

Crotalarieae (27.01–27.11)

Genus: *Pearsonia* R.A. Dummer

Phylogenetic Number: 27.01.

Tribe: Crotalarieae.

Species Studied—Species in Genus: 7 spp.—12 spp.

Fruit a legume; unilocular; $0.5\text{--}3.8 \times 0.35\text{--}0.8 \times 0.7\text{--}0.8$ cm; with persistent calyx; with calyx equal in length to or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight or curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; elliptic or oblong (lanceolate); when asymmetrical with both sutures nearly straight; not inflated; compressed; without beak; tapered 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 dehiscing (assumed); splitting along sutures. Dehiscence of valves along both sutures; apical and down; assumed active; with valves twisting (assumed). Replum invisible. Epicarp dull; monochrome; brown (because of numerous golden hairs); pubescent and indurate; with 1 type of pubescence; pilose, tomentose, villous, or sericeous; with pubescence golden; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; veined or not veined; reticulately veined; not tuberculate; shagreen (may not be best answer); 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 1–15; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

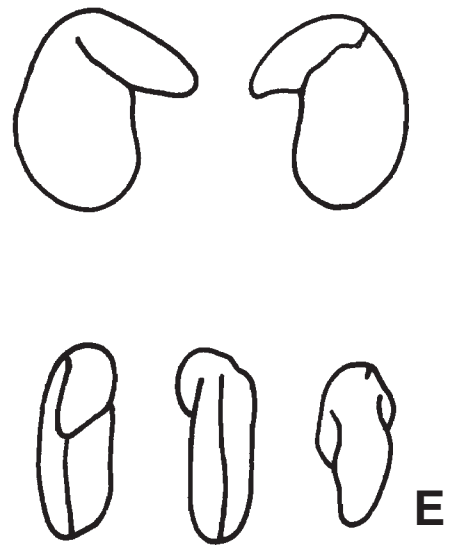
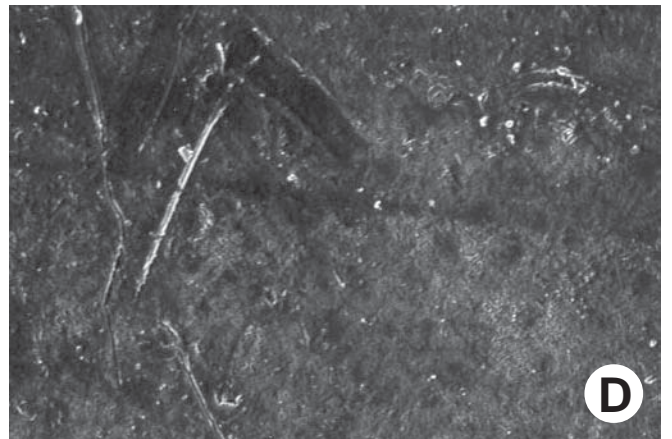
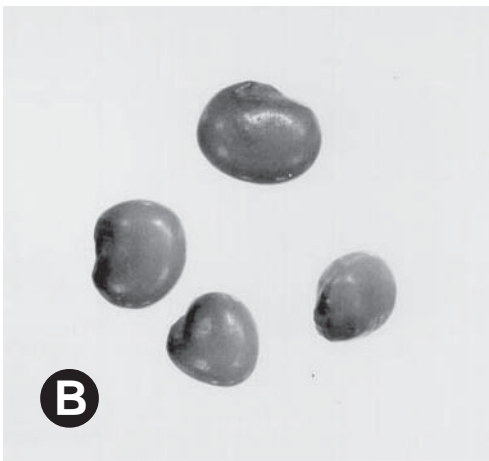
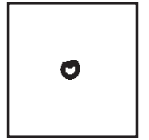
Seed $2\text{--}2.5 \times 1.7\text{--}2 \times 1.4\text{--}1.5$ mm; not overgrown; not angular; asymmetrical; obliquely cordate or reniform; compressed; with or without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; brown or tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible or fully

concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; flush; within rim. Hilum rim color of or lighter than testa. Lens discernible; equal to or greater than 0.5 mm in length; 0.5–0.7 mm long; with margins straight or curved; linear or oblong; not in groove of raphe; adjacent to hilum; 0.1 mm from hilum; mounded; dissimilar color from testa; darker than testa; reddish brown; 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; similar at apex; not concealing radicle; entire over 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 deflexed; oblique to length of seed. Radicle bulbous; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Africa (south of the equator) and Madagascar (1 sp.).

Notes: Polhill (1981q) broadly defined the tribe Crotalarieae with two generic groups. The first group, which does not have a two-lipped calyx, formed a tight cluster around *Lebeckia* (27.10) in southern Africa. The second group, which has a two-lipped calyx, had more scattered distributions and uncertain affinities. Wyk (1991) followed Polhill (1981q) and transferred *Argyrolobium* (30.03) from Genisteae (30) to the second group. Crotalarieae and related tribes are rich in alkaloids, which have been extensively studied in the last decade (Hussain et al. 1988; Wyk and Verdoorn 1989a,b,c, 1990, 1991a,b; Wyk et al. 1989, 1993; Verdoorn and Wyk 1990, 1991). Using chemical and morphological data, Polhill (1994a,b) and Wyk and Schutte (1995) restricted Crotalarieae to the genera without a two-lipped calyx and transferred those with a two-lipped calyx to Genisteae, *Anarthrophyllum* (30.06), *Argyrolobium* (30.03), *Dichilus* (30.02), *Melolobium* (30.01), and *Sellocharis* (30.07), except *Lebeckia*. They also more or less inverted the generic order within the first group according to Wyk and Schutte's cladistic analysis for the genera of Crotalarieae in the narrow sense. Polhill (1974) monographed *Pearsonia*.

Pearsonia: *P. cajanifolia* (C.E.O. Kuntze) R.M. Polhill (C–E), *P.* spp. (A–B). A, Fruit ($\times 2.8$); B, seeds ($\times 8$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



Genus: *Rothia* C.H. Persoon

Phylogenetic Number: 27.02.

Tribe: Crotalariaeae.

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

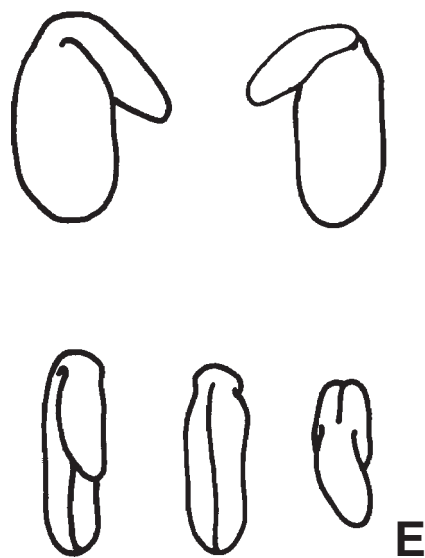
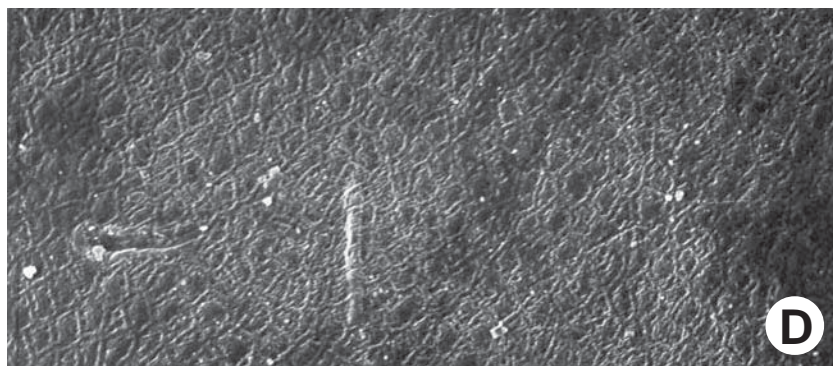
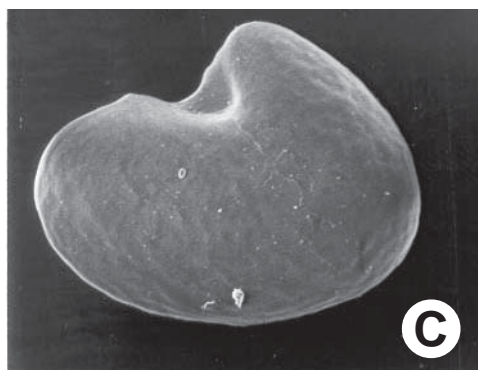
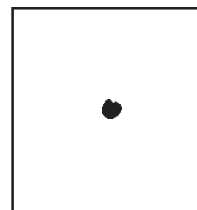
Fruit a legume; unilocular; $3.5\text{--}4.5 \times 0.15\text{--}0.2 \times 0.15\text{--}0.17$ cm; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; linear; not inflated; flattened; without beak; tapered 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; membranous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscing; splitting along suture. Dehiscence of valves along 1 suture; apical and down; active; with valves enrolling (when mature gaping along adaxial suture). Replum invisible. Epicarp dull; monochrome; reddish brown; pubescent and indurate; with hairs appressed; with 1 type of pubescence; with pubescence golden; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp absent. Endocarp glossy; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 30–40 (estimated); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; up to 1 mm long; of 1 length only; filiform; contorted. Aril absent.

Seed $1\text{--}1.4 \times 0.8\text{--}1 \times 0.6\text{--}0.7$ mm; not overgrown; not angular; asymmetrical; mitaform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; conspicuously to faintly mottled or monochrome; with frequent mottles; brown, green, or tan; with purple or tan overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform (may be the smallest in the subfamily); between cotyledon and radicle lobe; recessed; within rim (with or without a black patch around rim). Hilum rim color of testa. Lens discernible (as large as hilar area (including rim)); less than 0.5 mm in length; with margins curved; circular;

not in groove of raphe; confluent (or nearly so) with hilum; mounded; dissimilar color from testa; darker than testa; reddish brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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 yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; deflexed and parallel to cotyledon length; not centered between cotyledons (radicle outside 1 cotyledon and inside other, therefore junctions for each cotyledon different); less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Africa (1 sp.) and Baluchistan to Australia (1 sp.).

Rothia: *R. indica* (C. Linnaeus) G.C. Druce (*C–E*), *R. spp.* (*A–B*). *A*, Fruits ($\times 2.5$); *B*, seeds ($\times 11$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 18$).



Genus: *Robynsiophyton* R. Wilczek

Phylogenetic Number: 27.03.

Tribe: Crotalariaeae.

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

Fruit a legume; unilocular; $0.6-1 \times 0.3-0.45 \times 0.1-0.15$ cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; oblong (ovate), lanceolate (linear), or linear; not inflated; compressed to flattened; without beak; short tapered at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscing; splitting along suture. Dehiscence of valves along apparently 1 suture; assumed apical and down; passive. Replum invisible. Epicarp dull; monochrome; brown; pubescent and indurate; with 1 type of pubescence; pilose or tomentose; with pubescence golden; with simple hairs; pliable; with hair bases plain; without spines; apparently smooth; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp absent or present; thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; chartaceous. Endocarp dull; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp or to epicarp; entire. Seeds 4–8; length parallel with or transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 1.5–1.7 mm long; of 1 length only; filiform; straight. Aril absent.

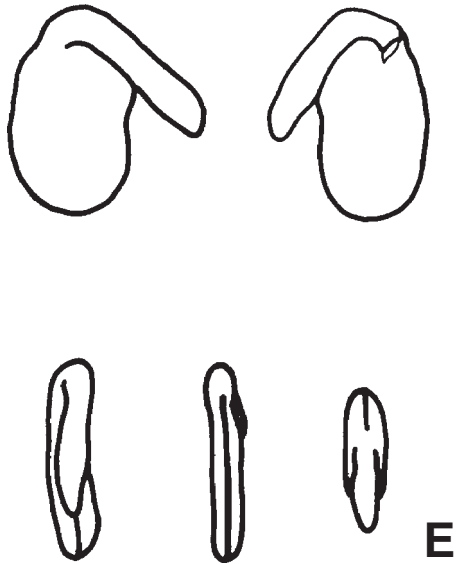
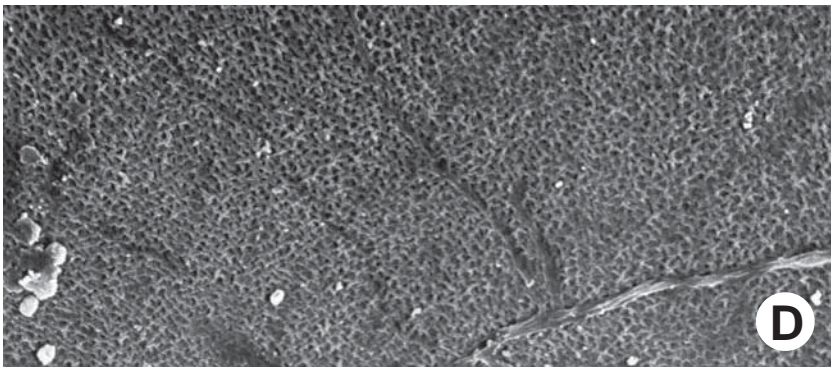
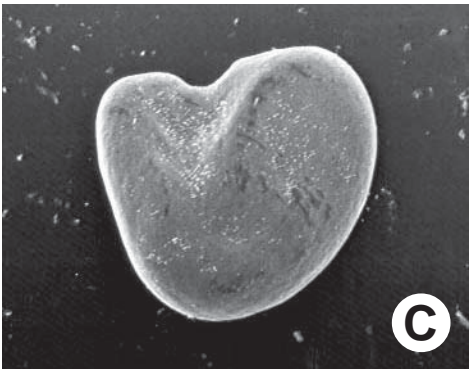
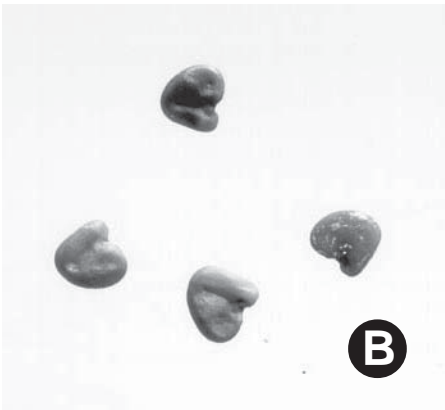
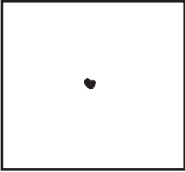
Seed $1-1.2 \times 1-1.2 \times 0.4-0.5$ mm; not overgrown; not angular; asymmetrical; mitaform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; greenish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color of testa. Lens discernible; less than 0.5 mm in length; with margins straight; wedge-shaped; not in groove of raphe; adjacent to hilum; mounded; same color as testa; not

within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; deflexed and parallel to cotyledon length; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule moderately developed; glabrous.

Distribution: South-central Africa.

Notes: Our observations are based on only one sample augmented by data from the literature.

Robynsiophyton: *R. vanderystii* R. Wilczek (A–E). A, Fruits ($\times 5.1$); B, seeds ($\times 12.5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 20$).



Genus: *Spartidium* A.N. Pomel

Phylogenetic Number: 27.04.

Tribe: Crotalariaeae.

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

Fruit a legume; unilocular; $3\text{--}4.3 \times 0.8\text{--}1 \times 0.08\text{--}0.17$ cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted or twisted; symmetrical or asymmetrical; oblong; when asymmetrical with 1 straight and 1 curved suture or both sutures nearly straight; widest near middle or D-shaped; not inflated; flattened; without beak; rounded at apex; apex aligned or oblique with longitudinal axis of fruit; short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous; seed chambers externally visible; with the raised seed chambers torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit assumed indehiscent. Replum invisible or visible (valve could irregularly separate from sutures). Epicarp semiglossy; monochrome; reddish brown; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; chartaceous. Endocarp dull; monochrome; tan; smooth and scurfy (smooth around seeds and scurfy between seeds); nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 2–6; length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 4 mm long; of 1 length only; filiform; hooked. Aril absent.

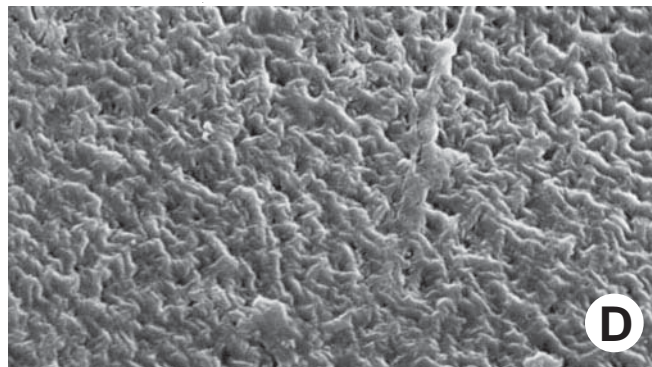
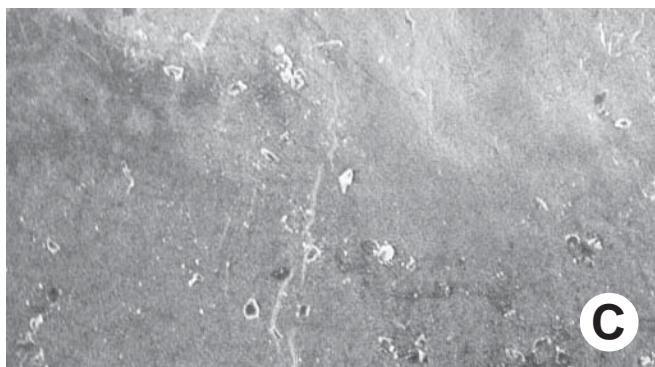
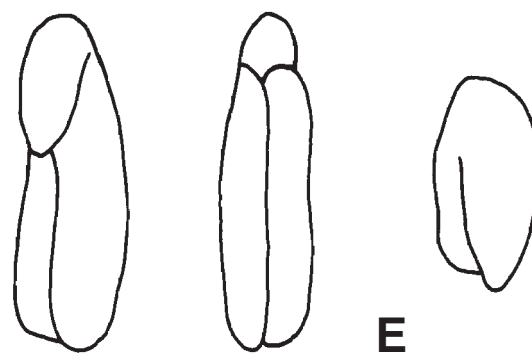
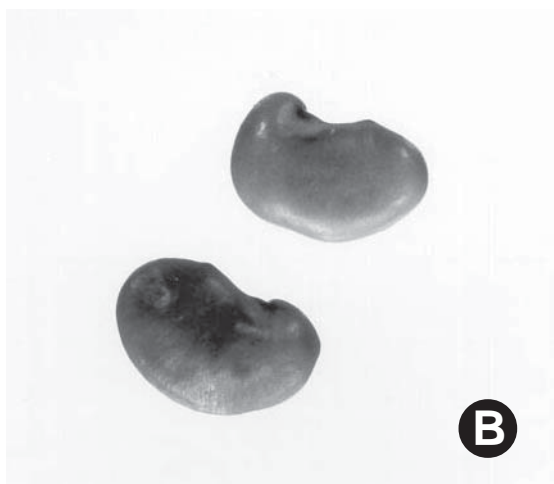
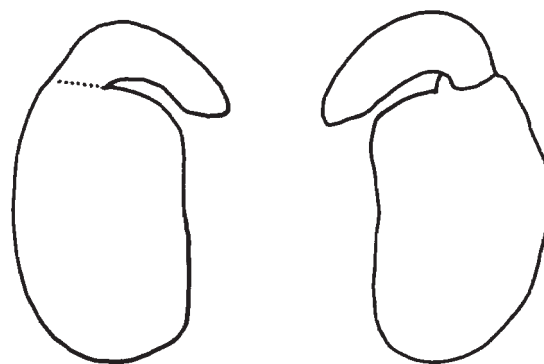
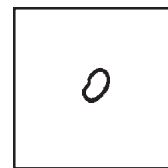
Seed $3.5\text{--}4 \times 2\text{--}2.5 \times 1.5\text{--}1.8$ mm; not overgrown; not angular or angular (somewhat); asymmetrical; oblong or reniform; terete; with visible radicle and cotyledon lobes; without external groove between radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown or tan (to reddish); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible or fully concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe;

recessed; within rim. Hilum rim color of testa. Lens discernible; equal to or greater than 0.5 mm in length; 1.4–1.8 mm long; with margins straight or curved; oblong; not in groove of raphe; confluent with hilum; mounded; dissimilar color from testa; darker than testa; brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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; split over radicle; with lobes; without margins recessed; reddish 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; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: North Africa (Libya to Algeria and probably Morocco).

Notes: Polhill (1981q) noted that this genus is “virtually indistinguishable from *Lebeckia*” (27.10). However, alkaloid data support keeping *Spartidium* separate from *Lebeckia* (Wyk et al. 1989).

Spartidium: *S. saharae* (E.S.-C. Cosson & E. Reboul) A.N. Pomel (A–E). A, Fruit ($\times 1.7$); B, seeds ($\times 8.4$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 4.6$).



Genus: *Rafnia* C.P. Thunberg

Phylogenetic Number: 27.05.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 9 spp.—ca. 23 spp.

Fruit a legume; unilocular; $1.5\text{--}3 \times 0.5\text{--}0.8 \times 0.2\text{--}0.3$ 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; lanceolate (linear), linear, or oblong (narrowly to broadly); when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest at base or near apex; not inflated; compressed; without beak; short tapered 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; embellished to plain. Fruit wing present or absent; 1; 1–2 mm wide; sutural (along upper suture and usually best developed near calyx); on 1 suture. Fruit stipitate to substipitate to nonstipitate; with the stipe up to 10 mm long. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down; active; with valves enrolling or twisting. Replum invisible. Epicarp dull; monochrome; black or brown (dirty); glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; lenticular (tannish); not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; nearly spongy or solid; coriaceous. Endocarp dull or glossy; monochrome; brown (to reddish); reticulate or hairy (appressed and silver); nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seed 1 (assumed); assumed length parallel with fruit length. Funiculus less than 0.5 mm long; thick; straight. Aril absent.

Seed $3.7\text{--}4 \times 2.2\text{--}2.5 \times 0.8\text{--}2$ mm; not overgrown; not angular; asymmetrical; reniform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome or mottled and streaked; with frequent mottles; with frequent streaks; reddish brown or tan; with black (grayish) overlay; glabrous; smooth or not smooth; with elevated features; wrinkled; coriaceous. Fracture lines absent.

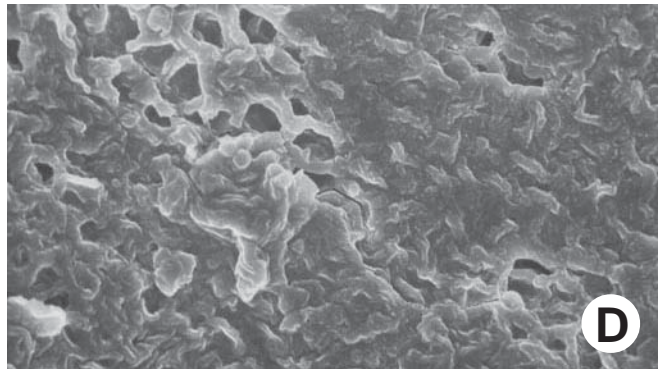
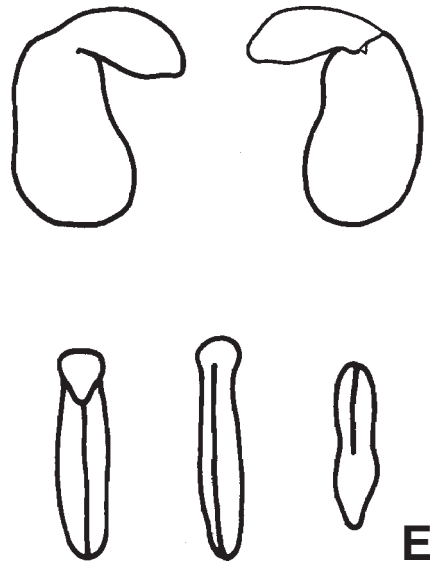
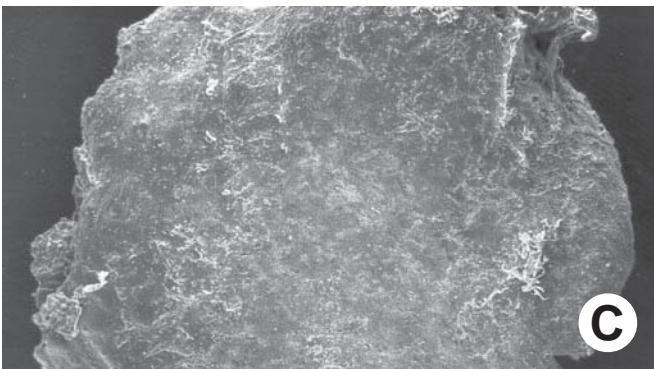
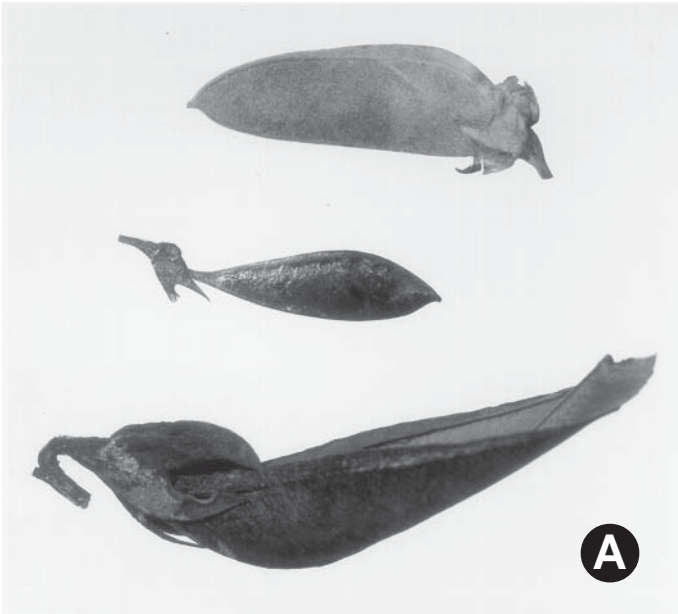
Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 0.5–0.7 mm long; with straight outline; oblong; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color darker (slightly to black) than testa. Lens discernible; equal to or greater than 0.5 mm in length; 0.5–1 mm long; with margins straight or curved; narrowly oblong; not in groove of raphe; adjacent to hilum; mounded; dissimilar color from testa; darker than testa; black or brown (dark to reddish to greenish); not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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; brownish red; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (southwestern Cape Province to Natal).

Notes: Number of species and distribution taken from Wyk (1991) and Wyk and Schutte (1995).

Rafnia: *R. amplexicaulis* (C. Linnaeus) C.P. Thunberg (*C–E*), *R.* spp. (*A–B*). *A*, Fruits ($\times 2$); *B*, seeds ($\times 6$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 6$).

3



Genus: *Aspalathus* C. Linnaeus

Phylogenetic Number: 27.06.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 24 spp.—ca. 278 spp.

Fruit a legume or nutlet (a few spp.); unilocular; $0.4\text{--}3 \times 0.2\text{--}6.3 \times 0.2\text{--}0.3$ cm; with persistent calyx or deciduous calyx; with calyx longer or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; linear, obovate, ovate (and rhombic), rhombic (sub), lanceolate, falcate, or rectangular; when asymmetrical with 1 straight and 1 curved suture, both sutures parallelly curved, or both sutures unequally curved; widest near middle or D-shaped; slightly inflated or not inflated; compressed or terete; without beak; long tapered to tapered to short tapered to rounded at apex; apex aligned to oblique with longitudinal axis of fruit; tapered to short tapered to rounded (nearly) at base; base aligned to oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous or ligneous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit stipitate to substipitate to nonstipitate; with the stipe up to 7 mm long. Fruit with all layers dehiscent (calyx may retard dehiscence for ovate pods shorter than calyx); splitting along sutures. Dehiscence of valves along 1 suture (for ovate fruits) or both sutures; apical and down or basal and up (for ovate fruits); active or passive; with valves twisting. Replum invisible. Epicarp dull; monochrome; black, brown (reddish), or tan; glabrous, glabrate, or pubescent and indurate; with 1 type of pubescence; villous, tomentose, or sericeous; with pubescence gray or golden; with pubescence uniformly distributed or apical pubescence different from basal pubescence; with apical 1/4 tomentose and basal 3/4 glabrous; with simple hairs; pliable; with hair bases plain; eglandular; without spines; smooth or not smooth; with elevated features; reticulately veined; not tuberculate; rugose; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid coriaceous to ligneous (including subligneous). Endocarp dull; monochrome; brown or tan; smooth; subseptate to nonseptate; with septa thicker than paper, firm; with septa eglandular; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–18

(many); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

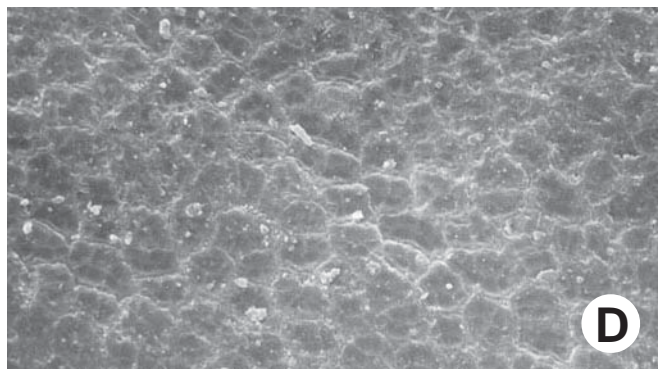
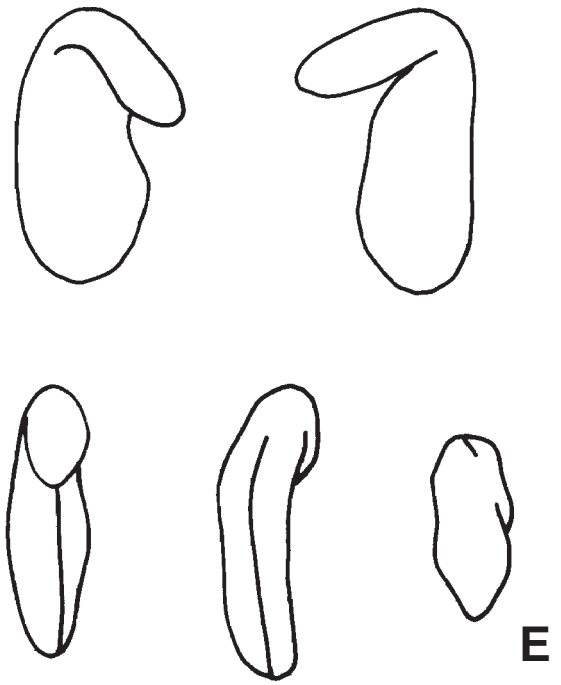
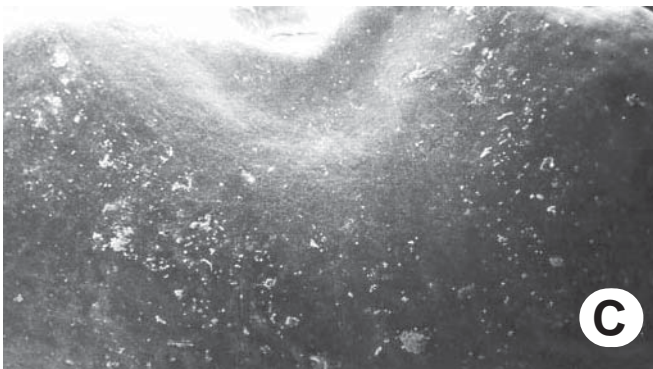
Seed $2\text{--}3.5 \times 1.5\text{--}3 \times 1\text{--}2$ mm; not overgrown; not angular to angular; asymmetrical; mitaform, quadrangular, rhombic (sub), or circular (sub); compressed to terete; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull or glossy; not modified by a bloom; colored; monochrome or mottled and streaked; with frequent mottles; with frequent streaks; black, brown (to yellowish or reddish), tan, or white; with black or gray overlay (green, brown, purple or dark); glabrous; smooth or not smooth; with elevated features; warty; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum visible or partially concealed; concealed by funicular remnant; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; marginal according to radicle tip or between cotyledon and radicle lobe; recessed; within rim, corona, and halo or not within corona, halo, or rim. Hilum corona color darker than testa. Hilum halo color lighter or darker than testa. Hilum rim color of testa. Lens discernible or not discernible; equal to or greater than 0.5 mm in length; 0.7 mm long; with margins straight or curved; oblong (with or without lighter colored medial line); not in groove of raphe; adjacent to hilum; to 0.5 mm from hilum; slightly mounded; similar color as testa; darker than testa; black or brown (reddish); within halo and corona. Lens corona color darker than testa. Lens halo color lighter than testa. Endosperm thin; covering entire embryo; adnate to testa. 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 deflexed; oblique to length of seed. Radicle bulbous; lobe tip straight; deflexed and parallel to cotyledon length not centered between cotyledons (radicle outside 1 cotyledon and inside other, therefore junctions for each cotyledon different); less than 1/2 length of cotyledons to 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (southwestern Cape Province to Natal).

Notes: Dahlgren (1960, 1963a,b, 1965, 1968) monographed *Aspalathus* in a series of papers. His fruit and seed data were used to enlarge our limited database. In discussing the legume morphology, Dahlgren (1963b, pp. 98–105) noted that there is no typical *Aspalathus* legume, though the short, more or less triangular and compressed legume is most common. His figure 15 is a useful compilation of legume shapes and hair types and patterns. Legumes usually dehisce either actively or passively on the plant. Some species have legumes that remain closed and fall to the ground while closed, acting as a “nutlet”; for example, *A. bodkinii* H. Bolus and probably *A. argyrella* P. MacOwan, *A. comptonii* R.M.T. Dahlgren, and *A. villosa* C.P. Thunberg. The number of species and distribution used here were taken from Wyk (1991) and Wyk and Schutte (1995).

Aspalathus: *A. linearis* (N.L. Burman) R.M.T. Dahlgren
(C-E), *A. spp.* (A-B). *A*, Fruits ($\times 2.1$); *B*, seeds ($\times 8.4$); *C-D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 12$).

8



Genus: *Crotalaria* C. Linnaeus

Phylogenetic Number: 27.07.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: Ca. 200 spp.—ca. 600 spp.

Fruit a legume; unilocular; 0.3–12 × 0.3–1.7 × 1–2 cm; with deciduous or persistent 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; oblong, elliptic (clavate, oblong, or circular), linear (and linear-oblong), or circular; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; inflated (some species markedly inflated); terete or compressed (especially species in subgenus *Priotropis* (R. Wight & G.A.W. Arnott) C.D.F. Meisner); without or with beak; straight; with solid beak the same color and texture as fruit; rounded to short tapered at apex; apex aligned or oblique with longitudinal axis of fruit; rounded at base; base aligned or oblique with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous or coriaceous; seed chambers externally invisible. Fruit margin not constricted; with or without sulcus; plain. Fruit wings absent. Fruit stipitate to substipitate to nonstipitate; with the stipe 0–30 mm long. Fruit with all layers dehiscent or indehiscent (for a few species); splitting along sutures. Dehiscence of valves along both sutures; apical and down; active; with valves enrolling or twisting. Replum invisible. Epicarp dull; monochrome; brown to tan; glabrous or pubescent and indurate; with 1 type of pubescence; puberulent, tomentose, villous, sericeous, or peltate; with pubescence brown (and including purple and blackish-brown); with pubescence uniformly distributed or apical pubescence different from basal pubescence; with apical 1/4 tomentose and basal 3/4 glabrous; with simple hairs; pliable; with hair bases plain; eglandular; without spines; smooth or not smooth; with elevated features; not veined; not tuberculate; shagreen; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous to ligneous (sub). Endocarp dull; monochrome; brown or tan; smooth or hairy; with hairs restricted to sutures, in longitudinal rows, or scattered over endocarp; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 10–80; length parallel with fruit length;

neither overlapping nor touching; in 1 series. Funiculus measured; up to 3 mm long; of 1 length only; filiform or thick; S-curved or curved. Aril absent or present (rarely); dry; rim-aril (in section *Chrysocalycinae* (G. Bentham) E.G. Baker subsection *Stipulosae* (E.G. Baker) F.A. Bisby & R.M. Polhill); covering less than 1/2 of seed; brown or tan.

Seed 1–8 × 1–6 × 0.75–3 mm; not overgrown; not angular to angular; asymmetrical; reniform (and obliquely reniform), mitaform, cordate (obliquely), or circular (sub); compressed or flattened; with visible radicle and cotyledon lobes; with deep, with shallow, or without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; usually glossy or dull; not modified by a bloom; colored; monochrome, mottled and streaked, or bichrome (primarily dark reddish-black with a white patch over radicle tip and with or without white patch at junction of radicle and cotyledon lobes or a continuous white patch to radicle tip to radicle cotyledon junction, *C. spectabilis* A.W. Roth); with frequent mottles; with frequent streaks; brown (in combination with most other colors), tan, yellow, orange, red, black, cream, gray, green, or purple; with black or brown (greenish, yellowish, reddish) overlay; glabrous; smooth or not smooth; with elevated or recessed features; rugose (faces and/or margins), shagreen, warty, wrinkled, or papillate; punctate (minutely punctate in *C. stolzii* (E.G. Baker) R.M. Polhill); coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible, partially concealed, or fully concealed; concealed by radicle lobe (partially or completely concealed), funiculus, or wing; with or without faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform or punctiform; up to 6 mm long; with curved outline; elliptic; between cotyledon and radicle lobe; recessed; within rim and halo or rim or not within corona, halo, or rim. Hilum halo color lighter than testa. Hilum rim color darker than testa. Lens discernible (not bearing elevated features that rest of testa may bear and often with a light-colored longitudinal medial line); equal to or greater than 0.5 mm in length; 0.5–1.5 mm long; with margins straight or curved; rectangular, wedge-shaped, oblong, or circular; not in groove of raphe; adjacent to hilum; 1–7 mm from hilum; mounded; similar color as or dissimilar color from testa; lighter or darker than testa; tan; not within corona, halo, or rim. Endosperm thick; covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded;

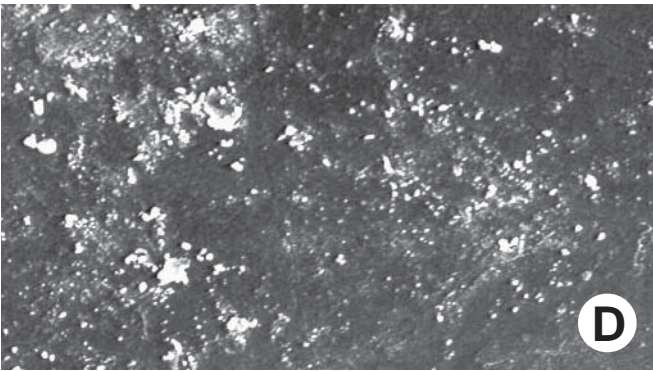
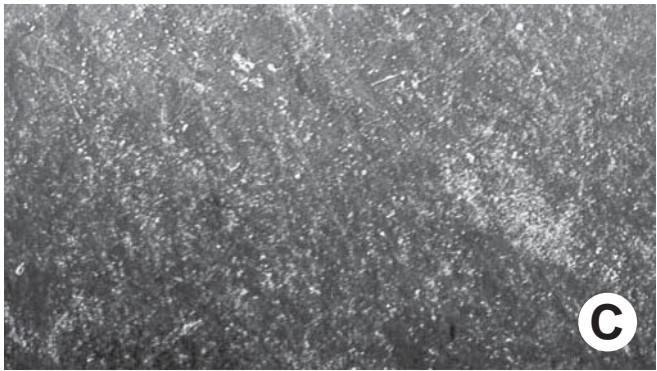
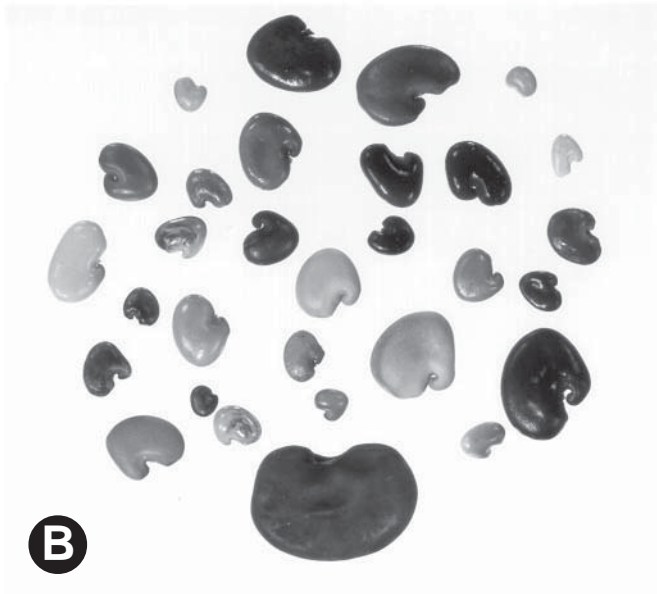
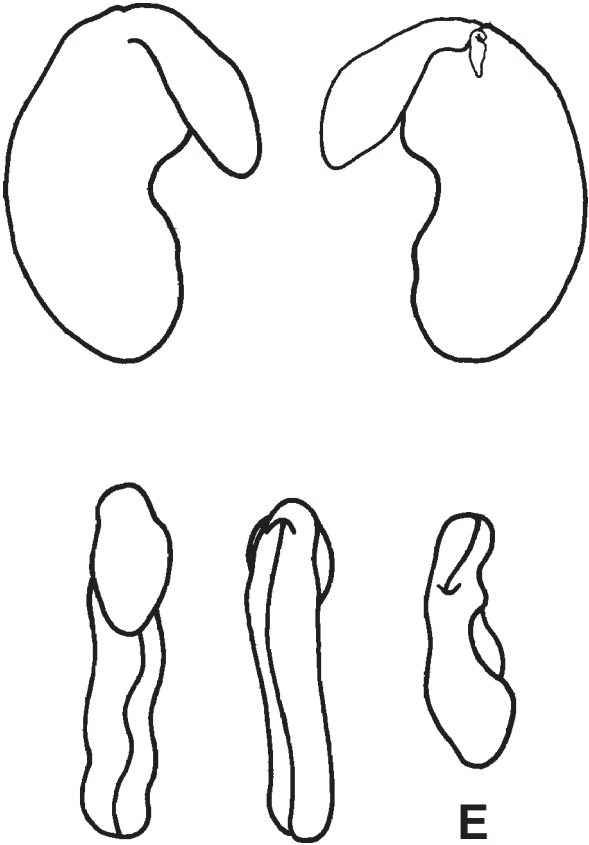
margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; yellow or tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear or bulbous; lobe tip straight, curved, or hooked; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 or 1/2 to nearly length of cotyledons. Plumule rudimentary, or moderately developed; glabrous.

Distribution: Pansubtropical and pantropical with three-quarters of the species in eastern and southern Africa.

Notes: Polhill (1982) monographed the species of this genus in Africa and Madagascar, where three-quarters of the species are endemic. To balance his excellent contribution, we also consulted the following three monographs from the New World and one from Thailand: North America, Windler (1974); Colombia, Bernal (1986); Venezuela, Matos (1978); and Thailand, Niyomdham (1978). Miller (1967) studied the seed morphology and anatomy of "40 species probably endemic to the New World, 21 species from the Old World, and four pantropicals." Because of synonymy problems, seeds of only 47 different species are keyed and illustrated. Miller's key seed characters are: hilum open vs. hilum occluded by radicle, seeds small vs. medium, funicular remnant distinct vs. absent, and glossy vs. not glossy. His term "boss" is synonymous with our term "lens." Windler (1973) noted that like other legume genera, *Crotalaria* pods have an active ballistic dehiscence. The two valves separate along the "center part of the adaxial suture," and an "explosive inward and upward movement of the lower suture causes the dispersal of the seeds. The valves continue to curl in the same direction, frequently trapping a few seeds in each of the curled valves." Windler reported that in the laboratory seeds were thrown up to 5 meters. He also noted that movement by water and animals accounted for most seed dispersal. Niyomdham (1978) observed that species of *Crotalaria* can be divided into two seed groups: Reniform group and cordate (with unequal lobes) or mitiform group. The seeds of *Crotalaria* exhibit an impressive array of monochrome colors, including, but not limited to, brown (light to dark and in combination with red, gray, yellow, orange, or orange-red), tan, black, orange, red, and yellow. Mottled seeds also occur.

Crotalaria: *C. juncea* C. Linnaeus (*C-E*), *C. spp.* (*A-B*). *A*, Fruits ($\times 1.6$); *B*, seeds ($\times 2.3$); *C-D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 5$).

3



Genus: *Bolusia* G. Bentham

Phylogenetic Number: 27.08.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 3 spp.—5 spp.

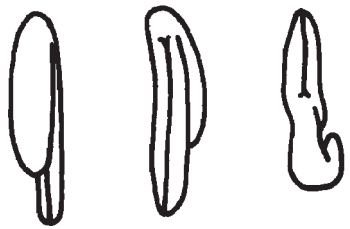
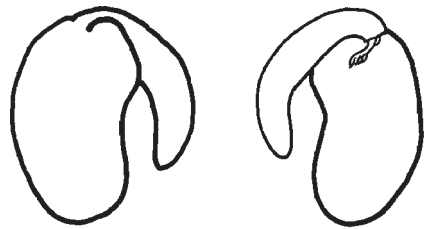
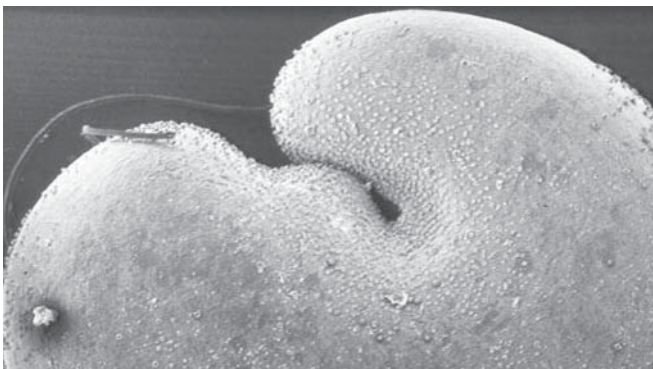
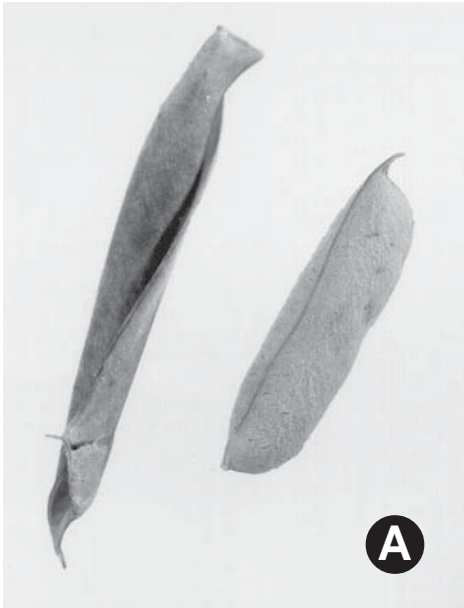
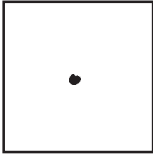
Fruit a legume; unilocular; $2.5-4 \times 0.5-1 \times 0.5-0.6$ cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong (fusiform or clavate); when asymmetrical with both sutures nearly straight; inflated (like most *Crotalaria* (27.07) spp.); compressed; without beak; short tapered to rounded at apex; apex aligned with longitudinal axis of fruit; short tapered to rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; ligneous; 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; with valves enrolling or twisting. Replum invisible. Epicarp dull; monochrome; tan; glabrous; eglandular; without spines; not smooth; with elevated features; faintly reticulately veined; not tuberculate; faintly wrinkled; not exfoliating; without or with cracks (with age); cracking oblique to fruit length. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; subligneous. Endocarp glossy; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 5–8 (estimated); length parallel with or transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 1–1.5 mm long; of 1 length only; filiform; hooked. Aril absent.

Seed $2.5-4 \times 2.5-3 \times 1$ mm; not overgrown; not angular; asymmetrical; circular (but with deep hilar sinus); compressed; with visible radicle and cotyledon lobes; with shallow hilar sinus; with umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; streaked and mottled or monochrome (when immature); with frequent mottles; with frequent streaks; tan; with brown (ish gray) overlay; glabrous; not smooth; with elevated features; tuberculate (with tiny white tubercles especially along margin of seed); coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by radicle lobe (hilum in deep sinus) or wing; without faboid split; punctiform; between

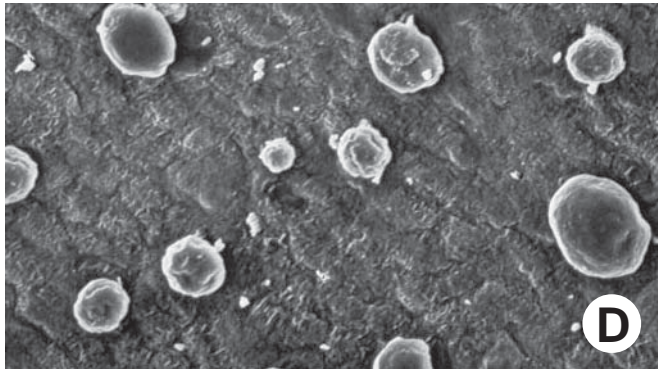
cotyledon and radicle lobe (in deep hilar sinus); flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins straight or curved; apparently oblong; not in groove of raphe; adjacent to hilum; 0.2 mm from hilum; mounded (well developed and blocking hilar sinus); same color as testa; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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; partially concealing (barely covering part of radicle near base) or not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; with 1 or both margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip hooked; deflexed and parallel to cotyledon length; centered between cotyledons; $1/2$ to nearly length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Africa (south of the equator).

Bolusia: *B. rhodesiana* A.G. Corbishley (C–E), *B.* spp. (A–B). A, Fruit and valve ($\times 2.1$); B, seeds ($\times 5.2$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 9$).



E



D

Genus: *Lotononis* (A.-P. de Candolle) C.F. Ecklon & J.M. Zeyher

Phylogenetic Number: 27.09.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 16 spp.—ca. 150 spp.

Fruit a legume; unilocular; $0.2\text{--}1.7 \times 0.15\text{--}0.9 \times 0.1$ cm; with persistent calyx; with calyx longer or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight or curved; not plicate or plicate (rarely); not twisted; asymmetrical or symmetrical; oblong, falcate, circular, linear, or ovate; when asymmetrical with both sutures nearly straight or parallelly curved; not inflated; flattened; without beak; tapered to short tapered at apex; apex oblique with longitudinal axis of fruit; 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 (lower suture flush) or with sulcus (lower suture deeply sulcate); plain or embellished. Fruit wing present or absent; 1; 2 mm wide; sutural; on 1 suture. Fruit stipitate to substipitate to nonstipitate; with the stipe up to 10 mm long. Fruit with all layers dehiscent (to tardily dehiscent) or indehiscent; splitting along sutures. Dehiscence of valves along both sutures; assumed apical and down; active; with valves twisting. Replum invisible. Epicarp dull; monochrome; dark brown to black; pubescent and indurate or pubescent but soon deciduous; with 1 type of pubescence; pilose, villous, or sericeous; with pubescence golden or gray; with simple hairs; pliable; with hair bases plain; without spines; smooth or not smooth; with elevated features; reticulately veined; not tuberculate; distinctly to inconspicuously verrucose-rugose or warty (along upper suture); not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; reddish brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–30; length parallel with fruit length; neither overlapping nor touching or touching; in 1 series. Funiculus measured; up to 2.5 mm long; of 2 different lengths (are some of 1 length?); filiform; straight. Aril absent.

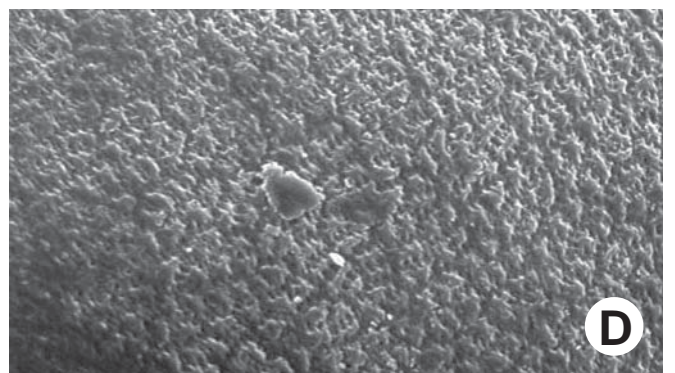
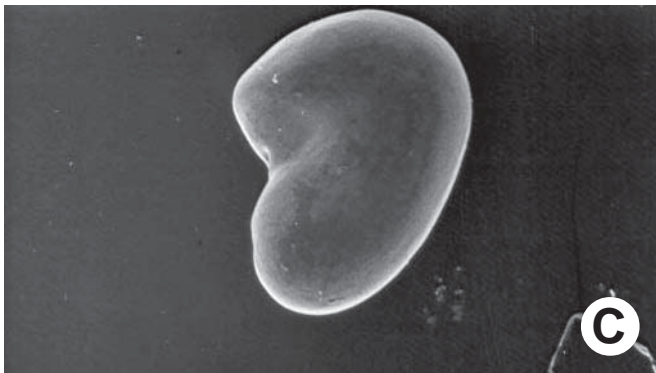
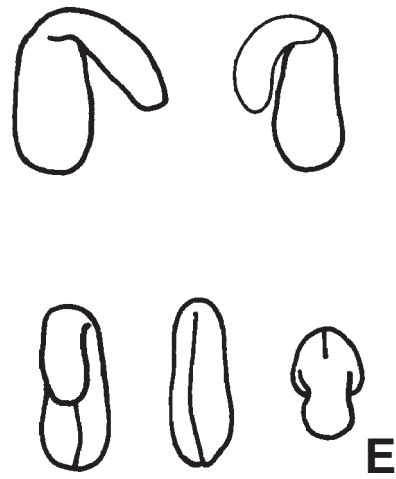
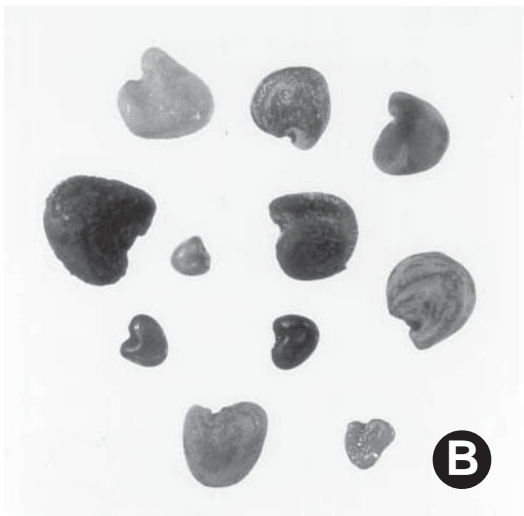
Seed $1\text{--}3 \times 1\text{--}2.8 \times 0.5\text{--}0.7$ mm; not overgrown; not angular; asymmetrical; mitaform, reniform, or cordate (obliquely); compressed; with visible radicle and

cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome, bichrome (especially yellows and purples or brown with black tubercles), or mottled and streaked; with frequent mottles; with frequent streaks; red (dish to yellowish), yellow (to greenish), or purple (to tannish); with black or purple overlay; glabrous; smooth or not smooth; with elevated features; tuberculate (minute and densely to sparsely); coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color of or darker than testa. Lens discernible; less than 0.5 mm in length; with margins curved; more or less circular; not in groove of raphe; adjacent to hilum; 0.1–0.4 mm from hilum; mounded; same color as, similar color as, or dissimilar color from testa; lighter or darker than testa; brown; 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; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; deflexed and parallel to cotyledon length; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Southern Africa (ca. 93 percent of species) to Mediterranean region and India.

Notes: *Buchenroedera* C.F. Ecklon & J.M. Zeyher has been merged with *Lotononis*, following Gunn et al. (1992). Polhill (1981q) noted that the 20 species of *Buchenroedera* might be “perhaps better included in *Lotononis*.” The seeds of *Lotononis* are remarkably similar in shape, size, and color to seeds of *Trifolium* (21.06). Number of species and distribution follow Wyk (1991) and Wyk and Schutte (1995).

Lotononis: *L. bainesii* J.G. Baker (C–E), *L. spp.* (A–B). A, Fruits and valves ($\times 2.8$); B, seeds ($\times 8.7$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 15$).



Genus: *Lebeckia* C.P. Thunberg

Phylogenetic Number: 27.10.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 14 spp.—ca. 35 spp.

Fruit a legume; unilocular; $1.2-6 \times 0.2-1.3 \times 0.25$ cm; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved; not plicate; not twisted; asymmetrical or symmetrical; linear, oblong, or elliptic (oblong); when asymmetrical with both sutures parallelly to unequally curved; not inflated to inflated; flattened to terete; without beak; short tapered to rounded at apex; apex aligned with longitudinal axis of fruit; tapered to rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous to coriaceous; seed chambers externally visible; with the raised seed chambers torulose or not torulose. Fruit margin not constricted; without sulcus; plain or embellished. Fruit wing present or absent; 1; 1–2 mm wide; sutural; on 1 suture. Fruit stipitate to substipitate; with the stipe up to 30 mm long. Fruit with all layers dehiscing or indehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down; active; with valves twisting. Replum invisible. Epicarp dull; monochrome; reddish brown or tan; glabrous or pubescent and indurate; with hairs appressed; with 1 type of pubescence; with pubescence gray; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; 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; tan; smooth and cobwebby (smooth below seeds and cobwebby between seeds and in areas without seeds); septate or nonseptate; with septa thin (tissue paper-like), flexible; with septa eglandular; coriaceous to chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–8; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

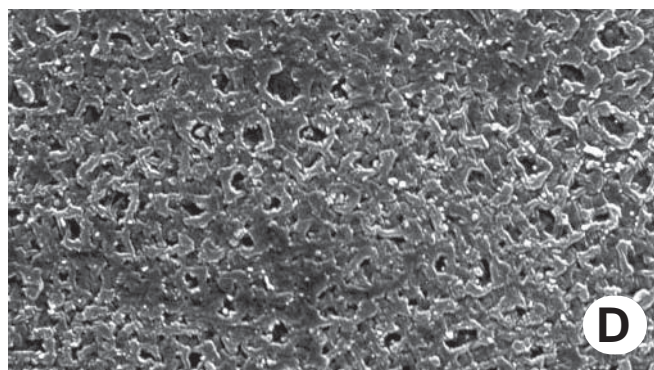
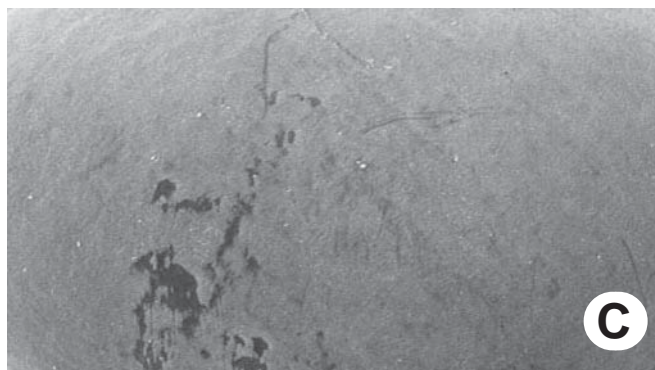
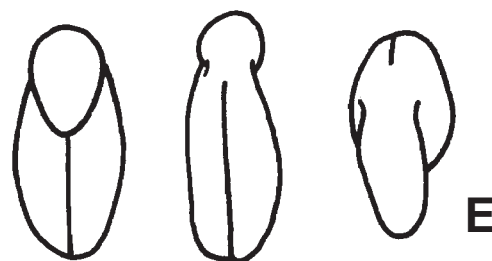
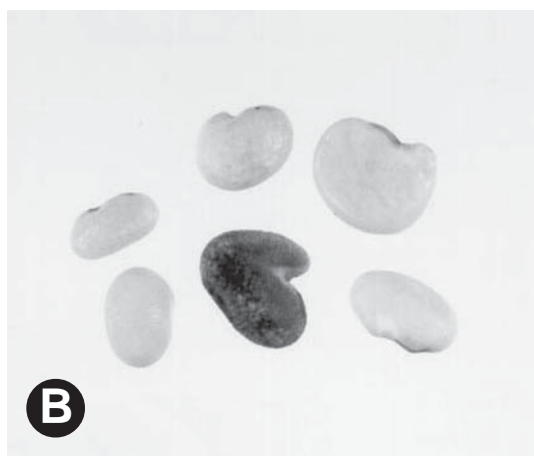
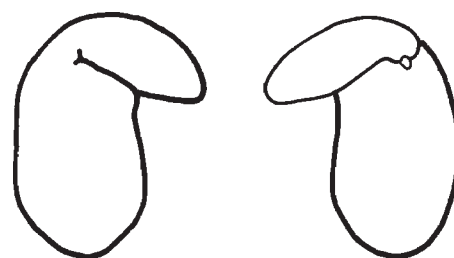
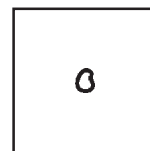
Seed $3-4 \times 1.7-2.2 \times 1.2-1.5$ mm; not overgrown; not angular to angular; asymmetrical; obliquely cordate, oblong (reniform), rectangular, or reniform; compressed; with visible (barely) radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering

to endocarp; dull; not modified by a bloom; colored; monochrome or mottled and streaked; with frequent mottles; with frequent streaks; tan; with brown (dark reddish to purplish) overlay; glabrous; smooth or not smooth; with elevated features; faintly warty; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; recessed; within rim, halo, and corona or within rim. Hilum corona color darker than testa. Hilum halo color of testa. Hilum rim color of or darker than testa. Lens discernible; equal to or greater than 0.5 mm in length; 0.7–1 mm long; with margins straight or curved; wedge-shaped (elongated and ending or not in circular area) or circular (above elongated wedge-shape); not in groove of raphe; adjacent to hilum; mounded; dissimilar color from testa; darker than testa; reddish to orangish to dark 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; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; deflexed and parallel to cotyledon width to deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary or moderately developed; glabrous.

Distribution: Namibia, Botswana, and South Africa (Cape Province).

Notes: Polhill (1981q) noted that *Lebeckia* is “virtually indistinguishable” from *Spartidium* (27.04). Number of species and distribution taken from Wyk (1991) and Wyk and Schutte (1995).

Lebeckia: *L. capensis* (C. Linnaeus) G.C. Druce (C–E), *L.* spp. (A–B). A, Fruits and valves ($\times 1.6$); B, seeds ($\times 4.6$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 9$).



Genus: *Wiborgia* C.P. Thunberg

Phylogenetic Number: 27.11.

Tribe: Crotalariaeae.

Species Studied—Species in Genus: 10 spp.—10 spp.

Fruit a legume or nutlet; unilocular; $0.7\text{--}3.2 \times 0.4\text{--}1.8 \times 0.15\text{--}0.5$ cm; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical or symmetrical; circular, elliptic, oblong, or ovate; when asymmetrical with both sutures parallelly curved or nearly straight; not inflated or inflated (*W. humilis* (C.P. Thunberg) R. Dahlgren); flattened, compressed, or terete (because crested); without beak; short tapered or rounded at apex; apex aligned with longitudinal axis of fruit; rounded at base; base aligned or oblique with longitudinal axis of fruit; with the apex and base uniform in texture; fragile, thinner than chartaceous like *Trifolium* (21.06); seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; embellished. Fruit wing 1; $0.5\text{--}5$ mm wide (broadest in *W. monoptera* E.H.F. Meyer and *W. sericea* C.P. Thunberg); samaroid or sutural; on 1 suture or both sutures. Fruit stipitate or substipitate; with the stipe 5 mm long. Fruit indehiscent. Replum invisible. Epicarp dull or glossy; monochrome (though wings may be a different shade); black or brown (to black-brown and with or without patches of brown); with surface texture uniform or not uniform, with patches of different texture not restricted to the base and apex; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; subligneous or coriaceous. Endocarp glossy; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–3; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; up to 1 mm long; of 1 length only; filiform; curved. Aril absent.

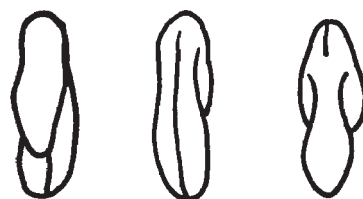
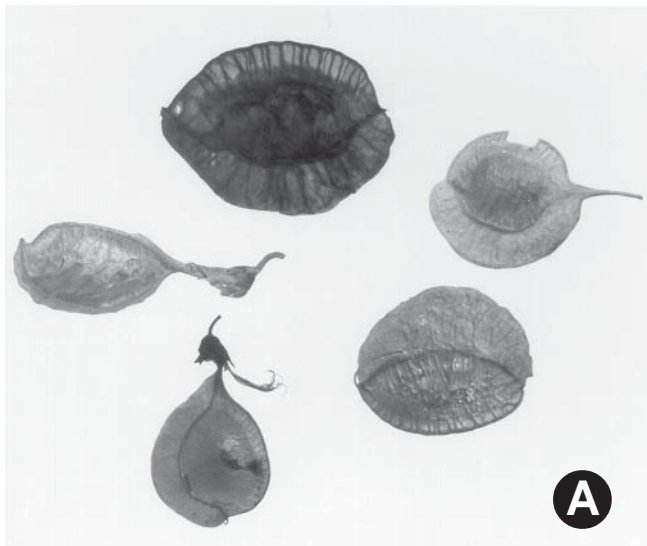
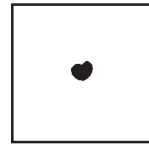
Seed $3\text{--}4 \times 2.5\text{--}2.8 \times 1.5\text{--}1.8$ mm; not overgrown; not angular to angular (somewhat); asymmetrical; ovate or rectangular; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored or clear; monochrome; salmon brown or orange

(light); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum visible, fully concealed, or partially concealed; concealed by funicular remnant or wing; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; punctiform; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color of or darker than testa (green). Lens discernible; equal to or greater than 0.5 mm in length; $0.8\text{--}1.5$ mm long; with margins straight or curved; oblong (with narrow extension or full body reaching to hilum); not in groove of raphe; adjacent to hilum; mounded; dissimilar color from testa; darker than testa; brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. 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; yellow or tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: South Africa (southern and southwestern Cape Province).

Notes: Dahlgren (1975) monographed the genus and illustrated fruits of the species. He noted that fruit characters are important in “distinguishing *Wiborgia* from the similar species of *Lebeckia*” (27.10). Fruits of most species are typical samaras. However, the fruit of *W. humilis* (C.P. Thunberg) R. Dahlgren is a stipitate nutlet with no dorsal wing, and the fruits of *W. leptoptera* R. Dahlgren and *W. obcordata* (B. Bergius) C.P. Thunberg have a distinct upper ridge reminiscent of the wing in other species. The wing tissue may or may not be reticulate, but the fruit tissue over the seed chamber is always reticulate.

Wiborgia: *W. mucronata* (C. Linnaeus) A.P. Druce (C–E), *W. spp.* (A–B). A, Fruits ($\times 2.1$); B, seeds ($\times 5.3$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 7$).



E

