

FSA contributions 13: Ulmaceae

C.M. WILMOT-DEAR*

Trees or shrubs, monoecious or dioecious, sometimes spiny. *Leaves* alternate, simple, blade often unequal-sided at base; stipules lateral and free or amplexicaul and connate, caducous. *Flowers* unisexual or bisexual, regular, axillary, solitary or in cymes or clusters. *Perianth* of (4–)5 tepals, imbricate or valvate, free or shortly united, persistent. *Stamens* as many as, and opposite, tepals, inserted at base of perianth, erect in bud; anthers 2-the-cous, opening longitudinally. *Ovary* superior, 2-carpellate, 1-locular; stigmas 2, divergent; ovule solitary, pendulous from or near apex, anatropous. *Fruit* thinly fleshy; endo-carp hard. *Seeds* without endosperm; embryo curved.

Characters not applicable in South Africa except in cultivated species (*Ulmus*; see appendix): sepals sometimes 6–8; stamens rarely more than calyx lobes; ovary 2-locular; fruit compressed, dry and ± winged; embryo straight.

Genera 14, with about 120 species, mainly tropical and North Temperate, only four genera represented in Africa, three in southern Africa together with one commonly cultivated.

- 1a Plant with axillary spines; stipules united along one margin *Chaetacme*
- 1b Plant unarmed (in African species); stipules free:
 - 2a Ovary stipitate, compressed; fruit a flat samara, wing surrounding fruit; embryo straight (cultivated) *Ulmus*
 - 2b Ovary sessile; fruit a thinly fleshy drupe; embryo curved:
 - 3a Male flowers with induplicate-valvate calyx lobes; leaves serrate almost from base; stigmas 0.5–1.0 (–2.0) mm long *Trema*
 - 3b Male flowers with imbricate calyx lobes; leaves entire, coarsely toothed or serrate but then only in upper 2/3; stigmas 2–5 mm long *Celtis*

1906000 CHAETACME

Chaetacme Planch. in Annales des sciences naturelle, Sér. 3, 10: 266, 340 (1848); E.Phillips: 246 (1951); Polhill: 144 (1964); Polhill: 12 (1966); J.H.Ross: 149 (1972); Palmer & Pitman: 433 (1972); R.A.Dyer: 35 (1975); Wilmot-Dear: 1 (1991); Todzia: 610 (1993). Type: *C. aristata* Planch.

Trees or shrubs, monoecious, rarely dioecious; bark smooth, grey, later fibrous, longitudinally striate; branches with axillary spines. *Leaves* penninerved with lateral veins looping near margin, shortly petiolate, long-mucronate, slightly unequal-sided at base; stipules relatively large, amplexicaul and connate, tightly enclosing terminal bud, caducous leaving annular scars. *Inflorescences* cymose, often branched, usually congested, entirely male or with 1(–2) females near base; female flowers otherwise solitary, usually in upper axils. *Flowers*

subtended by small broadly ovate bracts; male with pistillode; female without staminodes. *Tepals* 5, shortly basally united, in male buds induplicate-valvate, in female imbricate. *Anthers* oblong. *Ovary* sessile; stigmas long, persistent, divaricate. *Fruits* large, endocarp very hard.

A genus of one species, confined to Africa and Madagascar.

Chaetacme aristata Planch. in Annales des sciences naturelles, Sér. 3, 10: 341 (1848); Engl.: 160 (1895); Sim: 305, t. 160 (1907); Engl.: 15, t. 8 (1915); N.E.Br.: 521 (1925); Burt Davy: 437 (1932); Henkel: 57, 79 (1934); Brenan: 625 (1949); Codd: 19 (1951); Eggeling: 436 (1952); Andrews: 254, t. 88 (1952); Keay: 593 (1958); Dale & Greenway: 576 (1961); White: 22 (1962); F.von Breitenbach: 84 (1965); Compton: 105 (1966); Letouzey: 56, t. (1968); P.van Wyk: 39, t. (1972); Compton: 173 (1976); Coates Palgrave: 98 (1977); Pooley: 66, t. (1993). Type: Cape Province, *Drège s.n.* (K, isolecto!).

Chaetacme nitida Planch. & Harv.: 16, t. 25 (1859). *C. aristata* Planch. var. *nitida* (Planch. & Harv.) Engl.: 15 (1915). Types: South Africa, Cape Province, Galgebosch, *Drège s.n.* (TCD, lecto.; K, isolecto!).

C. madagascariensis Baker: 443 (1885). Type: Madagascar, *Baron* 2397 (K, holo!).

C. aristata Planch. var. *kamerunensis* Engl.: 24 (1900); Engl.: 15 (1915). Types: Cameroun, *Zenker & Staudt* 430 (B, syn.); Zaire, *Pogge* 692 (B, syn.).

C. serrata Engl.: 24 (1900). Types: Tanzania, Usambara Mts, *Holst* 505 (B, syn.); South Africa, Cape Province, *Beyrich* 119 (B, syn.); *Bachmann* 432, 433 (B, syn.).

C. aristata Planch. var. *longifolia* De Wild. & T.Durand: 214 (1901). Types: Zaire, *Dewevre* 903, 965 (BR, syns.).

Bosqueia spinosa Engl.: 548 (1908). Type: Tanzania, Ukerewe Is., *Uhlig* V73 (B, holo., K, photo!).

C. microcarpa Rendle: 13 (1916); Rendle: 423 (1928); Peter: 61 (1932); Battiscombe: 85 (1936); Eggeling: 247 (1940); Hauman: 51 (1948). Type: Sudan Republic, Bahr el Ghizal, *Schweinfurth* 2828 (K, isolecto!).

C. microcarpa Rendle var. *crenata* Hutch. & Dalz.: 423 (1928). Type: Ivory Coast, *Chevalier* 21824 (K, holo!).

Scrambling shrub to small, much-branched tree, 1–13 m tall, branches ± drooping, zigzag; twigs shortly spreading-pubescent to glabrous, often short and becoming spinose at apex; axillary spines single(–paired), 4–30 mm long. *Leaves* elliptic to elliptic-ovate, (20–) 30–90(–110) × (10–)15–45 mm, apex acute to shortly acuminate, terminal point up to 7 mm long, base broadly cuneate to rounded (to slightly cordate), margin entire or with occasional irregularly-disposed (or many, regular, especially juvenile plants) mucronate teeth; midrib prominent beneath, lateral veins ± 10, indistinct, coriaceous (juvenile foliage sometimes membranous-charta-

* The Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, England.

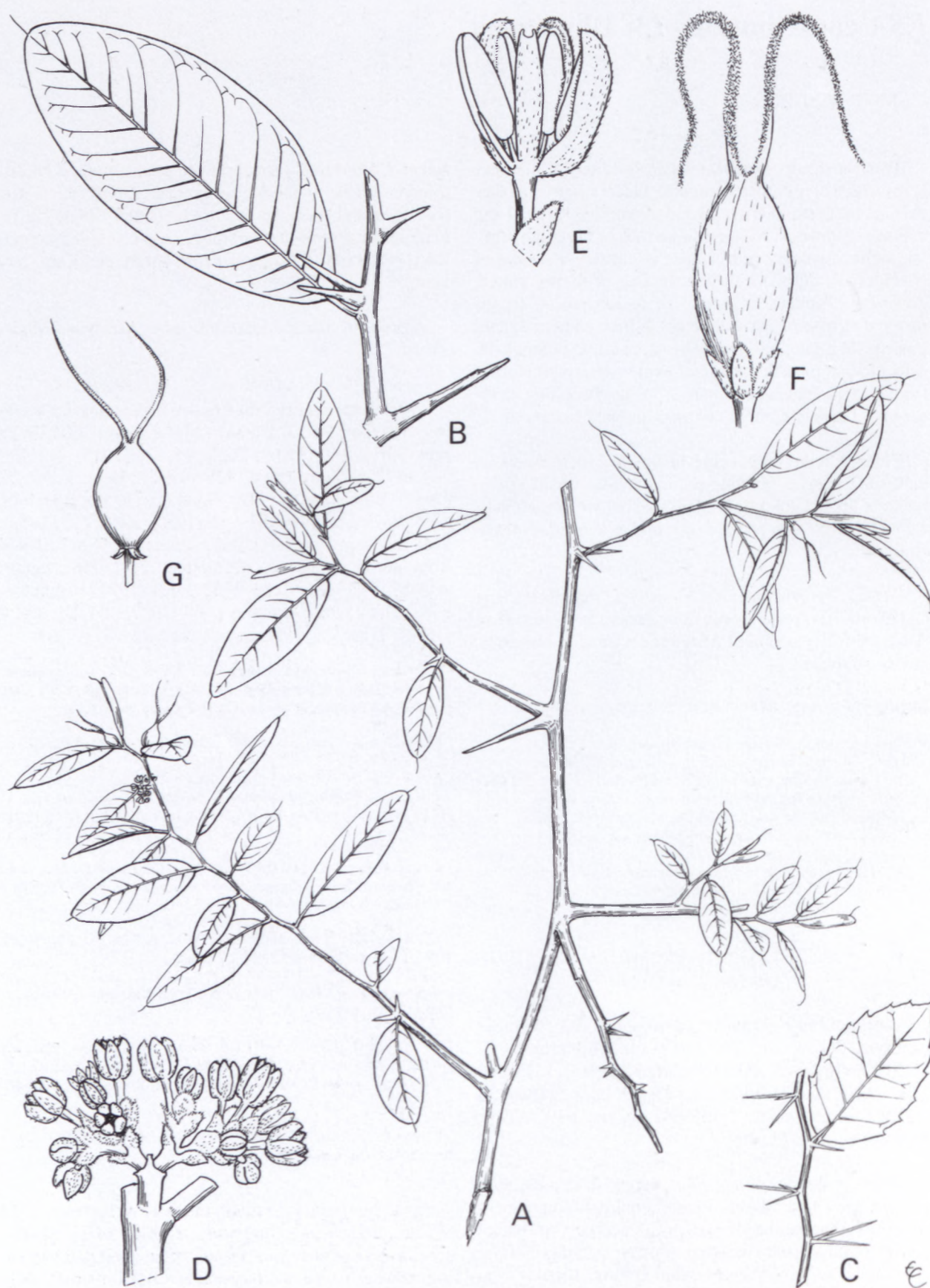


FIGURE 1.—*Chaetacme aristata*. A, branches showing flowers and fruits, $\times 0.8$. B, C, portions of twigs: B, $\times 1.6$; C, $\times 0.8$. D, cyme of male flowers, $\times 4.6$; E, male flower, 2 tepals and 1 stamen removed, $\times 9.4$; F, female flower, $\times 9.4$; G, mature fruit, $\times 2.4$. A, Acocks 12540; B, Van der Schijff 2456; C, Vahrmeijer 574; D, Gordon-Gray 1726; E, F, Acocks 9455; G, Strey 7364. Artist: Eleanor Catherine.

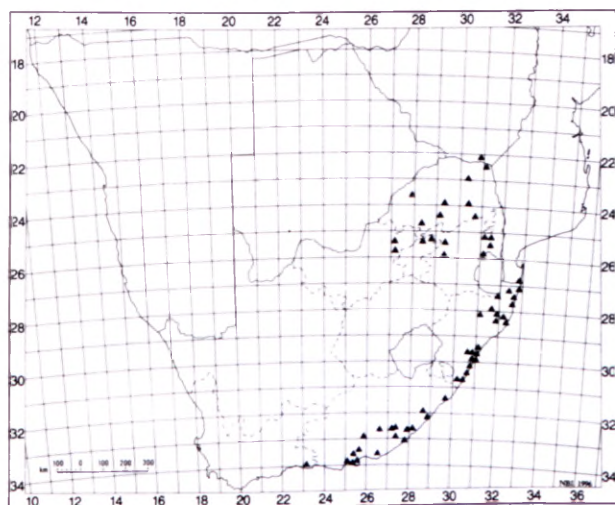


FIGURE 2.—Distribution of *Chaetacme aristata* in southern Africa.

ceous), glabrous, very glossy above, often scabrid or sparsely fine-pubescent below and on midrib; petiole 3–6 mm long; stipules narrowly oblong-lanceolate, (6–)10–20 mm long. *Stipules* (5–)10–20 mm long, narrowly oblong-lanceolate. *Inflorescences* 5–15 mm; flowers greenish cream-coloured, males (few–)10–over 30; pedicels 1–3 mm long. *Tepals* finely pubescent, male 2.0–3.5 × 1.5–2.0 mm, female 1.0–2.0 × 1.0–1.5 mm. *Ovary* sparsely fine-pubescent, 3–5 mm long; stigmas 7–12(–30) mm long. *Fruit* green, ripening yellowish orange, ovoid or depressed-globose, 10–15 × 10–14 mm (dried), to 35 × 20 mm (fresh), glabrous. Figure 1.

Found in the Northern Province, North-West, Mpumalanga, Swaziland, throughout the coastal region from northern KwaZulu-Natal, Eastern Cape as far south as Knysna in Western Cape (Figure 2); from Sudan, eastern Africa and Zaïre to West Africa, and in Madagascar. Occurs in riverine and coastal forest, lowland and upland rainforest, wooded grassland, sand dunes; found especially in disturbed and cleared areas.

Distinctive in its axillary spines and long-mucronate glossy leaves.

Vouchers: *Guy* 109 (PRE); *Moll* 2155 (NU, PRE); *Netshungani* 758 (NH, PRE); *Pott* (5699) 16731 (NH, PRE); *Scott-Smith & Ward* 8 (NH, PRE).

1902000 TREMA

Trema Lour., *Flora cochinchinensis*: 562 (1790); E. Phillips: 246 (1951); Palmer & Pitman: 429 (1972); J.H. Ross: 148 (1972); R.A. Dyer: 32 (1975); Polhill: 143 (1964); Polhill: 10 (1966); Polhill: 268 (1989); Wilmot-Dear: 3 (1991); Todzia: 610 (1993). Type: *T. cannabina* Lour.

Trees or shrubs, monoecious(–dioecious). *Leaves* alternate, penninerved, petiolate, unequal-sided at base, serrate; stipules lateral, free, relatively small, caducous. *Inflorescences* axillary, cymose, often branched, usually congested, mainly male with female and bisexual flowers fewer and towards apex. *Tepals* (4–)5, shortly united at base, in male buds induplicate-valvate, in female

imbricate. *Anthers* oblong-ovate. *Ovary* sessile; stigmas short, divaricate or inrolled, persistent. *Fruits* small.

A genus of ± 15 species in the tropics and subtropics, only one present in Africa.

Trema orientalis (L.) Blume, *Museum Botanicum Lugduno-Batavum* 2: 62 (1856); Leroy: 10 (1952); Compton: 105 (1966); Schreiber: 1 (1967); Letouzey: 48, t. (1968); P. van Wyk: 42, t. (1972); Compton: 173 (1976); Coates Palgrave: 98 (1977); Pooley: 66, t. (1993). Types: Sri Lanka, *Herb. Hermann folio* 2: 1 & 4: 71 (BM-SL, syn.).

Celtis orientalis L.: 1044 (1753). *Sponia orientalis* (L.) Planch: 320 (1848).

C. guineensis Schumach. & Thonn.: 160 (1827). *Sponia guineensis* (Schumach. & Thonn.) Planch.: 197 (1873). *Trema guineensis* (Schumach. & Thonn.) Ficalho: 261 (1884); Engl.: 160 (1895); Engl.: 14, t. 7 (1915); Rendle: 11 (1916); Burt-Davy: 436, t. 67 (1932); Peter: 62 (1932); Henkel: 107 (1934); Hauman: 48, t. 8 (1948); Robyns: 46, t. 4 (1948); Brenan: 625 (1949); Williams: 475, t. (1949); Eggeling: 438 (1952); Andrews: 256, t. 89 (1952); Brenan: 76 (1954); Brenan: 592 (1958); Dale & Greenway: 577 (1961); White: 24 (1962); F. von Breitenbach: 81, t. 2, 83 (1965). Type: Ghana, *Thonning s.n.* (C, iso.).

C. guineensis Schumach. & Thonn. var. *parvifolia* Schumach. & Thonn.: 161 (1827). *T. guineensis* (Schumach. & Thonn.) Ficalho var. *parvifolia* (Schumach. & Thonn.) Engl.: 14 (1915). Type: Ghana, *Thonning s.n.* (C, iso.).

Sponia bracteolata Hochst.: 87 (1845). *T. bracteolata* (Hochst.) Blume: 58 (1856); Sim: 305, t. 158 (1907); N.E. Br.: 519 (1925). Type: KwaZulu-Natal, 'in clivitiis montium Tafelburge terrae Natalensis', Dec. 1839, *Krauss* 41 (B, holo. ♀; BM, K, iso.!).

S. glomerata Hochst.: 87 (1845). *T. glomerata* (Hochst.) Blume: 58 (1856). Type: KwaZulu-Natal, 'in silvis primitivis terrae Natalensis', Oct. 1839, *Krauss* 343 (B, holo. ♀; K, iso.!).

S. africana Planch.: 320 (1848). *T. africana* (Planch.) Blume: 58 (1856). Types: Senegal, *Heudelot* 50 (K, syn.!). Sierra Leone, *Vogel* 138 (K, syn.!).

S. nitens Planch.: 325 (1848). *T. nitens* (Planch.) Blume: 58 (1856). Type: Fernando Po, 'secus oram Africae occident. haud longe a littore maris', 1848, *Vogel* 47 in herb Hook. (K, holo. ♂ & iso.!).

S. strigosa Planch.: 320 (1848). *T. strigosa* (Planch.) Blume: 58 (1856). Type: Nigeria, *Vogel* 33 (K, holo.!).

S. hochstetteri Planch.: 198 (1873). *T. guineensis* (Schumach. & Thonn.) Ficalho var. *hochstetteri* (Planch.) Engl.: 160 (1895); Engl.: 14 (1915); Rendle: 12 (1916); Peter: 63 (1932). Type: Ethiopia, Gojjam, *Schimper* 195 (K, isolecto.!).

T. guineensis (Schumach. & Thonn.) Ficalho var. *paucinervia* Hauman: 412 (1942); Hauman: 48 (1948). Type: Zaïre, Ubangi-Uele, Bossobolo, *Leontovitch* 93 (BR, holo.). See note in Polhill: 10 (1966).

Shrub or small to medium tree 12(–18) m tall, branches ± spreading or drooping; bark smooth, grey, becoming longitudinally fissured; lenticels conspicuous; twigs densely(–sparsely) pubescent. *Leaves* ovate-attenuate to ovate-lanceolate(–lanceolate-oblong), (45–)60–110(–150, juvenile) × (15–)22–50(–90, juvenile) mm, apex acute, base rounded to cordate, evenly closely serrate except extreme base; midrib and lateral veins compressed above, prominent below; ± scabrid, sparsely stiff-hairy(–glabrescent) above, densely pubescent-tomentose below; petiole 8–10(–13) mm; stipules lanceolate, pubescent, 4–7 mm. *Cymes* 5–10 mm; flowers greenish cream-coloured, males (few–)many, females and bisexual

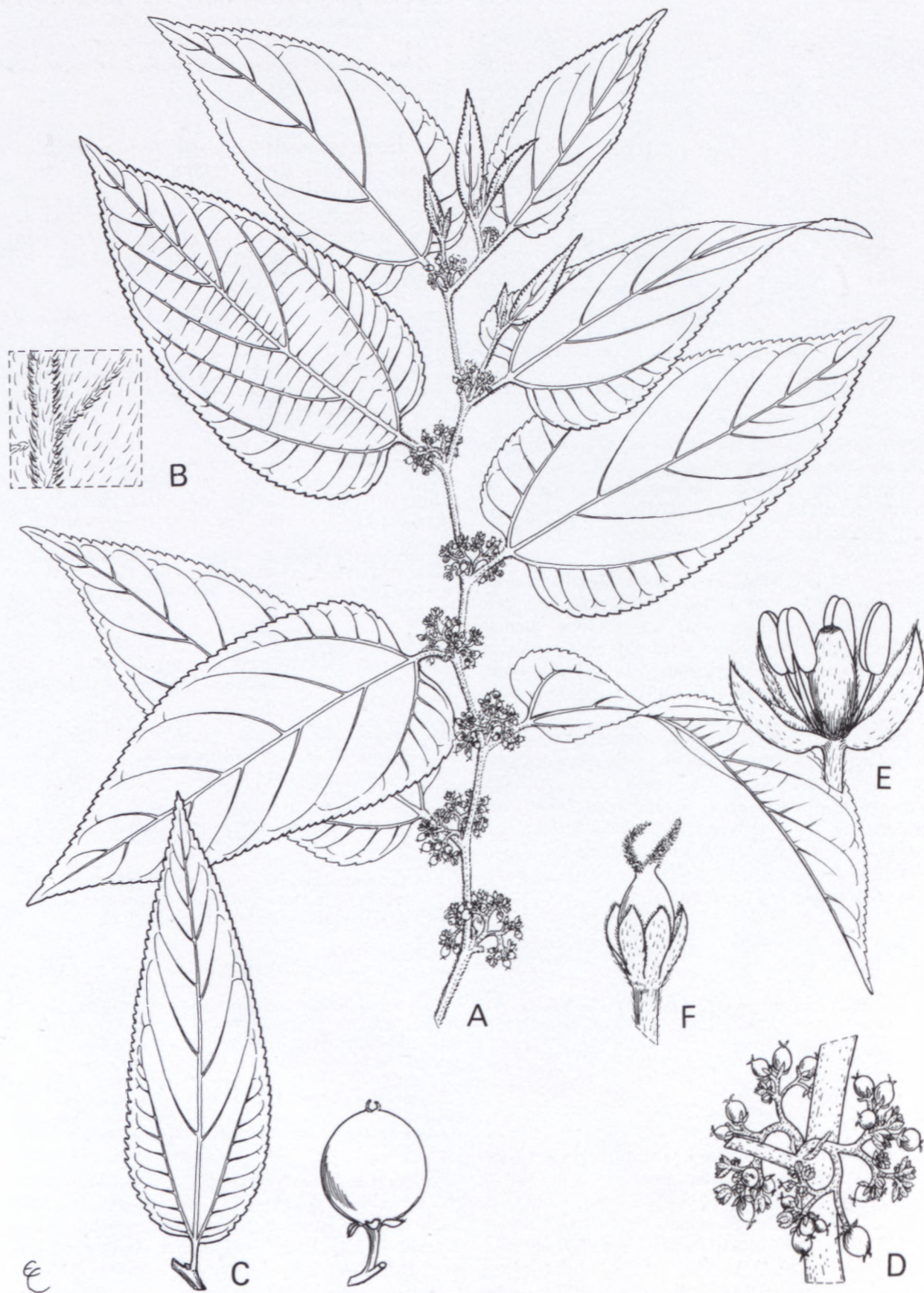


FIGURE 3.—*Trema orientalis*. A, branch with inflorescences and young fruit, $\times 0.8$; B, detail of leaf, lower surface, $\times 12$; C, leaf, $\times 0.8$; D, inflorescence, $\times 2.4$; E, male flower, 1 tepal and 1 stamen removed, $\times 9.6$; F, female flower, $\times 9.6$; G, fruit, $\times 4.8$. A, B, D, F, Merxmüller & Giess 30725; C, Hanafusa 1347; E, Pearson 9826; F, Gerrard 14. Artist: Eleanor Catherine.

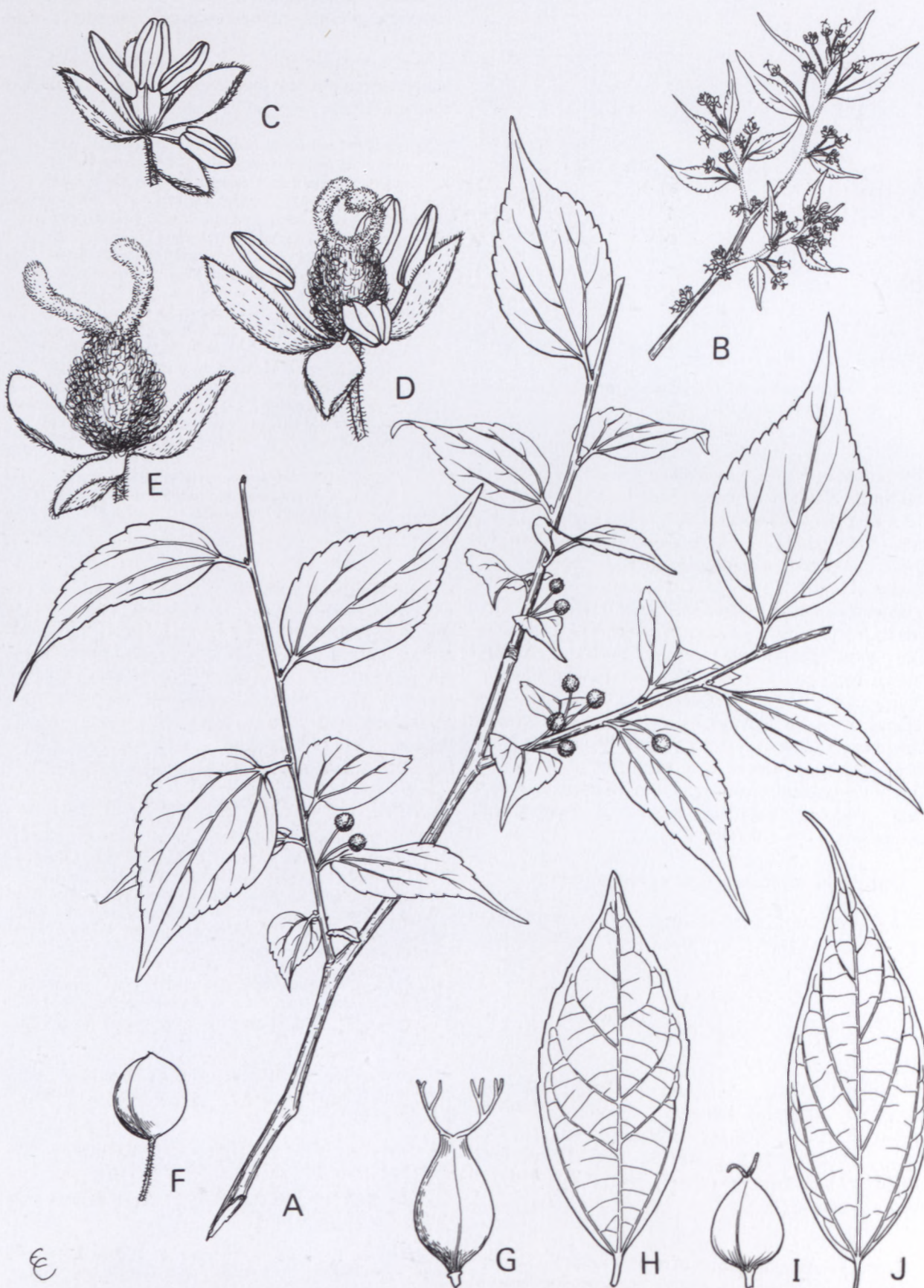
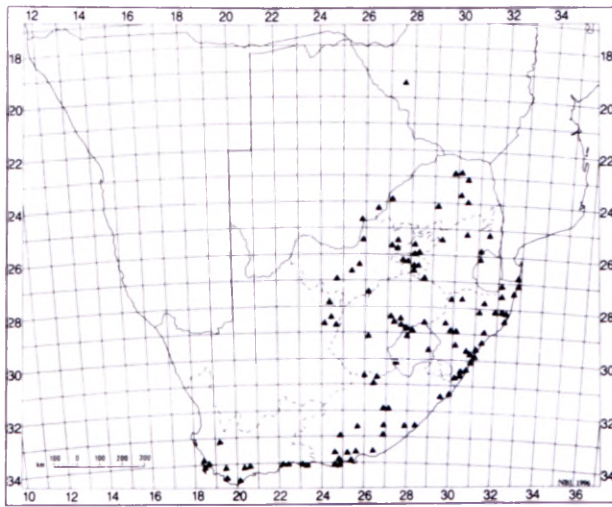


FIGURE 5.—*Celtis*. A–F, *C. africana*: A, fruiting branch, $\times 0.8$; B, flowering branch, $\times 0.4$; C, male flower, $\times 9.4$; D, bisexual flower, $\times 9.4$; E, female flower, $\times 9.4$; F, fruit, $\times 2.4$. G, H, *C. mildbraedii*: G, fruit, $\times 2.4$; H, leaf, $\times 0.8$. I, J, *C. gomphophylla*: I, fruit, $\times 2.4$; J, leaf, $\times 0.8$. A, B, Bolus 685; C, D, Galpin 11529; E, Strey 8921; F, Rodin 3899; G, H, Ward 7631; I, Strey 8785; J, Ward 5905. Artist: Eleanor Catherine.

FIGURE 6.—Distribution of *Celtis africana* in southern Africa.

ly-cut wood unpleasant-smelling; young twigs densely tawny-pubescent-tomentose. *Leaves* broadly or narrowly ovate to ovate-lanceolate, 30–90(–130, juvenile) × 25–55(–70, juvenile) mm, acuminate, base rounded to cuneate, margin (± entire to coarsely crenate-)dentate-serrate in upper $\frac{2}{3}$; basal lateral veins extending well into upper half, upper lateral veins 1 or 2 each side; thinly or thickly chartaceous, often rough, young foliage often densely tawny-pubescent both sides, but glabrescent except veins below; petiole 2.5–5.0(–10.0) mm; stipules linear to linear-obovate, 3–8 mm, pubescent. *Inflorescences*: lower cymes numerous, of (3–)many male flowers; pedicels 1.5–5.0 mm; uppermost inflorescences of 1–few bisexual flowers; pedicels to 12 mm, intermediate of both male and bisexual; axis and pedicels usually densely tawny-pubescent. *Tepals* 1.5–2.5 mm, pubescent. *Ovary* densely pubescent; stigmas unbranched, 1.5–3.5 mm. *Fruits* orange(–blackish), subglobose (–ovoid-ellipsoid) (4–)5–7(–8) × 3–6 mm (dried), pubescent, pedicel to 18 mm. Figure 5A–F.

Found in southwestern and southeastern Botswana (Ukwi, Mochudi; few collections), throughout Northern Province, North-West, Mpumalanga and Gauteng and extreme south, throughout Swaziland, Free State, KwaZulu-Natal, Lesotho, most northeastern parts of Northern Cape, Eastern Cape and along major rivers and in coastal areas of Western Cape excluding the west coast north of Cape Town (Figure 6); widespread from Arabia to Cape, Sudan to Nigeria and Angola. Occurs in a wide range of habitats: dry evergreen and riverine forests, upland rainforest, coastal forest; found from coast up to 2 000 m.

A useful street tree; also yields hard timber.

Vouchers: *Acocks* 1616 (PRE), *Brueckner* 1218 (K, PRE), *Flanagan* 279 (K, PRE), *Moll* 4455 (NH, PRE), *Ward* 7701 (K, NH, NU, PRE).

2. *Celtis gomphophylla* Baker in Journal of the Linnean Society of London, Botany 22: 521 (1887); Leroy: 6, t. 3 (5–8) (1952); Letouzey: 39, t. (1968); Coates Palgrave: 97 (1977). Type: Madagascar, *Baron* 3697 (K, holo.!).

C. durandii Engl.: 22 (1900); Engl.: 179 (1911); Engl.: 12, t. 6D (1915); Rendle: 4 (1916); Peter: 65 (1932); Hauman: 42 (1948); Robyns: 43 (1948); Brenan: 624 (1949); Keay: 592 (1958); White: 431 (1962); Polhill: 140 (1964); Polhill: 5 (1966); Palmer & Pitman: 427 (1972); Pooley: 64, t. (1993). Types: Tanzania, Usagara, *Von Trotha* 171 (B, syn.; K, photo. of syn.!). Zaire, Bas-Congo, *Dupuis* (B, syn.; BR isosyn.; K, photo. of syn.!).

C. ugandensis Rendle: 341 (1906). *C. durandii* Engl. var. *ugandensis* (Rendle) Rendle: 5 (1916); Battiscombe: 84 (1936); Hauman: 43 (1948); Robyns: 43 (1948); Eggeling: 432 (1952); Dale & Greenway: 574 (1961). Type: Uganda, Entebbe, *Bugshaw* 669 (BM, holo.!).

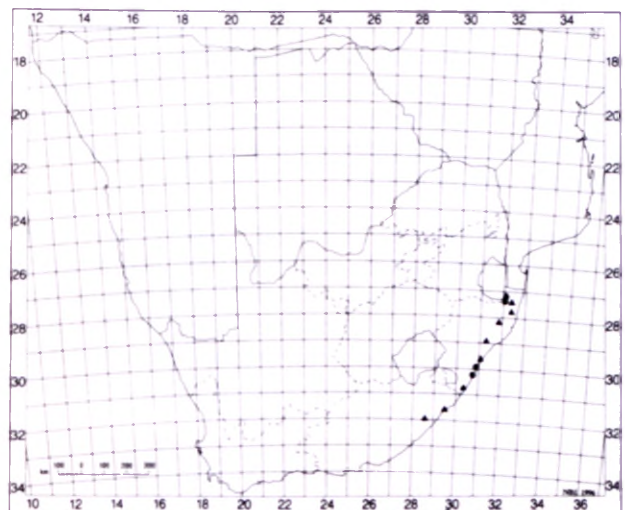
C. dioica S.Moore: 204 (1911). Type: Zimbabwe, Chirinda Forest, *Swynnerton* 108 (BM, holo.!, K!).

Deciduous monoecious(–dioecious) tree, 3–30 m tall; bark smooth, light grey, wood unpleasant-smelling; young twigs whitish pubescent. *Leaves* ovate-elliptic (–oblong-elliptic), (50–)60–150 × 20–50 mm, long-acuminate, base cuneate to rounded, margin entire, (juvenile foliage of very different appearance, to 210 × 90 mm, upper half of margin coarsely dentate); basal lateral veins extending little into upper half, upper lateral veins (2)3–6 each side, as thickly prominent beneath as midrib, usually making an acute angle of less than 45° with midrib; membranous-chartaceous, usually thin, glabrescent, often scabrid; petiole 4–8 mm; stipules linear to linear-oblong, 2–6 mm, pubescent. *Cymes* of male flowers numerous, (few–)many-flowered, pedicels 3–7 mm, female and bisexual flowers few or solitary, pedicels often longer. *Tepals* 1.2–2.0 mm, pubescent. *Ovary* ± pubescent; stigmas unbranched, 2.0–2.5 mm. *Fruits* dark yellowish, conical-ovoid, often 4-angled when dry, 4–6(–7) × 3–5 mm, glabrous; pedicel 3–10 mm. Figure 5I, J.

Found in coastal regions of KwaZulu-Natal and of Eastern Cape south to Umtata (Figure 7); also in western Mozambique, eastern Zimbabwe and Zambia and from Zaire and Angola to Nigeria and San Tomé. Occurs in lowland and upland rain forest and riverine forest.

Vouchers: *Moll* 3359 (K, PRE), 5636 (K, NH), *Tinley* 450 (K, PRE), *Ward* 2998 (K, PRE), *White* 10431 (NH).

3. *Celtis mildbraedii* Engl. in Botanische Jahrbücher 43: 309 (1909); Engl.: 180, t. 16E (1911); Engl.:

FIGURE 7.—Distribution of *Celtis gomphophylla*, ▲; and *C. mildbraedii*, ●, in South Africa.

14 (1915); Hauman: 45 (1948); Keay: 592 (1958); Dale & Greenway: 576 (1961); Letouzey: 33, t. (1968); Coates Palgrave: 97 (1977); Pooley: 66, t. (1993). Type: Zaïre orientale, *Mildbraed* 2897 (B, lecto.; K, photo. of lecto.!).

C. soyauxii sensu Engl.: 23 (1900) pro parte; Rendle: 5 (1916); Battiscombe: 84 (1936); Brenan: 624 (1949); Eggeling: 435, t. 89c, photo. 55 (1952); Andrews: 251 (1952); non Engl. sensu stricto.

C. usamburensis Engl.: 309 (1909); Engl.: 14 (1915); Peter: 65 (1932). Type: Tanzania, E Usambara Mts, Zimmermann in Herb. Amani 831 (B, holo.; K, photo. of holo.!).

C. franksiae N.E.Br.: 517 (1925); Henkel: 106 (1934); Fvon Breitenbach: 82 (1965). Type: South Africa, KwaZulu-Natal, near Durban, 12 Dec. 1910, *Franks s.n.* in Herb. Wood 11726 (K, holo.!) BOL, NBG, SAM, iso.!).

Evergreen or deciduous monoecious tree, 3–40 m tall, buttressed, branches often drooping; bark pale, smooth or scaling in discs; young twigs tawny-pubescent. *Leaves* elliptic to elliptic-obovate, (75–)90–150 × 40–50 mm, acuminate ± mucronate, base cuneate, (± entire-) obscurely crenate to coarsely dentate in upper half; chartaceous to thinly coriaceous, venation as in *C. gomphophylla* but upper lateral veins markedly less thickly prominent beneath than midrib and making more obtuse angle of over 45° with midrib; pubescent, soon glabrescent except veins beneath; petiole 3–9 mm; stipules lanceolate, 4–5 mm., pubescent. *Cymes* 4–15 mm, of (few–)many often crowded male flowers, pedicels to 2 mm, female and bisexual flowers 1–few at apex, uppermost cymes with several bisexual flowers. *Tepals* 1.5–2.0 mm, pubescent. *Ovary* hairy at base; stigmas 1 or 2 times branched, ± 5 mm. *Fruits* red, ovoid-ellipsoid, 4-ribbed when dry, 7–10 × 5–6 mm, glabrous; pedicels 3–13 mm. Figure 5G, H.

Found in KwaZulu-Natal in north (Ubombo) and southeast (Stanger to Port Shepstone) (Figure 7), in Zimbabwe and Mozambique, from Sudan to Tanzania and from Zaïre to Angola and West Africa. Occurs in isolated patches of lowland rain forest; uncommon.

Vouchers: *Bayer* 2 (BM, K, PRE); *Dohse* 260 (BM, K, PRE); *Moll* 3233 (K); *Ward* 4817 (PRE), 5905 (K, NH, NU, PRE).

C. australis L., a Eurasian species closely related to *C. africana*, but with leaves usually serrate throughout length, grey-pubescent beneath and drying bright yellow-green above, fruits larger, (8–)10 × 9 mm, and *C. occidentalis* L. (N America), somewhat similar to *C. australis* but with bright green leaves glabrous beneath, have been cultivated in Pretoria.

Several species and hybrids of *Ulmus* L. have been cultivated as ornamentals: deciduous trees; bark fissured. *Leaves* serrate or biserrate. *Flowers* bisexual or hermaphrodite. *Perianth* herbaceous, cup-shaped, lobes 4–8, connate. *Stamens* of same number as perianth lobes. *Ovary* compressed, stipitate. *Fruit* a flat samara with encircling wing, emarginate at apex.

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