

Bossiaeeae (23.01–23.10)

Genus: *Templetonia* R. Brown

Phylogenetic Number: 23.01.

Tribe: Bossiaeeae.

Group: Templetonia.

Species Studied—Species in Genus: 4 spp.—9 spp.

Fruit a legume; unilocular; $1.5\text{--}8 \times 0.6\text{--}1.6 \times 0.25$ 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 or symmetrical; elliptic or linear; when asymmetrical with both sutures parallelly curved to unequally curved; not inflated; flattened; without beak; short tapered or rounded at apex; apex aligned to oblique with longitudinal axis of fruit; short tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit stipitate or nonstipitate; with the stipe up to 10 mm long. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; active or passive; with valves twisting. Replum invisible. Epicarp dull or semiglossy; monochrome; dark reddish and dark greenish 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; coriaceous. Endocarp dull; monochrome; brown; smooth; septate or nonseptate; with septa thin (tissue paper-like), flexible; with septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–12; length parallel or oblique 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 fleshy; caplike (*T. biloba* (G. Bentham) R.M. Polhill) or cupshaped (lipped or not); covering less than 1/2 of seed; brown.

Seed $3.5\text{--}14.5 \times 2\text{--}8.5 \times 1.2\text{--}3.3$ mm; not overgrown; not angular; symmetrical (except for hilum); elliptic to ovate; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not

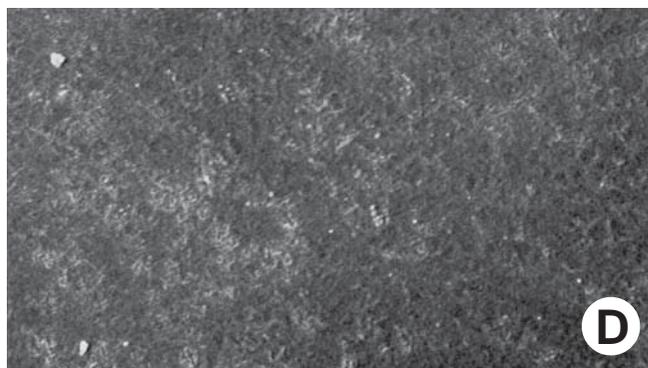
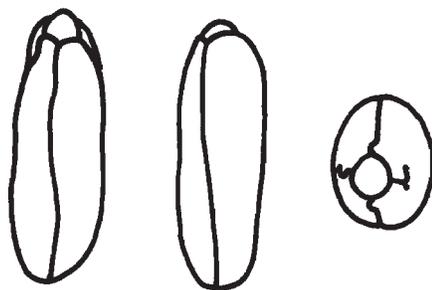
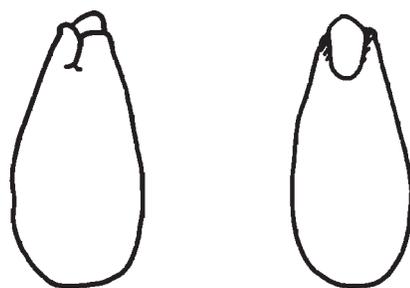
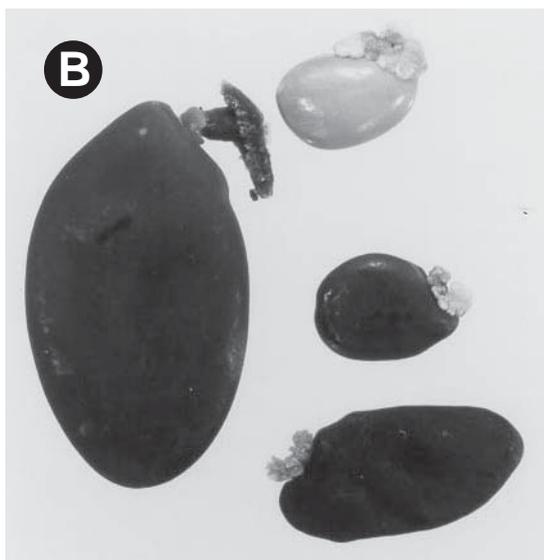
adhering to endocarp; glossy; not modified by a bloom; colored; monochrome; yellowish to reddish or olive brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 1 mm long; with curved outline; elliptic; subapical to radicle tip; flush; within rim. Hilum rim color darker than testa. Lens discernible; equal to or greater than 0.5 mm in length; 1 mm long; with margins straight or curved; rhombic; not in groove of raphe; adjacent to hilum; 1 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; split over radicle; with lobes; with lobes touching (auriculate); with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis almost straight; parallel to length of seed. Radicle nearly linear; straight with embryonic axis; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Australia.

Notes: The Bossiaeeae traditionally consisted of 10 genera and has been divided into two groups, in part on fruit and seed characters. The Templetonia group contains the first four genera (including *Lamprolobium*, 23.02) and has nonwinged, coriaceous legumes with compressed seeds bearing a collarlike, often lipped aril (except for *Templetonia biloba* (G. Bentham) R.M. Polhill) and a short, straight radicle. The Bossiaea group contains the remaining genera and has legumes that are keeled to winged or not so; the group has plump seeds that are often covered by a hooded caplike aril (which is lacking in *Muelleranthus* (23.08) and *Ptychosema* (23.09)) and a radicle that is slender, deflexed, and exerted from the cotyledons. Crisp and Weston (1987, pp. 105–107) in their cladistic analysis of the Bossiaeeae, Brongniartieae (22), and Mirbelieae (24), provided compelling evidence that the Bossiaeeae should be redefined to include only the *Bossiaea* group (genera 23.05–23.10). They proposed that the Templetonia group be moved to the Brongniartieae, becoming genera three through eight, after *Brongniarta* (22.01) and *Harpalyce* (22.02). The proposed generic

sequence would therefore be: 3, *Templetonia* (23.01); 4, *Lamprolobium*; 5, *Plagiocarpus* (23.03); 6, ?Genus A (*Templetonia incana* J.H. Ross); 7, ?Genus B (*Templetonia biloba* (G. Bentham) R.M. Polhill); and 8, *Hovea* (23.04). They (Crisp and Weston 1995) retracted their proposal to transfer the *Templetonia* group because of Chappill's (1995) cladistic analysis of the entire family, and we have used the traditional circumscriptions of the two tribes (Polhill 1994a,b). Polhill (1981n) reported 9 species in this genus, but Ross (1982) recognized 11 species, the number used in our study. Polhill (1976) has a full plate of the external and internal morphology of the seeds of *Templetonia biloba* (G. Bentham) R.M. Polhill.

Templetonia: *T. retusa* (E.P. Ventenat) R. Brown (*C–E*), *T.*
spp. (*A–B*). *A*, Fruits (with and without calyx) and valve
($\times 1.6$); *B*, seeds ($\times 4.1$); *C–D*, testa ($\times 50$, $\times 1000$);
E, embryos ($\times 6$).



Genus: *Lamprolobium* G. Bentham

Phylogenetic Number: 23.02.

Tribe: Bossiaeeae.

Group: Templetonia.

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

Fruit a legume; unilocular; $4 \times 0.8-1 \times 0.5$ (estimated) cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; oblong; not inflated; flattened; 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; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down (assumed); active; with valves twisting. Replum invisible. Epicarp semiglossy; monochrome; brown; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; wrinkled (faintly); not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; brown; smooth; subseptate; with septa thicker than paper, firm; with septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 5–7; length transverse to fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 3 mm long; of 1 length only; thick; straight. Aril fleshy; cupshaped (with 1 side longer (liplike) than other); covering less than 1/2 of seed; tan.

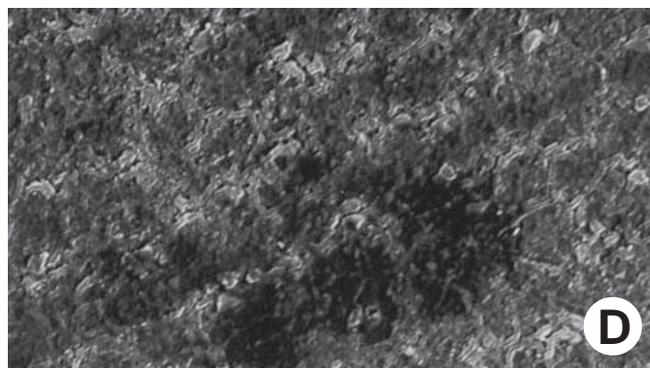
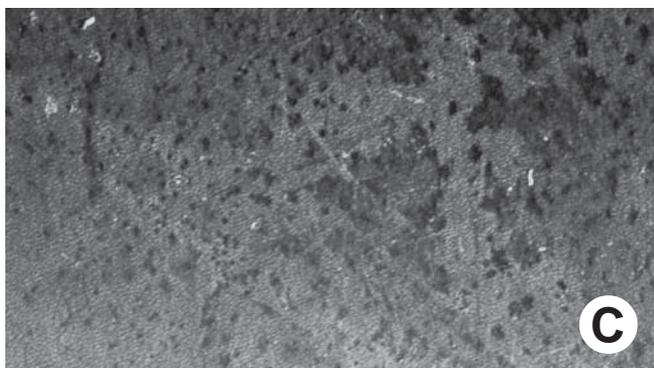
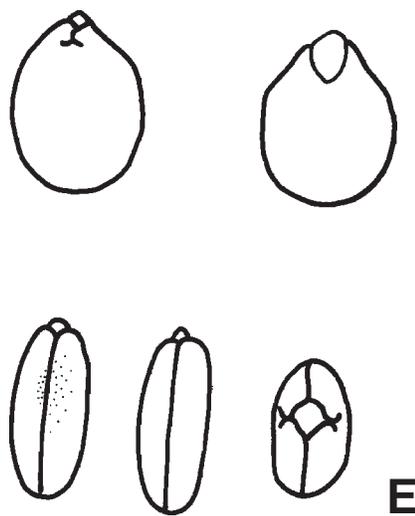
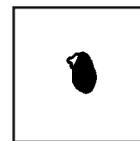
Seed $5.3-6 \times 3.5-4 \times 1.7-2.5$ mm; not overgrown; not angular; asymmetrical; oblong; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome (when immature), mottled (when mature), or streaked (when mature); with frequent mottles; with frequent streaks; reddish brown; with brown (darker reddish) overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum through lens to base of seed and terminating (beyond base of seed); not bifurcating; darker than testa; recessed.

Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 2 mm long; with curved outline; elliptic; apical according to radicle tip but marginal according to seed length; recessed; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; elliptic; in groove of raphe; adjacent to hilum; 1.5 mm from hilum; mounded; similar color as testa; darker than 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; margin entire 180 degrees from base of radicle; similar at apex; partially concealing radicle; split over radicle; with lobes; with lobes touching (auriculate); 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; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Australia (north Queensland).

Notes: The hilum length:seed length ratio is similar to the ratios seen in seeds of genera in tribe Phaseoleae (10) and *Hovea* (23.04).

Lamprolobium: *L. fruticosum* G. Bentham (A–E). A, Valve ($\times 2.3$); B, seeds ($\times 5.1$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 5$).



Genus: *Plagiocarpus* G. Bentham

Phylogenetic Number: 23.03.

Tribe: Bossiaeeae.

Group: Templetonia.

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

Fruit a legume; unilocular; $1 \times 0.4\text{--}0.5$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong; when asymmetrical with both sutures nearly straight; not inflated; compressed; without beak; rounded at apex; apex right-angled with longitudinal axis of fruit; rounded at base; base oblique 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; passive. Replum invisible. Epicarp glossy; multicolored; bichrome (outer margin of valve greenish-brown surrounding a tan inner area); glabrous; without spines; not smooth; with elevated features; reticulately veined (faintly); not tuberculate; faintly wrinkled; not exfoliating; without cracks. Mesocarp thick; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; ligneous (sub). Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp. Seeds 1 or 2; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long; of 1 length only; thick; curved. Aril fleshy; cupshaped (if funiculus absent; if funiculus is present, then aril center plugged by a curved, thick, stalklike funiculus); covering less than 1/2 of seed; tan.

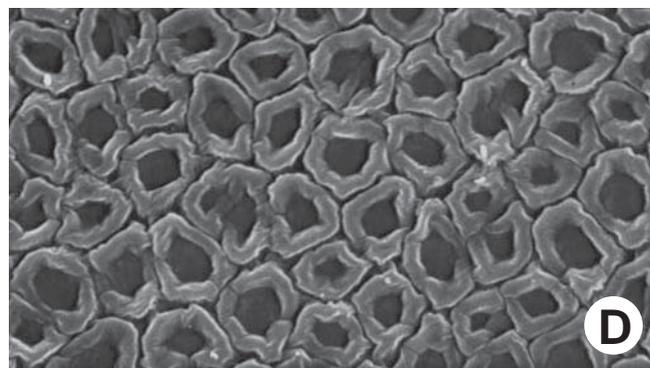
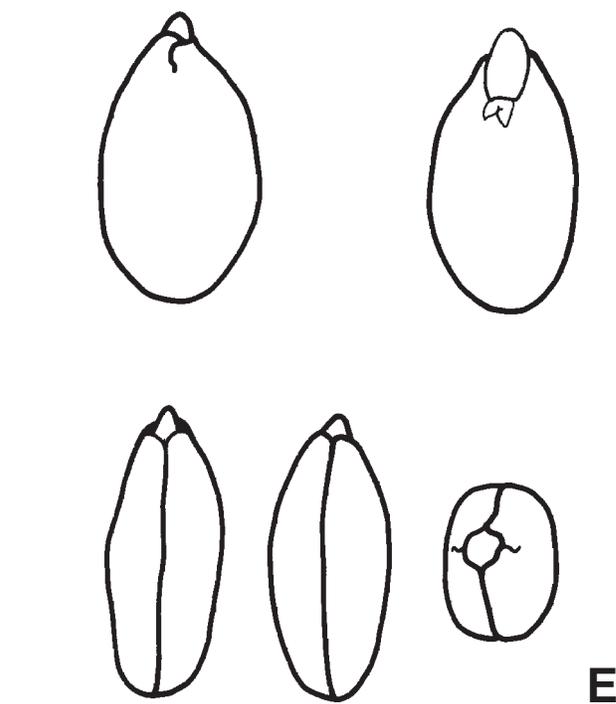
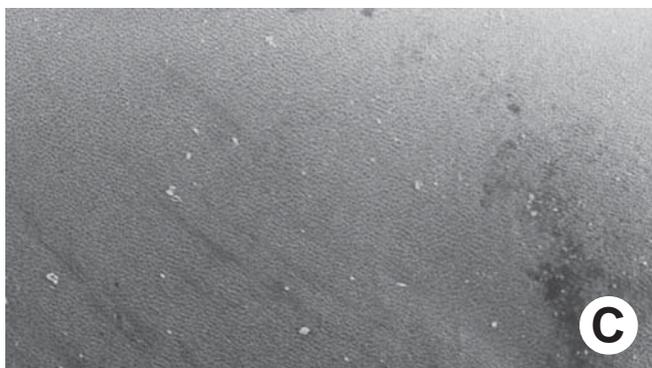
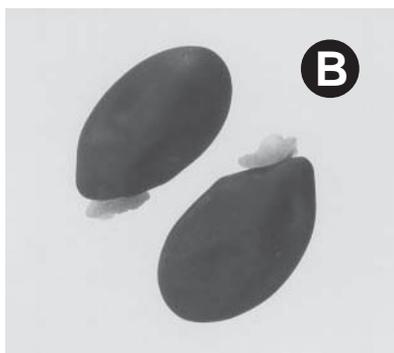
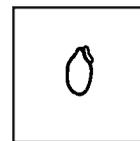
Seed $4.5\text{--}6.5 \times 3\text{--}3.8 \times 1.5\text{--}3$ mm; not overgrown; not angular; asymmetrical; elliptic; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; greenish to reddish or dark brown; glabrous; smooth (at $\times 10$, see Notes); coriaceous. Fracture lines absent. Rim absent. Raphe from hilum through lens to base of seed and terminating to from hilum to lens (and just beyond lens); not bifurcating; color of, lighter than, or darker than testa (color of raphe may vary: Between hilum and

lens darker than between lens and base of seed); brown; flush. Hilum partially or fully concealed; concealed by funiculus and aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 0.9–1 mm long; with curved outline; elliptic; subapical to radicle tip; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm or equal to or greater than 0.5 mm in length; 0.5 mm long; with margins curved; roughly circular; not in groove of raphe; adjacent to hilum; 0.6 mm from hilum; slightly mounded; dissimilar color from testa; darker than testa; black; 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; split over radicle; with lobes; with lobes touching (auriculate); with the interface division terminating at base of radicle; without margins recessed; yellow or brown; inner face flat; glabrous around base of radicle. Embryonic nearly axis straight; parallel to length of seed. Radicle bulbous; straight with embryonic axis; centered between cotyledons; less than 1/2 length of cotyledons. Plumule well developed; glabrous.

Distribution: Australia (northern Queensland).

Notes: At a magnification of $\times 10$, the seed coat of *Plagiocarpus* appears to be smooth. At $\times 50$ (fig. C) the surface of the testa appears to be minutely pitted; and at $\times 1000$ (fig. D) the surface cells of the testa have thick lateral walls and the lumen of the cell is a pit.

Plagiocarpus: *P. axillaris* G. Bentham (A–E). A, Fruit with calyx and valves ($\times 3.4$); B, seeds ($\times 4.3$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 6$).



Genus: *Hovea* R. Brown ex W.T. Aiton

Phylogenetic Number: 23.04.

Tribe: Bossiaceae.

Group: Templetonia.

Species Studied—Species in Genus: 11 spp.—ca. 20 spp.

Fruit a legume; unilocular; $1.2 \times 2.1 \times 0.35\text{--}0.5$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; circular (subcircular); when asymmetrical with both sutures parallelly curved; not inflated; compressed; without beak; rounded 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; coriaceous; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; active; with valves enrolling. Replum invisible. Epicarp dull; monochrome; brown; glabrous or pubescent and indurate; with 1 type of pubescence; puberulent or villous; with pubescence golden; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; 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; curved. Aril fleshy or dry (rarely); when fleshy cupshaped; entire; covering less than 1/2 of seed; when dry cupshaped; entire; covering less than 1/2 of seed; brown or tan.

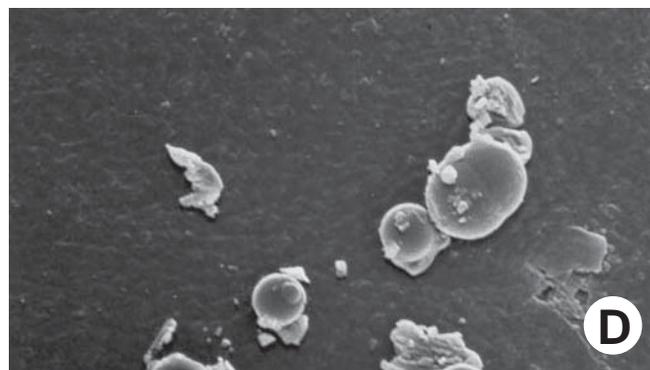
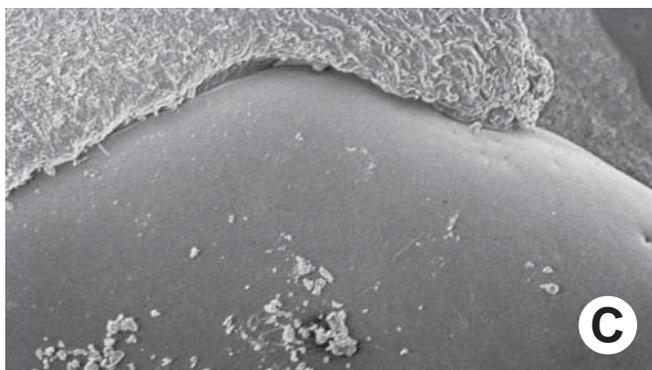
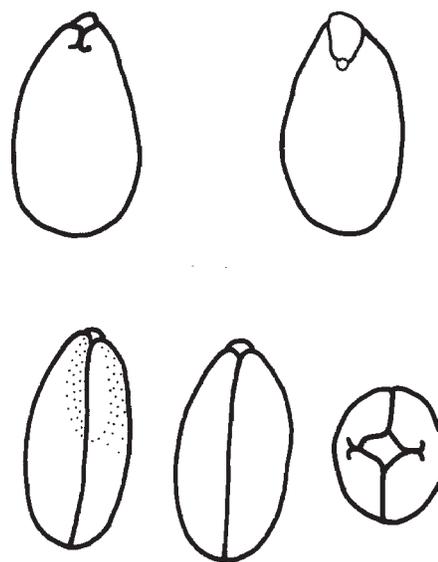
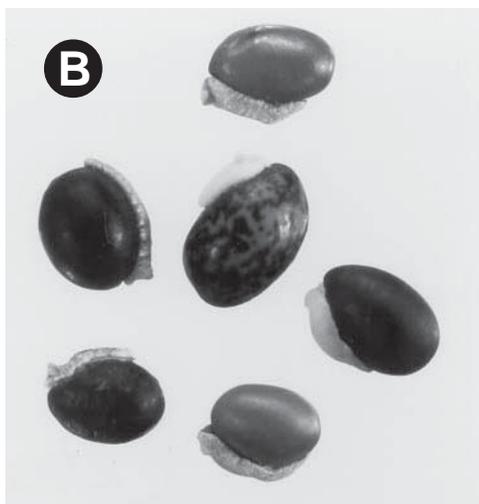
Seed $4\text{--}6 \times 4\text{--}5 \times 2\text{--}2.5$ mm; not overgrown; not angular; asymmetrical; elliptic to oblong; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe from hilum through lens to base of seed and terminating; not bifurcating; darker than testa. Hilum partially concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 2

mm long; with curved outline; elliptic; marginal according to radicle tip; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 1 mm from hilum; mounded; similar color as 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; split over radicle; with lobes; with lobes touching (auriculate); with the interface division terminating at base of radicle; without margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis straight; oblique to length of seed. Radicle bulbous; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Eastern to southwestern Australia (Queensland to Tasmania).

Notes: Polhill (1981*n*) listed ca. 12 species, Ross (1988) listed ca. 20 species, and we are following Ross's count. Polhill (1976) provided a full-page plate of external and internal seed characters of *Hovea heterophylla* A. Cunningham ex J.D. Hooker (now *H. linearis* (J. Smith) R. Brown). Valves of *Hovea* fruits curve inward from the apex to the base, bringing both closer together because they are wider than they are long. These fruit characters are unusual legume characters because most faboid valves curve inward from their sides, leaving the apex and base in the same relative position, and are usually much longer than wide. The seeds of *Hovea* species have a surprisingly large hilum. The hilum length:seed length ratio is similar to the ratios seen in seeds of some genera in tribe Phaseoleae (10) and *Lamprolobium* (23.02).

Hovea: *H. elliptica* A.-P. de Candolle (C–E), *H.* spp. (A–B). A, Fruits and valves ($\times 2.1$); B, seeds ($\times 5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).



Genus: *Goodia* R.A. Salisbury

Phylogenetic Number: 23.05.

Tribe: Bossiaeeae.

Group: Bossiaea.

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

Fruit a legume; unilocular; $0.9\text{--}3.8 \times 0.55\text{--}0.8 \times 0.2\text{--}0.3$ (estimated) cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong or rhombic; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; not inflated; flattened; without beak; short tapered 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; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain or embellished; with thickened sutural areas (margin thickened). Fruit wings absent. Fruit stipitate or substipitate; with the stipe up to 5 mm long. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Epicarp dull; 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; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; coriaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–4; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 1.5 mm long; of 1 length only; thick; hooked. Aril fleshy; hooked; covering less than 1/2 of seed; tan or brown.

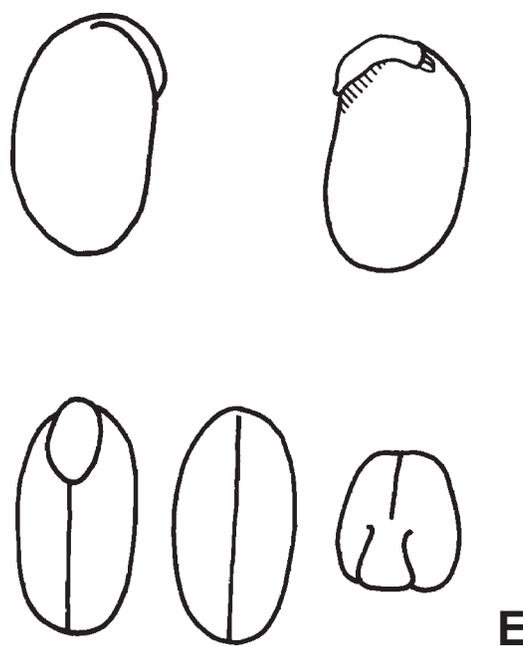
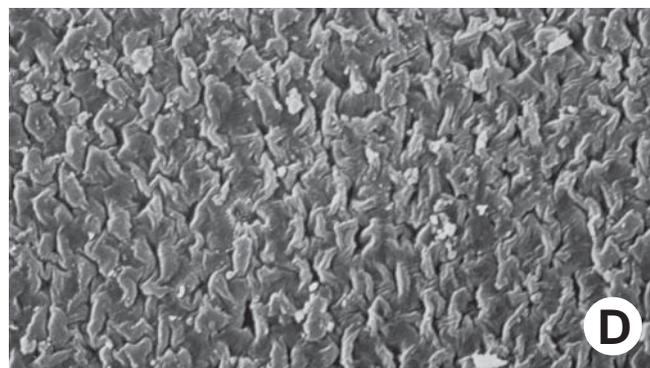
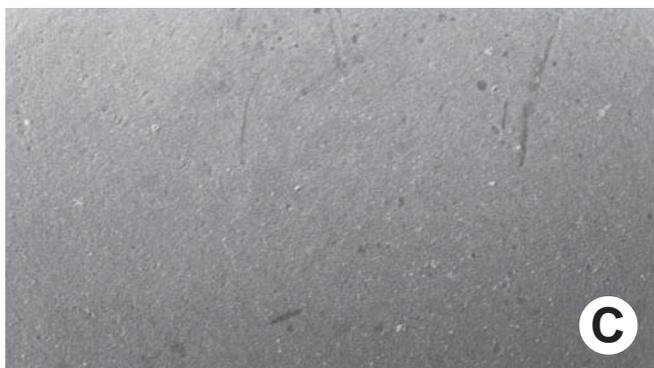
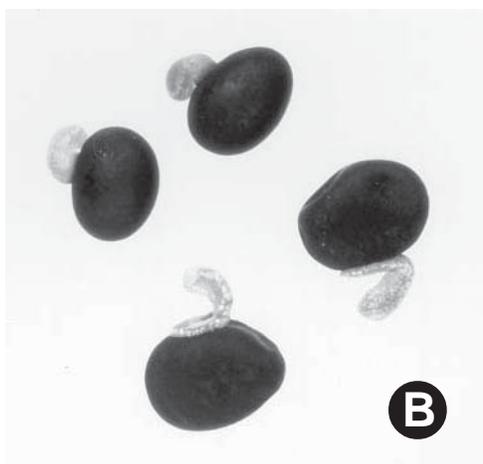
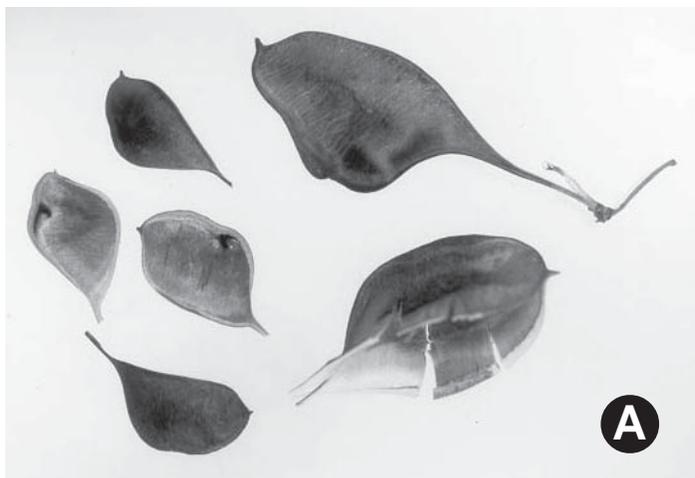
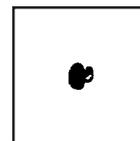
Seed $2.7\text{--}4 \times 2.2\text{--}3 \times 2.2\text{--}3$ mm; not overgrown; not angular; asymmetrical; oblong; terete; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; black; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; 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; not within corona, halo, or rim. Lens not discernible. 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; with 1 or both margins recessed; yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle bulbous or linear; deflexed and parallel to cotyledon width; centered between cotyledons; 1/2 to nearly length of cotyledons. Plumule rudimentary or moderately developed; glabrous.

Distribution: Southern Australia including Tasmania.

Notes: Ross (1997) monographed the genus and recognized two species. The only reliable character separating the two species is the length of the aril foot at its point of attachment to the seed—up to 1.1 mm long in *G. medicagnea* and 1.4–2 mm long in *Goodia lotifolia* G. Salisbury. Polhill (1976) provided a full-page plate of external and internal seed characters of *G. lotifolia*.

Goodia: *G. medicagnea* F.H.J. von Mueller (C–E), *G. spp.* (A–B). A, Fruits (closed and dehiscent) ($\times 1.7$); B, seeds ($\times 5.1$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).



Genus: *Bossiaea* E.P. Ventenat

Phylogenetic Number: 23.06.

Tribe: Bossiaeeae.

Group: Bossiaea.

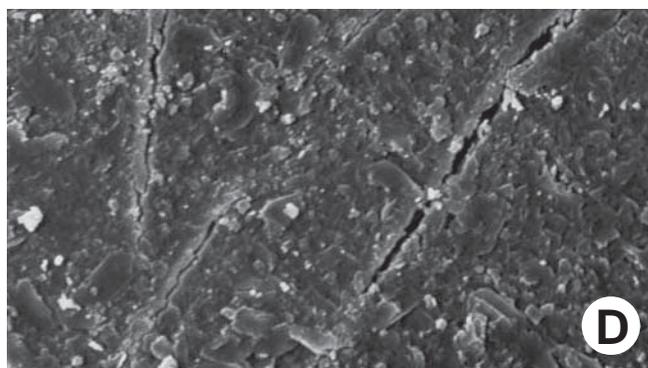
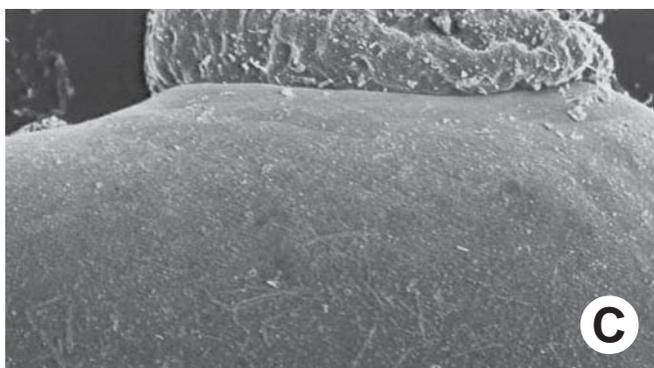
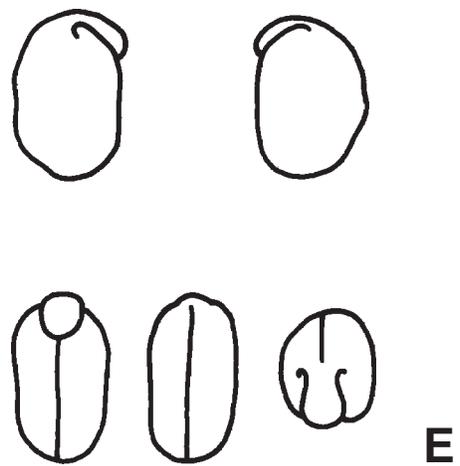
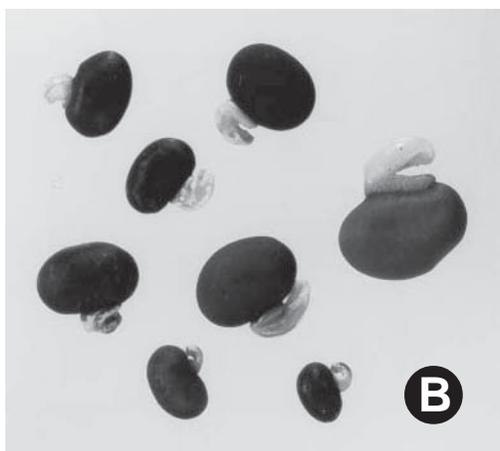
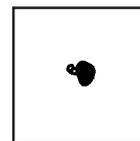
Species Studied—Species in Genus: 15 spp.—ca. 40 spp.

Fruit a legume; unilocular; $1.2\text{--}1.7 \times 0.7\text{--}1 \times 0.15\text{--}0.25$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical or symmetrical; oblong, circular, or linear; when asymmetrical with 1 straight and 1 curved suture or both sutures parallelly curved; widest near middle or D-shaped; not inflated; flattened; without or with beak; straight; with solid beak the same color and texture as fruit; short tapered to 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 chartaceous; seed chambers externally visible or invisible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain or embellished; with thickened sutural areas (thick or keeled especially upper suture). Fruit wings absent. Fruit stipitate to substipitate to nonstipitate; with the stipe to 5 mm long. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down (assumed); active or passive; with valves revolute. Replum invisible. Epicarp dull; monochrome; black, brown, or gray; glabrous or pubescent and indurate; villous; with pubescence golden or gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; without spines; not smooth; with elevated features; veined or not veined; not tuberculate; striate (at right angles to fruit length); not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; brown; spongy (corklike); septate or nonseptate; with septa thicker than paper, firm; with septa eglandular; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1–2(–3); 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 fleshy; flat from apex to near base; covering less than 1/2 of seed; tan.

Seed $3\text{--}3.5 \times 2.3\text{--}2.5 \times 1.8\text{--}2$ mm; not overgrown; not angular; symmetrical or asymmetrical; elliptic to ovate; compressed; without 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; with frequent mottles; dark brown to brown; with black overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; without faboid split; larger than punctiform; with curved outline; elliptic; marginal according to radicle tip; not within corona, halo, or rim. Lens not discernible (may be concealed by aril). 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; 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 linear; deflexed and parallel to cotyledon width; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Temperate Australia, including Tasmania.

Bossiaea: *B. cinerea* R. Brown (C–E), *B. spp.* (A–B). A, Fruits (dehiscid and closed) ($\times 1.5$); B, seeds ($\times 4$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).



Genus: *Platylobium* J.E. Smith

Phylogenetic Number: 23.07.

Tribe: Bossiaeeae.

Group: Bossiaea.

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

Fruit a legume; unilocular; $1.3\text{--}5.5 \times 0.7\text{--}2 \times 0.2$ 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; when asymmetrical with 1 straight and 1 curved suture; widest near middle or D-shaped; not inflated; flattened; without beak; rounded or truncate at apex; apex oblique with longitudinal axis of fruit; truncate at base; base oblique with longitudinal axis of fruit; with the apex and base uniform in texture; chartaceous; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain or embellished; with wings. Fruit wings 2–5; 2–3 mm wide; sutural; on 1 suture (upper). Fruit stipitate to substipitate; with the stipe 0.5–16 mm long. Fruit with all layers dehiscent. Dehiscence of valves along both sutures; active; with valves revolute. Replum invisible. Epicarp dull; monochrome; dark reddish brown; glabrous or pubescent and indurate; puberulent; with pubescence gray; with pubescence uniformly distributed; 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; chartaceous. Endocarp dull; monochrome; brown and tan (especially dark-brown beneath seeds and tan along wing); smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds (1–)2–8; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus measured; 1 mm long; of 1 length only; thick; curved. Aril fleshy; hooked; covering less than 1/2 of seed; tan.

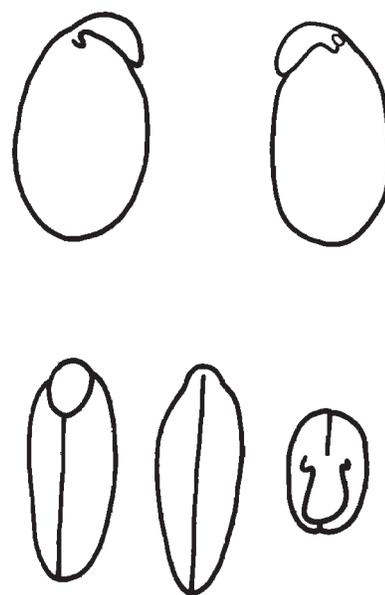
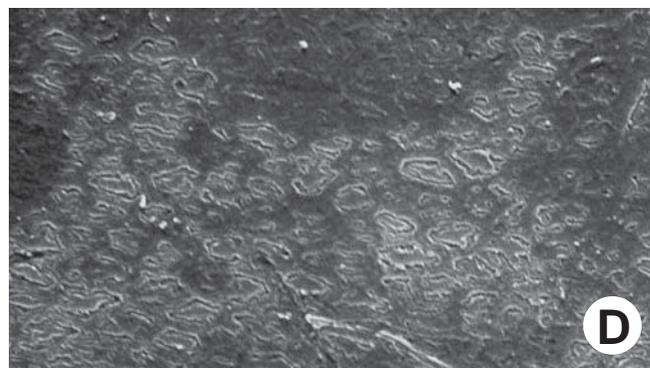
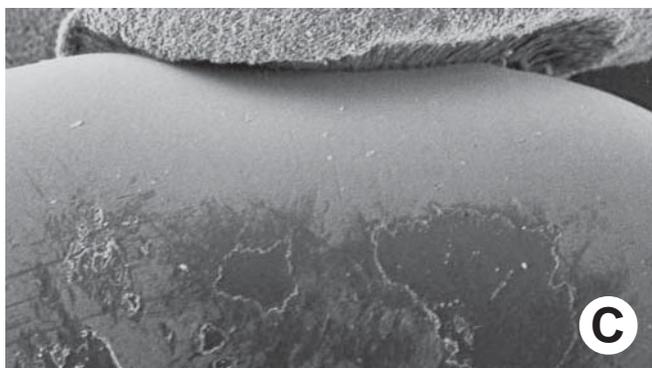
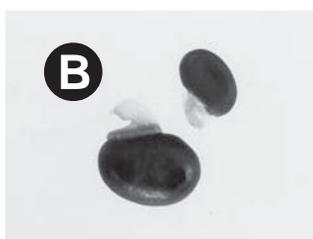
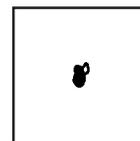
Seed $2.5\text{--}4 \times 1.6\text{--}2.5 \times 1.5\text{--}1.7$ mm; not overgrown; not angular; asymmetrical; elliptic or ovate; compressed; without visible radicle and cotyledon lobes; with umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome or mottled; with frequent mottles; reddish to dark (nearly black) reddish brown; with black overlay; glabrous; smooth;

coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; with faboid split; with the lips of the faboid split the same color as the rest of the hilum; larger than punctiform; 1.3 mm long; with straight outline; oblong; marginal according to radicle tip; flush; not within corona, halo, or rim. Lens discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; confluent with hilum (at least hilar rim); flush; dissimilar color from testa; darker than testa; black; 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; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Eastern and southern Australia, including Tasmania.

Notes: Ross (1983) monographed the genus.

Platylobium: *P. formosum* J.E. Smith (C–E), *P.* spp. (A–B). A, Fruits (closed and dehiscent) ($\times 1.3$); B, seeds ($\times 4.5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).



Genus: *Muelleranthus* J. Hutchinson

Phylogenetic Number: 23.08.

Tribe: Bossiaceae.

Group: Bossiacea.

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

Fruit a legume; unilocular; (13–)17–25(–29) × 0.4–0.5 (–0.6) × 0.12–0.2 cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical or symmetrical; linear; when asymmetrical with both sutures nearly straight; not inflated; flattened; without beak; short tapered 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; seed chambers externally visible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit substipitate. Fruit with all layers dehiscing; splitting along sutures. Dehiscence of valves along both sutures; apical and down; passive. Replum invisible. Epicarp dull; monochrome; reddish brown; glabrous; 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; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 6–10; length parallel with fruit length (because seeds are round, both length or width can be considered parallel to fruit length); neither overlapping nor touching; in 1 series. Funiculus of 1 length only; thick; curved. Aril dry; rim-aril; white.

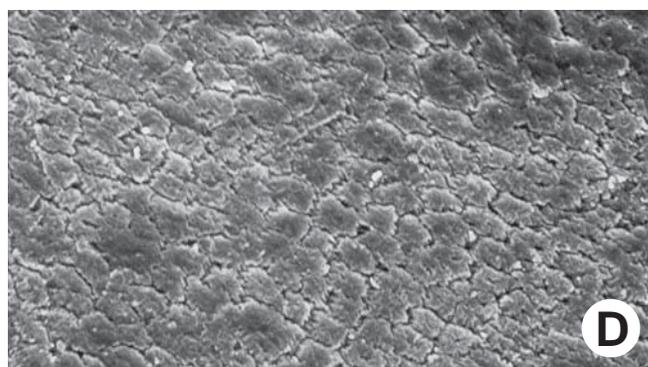
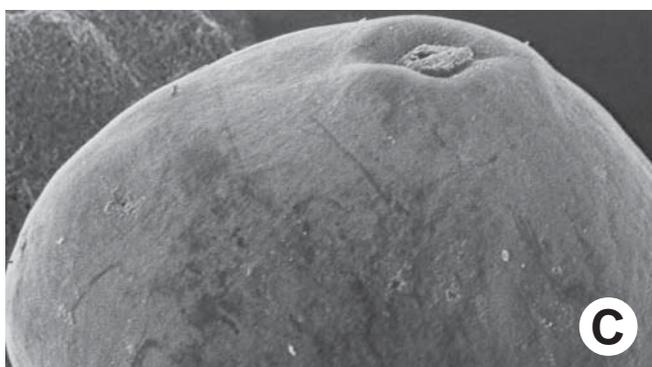
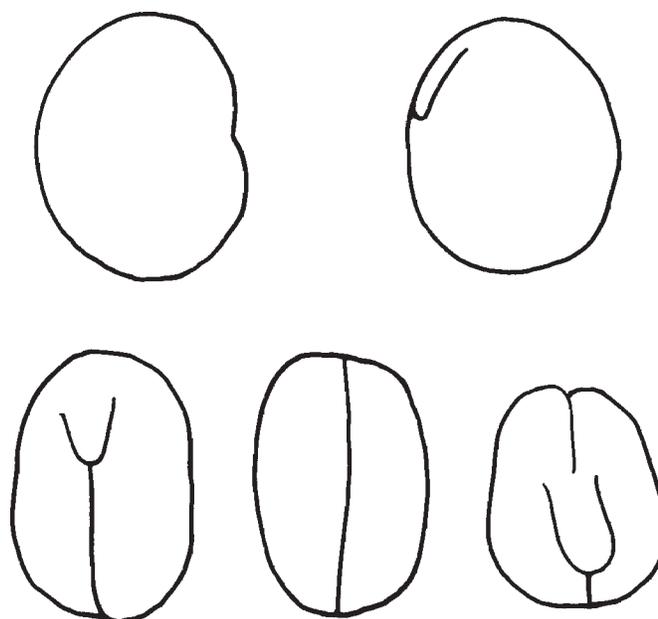
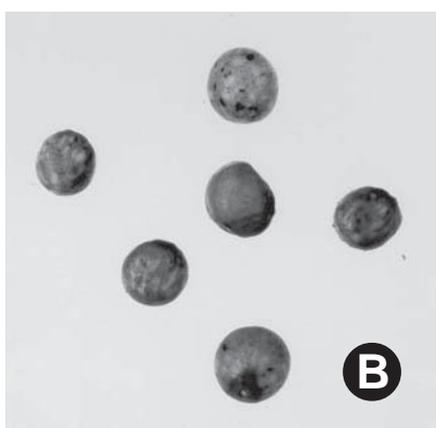
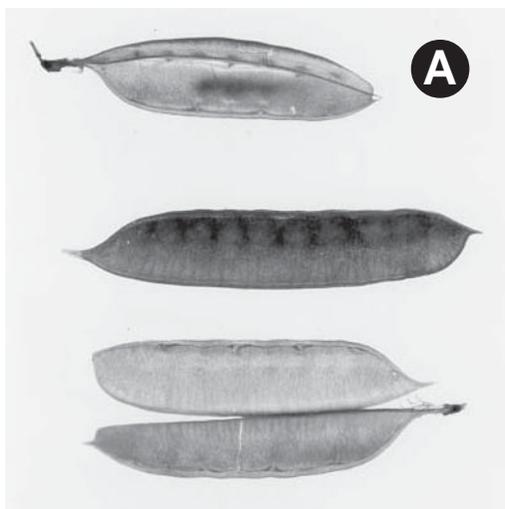
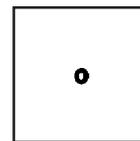
Seed 2–2.2 × 2–2.2 × 1.5 mm; not overgrown; not angular; symmetrical; circular; terete; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; mottled and streaked or monochrome (when immature); with frequent mottles; with frequent streaks; tan; with orange, yellow, brown, red (the orange overlay forming a reticulate pattern from hilum to base, the brown overlay reddish, and the red overlay with a brick tone), or black (when fully mature (Lee 1973)) overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Raphe not visible. Hilum partially concealed; concealed by aril; with faboid split; with the

lips of the faboid split the same color as the rest of the hilum; punctiform; marginal according to radicle tip; recessed; within rim. Hilum rim color darker than testa. Lens discernible; less than 0.5 mm in length; not in groove of raphe; adjacent to hilum; 0.2 mm from hilum; mounded; dissimilar color from testa; darker than testa; black (ish); within rim. Lens rim color darker 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; yellow; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed. Radicle linear; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Australia.

Notes: Lee (1973) noted that *M. trifoliatum* (F.H. Mueller) J. Hutchinson ex A.T. Lee has at first a “reduced hooded aril as in *Aenictophyton*” (23.10) and later is “finally not arillate.” She also noted that *M. stipularis* seeds are not arillate. Based on our observations the seeds of both species of *Muelleranthus* and the one species of *Aenictophyton* have a dry rim aril. Perhaps Lee thought the curved funiculus was a “hooded aril” that disappeared on maturation. Fruits and seeds of *M. crenulatus* A.T. Lee are unknown. The attractive seeds of *M. stipularis* and *M. trifoliatum* resemble a stained glass window. Similar colors may be found in seeds of some species of *Vicia* (19.01).

Muelleranthus: *M. stipularis* (J.M. Black) A.T. Lee (A–E). A, Fruits (dehiscid and closed) (× 2); B, seeds (× 4.8); C–D, testa (× 50, × 1000); E, embryos (× 10).



Genus: *Ptychosema* G. Bentham ex J. Lindley

Phylogenetic Number: 23.09.

Tribe: Bossiaeeae.

Group: Bossiaea.

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

Fruit a legume; unilocular; $1.4\text{--}2.2 \times 0.45\text{--}0.5 \times 0.08$ cm; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; straight; not plicate; not twisted; symmetrical; oblong; not inflated; flattened; without beak; short tapered or emarginate 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; coriaceous; seed chambers externally visible (faintly) or invisible; with the raised seed chambers not torulose. Fruit margin not constricted; without sulcus; plain. Fruit wings absent. Fruit stipitate to substipitate; with the stipe 4–7 mm long. Replum invisible. Epicarp dull; multicolored; mottled and streaked; tan; with brown (reddish) overlay; 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; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 2–7; 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 dry; tongue-aril; white.

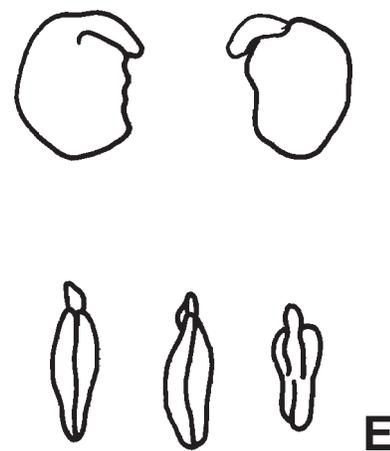
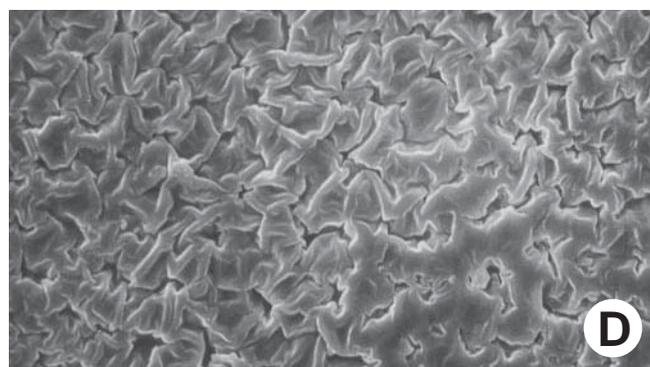
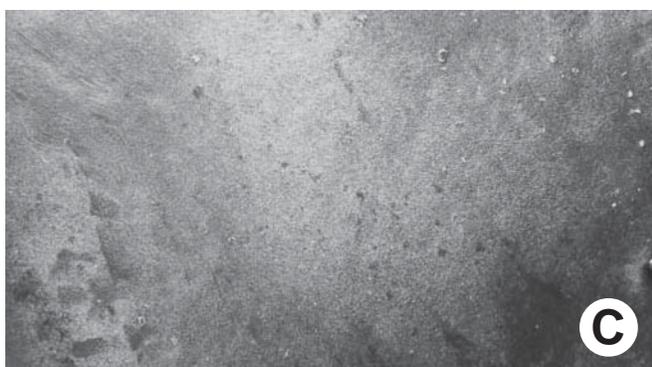
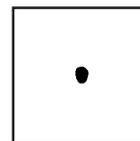
Seed $2.3\text{--}2.5 \times 1.7\text{--}2 \times 0.5\text{--}0.7$ mm; not overgrown; not angular; symmetrical (except for hilum); elliptic to oblong; compressed; with surface smooth; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; black (blackish-brown when mature) or green (greenish-brown when immature); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; without faboid split; punctiform; marginal according to radicle tip; flush; within halo. Hilum halo color lighter than testa. Lens faintly discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.1–0.2 mm from hilum; barely mounded; similar color as testa (but in lighter

colored halo); within halo. 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 not 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; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Central and Western Australia.

Notes: The fruits and seeds of the type species, *Ptychosema pusillum* G. Bentham, are not known to science (Lee 1973).

Ptychosema: *P. anomalum* G. Bentham (A–E). A, Fruit ($\times 3.2$); B, seed ($\times 5$); C–D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 10$).



Genus: *Aenictophyton* A. Lee

Phylogenetic Number: 23.10.

Tribe: Bossiaeeae.

Group: Bossiaea.

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

Fruit a legume; unilocular; $1.5-1.7 \times 0.4-0.5 \times 0.1-0.2$ cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; asymmetrical; oblong; when asymmetrical with both sutures parallelly curved; not inflated; flattened; 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; plain. Fruit wings absent. Fruit stipitate; with the stipe up to 10 mm long. Fruit with all layers dehiscent; splitting along sutures. Dehiscence of valves along both sutures; passive. Replum invisible. Epicarp dull; monochrome; reddish brown to brown; glabrous; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp present (and reddish-brown); thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp glossy; monochrome; white (ish) or red (dish-brown because whitish thin endocarp does not conceal mesocarp color); smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1-4; 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 dry; hooded; white.

Seed $4-5 \times 1.5-2.5 \times 1.5-2.5$ mm; not overgrown; not angular; symmetrical; circular to oblong; compressed; without visible radicle and cotyledon lobes; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; black (ish-brown); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by aril; without faboid split; punctiform; marginal according to radicle tip; flush; not within corona, halo, or rim. Lens not discernible. 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; oblique to cotyledons; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Australia (Northern Territory and Western Australia).

Notes: Lee (1973) founded the genus and related it to other genera in the Bossiaeeae. Only two seed-fruit samples were available for our study, and both were consistent with each other and with Lee's limited seed-fruit data.

Aenictophyton: *A. reconditum* A.T. Lee (A-E). A, Fruits ($\times 3.7$); B, seeds in situ ($\times 4.7$); C-D, testa ($\times 50$, $\times 1000$); E, embryos ($\times 8$).

