

Podalyriace (25.01–25.09)

Genus: *Xiphotheca* C.F. Ecklon & J.M. Zeyher

Phylogenetic Number: 25.01.

Tribe: Podalyriace.

Subtribe: Xiphothecinae.

Species Studied—Species in Genus: 1 sp.—9 spp.

Fruit a legume; unilocular; $1.5\text{--}3.8 \times 0.6\text{--}0.9 \times 0.3\text{--}0.4$ cm; with persistent calyx or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight or curved (rarely); not plicate; not twisted; asymmetrical or symmetrical (rarely); obliquely obovate, obliquely ovate, or oblong (rarely); when asymmetrical with both sutures unequally or parallelly (rarely) curved; not inflated or inflated (rarely); compressed; with beak (1–5 mm long); straight; with solid beak the same color and texture as fruit; tapered to long tapered at apex; apex aligned or oblique (slightly) with longitudinal axis of fruit; tapered or long tapered at base; base oblique or aligned with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous; seed chambers externally invisible or visible; with the raised seed chambers not torulose. Fruit margin not constricted or constricted; slightly constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures (assumed); active (assumed); with valves twisting (slightly). Replum invisible. Epicarp dull; monochrome; brown to tan; with surface texture uniform; pubescent and indurate or glabrous (rarely); with hairs erect; with 1 type of pubescence; tomentose, villous (densely), velutinous, or hirsute; with pubescence brown; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; straight; straight at apex; eglandular; without spines; smooth; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp trace; surface not veined; 1-layered; without balsamic vesicles; without fibers; without reniform canals; solid. Endocarp glossy; opaque; monochrome; tan; smooth; without adhering pieces of testa; nonseptate; taceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–6; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 0.4–0.8 mm long; of 1 length only; flattened; straight. Aril fleshy; cupshaped

(with a narrow opening on the micropylar side) or horseshoe shaped (with the opening towards the micropyle); entire; covering less than 1/2 of seed; orangish tan or white.

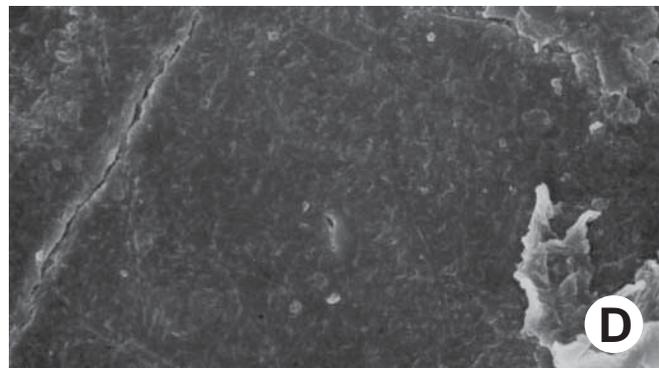
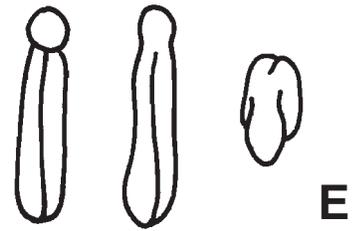
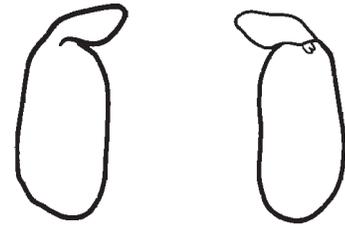
Seed $3.5\text{--}4.5 \times 2.5\text{--}3.5 \times$ ca. 2 mm; not overgrown; not angular; asymmetrical; reniform (oblong) or oblong; compressed; with surface smooth; without visible radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces; without medial ridge on each face. Testa without pieces of adhering epicarp; not adhering to endocarp; free from endocarp; glossy; not modified by a bloom; colored; mottled or monochrome (rarely); with frequent mottles; greenish tan to tan or brown; with brown (darker) overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens and terminating before base of seed; not bifurcating; color of or darker than testa; brown; flush. Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 0.5–1 mm long; with curved outline; elliptic; apical according to radicle tip but marginal according to seed length; recessed; within rim or not within corona, halo, or rim. Hilum rim color darker than testa. Lens discernible; equal to or greater than 0.5 mm in length; 1.2–1.5 mm long; with margins straight; oblong; not in groove of raphe; confluent with hilum; mounded; similar color as or dissimilar color from testa; darker than testa; brown; not within corona, halo, or rim. Endosperm thick; not pluglike and not resembling tip of radicle; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis oblique; perpendicular to length of seed; without a joint evident between the radicle and the cotyledons. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (Cape Province).

Notes: Wyk and Schutte (1995) considered Lipariace and Podalyriace to each be monophyletic and Sophoreae (2) to be their sister group. Using Crotalariae (27) as the outgroup, Schutte and Wyk (1998a,b) found that the

genera of Liparieae and Podalyrieae coalesced into two closely related clades. *Liparia* (25.04) was in the *Podalyria* (25.06) clade. This supported earlier suggestions (Polhill 1976, 1981o; Wyk and Schutte 1995) that Liparieae and Podalyrieae should be merged. Schutte and Wyk (1998a,b) merged the two tribes as Podalyrieae, recognized the two clades as subtribes, Xiphothecinae and Podalyriinae, and erected a monotypic tribe for *Hypocalyptus* (26.01), Hypocalypteae (26). The generic enumeration and number of species in each genus follows Schutte and Wyk (1998a). Schutte and Wyk (1993) recently reinstated *Xiphotheca*, a segregate genus of *Priestleya* A.-P. de Candolle, and Schutte (1997) revised the genus.

Xiphotheca: *X. fruticosa* (C. Linnaeus) A.L. Schutte & B.-E. van Wyk (A-E). A, Fruits ($\times 4.2$); B, seeds ($\times 3.3$); C-D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Amphithalea* C.F. Ecklon & C.L.P. Zeyher

Phylogenetic Number: 25.02

Tribe: Podalyriaceae.

Subtribe: Xiphothecinae.

Species Studied—Species in Genus: 4 spp.—21 spp.

Fruit a legume; unilocular; $0.7\text{--}0.8 \times 0.3\text{--}0.4 \times 0.2$ cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong to ovate; when asymmetrical with 1 straight and 1 curved suture, both sutures unequally curved, or both sutures parallelly curved; widest near middle or D-shaped; not inflated; compressed; without beak; short tapered at apex; apex aligned with longitudinal axis of fruit; short tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate or nonstipitate. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive or active (barely); with valves enrolling (somewhat). Replum invisible. Epicarp dull; monochrome; greenish to dirty or reddish brown (concealed by long straight dense hairs) or gray (because of hairs); pubescent and indurate; with 1 type of pubescence; villous (*A. ericifolia* (C. Linnaeus) C.F. Ecklon & J.M. Zeyher); with pubescence gray or golden; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; smooth; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; spongy; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–4 (several); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick or triangular; straight. Aril fleshy; cupshaped (with tongue-like extension); covering less than 1/2 of seed; reddish brown.

Seed $2.7\text{--}3 \times 1.5\text{--}1.7 \times 0.7\text{--}1.1$ mm; not overgrown; not angular; asymmetrical; reniform (oblong) or oblong; compressed; with surface smooth; with visible radicle and cotyledon lobes; without external groove between

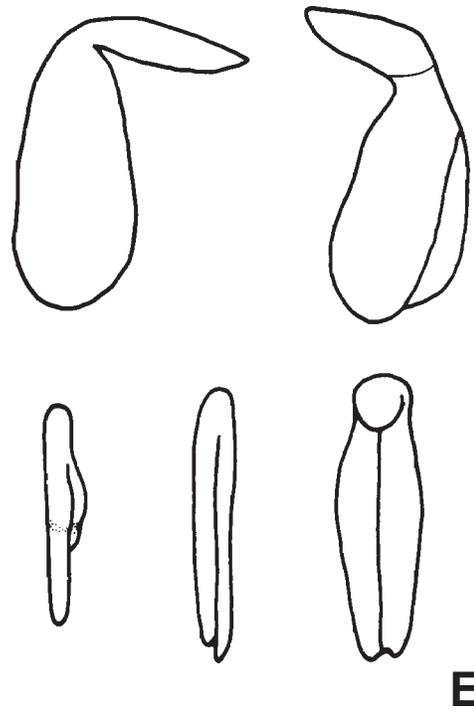
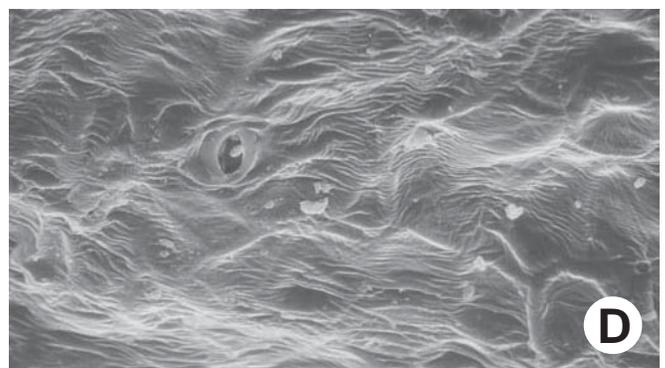
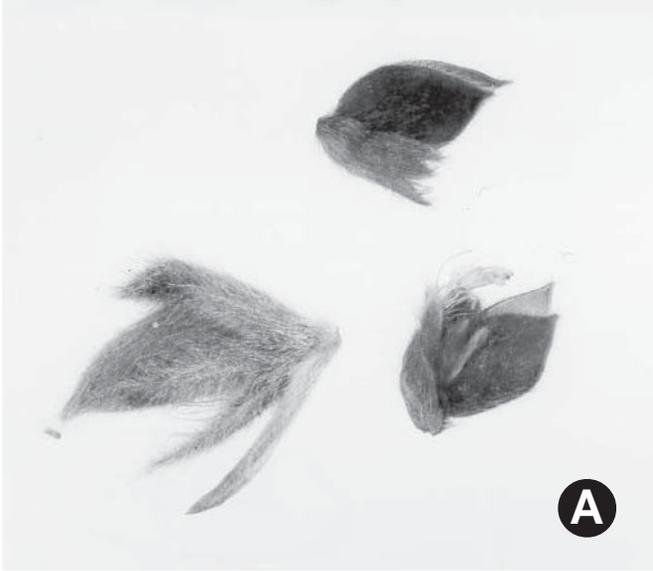
radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible (perhaps concealed by aril). Hilum visible; with faboid split; with the lips of the faboid split the same color (nearly so) as the rest of the hilum; larger than punctiform; 0.5 mm long; with curved outline; circular; between cotyledon and radicle lobe; recessed; within rim or halo. Hilum halo color lighter than testa. Hilum rim color darker than testa. Lens not discernible (perhaps concealed by aril). Endosperm absent. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (southern Cape Province).

Notes: Polhill (1981p) noted that *Amphithalea* may be combined with *Coelidium* (26.04). Schutte (1998) carried out a cladistic analysis using morphological and alkaloid characters of *Amphithalea* and *Coelidium* with *Liparia* (26.01) and *Xiphotheca* (26.03) as outgroups. She concluded that the two genera are synonymous, and transferred the *Coelidium* species to *Amphithalea*.

Amphithalea: *A. cuneifolia* C.F. Ecklon & C.L.P. Zeyher (B–E), A. spp. (A). A, Fruits ($\times 3.3$); B, seed ($\times 10$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 20$).

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Genus: *Coelidium* (B.C. Vogel) G.W. Walpers

Phylogenetic Number: 25.03.

Tribe: Podalyrieae.

Subtribe: Xiphothecinae.

Species Studied—Species in Genus: 5 spp.—21 spp.

Fruit a legume; unilocular; $0.3\text{--}1.5 \times 0.2\text{--}0.7 \times 0.2$ cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; ovate or dolabriform; when asymmetrical with both sutures nearly straight; not inflated; compressed; with beak; straight; with solid beak the same color and texture as fruit; rounded at apex; apex aligned with longitudinal axis of fruit; rounded at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate or nonstipitate. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Epicarp dull; monochrome; brown; pubescent and indurate; with 1 type of pubescence; tomentose, villous, or sericeous; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; not veined; not tuberculate; faintly wrinkled; not exfoliating; without cracks. Mesocarp thin; surface uniformly veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick or triangular; straight. Aril fleshy; cupshaped (with tongue-like extension); covering less than 1/2 of seed; reddish brown.

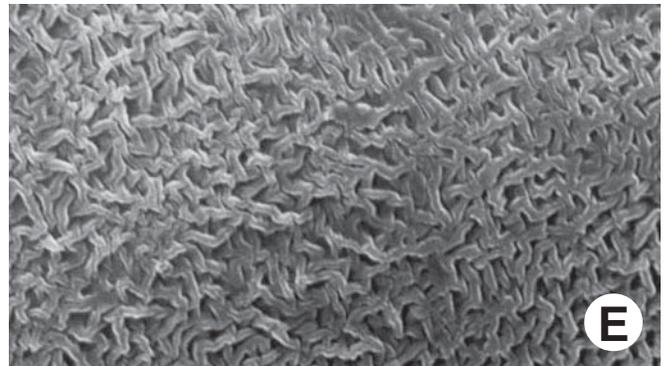
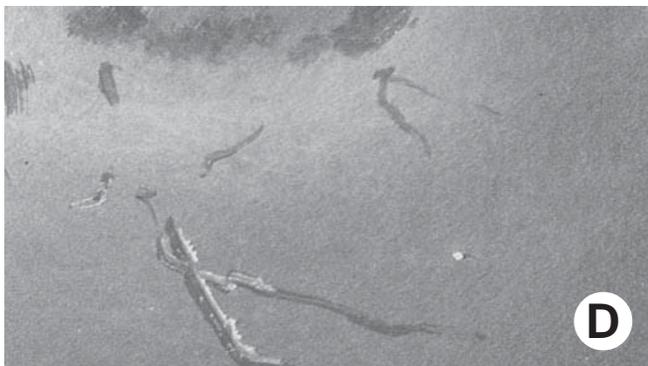
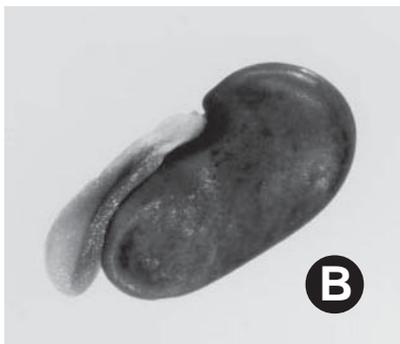
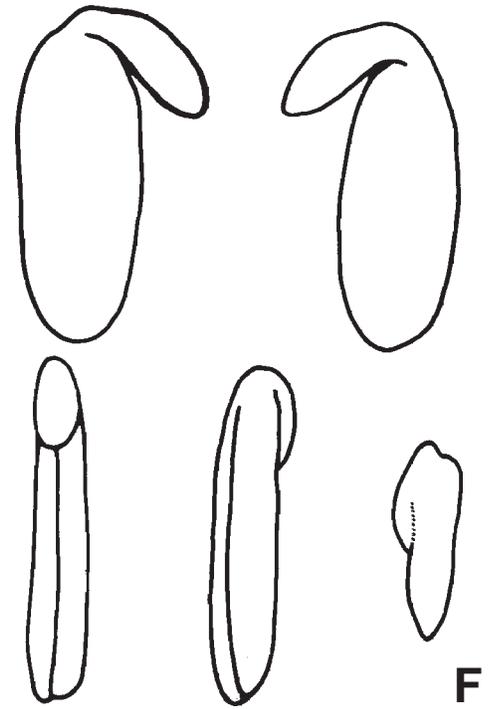
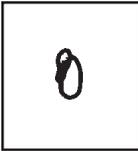
Seed $1.5\text{--}5.5 \times 0.9\text{--}3 \times 0.5\text{--}1.2$ mm; not overgrown; not angular; asymmetrical; oblong; compressed; with surface smooth; with (slightly) or without visible radicle and cotyledon lobes; without external groove between radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; streaked and mottled; with frequent mottles; with

frequent streaks; brown; with black overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible (perhaps concealed by aril). Hilum visible; with faboid split; with the lips of the faboid split lighter colored than the rest of the hilum and therefore conspicuous; larger than punctiform; 0.5 mm long; with curved outline; elliptic; between cotyledon and radicle lobe; recessed; within rim or halo. Hilum halo color lighter than testa. Hilum rim color darker than testa. Lens discernible (but concealed under aril); not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; green; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle bulbous; lobe tip straight; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (southern Cape Province).

Notes: Polhill (1981p) noted that this genus is “doubtfully distinct from *Amphithalea*” (26.05). Granby (1980) monographed the genus, recognizing 19 species (7 new), but Polhill recognized only ca. 15 species. Schutte (1998) carried out a cladistic analysis using morphological and alkaloid characters of *Amphithalea* and *Coelidium* with *Liparia* (26.01) and *Xiphotheca* (26.03) as outgroups. She concluded that the two genera are synonymous, and transferred the *Coelidium* species to *Amphithalea*. According to Granby, fruits of several species were unknown.

Coelidium: *C. muraltioides* G. Benth (C), *C. pageae* H.M.L. Bolus (B, D–F), *C.* spp. (A). A, Fruits ($\times 5$); B–C, seed ($\times 7$, $\times 12.5$); D–E, testa ($\times 50$, $\times 1000$); F, embryos ($\times 7$).



Genus: *Liparia* C. Linnaeus

Phylogenetic Number: 25.04.

Tribe: Podalyrieae.

Subtribe: Podalyriinae.

Species Studied—Species in Genus: 8 spp.—20 spp.

Fruit a legume; unilocular; $1.5\text{--}3.5 \times 0.5\text{--}1$ cm; with deciduous or persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical or symmetrical; oblong (obliquely ovate); when asymmetrical with both sutures parallelly curved or 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; with or without beak; declined or straight; with solid beak the same color and texture as fruit; short tapered at apex; apex slightly oblique or aligned with longitudinal axis of fruit; rounded or short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; active or passive; with valves twisting. Replum invisible. Epicarp dull; black or brown (dark); pubescent and indurate or pubescent but soon deciduous; with 1 type of pubescence; villous; with pubescence golden or gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; with elevated features; veined or not veined; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–5; length parallel with or transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 1–2 mm long; of 1 length only; triangular or thick; straight. Aril fleshy; cupshaped (but not a complete circle); covering less than 1/2 of seed; reddish brown to brown or yellow (pale).

Seed $3.5\text{--}5.6 \times 1.5\text{--}4 \times 1.5\text{--}1.8$ mm; not overgrown; not angular; asymmetrical; reniform (oblong) or oblong; compressed; with surface smooth; with visible radicle and cotyledon lobes; without external groove between

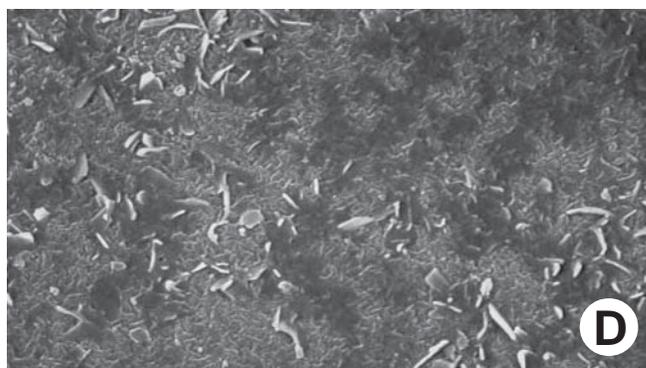
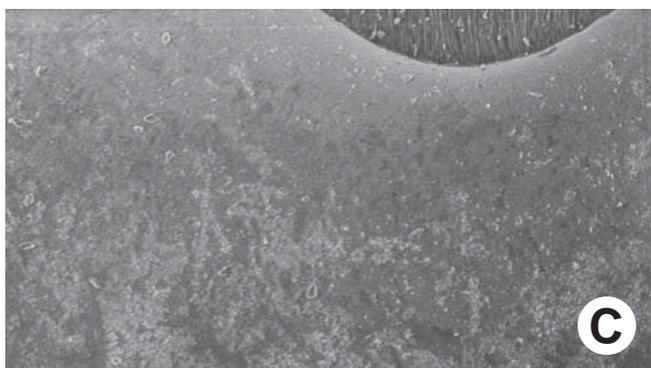
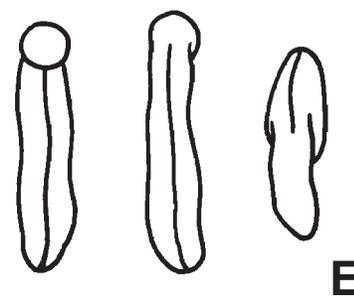
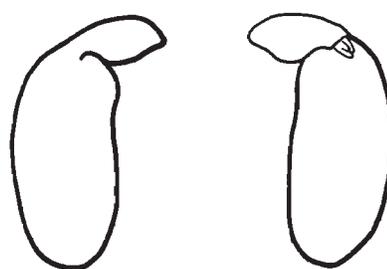
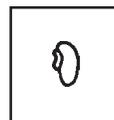
radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome, streaked (mainly), or mottled; with frequent mottles; with frequent streaks; dark or reddish brown or tan; with black or purple overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens to base of seed and terminating or from hilum to lens (at base of seed); not bifurcating; darker than testa; reddish to blackish brown; flush. Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 1 mm long; with curved outline; circular or elliptic; between cotyledon and radicle lobe; recessed; not within corona, halo, or rim or within halo. Hilum halo color darker than testa. Lens discernible; equal to or greater than or less than 0.5 mm in length; 0.5–1 mm long; with margins curved; roughly elliptic; not in groove of raphe; adjacent to hilum; 1.2–2 mm from hilum; mounded; similar color as or dissimilar color from testa; darker than testa; reddish to blackish brown; not within corona, halo, or rim. Endosperm present (with or without 3 layers: white, cloudy, translucent (thin)); thick; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; tan or green; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; with a joint evident between the radicle and the cotyledons. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed or well developed; glabrous.

Distribution: South Africa (Cape Province).

Notes: Bos (1967) monographed *Liparia*, s.s. Our treatment follows the reappraisal of *Liparia* and *Priestleya* A.-P. de Candolle (26.02) by Schutte and Wyk (1994), who placed *Priestleya* into synonymy under *Liparia*. Wyk and Schutte (1995) carried out cladistic analyses of tribes Crotalarieae (27), Liparieae, and Podalyrieae (25) and their genera, and presented *Priestleya* as a good genus distinct from *Liparia*. Wyk (personal communication, 1997; see also Schutte and Wyk 1998a) in-

formed us that “*Priestleya* is definitely included in
Liparia.”

Liparia: L. splendens (N.L. Burman) J.J. Bos & H.C.D. de Wit (A–E). A, Valves ($\times 3.4$); B, seeds ($\times 4.8$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Cyclopia* E.P. Ventenat

Phylogenetic Number: 25.05.

Tribe: Podalyriaceae.

Subtribe: Podalyriinae.

Species Studied—Species in Genus: 6 spp.—23 spp.

Fruit a legume; unilocular; $2-3.5 \times 0.7-1.5 \times 0.3-0.4$ (estimated) cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; not inflated; compressed; without beak; short tapered at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned to oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; assumed apical and down; passive. Replum invisible. Epicarp dull; monochrome; brownish black or brown (reddish); glabrous; eglandular; without spines; not smooth; with elevated features; faintly reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; reddish brown; cobwebby (around funicular area) or smooth; nonseptate; coriaceous; not exfoliating; remaining fused to mesocarp and epicarp. Seeds 2–11; length parallel with or transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; up to 1 mm long; of 1 length only; thick; straight. Aril fleshy; annular; covering less than 1/2 of seed; tan.

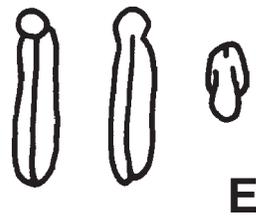
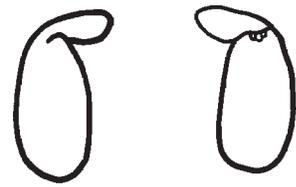
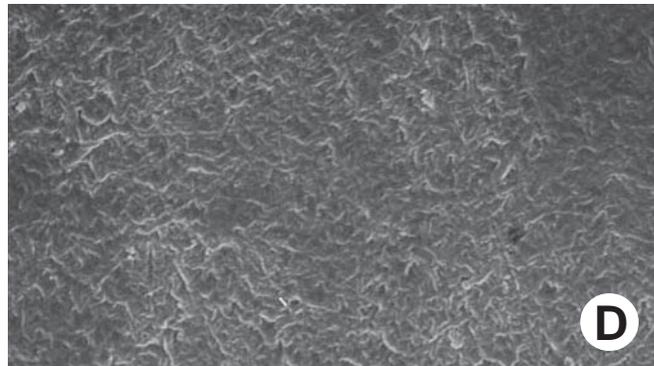
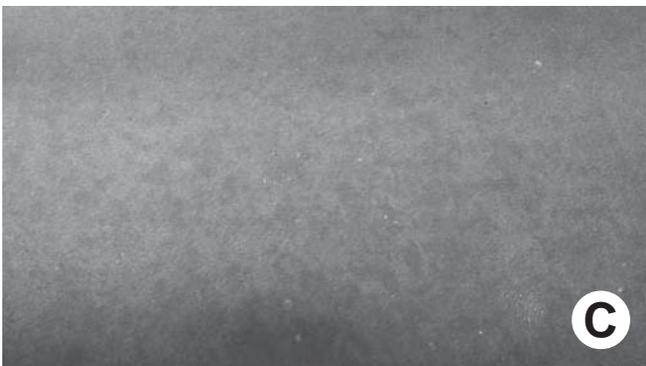
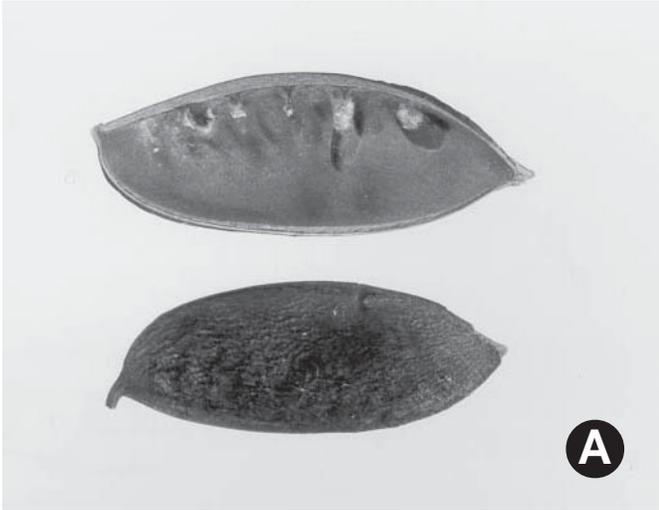
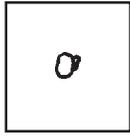
Seed $3.5-4 \times 2-2.5 \times 1.5-1.7$ mm; not overgrown; not angular; asymmetrical; nearly oblong; compressed; without or with (barely) visible radicle and cotyledon lobes; with umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; greenish brown or tan; glabrous; smooth; coria-

ceous. Fracture lines absent. Rim absent. Raphe from hilum through lens to base of seed and terminating; not bifurcating; lighter than testa; flush. Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 1–1.2 mm long; with curved outline; circular or elliptic; between cotyledon and radicle lobe; recessed; not within corona, halo, or rim. Lens discernible or not discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; mounded or flush; similar color as or dissimilar color from testa; darker than testa; reddish brown; not within corona, halo, or rim. Endosperm thick; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; green; inner face flat; glabrous around base of radicle. Embryonic axis oblique; perpendicular to length of seed. Radicle bulbous; lobe tip curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: South Africa (Cape).

Notes: Kies (1951) monographed *Cyclopia* and noted that most species are used as a type of tea and “lately ‘bush-tea’ has become a marketable commodity.”

Cyclopia: *C. galioides* (B. Bergius) A.-P. de Candolle (A, C–E), *C. spp.* (B). A, Valves ($\times 3$); B, seeds ($\times 6$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Podalyria* C.L. von Willdenow

Phylogenetic Number: 25.06.

Tribe: Podalyrieae.

Subtribe: Podalyriinae.

Species Studied—Species in Genus: 7 spp.—19 spp.

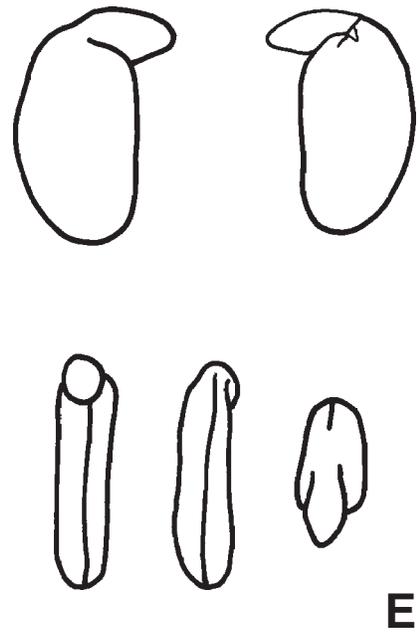
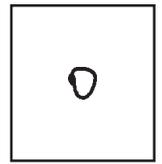
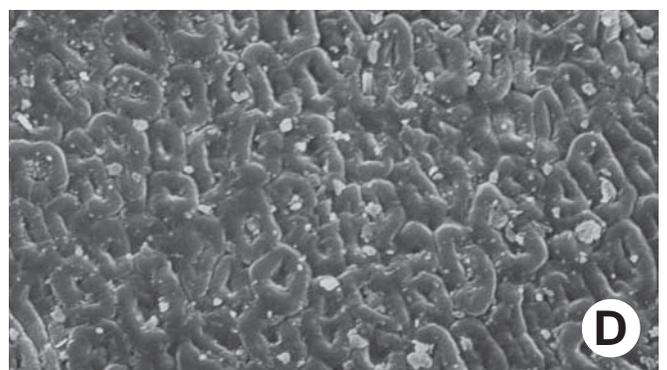
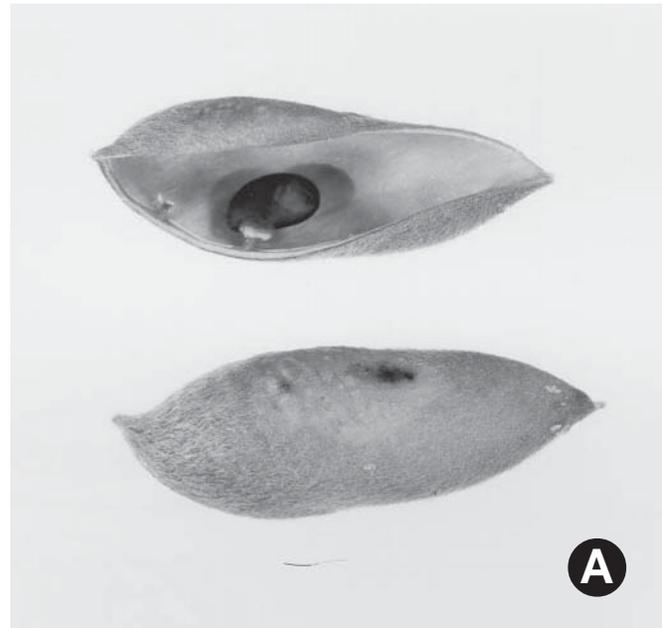
Fruit a legume; unilocular; $2.5-3 \times 1.2-1.3 \times 0.3-0.4$ (estimated) cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; assumed apical and down; passive. Replum invisible. Epicarp dull; monochrome; green or brown (greenish); pubescent and indurate; with 1 type of pubescence; tomentose; with pubescence golden; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with recessed features; not veined; not tuberculate; minutely pitted; not exfoliating; without cracks. Mesocarp thin; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; coriaceous; not exfoliating; remaining fused to mesocarp and epicarp. Seeds 8; length oblique to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 0.5 mm long; of 1 length only; thick; straight. Aril fleshy; annular; covering less than 1/2 of seed; cream, tan, or white.

Seed $4.5-5 \times 3-4 \times 2.5-3$ mm; not overgrown; not angular; asymmetrical; oblong; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome, mottled, or streaked; with frequent mottles; with frequent streaks; reddish, blackish, greenish, or dark brown, green, or tan; with black overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings

absent. Raphe from hilum through lens to base of seed and terminating; lighter than testa; flush. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 2 mm long; with straight outline; oblong; marginal according to radicle tip or between cotyledon and radicle lobe; recessed; within corona (when aril removed) or not within corona, halo, or rim. Hilum corona color darker than testa. Lens not discernible or discernible; less than 0.5 mm or equal to or greater than 0.5 mm in length; up to 0.5 mm long; with margins straight or curved; irregular; not in groove of raphe; adjacent to hilum; 1 mm from hilum; mounded; similar color as testa; lighter or darker than testa; brownish red; not within corona, halo, or rim. Endosperm thick; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; green; inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle bulbous; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: South Africa (Cape region into Natal).

Podalyria: *P. sericea* (H.C. Andrews) R. Brown (*A*, *C-E*), *P. spp.* (*B*). *A*, Valves ($\times 3$); *B*, seeds ($\times 7$); *C-D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).



Genus: *Virgilia* J.L.M. Poiret

Phylogenetic Number: 25.08.

Tribe: Podalyrieae.

Subtribe: Podalyriinae.

Species Studied—Species in Genus: 2 spp.—2 spp.

Fruit a legume; unilocular; $1.5-7 \times 0.7-1.5 \times 0.1-0.2$ cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; slightly curved; not plicate; not twisted; asymmetrical or symmetrical; linear to oblong; when asymmetrical with both sutures nearly straight; not inflated; flattened; without beak; rounded at apex; apex oblique with longitudinal axis of fruit; tapered at base; base oblique (slightly) with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous or ligneous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin slightly constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit substipitate to nonstipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along 1 suture or both sutures; assumed apical and down; passive. Replum invisible. Epicarp dull; monochrome; brown; pubescent and indurate (widely scattered); with 1 type of pubescence; pilose; with pubescence golden; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; transversely veined relative to fruit length; not tuberculate; not exfoliating; with cracks; cracking transverse to fruit length. Mesocarp apparently absent. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp. Seeds 4–6; length oblique to fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only. Aril fleshy; annular; covering less than 1/2 of seed; tan or white.

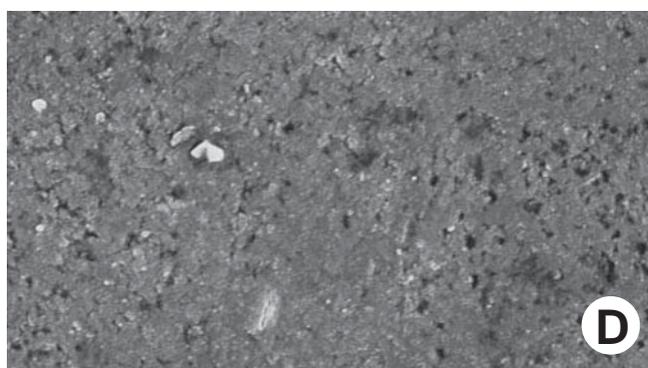
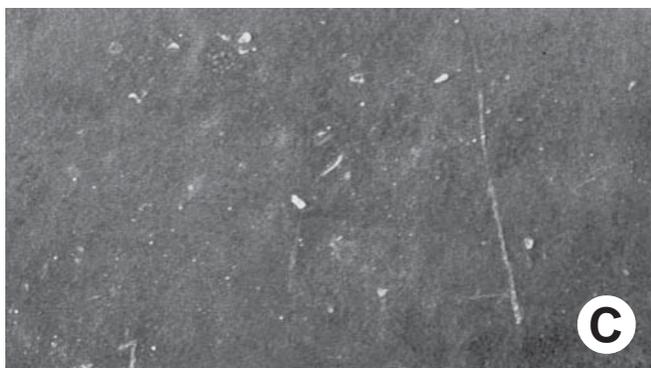
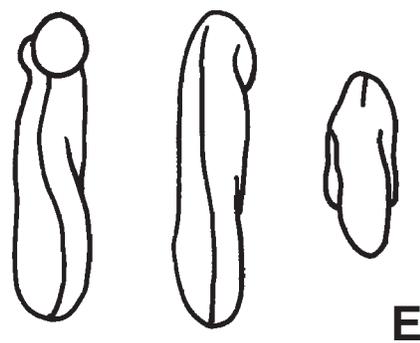
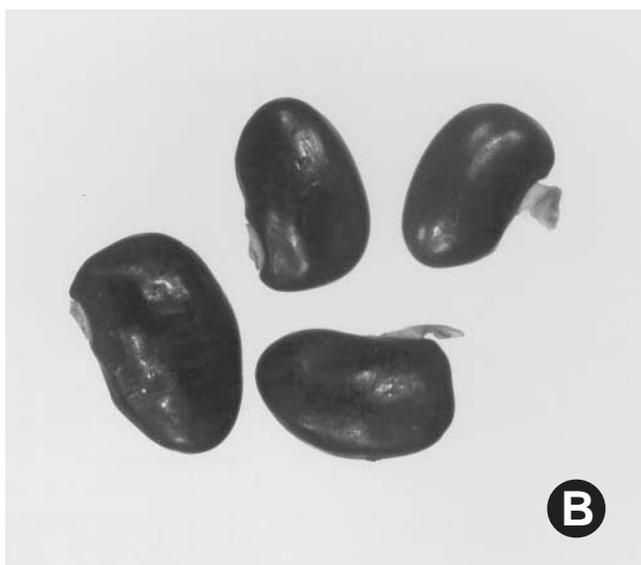
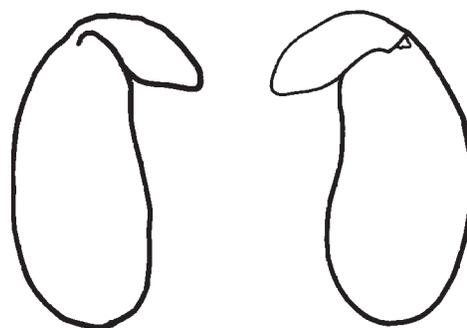
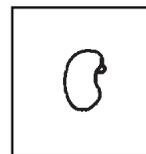
Seed $5-9 \times 3-6 \times 2.5-3.5$ mm; not overgrown; angular or not angular; symmetrical or asymmetrical; sub circular to oblong to reniform; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy to dull; not modified by a bloom; colored; monochrome; black, brown, or yellow (-brown); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum to lens; not bifurcating; color of

testa; flush. Hilum partially or fully concealed; concealed by aril or aril remnant; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 1.3–1.5 mm long; with curved outline; elliptic; marginal according to radicle tip; recessed; not within corona, halo, or rim. Lens discernible or not discernible (at most a discolored darker and flush area); equal to or greater than 0.5 mm in length; 0.8 mm long; with margins curved; elliptic; not in groove of raphe; adjacent to hilum; 1.5 mm from hilum; flush; similar color as testa; darker than testa; gray (ish); not within corona, halo, or rim. Endosperm thick; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; green (ish); inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle linear; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: South Africa (southern Cape Province).

Notes: Wyk (1986) monographed *Virgilia*.

Virgilia: *V. oroboides* (B. Bergius) T.M. Salter (*A, C–E*), *V. spp.* (*B*). *A*, Valves ($\times 2$); *B*, seeds ($\times 4.5$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).



Genus: *Calpurnia* E.H.F. Meyer

Phylogenetic Number: 25.09.

Tribe: Podalyrieae.

Subtribe: Podalyriinae.

Species Studied—Species in Genus: 4–5 spp.—7 spp.

Fruit a legume; unilocular; $2.2\text{--}13 \times 0.5\text{--}1.9 \times 1\text{--}3$ cm; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight or curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; linear or falcate (slightly); when asymmetrical with both sutures parallelly curved; not inflated; flattened; with beak; straight or hooked; with solid beak the same color and texture as fruit; tapered or rounded at apex; apex aligned or oblique with longitudinal axis of fruit; long tapered or tapered at base; base aligned or oblique with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous to coriaceous (sub); seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; embellished; with wing. Fruit wing 1; $0.2\text{--}2.5$ mm wide; sutural; on 1 suture. Fruit stipitate or substipitate; with the stipe $4\text{--}15$ mm long. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome or multicolored; mottled; greenish tan; with brown overlay; glabrous or pubescent and indurate; with 1 type of pubescence; sparsely strigose; with pubescence golden; with pubescence uniformly distributed; with simple hairs; stiff; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; sometimes dotted; not exfoliating; without cracks. Mesocarp present or absent; thin; surface not veined; 1-layered; without balsamic vesicles; solid; chartaceous. Endocarp glossy; monochrome; golden tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; remaining fused to epicarp; entire. Seeds 2–10; length oblique or transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; $1.5\text{--}2.5$ mm long; of 1 length only; filiform; curved. Aril dry; rim-aril; entire; cream or tan.

Seed $4\text{--}10.5 \times 2.5\text{--}6.5 \times 1.5\text{--}3.5$ mm; not overgrown; not angular; asymmetrical; elliptic to ovate to irregular; terete or compressed; with surface smooth; without

visible radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; glossy to dull; not modified by a bloom; colored or clear; monochrome or mottled; with infrequent mottles; brown or tan; with brown (darker) overlay; glabrous; smooth; chartaceous. Fracture lines absent. Rim absent. Wings absent. Raphe visible or not visible; from hilum through lens to base of seed and terminating; not bifurcating; darker than testa; brown; flush. Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; $0.4\text{--}0.6$ mm long; with curved outline; circular to elliptic; subapical to radicle tip or apical according to radicle tip but marginal according to seed length; recessed; within rim. Hilum rim color of testa. Lens discernible; equal to or greater than 0.5 mm in length; $0.5\text{--}0.8$ mm long; with margins straight; diamond-shaped; not in groove of raphe; adjacent to or confluent with hilum; 1 mm from hilum; mounded; similar color as testa; lighter or darker than testa; brown; not within corona, halo, or rim. Endosperm thick; covering entire embryo; adnate to testa or embryo. Cotyledons not smooth; apically sulcate; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; notched at radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis right angled; parallel to length of seed; without a joint evident between the radicle and the cotyledons. Radicle differentiated from cotyledon; linear; lobe tip curved; oblique to cotyledons or with 90 -degree turn; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule moderately developed; glabrous.

Distribution: South Africa (eastern Cape) and southern India.

Notes: Brummitt (1967) treated *Calpurnia aurea* and suggested that the genus has six or seven species. Yakovlev (1971) recognized nine species in the genus.

Calpurnia: *C. aurea* (W. Aiton) G. Bentham (C–E), *C. spp.* (A–B). A, Fruits ($\times 1.1$); B, seeds ($\times 6.3$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).

