning 1018* (WAG), 7 Feb 1973, *J. de Koning 1091* (WAG); Abidjan, National Park Banco Forest, road along Banco River at the left side, 5°23′ N, 4°3′ W, 27 Apr 1973, *J. de Koning 1607* (WAG); Abidjan, National Park Banco Forest, in northern central part, 5°23′ N, 4°3′ W, 12 Jun 1973, *J. de Koning 1777* (U, WAG), 4 Jul 1973, *J. de Koning 1818* (U, WAG); Abidjan, Banco Forest Reserve, road at limit with Anguededou Forest, in the NW part, 5°23′ N, 4°3′ W, 9 Jul 1973, *J. de Koning 1830* (WAG), 28 Jul 1973, *J. de Koning 2036* (WAG); Abidjan, Experimental Station ORSTROM, Adiopodoume, 5°23′ N, 4°3′ W, 3 Apr 1974, *J. de Koning 3664* (WAG); Abidjan, Banco Forest Reserve, 5°23′ N, 4°3′ W, 29 Oct 1974, *J. de Koning 4570* (WAG), 15 Nov 1974, *J. de Koning 4771* (U, WAG), 9 Dec 1974, *J. de Koning 4987* (U, WAG); Abidjan, Banco Forest Reserve, route Reste, 5°23′ N, 4°3′ W, 13 Jan 1976, *J. de Koning 6389* (WAG); Abidjan, Banco Forest Reserve, 5°23′ N, 4°3′ W, 23 Mar 1976, *J. de Koning 6738* (WAG); Abidjan, along Agnéby road, 30 km on new road Abidjan to Ndouci, 5°3′ N, 4°15′ W, 17 Jul 1979, *A.P.M. de Kruif 198* (WAG); W of La Mé R., about 20 km NE of Abidjan, 5°23′ N, 4°3′ W, 14 May 1962, *A. J. M. Leeuwenberg 4173* (WAG); region d'Abidjan, 5°25′ N, 4°2′ W, 22 Aug 1956, *J. J. F. E. de Wilde 389* (WAG); Forêt du Banco, ca. 5 km N of Arboretum, 5°23′ N, 4°3′ W, 4 Jul 1963, *W. J. J. O. de Wilde 388* (WAG), *W. J. J. O. de Wilde 388A* (WAG); Abidjan, Banco National Park, northern part, 5°23′ N, 4°3′ W, 1 Sep 2001, *J. J. Wieringa 4299* (WAG). Moyen Cavally: Guiglo, relevé J Gouléako, FDH fragment forestier 2ha, 5°5′ N, 7°24′ W, 13 Jul 2001, *A. Bakayoko & P. Martin 80* (G, WAG); 16 km SW of Toulepleu, 6°28′ N, 8°31′ W, 9 Sep 1975, *H.J. Beentje 933* (WAG); 2 km NE of Basobli, 6°33′ N, 8°32′ W, 10 Sep 1975, *H.J. Beentje 948* (WAG); Guiglo, Taï, 5°52′ N, 7°27′ W, Dec 1981, *N. Stäuble NS0504* (G). Sud-Comoé: 3 km E of Maféré, 5°24′54″N, 3°1′ W, 18 Jun 1975, *H.J. Beentje 463* (WAG); 5 km N of Nganda-Nganda, 5°4′ N, 3°2′ W, 24 Jul 1975, *H. J. Beentje 601* (WAG); about 30 km E of Aboisso, 2 km N of Mafere on Bafia-road, 5°27′ N, 3°3′ W, 23 Jun 1978, *A. J. F. M. Dekker 78* (WAG); Soumié, 5°25′54″N, 3°17′ W, 3 Jul 1931, *Service Forestier 451* (FHO, S), 1931, *Service Forestier 884* (A). Without locality, 6 Mar 1935, *Service Forestier de la Côte d'Ivoire 1998* (MO), *1999* (B, NY).

LIBERIA. Bong: Gbanga, 6°59′ N, 9°28′ W, 14 Sep 1926, *D. H. Linder 560* (K). Gran Bassa: Cestos-Sanguin area, logging concession of the Cooper's, Sudan Section, 5°29′ N, 9°23′ W, 6 Dec 2002, *C. C. H. Jongkind & F. Blyden 5629* (WAG). Grand Gedeh: Tchien District, Zeahtown, 5°59′ N, 8°5′ W, 1 Aug 1947, *J. T. Baldwin, Jr.* 6968 (K); West slope of the Putu Hills East Range, west of Tiama Town, 5°39′ N, 8°11′ W, 27 May 2005, *C. C. H. Jongkind et al. 6431* (WAG); East Range, 5°41′ N, 8°9′ W, 19 Jan 2010, *C. C. H. Jongkind et al. 9133* (WAG); Putu Hills, East Range, 5°39′ N, 8°1′ W, 26 Jan 2010, *C. C. H. Jongkind et al. 9251* (WAG); Putu District, Near Kanweaken, a small village ca. 70 km S of Chuielu [Zwedru village], 5°39′ N, 8°1′ W, 26 Mar 1962, *J. J. F. E. de Wilde & A.G. Voorhoeve 3657* (WAG). Lofa: Gola Forest, old village site near river, 5°27′ N, 10°41′ W, 30¢Nov 2005, *C. C. H. Jongkind et al. 7020* (WAG). Montserrado: near firestone plantations, along Dukwai River, 6°3′ N, 10°3′ W, 1929, *G. P. Cooper 306* (A, FHO, GH, K, NY, PH, US, WIS), *G. P. Cooper 416* (FHO, NY, US, WIS). Nimba: Yèkèpa, 7°34′ N, 8°32′ W, 7 Oct 1969, *J. G. Adam 25058* (MO); Mont Nimba Beeton, 7°29′ N, 8°34′ W, 23 Jul 1974, *J. G. Adam 28728* (G, MO, WAG); Mt. Huelliton & Beeton, 7°29′ N, 8°34′ W, 23 Feb 1974, *P. Jaeger 10010* (G). River Gee: Webo District, Jabroke (Palipo), 5°17′ N, 7°38′ W, *J. T. Baldwin, Jr.* 6675 (MO). Sinoe: SW corner of Sapo National Park, 5°18′ N, 8°45′ W, 1 Feb 2010, *A. K. Daniels et al. 67* (WAG); Krahn Bassa forest, 5°45′ N, 8°55′ W, 26 Jan 1962, *A. M. van Harten 262* (WAG); 20 miles N of Sinoe, 5°2′ N, 8°4′ W, 16 Jan 1969, *J.W.A. Jansen 1109* (WAG); Sapo NP, along Sinoe River, 5°2′ N, 8°48′ W, 25 Nov 2002, *C. C. H. Jongkind & F. Blyden 5426* (WAG); close after Sinoe River, crossing from Jalay's town into Sapo NP, 5°2′ N, 8°47′ W, 4 Mar 2005, *C. C. H. Jongkind et al. 8795* (BR, WAG); inside Sapo NP, close to canoe crossing of Sinoe River, 5°2′ N, 8°47′25″W, 6 Mar 2009, *C. C. H. Jongkind et al. 8839* (BR, WAG).

Notes—*Neostenanthera gabonensis* can be easily distinguished in fruiting specimens by its longitudinally ribbed and fusiform monocarps. Other species of the genus have monocarps smooth and ellipsoid, never ribbed or canaliculate. In flowering specimens, the pedicels are more slender than in the remaining species of the genus. Internal petals are contiguous from the base and expanded and curved inwards apically. The prolonged and widened anther connective with yellowish, eglandular hairs is also characteristic.

Neostenanthera gabonensis is morphologically most similar to *N. hamata*, especially sterile material. In this case, *N. gabonensis* can be separated from *N. hamata* by its leaves, which have a cuneate to slightly rounded base, and the apex caudate to long-acuminate. *Neostenanthera hamata* leaves have a cuneate to obtuse base, and the apex is acuminate to attenuate. In flowering and fruiting specimens, both species are easily distinguished because specimens of *N. hamata* have thickened flowering pedicels, the external petals are sometimes reflexed apically, the internal petals are not contiguous at the base, the apex is acuminate, and the monocarps are ellipsoid and smooth.

Neostenanthera gabonensis shares with *N. myristicifolia* the presence of fascicled flowers. Both species can be easily distinguished by their fruits, which in *N. myristicifolia* are ellipsoid and not longitudinally ribbed. In addition, the internal petals are not contiguous at the base and the flowering pedicels are thickened in *N. myristicifolia*.

There is some morphological difference between the specimens from West Africa (Ghana, Ivory Coast, and Liberia) and those from Gabon. The material from West Africa has monocarps markedly ribbed (e.g. *J. de Koning 41*, WAG; *Daniels et al. 67*, WAG), while in specimens from Gabon the monocarps are slightly ribbed (e.g. *G. McPherson 18006*, MO; *N. Hallé 2316*, BR). The rest of the characters are common in all specimens studied and the differences encountered in fruit morphology do not support segregation of these specimens into different taxa.

When Engler and Diels (1899) described *N. gabonensis* they mentioned the collections *Soyaux 117* and *Soyaux 165* from Gabon (= syntypes). The lectotype was later designated by Le Thomas (1969) and this author placed under *N. gabonensis* the related species *N. micrantha* from Angola. *Neostenanthera bakuana* from Liberia (Hutchinson and Dalziel 1927) was synonymised by Aubréville (1959). We have checked the type material of *N. bakuana* and *N. micrantha* and they match with *N. gabonensis*. According to Exell (1935), Paiva (1966), and Figueiredo and Smith (2008), the holotype of *N. micrantha* (*Gossweiler 7753*) is deposited in BM. Unfortunately we did not see this material, but we did examine the isotypes from K and LISC.

2. NEOSTENANTHERA HAMATA (Benth.) Exell, J. Bot. 73(Suppl. 1): 6. 1935. *Oxymitra hamata* Benth., Trans. Linn. Soc. London 23: 471, Table 50. 1862. *Stenanthera hamata* (Benth.) Engl. & Diels, Notizbl. Königl. Bot. Gart. Berlin 3: 57. 1900.—TYPE: SIERRA LEONE. On the River Bagroo, West Africa, Apr. 1861, *G. Mann 876* (holotype: K!; isotype: P image!).

Stenanthera yalensis Hutch. & Dalziel ex G. P. Cooper & Record, Bull. Yale Univ. School Forest. 31: 17, pl. 2. Figure 2. 1931. *Neostenanthera yalensis* (Hutch. & Dalziel ex G.P. Cooper & Record) Hutch. & Dalziel, Fl. W. Trop. Afr. 2: 605. 1936.—TYPE: LIBERIA. Dukwai River, 1929, *G. P. Cooper 371* (holotype: WIS!; isotypes: B!, FHO!, NY!, PH!, US!).

Trees or treelets, rarely large trees or shrubs (5–)9–15(–25) m tall; trunk with dbh (12–)15–25(–25) cm; old branches glabrescent to glabrous and young branches pubescent. Leaf lamina (4.5–)9.7–13.6(–17.8) × (1.3–)2.8–4.4(–5.4) cm, elliptic to lanceolate or oblong-oblanceolate; base cuneate to obtuse, apex (2.7–)8.5–18.9(–23) mm long, acuminate to attenuate, upper surface glabrescent to glabrous, dark green, lower surface puberulous, pale glaucous to brown; secondary veins (9–)10–12(–14); petiole (3–)4–5(–6) mm long, (0.8–)1–1.4(–2) mm in diameter, pubescent. Flowers solitary, extra-axillary and ± leaf-opposed; flowering peduncles (1.8–)2.5–3.1(–4) × (0.9–)1–1.7(–2) mm, simple, not ramified, pubescent; flowering pedicels (31–)34–41(–45) mm long, thickened, pubescent; bracteoles 0.5–1.2 × ca. 0.3 mm, pubescent. Sepals (0.8–)0.9–1.4(–1.9) × (2–)3–4(–5) mm, triangular-ovate, acute, puberulous to glabrescent. External petals (17.2–)25.9–66.5(–111.7) mm long, with ± narrow apical part and expanded basal part [basal/apical length ratio = (0.05–)0.08–0.2(–0.3)], pubescent to puberulous abaxially; basal part (3.5–)4.2–5.1(–5.8) × (4.7–)5.3–6.2(–8.1) mm, suborbicular and spoon-shaped, puberulous adaxially; apical part (13–)21.4–62.3(–106.5) × (1.9–)2.9–5.6(–7.9) mm, lanceolate, usually with reflexed, caudate, puberulous apex. Internal petals (7.2–)8–10.4(–13.4) mm long, contiguous except at base, puberulous abaxially; basal part (3.7–)5.7–7(–9.3) × (3.5–)7.2–6.3(–7.4) mm, puberulous along margins adaxially; apical part (1.2–)1.5–4.1(–5) × (1.2–)1.6–2.3(–2.9) mm, acuminate, glabrous adaxially. Stamens 187–244, (1.2–)1.6–1.9(–2.3) mm long; anthers 0.9–1.8 × 0.2–0.5 mm; connective prolonged above anthers 0.1–0.5 mm, glabrous. Carpels 123–142, (1.6–)1.7–2.3(–3.1) × (0.2–)0.3–0.4(–0.8) mm; style (0.5–)0.6–1(–1.3) mm long, straight or slightly curved. Fruit solitary, (7.1–)9.8–14.5(–17) cm in diameter; fruiting peduncles ca. 4.3 cm long; fruiting pedicels (2.3–)3.2–4.8(–5.5) cm long. Monocarps (18–)27–65(–99), (7.8–)14.2–19.4(–22.2) mm long, (3.9–)7.5–10.7(–13.2) mm in diameter, ellipsoid, with obtuse base and apex apiculum ca. 0.1 mm long, smooth, pubescent to puberulous, rarely glabrescent; monocarp stipes (32–)36.9–58.3(–81) mm long, (0.4–)1–1.2(–1.4) mm in diameter [monocarp/stipe length ratio = 0.2–0.4(–0.5)]. Seeds (6.3–)14.1–15.8(–17.3) mm long, (3.2–)6.1–8.7(–12.5) mm in diameter, ellipsoid. Figure 1a–h.

Phenology—Flowering and fruiting have been reported throughout the year.

Distribution and Habitat—*Neostenanthera hamata* is present in humid high forests, on slopes, secondary forests, along rivers and humid places, from 90–700 m. It is confined to west tropical Africa, from Guinea (Conakry) to western Ghana (Fig. 3).

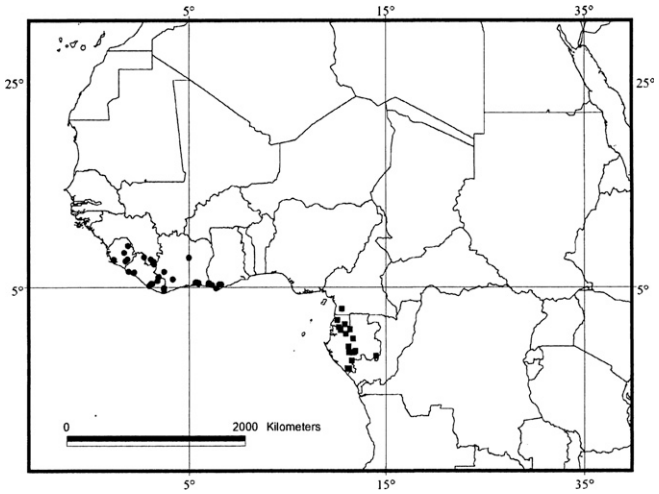

FIG. 3. Distribution of *Neostenanthera hamata* (circles) and *Neostenanthera robsonii* (squares).

Vernacular Names—Ghana: *Silikokole Nzima*; *Silikawkawle* (Abbiw 1990). Ivory Coast: *Baoué, Baouéfou* (Abé) (Aubréville 1936, 1959). Liberia: *Je-Ah-Chu* (Bassa). Sierra Leone: *Mamburi*, *Pamawuli* (Mendi).

Uses—The bark is used in Ghana and Liberia as an anthelmintic (Cooper and Record 1931; Burkill 1985; Abbiw 1990); in Sierra Leone, a decoction of the bark is used in the treatment of "yellow fever" (blackwater fever?) (*T. E. Edwardson 144*, FHO, G).

Specimens Examined—GHANA. Western Region: Tarkwa District, Benso [Banso], 5°17′ N, 1°57′ W, Sep 1953, *J. E. Andoh 5775* (B, FHO, NY); Ankasa Forest Reserve, Mapatuba-Elubo Rd., 5°14′ N, 2°4′ W, Nov 1973, *A. A. Enti & P. K. Awuch R1192* (E, WAG); Axim, 4°52′ N, 2°16′ W, Feb 1935, *F. R. Irvine 2235* (E); Ankasa Forest Reserve along Elubo-Takoradi road ca. 22 km E of Elubo, 8 km along dirt road at forest reserve sign, 5°14′ N, 2°4′ W, 15 Jul 1995, *M. Merello et al. 1288* (MO, PRE, WAG); Ankasa Forest Reserve, 5°14′ N, 2°4′ W, Dec 1933, *C. Vigne 3163* (A, FHO, GH); Subri Reserve, 5°18′ N, 1°44′ W, Feb 1941, *C. Vigne 4758* (A, FHO, US).

GUINEA. Nzérékoré: Ndieké, 7°5′ N, 8°5′ W, Apr 1945, *J. G. Adam 138* (MO).

IVORY COAST. Bas-Sassandra: Tai-Grabo, 15 km S de la Hana, 4°55′ N, 7°29′ W, 21 Mar 1969, *P. Bamps 2247* (BR, WAG); Tabou, along road via Irputou to Cavally River, 4°41′ N, 7°31′ W, 8 Apr 2000, *C. C. H. Jongkind & J. Assi-Yapo* 4978 (WAG); Guéyo (between Gagnoa and Sassandra), 5°48′ N, 6°37′ W, 8 Dec 1961, *J. J. F. E. de Wilde 3349* (K, WAG). Lagunes: Forêt du Banco, 5°23′ N, 4°3′ W, 20 Apr 1973, *L. Aké Assi 12029* (G), 6 Mar 1974, *L. Aké Assi 12499* (G), 17 May 1975, *L. Aké Assi 12891* (G); Dabou, near road to Kiassatown, 5°27′ N, 4°21′ W, 24 Jun 1975, *H.J. Beentje 537* (WAG); Abidjan, 5°25′ N, 4°2′ W, 17 Apr 1968, *G. Cremers 796B* (BR); Abidjan, Banco Forest Reserve, Route du Rail, 5°23′ N, 4°3′ W, 19 Apr 1974, *J. de Koning 4795* (U, WAG), 5 Apr 1976, *J. de Koning 6762* (WAG); Abidjan, along Agnéby R., 30 km new road Abidjan-Ndouci, 5°3′ N, 4°15′ W, 29 May 1979, *A.P.M. de Kruif 94* (WAG); Banco, 5°23′ N, 4°3′ W, 1 Sep 1931, *Service Forestier 463* (A); Forest reserve "Du Banco", ± 10 km W of Abidjan, 5°23′ N, 4°3′ W, 12 Aug 1969, *C. Versteegh & R.W. den Outer* 673 (U, WAG); Forêt du Banco arboretum, 5°23′ N, 4°3′ W, 24 Jul 1956, *J. J. F. E. de Wilde 134* (FHO, WAG); Forest reserve "Du Banco", ± 10 km W of Abidjan, 5°23′ N, 4°3′ W, 6 Dec 1956, *J. J. F. E. de Wilde 983* (WAG). Moyen-Cavally: Guiglo, relevé G Zagné, FDH fragmente forestier, 6°32′ N, 7°29′ W, 22 May 2001, *A. Bakayoko & P. Martin 70* (G, WAG). Sud-Comoé: 3 km E of Maféré, 5°24′ N, 3°1′ W, 18 Jun 1975, *H.J. Beentje 456* (WAG). Without locality, 8° N, 5° W, 1932, *Service Forestier Côte d'Ivoire 1096* (B), 15 Oct 1934, *Service Forestier Côte d'Ivoire 2007* (B).

LIBERIA. Grand Cape Mount: near Obeyamai, Loffa River drainage, 6°34′ N, 11°3′ W, 28 Jan 1949, *K. R. Mayer 45* (US). Grand Gedeh: along the road from Tchien to Sinoe, about 15 miles S of Tchien, 5°59′ N, 8°5′ W, 22 Jan 1969, *J. W. A. Jansen 1336* (MO, U, WAG); Putu Hills, East Range, 5°38′ N, 8°1′ W, 21 Jan 2010, *C. C. H. Jongkind et al. 9175* (WAG). Lofa: between Zigida and Mt. Wonegisi, 8°1′ N, 9°3′ W, 9 Feb 2010, *C. C. H.*

Jongkind et al. 9401 (WAG). Nimba: Yekepa, Grandfield, 7°34′ N, 8°32′ W, 5 May 1973, *J. G. Adam 27408* (WAG); Sanokwele District, Ganta, 7°18′ N, 8°31′ W, 15 Sep 1947, *J. T. Baldwin, Jr. 9243* (MO, NY, PRE, US); valley between Mt. Gangra and Mt. Yuelliton, 7°33′ N, 8°38′ W, 13 Jan 2009, *C. C. H. Jongkind et al. 8445* (WAG); Nimba Mts., near Iron mine of L.A.M.C.O., 7°29′ N, 8°34′ W, 28 Jul 1962, *A. J. M. Leeuwenberg & A. G. Voorhoeve 4712* (B, BR, HBG, MO, WAG). River Gee: Webo District, Nyaake, 4°51′ N, 7°33′ W, 4 Jun 1947, *J. T. Baldwin, Jr. 6185* (MO, US). Sinoe: Sinoe County, road from Greenville to African Fruit Company, along river, about 5 miles before AFC, 5°7′ N, 9° W, 28 Jul 1977, *A. de Gier 40* (WAG); 20 miles N of Sinoe, 5°2′ N, 8°4′ W, 16 Jan 1969, *J.W.A. Jansen 1090* (BR, NY, U, WAG); Sapo NP, buffer zone, creek between Safari Camp and Jelaytown, 5°21′ N, 8°48′ W, 4 Dec 2002, *C. C. H. Jongkind & F. Blyden 5615* (WAG); near footpath SW of Jalay's Town, 5°2′ N, 8°49′ W, 2 Mar 2009, *C. C. H. Jongkind et al. 8744* (WAG).

SIERRA LEONE. Eastern Province: Kambui Forest, 7°37′ N, 11°21′ W, 21 Oct 1937, *T. E. Edwardson 144* (FHO, G); Waanje Valley, Kambui Hills Reserve, 7°37′ N, 11°21′ W, Mar 1947, *J. S. Sawyer FHN 13565* (FHO); Konnema [Kenema], 7°5′ N, 11°1′ W, 1914, *N. W. Thomas 7460* (LD). Northern Province: Kabala, Mt. Loma Kondembaya, 9°1′ N, 11°7′ W, 1 Feb 1966, *J. G. Adam 23489* (PRE); 3 Feb 1966, *J. G. Adam 23525* (MO, WAG); piedumont ouest Loma, 9°1′ N, 11°7′ W, 3 Feb 1966, *P. Jaeger 9207* (G); Bombali District, Karina, Makump, 9°10′ N, 12°1′ W, 18 Jul 1914, *N. W. Thomas 969* (S); Matotoka, 8°37′N, 11°52′W, 29 Jul 1914, *N. W. Thomas 1346* (Z). Without locality, *G. F. Scott- Elliot s. n.* (K); *C. V. Wallace 56* (FHO).

Notes*—Neostenanthera hamata* is easily recognized by its solitary flowers with long, elliptic, external petals (much longer than the internals), these sometimes caudate and reflexed apically. Monocarps are long, stipitate, ellipsoid, and shortly apiculate.

In the absence of flowers and fruits, material of *N. gabonensis* is sometimes confused with *N. hamata*¸ because both species have similar leaves. They can be distinguished by differences of the leaf apex, which are caudate and long-acuminate in *N. gabonensis* (see further discussion under *N. gabonensis*).

Neostenanthera hamata shares with *N. myristicifolia* the presence of ellipsoid monocarps with long stipes. The two species can only be confused in fruiting specimens. *Neostenanthera hamata* has longer stipes and smaller leaves than *N. myristicifolia*. In flowering specimens, these species are easily distinguished by the shape of their external petals (lanceolate vs. elliptic, respectively). Also important is the presence of solitary flowers in *N. hamata* vs. fascicled in *N. myristicifolia.*

According to Lisowski (2009a), this species has axillary flowers, but all the specimens we examined have extra-axillary flowers. In Lisowski (2009b, Fig. 33), the illustration clearly indicates the presence of fascicled and solitary, extra-axillary and axillary flowers, characters that help define *N. myristicifolia*. We have not studied the specimen (*Lisowski 80893*, POZG) upon which this figure is based, but it seems to be *N. myristicifolia,* not *N. hamata*.

Cooper and Record (1931), when describing *N. yalensis* (as *Stenanthera yalensis*), pointed out that the female flowers were solitary and born on different branches from the male. All the specimens studied in the present work are bisexual. *Neostenanthera yalensis* was first placed under *N. hamata* by Aubréville (1959).

3. NEOSTENANTHERA MYRISTICIFOLIA (Oliv.) Exell, J. Bot. 73 (Suppl. 1): 6. 1935. *Oxymitra myristicifolia* Oliv., Fl. Trop. Afr. 1: 33. 1868. *Stenanthera myristicifolia* (Oliv.) Engl. & Diels, Notizbl. Königl. Bot. Gart. Berlin 3: 57. 1900.—TYPE: NIGERIA. Old Calabar, *W. C. Thomson 134* (holotype: K!).

Stenanthera pluriflora De Wild., Ann. Mus. Congo, Bot., sér. 5, 1(1): 45, Table 20. 1903. *Neostenanthera pluriflora* (De Wild.) Exell, J. Bot. 73(Suppl. 1): 6. 1935.—TYPE: DEMOCRATIC REPUBLIC of CONGO. Kisantu, 1899, *J. Gillet 168* (lectotype, designated by Boutique, 1951: 339, BR image!).

Treelets or shrubs, rarely large trees (2–)3.5–5(–13) m tall; trunk with dbh ca. 10 cm; old branches glabrous and young branches glabrescent or puberulous. Leaf lamina (8.5–)12–20.3(–25.5) × (3.7–)5.3–7.8(–9) cm, elliptic-oblong to obovate-oblong; base rounded to obtuse, apex (2.2–)5.8–12.1(–18.3) mm long, attenuate to acute or acuminate, upper surface puberulous to glabrescent or glabrous, greenish to brown, lower surface puberulous, dark yellow-green to glaucous; secondary veins (10–)13–17(–18); petiole (4–)5.6–7.7(–12.4) mm long, (0.7–)1.4–2(–2.5) mm in diameter, puberulous. Flowers usually in fascicles of 2–4, rarely solitary, extra-axillary, supra-axillary, or ± leaf-opposed, rarely axillary; flowering peduncles (1.1–)1.6–2.3(–5) × (1.2–)1.6–2.1(–3.6) mm, simple, not ramified, puberulous; flowering pedicels (12.2–)19.8–27.3(–38) mm long, thickened, puberulous; bracteoles (0.6–)0.8–2.4(–3.4) × 0.2–0.3 mm, puberulous. Sepals (0.8–)1.3–2.5(–4.2) × (1.2–)1.4–2.1(–2.6) mm, triangular-ovate, acute to acuminate, puberulous. External petals (6.5–)14.1–23.1(–29) mm long, with ± narrow apical part and expanded basal part [basal/apical length ratio = (0.1–)0.2–0.3(–0.4)], puberulous to glabrescent abaxially; basal part (1.4–)3.1–4(–4.9) × (2.5–)3.8–5.1(–5.9) mm, suborbicular and spoon-shaped, puberulous adaxially; apical part (5–)11.2–19.2(–25.2) × (1–)2.2–4.6(–9.2) mm, lanceolate, with gradually attenuate, glabrescent apex. Internal petals (3.4–)6.6–9.7(–10.9) mm long, contiguous except at base, puberulous to glabrescent abaxially; basal part (1.6–)3.5–5(–6.1) × (1.6–)3.4–4.6(–5.6) mm, pubescent, with hairs in lines adaxially; apical part (1.8–)3.4–4.5(–5.7) × (0.6–)1.6–2.1(–3) mm, acute, glabrous adaxially. Stamens 135–156, (0.9–)1.8–2.2(–2.8) mm long; anthers (0.7–)1.4–1.7(–2.4) × (0.2–)0.3–0.4(–0.6) mm; connective prolonged above anthers (0.1–)0.2–0.4(–0.6) mm, glabrous. Carpels 67–109, (0.8–)1.7–2.5(–2.8) × (0.1–)0.3–0.4(–0.5) mm; style (0.2–)0.6–1.2(–1.4) mm long, straight or slightly curved. Fruit usually solitary, rarely 2-fascicled, (1.7–)5.9–8.1(–9.1) cm in diameter; fruiting peduncles (1.1–)2.1–4(–5.1) cm long; fruiting pedicels (1.9–)2.2–3.2(–3.9) cm long. Monocarps (15–)22–48(–60), (4.4–)9.2–13.2(–15.8) mm long, (2–)6–7.9(–9.6) mm in diameter, ellipsoid, with obtuse base and apex apiculum (0.4–)0.5–0.6(–1.1) mm long, smooth, finely puberulous to glabescent; monocarp stipes (3.4–)16.9–22.8(–32.1) mm long, (0.5–)0.8–1(–1.4) mm in diameter [monocarp/stipe length ratio = (0.4–)0.5–0.8(–1.4)]. Seeds (3.5–)10.3–11.9(–13.1) mm long, (1.7–)5.1–7.5(–9.2) mm in diameter, ellipsoid. Figure 4a–j.

***Phenology*—**Flowering and fruiting have been reported throughout the year.

Distribution and Habitat*—Neostenanthera myristicifolia* can be found in primary, secondary, and gallery forests, river banks, and swampy areas from 300–1,000 m. It is present in west and central tropical Africa, from SE Benin and SW Nigeria to the S of the Democratic Republic of Congo (Fig. 5).

***Vernacular Names*—**Central African Republic: *Mbuafa* (Lissongo), *Mofembefembe* (Lissongo, fruiting material), *Molo-ikuta* (Lissongo des Balingas), *Yerengba* (Banda). Democratic Republic of Congo: *Amapupu, Badimu* (Zande), *Bompimbo, Bompimpimbu, Kibila* (Angbe), *Pakasa* (Zande); *Bompimbo* (Boyeka), *Bonjungola-wa-bokeli* (Bokuma), *Buifu* (dial. batetela),

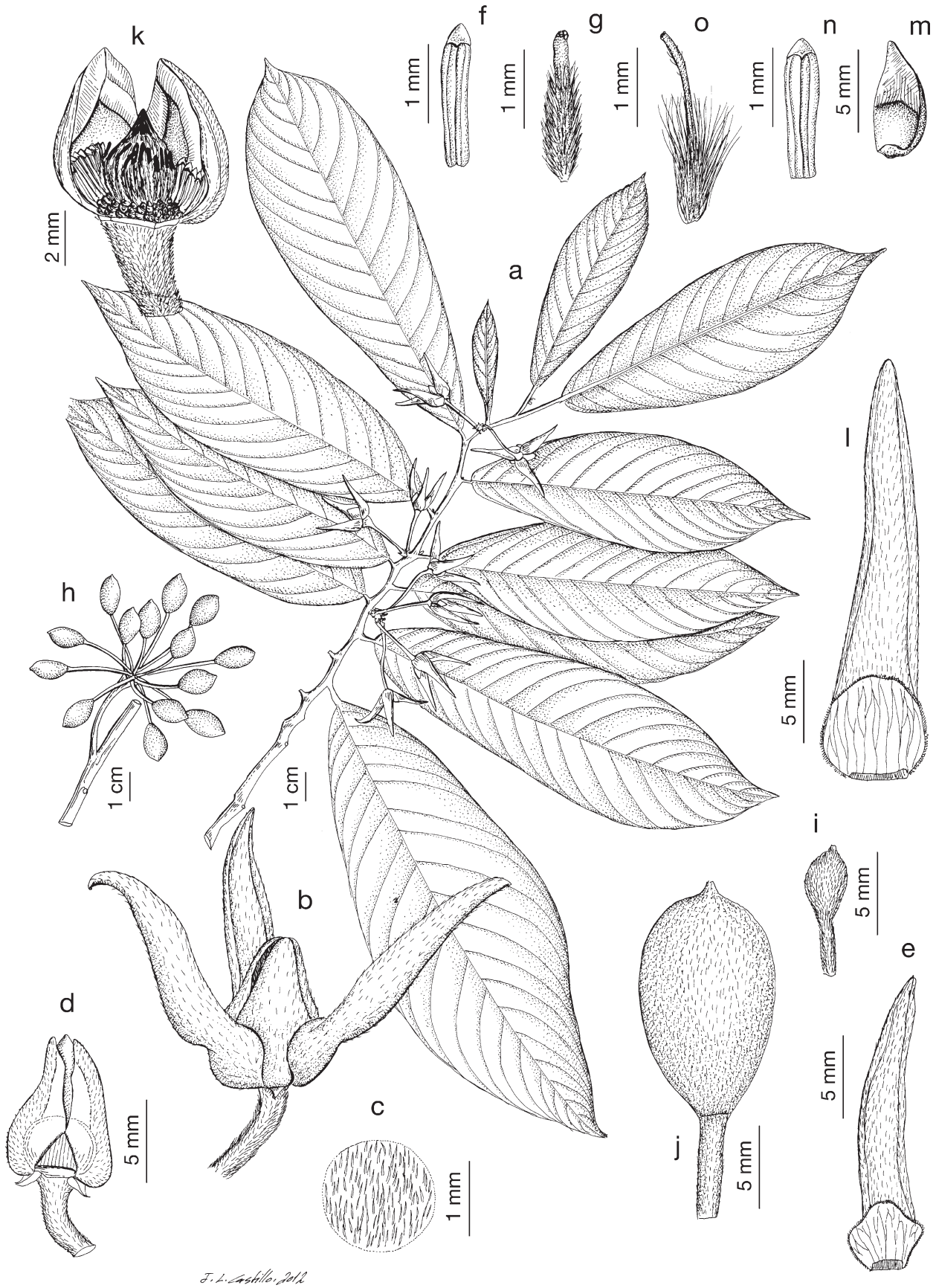

Fig. 4. *Neostenanthera myristicifolia*. a. Flowering branch. b. Flower. c. Detail of flower indumentum. d. Flower (external petals removed). e. External petal (adaxial surface). f. Stamen. g. Carpel. h. Fruiting branch. i. Immature monocarp. j. Mature monocarp. - *Neostenanthera neurosericea*. k. Flower (external petals and one internal petal removed). l. External petal (adaxial surface). m. Internal petal (adaxial surface). n. Stamen. o. Carpel. Based on: a, h–j, *D. W. Thomas et al. 8769* (US-3441274); b–g, *D. W. Thomas et al. 8769* (MO-4086502); k–o, *G. Zenker 3105* (HBG-502533).

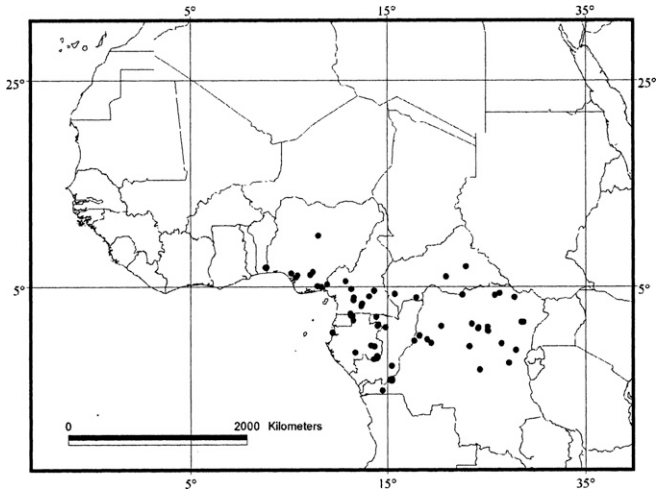

FIG. 5. Distribution of Neostenanthera myristicifolia.

Lumwenwe-lo-bote (dial. turumbu), *Engbu* (dial. babua), *Mokululu* (Amadi), *Wengola* (dial. kundu), *Wompimbo* (Yambata) (Boutique 1951). Nigeria: *Uyenghen eze* (Edo) (Keay 1989).

Uses—None recorded.

Specimens Examined—BENIN. Ouémé: Sakété, Fouditi, 6°53′N, 2°38′ E, 8 Aug 2001, *V. Adjakidjè 4687* (WAG); Adja-Ouèrè, Kpédjilé Agada, 6°53′N, 2°43′E, 23 Oct 1970, *A. P. M. van de Zon 112* (WAG).

CAMEROON. Centre Province: Mefou proposed National Park, 3°37′ N, 11°35′ E, 23 Mar 2004, *M. Cheek et al. 11965* (WAG); Mefou proposed National Park, Ndanan, 3°37′ N, 11°34′ E, 27 Mar 2004, *J.-M. Onana et al. 2870* (US); Nkolbison, 3°53′ N, 11°37′ E, 10 Feb 1963, *J. Raynal & A. Raynal 9560* (B); Ngoro, 4°45′ N, 11°22′ E, 29 Mar 1963, *J. Raynal & A. Raynal 10569* (B, BR, G, HBG, MA, MO, WAG). East Province: Bertoua, near catholic mission, 4°35′ N, 13°41′ E, 8 Nov 1960, *F. J. Breteler 644* (WAG); Doumé, near catholic mission, 3°59′ N, 13°11′ E, 12 Nov 1960, *F. J. Breteler 684* (BR, LISC, M, WAG); Bertoua, 6 km along road to Batouri and Bétari Oya, 4°35′ N, 13°41′ E, 16 Mar 1961, *F. J. Breteler 1220* (A, BR, M, WAG), 30 Aug 1961, *F. J. Breteler 1799* (BR, PRE, WAG). South Province: Bissombo, 59 km SE Akonolinga, 3°17′ N, 12°28′ E, 12 Jun 1981, *J. N. Asoncanyi 275* (MO); Bitye, S of Cameroons, 3°1′ N, 12°22′ E, 1916, *G. L. Bates 884* (MO, Z); Près de Mendong (25 km N of Akonolinga), 2°15′ N, 11°16′ E, 7 Mar 1962, *R. Letouzey 4486* (B, LISC). Southwest Province: Kumba, Ndoi first-Ndoi second, 5°12′ N, 8°53′ E, 17 Jun 1951, *J. Olorunfemi FHI30623* (K). Western Province: Touladen, en bas du versant oriental Nbepito, 15 km E of Founbot et 25 km SSW of Founban, 5°31′ N, 10°46′ E, 26 Oct 1974, *R. Letouzey 13025* (MO, WAG).

CENTRAL AFRICAN REPUBLIC. Haute-Kotto: Oubangui-Chari, Yalinga, 7° N, 23° E, 16 May 1921, *G. Le Testu 2547* (BM, LISC). Lobaye: Région Mbaiki, Station Central de Boukoko, 3°52′ N, 17°59′ E, 19 Apr 1951, *C. Tisserant 2080* (LISC), 21 Jan 1951, *C. Tisserant 2177* (BR), 23 Jan 1953, *C. Tisserant 2437* (BM, BR). Mambéré-Kadéï: Berbérati, 4°15′ N, 15°47′ E, 28 Jun 1937, *C. Tisserant 3546* (LISC); Ouaka: Waka [Ouaka], 6° N, 21° E, 15 Feb 1921, *C. Tisserant 935 bis* (LISC); Riv. Manga, 35 km NO of Morouba, 6° N, 21° E, 18 Feb 1921, *C. Tisserant 1777* (LISC).

DEMOCRATIC REPUBLIC OF CONGO. Bas-Congo: Kimiala, 5°31′ S, 14°32′ E, 16 Mar 1984, *L. Nsimundele 1100* (BR). Équateur: Eala, 0°4′ N, 18°18′ E, 7 Sep 1937, *G. Couteaux 315* (K); Bonguma, 0°27′ S, 17°46′ E, Sep 1937, *L. Doubois 799* (K); Boende, Rivière Ychuapo, en amont de Boende, 0°4′ S, 19°28′ E, 2 Apr 1958, *C. Evrard 3895* (FHO); Ykela, Yalikungu, 1°2′ S, 23°22′ E, 17 Nov 1958, *C. Evrard 5147* (FHO); Flandria, 0°19′ S, 19°5′ E, 25 Jun 1936, *J. Ghesquière 2820* (A, GH); Eala, route de Coq, 0°4′ N, 18°18′ E, *J. Léonard 787* (MO, US); Équateur, 1° N, 20°3′ E, 31 May 1936, *J. Louis 2110* (FHO); village Boyeka (Equateur), 0°3′ N, 18°19′ E, 28 Aug 1914, *A. Nannan 98* (BR); Eala, 0°4′ N, 18°18′ E, Nov 1930, *P. Staner 1388* (BR). Kasai-Oriental: Katako-kombe, 3°24′ S, 24°25′ E, 1938, *J. Gillardin 395* (K). Kinshasa: Ndlili, 4°27′ S, 15°2′ E, 3 Jun 1983, *H. Breyne 4637* (WAG); Léopoldville, Thysville, Gombe Matadi, 4°3′ S, 15°3′ E, 18 Mar 1960, *P. Compère 1752* (K); Kimuenza, Léo Zône annexe, 4°27′ S, 15°17′ E, 16 Aug 1963, *C. Evrard 6539* (BR); Léopoldville, 4°3′ S, 15°3′ E, 9 Jan 1947, *R. P. Jans 350* (BR, Z); au delá de Kinkole, 4°2′ S, 15°3′ E, 21 Apr 1965, *L. Pauwels 4977* (WAG). Maniema: Kivu, 8 km au NW de Lubutu, 0°44′ S, 26°35′ E, 30 Mar 1975, *S. Lisowski 40414* (BR). North Kivu: Masingu territoire, Walikale, 1°24′ S, 28°3′ E, 17 Feb 1958, *A. Léonard 1719* (C, MO, WAG), 20 Dec 1958, *A. Léonard 2136* (PRE, WAG). Orientale: Zone de Mambasa (Ituri Forest), Epulu, 1°25′ N, 28°35′ E, 31 Oct 1995, *C.E.N. Ewango 538* (BR, WAG); Magombo, 3°55′ N, 27°53′ E, 22 Oct 1955, *Ph. Gerard 1931* (BR, U); Digba-Ango, Fôret des Akare entre rivière Bili et Asa, 4°9′ N, 25°55′ E, 9 Dec 1963, *Ph. Gérard 5589* (U); Village de Yafolo, rive gauche, en mont d'Isangi, 0°46′ N, 24°15′ E, 23 Dec 1939, *R. Germain 56* (BR); Dakwa (Ango), 4°19′ N, 26°24′ E, Dec 1945, *R. Germain 4467* (BR); Isangi, village Yandjali, 2°42′ S, 27°2′ E, Oct 1952, *R. Germain 8083* (PRE); Isangi, Yababando [Yabaondo], 0°47′ N, 24°14′ E, 28 Mar 1956, *R. Germain 8721* (LISC); Kisangani, Mangobo, à 1 km l'Ouest de l'usine Sotexki, 0°32′ N, 25°11′ E, 2 Jan 1979, *J. Lejoly 4668* (BR); Kisangani, ancienne route de Buta, à 3 km de Kisangani, 0°33′ N, 25°13′ E, 4 Jul 1979, *J. Lejoly 5313* (WAG); Isangi, Yabaondo-Yaenisha, 0°47′ N, 24°14′ E, 19 May 1958, *A. Léonard 711* (M); Haute-Zaire, env. de Bengamisa, près du village Bakuti, 0°55′ N, 25°12′ E, 26 May 1973, *S. Lisowski 18660* (K); Haute-Zaire, au N de Kisangani, ancienne route de Buta, km 7.5, près du village Batiambale, 0°31′ N, 25°16′ E, 15 May 1977, *S. Lisowski 45144* (BR, K); Yambao, à 25 km au NW de Yangambi, 0°5′ N, 24°16′ E, 21 Apr 1938, *J. Louis 8954* (K, S); près du village Yangole, 0°5′ N, 24°16′ E, 9 May 1938, *J. Louis 9295* (B, NY, US); Yangole, à 20 km à l'W de Yangambi, 0°5′ N, 24°16′ E, 21 Oct 1938, *J. Louis 11942* (BR, NY), 24 Oct 1938, *J. Louis 12018* (K); Yalibwa, à 22 km au N de Yangambi, 0°55′ N, 24°30′ E, Oct 1938, *J. Louis 13265* (C); District de l'Ituri, territoire de Mambasa, Réserve de Faune à Okapis, Andimao, Forêt des Walesse-Dese, 1°25′ N, 28°48′ E, 15 Oct 2001, *J. K. Madidi 377* (C, M, MO); Zone de Mambasa (Ituri Forest), Epulu, 1°25′ N, 28°35′ E, 26 May 1993, *Marabo 1565* (K); Kisangani, Kabondo (anc. Route Buta), 4°11′ N, 22°39′ E, 8 Nov 1980, *M. Mosango 615* (BR); Haut-Zaire, S-Rég. Tshopo, Zone Basoko, km 25 route Basoko-Kisangani, rive gauche de l'Aruwimi, village Basakani, 1°14′ N, 23°36′ E, 25 Feb 1987, *F. Szafranski 1235* (BR). South Kivu: Bulumbu, territoire de Shabunda, 2°42′ S, 27°2′ E, 9 Apr 1959, *A. Léonard 3762* (U, WAG), 18 Apr 1959, *A. Léonard 3891* (MO, WAG); Kamusuku, territoire de Shabunda, 2°42′ S, 27°2′ E, 18 Aug 1959, *A. Léonard 5947* (WAG).

EQUATORIAL GUINEA. Kie Ntem: Eloan, carretera Ebibeyín-Mongomo, 2°4′ N, 11°19′ E, 22 Nov 2000, *R. Pérez Viso 4253* (MA).

GABON. Estuaire: environs de Libreville, 0°23′ N, 9°27′ E, 1913, *H. Courtet s. n.* (L). Haut-Ogooué: Haut-Ngounyé [Haut-Ogooué], 2° S, 14° E, 18 Nov 1925, *G. Le Testu 5761* (BR, LISC), 19 Apr 1930, *G. Le Testu 8033* (BM), *G. Le Testu 8190* (WAG); Poungou, 2° S, 14° E, 19 Dec 1930, *G. Le Testu 8597* (BR, LISC); à 2 km Nord-Ouest du Camp PPG, Bord de Mpassa, 2°7′ S, 14°4′ E, 17 Jul 2004, *R. Niangadouma & J. R. Stone 367* (WAG); Chantier CEB, 21 km on road Lelama to Okandja, east of road Okandja-Franceville, 1°2′ S, 13°44′ E, 2 Nov 2005, *M. S. M. Sosef et al. 2208* (WAG). Ngounié: Bouvala hills, 1°37′ S, 11°46′ E, 10 Oct 2007, *M. E. Leal et al. 1992* (WAG). Ogooué-Ivindo: 13 km on road Mékambo to Madjingo, 1°3′ N, 14°2′ E, 25 Dec 2000, *J. J. Wieringa et al. 3566* (WAG); 29 km on road Mékambo to Madjingo, 1°9′ N, 14°6′ E, 29 Dec 2000, *J. J. Wieringa et al. 3684* (WAG). Ogooué-Lolo: E of Lastoursville, near Osselé, 0°56′ S, 13°22′ E, 19 May 2004, *F. J. Breteler 15996* (WAG). Woleu-Ntem: Bitam, région entre Ogooué et Cameroun, 2°4′ N, 11°3′ E, Mar 1933, *G. Le Testu 9013* (WAG); Oyem, région entre Ogooué et Cameroun, 1°35′ N, 11°34′ E, Feb 1934, *G. Le Testu 9494* (WAG).

NIGERIA. Benin: Okomu Forest Reserve, Compartment N° 89, 6°18′ N, 5°14′ E, 13 Feb 1948, *J. P. M. Brenan et al. 9015A* (FHO, K); Sapoba, 6°6′ N, 5°53′ E, 3 May 1928, *Conservation of Forests 308* (FHO). Enugu: Enugu, 6°27′ N, 7°26′ E, *Conservation of Forests 305* (FHO). Onitsha: Mamu, 6°1′ N, 7°11′ E, 30 Apr 1959, *L. G. Cooper FHI34709* (FHO). Sapele: Jamieson River, 5°54′ N, 5°42′ E, 1931, *J. D. Kennedy 1701* (FHO). Uyo: Enyong, Ibiamang, 5°2′ N, 7°55′ E, 23 Jan 1966, *J. C. Okafor & M. G. Latilo FHI57773* (K, MO). Without locality, 10° N, 8° E, *J. R. Ainslie 163* (FHO); 10° N, 8° E, 4 Jan 1908, *A. E. Kitson s. n.* (BM).

REPUBLIC OF CONGO. Cuvette-Ouest: P.N. Odzala, vielle forêt secondaire à 9 km au N de Lobandza (lisière occidental du Parc), 0°53′ N, 14°5′ E, 15 Jan 1995, *L. Kouka 3* (BR). Lékoumou: near Simonbondo, Ogooué-Leketi proposed National Park, 2°19′ S, 13°39′ E, 5 Oct 2009, *J.-M. Moutsambote et al. 6308* (BR). Pool: Réserve de Chasse de Léfini, banks of the Léfini River near its confluence with the Louna River, ca. 20 km upstream from Mbouanbé, 3° S, 15°28′ E, 24 Oct 1991, *D. W. Thomas et al. 8734* (MO, WAG), 24 Oct 1991, *D. W. Thomas et al. 8735* (MA, MO, US, WAG). Sangha: District de Souanké, ca. 52 km SW of Souanké along Garabinzam road, Map 200,000 Mekambo NA-33-VIII, Bessié village (near "Koulmélen"), 1°56′ N, 13°54′ E, 9 Nov 1991, *D. W. Thomas et al. 8769* (MO, US, WAG).

Notes—*Neostenanthera myristicifolia* can be distinguished from other species of the genus by its fascicled and rarely solitary, extra-axillary, supra-axillary, or ± leaf-opposed,

rarely axillary flowers; the external petals are expanded basally and narrowed apically. The monocarps have an apiculum longer than other species (e.g. *N. hamata*). Flowering pedicels are thickened and widened apically, but not as markedly as in *N. hamata*, being sometimes uniform in shape from base to apex.

Neostenanthera myristicifolia can be confused with *N. hamata* only in fruiting specimens with small, elliptic-oblong leaves, because the monocarps are of similar size. *Neostenanthera myristicifolia* has shorter monocarp stipes and a longer apiculum than *N. hamata*. In flowering specimens, the differences are clear as indicated above (see details under *N. hamata*).

Another species with features similar to *N. myristicifolia* is *N. robsonii*. Both species share the presence of fascicled flowers on the old leafless branches. Although the flowering-fruiting peduncles are clearly dissimilar, ramified in *N. robsonii* and simple in *N. myristicifolia*, intermediate specimens can be found in the species distribution range. These specimens can be distinguished by the monocarps with longer stipes and shorter apicula in *N. robsonii*.

When describing *N. pluriflora,* De Wildeman (1903) indicated the existence of specimens with ± leaf-opposed flowers (*Dewèvre s. n.*). He considered this species distinct from *N. myristicifolia* by its fascicled, extra-axillary flowers. Oliver (1868) mentioned the presence of "1 or 2 pedicels" (flowers?). We have observed that the type specimen of *N. myristicifolia* (*Thomson 134*) has axillary and ± leaf-opposed flowers. *Neostenanthera myristicifolia* and *N. pluriflora* were first considered as synonyms by Le Thomas (1969) based on the variability in flower position.

Neostenanthera myristicifolia is the most widely distributed species in the genus, from Benin and southern Nigeria to the Democratic Republic of Congo. It is also the most variable species. Some specimens from Benin (e.g. *Adjakidjè 4687,* WAG) and Nigeria (e.g., *J. C. Okafor & Latilo FHI57773,* K, MO) with thickened fruiting pedicels and longer monocarps are a bit different from the specimens from Cameroon to the Democratic Republic of Congo (e.g., *A. Léonard 1719,* WAG). We have compared the specimens from both areas, but do not consider the differences worthy of recognition.

4. NEOSTENANTHERA NEUROSERICEA (Diels) Exell, J. Bot. 73(Suppl. 1): 6. 1935. *Stenanthera neurosericea* Diels, Bot. Jahrb. Syst. 39: 483. 1907.—TYPE: CAMEROON. Bipinde, May 1904, *G. Zenker 3105* (holotype: B!; isotypes: BR!, E image!, G!, HBG!, K!, L!, LISC image!, M!, MO!, P image!, S!, WAG!, WU image!, Z!).

Treelet ca. 6 m tall; trunk with dbh unknown; old branches glabrous and young branches pubescent. Leaf lamina (6.5–)12–17(–20.5) × (2.1–)3.9–5.3(–6.2) cm, obovate-oblong to oblanceolate; base cuneate to slightly rounded, apex (5.6–)12.3–16.6(–19.1) mm long, acuminate to attenuate, upper surface glabrescent, greenish, lower surface puberulous, greenish to glaucous; secondary veins (16–)16–17(–21); petiole (2.1–)2.4–3.6(–4.1) mm long, (1.2–)–1.4(–2) mm in diameter, pubescent. Flowers solitary, extra-axillary, ± leaf-opposed, or ± terminal; flowering peduncles ca. 1.4 × ca. 1.8 mm, simple, not ramified, glabrescent to glabrous; flowering pedicels (5.3–)8–9.8(–11.3) mm long, thickened, puberulous; bracteoles 1.1–1.3 × ca. 0.4 mm, glabrescent to glabrous. Sepals (0.7–)0.9–1.4(–1.5) × (1–)1.4–2(–2.6) mm, triangular-ovate, acute, puberulous to glabrescent on both sides. External petals (15.8–)16.3–24.8(–25.2) mm long, with a ± narrow apical part and expanded basal part (basal/apical length ratio = 0.1–0.3), puberulous abaxially; basal part (2.8–)3.1–4.2(–4.4) × 4–4.2 mm, suborbicular and spoon-shaped, glabrescent adaxially; apical part (11.7–)12.5–21.2(–21.6) × 5–6 mm, elliptic to lanceolate, with gradually attenuate, puberulous apex. Internal petals (6.2–)6.2–6.6(–6.8) mm long, contiguous except at base, puberulous abaxially; basal part (4.9–)5–5.4(–5.4) × (2.6–)3.4–4.5(–4.5) mm, glabrescent adaxially; apical part (0.8–)1–1.3(–1.4) × (1.2–)1.3–1.9(–1.9) mm, acute, glabrescent adaxially. Stamens 112–132, 1.8–2 mm long; anthers 1.3–1.7 × 0.3–0.5 mm; connective prolonged above anthers 0.3–0.5 mm, glabrous. Carpels 45–48, 2.3–2.5 × ca. 0.4 mm; style 1–1.2 mm long, straight or slightly curved. Fruits unknown. Figure 4k–o.

Phenology—Flowering is reported in November.

Distribution and Habitat—*Neostenanthera neurosericea* is only known from southern Cameroon (Fig. 2) where it was collected in primary forest.

Vernacular Names—None recorded.

Uses—None recorded.

Specimens Examined—CAMEROON. South Province: Bipinde, 3°14′ N, 10°2′ E, Nov 1913, *G. Zenker 440* (B, C, G, GH, MA, MO, U, US, WAG).

Notes—*Neostenanthera neurosericea* may be distinguished from other congeners by its solitary flowers with external petals widened in their apical part, and short flowering pedicels.

Neostenanthera neurosericea is similar to *N. platypetala* (= *Boutiquea platypetala*), particularly in the indumentum of simple, entangled, ferruginous hairs and the apically widened petals, 5–6 mm wide in *N. neurosericea* and (3.3–)5.6–12.8(–16.2) mm wide in *Boutiquea platypetala*. However, the carpel and stamen numbers, ca. 48 and ca.132, respectively, potentially differentiate it from *Boutiquea platypetala*, with 34–35 carpels and 121–125 stamens.

The genus *Boutiquea* was described by Le Thomas (1965) based on its wider external petals and sessile and basally triangular monocarps, clearly distinct from the stipitate monocarps of *Neostenanthera*. Although flowering specimens are difficult to separate because there is an overlap in flower size in both genera, fruiting specimens are clearly different. In his description of the genus *Boutiquea*, Le Thomas (1965) pointed out the similarity of *B. platypetala* and *N. neurosericea*. This similarity was also noted originally by Diels (1907) when describing *S. neurosericea* in comparison to *S. platypetala*. The type specimens of both species were collected in Bipindi, Cameroon (*Zenker 3105* for *N. neurosericea* and *Zenker 2877* for *N. platypetala*). Unfortunately we did not visit the area to collect more samples and potentially locate fruiting material.

The additional specimen studied, *Zenker 440*, was cited by Pellegrin (1949) and Le Thomas (1965) under *N. platypetala* and *Boutiquea platypetala*, respectively. Because of the absence of fruiting specimens to clarify its position, we prefer to maintain this species until additional material is available.

5. NEOSTENANTHERA ROBSONII Le Thomas, Fl. Gabon. Annonacées, 16: 196, 195 pl. 36. Figures 8–10, 197 Fig. 1. 1969.—TYPE: GABON. Région de Lastoursville, Ndingui, Dec. 1930, *G. Le Testu 8635* (holotype: BM!; isotypes: BM!, BR image!, P image!).

Trees, rarely small trees or treelets (5–)8–20(–25) m tall; trunk with dbh (10–)12–22.8(–30) cm; old branches glabrous and young branches pubescent. Leaf lamina (7.5–)15.8–25.8

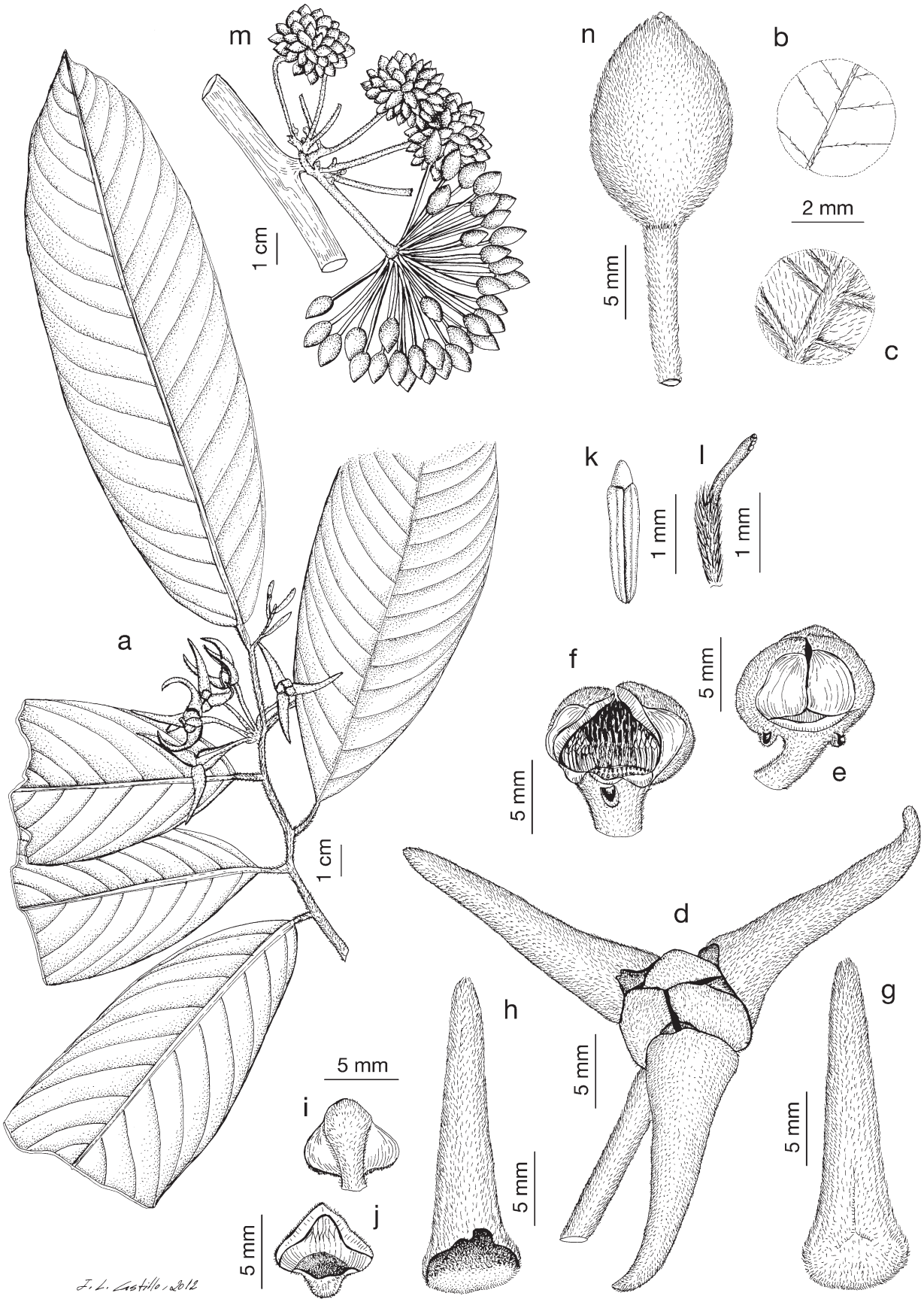

Fig. 6. *Neostenanthera robsonii*. a. Flowering branch. b. Leaf indumentum (adaxial surface). c. Leaf indumentum (abaxial surface). d. Flower. e. Flower (external petals removed). f. Flower (external petals and one internal petal removed). g. External petal (abaxial surface). h. External petal (adaxial surface). i. Internal petal (abaxial surface). j. Internal petal (adaxial surface). k. Stamen. l. Carpel. m. Fruiting branch. n. Monocarp. Based on: a–l, *A. M. Louis et al. 920* (BR-660894); m–n, *J. J. F. E. de Wilde et al. 265* (WAG-71888).

(–31) × (2.8–)5.5–8.7(–10.3) cm, elliptic-oblong; base obtuse to rounded, apex (0.8–)3–7.8(–24.6) mm long, acute to attenuate or acuminate, upper surface glabrescent, greenish, lower surface puberulous, greenish to glaucous; secondary veins (15–)17–21(–24); petiole (7.3–)8.5–10.7(–14.3) mm long, (1.2–)1.6–2.4(–3.1) mm in diameter, pubescent. Flowers usually in fascicles of 2–8, rarely solitary, cauliflorous and on old leafless branches; flowering peduncles (7.3–)8.1–26(–27) × (2.8–)3.1–4.5(–4.6) mm, arbuscle-like, glabrescent to glabrous; flowering pedicels (22–)29.3–42.4(–46) mm long, thickened, pubescent; bracteoles ca. 1 × ca. 0.2 mm, glabrescent to glabrous. Sepals 0.7–1 × 1.2–2 mm, semiorbicular, short-acuminate, puberulous. External petals (16.2–)16.9–21.2(–23.3) mm long, with a ± narrow apical part and expanded basal part [basal/apical length ratio = 0.2–0.4(–0.5)], puberulous abaxially; basal part (4.1–)4.5–5.5(–5.5) × (4.6–)4.9–5.5(–5.6) mm, suborbicular and spoon-shaped, glabrescent to glabrous adaxially; apical part (10.7–)11.6–16.4(–17.8) × (3–)3.4–4.3(–4.6) mm, lanceolate, with gradually attenuate, puberulous apex. Internal petals 5.6–6 mm long, contiguous except at base, puberulous; basal part (4–)4.2–4.7(–4.7) × (4.6–)4.1–6.4(–6.9) mm, glabrous adaxially; apical part (0.8–)0.9–1.7(–1.9) × (1.4–)1.5–2.5(–2.9) mm, acute, glabrescent adaxially. Stamens ca. 164, 1.6–1.8 mm long; anthers 1.2–1.6 × 0.2–0.4 mm; connective prolonged above anthers 0.1–0.4 mm, glabrous. Carpels ca. 144, (1.4–)1.5–1.9(–2) × 0.2–0.4 mm; style 0.6–0.9 mm long, straight or slightly curved. Fruits usually in fascicles of 2–8, rarely solitary, (3.5–)6.2–10.9(–12.3) cm in diameter; fruiting peduncles (5.2–)6.2–14.2(–22.3) cm long; fruiting pedicels (2.5–)3.1–4.7(–6.4) cm long, pubescent in young fruit. Monocarps (19–)53–88(–144), (8.5–)9.9–12.7(–13.9) mm long, (4.9–)6.9–8.9(–10.1) mm in diameter, ellipsoid, with obtuse base and apex apiculum ca. 02 mm long, smooth, pubescent to puberulous or glabrescent; monocarp stipes (5.5–)11.8–40.2(–49.5) mm long, (0.9–)1.2–1.5(–1.8) mm in diameter [monocarp/stipe length ratio = 0.2–0.9(–1.5)]. Seeds (7.1–)8.9–11.1(–11.7) mm long, (4–)6–7.6(–7.9) mm in diameter, ellipsoid. Figure 6.

Phenology—Flowering is reported in February, May, November, and December; fruiting has been reported in January, February, March, May, July, October, and December.

Distribution and Habitat—*Neostenanthera robsonii* can be found in primary, old secondary, and swampy forests, from 200–800 m. It is confined to west central tropical Africa, from southern Cameroon to eastern Gabon (Fig. 3).

Vernacular Names—Gabon: *Ebom* (Fang).

Uses—None recorded.

Specimens Examined—CAMEROON. South Province: Efoulan, au sud d'Akom II (mi-chamin entre Ebolowa et Kribi), 2°46′ N, 10°32′ E, 9 May 2009, *O. Lachenaud et al. 659* (BR).

EQUATORIAL GUINEA. Centro Sur: SO du Parc National de Monte Alén, 2 km au NE du site de traversée du Rio Uolo pour aller aux cataractas, 1°37′ N, 10°48′ E, 17 Feb 2002, *B. Senterre et al. 2389* (BRLU). Wele Nzas: pista forestal entre Eviam y Aconibe, 1°12′ N, 10°49′ E, 18 Mar 2000, *R. Pérez Viso 2089* (MA).

GABON. Estuaire: Cristal Mountains, Forest exploitation Leroy, 20 km NW of Asok, 0°53′ N, 10°12′ E, 26 Jan 1983, *J. J. F. E. de Wilde et al. 265* (BR, MO, WAG). Haut-Ogooué: Haute Ngounyé [Haut-Ogooué], 2° S, 14° E, Jul 1926, *G. Le Testu 5999* (BM, BR). Ngounié: Moumba, côté W, 02°28′ S, 011°32′ E, 1969, *N. Hallé & G. Cours 6094* (BR); Massif du Chaillu, near Mouyanama, about 27 km E of Mimongo, 1°39′ S, 11°46′ E, 26 Nov 1983, *A.M. Louis et al. 920* (B, BR, K, MA, U, WAG); a l'Est de Mouyanama, sur montagne Ngondo, 1°3′ S, 11°53′ E, 8 Mar 1984, *A. M. Louis 1453* (WAG); Massif de Chaillu, au nord-est de Mouila, chantier Leroy, 1°4′ S, 11°15′ E, 25 Apr 1989, *G. MacPherson 13936* (MO); just SW of Evouta village, along old forestry track, 1°3′ S, 11°11′ E, 22 Mar 2007, *M. S. M. Sosef et al. 2493* (WAG); 4 km N de Yeno, 1°38′ S, 11°29′ E, 23 Apr 1986, *C. Wilks 1270* (WAG). Nyanga: UFA CBG Mayumba, Sud-ouest du Mont Pelé (chaîne montgneuse du Mayumba), 3°16′ S, 11°7′ E, 6 Oct 2002, *J. L. Doucet et al. AB 27* (BR); Pélé Mountains, ca. 27 km on the road Tchibanga-Moulengui Binza (counted from the bifurcation with road to Mayumba), village Birougou, and then 12 km on a track in SW direction to village Bikamba, from there following track in direction of the hills, 3°16′ S, 11°17′ E, 5 Apr 2009, *M. S. M. Sosef et al. 2635* (WAG). Ogooué-Ivindo: Lopé Reserve, Soforga 3, 0°15′ S, 11°4′ E, 1989, *L. J. T. White 250* (MO); Lopé Reserve, Camel, 0°15′ S, 11°4′ E, 24 Jul 1994, *L. J. T. White 1159* (MO, PRE, WAG). Woleu-Ntem: Mission Otouma, 0°13′ N, 10°56′ E, 15 Feb 1992, *J. Dibata & Mbouissou 973* (BR, G, PRE, US, WAG); Chantier Rougier-Ocean, Oveng, 0°4′ N, 11°22′ E, 8 May 1985, *J. M. Reitsma et al. 892* (NY, WAG); 0.5 km N of Tchimbélé, 0°37′ N, 10°24′ E, 2 May 1990, *J. J. Wieringa 820* (WAG).

Notes—*Neostenanthera robsonii* is easily recognized by its cauliflorous inflorescences, on the trunk and old leafless branches, with ramified and arbuscle-like peduncles. Flowers are fascicled (2–8), rarely solitary. The external petals are also characteristic, with an apical part lanceolate, gradually attenuate apically, and thickened. The transverse section of the external petals is rounded or elliptic in contrast to ± linear in other species of the genus. The internal petals appear to curve inward.

Neostenanthera robsonii has been confused with *Boutiquea platypetala* because both species have similar indumentum and leaves (Le Thomas, 1969). They can be separated by the position of the inflorescences, cauliflorous in *N. robsonii* and ramiflorous in *B. platypetala*; the shape of the petals, elliptic in both species but widened in *B. platypetala;* and the fruits, ellipsoid in *N. robsonii* and conical in *B. platypetala.*

Neostenanthera robsonii is also similar to *N. myristicifolia* with fascicled flowers, sometimes on the leafless branches, but on short and simple peduncles, never ramified or arbuscle-like as in *N. robsonii*.

We found only one specimen from Equatorial Guinea (*Senterre & al. 2389,* BRLU) that does not match well with *N. robsonii*. The external petals are more flattened, and the leaves are elliptic and long-acuminate. We believe this specimen should remain under *N. robsonii* until additional material becomes available.

When describing *N. robsonii,* Le Thomas (1969) selected as type material the collection of *Le Testu 8635* (BM, P), previously misidentified by Pellegrin (1949) as *N. macrantha*, now considered synonymous with *Boutiquea platypetala.*

Excluded Names

Neostenanthera zenkeri Diels, nom. nud., in sched. (K!) [= *Boutiquea platypetala* (Engl. & Diels) Le Thomas].

Stenanthera macrantha Mildbr. & Diels, Bot. Jahrb. Syst. 52: 445. 1915. *Neostenanthera macrantha* (Mildbr. & Diels) Exell, J. Bot. 73(Suppl. 1): 6. 1935. [= *Boutiquea platypetala* (Engl. & Diels) Le Thomas].

Stenanthera platypetala Engl. & Diels, Bot. Jahrb. Syst. 39(3–4): 482. 1907. *Neostenanthera platypetala* (Engl. & Diels) Pellegr., Bull. Soc. Bot. France 1949: 56. 1949. [=*Boutiquea platypetala* (Engl. & Diels) Le Thomas].

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