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# *Chamaecrista mwangokae* (Fabaceae, Caesalpinioideae), a New Species from the Southern Highlands of Tanzania

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**ABSTRACT.** We discuss the historical usage of the genus *Chamaecrista* (Fabaceae, Caesalpinioideae) in Africa, describe and illustrate the new species *C. mwangokae* from southern Tanzania, reduce *C. hildebrandtii* to taxonomic synonymy under *C. zambeolica*, and provide a key to the East African species of *Chamaecrista* with stipitate petiolar glands.

**Key words:** Caesalpinioideae, *Chamaecrista*, Fabaceae, Tanzania.

Within Fabaceae subfamily Caesalpinioideae, Irwin and Barneby (1982) placed *Cassia* L., *Chamaecrista* Moench, and *Senna* Miller in tribe Cassieae, subtribe Cassiinae. *Chamaecrista* is a genus of approximately 330 species (G. P. Lewis, pers. comm.), with greatest diversity in Central and South America and a secondary center of diversity in tropical Africa (Polhill & Thulin, 1989; Thulin, 1993; Du Puy & Rabevohitra, 2002). Although Meyer (in Meyer & Drège, 1836) followed the generic concept of Moench (1794) and named a number of new South African species in *Chamaecrista*, the vast majority of African regional floristic treatments of Fabaceae predated the formal reinstatement of the genus in the New World by Irwin and Barneby (1982). Thus most of the well-known African floristic authors of the 19th (e.g., Harvey, 1862; Oliver, 1871) and 20th centuries (e.g., Steyaert, 1952; Keay, 1958; Brenan, 1967; Aubréville, 1968, 1970) treated *Chamaecrista* as part of a very broadly circumscribed *Cassia*, a circumscription maintained even later by Lebrun and Stork (1992). In the 20th century only Polhill and Thulin (1989) and Thulin (1993) recognized *Chamaecrista* in tropical African floristic treatments, followed in the present century by Du Puy and Rabevohitra (2002) for Madagascar.

Greene (1897) laid the foundation for a worldwide circumscription of *Chamaecrista* and soon afterward (1899) began the transfer of African species of *Cassia* to *Chamaecrista*. Standley (1917) followed with a few more new combinations in *Chamaecrista*, but without reference to Greene or providing any further explanation. Following the revision

of the New World species by Irwin and Barneby (1982), Lock (1988) provided most of the remaining combinations needed for African species. The tropical African species now included in *Chamaecrista* (Lock, 1989) may be differentiated from *Cassia* and *Senna* by the following key, based on the key to species of *Cassia* sensu lato by Brenan (1967: 51–58) with additional characters from Irwin and Barneby (1982: 2–3), Polhill and Thulin (1989: 50), and Thulin (1993: 343).

- 1a. Petioles and rachides of leaves eglandular.
  - 2a. Filaments of 2 or 3 lower stamens with an S-shaped curve above base, their anthers introrsely dehiscent by slits; legume indehiscent, cylindrical or slightly compressed, 20–90 cm long . . . . . *Cassia*
  - 2b. Filaments of all stamens straight or incurved, their anthers terminally dehiscent by slits or pores; legume dehiscent, flattened, or winged or ridged along each valve, almost always < 20 cm long (almost cylindrical and longer in the frequently introduced *Senna spectabilis* (DC.) H. S. Irwin & Barneby).
    - 3a. Leaflets in 2 pairs; stem with glandular-based bristles; seeds without areoles . . . . . *Chamaecrista absus* (L.) H. S. Irwin & Barneby
    - 3b. Leaflets in 3 or more pairs; stem without glandular-based bristles; seeds usually with areoles . . . . . *Senna*
- 1b. Petioles and/or rachides of leaves with conspicuous glands (extrafloral nectaries).
  - 4a. Leaflets with a short but distinct petiolule; glands of petiole or rachis mounded or elongate, secreting nectar from a convex surface; pedicels ebracteolate; sepals obtuse or rounded at apex; legume indehiscent or slowly dehiscent, the valves never twisting; seeds usually with areoles . . . . . *Senna*
  - 4b. Leaflets sessile or with a short pulvinulus; glands of petiole or rachis cup-shaped or flat, sometimes stipitate, secreting nectar from a concave or flat surface; pedicels with 2 bracteoles near or above middle; sepals acute or acuminate at apex; legume elastically dehiscent with twisting valves; seeds without areoles . . . . . *Chamaecrista*

Under “*Cassia* sp. A,” Brenan (1967: 84) described, but did not formally name, a distinctive

*Chamaecrista* from Mufindi District in the Southern Highlands of Tanzania. Recent collections made during plant inventories conducted by the Tanzania Forest Conservation Group, an environmental NGO based in Dar es Salaam, included material unquestionably corresponding to *Cassia* sp. A, although the material designated below as the type of the new species lacks additional stipitate glands on the leaf rhachis.

***Chamaecrista mwangokae*** Gereau & G. M. Walters, sp. nov. TYPE: Tanzania. Iringa Region, Mufindi District: public land between Mdabulo and Igoda Villages along road to Luhunga Village, 8°30'40"S, 35°30'02"E, 1675 m, 20 Oct. 2000, M. A. Mwangoka 1741 (holotype, NHT; isotypes, BRIT, K, MO, S, tfcg (reference collection of Tanzania Forest Conservation Group)). Figure 1.

Haec species inter congeneros Africae orientalis glandulis petiolaribus stipitatis praeditis ad *Chamaecristam grantii* et *C. zambesicam* quoad foliolorum costam excentricam sed non submarginalem maxime accedit, sed ab eis foliolorum venatione valde reticulata atque petalis 14–18 mm longis distinguitur.

Perennial herb with thick woody rootstock; stems spreading or ascending, 10–30 cm long, sparsely hirsute to glabrous. Stipules acuminate, parallel-veined, (3.0–)3.9–9.0 × 1.0–2.0 mm; petiole (3–)5–7 mm long; leaf rhachis channeled above, (1.0–)2.0–4.5(–5.8) cm long; gland on petiole just below lowest leaflet pair, occasionally with additional glands along rhachis between upper leaflet pairs, stipitate, the stipe (0.2–)0.4–1.5 mm long, the head (0.2–)0.3–0.4(–0.8) mm wide; leaflets in 2 to 11 pairs, glabrous except for frequently ciliate margins and costa, asymmetrically elliptic with proximal margin rounded, distal margin straight and parallel to strongly excentric costa, largest leaflets 9.5–12.0(–17.0) × (2–)4–8 mm; costa (0.3–)0.9–1.7(–2.5) mm from distal margin; secondary veins parallel only in basal half, branched and reticulate in distal half; tertiary venation strongly reticulate on both surfaces. Inflorescence 1- or 2-flowered; pedicels (2.4–)3.8–6.2(–9.4) cm long; bracteoles cordate, acute, located in uppermost 1/3 to 1/10 of pedicel, 3.0–5.1 × 0.9–2.0 mm. Sepals bright red in living material, (3–)9–13 × 2.0–4.1 (–5.0) mm; petals yellow, 14–18 × 9–11 mm; stamens 10, the anthers 0.3–0.8 mm long; ovary densely pubescent. Mature legume not seen; immature legume pubescent, ca. 4.5 cm long; seeds unknown.

*Paratypes.* TANZANIA. Iringa Region: Mufindi Dis-

trict, Ikanga near Mdabulo, 8°30'S, 35°31'E, 26 Aug. 1952, W. Carmichael 110 (K); Sao Hill, 8°30'S, 35°15'E, 1800 m, 16 Oct. 1987, J. Lovett, P. A. Keeley & M. S. Keeley 950 (K, MO); Irundi, ca. 8°27'S, 35°15'E, 1830–1980 m, 19 Sep. 1971, C. F. Paget-Wilkes 952 (MO); Irundi Hill, Sao Hill, ca. 8°27'S, 35°15'E, 1980 m, Dec. 1963, J. Procter 2469 (K); "Mufindi," 1830 m, Oct. 1931, R. R. Staples 232 (K).

The new species is known only from the above-cited specimens from Mufindi District in Iringa Region, southern Tanzania; J. M. Lock (pers. comm.) has confirmed that there are no specimens of *Chamaecrista mwangokae* at K from the *Flora Zambesiaca* area. Its conservation status must be considered as data deficient, although more recent collections (not examined) may allow more precise evaluation. From collectors' field notes, *Chamaecrista mwangokae* occurs in grassland and stony grassy hillsides, associated with *Aloe* (Asphodelaceae), *Apodytes dimidiata* E. Meyer ex Arnott (Icacinaceae), *Asparagus* (Asparagaceae), *Dodonaea viscosa* Jacquin (Sapindaceae), *Faurea* (Proteaceae), *Helichrysum* (Asteraceae), and *Protea* (Proteaceae). The new species is nearly always found in recently burned areas; unsuccessful attempts to locate it in unburned areas in October 2002 may indicate that *C. mwangokae* is dependent upon fire for induction of flowering.

The specific epithet commemorates the collector of the type, Moses Anyelwisye Mwangoka, whose collections under the direction of the Tanzania Forest Conservation Group have been of exceptional value to the taxonomic and phytogeographic study of the Eastern Arc Mountains of Tanzania.

During study of other East African species of *Chamaecrista* with stipitate petiolar glands, careful examination of type specimens and available herbarium material formerly assigned to *C. hildebrandtii* (Vatke) Lock and *C. zambesica* (Oliver) Lock revealed no consistently reliable means of distinguishing these species. Brenan (1967: 84–85) primarily distinguished these species on the basis of stipe length: 0.3–0.7 mm for *C. hildebrandtii* and 1.00–1.25 mm for *C. zambesica*. Our actual measurements of stipes showed a nearly continuous gradation between 0.1 and 1.3 mm. With no consistent morphological distinction and overlapping geographic ranges, we here synonymize these two species under the older binomial.

***Chamaecrista zambesica*** (Oliver) Lock, Kew Bull. 43: 338. 1988. Basionym: *Cassia zambesica* Oliver, Fl. Trop. Afr. 2: 280. 1871. TYPE: Mozambique. Shamwara, Kirk s.n. (holotype, K).

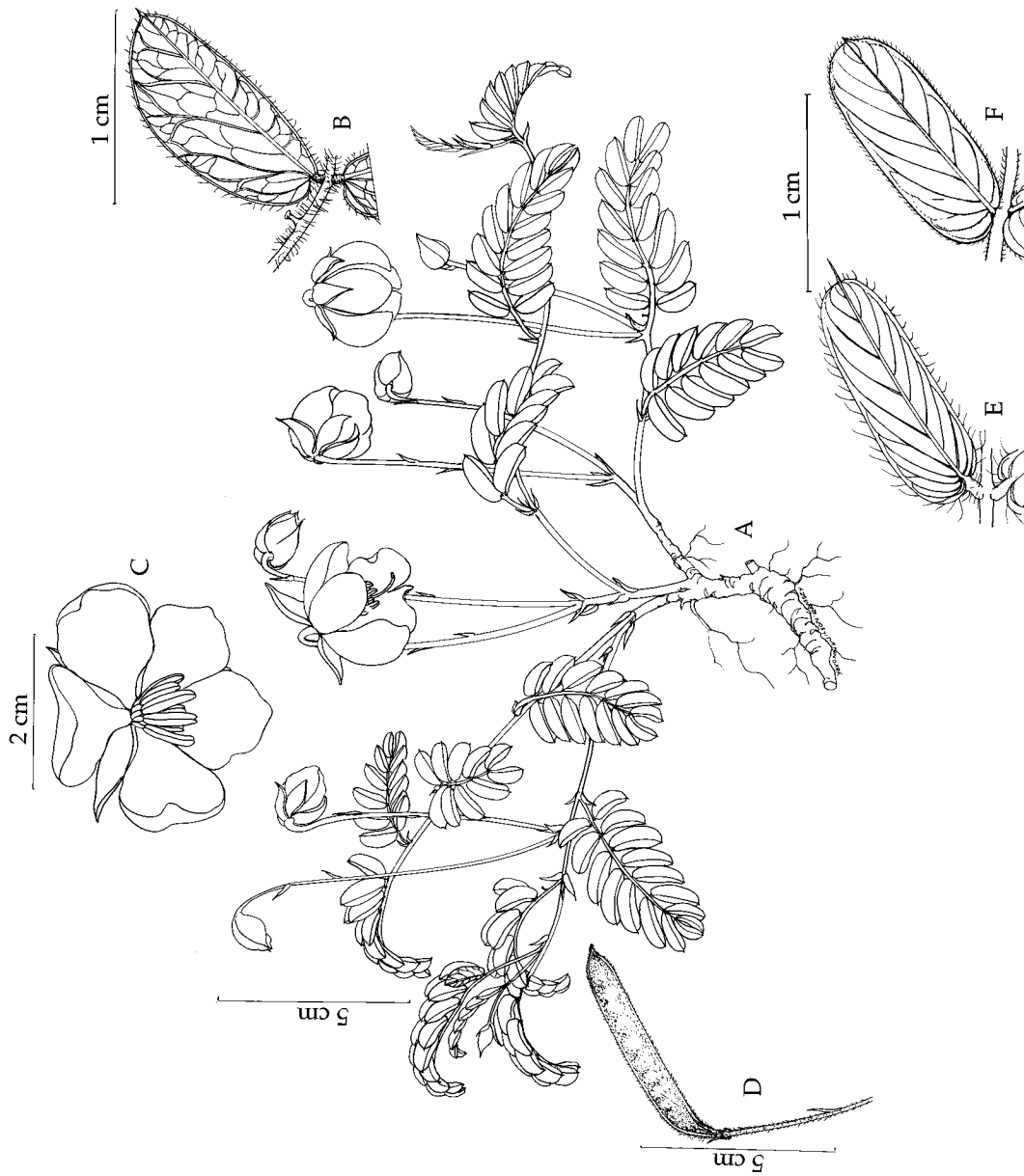


Figure 1. *Chamaecrista muangokae* Gereau & C. M. Walters. A–C drawn from isotype. —A. Flowering plant, habit. —B. Apex of petiole with petiolar gland and basal leaflet pair. —C. Open flower, frontal view. —D. Immature fruit. —E. Leaflet pair of *C. granitii*, G. P. Leedal 1164 (K). —F. Leaflet pair of *C. Archbold 1164* (MO).

*Chamaecrista hildebrandtii* (Vatke) Lock, Kew Bull. 43: 336. 1988. Syn. nov. Basionym: *Cassia hildebrandtii* Vatke, Oesterr. Bot. Z. 30: 80. 1880. TYPE: Kenya. Teita Dist., Ndara Hill, *Hildebrandt 2464* (holotype, B $\bar{+}$ ; isotype, K).

*Selected specimens.* UGANDA. **E Ankole Dist.:** Nyakatokye-Buyene, Kashari, 0°22'S, 30°31'E, 1680 m, 17 Mar. 1986, *P. K. Rwaburindore 2245* (MO). RWANDA. Biumba, Région de Mutara, env. Mimuli, colline Rutengura, 1400–1450 m, 8 Oct. 1959, *G. Troupin 11811* (MO). KENYA. Kiambu Dist., Muguga North, 2040 m, 15 Oct. 1953, *B. & L. D. Verdcourt 1022* (MO). TANZANIA. **Kilimanjaro Region:** Same Dist., S Pare Mountains, Suji Village, Hekano, 4°21'35"S, 37°51'20"E, 1480 m, 31 Mar. 1999, *J. A. Mlangwa 116* (MO, NHT). **Pwani Region:** Kisarawe Dist., Mkamba, ca. 70 km SW of Dar es Salaam, 70 m, 4 June 1972, *B. Mhoro & V. F. Malima DSM 2588* (DSM, MO).

KEY TO EAST AFRICAN SPECIES OF *CHAMAECRISTA* WITH STIPITATE PETIOLAR GLANDS

- 1a. Leaflets with costa excentric but not submarginal, (0.3–)0.5–2.5 mm from distal margin.
  - 2a. Leaflets with secondary veins branched and reticulate in distal half and tertiary venation strongly reticulate; petals 14–18 mm long . . . . . *C. muangokae* Gereau & G. M. Walters
  - 2b. Leaflets with secondary venation parallel nearly to margin and tertiary venation inconspicuous; petals 4–14 mm long.
    - 3a. Stipitate glands present on leaf rachis between some or all pairs of leaflets in addition to petiolar gland; petals 10–14 mm long . . . . . *C. grantii* (Oliver) Standley
    - 3b. Stipitate gland present only on petiole, rarely sessile or subsessile glands present on rachis between pairs of leaflets; petals 4–12 mm long . . . . . *C. zambesica* (Oliver) Lock
- 1b. Leaflets with costa marginal or submarginal, 0–0.4 mm from distal margin.
  - 4a. Petiolar gland with stipe 1.0–2.2 mm long; pedicel 3–6 mm long . . . . . *C. fallacina* (Chiovenda) Lock
  - 4b. Petiolar gland with stipe 0.1–0.8 mm long; pedicel 9–30 mm long.
    - 5a. Leaf rachis crenate-crested; petals 3.0–5.5 mm long . . . . . *C. gracilior* (Ghesquière) Lock
    - 5b. Leaf rachis channeled; petals 7–10 mm long.
      - 6a. Leaflets in 4 to 13 pairs; pedicel with appressed pubescence; petals yellow, orange, or red at base; legume 1.2–3.3 cm long . . . . . *C. usambarensis* (Taubert) Standley
      - 6b. Leaflets in 11 to 43 pairs; pedicel with pubescence short and dense, not appressed, or with trichomes 1–2 mm long perpendicular to pedicel; petals yellow; legume 2.5–5.0 cm long.
        - 7a. Stipitate gland present only at apex of petiole; stipe of gland 0.1–0.2 mm long; petals 7.0–

7.5 mm long . . . . .  
. . . *C. fenarolii* (Mendonça & Torre)  
Lock

7b. Stipitate glands sometimes present in lower part of petiole and/or on rachis between lower pairs of leaflets; stipe of gland 0.25–0.75 mm long; petals 8–10 mm long . . . . .  
. . . . . *C. katangensis* (Ghesquière)  
Lock

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