

## Hedysareae (18.01–18.07)

Genus: *Eversmannia* A.A. von Bunge

Phylogenetic Number: 18.01.

Tribe: Hedysareae.

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

Fruit a legume (apparently breaking between seed chambers (like a loment)); unilocular;  $3 \times 0.6\text{--}0.7 \times 0.2$  cm; with deciduous corolla; with deciduous calyx; without orifice formed by curving of fruit or fruit segments; slightly curved; plicate (loosely) or not plicate; not twisted; asymmetrical or symmetrical; linear; when asymmetrical with both sutures nearly straight; not inflated; compressed; without beak; short tapered or rounded at apex; apex aligned with longitudinal axis of fruit; short tapered or rounded at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous; seed chambers externally visible; with the raised seed chambers torulose. Fruit margin constricted along both margins; without sulcus; plain. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent (probably). Replum visible (“articles” falling free from replum). 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 (seed fits into fruit like a ball in a socket and walls of fruit form pseudosepta); 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; triangular; straight. Aril absent.

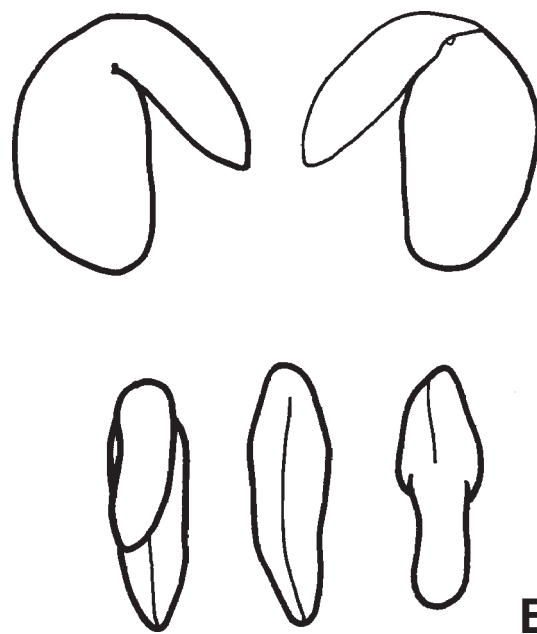
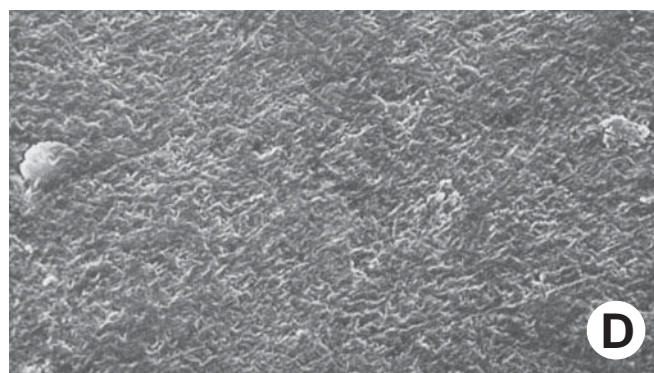
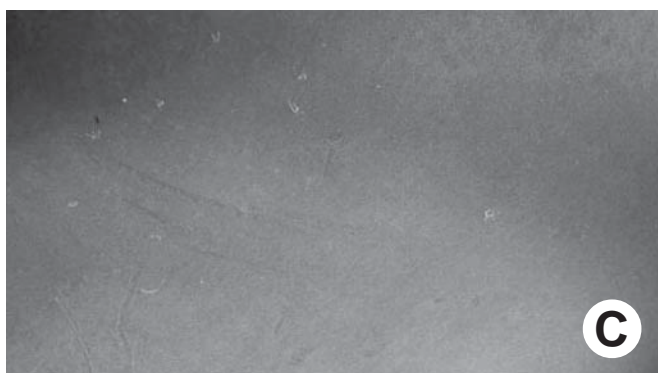
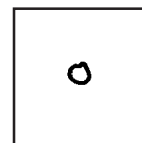
Seed  $3\text{--}3.7 \times 3 \times 1.3\text{--}1.5$  mm; not overgrown; not angular; asymmetrical; D-shaped, mitaform, or rhombic; compressed; with surface smooth; with visible radicle and cotyledon lobes; without external groove between radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome; reddish brown; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum fully concealed; concealed by funicular remnant; without faboid split; punctiform; between cotyledon and radicle lobe;

recessed; within halo. Hilum halo color darker than 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; similar color as testa; darker than testa; reddish brown; not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to embryo. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; 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; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon length; centered between cotyledons; more than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Russia and Iran from the Caspian to Tian Shan (border of former U.S.S.R. and China).

Notes: Polhill (1981j) primarily used fruit characters for his key to genera of this tribe. The fruits of *E. subspinosa* (formerly *E. hedysaroides* A.A. von Bunge) function as a loment, though they are not true loment. The fruit tissue between the seed chambers is thin and easily broken (but by no regular separation) into one-seeded fruit segments leaving the replum.

*Eversmannia*: *E. subspinosa* (F.E.L. von Fischer ex A.-P. de Candolle) B.A. Fedtschenko (A–E). A, Fruits ( $\times 2.4$ ); B, seeds ( $\times 5.5$ ); C–D, testa ( $\times 50$ ,  $\times 1000$ ); E, embryos ( $\times 15$ ).



Genus: *Hedysarum* C. Linnaeus

Phylogenetic Number: 18.02.

Tribe: Hedysareae.

Species Studied—Species in Genus: 50 spp.—ca. 100 spp.

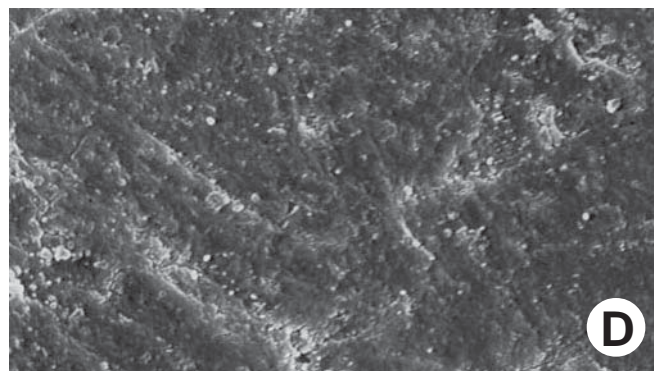
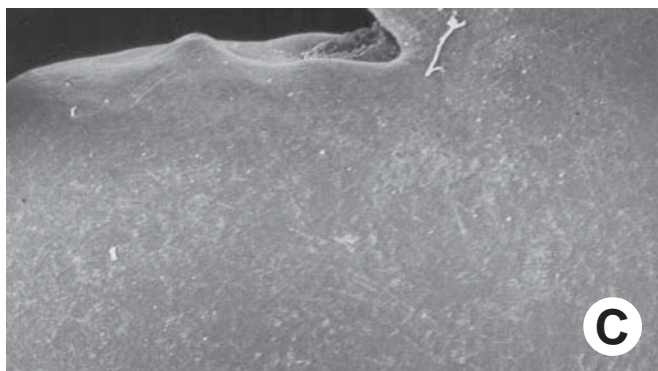
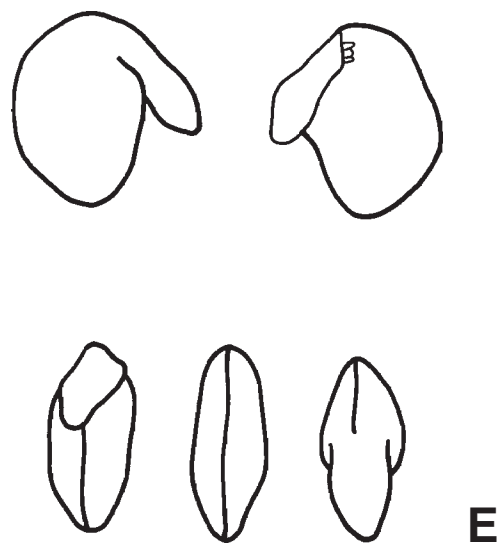
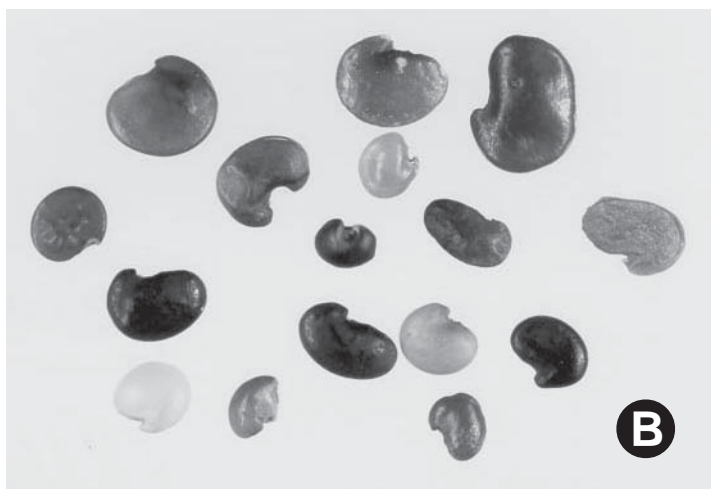
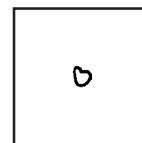
Fruit a loment (with 2 to several joints);  $2-4 \times 0.3-1 \times 0.15-0.25$  cm; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical or asymmetrical; linear, elliptic, or ovate; when asymmetrical with both sutures parallelly curved; not inflated; compressed or terete; without beak; short tapered at apex; apex aligned with longitudinal axis of fruit; rounded or short tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; coriaceous, membranous, or ligneous; seed chambers externally visible; with the raised seed chambers torulose. Fruit margin constricted along both margins; without or with sulcus; plain or embellished; with spines (with usually curved or occasionally straight apex), prickles, or wing. Fruit wing present or absent; 1;  $0.5-3$  mm wide; sutural. Fruit nonstipitate or substipitate. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous;  $3.5-16$  mm long; widest across seed area; with all essentially similar in shape or lower 1 different shape than middle ones; elliptic to oblong, D-shaped, quadrangular, or circular. Epicarp dull; monochrome; brown; glabrous, glabrate, or pubescent but soon deciduous; with hairs appressed or erect; with 1 type of pubescence; pilose or tomentose; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; with or without spines; with spines persistent or broken off and their bases evident; with spines same color as the rest of the fruit; not smooth; with elevated features; reticulately veined; tuberculate (if apices of spines removed); with solid tubercles on each valve; rugose, wrinkled, tuberculate, or muricate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; ligneous (sub) or coriaceous. Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; with the septa eglandular; 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 less than 0.5 mm long or measured; up to 3 mm long; of 1 length only; filiform; straight. Aril absent.

Seed  $2.8-4.5 \times 2-4 \times 1-2$  mm; not overgrown; not angular; asymmetrical; reniform; compressed; with surface smooth; with visible radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes same color as testa; with shallow hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome; reddish or greenish brown, tan (to greenish), yellow, or cream; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum partially concealed; concealed by funicular remnant or concealed by 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; flush; within rim. Hilum rim color darker than testa or color of testa. Lens discernible or not discernible (because may be color of testa); less than 0.5 mm in length; with margins straight or with margins curved; circular or oblong; not in groove of raphe; adjacent to or confluent with hilum; 0.4 mm from hilum; mounded; dissimilar color from or same color as 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; white or yellow; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip hooked or straight; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 or 1/2 to nearly length of cotyledons. Plumule rudimentary or moderately developed; glabrous.

Distribution: Europe, Mediterranean region, Asia, and North America.

*Hedysarum*: *H. coronarium* C. Linnaeus (C-E), *H.* spp. (A-B). A, Fruits and articles ( $\times 1.4$ ); B, seeds ( $\times 4$ ); C-D, testa ( $\times 50$ ,  $\times 1000$ ); E, embryos ( $\times 10$ ).



Genus: *Taverniera* A.-P. de Candolle

Phylogenetic Number: 18.03.

Tribe: Hedysareae.

Species Studied—Species in Genus: 9 spp.—ca. 10 spp.

Fruit a loment (with 2–4 joints); 1.25–1.5 × 0.3–0.7 × 0.5–0.7 cm; with deciduous or persistent corolla; with standard; 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; oblong; when asymmetrical with 1 straight and 1 curved suture (or nearly straight); narrowest near middle, B-shaped; not inflated; compressed; without beak; rounded or short tapered at apex; apex aligned or oblique 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 visible; with the raised seed chambers torulose. Fruit margin constricted along both margins; without sulcus; embellished or plain; with prickles or spines. Fruit wings absent. Fruit substipitate. Fruit indehiscent. Replum invisible. Loment indehiscent. Loment segments (articles) inconspicuous; widest across seed area; with all essentially similar in shape; D-shaped or circular. Epicarp dull or glossy; monochrome; dark to reddish brown or tan; pubescent and indurate; with hairs erect or appressed; with 1 type of pubescence; pilose; with pubescence gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; with spines (either glabrous or hairy and with straight or hooked apices) or without spines; with spines persistent; with spines same color as the rest of the fruit; not smooth; with elevated features; veined or not veined; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface not veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; smooth; septate; with septa thicker than paper, firm; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 2–3; length parallel with fruit length; neither overlapping nor touching; in 1 series. Funiculus less than 0.5 mm long or measured; 0.5 mm long; of 1 length only; filiform; curved. Aril absent.

Seed 1.5–2.5 × 1.1–2 × 0.5–1.1 mm; not overgrown; not angular; asymmetrical; mitaform or reniform; compressed; with surface smooth; with visible radicle and cotyledon lobes; without umbo on seed faces. Testa not

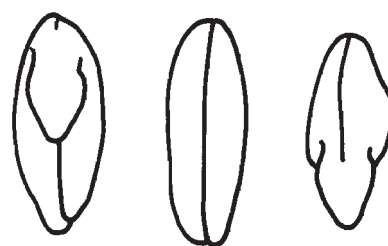
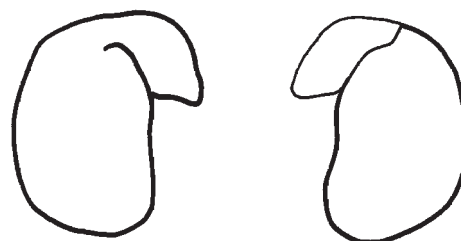
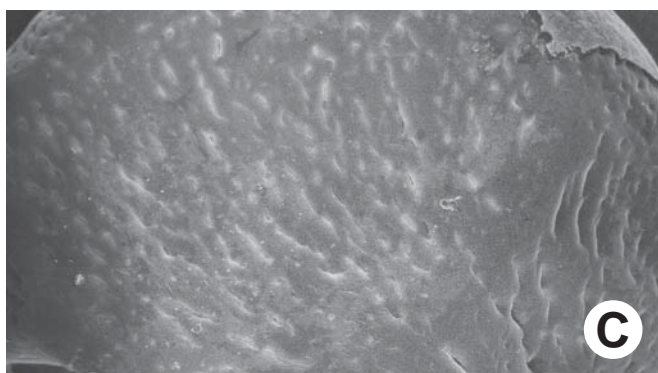
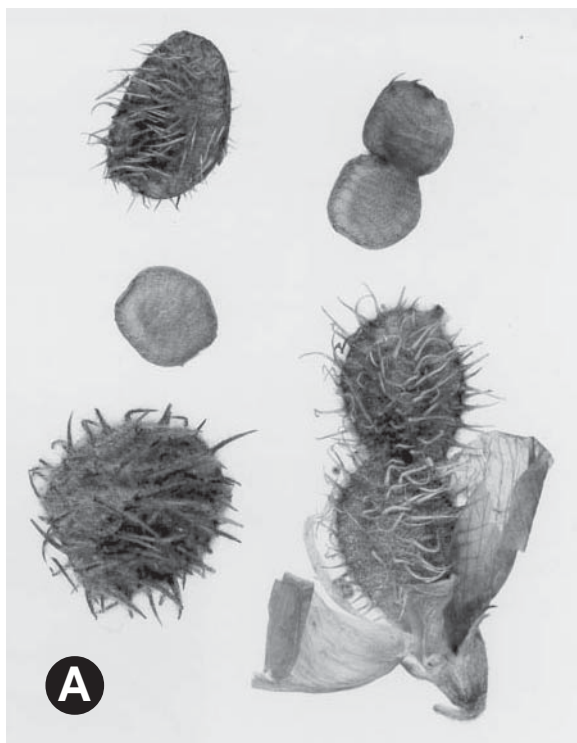
adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome; brown (to greenish); glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. Hilum partially concealed; concealed by funicular remnant; without faboid split; punctiform; between cotyledon and radicle lobe; recessed; within rim. Hilum rim color of testa or color darker than testa. Lens discernible; less than 0.5 mm in length or equal to or greater than 0.5 mm in length; up to 0.5 mm long; with margins straight or curved; circular or oblong; not in groove of raphe; confluent with or adjacent to hilum; 0.1–0.5 mm from hilum; mounded (light colored mound within darker area); similar color as or dissimilar color from testa; darker than testa; black or brown (greenish); not within corona, halo, or rim. Endosperm thin; covering entire embryo; adnate to testa. Cotyledons smooth; both outer faces convex; both the same thickness; both more or less of equal length; not folded; margin entire 180 degrees from base of radicle; similar at apex; not concealing radicle; entire over radicle; without lobes; with the interface division terminating at base of radicle; without margins recessed; green; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle linear; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Horn of Africa and Socotra through Middle East to western India.

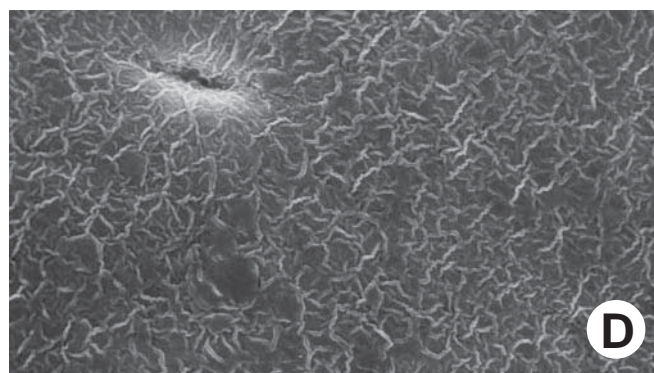
Notes: Polhill (1981j) noted that the genus has “about ten species (several undescribed).”

*Taverniera*: *T. lappacea* (P. Forsskål) A.-P. de Candolle (C–E), *T. spp.* (A–B). A, Fruits and articles (× 3.6); B, seeds (× 8); C–D, testa (× 50, × 1000); E, embryos (× 8).

D



E



Genus: *Stracheya* G. Bentham

Phylogenetic Number: 18.04.

Tribe: Hedysareae.

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

Fruit a legume; unilocular;  $2-3 \times 0.6-0.7$  (excluding spines)  $\times 0.2$  (excluding spines) cm; with deciduous corolla; with persistent calyx; with calyx shorter than fruit; without orifice formed by curving of fruit or fruit segments; slightly curved or straight; not plicate; not twisted; asymmetrical or symmetrical; linear or oblong; when asymmetrical with both sutures nearly straight; not inflated; compressed (but spines along sutures and midvalve (4 rows of spines)); without beak; truncate 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 invisible. Fruit margin not constricted; without sulcus; embellished; with spines. Fruit wings absent. Fruit nonstipitate. Fruit indehiscent. Replum invisible. Epicarp dull; monochrome; reddish 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; with spines (along sutures and midvalves (4 rows) on fruit); with spines persistent; with spines same color as the rest of the fruit; not smooth; with elevated features; not veined; not tuberculate; not exfoliating; without cracks. Mesocarp thin; surface uniformly veined; 1-layered; without balsamic vesicles; without fibers; solid; coriaceous. Endocarp dull; monochrome; tan; smooth; nonseptate (but seeds seated like a ball and socket in fruit); chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 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.

Seed  $2-2.7 \times 1.3-2 \times 0.7$  mm; not overgrown; not angular; asymmetrical; reniform; compressed; with surface smooth; with visible radicle and cotyledon lobes; without external groove between radicle and cotyledon lobes; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified or modified by a bloom; colored; monochrome; dark reddish brown; glabrous; not smooth; with elevated features; shagreen; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe from hilum to lens;

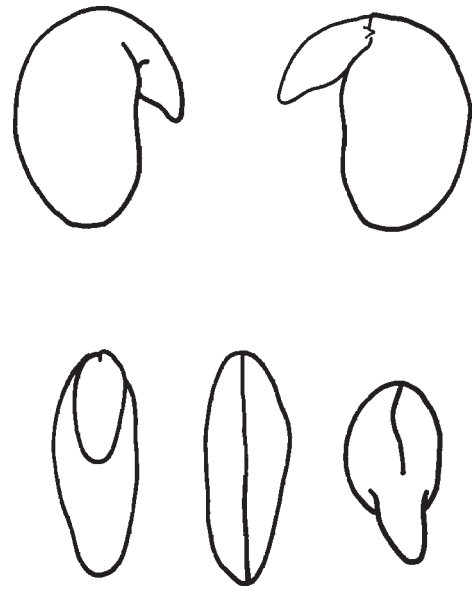
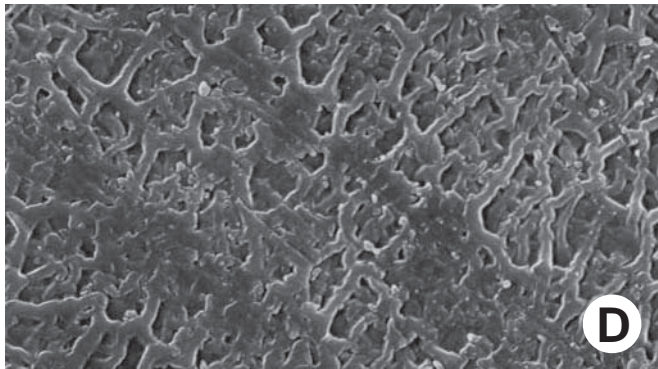
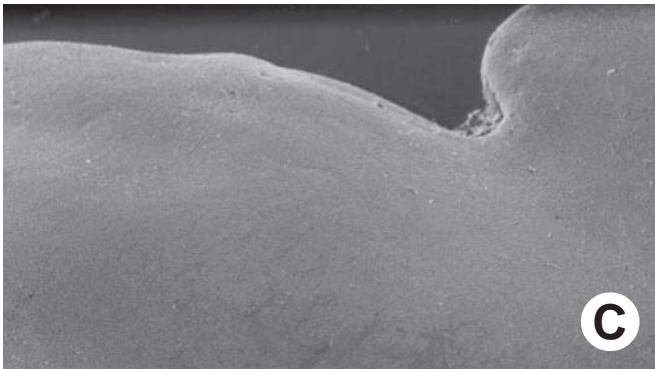
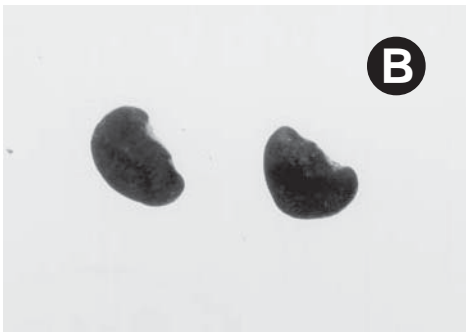
not bifurcating; darker than testa; black; flush. Hilum fully concealed; concealed by funicular remnant; without faboid split; punctiform; between cotyledon and radicle lobe; recessed; not within corona, halo, or rim. Lens discernible or not discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.8 mm from hilum; 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; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon length; centered between cotyledons; less than 1/2 length of cotyledons. Plumule rudimentary; glabrous.

Distribution: Kashmir, Tibet, Sikkim, and Nepal.

Notes: Little is known about this monotypic genus, and Viswanathan (1995) revised it. The fruits appear to be indehiscent and are not loment. The fruits are definitely echinate-dentate and have spines in four rows. Only pressed fruits were seen.

*Stracheya: S. tibetica* G. Bentham (A–E). A, Fruits ( $\times 2.9$ ); B, seeds ( $\times 7.4$ ); C–D, testa ( $\times 50$ ,  $\times 1000$ ); E, embryos ( $\times 10$ ).

6





Genus: *Onobrychis* P. Miller

Phylogenetic Number: 18.06.

Tribe: Hedysareae.

Species Studied—Species in Genus: 66 spp.—ca. 130 spp.

Fruit a legume; unilocular;  $0.4\text{--}1.5 \times 0.15\text{--}1$  cm; with deciduous corolla; with persistent or deciduous calyx; with calyx shorter than, longer than, or equal in length to fruit; without or with orifice formed by curving of fruit or fruit segments; straight, curved, or 1-coiled (nearly); not plicate; not twisted; asymmetrical; circular, reniform, or samaroid; when asymmetrical with 1 straight and 1 curved suture, both sutures parallelly curved or both unequally curved; widest near middle or D-shaped; not inflated; compressed or terete; without or with beak; hooked (at apex), straight, or declined; with solid beak the same color and texture as fruit (3–10 mm long); short tapered at apex; apex aligned with or almost reaching longitudinal axis of fruit; tapered or 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; without sulcus; embellished or plain; with spines, wing (entire or cut), prickles, or fringe. Fruit wing absent or present; 1; up to 3 mm wide; samaroid, sutural, or continuous wing around fruit; on both sutures. Fruit nonstipitate or substipitate. Fruit indehiscent. Replum invisible. Fruit a nutlet; an intact article; entire. Epicarp dull; monochrome; brown or tan; glabrous or pubescent and indurate; with hairs erect or appressed; with 1 type of pubescence; minutely puberulent or tomentose; with pubescence golden or gray; with pubescence uniformly distributed; with simple hairs; pliable; with hair bases plain; eglandular; with or without spines; with spines persistent or broken off and their bases evident; with spines same color as the rest of the fruit; not smooth; with elevated or recessed features; veined or not veined; reticulately veined (and with or without spines and reticulum can be removed); not tuberculate or tuberculate; with solid tubercles on each valve; pitted (broad pits); not exfoliating; without cracks. Mesocarp absent. 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; filiform; straight. Aril absent.

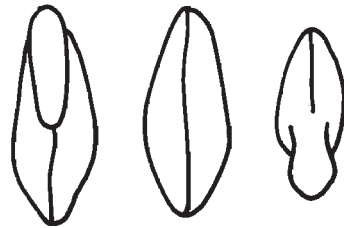
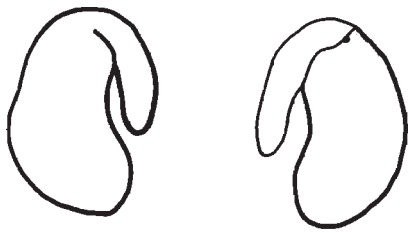
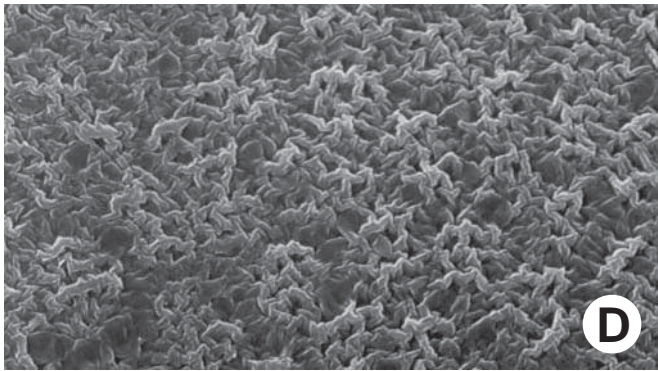
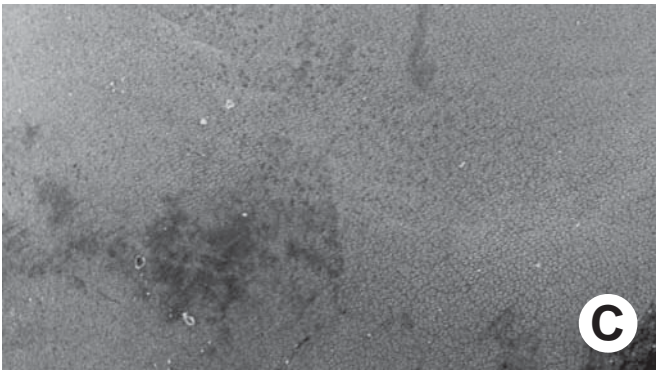
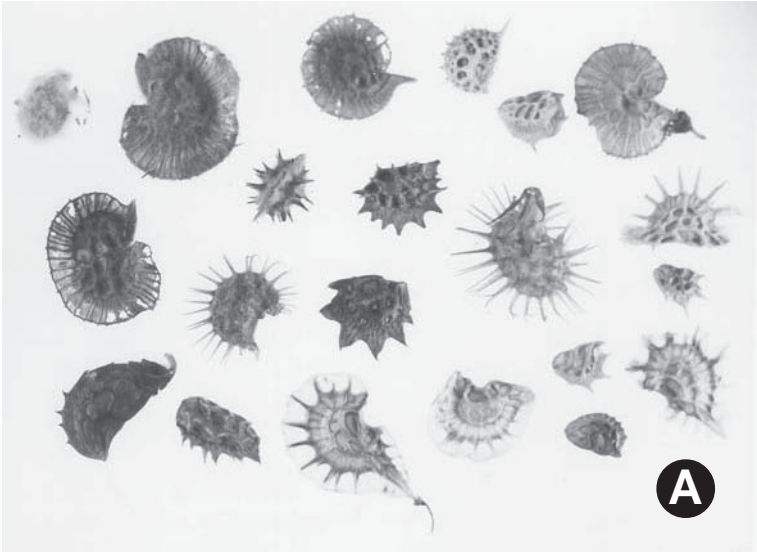
Seed  $2\text{--}5 \times 2.6\text{--}3 \times 2.1\text{--}2.2$  mm; not overgrown; not angular; asymmetrical; reniform or oblong; compressed; with surface smooth; with visible radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes same color as testa; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; glossy or dull; not modified by a bloom; colored; monochrome or mottled; brown, yellow, cream, or black; with black overlay; glabrous; smooth; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible or visible; from hilum to lens; not bifurcating; darker than testa or color of testa; reddish brown; recessed. 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; between cotyledon and radicle lobe; flush; within halo. Hilum halo color darker than testa. Lens discernible; less than 0.5 mm in length; with margins curved; circular or elliptic; not in or in groove of raphe; adjacent to or confluent with hilum; 1 mm from hilum; mounded; dissimilar color from or similar color as testa; darker than testa; reddish brown or 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; tan; inner face flat; glabrous around base of radicle. Embryonic axis deflexed; oblique to length of seed; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon length; centered between cotyledons; less to more than 1/2 length of cotyledons. Plumule rudimentary or moderately developed; glabrous.

Distribution: Europe, Mediterranean region, western and central Asia, and Ethiopia.

Notes: Cooper and Carleton (1968) edited a symposium proceeding dealing with the agronomic aspects of sainfoin (*O. viciifolia* J.A. Scopali).

*Onobrychis*: *O. melanotricha* P.E. Boissier (C–E), *O.* spp. (A–B). A, Fruits ( $\times 1.3$ ); B, seeds ( $\times 3.7$ ); C–D, testa ( $\times 50$ ,  $\times 1000$ ); E, embryos ( $\times 5$ ).

9



**E**

Genus: *Ebenus* C. Linnaeus

Phylogenetic Number: 18.07.

Tribe: Hedysareae.

Species Studied—Species in Genus: 7 spp.—20 spp.

Fruit a legume; unilocular;  $0.45\text{--}0.6 \times 0.3\text{--}0.4 \times 0.13\text{--}0.2$  cm; with deciduous corolla; with persistent calyx; with calyx longer than fruit; without orifice formed by curving of fruit or fruit segments; straight; not plicate; not twisted; symmetrical; oblong or obovate; not inflated; compressed; without beak; rounded at apex; apex aligned with longitudinal axis of fruit; tapered at base; base aligned with longitudinal axis of fruit; with the apex and base uniform in texture; membranous or fragile, thinner than chartaceous like *Trifolium*; seed chambers externally invisible. Fruit margin not constricted; without sulcus; plain. Fruit nonstipitate. Fruit indehiscent (rupturing at base). Replum invisible. Epicarp dull; monochrome; tan; pubescent and indurate; with 1 type of pubescence; tomentose; with pubescence golden; with apical pubescence different from basal pubescence; with apical  $3/4$  tomentose and basal  $1/4$  glabrous or with apical  $1/2$  crinkly tomentose and basal  $1/2$  densely villose with straight hairs; with simple hairs; pliable; with hair bases plain; eglandular; without spines; not smooth; with elevated features; reticulately veined; not tuberculate; not exfoliating; without cracks. Mesocarp absent. Endocarp dull; monochrome; tan; smooth; nonseptate; chartaceous; not exfoliating; remaining fused to epicarp; entire. Seeds 1(–2); length transverse to 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  $2.5\text{--}3.2 \times 1.8\text{--}2 \times 1.6\text{--}2$  mm; not overgrown; not angular; asymmetrical; mitaform or ovate; terete; with surface smooth; with visible radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes; with external groove between radicle and cotyledon lobes same color as testa; without hilar sinus; without umbo on seed faces. Testa not adhering to endocarp; dull; not modified by a bloom; colored; monochrome or mottled; with frequent mottles; reddish brown or tan; with black overlay (minute mottles may be present on tan testae); glabrous; smooth or not smooth; with recessed features; faintly striate or concaved; coriaceous. Fracture lines absent. Rim absent. Wings absent. Raphe not visible. 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; marginal according to radicle tip or between cotyledon and radicle lobe; flush; not within corona, halo, or rim or within halo. Hilum halo color darker than testa. Lens not discernible or discernible; less than 0.5 mm in length; with margins curved; circular; not in groove of raphe; adjacent to hilum; 0.2 mm from hilum; mounded; similar color as testa; darker than testa; reddish brown or tan; 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; without a joint evident between the radicle and the cotyledons. Radicle linear; lobe tip straight; deflexed and parallel to cotyledon length; centered between cotyledons; less than  $1/2$  length of cotyledons. Plumule moderately developed; glabrous.

Distribution: Mediterranean region.

*Ebenus*: *E. cretica* C. Linnaeus (*D–F*), *E. spp.* (*A–C*). *A*, Fruits in calyx ( $\times 2.1$ ); *B*, fruits with calyx removed ( $\times 7$ ); *C*, seeds ( $\times 5.7$ ); *D–E*, testa ( $\times 50$ ,  $\times 1000$ ); *F*, embryos ( $\times 8$ ).

