

# Novitates Gabonenses 83. Two new species of *Cola* (Sterculiaceae s.str.) from Gabon with an introductory note on the subdivision of the genus

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**Background and aims** – The existing subdivisions of the large genus *Cola* of the Sterculiaceae s.str. are briefly presented and their usefulness as regards the identification of newly acquired material is discussed.

**Material and methods** – Normal practices of herbarium taxonomy have been applied to study all herbarium available mainly at BR, K, LBV, P, and WAG.

**Key results** – Two new species of *Cola* from Gabon are described. They belong to a group of species that have only shortly-petioled leaves. A key to and a synopsis of the five species of this group in Gabon is presented. The two new species and *C. letestui*, which also has only shortly-petioled leaves, are illustrated.

**Key words** – Sterculiaceae, *Cola*, subdivision, Gabon, tropical Africa, new species.

## INTRODUCTION

The African genus *Cola* with 100–125 species (Cheek 2002) is much in need of a thorough revision. The genus, at least for Lower Guinea, is far from being well known. The following may be illustrative for this situation. Prior to the taxonomic treatment of *Cola* for the second edition of the Flora of West Tropical Africa (FWTA) (Keay & Brenan 1958), Brenan & Keay (1956) described nine new species for this flora. Of their new total of 42 species for the genus in this flora eight occur in Upper Guinea, 22 in Lower Guinea, and 12 species in both subdivisions. However, in addition to these 42 species, two species were mentioned as being imperfectly known and seven entities (species A–G) were added representing unidentified material. The same picture is apparent for Gabon. Since the publication of a treatment of the genus *Cola* for the Flore du Gabon (Hallé 1961) only one new species, *Cola lizae* N. Hallé (Hallé 1988), has been added to that country's flora, but the *Checklist of Gabonese Vascular Plants* (Sosef et al. 2006) listed 120 unidentified collections, of which, at least some, may represent new species. Identification of new material often is hampered by the lack of a good structure within this large genus, i.e. a subgeneric division, whether at subgeneric or sectional level or even below it.

Schumann (1900) monographed *Cola* and divided it into six subgenera: *Protocola* K.Schum. with one species, *Chlamydocola* K.Schum. also monotypic, *Haplocola* K.Schum. with 19 species, *Cheirocola* K.Schum. and *Autocola* K.Schum. each with five species, and, finally, *Anomocola* K.Schum. also with one species only, 32 species in total.

The subgenus *Autocola* contains the type of the genus, *Cola acuminata* (P.Beauv.) Schott & Endl., and should now be called subgenus *Cola*.

Chevalier & Perrot (1911) recognised forty species of *Cola*. They discussed Schumann's subdivision, repeatedly mixing up the ranks subgenus and section (also, at least once, by Schumann in 1902), and translated Schumann's key to the subgenera into French. They found that the subgenus *Anomocola* should be united with *Autocola*, because the single species of the former (*C. anomala* K.Schum.) is considered to be a synonym of *C. verticillata* (Thonn.) Stapf ex A.Chev. (= *C. vera* K.Schum. = *C. nitida* (Vent.) Schott. & Endl.) of the latter. As regards Schumann's *Autocola*, the subgenus with the cultivated species, they proposed a subdivision in two sections (subgenera?): *Eucola* for the two cultivated species *C. acuminata* and *C. vera* K.Schum. (= *C. nitida* (Vent.) Schott & Endl.) and *Macrocola* for the remaining three species.

Baker (1913) adopted Schumann's subdivision and added a new subgenus *Schizocola* to accommodate *Cola schizandra* Baker f. Pellegrin (1921) and Exell (1927) referred to Schumann's subgenera as sections. Schumann's subdivision was scarcely mentioned by Pellegrin (1951) in his taxonomic work on the 44 species of *Cola* he recognised as occurring in Gabon.

Hallé, prior to his treatment of the Sterculiaceae for the Flore du Gabon (Hallé 1961), presented a new subgeneric division of *Cola* at the AETFAT meeting in Lisbon in 1960. His subdivision, published two years later (Hallé 1962), includes eight subgenera, as well as some sections, and was employed by him in his flora treatment, counting 33 species in *Cola*.

and two in *Chlamydocola*, the former subgenus of Schumann with the same name. Hallé's subdivision works very well in the identification of Gabonese material, and it may, when adapted, be useful for a much larger area. However, the rules of botanical nomenclature were not fully respected. Hallé's new subgenera and sections were not accompanied by a Latin description or diagnosis and were therefore not validly published. One of the species classified by Hallé under the subgenus *Neocourtenia* N.Hallé is *Cola caricifolia* (G.Don) K.Schum., the only species mentioned and hence the type of the older subgeneric name *Protocola* K.Schum., which renders *Neocourtenia* superfluous. Another and last example of Hallé's erroneous application of the rules is the following. For *Cheirocola* K.Schum., Hallé did not designate one of the five original species as the (lecto-) type, but *Cola rostrata* K.Schum. a species that was published two years later than the subgenus concerned.

SYSTEMATICS

As was emphasized in the introduction, Hallé's (1962) subdivision of *Cola*, although with invalidly published subgeneric names, proves to be very valuable in the identification of new material from Gabon. The species of Hallé's subgenus *Pseudobichea* as treated for the Flore du Gabon (Hallé 1961), are keyed out in two groups, one with leaves with short petioles only, the other with short- and long-petioled leaves on the same specimen. In the first group three species are listed, *Cola cauliflora* Mast., *C. letestui* Pellegr., and *C. mayimbensis* Pellegr. (≠ *C. mayumbensis* Exell, Exell 1927) of which the first species is substituted for Gabon by *C. elegans* Pierre ex Breteler (Breteler in press). Species of this group can easily be distinguished from other *Cola* species, by this short-petioled leaf character, which renders the publication of new species not precarious. The group was enriched by three new species from western Cameroon, from a forest between the Cross River of extreme southeastern Nigeria and the Mungo River of western Cameroon (the eastern boundary of FWTa). This small area, which accounts for c. 1% of the total FWTa area, includes 28 of the 42 *Cola* species in FWTa (Cheek 2002). Current identification activities for the Gabonese flora revealed two different, flowering *Cola* collections with short-petioled leaves that proved to be dis-

tinct from the existing species of this group (table 1). They are described as new species below.

The apparent level of endemism for Gabon as regards *Cola*, eight species in Hallé's flora treatment of 1961 plus two imperfectly known species and *C. lizae*, increases to 13 by the publication of the two new species. Of these endemics six species are only known from a single collection. Although Gabon is now much better explored than in 1961 when Hallé's flora contribution appeared, many relatively small, and often remote areas remain under-collected. Given that several *Cola* species apparently inhabit small areas (Cheek 2002, 2007) and that they are easily overlooked because of their small flowers (fruiting specimens are usually more distinct) it is expected that the Gabonese flora will yield more novelties following further exploration and identification of existing collections.

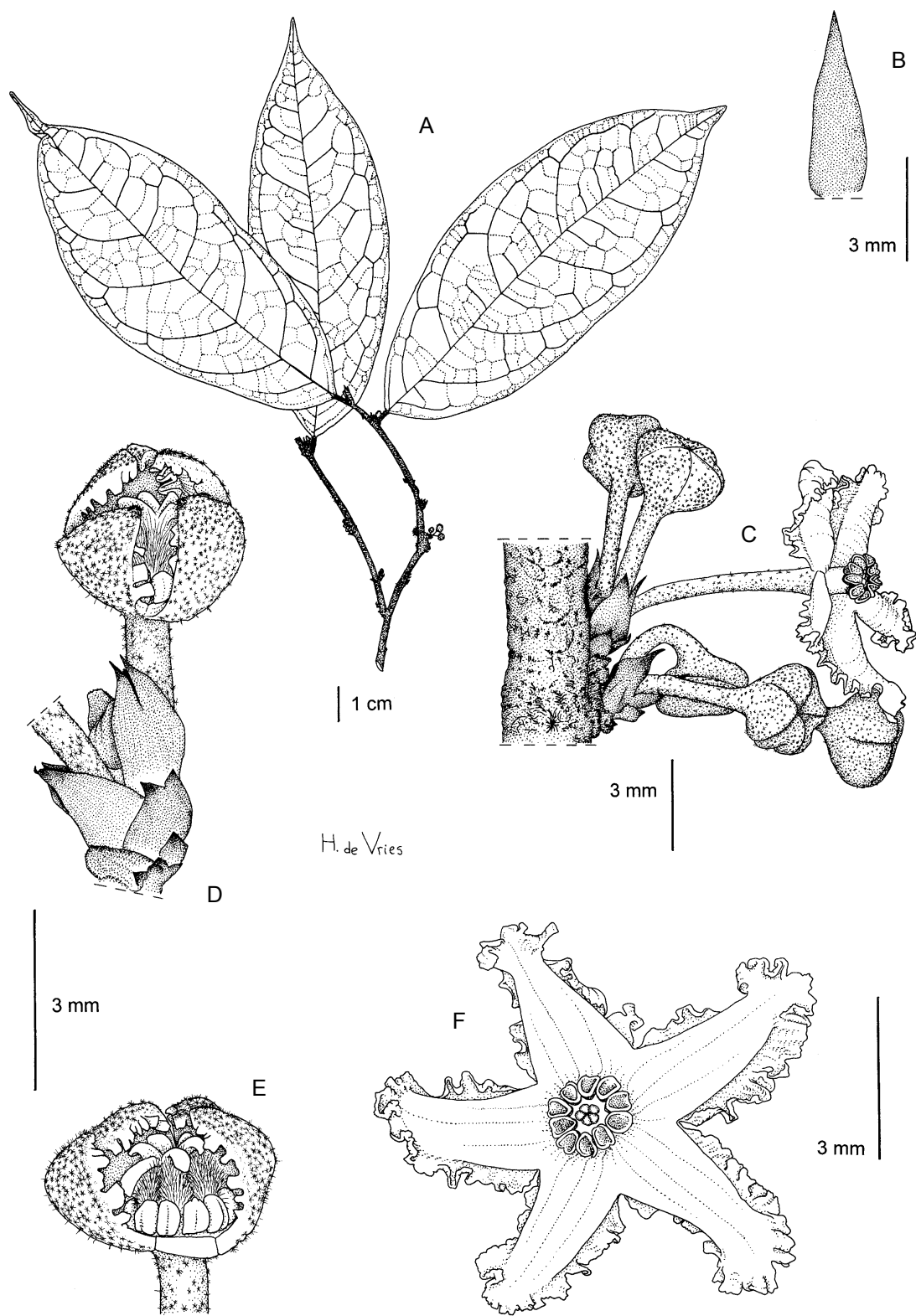
*Cola moussavoui* Breteler, sp. nov.

By the size and shape of the flowers with undulate calyx margins resembling *Cola micrantha* K.Schum. and *C. suboppositifolia* Cheek, differing from both these species by the alternate not subopposite or rosulate leaves, the larger, glabrous bracts and bracteoles, and the shorter androgynophore. – Type: Gabon, Ngounié, Bindolo R. basin, NW of Fougamou, 1°15'S 10°29'E, 20 Sep. 1997, *Breteler, Leal, Mous-savou & Nang* 14011 (holo-: WAG, 2 sheets).

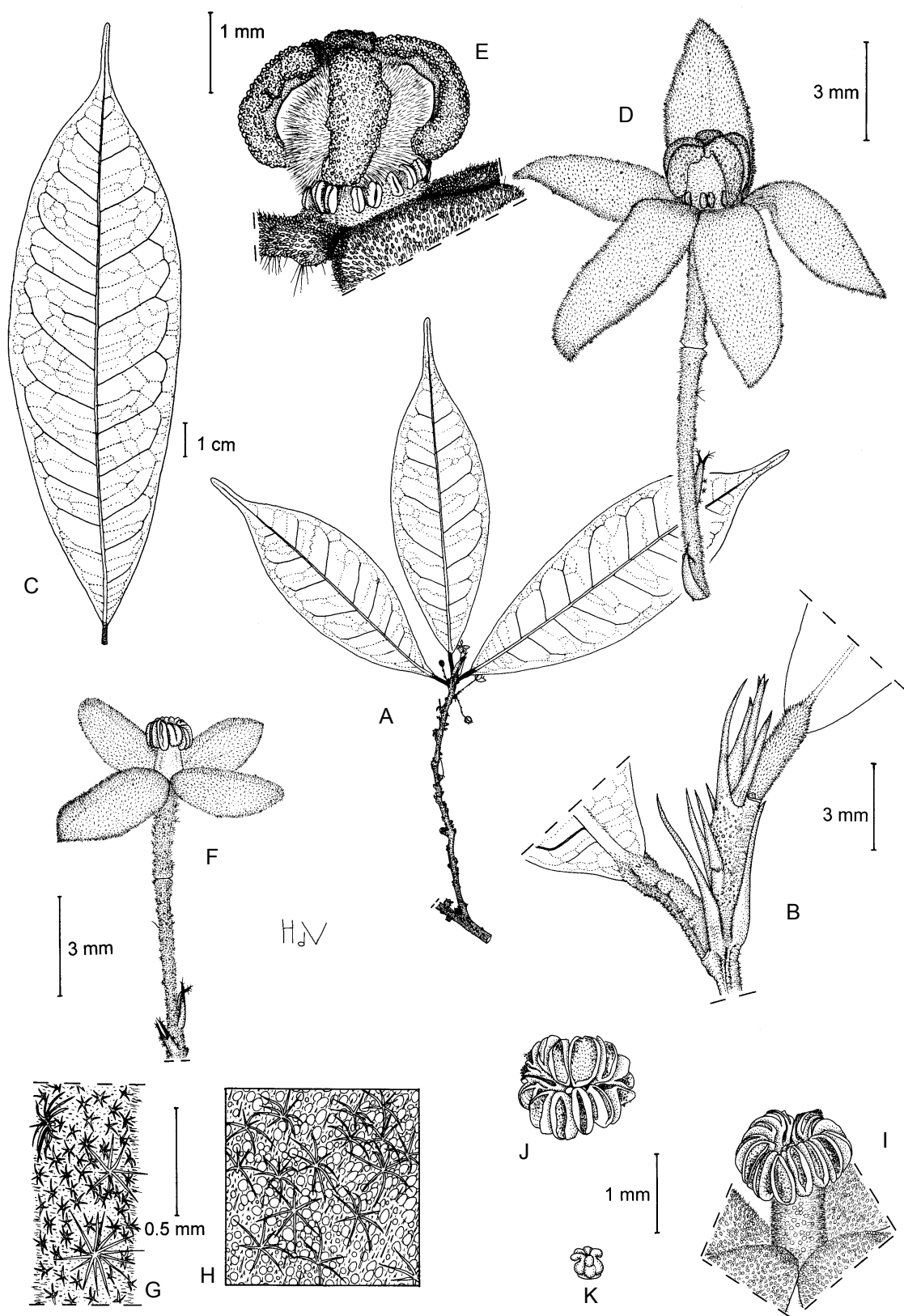
**Shrub** 2 m tall. Branchlets puberulous, glabrescent. **Stipules** caducous, triangular, 3–4 × 1–2 mm, appressed-pubescent. **Leaves** alternate: petiole subterete, grooved above or not, 5–7 mm long, puberulous, soon glabrescent; lamina ± papery, elliptic, 2.5–3 times as long as wide, (9–)12–20 × 3–7 cm, broadly rounded at base, 1–1.5(–2) cm acuminate at apex, glabrous both sides except for a few sparse hairs mainly on the midrib beneath; midrib and the 7–8 pair of main lateral nerves prominent both sides. **Flowers** fascicled, arranged in 3-flowered cymes situated below the leaves; bracts and bracteoles brown, glossy, glabrous, elliptic-ovate, 1–2 mm long, sometimes bilobed at the apex. **Male flower**: pedicel 4–5 mm long, articulated at or below the middle, ± sparsely, minutely stellate-hairy; calyx 1.5–2 mm long; sepals elliptic, shortly united at base, 2.5–3 × 1–1.5 mm, inner margin lobulate-undulate, hairy as pedicel outside, glabrous

Table 1 – Comparison of the two new Gabonese *Cola* species (names in bold) with the morphologically related *Cola* species from western Cameroon.

	<i>C. micrantha</i>	<i>C. moussavoui</i>	<i>C. stigmatosa</i>	<i>C. suboppositifolia</i>
leaves	rosulate	alternate	alternate	subopposite
bracts & bracteoles	≤ 1 mm long, stellate-hairy	1–2 mm long, glabrous	1–2(–3) mm long, stellate-hairy	0.5–1 mm long puberulent
sepals	united at base	united at base	free or nearly so	united at base
sepal margin	undulate	undulate	straight	undulate
androgynophore	1–2 mm long	c. 0.8 mm long	c. 1 mm long	2–3.5 mm long
stigmas	minute, ± sub-capitate, ≤ 0.5 mm long	small, spreading to reflexed, < 1 mm long	large, 1.5 mm long, sharply reflexed, clasping the ovaries	capitate < 1 mm long
area	western Cameroon	Gabon	Gabon	western Cameroon



**Figure 1** – *Cola moussavoui*: A, branchlet with flower buds; B, stipule; C, inflorescence with open male flower; D, part of inflorescence with female flower; E, female flower, one sepal removed; F, male flower from above. A–F from Breteler *et al.* 14011 (WAG). Drawn by H. de Vries



**Figure 2** – *Cola stigmatosa*: A, flowering branchlet; B, apical part of branchlet showing stipules; C, large leaf; D, female flower; E, idem, sepals removed; F, male flower; G, detail of male pedicel showing indumentum; H, detail of sepal indumentum inside; I, androgynophore; J, androecium; K, pistillodes. A–K from Bissiengou *et al.* 418 (WAG). Drawn by H. de Vries.

inside; androgynophore c. 0.8 mm long, glabrous; anthers 5,  $\pm$  sessile; sterile carpels minute,  $\pm$  glabrous. Female flower: pedicel 3–3.5 mm long, articulated below the middle, indumentum as in the male; calyx as in the male flower; carpels 5(–6), 1–1.5 mm long, sessile, densely stellate-hairy; stigmas sessile, oblong, spreading to reflexed; staminodes at base of capels 5, sessile, glabrous. Fruits unknown. Fig. 1.

**Habitat and distribution** – Gabon, tropical rain forest in the Bindolo R. basin NW of Fougamou.

**Etymology** – The species is named after Jean-Mathieu Moussavou, field botanist and technician of the Herbar National du Gabon, one of the collectors of the type material.

### *Cola stigmatica* Breteler, sp. nov.

By the flower size and shape similar to *Cola micrantha* K.Schum., *C. moussavoui* Breteler, and *C. suboppositifolia* Cheek, differing from these three species by the free or nearly free sepals without undulate margin and by the large stigmas clasping the ovaries. – Type: Gabon, Nyanga, c. 41 km on Tchibanga-Mayumba Rd., 3°4.6'S 10°44.1'E, 21 Oct. 2009, Bissiengou, Breteler, Niangadouma & Boussiengui 418 (holo-: WAG, 2 sheets; iso-: BR, G, K, LBV, MA, MO, P).

Shrub 6 m tall. Branchlets pubescent, glabrescent. Stipules caducous, narrowly triangular to subulate, (2–)3–7 mm long, pubescent, soon glabrescent. Leaves alternate: petiole subterete, 4–7 mm long, densely pubescent; lamina narrowly elliptic to slightly obovate, 3–3.5 times as long as wide, (5–)9–15(–20)  $\times$  (1.5–)3–5(–6) cm, cuneate at base, caudate at apex, the acumens (1–)1.5–2.5 cm long; glabrous both sides except for an extension of the petiole indumentum on the midrib, the latter and the (8–)10–13 (–15) pair of main lateral nerves as well as the reticulate, tertiary venation prominent both sides. Flowers solitary or arranged in 2(–3?)-flowered fascicles; bracts narrowly triangular to subulate, 1–2(–3) mm long, sparsely stellate-pubescent, glabrescent; bracteoles inserted on the lower part of pedicel, narrowly triangular, often bilobed at the apex, 1–1.5 mm long, sparsely stellate-hairy. Male flower: pedicel 8–11 mm long,  $\pm$  densely stellate-hairy, usually articulated in the upper half, the lower part as long as to twice as long as the upper part; sepals 4–5, free or nearly so, spreading to slightly reflexed, elliptic, 4–6  $\times$  2–3 mm, densely stellate-hairy outside, papillate and stellate-hairy inside, papillate only near base; androgynophore c. 1 mm long,

stellate-hairy; anthers 8–10; carpellodes minute, glabrous. Female flower: pedicel and calyx as in the male flower; carpels 4–5, sessile, 1.5–2 mm long; ovaries densely stellate-hairy; stigmas sharply reflexed, clasping the ovaries, c. 1.5 mm long. Sterile anthers 8–10, minute, 0.5 mm long. Fruits unknown. Fig. 2.

**Habitat and distribution** – Gabon, exploited rain forest between Tchibanga and Mayumba. Alt. c. 100 m.

**Etymology** – The epithet '*stigmatica*' refers to the relatively large, conspicuous stigmas of this new species of *Cola*.

**Note** – *Cola cecidiifolia* Cheek (2002), published without a description of the flowers, differs from the two new species described above by the much longer petioles, 7–15 mm long, pulvinate at both ends, versus 4–7 mm long and without distinct pulvini or with one, continuous pulvinus only. *Cola metallica*, the other species published by Cheek (2002) on fruiting material only, can be distinguished by the metallic dark grey or metallic blackish green colour on the lower leaf surface.

**Conservation status** – The conservation status of both new species cannot be calculated because of deficient data (DD). However, the areas from where the type material of the new species was collected do not suffer under population pressure or under severe forest exploitation.

### Synopsis of the Gabonese short-petioled *Cola* species

1. *Cola elegans* Pierre ex Breteler (Breteler in press). – Type: Gabon, near Libreville, Apr. 1903, Klaine 3292 (holo-: P).

**Distribution** – W Gabon and western Republic of the Congo.

**Note** – This species is the same as described by N. Hallé in the Flore du Gabon 2 (Hallé 1961) under the name *Cola cauliflora* Mast. It is illustrated in Breteler (in press).

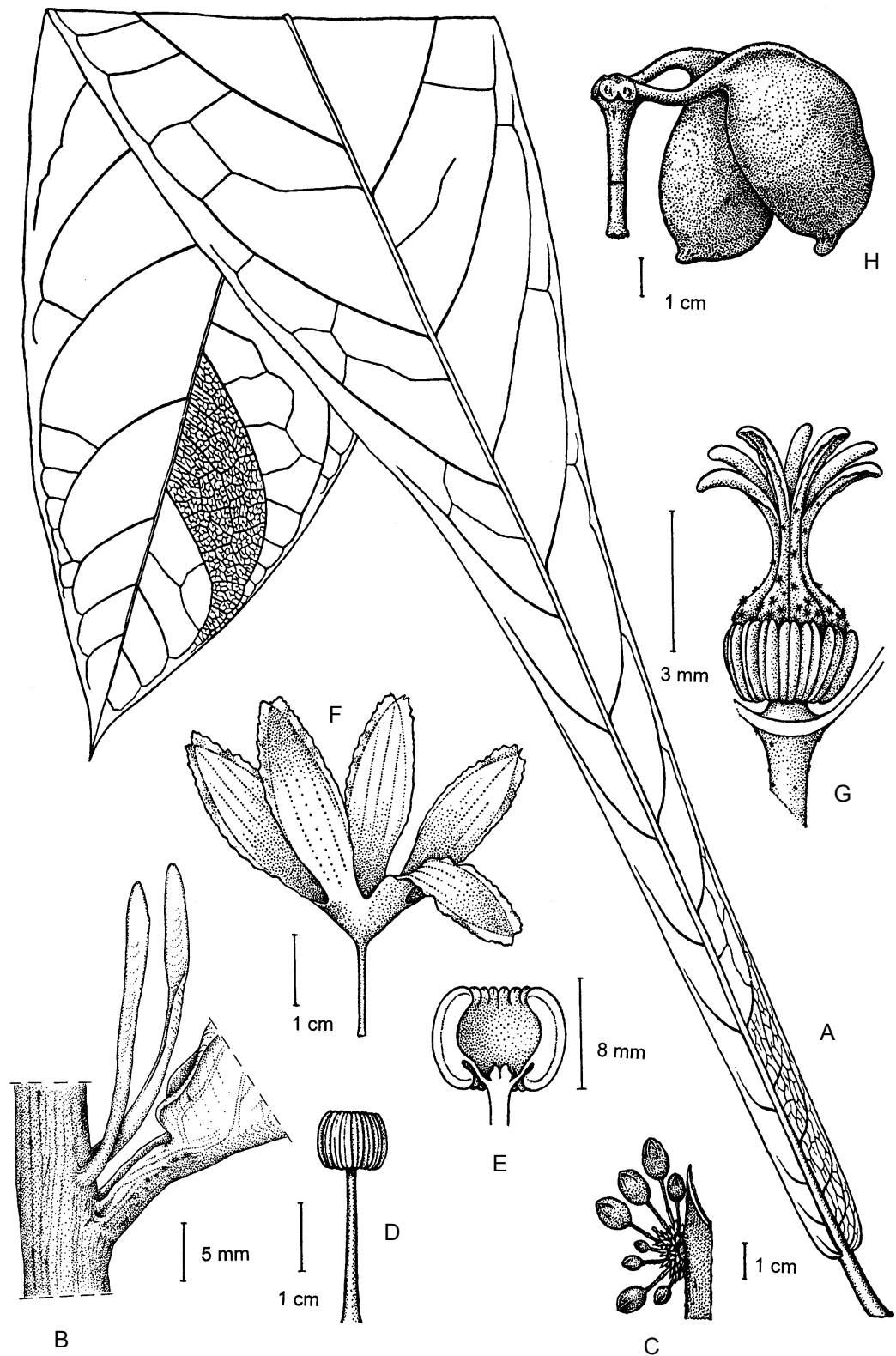
2. *Cola letestui* Pellegr. (Pellegrin 1921: 445; 1951: 38); Hallé (1961: 70). – Type: Gabon, Ngounié, forêt des Echiras, 10 Oct. 1912, Le Testu 2325 (holo-: P). Fig. 3.

**Distribution** – Endemic to Gabon.

**Additional specimens examined from Gabon** – Ogooué-Ivindo, au pied de la Montagne du Casque, 10 Oct. 1983, Floret et al. 1814 (WAG); Ngounié, SW of Fougamou, Koumounabwali Massif, 1°18'S 10°25'E, 11 Dec. 1995, J.J. de Wilde et al. 11542 (WAG); Ogooué-Lolo, Lastoursville region, 1929, Le Testu 7472 (WAG);

### Key to the Gabonese *Cola* species with shortly petioled leaves only

1. Leaves 20–70  $\times$  6–18 cm, tapering from above the middle to a narrow, rounded base; stipules narrowly triangular to linear, 15–20 mm long.....2 *C. letestui*
1. Leaves 5–30 cm long, differently shaped, either with a cuneate base, or hardly tapering and with a broadly rounded base; stipules to 5 mm long.....2
2. Leaves with 5–7(–8) pair of main lateral nerves.....3
2. Leaves with (8–)10–15(–20) pair of main lateral nerves.....4
3. Leaves 5.5–12(–14)  $\times$  1.7–4.5 cm; calyx 4–7 mm long; carpels 3–3.5 mm long.....3 *C. mayimbensis*
3. Leaves (9–)12–20  $\times$  3–7 cm; calyx 1.5–2 mm long; carpels 1–1.2 mm long.....4 *C. moussavoui*
4. Sepals  $\pm$  free, spreading; petioles pubescent.....5 *C. stigmatica*
4. Sepals distinctly united for  $\frac{1}{3}$  to  $\frac{1}{2}$  of their length; petioles glabrous.....1 *C. elegans*



**Figure 3** – *Cola letestui*: A, leaf; B, leaf axil with stipules; C, young cauliflorous inflorescence; D, androgynophore; E, androecium cut lengthwise; F, open female flower; G, female flower, calyx removed; H, carpels in fruit. A from *Le Testu* 5120 (P); B from *van der Maesen et al.* 5759 (WAG); C & H from *Le Testu* 7504 (P); D–G from *Le Testu* 2325 (P). A, C–H drawn by N. Hallé. B drawn by H. de Vries.

Estuaire, S of Ekouk, 3 Nov. 1983, *A.M. Louis et al.* 342 (WAG); Ogooué-Lolo, 21km SW of Lastoursville, 22 Nov. 1988, *van der Maesen et al.* 5759 (WAG).

**3. *Cola mayimbensis*** Pellegr. (Pellegrin 1950: 189; 1951: 38); Hallé (1961: 66). – Type: Gabon, Lastoursville region, Mayimba, Dec. 1929, *Le Testu* 7765 (holo-: P; iso-: WAG).

**Distribution** – Endemic to Gabon.

**Additional specimens examined from Gabon** – Ogooué-Ivindo, Bélinga, 16 Nov. 1964, *N.Hallé* 383 (P); Ogooué-Lolo, Lastoursville, Nov. 1929, *Le Testu* 7643 (BR).

**4. *Cola moussavoui*** Breteler (this paper).

**Distribution** – Endemic to Gabon. Only known from the type specimen.

**5. *Cola stigmatisata*** Breteler (this paper).

**Distribution** – Endemic to Gabon. Only known from the type specimen.

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