Thermopsideae (29.01–29.06)

Genus: *Ammopiptanthus* S.F. Cheng

Phylogenetic Number: 29.01.

Tribe: Thermopsideae.

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

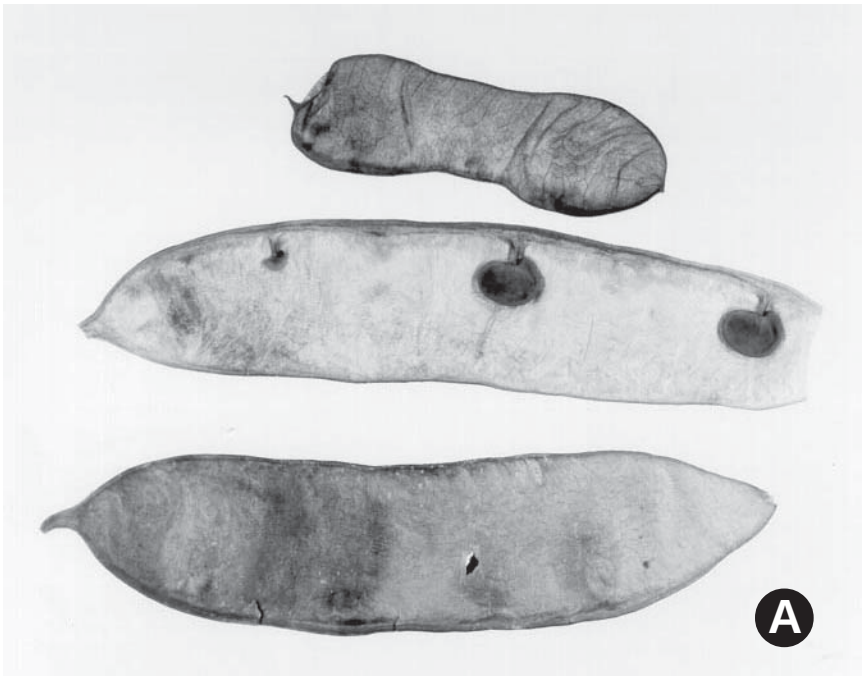
Fruit a legume; unilocular; 4–8 × 1.5–2 × 0.1–0.25 cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight or curved (slightly); not plicate; not twisted; asymmetrical or symmetrical; oblong; when asymmetrical with both sutures nearly straight; not inflated; flattened; without or with beak; straight or declined; with solid beak the same color and texture as fruit; short tapered 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; chartaceous; seed chambers externally visible. Fruit margin not constricted or constricted; slightly constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit stipitate; with the stipe up to 8 mm long. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Epicarp dull; monochrome; tan; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp quite thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; chartaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 2–5; 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 (but indurate funiculus present).

Seed 5–8 × 5–7 × 1.5–1.6 mm; not overgrown; not angular; asymmetrical; reniform (rounded); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; modified by a bloom; colored; mottled to streaked or monochrome; with frequent mottles; with frequent streaks; brown, tan (greenish), or yellow; with black overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens and terminating before base of seed; not bifurcating; darker than testa; black; slightly raised. Hilum partially or fully concealed; concealed by funicular remnant, 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; 0.6 mm long; with curved outline; elliptic; between cotyledon and radicle lobe; flush; not within corona, halo, or rim. Lens discernible; equal to or greater than or less than 0.5 mm in length; 0.5 mm long; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.5 mm from hilum; barely 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; partially concealing radicle; notched at radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis 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: Russia to Mongolia (Inner and Outer) and China.

Notes: Yuan and Peng *(1990)* reevaluated the 6 genera and 47 species in the tribe, and their data confirms the information reported by Turner *(1981).* Turner recognized 46 species and 6 genera in the tribe. Cheng *(1959)* monographed the genus and illustrated the fruits and seeds of both species. Turner *(1981)* noted "one or possibly two species," and Yuan and Peng *(1990)* recognized two species, the number which we used.

Ammopiptanthus: *A. mongolicus* (C.J. Maximowicz) S.-H. Cheng *(C–E)*, *A.* spp. *(A–B)*. *A*, Fruits (× 1.2); *B*, seeds (× 7.3); *C–D*, testa (× 50, × 1000); *E*, embryos (× 3).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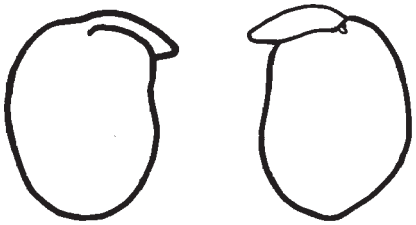

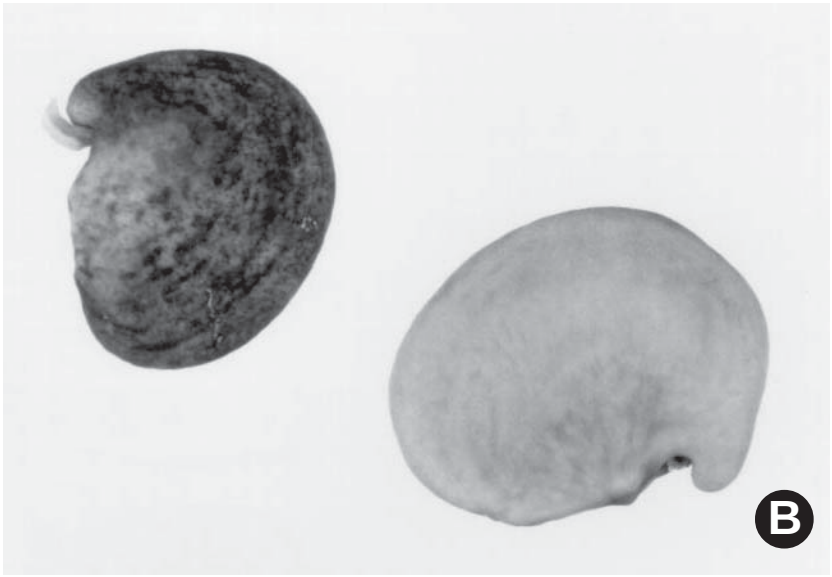
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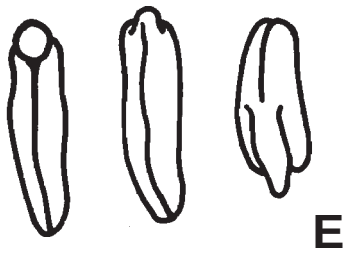
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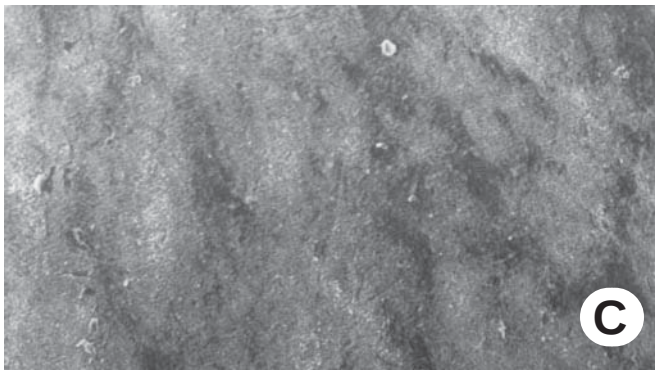
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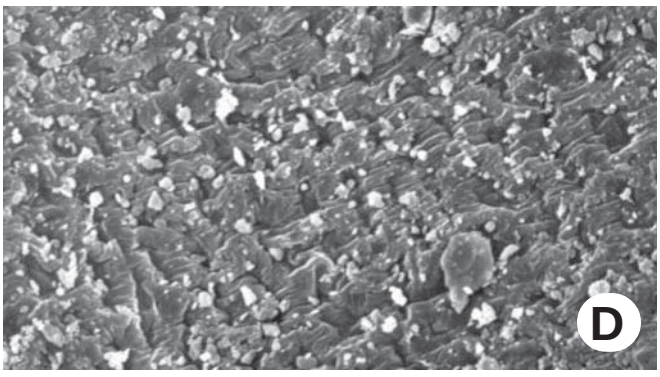
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Genus: *Piptanthus* R. Sweet

Phylogenetic Number: 29.02.

Tribe: Thermopsideae.

Species Studied—Species in Genus: 2 spp.—2–3 spp.

Fruit a legume; unilocular; 7–9 × 1–1.3 × 0.18–0.2 cm; with persistent or deciduous calyx; with 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 or symmetrical; linear; when asymmetrical with both sutures nearly straight; not inflated; flattened; without beak; tapered or short tapered 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; coriaceous; seed chambers externally visible. Fruit margin constricted or not constricted; constricted along both margins (not regularly); without sulcus; plain. Fruit wings absent. Fruit stipitate or substipitate; with the stipe 5–20 mm long. Fruit with all layers dehiscing or indehiscent; splitting along sutures. Dehiscence of valves passive. Replum invisible. Epicarp dull; monochrome; brown or tan (and brown over seeds); pubescent and indurate; with hairs appressed or erect; with 1 type of pubescence; tomentose; with pubescence golden (*P. tomentosa* A.R. Franchet) or gray *(P. nepalinsis);* with pubescence uniformly distributed; 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 quite thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; chartaceous. Endocarp dull; monochrome; dark brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; separating into 1-seeded winged segments. Seeds 2–10; length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 3 mm long; of 1 length only; thick; straight. Aril absent.

Seed 5–7 × 4.3–5 × 1.5–3.5 mm; not overgrown; not angular; asymmetrical; oblong (with radicle lobe); 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; greenish or reddish brown or tan (reddish); with reddish brown or green overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens and terminating before base of seed; not bifurcating; darker than testa; brown; flush. Hilum 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; larger than punctiform or punctiform; 0.3–0.7 mm long; with curved outline; circular; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color of or darker than testa. Lens discernible; less than or equal to or greater than 0.5 mm in length; 0.5–1 mm long; with margins curved; circular; not in groove of raphe; adjacent to hilum; 1.3–1.5 mm from hilum; mounded; dissimilar color from testa; darker than testa; dark brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa (and a sheath around radicle). 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 bulbose; deflexed and parallel to cotyledon length or width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: India, Nepal, and China.

Notes: Turner *(1980),* who monographed the genus, recognized two species, but later, he noted the species number as two or three (Turner *1981*). We noticed that the area under the hilum is thick and spongy.

Piptanthus: *P. nepalensis* (W.J. Hooker) D. Don *(B–E)*, *P.* spp. *(A)*. *A*, Fruits (× 1.3); *B*, seeds (× 5.7); *C–D*, testa (× 50, × 1000); *E*, embryos (× 6).


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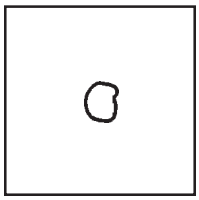

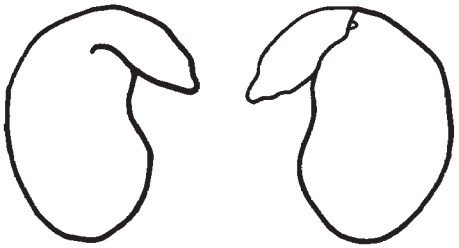

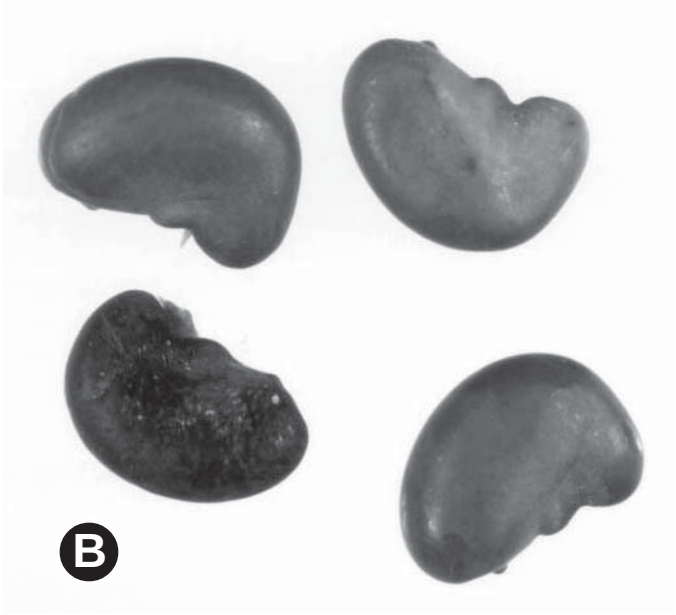
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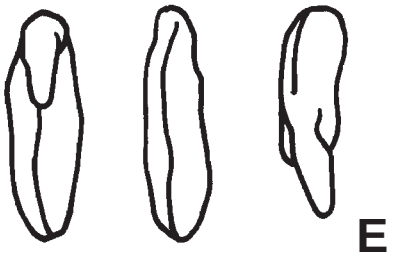
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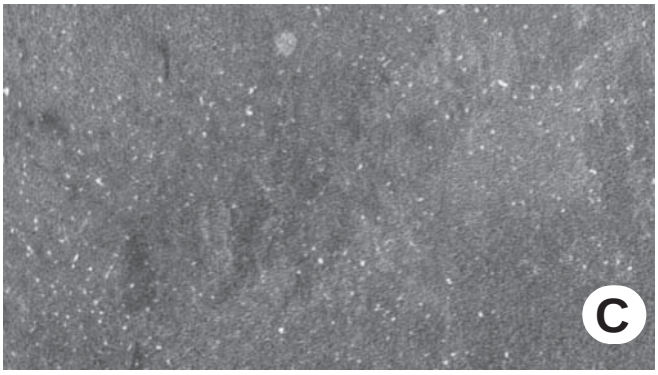
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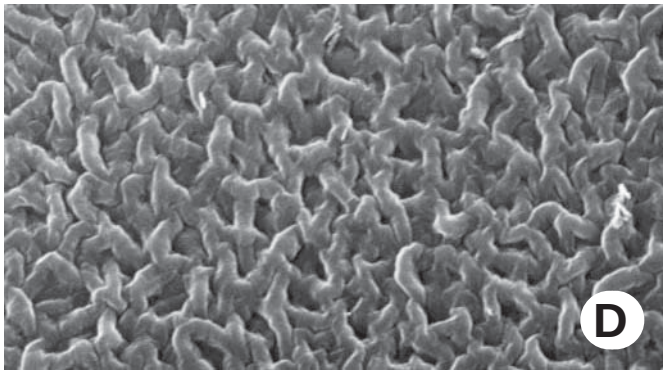
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Genus: *Anagyris* C. Linnaeus

Phylogenetic Number: 29.03.

Tribe: Thermopsideae.

Species Studied—Species in Genus: 2 spp.—1 or 2 spp.

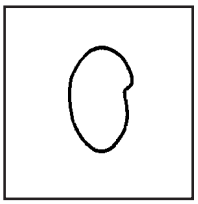
Fruit a legume; unilocular; up to 13 × 1.5–2 × 0.3–1.3 cm; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight or curved (slightly); not plicate; not twisted; symmetrical; broadly linear; not inflated; flattened or compressed; without or with beak; straight; with solid beak the same color and texture as fruit; tapered or rounded at apex; apex aligned with longitudinal axis of fruit (or nearly so); long tapered or rounded at base; base aligned with longitudinal axis of fruit (or nearly so); with the apex and base uniform in texture; coriaceous or ligneous (when dry); seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit stipitate; with the stipe up to 10 mm long. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome; brown; glabrous; eglandular; without spines; smooth; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp thick or thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; spongy or solid; coriaceous or ligneous. Endocarp dull; monochrome; brown; smooth; septate; with septa thin (tissue paper-like), flexible; with septa eglandular; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 5; length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; straight. Aril absent.

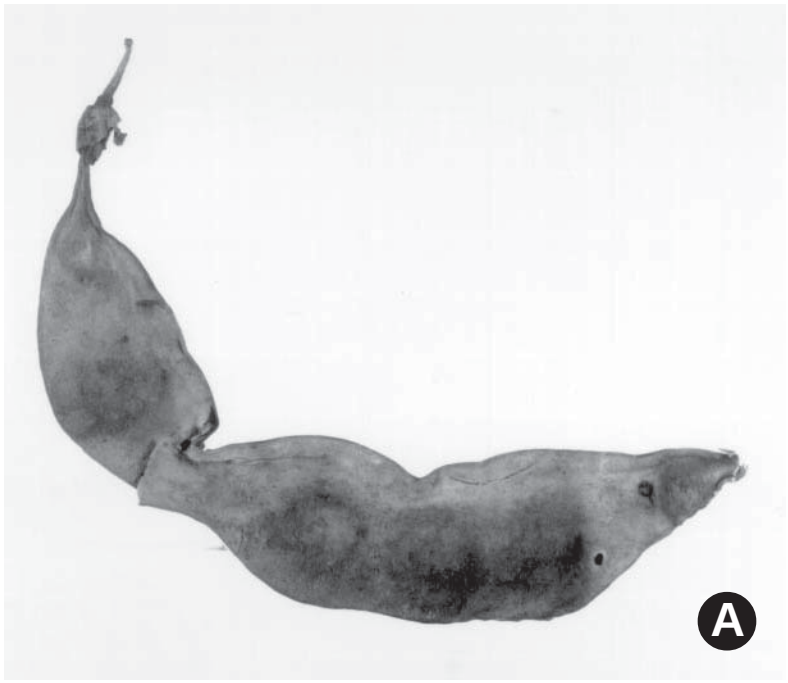
Seed 10–15 × 7–10 × 5–6.7 mm; not overgrown; not angular; asymmetrical; elliptic to oblong; compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; dark to light brown or tan; glabrous; smooth; osseous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens and terminating before base of seed; not bifurcating; darker than testa; dark reddish brown; flush. Hilum visible; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 2 mm long; with curved or straight outline; elliptic or oblong; marginal according to radicle tip; recessed; within rim. Hilum rim color of testa. Lens discernible; equal to or greater than 0.5 mm in length; 1 mm long; with margins curved; circular; not in groove of raphe; adjacent to hilum; 2 mm from hilum; barely mounded; dissimilar color from testa; darker than testa; reddish brown; 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; 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 curved; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Mediterranean Europe, Asia Minor, northern Africa, and Canary Islands.

Notes: We are still unsure whether one or two species exist in *Anagyris*. The other possible species (besides *A. foetida*) is *A. latifolia* P.M.A. Broussonet ex C.L. von Willdenow (Hansen and Sundling *1993*).

Anagyris: *A. foetida* C. Linnaeus *(A–E)*. *A*, Fruits (× 1.1); *B*, seeds (× 2.5); *C–D*, testa (× 50, × 1000); *E*, embryos (× 2).

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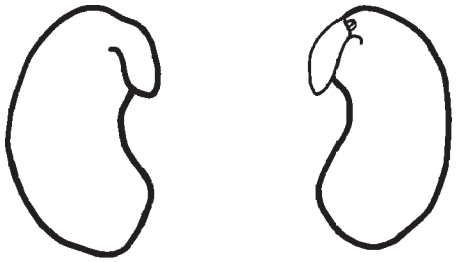


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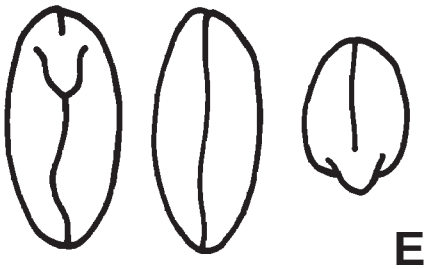
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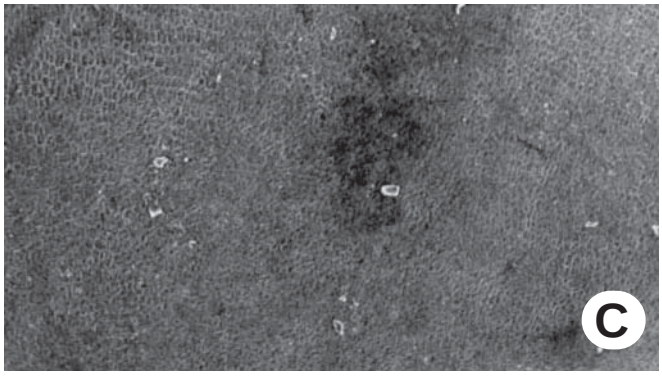
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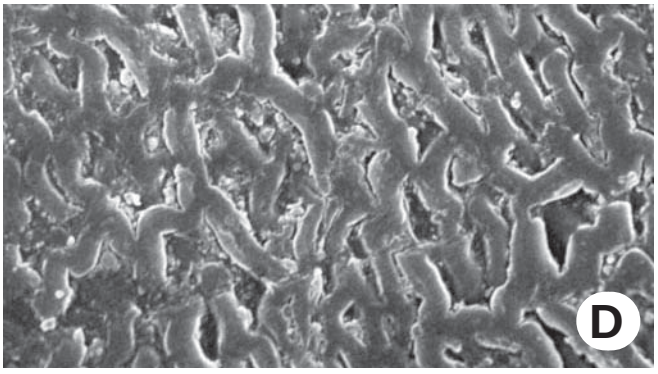
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Genus: *Thermopsis* R. Brown

Phylogenetic Number: 29.04.

Tribe: Thermopsideae.

Species Studied—Species in Genus: 17 spp.—23 spp.

Fruit a legume or loment (or a loment segment, or at least lomentaceous); unilocular; 3–10 × 0.8–1 × 0.15–0.3 cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight, curved (or slightly curved), or 0.5-coiled; not plicate; not twisted; asymmetrical or symmetrical; linear, oblong, ovate, or elliptic; when asymmetrical with both sutures parallelly curved or nearly straight; not inflated or inflated (*T. inflata* J. Cambessedes); flattened or compressed; without beak; short tapered or rounded at apex; apex aligned with longitudinal axis of fruit; short tapered at base; base aligned or right angled 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 substipitate or nonstipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Loment indehiscent. Loment segments widest across seed area; rectangular. Epicarp dull; monochrome; brown; glabrous or pubescent and indurate; with hairs erect or appressed; with 1 type of pubescence; puberulent or villous; with pubescence gray; with pubescence uniformly distributed; 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 thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; brown; smooth; nonseptate or septate; with septa thicker than paper, firm; with septa eglandular; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 2–11; length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight or hooked. Aril dry; when dry rim-aril, or partial rim-aril; laciniate, or entire; covering less than 1/2 of seed; without tongue (or flap-like) on lips of 2-lipped rim-aril; white.

Seed 3.2–6 × 2–4 × 1.5–2.8 mm; not overgrown; not angular; asymmetrical; reniform (or nearly so); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull or glossy; not modified or modified by a bloom; colored; monochrome or bichrome; greenish or reddish black, black, brown (yellow, orange, or brown), purple, or orange; glabrous; not smooth or smooth; with elevated features; blistered cuticle (exudate); coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible or visible; from hilum through lens and terminating before base of seed; not bifurcating; color of or darker than testa; brown; raised. Hilum 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 testa. 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; same color or similar color as testa; darker than testa; black or brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa or embryo. Cotyledons smooth; both outer faces convex; both the same thickness; 1 longer than other; not folded; margin 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; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; lobe tip straight; 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: North America (10 spp.) and Asia (13 spp.).

Notes: Larisey *(1940b)*, Isley *(1981)*, and Chen et al. *(1994)* monographed the North American species, and Barneby *(1989)* treated the species for the intermountain region of the western United States. Larisey and Chen et al. used narrow species concepts, and recognized 10 species in North America—the number we used for our species count. Isley and Barneby employed much broader species concepts. Isley accepted only four species in North America, and Barneby just three. Most species have a dehiscent legume, but a few species have lomentaceous fruits and these should be studied. Species producing the latter include *T. divaricarpa* A.

Nelson, *T. gracilis* T.J. Howell, and *T. rhombifolia* (T. Nuttall ex F.T. Pursh) J. Richardson.

Thermopsis: *T. lupinoides* (C. Linnaeus) J.H.F. Link *(C–E)*, *T.* spp. *(A–B)*. *A*, Fruits (× 1.4); *B*, seeds (× 6.6); *C–D*, testa (× 50, × 1000); *E*, embryos (× 8).


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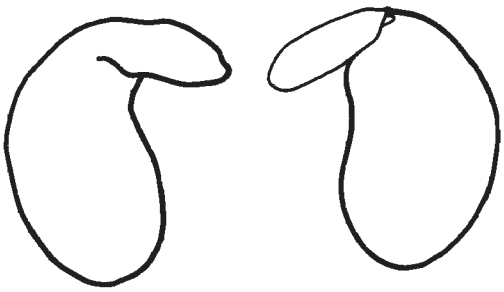

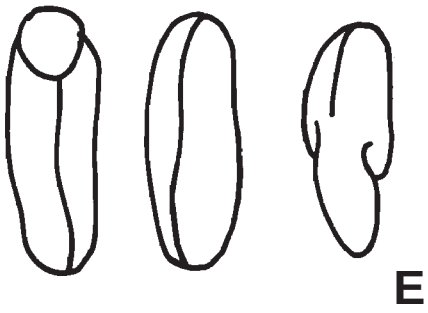
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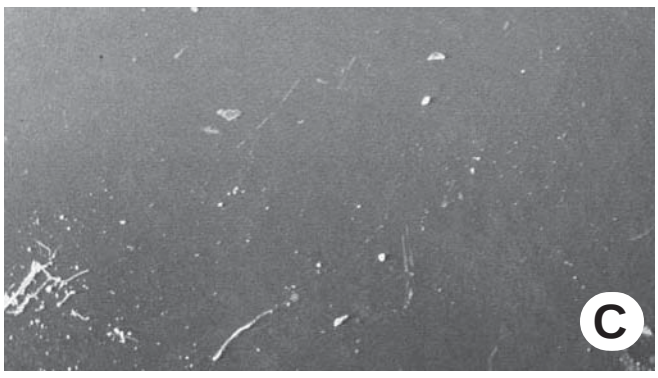
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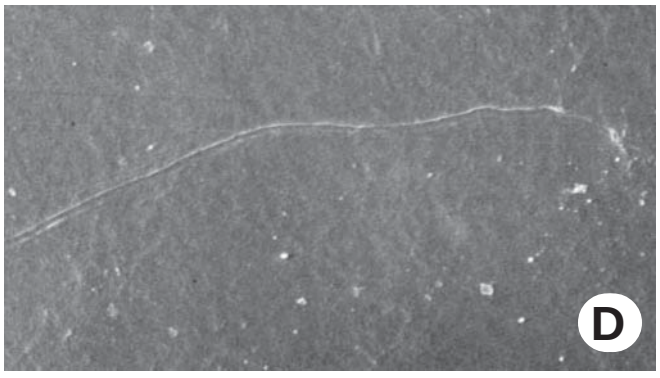
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Genus: *Baptisia* É.P. Ventenat

Phylogenetic Number: 29.05.

Tribe: Thermopsideae.

Species Studied—Species in Genus: 7 spp.—17 spp.

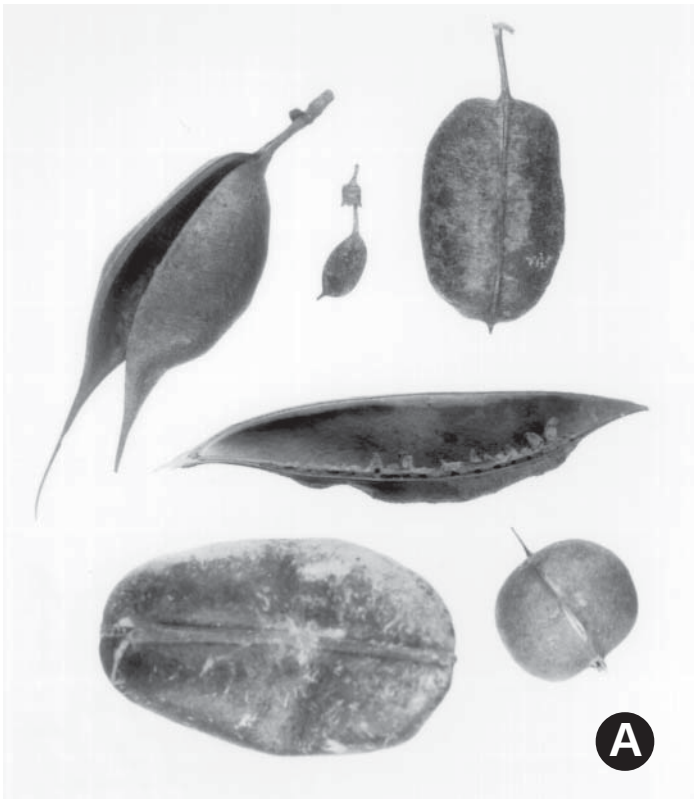
Fruit a legume; unilocular; 1–7 × 0.2–2.5 × 0.7–2 cm; with persistent or deciduous calyx; with calyx shorter than or equal in length to fruit; without orifice formed by curving of fruit or fruit segments; straight or curved (slightly); not plicate; not twisted; symmetrical or asymmetrical; oblong, ovate, circular, or elliptic; when asymmetrical with both sutures parallelly curved or 1 straight and 1 curved suture; widest near middle or D-shaped; usually inflated or not inflated; terete; without or with beak; straight; with solid beak the same color and texture as fruit; rounded or long tapered at apex; apex aligned or oblique with longitudinal axis of fruit; long tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; ligneous, coriaceous, or membranous (*B. megacarpa* A.W. Chapman ex J. Torrey & A. Gray); seed chambers externally invisible. Fruit margin not constricted; without or with sulcus; plain. Fruit wings absent. Fruit stipitate or substipitate; with the stipe 4–13 mm long. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Epicarp dull or semiglossy; monochrome; dark to yellowish to reddish to purplish brown or black (brownish); glabrous or pubescent and indurate; with hairs appressed (sub) or erect; with 1 type of pubescence; villous; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; without spines; smooth or not smooth; with elevated features; reticulately veined; not tuberculate; wrinkled or rugose; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; subligneous, coriaceous, or chartaceous. Endocarp dull; monochrome; dark to light brown; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 20–30 (estimated); length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 3.5 mm long; of 1 length only; thick; straight. Aril absent or present (really funicular remnant); dry; rim-aril; brown.

Seed 2.5–4.5 × 2–3 × 1.6–2 mm; not overgrown; not angular; asymmetrical; D-shaped (with inconspicuous radicle lobe); compressed; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull or glossy; modified by a bloom; colored; monochrome; yellowish to dark brown, tan, or white; glabrous; smooth or not smooth; with elevated features; tuberculate (glandular exudates) or blistered cuticle (*B. megacarpa* A.W. Chapman ex J. Torrey & A. Gray); coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from lens to base of seed and terminating (near base); not bifurcating; darker than testa; black; slightly recessed or flush. Hilum 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 or larger than punctiform; 0.3–0.4 mm long; with curved outline; circular; between cotyledon and radicle lobe; recessed; within rim or halo (occasionally and faintly). Hilum halo color darker than testa. Hilum rim color of testa. Lens discernible or not discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 2 mm from hilum; flush; 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; yellow or tan; 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: Eastern Canada, United States, and Mexico.

Notes: Larisey *(1940a)* and Isley *(1981)* monographed *Baptisia*. Occasionally, three cotyledons are found in the seed.

Baptisia: *B. alba* (C. Linnaeus) É.P. Ventenat *(C–E)*, *B.* spp. *(A–B)*. *A*, Fruits (× 1.2); *B*, seeds (× 7.2); *C–D*, testa (× 50, × 1000); *E*, embryos (× 12).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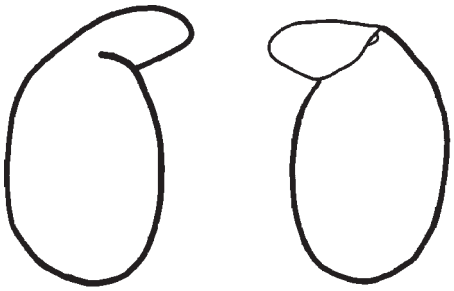

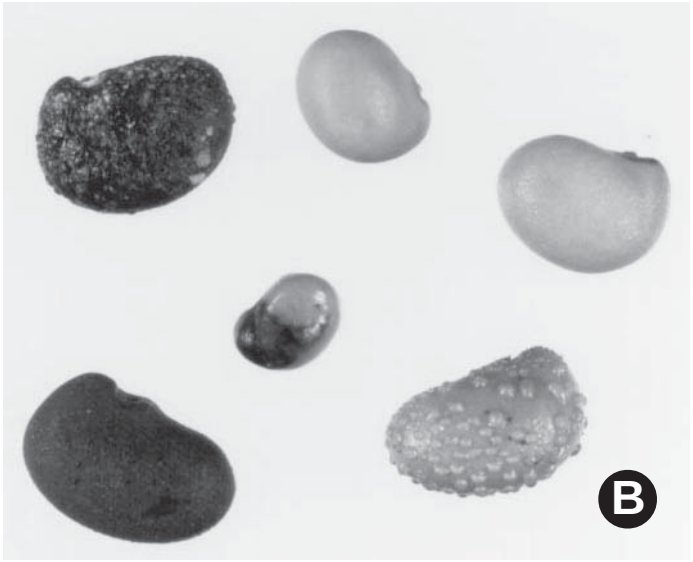
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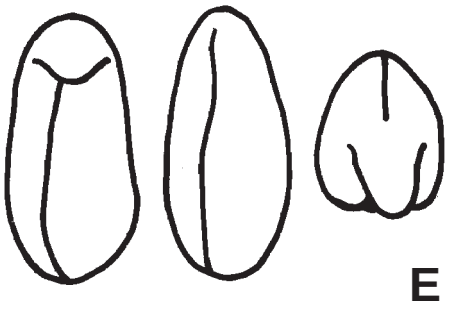
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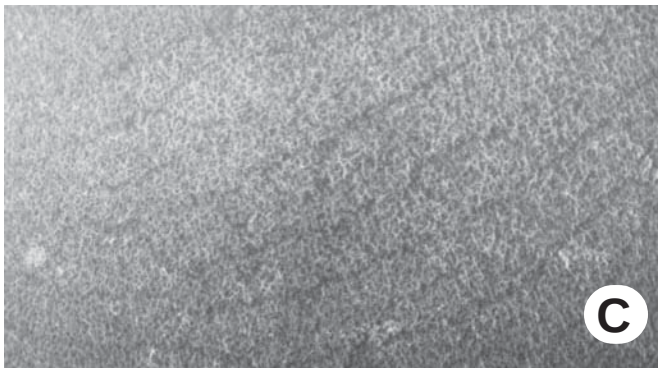
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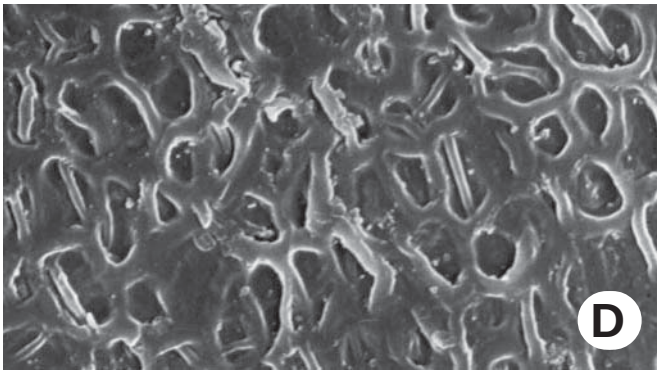
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Genus: *Pickeringia* T. Nuttall ex J. Torrey & A. Gray

Phylogenetic Number: 29.06.

Tribe: Thermopsideae.

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

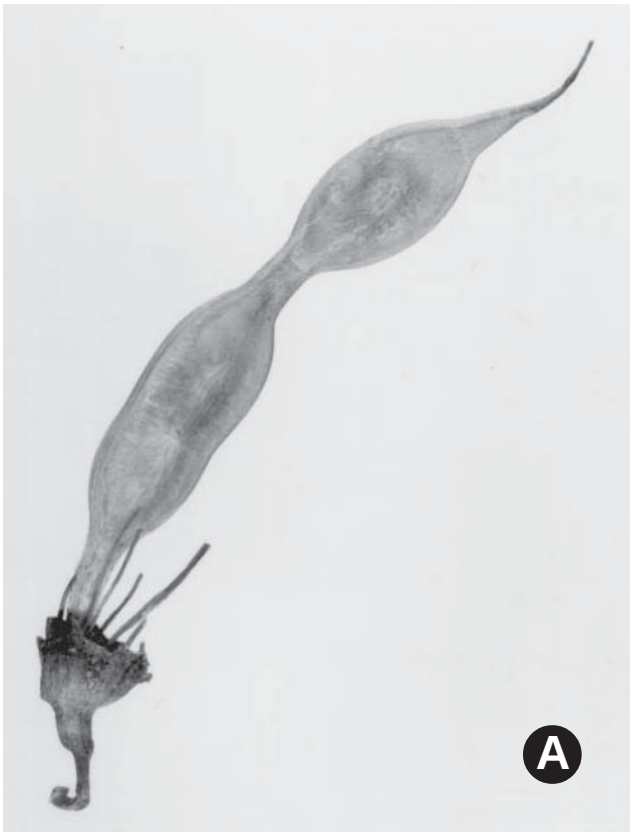
Fruit a legume; unilocular; 2–5 × 0.4–0.5 × 0.2 cm; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; slightly curved; not plicate; not twisted; symmetrical; linear; not inflated; compressed; with beak; straight; with solid beak the same color and texture as fruit; long tapered at apex; apex aligned or oblique with longitudinal axis of fruit; long tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin constricted along both margins (by abortion of ovules); without sulcus; plain. Fruit wings absent. Fruit stipitate; with the stipe 5–6 mm long. Fruit with all layers dehiscing; splitting along suture. Dehiscence of valves along 1 suture; assumed apical and down; passive. Replum invisible. Epicarp dull; monochrome; light brown; pubescent and indurate; with hairs appressed; with 1 type of pubescence; with pubescence gray; with pubescence uniformly distributed; 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 present (other mesocarp characters are assumed); thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; chartaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to mesocarp and epicarp; entire. Seeds 1–10; length parallel with fruit length; neither overlapping nor touching or touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; straight. Aril absent.

Seed 3–4.2 × 2–2.5 × 1–1.5 mm; not overgrown; not angular; asymmetrical; rectangular or reniform; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; modified by a bloom; colored; monochrome; brownish black; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens and terminating before base of seed; not bifurcating; color of testa; raised. Hilum partially 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; marginal according to radicle tip; recessed; within rim. Hilum rim color of testa. Lens 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; same color as testa; 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; parallel to length of seed; without a joint evident between the radicle and the cotyledons. Radicle differentiated from cotyledon; linear; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: United States (north-central California) to Mexico (northern Baja California).

Notes: Isley *(1981)* revised the genus. *Pickeringia montana* rarely sets fruits and seeds, hence the lack of material for our plate. Some authors, including Isley but not Rudd *(1968)*, recognized var. *tomentosa*, which sets more fruits and seeds. Variety *tomentosa* cannot be separated from var. *montana* by the use of morphological characters.

Pickeringia: *P. montana* T. Nuttall *(A)*, *P. montana* T. Nuttall var. *tomentosa* (L.R. Abrams) I.M. Johnston *(C–E)*, *P.* spp. *(B)*. *A*, Fruit (× 3.7); *B*, seeds (× 11.3); *C–D*, testa (× 50, × 1000); *E*, embryos (× 10).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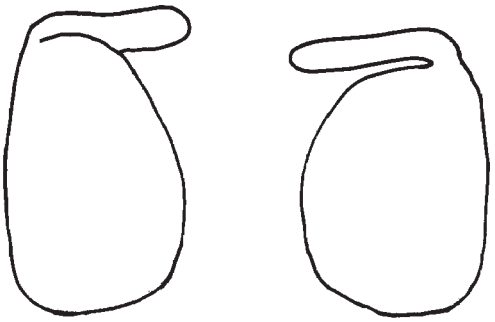

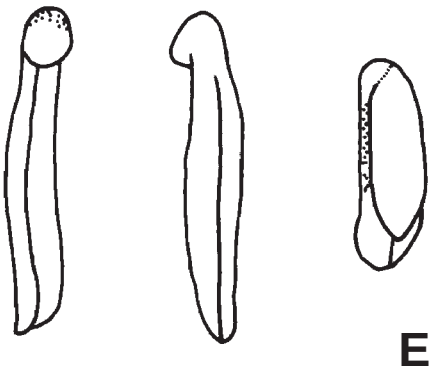
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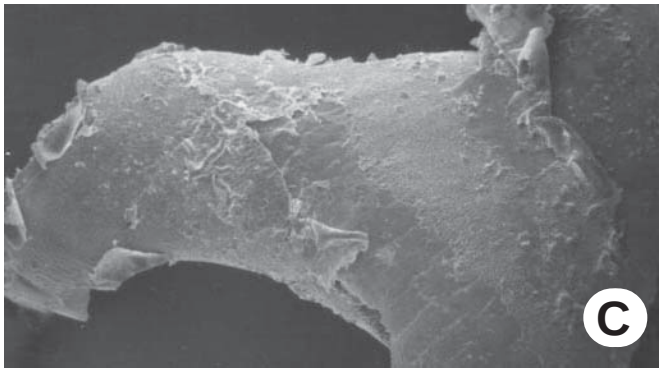
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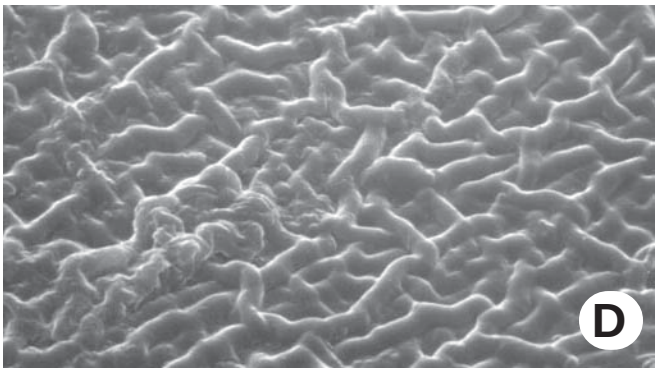
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