

The genus *Cola* in southern Africa

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ABSTRACT

The two species of *Cola* that occur in southern Africa are reviewed. *C. natalensis* Oliv. is endemic, but *C. greenwayi* Brenan has mainly a tropical east African distribution with the eastern Transvaal and northern Zululand specimens being the most southerly records. A study of the available material from tropical east Africa and southern Africa supports the view that *C. microcarpa* Brenan is synonymous with *C. greenwayi*.

RÉSUMÉ

LE GENRE COLA EN AFRIQUE AUSTRALE

Les deux espèces de *Cola* que l'on trouve en Afrique australe sont révisées. *C. natalensis* Oliv. est endémique, mais *C. greenwayi* Brenan a surtout une distribution tropicale Est africaine avec les spécimens du transvaal oriental et du Zululand septentrional étant ceux qui ont été enregistrés comme les plus méridionaux. Une étude du matériel disponible d'Afrique tropicale de l'Est et de l'Afrique australe soutient l'opinion que *C. microcarpa* Brenan est synonyme de *C. greenwayi*.

COLA

Cola Schott & Endl., Melet. Bot. 33 (1832); Benth. & Hook. f., Gen. Pl. 1: 218 (1862); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 110 (1900); Wild in F.Z. 1: 558 (1961); nom. cons. (I.C.B.N. 1956); R. A. Dyer, Gen. 1: 365 (1975). Type species: *C. acuminata* (Beauv.) Schott & Endl.

Trees dioecious or monoecious, or occasionally with bisexual flowers. *Leaves* alternate, entire or lobed, petiolate; petioles often with a swollen apical portion (pulvinus). *Inflorescence* cymose or flowers in the axils of the leaves, or on branchlets between the leaves, solitary or clustered, sometimes on old wood;

unisexual, occasionally bisexual. *Calyx* 4-5(-6) lobed *Petals* absent. *Male flower*: stamens usually 10, united into a column, bearing sessile anthers in 1 or 2 rings around the apex, vestigial carpels often sunk in the top of the androphore column. *Female flower*: carpels (3)-4-5 (-10), cohering at first with a ring of rudimentary stamens at the base; ovules several to many per carpel; styles as many as the carpels. *Fruit* splitting into 4-5 carpels or sometimes 1 or more aborting. *Seeds* exendospermous; cotyledons thick, 2 or more.

Species over 100, all African. Two species occur in South Africa.

KEY TO SPECIES

- Petiole with apical swollen portion glabrescent; fruit obovate, up to about 4 cm long, rind hard and thick 1. *C. natalensis*
- Petiole with apical swollen portion tomentose; fruit subglobose to oblique ellipsoid, 1 x 1,3-1,8 x 2 cm, rind at maturity rather thin and brittle 2. *C. greenwayi*

1. *Cola natalensis* Oliv. in Hooker's Icon. Pl. 14: 70, Plate 1390 (1882); K. Schum. in Engl., Monogr. Afr. Pfl. 5: 114 (1900); Sim, For. Fl. Cape Col. 144, Plate 17, f.3 (1907). Type: Inanda, Natal, *Medley Wood* 321.

Tree 3-15 m high, evergreen, monoecious or dioecious, 'bark flaking off in small patches'; branchlets glabrescent. *Stipules* early caducous, not seen except on seedlings, subulate-acuminate, ± 6 mm long. *Leaves* simple, entire; blade obovate-elliptic, usually narrowly so, shortly and broadly narrowing to, or acuminate at, the apex, narrowing from above the middle to the base, 7-20 cm long, 1-6,5 cm broad, glabrous at maturity, young leaves sparsely stellate with short hairs, midrib prominent, especially on under surface, with 7-12 or more distinct lateral nerves; petioles 1-4 cm long, with a slight thickening (pulvinus), 5-10 mm long, at the apex; pulvinus glabrescent. *Inflorescence* 1-flowered, axillary, solitary or fasciated, or from below leaves and on old wood, usually clustered on a much ab-

breviated shoot, 2 to several in a cluster; bracts at base, 1,5-2 mm long, 1,5-2 mm broad, early deciduous; pedicels 3-7 mm long, up to 1 mm diam., articulated about midway, and with scars of 1-2 bracts; densely stellate-tomentose at first, hairs short, less than 0,5 mm long, light or dark brown. *Calyx* 5-lobed almost to base, densely brown stellate-pubescent without; lobes 4-8 mm long 1,5-4,5 mm broad, lepidote within and with a few scattered brown stellate hairs in upper half. *Male flower* with staminal-tube glabrous or minutely stellate in basal portion, 1,5-5 mm long, anthers 8 in 1 row at the apex, cells parallel, 1 mm long, rudimentary ovary and 5 styles in anther ring. *Female flower* with sessile ovary, 4-5 carpellate, about 2 mm diam., with a ring of rudimentary stamens round the base; styles 5, sometimes fewer, with club-shaped recurved, stigmas; ovules 2 or 3 in each cell. *Carpels* 4-5, or by abortion fewer, obovate-globose, about 4 cm long, 3 cm diam., densely microscopically scaly and stellate-pubescent, hairs very short or worn off, rind hard (often tuberculate through insect activity), ripe fruit orange to salmon yellow, glutinous inside; seeds 2, or sometimes 3, cotyledons thick, creamy white and

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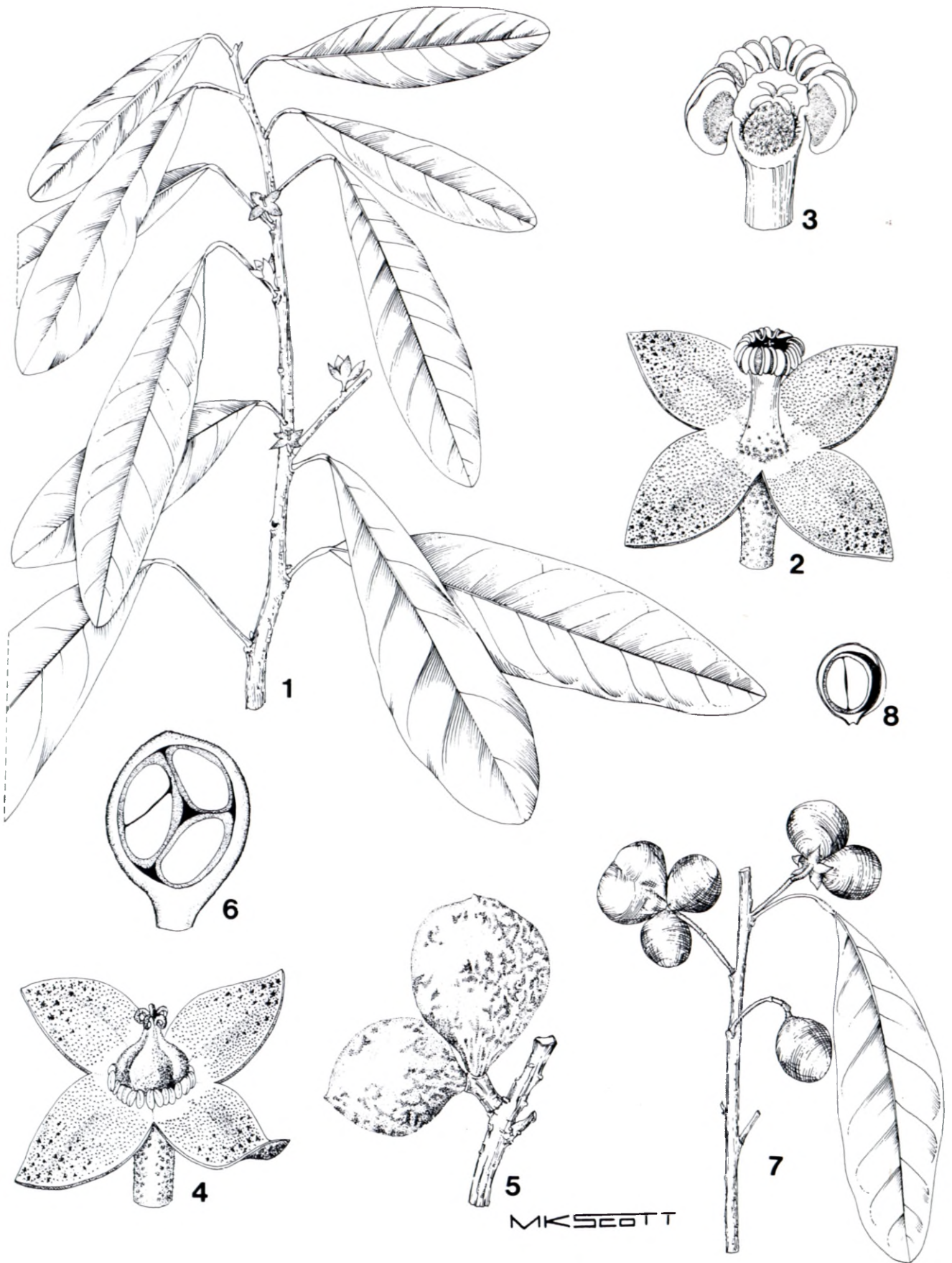


FIG 1.—*Cola natalensis* 1–6. 1, flowering twig with male flowers, $\times 0,8$ (Ward 5623); 2, male flower, $\times 5$ (Ward 5622); 3, androphore with front stamen removed to expose the rudimentary ovary, $\times 12$ (Ward 5622); 4, female flower, $\times 5$ (Moll 3211); 5, fruiting twig, $\times 0,8$ (Ward 2623); 6, longitudinal section of carpel, $\times 0,8$ (Ward 2623). *C. greenwayi* 7–8. 7, fruiting twig with comparatively smaller carpels, $\times 0,8$; 8, longitudinal section of carpel showing the comparatively thin rind, $\times 0,8$. (7 & 8, Garland sub PRE 47565.)

deep pinkish red tinged on inner face and with resinous ducts, in part minutely stellate-pubescent. Fig. 1.

Found in dense forest along coast in the Transkei and Natal as far north as Mtunzini.

TRANSKEI.—Lusikisiki: Intafufu, *Campbell*, sub *Sim* 2627. Port St Johns: Noxolweni Forest, *Mogg* 13066; St Johns River, *Pole Evans* H. 18047.

NATAL.—Durban: Bluff (?), *Medley Wood* s.n.; Inanda: *Medley Wood* 1500; Umhlanga, *Marais* 797; *Story* 4152. *Watmough* 443; *Cheadle, Johnson & Wells* 686; *Moll* 1810. Mtunzini: Ngoya Forest, *Edwards* 121.

The fruit is said to be inedible. Wood durable. Related to the tropical species *C. clavata*, but differs principally in the large, less numerous flowers. In *C. clavata*, the flowers arise from numerous abbreviated shoots on the old wood as well as in the axils of the leaves. It differs from *C. mossambicensis*, the other species that occurs in Mozambique, mainly in the texture of the leaves, the subglabrescent fruits and the glabrescent pulvinus.

2. *Cola greenwayi* *Brenan* in *Kew Bull.* 1956: 147 (1956); *Wild* in *F.Z.* 1: 560 (1960); *Drummond* in *Kirkia* 10: 260 (1975); *Palgrave*, *Trees of Sth. Afr.* 598 (1977). Type: Tanzania, Mkuzi, *Greenway* 7891 (K, holo.!).

C. microcarpa *Brenan* in *Kew Bull.* 1956: 147 (1956); *Palmer & Pitman*, *Trees of Sth. Afr.* Vol. 2, 1491 (1972). Type: Tanzania, Turiana, *Sensei* 1466 (K, holo.!).

Tree 3–20 m high, monoecious or dioecious; young branchlets russet to light cinnamon brown or grey tomentose at first, mixed with stellate or bunched hairs which fall readily. *Stipules* very soon falling, subulate-lanceolate to linear, 3–6 mm long, dark to light-brown or grey tomentose. *Leaves* simple, entire, blade elliptic to narrowly obovate-elliptic, narrowing to base and apex, 4–15 cm long, 1,4–5 cm broad, glabrous at maturity, midrib slender, prominent on both surfaces, with usually 7–18 main lateral veins, distinct to prominent on lower surface; petiole 0,5–5,5 cm long with a thickened pulvinus at the apex, tomentose throughout, with some long hairs as well, becoming glabrous except for the pulvinus which is persistently tomentose. *Inflorescence* 1-flowered, axillary, solitary or fascicled and crowded on branchlets between the leaves; flowers unisexual, rarely some bisexual, apparently dioecious (may be monoecious), arising from sessile imbricating bracts which are 1,5–3,5 mm long, densely stellate-tomentose without subsistent; pedicels about 7–20 mm long, (sometimes obscurely articulate), about midway, densely stellate-pubescent, hairs dark to light brown, short or long (as long as the pedicel is broad). *Calyx* 4–6-lobed almost to the base at flowering time, dorsally stellate-pubescent; lobes from about 5–10 mm long, 2,5–3,5 mm broad, inner face stellate-pubescent at least in upper half lepidote below. *Petals* 0. *Male flower* with staminal tube about 2,5–4,5 mm long, densely pubescent to subglabrous; anthers up to 8 in one row, sessile in a ring around the apex of the staminal-tube, rudimentary carpels and styles in the centre of the ring. *Female flower* with ovary sessile, densely stellate-pubescent, about 2 or 3 mm diam., with a ring of rudimentary stamens around the base, carpels 4–5

(3?); styles arising laterally with clavate recurved, papillose stigmas. *Carpels* 4–5 or less by abortion, orange yellow to deep orange with touch of vermilion when ripe, obliquely subglobose obliquely ellipsoid or obovate, 1 × 1,3 cm to 1,8 × 2 cm rounded on top with the remains of the style-base lateral and obscure, or forming a mucro, stellate pubescent in parts (rubs off easily) with dark to light brown hairs, long bristles, rind at maturity rather thin and brittle; seeds 1–2 (coat like that of fruit); cotyledons 2 (one smaller than the other, reddish pink tinge between them in fresh fruit); plumule stellate-pubescent.

Found in dense woodland or forests, ranging from sea level to steep mountain slopes at altitudes of 1 100 m or more. Recorded from northern Natal and eastern Transvaal. Also occurs in Mozambique and northwards in tropical east Africa.

TRANSVAAL.—Barberton: Bearded Man Mountain, farm *Duurstede Buitendag* 1110; Twello Forest Estate, ± 12 km S.E. of Barberton on road to Havelock, *Arnold* 1621; *Pedlar's Bush, Buitendag & Kruger* 0000.

NATAL.—Hlabisa: False Bay, *Ward* 3664, 3676; near Charters Creek, *Rochat* 14; Hluhluwe Game Reserve, *Ward* 2966; Dukuduku Forest *Strey* 5590. Ingwavuma: Lake Sibayi, *Vahrmeijer* 1080; *Garland* 5801. Ubombo: Lake Sibayi, *Vahrmeijer* 720.

When describing the two species, *C. greenwayi* and *C. microcarpa*, *Brenan* (1956) mentioned that the differences between them are small but the altitudes at which they grow differ considerably, *C. microcarpa* occurring at about 460 m, whereas *C. greenwayi* is found at altitudes between 1 600 and 2 000 m. *Drummond* in *Kirkia* (1975) sank *C. microcarpa* under *C. greenwayi* without comment. *Drummond* is followed here because, whereas the small differences noted between these two species are merely of degree, such as the colouring and length of the pubescence, the comparable size of the fruit and the mucro being more obvious on the carpels of one than on the other, the features considered to be diagnostic are the same. These features are the general size and shape of the flowers and the carpels and the brittle rind of the ripe fruit. According to collectors' notes, both species are at times, and in small patches, especially on the ripening carpels, suffused with 'reddish crimson' or 'orange vermilion', but this is not obvious on herbarium specimens.

The presence of a species of *Cola* in the Barberton District, probably the southernmost limit of the genus, has only recently (1976) come to light. This is surprising, since that is an area particularly well collected as shown by the large *Thorncroft* collection. The probable explanation is the inaccessible nature of the forest patches on the steep mountain slopes.

UITTREKSEL

Die twee Cola-spesies wat in suidelike Afrika voorkom word hersien. C. natalensis Oliv. is endemies, maar C. greenwayi Brenan kom hoofsaaklik in tropiese Oos-Afrika voor met eksemplare uit Oos-Transvaal en Noord-Zoeloeland as die mees suidelike verspreidingsrekords. 'n Studie van die beskikbare eksemplare uit tropiese Oos-Afrika en suidelike Afrika staaf die opvatting dat C. microcarpa Brenan 'n sinoniem van C. greenwayi is.