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Revision of the genus *Calpurnia* (Sophoreae: Leguminosae)

A.J. BEAUMONT*, R.P. BECKETT,* T.J. EDWARDS* and C.H. STIRTON**

Keywords: *Calpurnia* E.Mey., Leguminosae, new species, Sophoreae, southern Africa, taxonomy

ABSTRACT

Taxa recognised in this revision are: *Calpurnia aurea* (Aiton) Benth. subsp. *aurea*; *C. aurea* (Aiton) Benth. subsp. *indica* Brummitt; *C. floribunda* Harv.; *C. glabrata* Brummitt; *C. intrusa* (R.Br. in W.T.Aiton) E.Mey.; *C.* **reflexus** A.J.Beaumont sp. nov.; *C. sericea* Harv. and *C. woodii* Schinz. A putative hybrid between *C. sericea* and *C. woodii* is recorded. With the exception of *C. aurea*, all species are restricted to southern Africa. *C. reflexus* is possibly extinct, and *C. woodii* is considered rare. Characters examined in this revision are habitat, habit, vestiture, leaf morphology and anatomy; floral, pollen, fruit and seed morphology and anatomy; and seedling morphology. Illustrations and a key to taxa are provided.

INTRODUCTION

Calpurnia E.Mey. is a small genus of papilionoid legumes, and belongs to the Sophora group of the primitive tribe Sophoreae *sensu* Polhill (1981). According to Polhill (1981), *Calpurnia* is closely related to *Maackia* Rupr. & Maxim, *Cladrastis* Raf. and *Salweenia* Baker f., of the Northern Hemisphere. *Calpurnia* species are slender trees or small shrubs with pinnate leaves and attractive yellow papilionoid flowers in racemes or panicles. All but one species are narrow endemics of southern Africa. *C. aurea* subsp. *aurea* extends north into Ethiopia and, together with *C. aurea* subsp. *indica*, into southern India.

Early classifications placed *Calpurnia* species under *Sophora* L., of the tribe Sophoreae (Aiton 1789), *Robinia* L., of the tribe Robinieae (L'Héritier 1791), and *Podalyria* Willd. (Willdenow 1799) and *Virgilia* Poir. (Lamarck 1793), of the tribe Podalyrieae. Meyer (1836) transferred four species from *Virgilia* and published a new species to establish *Calpurnia*. The genus commemorates the Roman poet Calpernicus Siculus who, in the middle of the First Century A.D., wrote poetry similar to that of Virgilius. Superficially, species of *Calpurnia* resemble those of *Virgilia* (commemorating Virgilius).

Phillips (1917) recognised seven species of *Calpurnia*. Subsequent workers have contributed taxonomic notes on species and some have recognised subspecific taxa (Gillett 1965; Brummitt 1967, 1970). Yakovlev (1971) provides the most comprehensive recent account of the genus, notwithstanding the correction of some erroneous nomenclature by Ross (1976).

MATERIALS AND METHODS

Pollen

Mature buds preserved in the mixture: formalin: acetic acid: ethanol (FAA), and material from herbarium sheets were used. Buds from herbarium sheets were softened by gently boiling in water with a few drops of 'Teepol', before the anthers were removed. Anthers were sonicated in distilled water for one minute to release pollen. The suspensions were passed through 250 µm mesh filters to remove anther debris. Two drops of lactic acid were added to pollen filtrates to prevent excessive expansion of the pollen grains. Pollen was acetolysed using a freshly prepared acetic anhydride and concentrated sulphuric acid mixture (9:1) for 2 minutes 45 seconds in a water bath at 100°C. For scanning electron microscopy, acetolysed grains were pipetted onto glass cover slips and fixed onto brass viewing stubs. Specimens were viewed using a Hitachi S570 Scanning Electron Microscope (SEM) at 10 kv. For transmission electron microscopy, acetolysed grains were embedded in Spurr's resin using conventional procedures. Sections slightly thicker than 0.1 µm were stained and viewed with a Jeol T200 Transmission Electron Microscope (TEM) at 80 kv.

Seed morphology and anatomy

Seeds were flash frozen in liquid nitrogen and fractured transmedially through the hilum with a scalpel. Specimens were coated with gold-paladium and viewed with a Hitachi S570 SEM at 10 kv.

RESULTS AND DISCUSSION

Pollen

Ferguson & Skvarla (1981) reviewed the pollen of the Sophoreae and *Calpurnia* conforms to the general morphology of the tribe. The pollen of all species of *Calpurnia* is in monads, tricolporate, spheroidal to prolate, and apocolpate (Figure 1A, B). Further, colpus margins are smooth and the texture of the colpus furrow may be smooth or crustate in all species. Size variation is minimal and most grains are about 20 × 15 mm. Comparatively fewer columellae and a less continuous tectum distinguishes *C. intrusa* pollen (Figure 1C) and *C. sericea* (Figure 1D) from that of other *Calpurnia* species. The pollen wall is between 0.5 mm and 1.0 mm thick in all species. The pollen of the putative hybrid, *C. sericea* × *C.*

* Department of Botany, University of Natal, Pietermaritzburg, Private Bag X01, 3209 Scottsville, South Africa.
** The National Botanic Garden of Wales, Middleton Hall, Llanarthne, Carmarthenshire, SA32 8HN, U.K.
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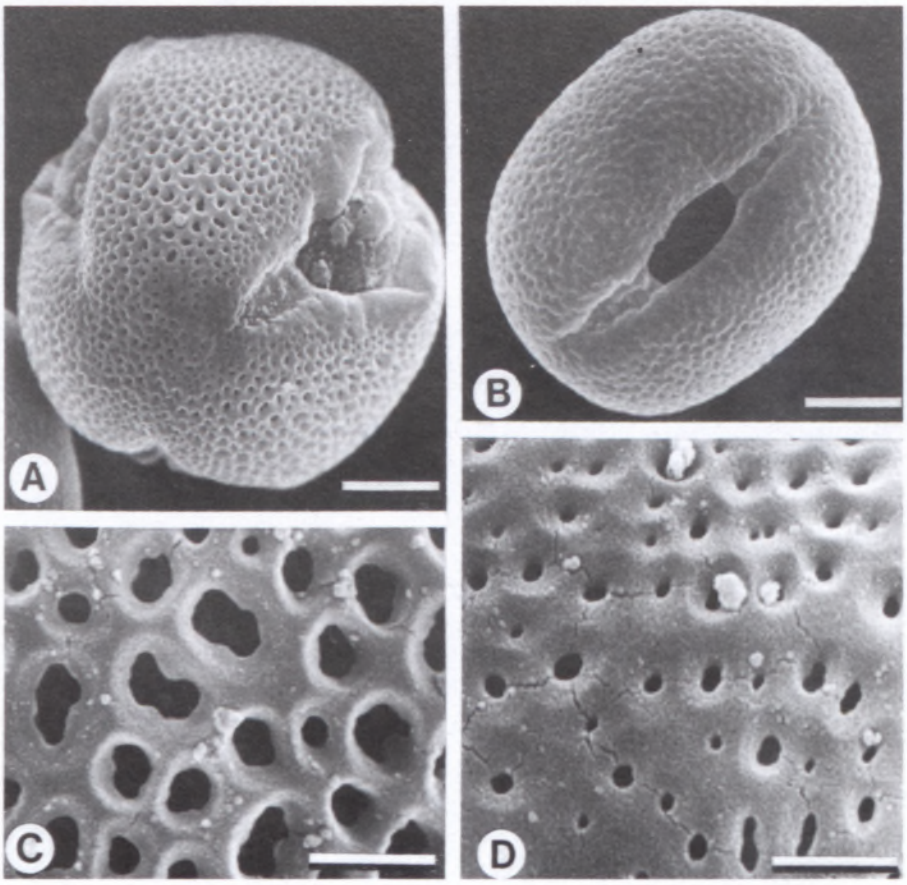

FIGURE 1.—Pollen features of *Calpurnia*. A, *C. intrusa* pollen grain, oblique-polar view; B, *C. sericea* pollen grain, equatorial view; C, *C. intrusa* pollen surface, tectum perforate-reticulate; D, *C. sericea* pollen surface, tectum perforate. A, C, *Beaumont 80*; B, D, *Beaumont 53*. Scale bars: 1 mm.

woodii, and to a lesser extent *C. woodii*, have slightly thicker foot and tectum layers than the remaining species.

Seeds

Mature seeds of all *Calpurnia* species except those of *C. floribunda*, and immature seed only of *C. reflexus*, were available for study. Seeds maturing apically and basally where the pod constricts, are frequently smaller and, together with seeds maturing next to aborted ovules and aborted developing seeds, were omitted from this study.

Calpurnia seeds range in size from 3 × 2 mm to 7 × 4 mm and are oblong-reniform to oblong-ellipsoid, and slightly compressed laterally. The radicle is horizontal to slightly deflexed (Figures 5S; 6R; 8S; 10R; 11Q; 13Q). The testa is uniform in colour, ranging from light yellowish brown, through chestnut to dark brown to brown-black in all species. A dark brown halo surrounds the hilum and dark markings extend down the raphe through the lens to the base of the seed opposite the hilar pole. The hilum is lateral, and is surrounded by the white remnants of the funiculus that form the rim aril. The hilum of *C. aurea* subsp. *aurea* is elliptic and surrounded by a thin aril. In *C. glabrata*, *C. intrusa*, *C. sericea*, *C. reflexus*, *C. woodii* and the putative hybrid *C. sericea* × *woodii*, the hilum is round to obovate, and a little smaller than that found in *C.aurea* subsp. *aurea*. The rim aril is of even thickness or it may be thickest away from the radicular lobe, and is coarsely rugulate. The Y-shaped micropyle lies between the hilum and radicular lobe, next to, or partly surrounded by the rim aril, and the sculpturing of the testa attains maximum development closest to the hilum (Figure 2F). *C. aurea* subsp. *aurea*, *C. glabrata* and *C. sericea* have uninterrupted rugose sculpturing of the testa, in contrast to the testa sculpturing of *C. intrusa* which consists of tightly packed rugae in finite groups interrupted by prominent channels. In all species, an ovate tracheid bar extends from the micropyle to the ovule bundle, and tracheids are pitted and orientated with their long axes perpendicular to the hilar groove. *Calpurnia* seeds lack a vascular bundle subtending the tracheid bar.

Calpurnia *E.Mey.*, Commentariorum de plantis africae australioris 1: 2 (1836); Benth.: 90 (1837); Walp.: 806 (1842); Harv.: 266 (1862); Benth. & Hook.f.: 456 (1865); Harv.: 88 (1868); Baker: 252 (1871); Hook.f.: 251 (1878); Taub.: 197 (1892); Thonner: 258 (1915); E.Phillips: 475 (1917); Baker f.: 316 (1926); Hutch.: 329 (1964); J.B.Gillett et al.: 46 (1971); Palmer & Pitman: 898 (1972); J.H.Ross: 196 (1972); Yakovlev: 591 (1972); R.A.Dyer: 244 (1975); Coates Palgrave: 299 (1977). Type: *C. intrusa* (R.Br. in W.T.Aiton) E.Mey.

Slender trees or shrubs, deciduous, unarmed; stems flexible, old stems glabrescent to glabrous, young stems usually pubescent. *Leaves* imparipinnate, pulvinate, petiolate; stipules triangular to subulate, small, paired, adnate to base of pulvinus; leaflets 4–28, oblong, ovate to obovate, symmetrical about the midvein, opposite or sub-opposite, membranous, flat or slightly conduplicate, base often slightly asymmetrical, pulvinate, apex acute to retuse, with or without mucro, terminal leaflet sometimes smaller and broader; venation brochidodromous, secondary veins in 4–7 pairs. *Inflorescence* racemose to paniculate, terminal and axillary; bracts deltoid, ovate or narrowly ovate, sessile; bracteoles deltoid to filiform or rarely foliaceous, paired or absent, sessile or rarely petiolate; flowers

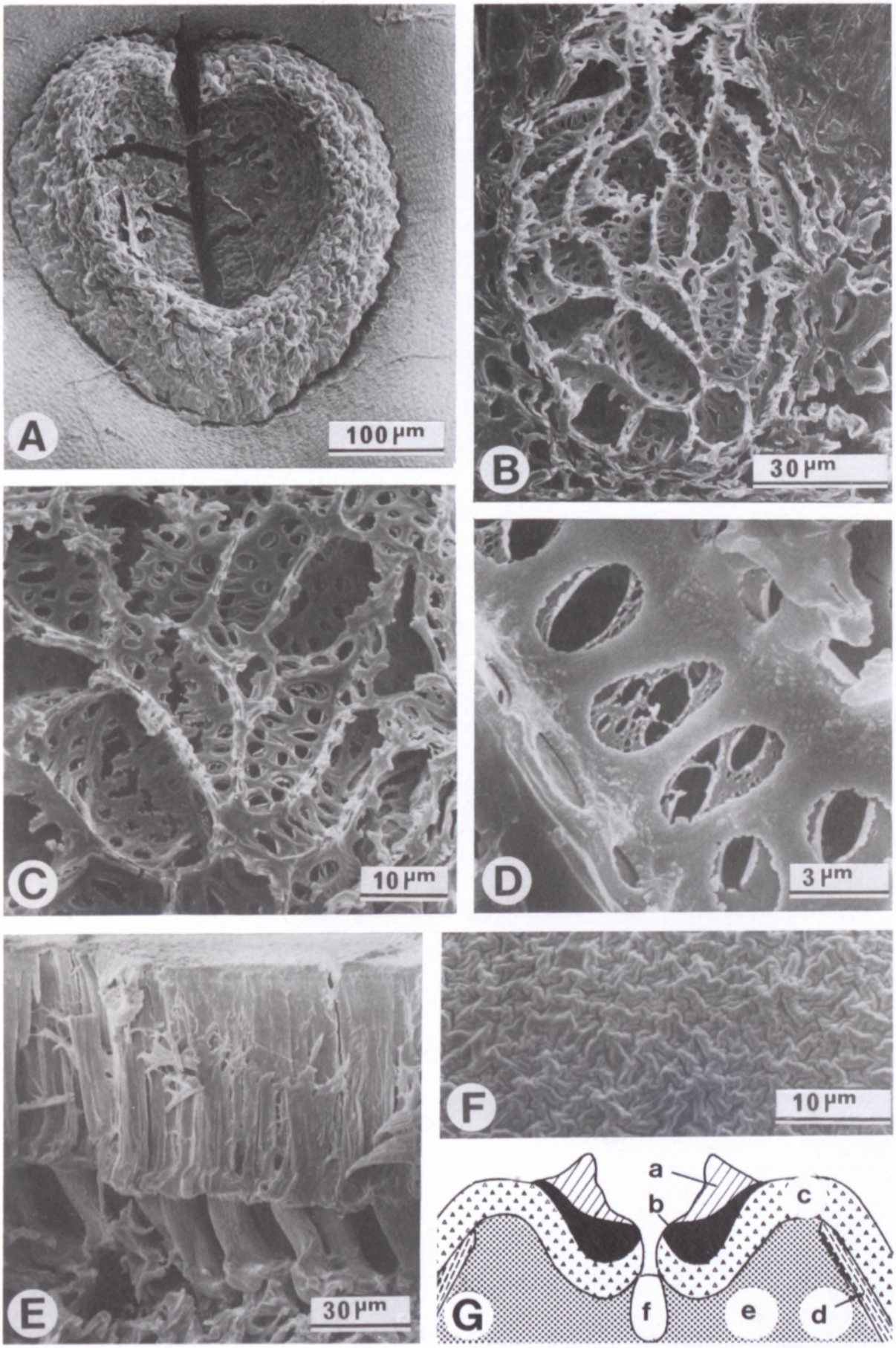

FIGURE 2.—Features of seed surface, tracheid anatomy and testa structure in *Calpurnia sericea, Beaumont 79*. A, hilum; B, tracheid bar; C, tracheids; D, pits in tracheids; E, seed coat structure; F, seed surface near hilum; G, plan diagram of section through hilar region; a, rim aril; b, hilar palisade; c, palisade; d, hypodermal cells; e, parenchyma; f, tracheid bar. Scale bars: A, 100 µm; B, E, 30 µm; C, F, 10 µm; D, 3 µm.

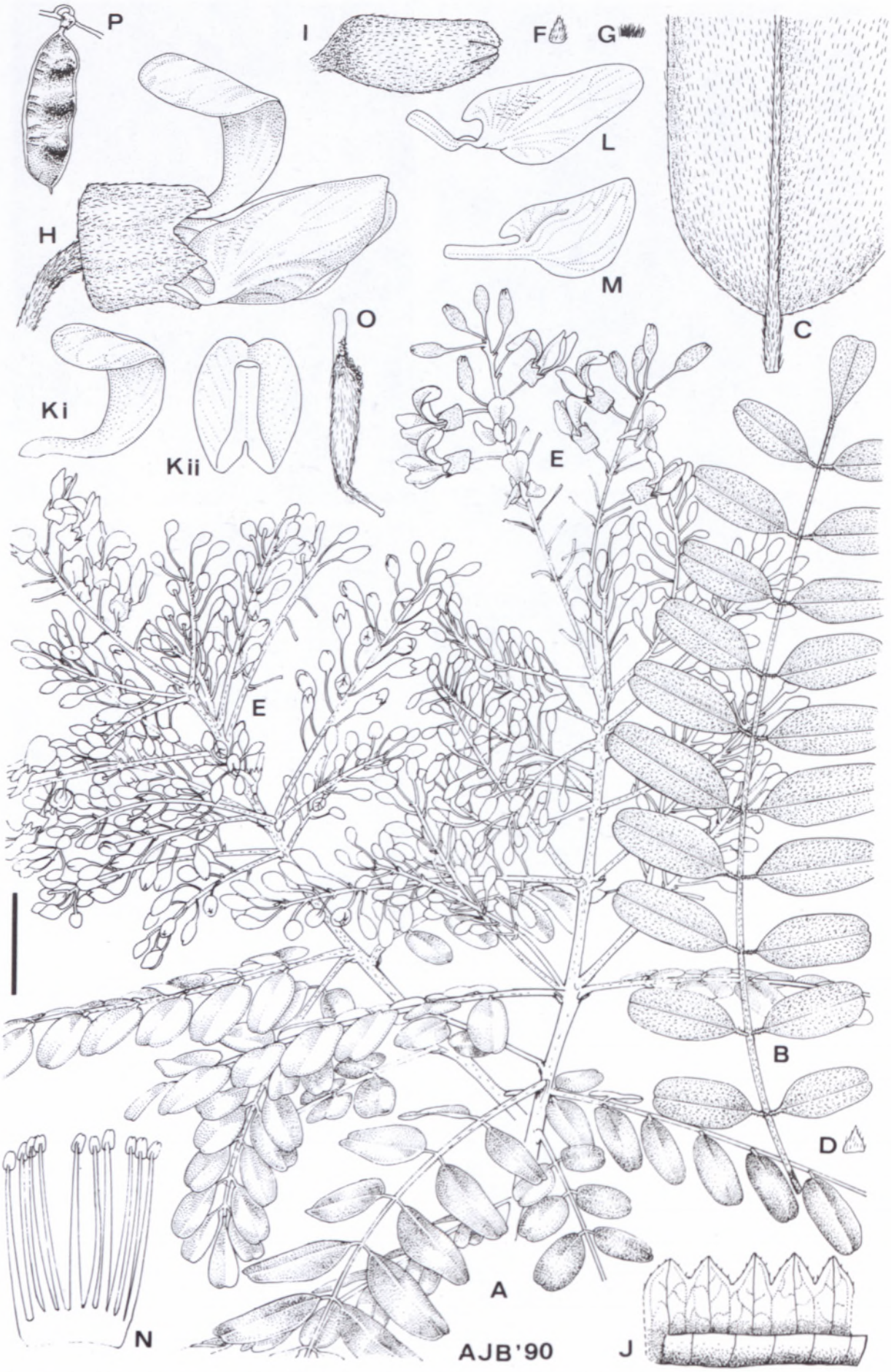

FIGURE 3.—*Calpurnia floribunda*: A–O, *Bean & Viviers 2306*; P, figure drawn from Batten & Bokelmann (1966: plate 67, fig. 2a). A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, hairs at junction of pedicel and hypanthium; H, flower; I, bud; J, calyx; Ki, standard petal, lateral view; Kii, standard petal, ventral view; L, wing petal; M, keel petal; N, androecium; O, gynoecium; P, fruit. A, B, E, P, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5.

10–100, papilionaceous. *Hypanthium* funnel-shaped, poorly to moderately developed. *Calyx* campanulate; tube cylindrical, base variably intrusive; lobes 5, triangular, straight, rarely retrorse, upper sinus shallow, rarely all sinuses equal. *Petals* exserted, bright sulphur to golden yellow; standard broadly elliptic, obcordate to broadly ovate, erect or reflexed, apex emarginate, base clawed, channelled, glabrous or rarely minutely hairy; pollinator guides if present with red and brown flecks to larger, solid patches; calluses absent; wing falcate-ovate to falcate-obovate, auriculate, apex acute to blunt, base clawed, petal sculpturing lunate-lamellate or absent; keel boat-shaped, auriculate, shorter than wings, with lateral pockets, base clawed, apex acute to blunt, lower margins lightly coherent. *Stamens* 10, monadelphous from adaxial filaments fused basally to abaxial filaments fused for up to half of their lengths, or nearly diadelphous, nine filaments fused to two thirds of their length, tenth filament fused to one third of its length, glabrous or rarely basally papillate; anthers dorsifixed, slightly alternately dimorphic. *Pollen* tricolporate; tectum perforate to perforate-reticulate. *Ovary* oblong-falcate, slightly compressed, stipitate; ovules 6–16; style filiform, slightly arcuate, glabrous or with sparse extension of ovary vestiture; stigma capitate, terminal with elongate peripheral papillae. *Fruits* linear, compressed, stipitate, 1–6-seeded, papery or woody, brittle, glabrescent to minutely pubescent; upper suture winged, dehiscent. *Seeds* ovoid to unequally reniform, longer than broad, compressed, pale yellow-brown, chestnut to brown-black; hilum small, oval to obovate, subterminal, rim aril weakly developed.

Key to species

1a Inflorescence paniculate:
  2a Stipules up to 1 mm long . . . . . 1. *C. floribunda*
  2b Stipules longer than 1 mm:
    3a Leaves, pedicels and calyces moderately to densely villous-tomentose; calyx base truncate; bracts 3–5 mm long; standard broadly ovate; petal claws and lower third to one half of the filaments concealed by calyx lobes . . . . . 2. *C. woodii*
    3b Leaves, pedicels and calyces glabrescent to puberulous, minutely tomentose or sericeous; calyx base intrusive; bracts to 2 mm long; standard oblong-elliptic or slightly obovate; petal claws and lower third to one half of the filaments exposed . . . . . 3. *C. sericea*
1b Inflorescences racemose:
  4a Calyx lobes reflexed; filament bases densely hairy . . . 4. *C. reflexus*
  4b Calyx lobes straight; filament bases glabrous:
    5a Seeds not exceeding 3.5 × 2.5 mm . . . . . 5. *C. intrusa*
    5b Seeds larger than 3.5 × 2.5 mm:
      6a Fruits usually larger than 50 × 10 mm:
        7a Calyx lobes shorter than calyx tube; ovules 10–16, native to Africa . . . . . 6a. *C. aurea* subsp. *aurea*
        7b Calyx lobes equal to or longer than calyx tube; ovules 6–7; plants restricted to India . . . . . 6b. *C. aurea* subsp. *indica*
      6b Fruits usually less than 50 × 10 mm:
        8a Petal claws and filaments exposed in mature flowers . . . . . 7. *C. sericea*
        8b Petal claws and filaments concealed by calyx in mature flowers:
          9a Plants glabrescent; distribution in Swaziland and Mpumalanga only . . . . . 8a. *C. glabrata*
          9b Young stems, leaves, and calyx puberulous; ovary puberulous-tomentose to sericeous; distribution in Eastern Cape only . . . . . 8b. *C. floribunda*

1. **Calpurnia floribunda** *Harv.* in Harv. & Sond., Flora capensis 2: 267 (1862); E.Phillips: 480 (1917). Type: Roadside near Grahamstown, *H. Hutton s.n.* (TCD, holo.; K, iso.!).

Shrub or small tree up to 3 m tall; young stems moderately puberulous to glabrescent. *Leaves* 20–220 mm long, moderately puberulous; petiole 2–19 mm long; petiolule 1.0–2.5 mm long, puberulous; stipules triangular-ovate, 1 mm long, puberulous, persistent; leaflets 4–20, elliptic-oblong, sometimes slightly ovate or obovate, 6–30 × 4–14 mm, base obtuse to acute, apex obtuse to retuse, blunt. *Inflorescence* paniculate, rarely racemose, 30–80 mm long, densely puberulous, 5–100-flowered; bracts broadly triangular-ovate, 1 mm long, puberulous, persistent; bracteoles usually absent. *Hypanthium* 1–2 mm long. *Calyx* 3–5 mm long, moderately puberulous, base intrusive; lobes 1–2 mm long, straight, shorter than tube. *Petals*: standard elliptic, 6–7 × 5–6 mm, erect, apex reflexed, claw 3–4 mm long, glabrous; wing falcate-oblong to falcate-ovate, 7–10 × 3–5 mm, upper basal region sculptured, claw 3.5–5.0 mm long; keel 6–7 × 4–5 mm, apex acute to obtuse, claw 3.5–5.0 mm long. *Stamens* fused at base of staminal sheath, glabrous. *Ovary* 5–6 mm long, densely puberulous-tomentose to sericeous; stipe 3.0–3.5 mm long; ovules 7 or 8; style 2.0–2.5 mm long. *Fruit* and *seed* not seen. Figure 3.

The epithet *floribunda* refers to the profuse flowering of this species with, as Harvey (1862) observed: 'peduncles crowded towards the ends of the branches.'

The distribution and small stipules of *C. floribunda* distinguish it from *C. woodii*. The concealed petal claws and filaments distinguish *C. floribunda* from *C. sericea*. The leaves of *C. floribunda* resemble those of *C. aurea* subsp. *aurea* but the flowers of *C. aurea* are considerably larger than those of *C. floribunda*, and are borne in racemes.

C. floribunda is endemic to the Eastern Cape (Figure 4), occuring from sea level to 2 000 m. It grows in Valley Bushveld, Eastern Province Thornveld, Highland Sourveld and Dohne Sourveld and North Eastern Mountain Sourveld vegetation types of Acocks (1988), inhabiting forest margins, open scrub bush and gullies. *Flowering time*: January to April.

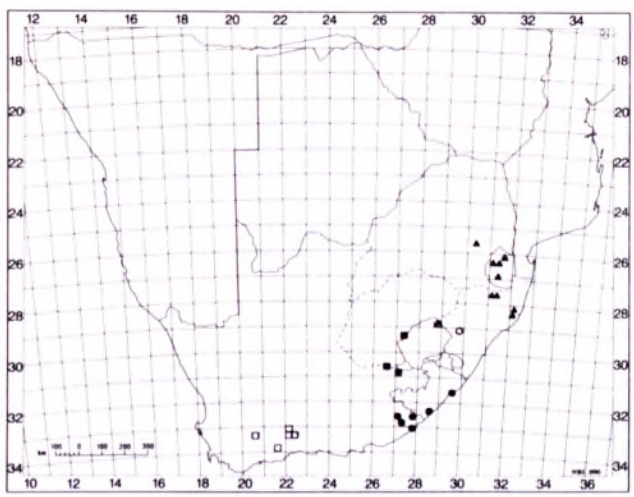

FIGURE 4.—Known distribution of *Calpurnia floribunda*, ●; *C. woodii* and *C. sericea* × *woodii*, ○; *C. reflexus*, ■; *C. intrusa*, ❑ and *C. glabrata*, ▲, in southern Africa.

FIGURE 5.—*Calpurnia woodii, Beaumont 90.* A, habit; Bi, leaf with terminal leaflet; Bii, leaf posture; C, leaflet; D, stipule; E, inflorescence; F, bract; G, bracteole; H, flower; I, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, gynoecium; P, immature infructescence; Q, mature infructescence; R, fruit; S, seed. A, B, E, P–R, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5; S, × 18.

Vouchers: *Bean & Viviers 2306* (NU); *Bokelmann 7* (NBG); *Britten 6517, s.n.* (GRA); *Dyer 1235* (GRA); *Rycroft 1893* (NBG).

2. **Calpurnia woodii** *Schinz* in Bulletin de l'Herbier Boissier 4: 426 (1896); E.Phillips: 478 (1917). Type: slopes of Drakensberg, *Wood 3516* (Z, holo.; K!, NH!, PRE, iso.!).

Compact shrubs up to 2 m tall, branched basally; young stems whitish puberulous-tomentose. *Leaves* 50–200 mm long, moderately to densely villous-tomentose; petiole 9–26 mm long; petiolule 1–2 mm long, densely villous-tomentose; stipules subulate to filiform, 3–15 mm long, villous-tomentose, persistent, apex often curled; leaflets 16–28, oblong-elliptic to ovate, 9–41 × 5–16 mm, base round to acute, apex acute, mucronate. *Inflorescence* robust, upright, paniculate, 30–100 mm long densely villous-tomentose, 10–100-flowered; bracts shortly oblong to elongate-ovate, 3–5 mm long, densely villous-tomentose, persistent; bracteoles filiform, often caducous. *Hypanthium* 1 mm long. *Calyx* 3–5 mm long, densely villous-tomentose, base truncate; lobes 0.5–1.5 mm long, straight, shorter than tube. *Petals*: standard suborbicular to very broadly ovate, 4.0–4.5 × 3.0–3.5 mm, erect, apex not reflexed, claw 3.5–4.5 mm long, glabrous; wing falcate-oblong, 6.5–7.5 × 2.5–3.5 mm, upper basal region pocketed and sculptured, claw 3.0–3.5 mm long; keel 3.5–4.0 × 2.5–3.5 mm, apex blunt, claw 3.5–4.5 mm long. *Stamens* fused basally to one third of their lengths, glabrous. *Ovary* 4.5 mm long, densely villous; stipe 1.5 mm long; ovules 6–8; style 3 mm long. *Fruit* 25–40 × 9–12 mm, 1–4-seeded, chartaceous, moderately to sparsely villous, pale brown, venation faint; upper suture wing to 1 mm broad. *Seed* 5–6 × 3–4 mm (Figure 5).

This species commemorates John Medley Wood (1827–1915), botanist and former curator of the Durban Botanic Gardens.

Distinguishing characters of *C. woodii* are: the densely villous-tomentose leaves and inflorescences which give shrubs a silver-green to grey-white hue, short, robust, upright panicles which bear numerous small flowers, and large, persistent stipules and bracts. Although similar, the fruits of *C. woodii* (Figures 5Q, R) are broader and of thinner texture to those of *C. sericea* (Figures 6P, Q).

C. woodii has a very restricted distribution in KwaZulu-Natal (Figure 4) and occurs at approximately 1 500 m above sea level, in the Underberg region and at South Downs, near Estcourt, Weenen County. The south-east-facing grassland slopes overlooking Wagendrift Dam and the Moor Park Nature Reserve near Estcourt, support a locally abundant population of this species. Here, plants form a stand in Southern Tall Grassveld (Acocks 1988) dominated by *Themeda triandra* Forssk. *C. woodii* occurs on steep, dry slopes in loose, shaley soils undisturbed by cultivation or grazing. There appears to be little that is unique to the area where *C. woodii* grows that could explain the scarcity of this species. The flowers are prone to insect herbivory and beetles of the order Bruchidae eat the seeds. The stems and leaves however, remain ungrazed even by the local goats. *C. woodii* is a very appealing species, especially when in flower, and it is hoped that an interest in its cultivation could be fostered, which might ensure the survival of this very restricted and little-known species. *Flowering time*: December to May.

Vouchers: *Beaumont 72, 90* (NU); *Rentz 512* (K); *Sidey 124* (MO); *Wood 4377* (BOL, K).

3. **Calpurnia sericea** *Harv.* in Harv. & Sond., Flora capensis 2: 267 (1862); J.H.Ross: 59 (1976). Type: Lesotho, '*collector unknown 82*' (S, holo.!).

C. obovata Schinz: 426 (1896). Type: KwaZulu-Natal, Ingunga, *Schlechter 6310* (Z, holo.!).

C. mucronulata Harms ex Kuntze: 54 (1898). Type: KwaZulu-Natal, Klip River Dist., Van Reenen's Pass, *Kuntze s.n.* (K, lecto.!, here designated; NY!).

C. obovata var. *pubescens* Yakovlev: 183 (1971). Type: KwaZulu-Natal, Utrecht Dist., Kafir Drift, Tweekloof, *Thode A270* (K, holo.!; PRE, iso.!).

C. intrusa auct., non (R.Br. in W.T.Aiton) E.Mey. *sensu stricto*.

Virgate shrub to 2 m tall; young stems moderately puberulous to tomentose or glabrescent to glabrous. *Leaves* 30–150 mm long, densely to sparsely pubescent to puberulous, minutely tomentose to sericeous or glabrescent to glabrous; petiole 2–20 mm long; petiolule 0.5–2.0 mm long, from puberulous, tomentose, villous or sericeous to glabrescent to glabrous; stipules narrowly triangular to subulate, 2–4 mm long, from puberulous, tomentose, villous or sericeous to glabrescent to glabrous, usually persistent, apex acute to filiform; leaflets 8–24, shape variable within and among plants, suborbicular to elliptic or slightly oblong to elliptic-ovate or obovate-elliptic, 3–25 × 3–17 mm, base subcordate to obtuse, apex retuse to acute, mucronate to blunt. *Inflorescence* upright or pendulous, racemose, rarely paniculate, 30–200 mm long, densely to sparsely pubescent from puberulous, villous, tomentose or sericeous to glabrescent to glabrous, 10–100-flowered; bracts oblong-ovate to triangular, 2 mm long, puberulous, tomentose, villous or sericeous to glabrescent or glabrous, persistent, apex irregularly dentate or acute; bracteoles usually absent. *Hypanthium* 1.0–1.5 mm long. *Calyx* 2.0–4.5 mm long, moderately puberulous, tomentose to shortly sericeous, or glabrescent to glabrous, base intrusive; lobes 0.5–1.5 mm long. *Petals*: standard suborbicular to slightly obovate-oblong, 4–5 × 4–6 mm, apex not reflexed; pollen guides with red and brown flecks, rarely with larger, blood-red patches flanking midvein, or absent, claw 2.5–4.0 mm long, glabrous; wing falcate-oblong, 5.0–6.5 × 2.5–3.5 mm, upper basal region sometimes pocketed, sculpturing absent, claw 3.0–4.5 mm long; keel 4.0–5.0 × 2.5–3.5 mm, apex acute to blunt, claw 2.5–4.0 mm long. *Stamens* fused at base of staminal sheath, glabrous. *Ovary* 4 mm long, minutely sericeous along sutures or throughout; stipe 1 mm long; ovules 5–8; style 2.5 mm long. *Fruits* 20–50 × 5–9 mm, 1–4-seeded, coriaceous to crustaceous, puberulous or minutely sericeous to glabrous, mid- to dark brown, venation moderately prominent; upper suture wing absent or less than 1 mm broad. *Seeds* 5.0–6.0 × 2.5–4.0 mm (Figure 6).

FIGURE 6.—*Calpurnia sericea*: A, Biii, Ci, D–G, J–Pii, R, *Beaumont & Beckett 46;* Bi, *Beaumont 68*; Bii, *Stirton 12740*; Cii, *Beaumont & Beckett s.n.*; Hi, Ii, *Beaumont & Beckett 47*; Hii, Iii, Q, *Beaumont 62*. A, habit; Bi–Biii, leaf; Ci, ii, leaflet; D, stipule; E, inflorescence; F, bract; G, hairs at base of pedicel and hypanthium; Hi, Hii, flower; Ii, Iii, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, gynoecium; Pi, immature infructescence; Pii, mature infructescence; Q, fruit; R, seed. A, B, E, P, Q, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5; R, × 18.

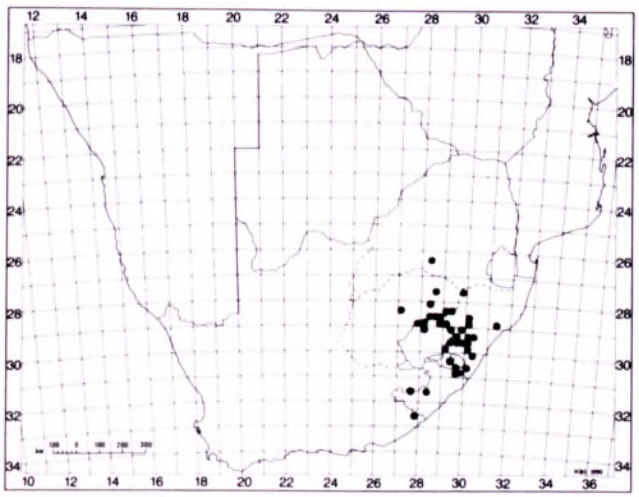

FIGURE 7.—Known distribution of *Calpurnia sericea* in southern Africa.

The specific epithet refers to the long, silky, close-pressed hairs of some specimens.

Ross (1976) provides a comprehensive account of the correct nomenclature of this species. Individuals of *C. sericea* show considerable variation in leaflet number, shape and size, pubescence length and density of leaflets and ovaries, and raceme length.

Apart from *C. aurea* subsp. *aurea*, *C. sericea* has the widest distribution among *Calpurnia* species (Figure 7). *C. sericea* often grows in association with *Buddleja* species, *Leucosidea sericea* and *Pteridium aquilinum*. It favours riverine habitats, especially river valley flood plains and stream gullies. *Flowering time*: November to May.

Vouchers: *Beaumont 59, 64, 69* (NU); *Hilliard & Burtt 12580* (K, NU); *Nicholas & Neave 2117* (NH).

3a. **Calpurnia sericea × woodii**

Figure 8 illustrates the putative hybrid *C. sericea* × *woodii*. This is the first record of possible hybridisation in *Calpurnia*. We have only seen two hybrid plants, both by the river at the picnic site of Moor Park Nature Reserve in KwaZulu-Natal (Figure 4), with *C. sericea* nearby, and *C. woodii* occurring about 2 km away. The hybrids are vigorous and express a combination of characters from the parents. The hybrid individuals are taller than plants of both *C. sericea* and *C. woodii*, and comprise many close-set, semi-erect, flexible stems which are reminiscent of those of *C. sericea*. Vegetative characters which appear to be derived from *C. woodii* are the dense villous-tomentose pubescence of the leaves and stipules, and the comparatively long stipules. The leaves of the hybrid plants also resemble those of *C. woodii* in shape, they are, however, smaller. The inflorescences of the hybrid plants are long, lax, many-flowered racemes concentrated towards the ends of branches. This arrangement is similar to the condition found in *C. sericea*, compared to the robust, erect, densely-flowered and shortly paniculate inflorescences of *C. woodii*. Floral characters of the hybrid plants which resemble *C. sericea* are: the exposed petal claws and stamen bases, and suborbicular-oblong standard petal. In contrast, the densely villous-tomentose calyces of hybrid individuals are very similar to those of *C. woodii*. Bracts of the hybrid plants are of intermediate length, between those of *C. sericea* and *C. woodii*. Hybrid fruit length to width ratios are very close to those of fruits of *C. sericea*. The slightly longer hilum of seeds of *C. woodii* however, is also expressed in hybrid seeds.

Voucher: *Beaumont 99* (NU).

4. **Calpurnia reflexus** *A.J.Beaumont*, sp. nov., *C. sericeae* habitu fructuque similis sed lobis calycis maturi revolutis et basi non intrusa, staminibus monadelphibus et ad basin papillatis puberulisque differt.

TYPE.—Lesotho, 2828 (Bethlehem): Leribe Dist., Tsikoane, (–DD), *Dieterlen 584* (K, holo.!; MASE!, PRE, SAM!).

Robinia capensis sensu auct. non Burm.f: 22 (1768). *Virgilia robinioides* sensu auct. non DC: 98 (1825). *Calpurnia robinioides* sensu auct. non (DC.) E.Mey.: 3 (1836). Type: '*Robinia capensis Burm.! cap. Virgilia robinioides* DC.' (G-DC, lecto.!, here designated).

Shrub or small tree up to 4 m tall; young stems puberulous. *Leaves* 30–100 mm long, moderately puberulous to glabrescent; petiole 4–23 mm long; petiolule 1–2 mm long, puberulous; stipules triangular-ovate, 1–2 mm long, puberulous, caducous; leaflets 4–12, elliptic, or slightly ovate- or obovate-elliptic, 4–40 × 4–20 mm, base round to acute, apex round to truncate or rarely slightly retuse, mucronate to blunt. *Inflorescence* racemose, 40–80 mm long, moderately to densely puberulous, 10–30-flowered; bracts narrowly ovate-triangular, 1.0–1.5 mm long, puberulous, caducous; bracteoles filiform, longer than bracts, caducous. *Hypanthium* 1–2 mm long. *Calyx* 5–7 mm long, puberulous, base campanulate; lobes 2–3 mm long, revolute, shorter than or equal to tube; anterior lobe shorter than other lobes. *Petals*: standard obovate, 6–9 × 5–7 mm, erect, apex reflexed, claw 3–4 mm long, papillate; wing falcate-oblong, 9–11 × 3–5 mm, upper basal and rarely upper central regions lightly sculptured, claw 3.0–3.5 mm long; keel 6–8 × 4–5 mm, inner anterior margins puberulous-tomentose, apex round to obtuse, claw 3–4 mm long. *Stamens* monadelphous, nine fused to two-thirds of their lengths, the tenth fused to one third of its length, base densely papillate-puberulous. *Ovary* 5 mm long, margins tomentose-sericeous, sides sparsely papillate towards the stipe; stipe 3 mm long; ovules 6–8; style 3 mm long, filiform, glabrous. *Immature fruits* 30–45 × 8–10 mm, 1–3-seeded, ligneus, glabrescent to glabrous, straw-coloured, venation prominent; upper suture wing to 0.5 mm broad; mature fruits not known. *Mature seed* not known (Figure 9).

Burman (1768) briefly described a plant which he named *Robinia capensis*, although he made no reference to the specimen upon which he based his description. De Candolle (1825) listed seven species under *Virgilia*. He transferred Burman's *Robinia capensis*, renaming it *Virgilia robinioides* (and adopting *Virgilia capensis* for *Sophora capensis* Burm.f.). De Candolle (1825) apparently was the first person to have referred to a specimen upon which Burman (1768) based his description of

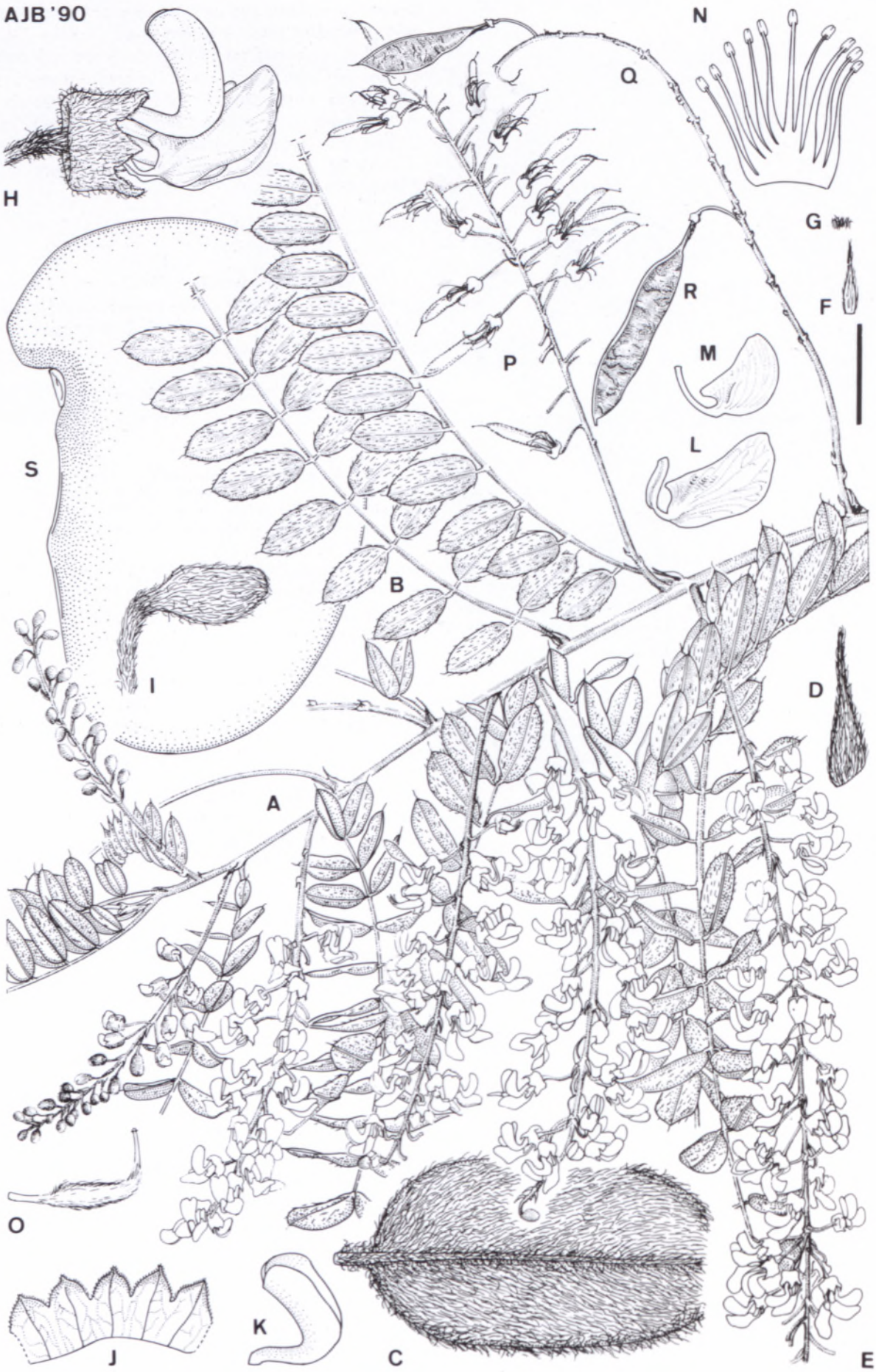

FIGURE 8.—*Calpurnia sericea* × *woodii*, *Beaumont 99*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, hairs at base of pedicel and hypanthium; H, flower; I, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, gynoecium; P, immature infructescence; Q, mature infructescence; R, fruit; S, seed. A, B, E, P–R, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5; S, × 18.

FIGURE 8.—*Calpurnia sericea* × *woodii*, *Beaumont 99*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, hairs at base of pedicel and hypanthium; H, flower; I, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, gynoecium; P, immature infructescence; Q, mature infructescence; R, fruit; S, seed. A, B, E, P–R, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5; S, × 18.

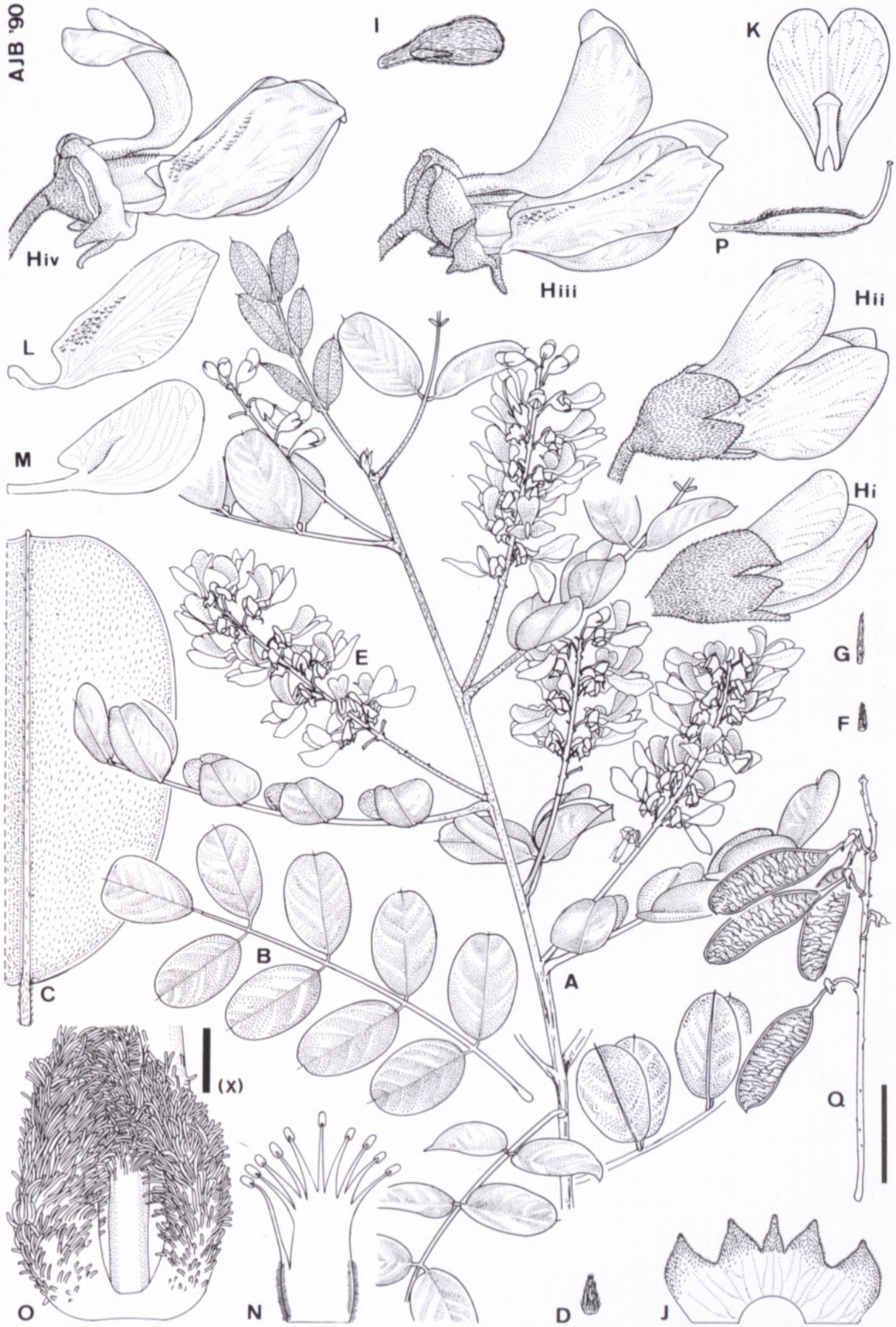

FIGURE 9.—*Calpurnia reflexus:* A–E, Hi–Hiv, J–Q, *Dieterlen 584*; F, G, I, *Archibald 509*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, bracteole; Hi–Hiv, successive floral maturation; I, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, base of staminal sheath; P, gynoecium; Q, immature infructescence. A, B, E, Q, × 0.8; C, D, F–I, × 4.4; J–N, P, × 3.5; O, scale bar, 0.5 mm.

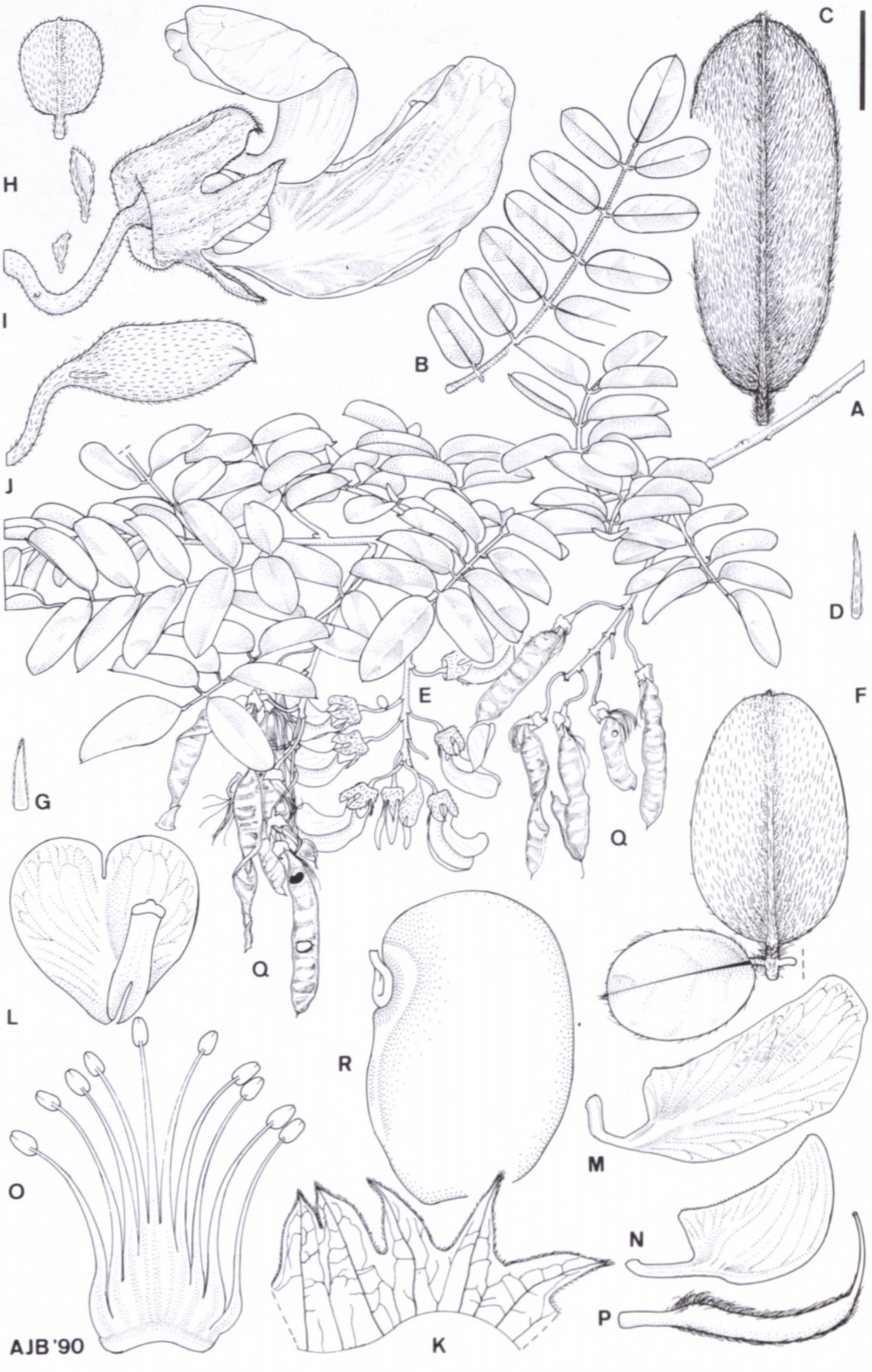

FIGURE 10.—*Calpurnia intrusa*: A–F, H–R, *Beaumont 81*; G, *Beaumont 80*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, condensed lateral branch leaf; G, bract; H, bracteoles; I, flower; J, bud; K, calyx; L, standard petal; M, wing petal; N, keel petal; O, androecium; P, gynoecium; Q, infructescence; R, seed. A, B, E, Q, × 0.8; C, D, F–J, × 4.4; K–P, × 3.5; R, × 18.

Robinia capensis. He reported this specimen to be housed in the Delessert Herbarium, Conservatoire et Jardin botaniques de la Ville de Genève (G-DEL). Dr A. Charpin (Genève) has investigated at our request, the whereabouts of this specimen, but unfortunately he reports that the specimen is no longer in the Delessert Herbarium. Dr Charpin however, did find a specimen in the De Candolle Herbarium (G-DC), labelled '*Robinia capensis* Burm.! cap. *Virgilia robinioides* DC.'. This presumably is part of Burman's original specimen of *Robinia capensis*, and possibly the last surviving remnant of this collection. This specimen bears metacentric trichomes on the calyx, and the dorsal surface of the standard petal is densely hairy throughout. Metacentric hairs are absent from *Calpurnia*, but are a characteristic of a number of legume genera including *Indigofera*. Dr B.D. Schrire (Royal Botanic Gardens, Kew) examined a microfiche of the specimen (which shows a leaf but no flowers) and confirmed it to be *Indigofera frutescens*. Accordingly, we reject all *Calpurnia* synonyms associated with the Burman fragment in the De Candolle Herbarium, Geneva (G-DC), and propose the new name *Calpurnia reflexus*. The specific epithet refers to the revolute nature of the calyx teeth, which is unique in *Calpurnia* (Figure 9).

In addition to the revolute calyx teeth, the monadelphous stamens and densely papillate base of the staminal sheath are unique characters for this species. Yakovlev (1971), citing calycine and staminal characters, suggested that this taxon might be worthy of recognition as a new genus. We prefer to recognise this taxon as a *Calpurnia* species because of the similarity of the remaining vegetative and floral characters between it and the other members of this genus. There is a paucity of representative herbarium material of *C. reflexus*. This plant appears to be very scarce and might be extinct. The first two authors visited the recorded Lesotho localities of the Leribe District, and west of the Thaba-Putsoa Range near Ramabantas between Roma and Nyakosoba, in May 1990, but were unable to find the plant. The western lowlands of Lesotho are heavily overgrazed, the flat land is cultivated or badly eroded, and consequently, indigenous flora survives only on isolated koppies.

C. reflexus is an upland species, occuring in mountain ravines around 1 800 m.

Vouchers: *Archibald 509* (GRA); *Barber 813* (K); *Drège 6402, La. 45* (P); *Muller 731* (GRA, PRE).

5. **Calpurnia intrusa** *(R.Br. in W.T.Aiton) E.Mey.*, Commentariorum de plantis Africae australioris 1,2: 4 (1836). Type: *Hort. Kew 1796* (BM, lecto.!, here designated).

Virgilia intrusa R.Br. in W.T.Aiton: 4 (1811); DC.: 98 (1825).

C. villosa Harv.: 268 (1862); E.Phillips: 475 (1917). Type: *Mund & Maire s.n.* sub Herb. Reg. Berol. (K, holo.!).

C. intrusa var. *glabrata* Yakovlev: 195 (1971). Type: Western Cape, Oudtshoorn Div. Meiringspoort, *Acocks 18292* (PRE, holo.!).

Shrub or tree up to 6 m tall; young stems puberulous-tomentose to glabrescent. *Leaves* 20–110 mm long; leaflets 4–24, oblong, sometimes slightly ovate- or obovate-oblong, 7–21 × 4–9 mm, base round to obtuse, apex round to obtuse, mucronulate or blunt, abaxial surface villous-tomentose to tomentose-sericeous rarely glabrescent to glabrous, adaxial surface glabrescent to glabrous, rarely villous-tomentose to tomentose-sericeous; petiole 5–15 mm long, pubescent; petiolule 0.5–1.5 mm long, pubescent; stipules filiform, 3–5 mm long, villous-tomentose to glabrescent, often caducous. *Inflorescence* pendulous, racemose, 30–100 mm long, densely villous-tomentose to sericeous or glabrescent, peduncle often bearing trifoliolate and unifoliolate leaves, 6–30-flowered; bracts narrowly triangular, 3 mm long, sparsely hairy, often caducous; bracteoles filiform to foliaceous, often persistent. *Hypanthium* 2–4 mm long. *Calyx* 5–8 mm long, moderately villous-tomentose to glabrescent, base intrusive; lobes 1.5–5.0 mm long, straight, abaxial and wing lobes equal to or longer than tube, adaxial lobes shorter than tube. *Petals*: standard broadly obovate, 6–10 × 7–11 mm, erect, apex reflexed, claw 3–6 mm long, glabrous; wing falcate-elliptic to falcate-obovate, 8–15 × 3–8 mm, upper central region lightly sculptured, claw 3–5 mm long; keel 6.5–10.0 × 4.0–6.0 mm, apex obtuse, claw 3–8 mm long. *Stamens* fused basally for nearly half their lengths, glabrous. *Ovary* 5–10 mm long, villous-tomentose to sericeous usually along margins, rarely hairy throughout or glabrous; stipe 1.5–2.5 mm long; ovules 9–14; style 2.5–4.0 mm long. *Fruits* 16–43 × 5–6 mm, 1–4-seeded, chartaceous, glabrescent to glabrous, pale sandy-brown, minutely flecked grey, venation faint; upper suture wing absent. *Seeds* 2.5–3.5 × 2.0–2.5 mm (Figure 10).

The specific epithet refers to the intrusive nature of the calyx base.

Many workers have misapplied the name *Calpurnia intrusa* to specimens of *C. sericea* Harv. The confusion surrounding the identity of *C. intrusa*, has arisen because successive workers perpetuated a misunderstanding of the original concept of this taxon. Meyer's (1836) concept of *C. intrusa* is in fact, *C. sericea* Harv., and not the Western Cape endemic which Brown described (Aiton 1811). This taxonomic mistake was perpetuated (Phillips 1917; Burtt-Davy 1932; Henkel 1934) until Brummitt (1967) and Ross (1976) clarified the nomenclature. Brummitt (1967) describes two specimens at the British Museum of Natural History mounted on one sheet: *Hort. Kew 1796* and *Hort. Kew 1797*, and identified as *Virgilia intrusa*. We examined these specimens and, although they do not bear Brown's handwriting, we believe that they represent the plant which he had in mind when he described *Virgilia intrusa*. Brummitt (1967) also notes that the plant illustrated in tablet 2617 in *Curtis's Botanical Magazine* 53 (1826), is in fact, *C. aurea* subsp. *sylvatica*, although Brown verified the illustration to be of *Virgilia intrusa*. Plants of *C. aurea* subsp. *aurea* resemble those of *C. intrusa* in some respects. Both have large flowers, and smaller specimens of *C. aurea* tend to be found in southern Africa, where they resemble *C. intrusa* with respect to organ size. Tablet 2617 in *Curtis's Botanical Magazine* 53 (1826) clearly portrays the inflated base of the calyx above the hypanthium, typical of *C. aurea*, and unlike the deeply intrusive calyx of *C. intrusa*. Meyer (1836) in transferring *V. intrusa* to *Calpurnia*, cites a Drège specimen (which is a specimen of

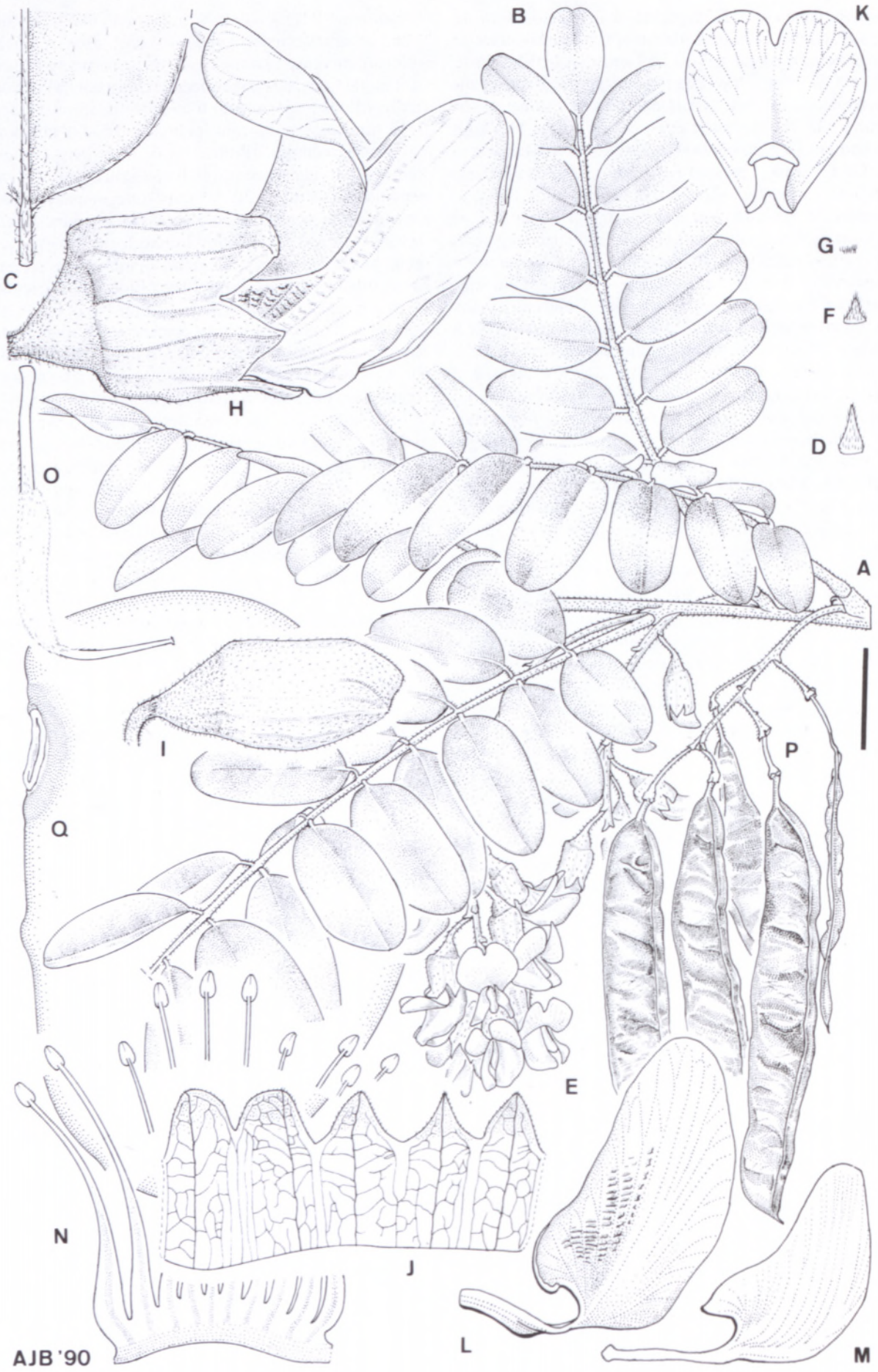

FIGURE 11.—*Calpurnia aurea* subsp. *aurea*, *Beaumont 26*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, hairs at base of pedicel and hypanthium; H, flower; I, bud; J, calyx; K, standard petal; L, wing petal; M, keel petal; N, androecium; O, gynoecium; P, infructescence hairs at base of pedicel and hypanthium; Q, seed. A, B, E, P, × 0.8; C, D, F–I, × 4.4; J–O, × 3.5; Q, × 18.

C. sericea Harv.), and describes the flowers of the new combination thus: '*in genere minimi, vix tres lineas longi lutei*'. Flowers of *C. sericea* are small and generally of this length (3 lines being equivalent to 6 mm), whereas flowers of *C. intrusa sensu* Brown are usually about twice this length. Meyer (1836) makes no mention of the collections *Hort. Kew 1796* and *Hort. Kew 1797* in the British Museum of Natural History.

Apart from *C. reflexus*, plants of *C. intrusa* tend to have fewer leaflets per leaf among *Calpurnia* species. The leaflets are characteristically oblong and usually glabrescent above and pubescent below. Yakovlev (1971) established *C. intrusa* var. *glabrata* to distinguish specimens with 'totally glabrous leaflets'. However, the leaflets of the type specimen of *C. intrusa* var. *glabrata* are not glabrous. The upper surfaces of the leaflets are usually glabrous but the rachis, petioles and lower leaflet surfaces are sparsely to moderately villous. Some specimens have leaflets which are equally pubescent on both surfaces (e.g. *Hort. Kirstenbosch, sub BOL470050*). Ovary pubescence, both in terms of distribution and density, is also highly variable, ranging from hairy throughout, hairs confined to the sutures, to glabrous. We do not support Yakovlev's establishment of varieties in *C. intrusa* based on variation of pubescence of leaflets or of ovaries because these characters are so variable and character states are not clearly defined.

C. intrusa is endemic to the Western Cape, and occurs south of 33° S and between 20° and 23° E in the Groot Swartberge region (Figure 4). It occupies an island of alluvial sand and calcrete surrounded by conglomerate sandstone, in turn surrounded by quartzitic sandstone with shale and tillite. *C. intrusa* is found in gorges in relict forest patches. *Flowering time*: December to June.

Vouchers: *Beaumont 80* (NU); *Goldblatt 7450* (MO, PRE); *Middlemost 607* (NBG); *Muir 1968* (BOL, PRE); *Stokoe 8779* (SAM).

6. **Calpurnia aurea** *(Aiton) Benth.*, Commentationes de leguminosarum generibus: 26 (1837); Baker: 252 (1871); Bedd.: 89, t.12 (1874); Hook.f.: 251 (1878); Fiori: 175 (1912); J.S.Henkel: 207 (1934); J.B.Gillett: 421 (1965); Brummitt:123 (1967); J.B.Gillett et al.: 46 (1971); Compton: 247 (1976); Coates Palgrave: 299 (1977); Britto: 469 (1986). Type: 'Nat. of Africa.' 'Sophora foliis pinnatis: foliolis numerosis oblongo-ovalibus supra glaberrimis, caule fruticoso.' '*Hort. Kew. 1778.*' (BM, lecto.!).

Sophora aurea Aiton: 44 (1789). *Virgilia aurea* (Aiton) Lam.: 454, t. 326 (1793). *Podalyria aurea* (Aiton) Willd.: 502 (1799).

Robinia subdecandra L'Hérit.: 157, t. 75 (1791); *C. subdecandra* (L'Hérit.) Schweick: 237 (1937); Brenan: 410 (1949); Eggeling & Dale: 298 (1952); L.Touss.: 45 (1953); Dale & Greenway: 355 (1961); F.White: 146 (1962). Type: grown at Paris from seed obtained in Ethiopia by *Bruce s.n.*: (G, holo.; K, microfiche!).

Sophora sylvatica Burch.: 146 (1824). *Virgilia sylvatica* (Burch.) DC.: 98 (1825). *Calpurnia sylvatica* (Burch.) E.Mey.: 2 (1836); Harv.: 267 (1862); *Calpurnia aurea* subsp. *sylvatica* (Burch.) Brummitt: 123 (1967). Type: forests of the Boschberg, *Burchell 3138* (K, holo.!).

C. lasiogyne E.Mey.: 3 (1836); Harv.: 267 (1862); F.Muell.: 31 (1866); J.M.Wood & M.S.Evans: 6 (1899); E.Phillips: 477 (1917); Burtt Davy: 354 (1932). Type: 'Zwischen Omtata und Omsamwubo,' *Drège V.b. 47* (MO!, P!, K, isosyn.!); 'prope Port Natal, 3000 feet,' *Drège V.c. 34* (P, syn.!).

C. aurea var. *major* Oliv. & Baker f.: 339 (1886); Baker f.: 594 (1926). Type: Kilimanjaro 6000 feet, *H.H. Johnston s.n.* (K, holo.!).

6a. subsp. **aurea**.

Shrub or slender tree to 15 m tall; young stems densely puberulous-tomentose to glabrescent. *Leaves* 40–250 mm long, moderately puberulous-tomentose to glabrescent-glabrous; petiole 10–30 mm long, densely puberulous-tomentose to glabrous; petiolule 1–4 mm long, densely puberulous-tomentose to glabrous; stipules triangular, 1.5–3.0 mm long, puberulous to glabrous, often persistent; leaflets 8–30, oblong-elliptic to ovate or obovate, 10–55 × 5–25 mm, base subcordate to acute, apex retuse to obtuse, blunt to mucronulate. *Inflorescence* pendulous, racemose, 40–250 mm long, densely puberulous-tomentose to glabrescent, 8–40-flowered; bracts broadly triangular, 0.5–3.0 mm long, puberulous-tomentose to glabrous, persistent; bracteoles usually absent. *Hypanthium* 2–5 mm long. *Calyx* 5–13 mm long, moderately puberulous to glabrous, base campanulate; lobes 2–5 mm long, straight, shorter than tube. *Petals*: standard suborbicular to obovate, 9–20 × 8–20 mm, erect, apex reflexed, claw 5–13 mm long, glabrous; wing falcate-oblong, falcate-ovate or falcate-obovate, 6–25 × 4–12 mm, sculpturing present in upper basal and central regions or absent, claw 4–9 mm long; keel 7–20 × 5–10 mm, apex broadly acute to obtuse, claw 4–9 mm long. *Stamens* fused basally less than one fifth of their lengths, glabrous. *Ovary* 7–15 mm long, densely sericeous to glabrous; stipe 6–10 mm long; ovules 10–16; style 6–9 mm long. *Fruits* 40–140 × 9–23 mm, 3–8-seeded, chartaceous, puberulous to glabrous, pale sandy-brown to brown-black, venation moderately prominent to faint; upper suture wing to 3 mm broad. *Seeds* 5–8 × 3–5 mm (Figure 11).

The epithet *aurea* refers to the golden-yellow flowers. In South Africa it is known as Natal laburnum.

C. aurea subsp. *aurea*, the best known *Calpurnia* species, is a frequent entry in African floras and botanical checklists. It is cultivated as an ornamental and as a shade tree in tea and coffee plantations (Brummitt 1967).

C. aurea subsp. *aurea* has the largest vegetative, floral and fruit characters in *Calpurnia*. It is the tallest species, often growing as a slender tree in forest clearings and forest margins. In drier, open scrub and grassland habitats it grows as a shorter, much branched shrub (Figure 12). Another characteristic of this species is the base of the calyx tube which is slightly inflated around the apex of the hypanthium. When viewed laterally, the base of the calyx tube does not obscure the hypanthium, but the calyx tube and teeth conceal the petal claws and lower portions of the stamens (Figure 11H). *Flowering time*: throughout the year when mild to hot weather prevails, usually during spring and summer.

We recognise two subspecies in *Calpurnia aurea*: subsp. *aurea* and subsp. *indica*. Subsp. *indica* occurs in India; however, specimens from Indian herbaria were

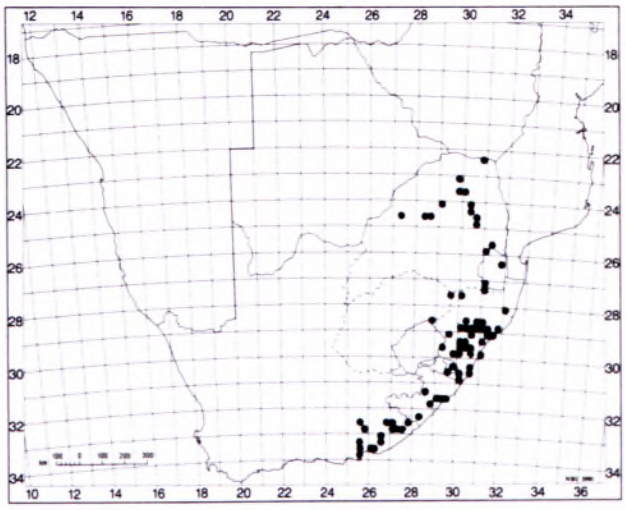

FIGURE 12.—Known distribution of *Calpurnia aurea* subsp. *aurea* in southern Africa.

unavailable to us for study. Although limited material from other herbaria was examined, the present authors feel that more consultation of specimens of subsp. *indica* is needed in order to present a full descriptive account of this taxon. Britto (1986) provides a clear account of the two subspecies in India. He uses ovule number per pod to distinguish subsp. *indica* (with six to seven ovules) from subsp. *aurea* with 12 to 15 ovules. Brummitt (1967) cites differences in the relative lengths of the teeth to the campanulate part of the calyx, to distinguish the two subspecies.

We reject previous decisions by other authors to recognise subsp. *sylvatica* within *C. aurea*, or to recognise it as a distinct species. Former taxonomic treatments distinguished such specimens by their glabrous leaflets and ovaries. Vestiture of leaves and ovaries is notoriously variable among other members of this genus as well as among specimens of *C. aurea sensu lato*. The infraspecific discrimination in *C. aurea* based upon degree of pubescence of these features has been quite arbitrary. Previous workers did not consider the pubescence of other structures. Vestiture on stipules, petioles, rachides, and petiolules do not necessarily correlate with the pubescent or glabrous nature of the leaflets of specimens. Features of the inflorescence (the peduncles, bracts, pedicels and calyx) may also be variously pubescent to glabrous, independent of the condition of the ovary. Plants in this genus are rarely, if ever, glabrous, and usually some pubescence is present, at least at the junctions of structures for example, bracts and pedicels and petioles. Plants of *C. aurea* vary greatly in the distribution and density of their pubescence, and classification at the specific or subspecific levels using these criteria is impractical and controversial with respect to defining the limits between character states.

Vouchers: *Codd & De Winter 3267* (K, PRE); *Edwards 1014* (NU); *Galpin 1214* (BOL, PRE, SAM); *Hilliard 2517* (NU); *Stirton 5201* (MO, PRE, SRGH).

7. **Calpurnia glabrata** *Brummitt* in Kew Bulletin 24: 71 (1970). Type: Swaziland, Mbabane Dist., Sheba's Veil, *Compton 27133* (K, holo.!; NBG!, PRE, iso.).

Shrub or small tree to 3 m tall; young stems glabrescent to glabrous. *Leaves* 70–360 mm long, glabrescent to glabrous; petiole 11–48 mm long; petiolule 2–6 mm long, glabrescent to glabrous; stipules triangular, 1–2 mm long, glabrescent to glabrous, persistent; leaflets 8–26, oblong-obovate to obovate, 14–38 × 5–16 mm, base acute and sometimes attenuate towards petiolule, apex blunt to rounded and sometimes slightly retuse, mucronulate to blunt. *Inflorescence* flexible, racemose, 80–210 mm long; glabrescent to glabrous, 15–40-flowered; bracts triangular, 0.5–1.0 mm long, glabrescent to glabrous; bracteoles minute to absent. *Hypanthium* 2–3 mm long. *Calyx* base intrusive; lobes 0.5–2.5 mm long, triangular, straight, shorter than tube. *Petals*: standard suborbicular to broadly elliptic, sometimes slightly obovate, 4–6 × 5–7 mm, erect, apex reflexed, claw 3–6 mm long, glabrous; wing falcate-elliptic to falcate-ovate, 4–9 × 2.5–5.0 mm, upper basal region lightly pocketed or sculptured, claw 3–6 mm long; keel 3.0–7.5 × 2.5–5.0 mm, apex acute to obtuse, claw 3–5 mm long. *Stamens* fused basally to half their lengths, glabrous. *Ovary* 3–8 mm long, glabrous or upper margin sparsely puberulous; stipe 2.5–7.5 mm long; ovules 6 or 7; style 2–3 mm long. *Fruits* 29–45 × 10–12 mm, 1–3-seeded, ligneous, glabrous, deep brown, venation prominent; upper suture wing 0.5–2.0 mm broad. *Seeds* 5.0–7.0 × 3.5–5.0 mm (Figure 13).

The epithet *glabrata* refers to the glabrescent nature of plants.

The most striking feature of *C. glabrata* is the almost glabrous nature of all parts. Presence or absence of hairs, however, is a character to be used with great caution when identifying *Calpurnia* specimens. In the absence of floral or fruit characters, vegetative specimens of *C. glabrata* may be confused with glabrescent specimens of *C. aurea* subsp. *aurea* occurring in the southern Cape. Flower size varies in *C. glabrata* (Figure 13E). Flowers may be similar in size to those of *C. sericea* (Figure 6E) or larger, resembling those of *C. floribunda* (Figure 3E).

The calyx of *C. glabrata* conceals the wing and keel petal claws, and the filament bases. These features are exposed in flowers of *C. sericea*, which *C. glabrata* otherwise resembles. In general outline and size, flowers of *C. glabrata* may resemble those of *C. floribunda*, but the pubescence of the leaves, calyx and ovary of the latter is denser than in *C. glabrata*.

The fruits of *C. glabrata* most closely resemble those of *C. sericea* and *C. reflexus*, although the upper suture wing of *C. glabrata* fruits is slightly broader.

C. glabrata (Figure 4) is concentrated in Swaziland but it also occurs in Mpumalanga between 30° and 31° E and in KwaZulu-Natal to 29° S. It occurs between 200 to 1 500 m. *Flowering time*: October to April.

This species occurs predominantly in North Eastern Mountain Sourveld (Acocks 1988) in hillside grassland, *Acacia caffra* scrub, roadsides and riverbanks. In Swaziland it grows in disturbed roadside grassland with the weeds *Pteridium aquilinum* (bracken) and *Psidium guajava* (wild guava).

Vouchers: *Beaumont 96* (NU). *Compton 63* (NBG); *28152* (NBG, PRE); *29869* (K, NBG, PRE, SRGH); *32203* (K, NBG, PRE).

FIGURE 13.—*Calpurnia glabrata*, A–O, *Beaumont 96*; P, Q, *Compton 28152*. A, habit; B, leaf; C, leaflet; D, stipule; E, inflorescence; F, bract; G, flower; H, buds; I, calyx; J, standard petal; K, wing petal; L, keel petal; M, androecium; N, gynoecium; O, immature infructescence; P, fruits; Q, seed. A, B, E, O, P, × 0.8; C, D, F–H, × 4.4; I–N, × 3.5; Q, × 18.

SPECIMENS EXAMINED

Abbott 1351 (6a) NH; *2464* (6a) UNITRA. *Acheson 25* (6a) SRGH. *Acocks 9861* (3) NH; *18292* (5) PRE. *Anon. 732* (5) B; *8897* (6a) BOL; *17315* (5) NBG. *Archibald 509* (4) GRA. *Ash 232* (6a) MO.

Balkwill, Manning & Meyer 794 (3) NU. *Banks 5* (6a) NY. *Barber 813* (4) K. *Barbosa 9430* (6a) LISC. *Barbosa & Moreno 9739* (6a) LISC. *Barker 5219* (6a) NBG. *Battiscombe 514* (6a) K. *Baur 575* (3) SAM. *Bayliss 4443* (6a) MO, NBG, NY; *8762* (6a) MO, NY. *Bean & Viviers 2306* (1) NU. *Beattie 30* (3) NH, NU. *Beaumont 72, 73, 90* (2) NU; *2, 55, 57, 58, 59, 60, 64, 65, 66, 69* (3) NU; *99* (3a) NU; *80* (5) NU; *25, 26, 29, 31, 32, 35, 49, 50, 52* (6a) NU; *96* (7) NU; *100* (3) ?; *Beaumont & Beckett s.n.* (3) NU. *Bews 1299* (3) NU. *Bie gel 1550* (6a) SRGH. *Bokelmann 7* (1) NBG. *Bourquin s.n., 36, 159* (6a) NH. *Brassnett 116* (6a) K. *Britten s.n., 6517* (1) GRA; *1* (6a) BOL. *Brown & Shapiro 275* (6a) U. *Bruce s.n.* (6) K. *Bullock 2817* (6a) B, K, LISC. *Burchell 3138* (6) K; *3138, 3233* (6a) K. *Buthelezi 372* (3) NH.

Cadman, Edwards & Norris 3319 (3) NU. *Cawe 473* (6a) UNITRA. *Chase 381* (6a) BM, NU, SRGH; *4221* (6a) BM. *Codd 9750* (6a) UPS. *Codd & De Winter 3267* (6a) K. *Coetzee 938* (6a) SRGH. *Compton 22471* (3) NBG; *28027* (6a) K, NBG; *29270* (6a) NBG; *63, 24703, 28152* (7) NBG; *27133, 32203* (7) K, NBG; *29869* (7) K, NBG, SRGH. *Corby 1637, 1994* (6a) SRGH. *Couto 107* (6a) LISC, SRGH. *Crewe 43* (6a) NU.

Dahlstrand 2662 (6a) MO. *Dahlstrand & Mogg 33* (6a) J. *De Menezes 1622* (6a) BM, K, LISC, SRGH. *Deschamps, Murta & Da Silva 1184, 1186, 1188, 1233, 1234, 1303* (6a) LISC. *Dieterlen 37* (3) K, P, SAM; *584* (4) K, MASE, SAM. *Drège 1,a, 45 , 6402* (4) P; *s.n.* (6a) K, MO; *s.n.* (6a) K; *s.n.* (6a) P; *V,b, 47* (6) MO, P, K; *V,c, 34* (6) P. *Duckworth 163* (6a) D. Killick Herb. *Dutton & Tinley 8* (6a) NH, NU. *Dyer 1235* (1) GRA. *Dyer & Verdoorn 4220* (6a) K.

Ecklon & Zeyher 1142 (6a) MO. *Edwards 2694* (2) NH, NU; *32* (3) NU; *725, 804, 934, 1014, 1121, 2316, 2374* (6a) NU; *25270* (6a) J. *Evans 456* (3) NH; *537* (6a) NH. *Exell & Mendonca 2481* (6a) BM. *Eyles 6159* (6a) SRGH.

Faden 74 (6a) MO. *Feinauer s.n.* (3) NBG. *Ferreira 224* (3) K. *Flanagan 127* (6a) SAM; *808* (1) GRA, SAM; *s.n.* (3) SAM.. *Forrester & Gooyer 186* (6a) J. *Fry 2776* (6a) GRA.

Galpin 1214 (6a) BOL, SAM; *s.n.* (6a) BOL; *s.n.* (7) BOL. *Gerstner 4090* (3) NH; *4092* (7) NH. *Gillett 14244* (6a) BOL. *Goldblatt 7450* (5) MO. *Goldsmith 36* (6a) SRGH. *Goodier & Phipps 150* (6a) SRGH. *Gossweiler 12678* (6a) LISC. *Greenhow s.n.* (6a) NY, SRGH. *Greenway 7596* (6a) K. *Greenway & Kanuri 12061, 12473* (6a) K. *Guillarmod 9878* (3) GRA. *Guy 72* (6a) NU.

Henderson 400 (6a) MO. *Henriques 1059* (6a) LISC. *Herb. Le Testu (sheets I and II) 4249* (6a) BM. *Hilliard 2780, s.n.* (3) NU; *1306* (3) NH, NU. *1040, 2112, 2517* (6a) NU. *Hilliard & Burtt 8501* (7) NU; *10064* (7) MO, NU; *12580* (3) K, NU. *Hort. Kew 1778* (6) BM; *1796* (5) BM. *Huntley 768* (3) NU. *H. Hutton s.n.* (1) K.

Johnson 62 (6a) NBG; *696* (6a) B, BOL. *H.H. Johnston s.n.* (6) K. *Johnston s.n.* (6a) BM.

Kemp 990 (6a) MO. *Kuntze s.n.* (3) K, NY.

Lawn 37 (6a) NH. *Leach 9658* (6a) SRGH. *Lebrun 3912* (6a) BM, K; *5498* (6a) P. *Leistner 3028* (3) SRGH. *Levyns 6933* (6a) BOL, P. *Lubke, Everard & Avis 2697* (6a) GRA.

Maas Geesteranus 4976 (6a) G, MO. *Maguire 157* (6a) J. *McClean 37* (3) MO, PRE; *s.n.* (6a) NH. *Mendes 923* (6a) ?. *Middlemost 607* (5) NBG. *Mogg 7546* (3) NH; *25374* (3) MO; *27864, 31071* (6a) J. *Moll 828 (6a)* NU; *1896, 3358* (6a) K, NU; *4448* (6a) SRGH; *5459* (3) NH. *Moore s.n.* (6a) NBG. *Moreno 27* (6a) LISC. *Moss 27753* (7) BOL, J. *Muir 1968* (5) BOL. *Muller 731* (4) GRA. *Mund & Maire s.n.* (5) K.

Nel 234 (6a) NBG. *Nelson s.n.* (4) K. *Netshiungani s.n.* (6a) J. *Nicholas & Neave 2117* (3) NH. *Nicholson 276* (6a) NH.

Obermeyer, Schweickerdt & Verdoorn 353 (6a) NH.

Pappe s.n. (6a) K. *Paterson s.n.* (6a) BOL. *Paulo (sheets I and II) 750* (6a) MO. *Pegler 79* (3) GRA; *155* (6a) BOL, K, SAM. *Phillips s.n.* (6a) NU. *Pienaar 128* (6a) MO, SRGH. *Platt s.n.* (3) NH. *Polhill & Paulo 2304* (6a) B, LISC. *Powell-Cotton 667* (6a) BM, MO, NY.

Ranales 89 (3) NU. *Rauh & Schlieben 9642* (6a) B, K, SRGH. *Rentz 512* (2) K. *Retief 1004* (3) K. *Rudatis 2056* (3) NH. *Rycroft 1893* (1) NBG.

Scheepers 1024 (6a) MO, SRGH. *Schimper 200* (6a) K. *Schlechter 6310* (3) Z. *Schlieben 4499* (6a) B, BM, G, LISC. *Schrire 246* (6a) NH. *Semsei 2785* (6a) K. *Sidey 124* (2) MO. *Sim 19071* (3) NU. *Stalmans 69* (6a) K. *Stirton 5201* (6a) MO, SRGH. *Stokoe 8779* (5) SAM. *Story 3407* (6a) MO. *Strey 6394* (6a) NH, NU; *8606* (6a) K, NH, SRGH. *Swynnerton 79* (6a) BM, K, SAM.

Taylor 1752 (6a) NY. *Teixeira 1642, 2158, 3409* (6a) LISC. *Teixeira & Andrade 4389* (6a) LISC, SRGH; *5172, 5218* (6a) LISC. *Thode A270* (3) K, PRE; *s.n.* (3) K; *s.n.* (6a) NH. *Tinley 696* (6a) NH. *Torre & Pereira 13* (6a) LISC. *Tyson 1248* (3) UPS; *1355* (3) BOL, SAM; *2595, 3062* (6a) SAM.

Van Wyk 7139 (3) NH, UNITRA.

Ward 518 (6a) NH; *3238* (7) NU. *Werger 243* (3) SRGH. *Wild 2103 , 2171* (6a) SRGH; *4286* (6a) K, LISC, MO, SRGH; *4335* (6a) LISC, MO, SRGH. *Wilson 771* (6a) K. *Wood 3516* (2) K, NH; *4377* (2) BOL, K; *s.n.* (3) MO; *11153* (3) NH, UPS. *Wright 1975* (3) NU.

Zeyher 777 (6a) K, P.

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