

Amorpheae (6.01–6.08)

Genus: *Apoplanesia* C.B. Presl

Phylogenetic Number: 6.01.

Tribe: Amorpheae.

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

Fruit a legume; unilocular; $0.3\text{--}0.35 \times 0.2\text{--}0.3 \times 0.2\text{--}0.23$ cm (all excluding calyx); with deciduous corolla; with persistent calyx; with calyx longer than fruit (lobes wing-like and up to 8 mm long); 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 (but with indurate style) or with beak; straight; with solid beak the same color and texture as fruit; short tapered at apex; apex aligned (nearly) or oblique with longitudinal axis of fruit; short tapered at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome (but gland dots reddish-brown against silvery (hair) background); brown or gray (because of hairs); pubescent and indurate; with 1 type of pubescence; tomentose; with pubescence gray; with pubescence uniformly distributed; with simple hairs; stiff; with hair bases plain; glandular; with glandular dots; without spines; not smooth; with elevated features; not veined; not tuberculate; rugose; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; glassy beads; coriaceous. Endocarp glossy; monochrome; dark brown or tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; thick; straight. Aril absent.

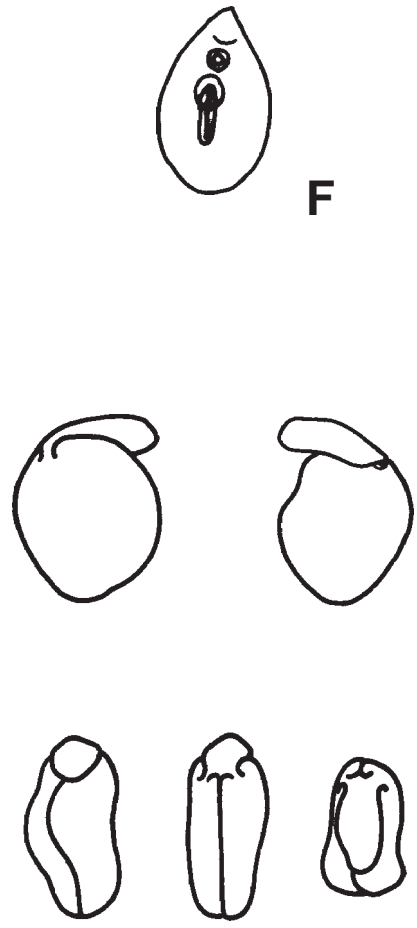
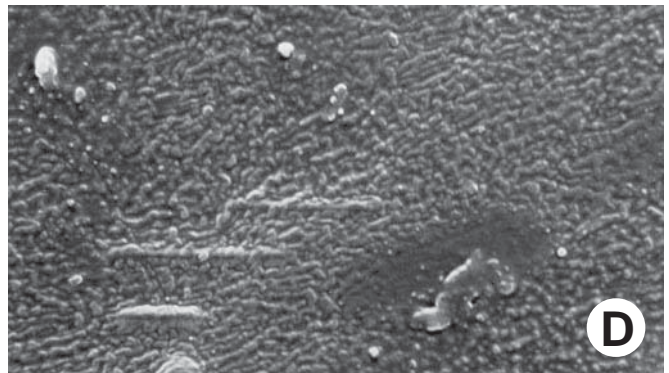
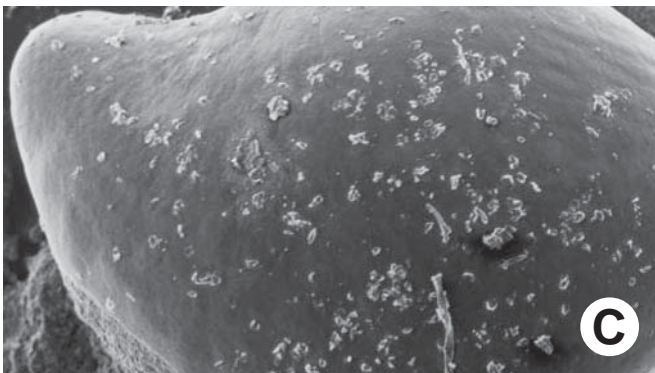
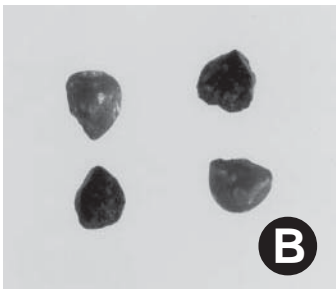
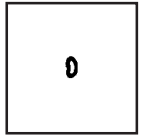
Seed $2.2\text{--}2.4 \times 1.8\text{--}2 \times 1.3\text{--}1.4$ mm; not overgrown; not angular; asymmetrical; D-shaped; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim 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 mm long; with curved outline; circular; between cotyledon and radicle lobe; flush; within rim. Hilum rim color darker than testa. Lens discernible (nearly as large as hilum—see fig. *F*); less than 0.5 mm in length; with margins curved; elliptic; not in groove of raphe; adjacent to hilum (separated by hilum rim); mounded; dissimilar color from testa; darker than testa; black; not within corona, halo, or rim. Endosperm thick; $1/2$ 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 radicle; split over radicle; with lobes; with lobes not touching; 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 width; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Southern Mexico to Venezuela.

Notes: Traditionally this tribe has been called Amorpheae. Reveal (1997) reported that the name Daleeae was published before the name Amorpheae. In accordance with the *International Code of Botanical Nomenclature* (Greuter et al. 1994), the oldest name for a taxon must be used, so Reveal suggested that this tribe should be called Daleeae. In 1999, however, Reveal (1999) reversed himself, so this tribe remains the Amorpheae. Barneby (1981) noted that this is seemingly the most archaic genus in the Amorpheae. The fruit in combination with the enlarged calyx form a unique unit in the Fabaceae. The D-shaped compressed fruit is half enclosed by enlarged calyx lobes, and this unit resembles a small fruit of *Dipterocarpus* C. Gaertner (Dipterocarpaceae).

Apoplanesia: *A. paniculata* C.B. Presl (*A–E*). *A*, Fruits with star-shaped calyx ($\times 2.3$); *B*, seeds ($\times 4.5$); *C–D*, testa ($\times 50$, $\times 1000$); *E*, embryos ($\times 10$); *F*, hilum-lens view ($\times 10$).



Genus: *Eysenhardtia* K.S. Kunth

Phylogenetic Number: 6.02.

Tribe: Amorpheae.

Species Studied—Species in Genus: 10 spp.—11 spp.

Fruit a legume; unilocular; $0.5\text{--}2.1 \times 0.15\text{--}0.5 \times 0.1$ cm; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; slightly curved to curved; not plicate; not twisted; asymmetrical; falcate, elliptic, or linear; when asymmetrical with both sutures parallelly curved; not inflated; flattened; without beak; short tapered at apex; apex oblique with longitudinal axis of fruit; long tapered at base; base aligned with longitudinal axis of fruit; with the apex and base differing in texture; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome (except for glandular dots); brown (to greenish or reddish or pale to dark); glabrous; glandular; with glandular dots (to elongated dots (nearly streaks) and conspicuous to faint because of size and color); limited to a portion of fruit; upper $2/3$ glandular and lower $1/3$ eglandular; without spines; not smooth; with elevated or recessed features; faintly reticulately to irregularly (nearly reticulate) veined; not tuberculate; inconspicuously punctate; not exfoliating; without cracks. Mesocarp absent. Endocarp glossy; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1(–2) (and may fill $1/2$ to entire fruit); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; filiform; straight. Aril absent.

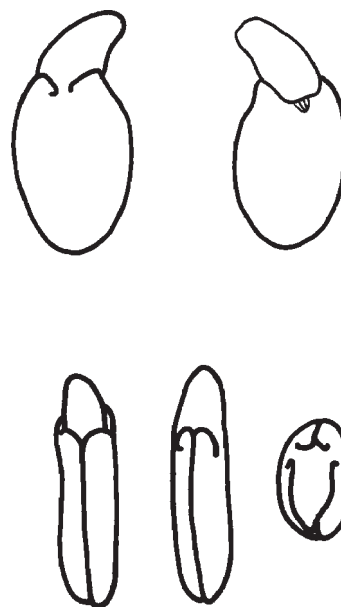
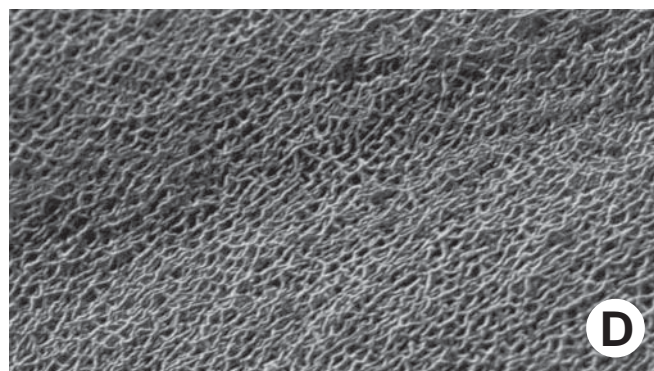
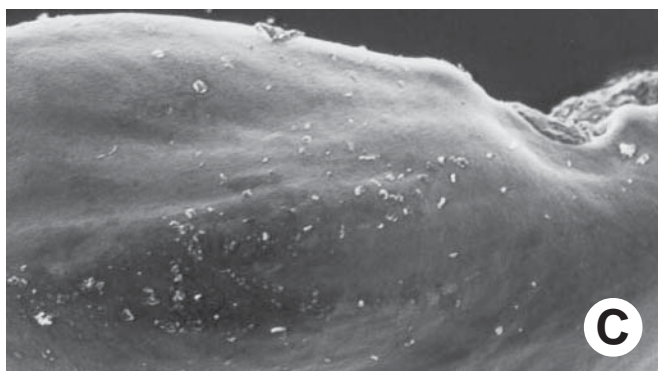
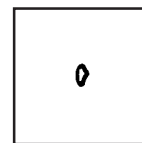
Seed $3.2\text{--}3.4 \times 1.6\text{--}1.7 \times 0.9\text{--}1.1$ mm; not overgrown; not angular; asymmetrical; oblong, reniform, or falcate; compressed to flattened; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; brown (olive to light or reddish), olive, or tan; glabrous; smooth; chartaceous. Fracture lines absent. Rim present. Raphe visible or not visible (*E. orthocarpa* (A. Gray) S. Watson); from hilum through lens to base of seed and terminating; not bifurcating; darker than testa; black; raised. Hilum visible; 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 (near apex); flush; within rim. Hilum rim color of testa (difficult to find). Lens discernible or not discernible (*E. parvifolia* T.S. Brandege); less than 0.5 mm in length; with margins curved; elliptic; not in groove of raphe; adjacent to hilum; 0.2 mm from hilum; mounded; similar color as testa; darker than testa (barely); black; not within corona, halo, or rim. Endosperm thin; $1/2$ 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 radicle (almost exposed); split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed (to almost straight in *E. parvifolia* T.S. Brandege); oblique 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 rudimentary or moderately developed; glabrous.

Distribution: Southwestern United States, Mexico, and Guatemala.

Notes: The species count is based on Lang and Isely (1982), who recognized ca. 10 species in their monograph, and not on Barneby (1981). The seed fills about two-thirds of the fruit.

Eysenhardtia: *E. spinosa* G. Engelmann (C–E), *E.* spp. (A–B). A, Fruits (some with a calyx) ($\times 3.3$); B, seeds ($\times 4.8$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



Genus: *Parryella* J. Torrey & A. Gray

Phylogenetic Number: 6.03.

Tribe: Amorpheae.

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

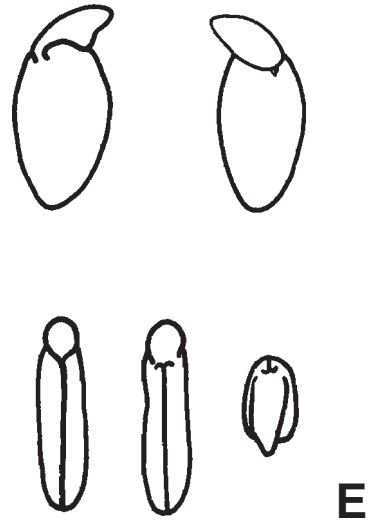
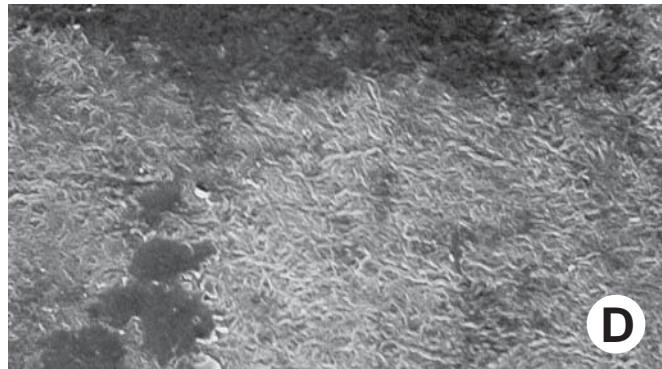
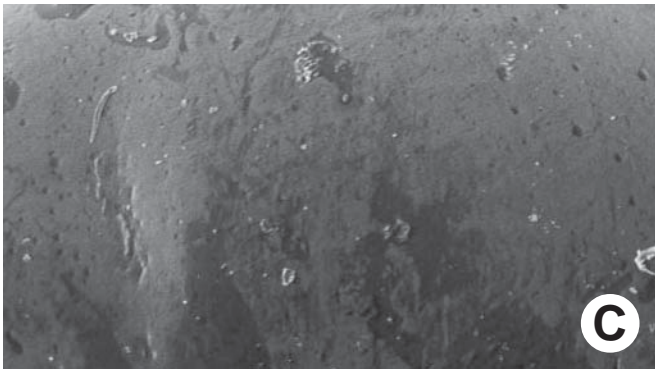
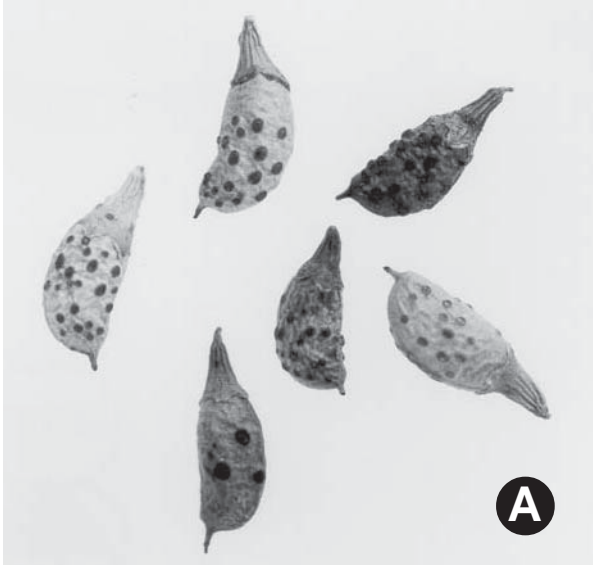
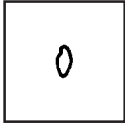
Fruit a legume; unilocular; $0.5\text{--}0.8 \times 0.25\text{--}0.35 \times 0.15\text{--}0.22$ cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; without or with beak; straight; with solid beak the same color and texture as fruit; 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 visible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Epicarp semiglossy; monochrome (with reddish-brown to dark reddish-brown glandular dots); tan; glabrous; without spines; not smooth; with elevated features; not veined; not tuberculate; wrinkled; not exfoliating; without cracks. Mesocarp absent. Endocarp glossy; monochrome; reddish brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; straight. Aril absent.

Seed $4\text{--}4.2 \times 2\text{--}2.4 \times 1.8\text{--}2$ mm; not overgrown; not angular; asymmetrical; elliptic; terete; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy (primarily caused by glandular exudate); not modified by a bloom; colored; monochrome; tan; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe from hilum to near base of seed and terminating; not bifurcating; darker than testa; brown; raised. 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 corona. Hilum corona color darker than testa. Lens not discernible. Endosperm thin; $1/2$ covering entire embryo; adnate to testa. Cotyledons not smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin not entire 180 degrees from base of radicle; similar at apex; completely 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; lobe tip curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than $1/2$ length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Southwestern United States.

Parryella: P. filifolia J. Torrey & A. Gray (A–E). A, Fruits with calyx ($\times 3.8$); B, seeds ($\times 3.8$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Amorpha* C. Linnaeus

Phylogenetic Number: 6.04.

Tribe: Amorpheae.

Species Studied—Species in Genus: 15 spp.—15 spp.

Fruit a legume; unilocular; $0.4\text{--}1.05 \times 0.15\text{--}0.45 \times 0.14\text{--}0.18$ cm; with deciduous corolla; with persistent calyx; with calyx equal in length to or calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (to slightly curved); not plicate; not twisted; asymmetrical; falcate or oblong; when asymmetrical with 1 straight and 1 curved suture, both sutures parallelly curved, or both sutures unequally curved; widest near middle, D-shaped, or widest near apex; not inflated; compressed; without or with beak; with solid beak the same color and texture as fruit; rounded at apex; apex aligned to oblique with longitudinal axis of fruit; tapered at base; base aligned to oblique with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous or fragile, thinner than chartaceous like *Trifolium* (21.06); seed chambers externally visible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate to nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome (sometimes with conspicuously darker colored glandular dots); brown or tan; with surface texture uniform or not uniform, with patches of different texture not restricted to the base and apex; glabrous, glabrate, or pubescent and indurate; with 1 type of pubescence; puberulent; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; glandular or eglandular; with glandular dots; without spines; not smooth; with elevated or recessed features; not veined; not tuberculate; faintly wrinkled; punctate (because of empty glandular dots); not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; glassy beads (reddish to dark-brown); coriaceous. Endocarp dull to glossy; monochrome; reddish brown or tan; smooth or vitreous (because of glandular exudates); nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; filiform or thick; straight. Aril present or absent; dry; rim-aril; light tan.

Seed $2.5\text{--}5 \times 1.6\text{--}3 \times 1.1\text{--}1.3$ mm; not overgrown; not angular; asymmetrical; D-shaped, elliptic, or oblong (all with radicular beak); compressed; with visible radicle

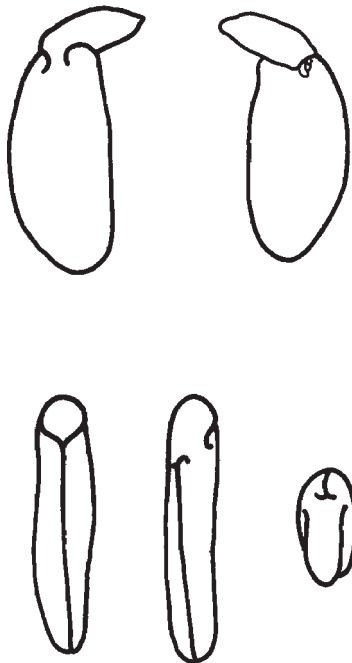
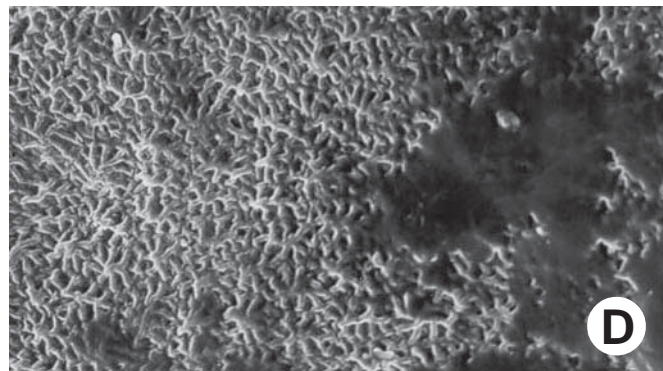
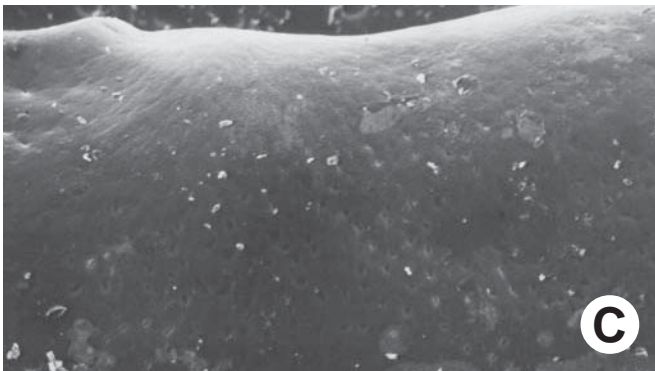
and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy (because of glandular exudate) or dull; not modified by a bloom; colored; monochrome; brown (reddish to orange to olive), tan, or black; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe from hilum to lens or near base of seed and terminating; not bifurcating; darker than testa; tan or brown (dark to light); flush. 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 (essentially). Lens discernible or not discernible; less than 0.5 mm in length; with margins curved; circular or elliptic; not in groove of raphe; adjacent to hilum; 1.5 mm from hilum; barely mounded; dissimilar color from testa; darker than testa; dark brown; not within corona, halo, or rim. Endosperm thick; 1/2 covering entire embryo; adnate to testa or 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; partially concealing radicle (barely); split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; green or tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique 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 rudimentary to moderately developed; glabrous.

Distribution: United States and Canada.

Notes: Palmer (1931) monographed *Amorpha* and illustrated its fruits, and Wilbur (1975) described the fruits and seeds in his revision of the genus. We followed the latter revision.

Amorpha: *A. croceolanata* P.W. Watson (C–E), *A. spp.* (A–B). A, Fruits with calyx ($\times 3.4$); B, seeds ($\times 5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).

D



Genus: *Errazurizia* R.A. Philippi

Phylogenetic Number: 6.05.

Tribe: Amorpheae.

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

Fruit a legume; unilocular; $0.4\text{--}1.1 \times 0.45\text{--}0.8 \times 0.5\text{--}0.6$ cm; with deciduous corolla; with 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; elliptic or ovate; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; without or with beak; straight; with solid beak the same color and texture as fruit; rounded at apex; apex oblique with longitudinal axis of fruit; tapered at base; base aligned with longitudinal axis of fruit; with the apex and base differing in texture; chartaceous; seed chambers externally visible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome (except for glandular dots); brown or gray (because of gray hairs); pubescent and indurate; with 1 type of pubescence; villous; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; glandular; with glandular dots; limited to a portion of fruit; upper 1/2 glandular and lower 1/2 eglandular; without spines; not smooth; with elevated features; not veined; not tuberculate; wrinkled; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; filiform; straight. Aril absent.

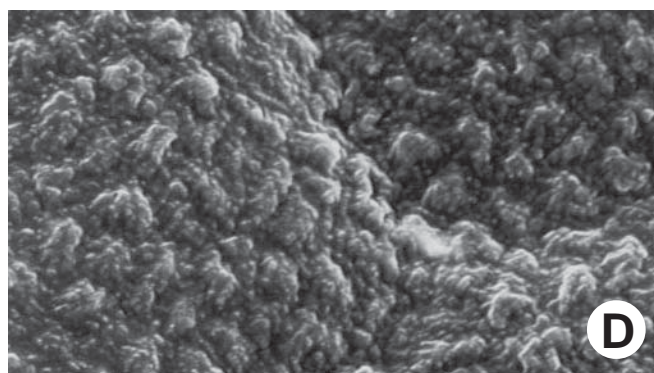
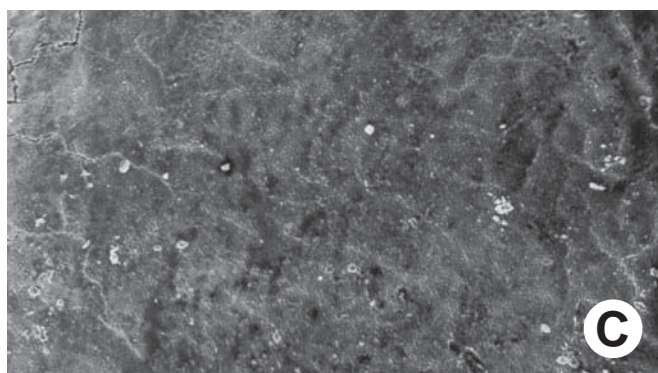
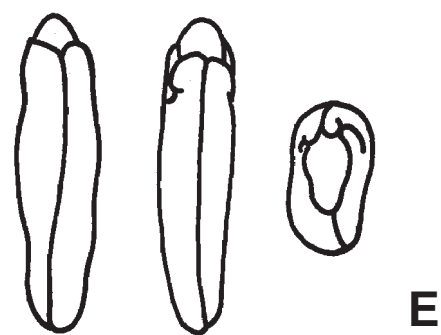
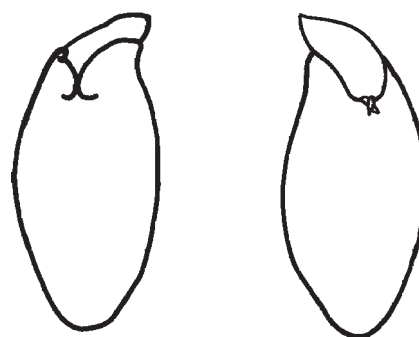
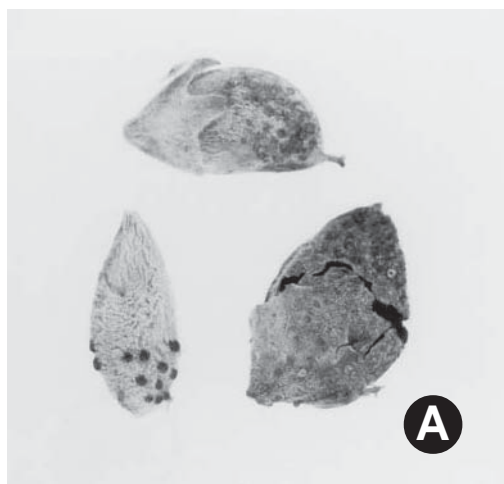
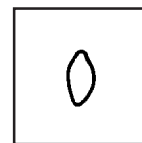
Seed $3\text{--}7.5 \times 2.7\text{--}5 \times 2\text{--}4.5$ mm; not overgrown; not angular; symmetrical (except for hilum); elliptic; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull (with splotches of glandular residue which are shiny); not modified by a bloom; colored; monochrome; black, brown, tan, or purple; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from lens to base of seed and terminating; not bifurcating; darker than testa; black; deeply recessed. Hilum fully concealed; concealed by funicular remnant; without faboid split; punctiform; marginal according to radicle tip; deeply recessed; not

within corona, halo, or rim. Lens not discernible. Endosperm thick; 1/2 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 radicle; split over radicle; with lobes; with lobes touching (auriculate); with basal groin formed by lobes; with the interface division terminating at base of radicle; without margins recessed; green or tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous or linear; lobe tip curved; deflexed and parallel to cotyledon width; 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 moderately developed; glabrous.

Distribution: Three species in southwestern United States and northwestern Mexico and one species along the coast of Chile.

Notes: Barneby (1977) monographed *Errazurizia*.

Errazurizia: *E. rotundata* (E.O. Wooton) R.C. Barneby (C-E), *E. spp.* (A-B). A, Fruits with calyx ($\times 2.7$); B, seeds ($\times 2.9$); C-D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Psorothamnus* P.A. Rydberg

Phylogenetic Number: 6.06.

Tribe: Amorpheae.

Species Studied—Species in Genus: 7 spp.—9 spp.

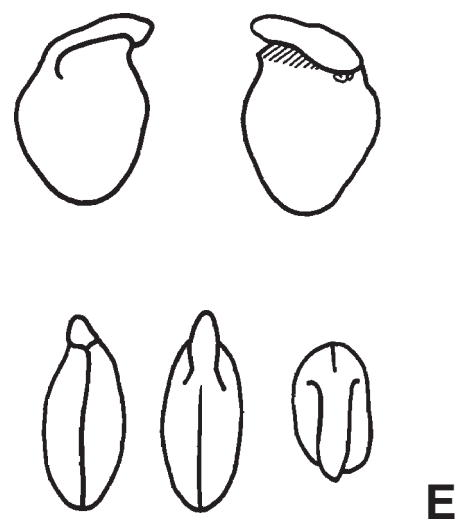
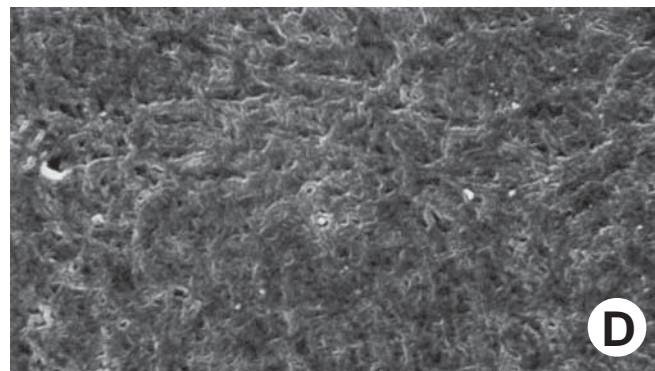
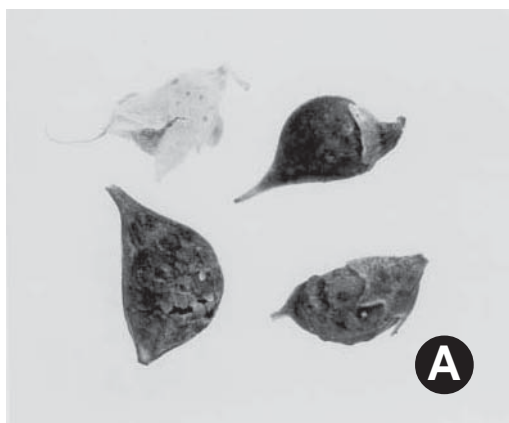
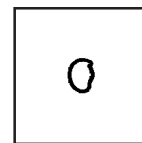
Fruit a legume; unilocular; $0.2-1 \times 0.36-0.6 \times 0.36-0.6$ cm; with deciduous corolla; with persistent calyx; with calyx longer or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical or asymmetrical; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; compressed; with beak; straight; with solid beak the same color and texture as fruit; short tapered at apex; apex aligned to 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 visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome (with glossy reddish-brown glandular dots); reddish brown; glabrous or pubescent and indurate; with 1 type of pubescence; puberulent; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; glandular; with glandular dots; without spines; not smooth; with elevated features; not veined; not tuberculate; shagreen; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1(–7) (–2 in *P. kingii* (S. Watson) R.C. Barneby or 3–7 in “one extralimital species” Barneby (1977)); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; straight. Aril absent.

Seed $4.2-6 \times 3-4 \times 2-3$ mm; not overgrown; not angular; asymmetrical; D-shaped; 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 (faintly); with frequent mottles; red; with red overlay; glabrous; smooth; coriaceous. Fracture lines absent. Raphe faintly visible or not visible; from hilum through lens to base of seed and terminating; not bifurcating; color of or lighter than testa. 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; 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; 0.5 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (-brown) or brown; not within corona, halo, or rim. Endosperm thin; 1/2 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 radicle; notched at or split over radicle; without or with lobes; with lobes not touching; with the interface division terminating at base of radicle; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; parallel or oblique to length of seed. Radicle linear; lobe tip curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Southwestern United States and northwestern Mexico.

Psorothamnus: *P. arborescens* (J. Torrey) R.C. Barneby (C–E), *P. spp.* (A–B). A, Fruits with and without calyx ($\times 2.3$); B, seeds ($\times 3.8$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Marina* F.M. Liebmann

Phylogenetic Number: 6.07.

Tribe: Amorpheae.

Species Studied—Species in Genus: 10 spp.—38 spp.

Fruit a legume or nutlet (Barneby 1977); unilocular; 0.15–0.33 × 0.13–0.26 × 0.13–0.26 cm; with persistent or deciduous androecial sheath; with deciduous corolla; with persistent calyx; with calyx longer than, equal in length to, or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; harp-shaped; when asymmetrical with 1 straight and 1 curved suture or both sutures unequally curved; widest near middle or D-shaped; not inflated; compressed; without beak; rounded at apex; apex aligned 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 to ligneous; seed chambers externally visible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Fruit a nutlet; entire. Epicarp dull; monochrome; brown (with large reddish-brown glandular dots); glabrous; glandular; with glandular dots; not smooth (because of large glandular dots); with elevated features; not veined; not tuberculate; glandular dotted; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; more or less smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1; length parallel with fruit length. Funiculus less than 0.5 mm long; straight. Aril absent.

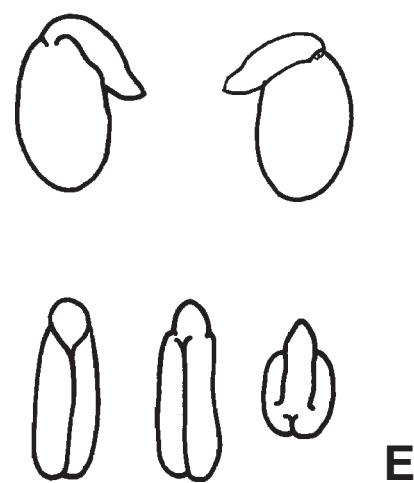
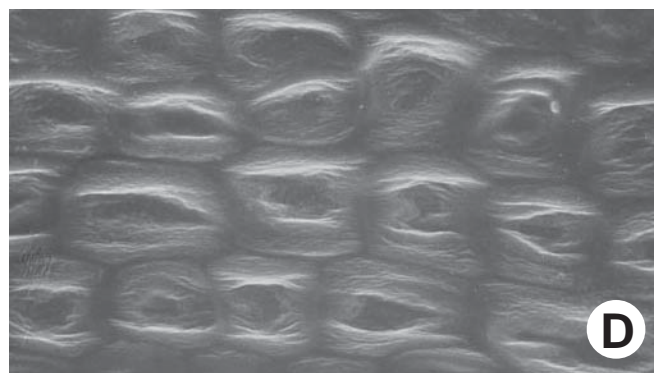
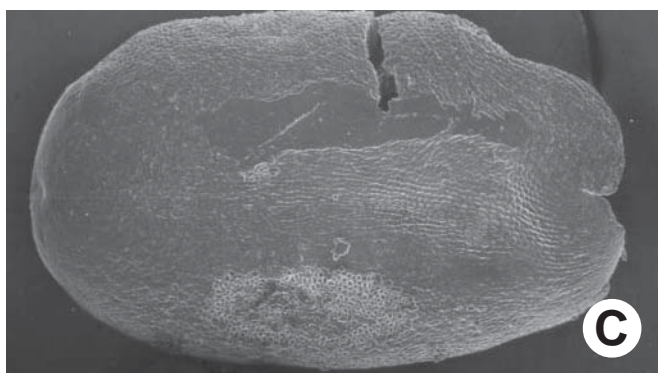
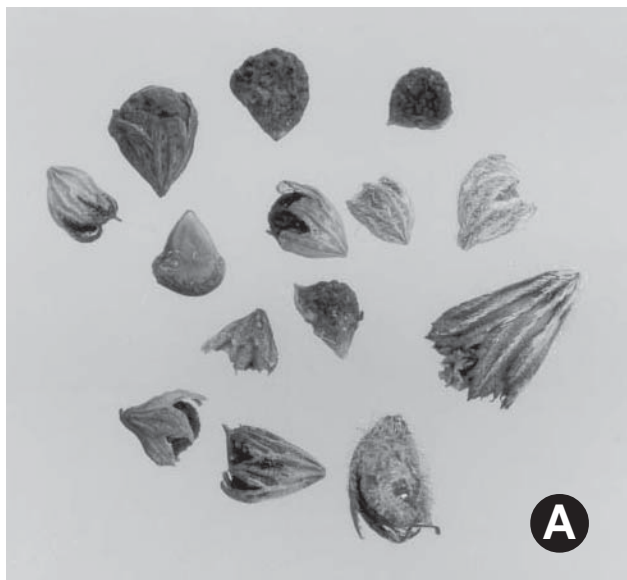
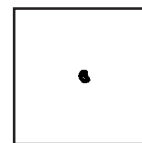
Seed 1.2–2.5 × 1.2–1.8 × 0.8–1.1 mm; not overgrown; not angular; asymmetrical; reniform (like *Crotalaria*); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not or partially adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; olive or tan; 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 lighter to darker than testa. Lens discernible; less than 0.5 mm in length; with margins straight or curved; oblong; not in groove of raphe; adjacent to hilum; mounded; similar color as testa; darker than testa; dark tan; not within corona, halo, or rim. Endosperm thin;

1/2 covering entire embryo; adnate to testa. Cotyledons smooth or not smooth (each outer face with a medial groove); both outer faces convex; both the same thickness; 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; tan; inner face flat; glabrous around base of radicle. Embryonic axis oblique; oblique to length of seed. Radicle linear; lobe tip curved; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Southwestern United States, Mexico, and Central America; adventive in northern Venezuela and Cuba.

Notes: Barneby (1977) monographed *Marina* and noted that there were three fruit types: (1) harp-shaped, compressed, not nutlike, seed cavity larger than seed, and bearing blister glands arranged in more-or-less definite crescents; (2) obliquely obovoid, terete, not nutlike, seed cavity larger than seed, and bearing blister glands arranged in more-or-less definite crescents; and (3) shape unstated by Barneby, nutlike, closely investing and adherent to seed, and pustulate with scattered or crowded glands arranged in no special pattern.

Marina: *M. neglecta* (B.L. Robinson) R.C. Barneby (*C–E*), *M. spp.* (*A–B*). *A*, Fruits in calyx (× 5.1); *B*, seeds (× 10); *C–D*, testa (× 50, × 1000); *E*, embryos (× 10).



Genus: *Dalea* Lucanus

Phylogenetic Number: 6.08.

Tribe: Amorpheae.

Species Studied—Species in Genus: ca. 60 spp.—ca. 160 spp.

Fruit a legume; unilocular; $0.2\text{--}0.6 \times 0.17\text{--}0.21 \times 0.09\text{--}0.15$ cm; with persistent (with keel and standard) or deciduous androecial sheath; with persistent (with androecial sheath) or deciduous corolla; with keel and with standard; with persistent calyx (with or without prominent glandular dots between ribs); with calyx longer, equal to, or shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight to curved (slightly); not plicate; not twisted; asymmetrical; C-shaped, subcircular and circular, obovate, triangular, or harp-shaped; when asymmetrical with 1 straight and 1 curved suture, both sutures parallelly curved, or both sutures unequally curved; widest near middle or D-shaped; not inflated (except fragile base may be slightly larger than seed); compressed to terete; without or with beak; straight; with solid beak the same color and texture as fruit; rounded at apex; apex oblique with longitudinal axis of fruit; short tapered at base; base oblique with longitudinal axis of fruit; with the apex and base uniform or differing in texture; upper $1/4\text{--}2/3$ firm and/or pubescent and lower $3/4\text{--}1/3$ fragile and glabrous; membranous to chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit often indehiscent or with all layers dehiscent (occasionally in species such as *D. leporina* (W. Aiton) A.A. Bullock and *D. urceolata* E.L. Greene); splitting along sutures. Dehiscence of valves along both sutures; passive. Replum invisible. Epicarp dull; multicolored; bichrome (and additionally large reddish-brown glands); brown (apically brown, basally tan); glabrous or pubescent and indurate; with 1 type of pubescence; pilose or villous; with pubescence red (-brown) or with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; glandular or eglandular; with glandular dots (arranged in crescents or random and either faint or prominent and large or tiny (microglandular in Barneby 1977); limited to a portion of fruit; upper $1/4\text{--}2/3$ glandular and lower $3/4\text{--}1/3$ eglandular; without spines; not smooth; with elevated features; veined or not veined; reticulately

veined; not tuberculate; occasionally warty or wrinkled (occasionally); not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seed 1 (mostly); length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; filiform; straight. Aril absent.

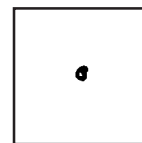
Seed $1\text{--}4.2 \times 1.2\text{--}2.6 \times 0.5\text{--}1.4$ mm; not overgrown; not angular; asymmetrical; elliptic (oblong), mitaform, or reniform; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; brown (reddish to pale or), green, olive, or tan; 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 lighter than testa. Lens discernible or not discernible; less than 0.5 mm in length or equal to or greater than 0.5 mm in length; $0.3\text{--}0.5$ mm long; with margins straight or curved; linear, triangular, or wedge-shaped; circular; not in groove of raphe; adjacent to hilum (and penetrating hilum rim); mounded; same color as, similar color as, or dissimilar color from testa; lighter or darker than testa; black or tan; within rim (penetrating rim) or not within corona, halo, or rim. Endosperm thin; $1/2$ covering entire embryo; adnate to testa or 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; partially concealing radicle; split over radicle; with lobes; with lobes not touching; with the interface division terminating at base of radicle; without margins recessed; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed or oblique; oblique to length of seed. Radicle bulbous or linear; lobe tip straight or curved; deflexed and parallel to cotyledon width; centered between cotyledons; less than $1/2$ length of cotyledons or $1/2$ to nearly length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Canada to Argentina.

Notes: Barneby (1977) monographed *Dalea* (including *Parosela* sensu P.A. Rydberg, *Petalostemum* C.L. Michaux, and *Kuhistera* J.B.A.P.M. de Lamarck, but excluding *Marina* F.M. Liebmann). Barneby also

provided literate descriptions of the interesting and varied external topography of the fruit. The species count follows Barneby (1981). Although it appears that fruits of most species of *Dalea* do not have a regular dehiscence mechanism, the lower half is fragile and ruptures irregularly, allowing the seed to fall out easily.

Dalea: *D. purpurea* E.P. Ventenat (C–E), *D.* spp. (A–B). A, Fruits within calyx ($\times 3.1$); B, seeds ($\times 5.2$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



E

