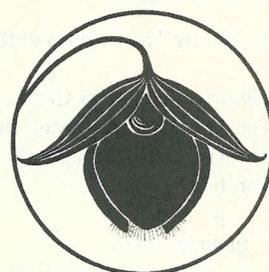


The Jepson Manual

Vascular Plants of California

SECOND EDITION



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LYCOPHYTES

Free-sporing pls; sporangia solitary in lf axils

ISOETACEAE QUILLWORT FAMILY

W. Carl Taylor & Jon E. Keeley

Per, aquatic to terrestrial. **ST**: buried, corm-like, 2–3-lobed, corky, brown. **LF**: simple, in grass-like tufts, spirally arranged on st top, erect to spreading, < 30 cm, linear above base. **SPORANGIUM**: solitary, embedded in wide lf base, < 1 cm, ± covered by a translucent membrane, male or female; male spores > 10000, < 0.045 mm, ± bean-shaped, gray or brown in mass; female spores 20–200, 0.2–0.7 mm, spheric, white, ± smooth, ridged, tubercled, or prickly. 1 genus, 200+ spp.: worldwide. [Taylor et al. 1993 FNANM 2:64–75] Scientific Editors: Alan R. Smith, Thomas J. Rosatti.

ISOETES QUILLWORT

(Greek: evergreen, from habit of some spp.) Perhaps most poorly known lycophyte genus. Mature female spores, found in decaying lf bases or soil, critical for identification, as are hand lens for texture when dry, microscope with micrometer for size. Hybrids (spores of variable size, shape) common between aquatic spp., making them less distinct.

1. Pl terrestrial (or becoming so), of seasonally wet soil, lake margins, temporary streams, vernal pools; gen < 1500 m
2. Translucent membrane covering < 75% of sporangium *I. howellii*
- 2' Translucent membrane covering > 75% of sporangium
3. Pl of wet soil; lf gen > 8 cm, > 1 mm wide at middle, rigid, ± brittle. *I. nuttallii*
- 3' Pl of vernal pools; lf gen < 8 cm, < 1 mm wide at middle, soft, flexible *I. orcuttii*
- 1' Pl underwater in persistent lakes or pools; gen > 1500 m
4. Female spores prickly. *I. echinospora*
- 4' Female spores ridged or tubercled
5. Lf abruptly tapered to tip; female spore 0.3–0.5 mm diam *I. bolanderi*
- 5' Lf gradually tapered to tip; female spore 0.5–0.7 mm diam *I. occidentalis*

I. bolanderi Engelm. (p. 115) Pl underwater. **LF**: deciduous, < 20 cm, rigid, not brittle, abruptly narrowed to tip, bright green; base white to ± brown. **SPORANGIUM**: membrane covering < 30%; male spores 0.02–0.03 mm, brown in mass; female spores 0.3–0.5 mm, ridged, tubercled. $2n=22$. Persistent lakes, pools; > 1300 m (250 m in Marin Co.). KR, NCoRH, CaRH, SNH, SnFrB, SnBr, Wm; to BC, WY, NM. [*I. b. var. pygmaea* (Engelm.) Clute] Hybridizes with *I. echinospora*, *I. occidentalis*. Spores mature late summer.

I. echinospora Durieu (p. 115) Pl underwater. **LF**: ± evergreen, < 20 cm, soft, flexible, tapered to tip, bright green; base white to ± brown. **SPORANGIUM**: membrane covering < 50%; male spores 0.02–0.03 mm, gray in mass; female spores 0.4–0.5 mm, prickly. $2n=22$. Persistent lakes, pools; > 1500 m. KR, n SNH; to AK, e NAm; Eurasia. Hybridizes with *I. bolanderi*, *I. occidentalis*. Spores mature late summer.

I. howellii Engelm. (p. 115) Pl becoming terrestrial. **LF**: deciduous, < 30 cm, rigid, not brittle, tapered to tip, bright green; base ± brown to black. **SPORANGIUM**: membrane covering < 75%; male spores 0.025–0.035 mm, brown in mass; female spores 0.3–0.5 mm, ridged. $2n=22$. Vernal pools, lake margins; gen < 1500 m. KR, NCoR, CaR, SNF, GV, SnFrB, SCoR, SCo, PR; to WA, MT, UT. Small pls of SCo, WA, Baja CA (lf < 10 cm, female spore < 0.42 mm) are assign-

able to *I. howellii* var. *minima* (A.A. Eaton) N. Pfeiff., recognition of which remains questionable pending further research, although it is ± clear that it should not be treated as an infraspecific taxon of *I. howellii*. Spores mature late spring, summer.

I. nuttallii Engelm. (p. 115) Pl terrestrial. **LF**: deciduous, gen > 8 cm, > 1 mm wide at middle, rigid, ± brittle, tapered to tip, light green to gray-green; base white to ± brown, outermost sterile, often surrounded by several black scales. **SPORANGIUM**: membrane covering > 75%; male spores 0.02–0.03 mm, brown in mass; female spores 0.35–0.6 mm, ± shiny, ± tubercled. $2n=22$. Seasonally wet soil, temporary streams; gen < 1500 m. NCoR, CaR, SN, ScV, n SnJV, CW (exc SCoRI), SCo, PR, w MP; to BC. Spores mature late spring, summer.

I. occidentalis L.F. Hend. (p. 115) Pl underwater. **LF**: evergreen, < 20 cm, rigid, brittle, tapered to tip, dark green; base brown-white. **SPORANGIUM**: membrane covering < 50%; male spores 0.035–0.045 mm, gray in mass; female spores 0.5–0.7 mm, ridged, tubercled. $2n=66$. Persistent lakes, pools; > 1500 m. KR, SNH; to BC, CO. Hybridizes with *I. bolanderi*, *I. echinospora*. Spores mature late summer.

I. orcuttii A.A. Eaton Pl becoming terrestrial. **LF**: deciduous, gen < 8 cm, < 1 mm wide at middle, soft, flexible, tapered to tip, bright

green; base white to ± brown, outermost fertile, often surrounded by several black scales. **SPORANGIUM**: membrane covering > 75%; male spores 0.02–0.025 mm, brown in mass; female spores 0.2–0.4

mm, ± shiny, ± smooth. $2n=22$. Vernal pools; < 1700 m. NCoRI (Howell Mtn, Napa Co.), n&s SNH, GV, CCo, SnFrB, SCo, PR; sw OR, Baja CA. Spores mature spring.

LYCOPODIACEAE CLUB-MOSS FAMILY

Andy Murdock, Alan R. Smith & Thomas Lemieux

Pl on ground (or other pls), creeping (to ± vine-like). **ST**: branches few to many, forked often unequally, also branched laterally or not. **LF**: many, simple, ± alternate, spirally arranged, small, needle- or scale-like, 1-veined, few-toothed to gen entire, those subtending sporangia gen unlike others [or not], in distinct cones [or not]. **CONE**: terminal on erect st, erect [or 0]. **SPORANGIA**: 1 in lf axils; spores of 1 kind. 4 genera, ± 400 spp.: worldwide, gen trop. [Wagner & Beitel 1993 FNANM 2:18–37] Scientific Editors: Alan R. Smith, Thomas J. Rosatti.

- 1. Fertile st unbranched, with 1 cone at tip **LYCOPODIELLA**
- 1' Fertile st branched, with few to many cones at tip **LYCOPODIUM**

LYCOPODIELLA BOG CLUB-MOSS

ST: sterile creeping, branched in 1 horizontal plane; fertile erect. ± 40 spp.: gen Am. (Diminutive of *Lycopodium*)

L. inundata (L.) Holub (p. 115) **INUNDATED BOG CLUB-MOSS**
ST: sterile 5–15(25) cm, 0.5–1 cm wide, incl lvs; fertile gen 1–2, ± 4–6(9) cm. **LF**: ± 3–8 mm, 1 mm wide, those subtending sporangia ± wider at base, ± not bristle-tipped. **CONE**: 1.5–3(6) cm, ± 8–10 mm

wide. $2n=156$. Peat bogs, muddy depressions, pond margins; < 50 m (NCo), ± 1000 m (n SNH). NCo (Humboldt Co.), n SNH (Nevada Co.); to AK, e N.Am, Eur, Asia. ★

LYCOPODIUM RUNNING-PINE, CLUB-MOSS

ST: sterile branched in > 1 plane; fertile erect. ± 40 spp.: worldwide. (Greek: wolf foot, from branch tips)

L. clavatum L. (p. 115) **RUNNING-PINE** **ST**: sterile wide-creeping to ± vine-like, < 0.5 m, 0.5–1.5 cm wide, incl lvs; fertile ± 10–20 cm terminated by 2–5 cones. **LF**: ± 4–7 mm, 0.5–1 mm wide, with narrow bristle tip, those subtending sporangia ovate-triangular,

abruptly bristle-tipped. **CONE**: 1–3(5) cm, ± 4–6 mm wide. $2n=68$. Moist ground, swamps (on trees); < 200 m. NCo; to AK, MT, NM, e N.Am; Caribbean, S.Am, Eur, Afr, Asia. ★

SELAGINELLACEAE SPIKE-MOSS FAMILY

Paul Wilson & Thomas J. Rosatti

ST: wiry, gen rooting adventitiously [or not], branching variable, gen not fragile when dry. **LF**: many, simple, overlapped, appressed, small, ± scale-like, 1-veined, gen grooved abaxially [or not] nearly to tip, gen ± of 2 kinds (“under-lvs” under main st, “over-lvs” over it). **CONE**: paired or 1, terminal, gen 4-sided, fertile lvs not like sterile, gen strongly keeled. **SPORANGIA**: 1 per lf axil, 2 kinds, male (gen more distal in cones, spores many, small), female (spores (1)4, large, gen orange-yellow). 1 genus. [Valdespino 1993 FNANM 2:38–63] Scientific Editors: Alan R. Smith, Thomas J. Rosatti.

SELAGINELLA SPIKE-MOSS

± 700 spp.: worldwide, gen trop, warm temp. (Latin: small *Selago*, ancient name for some *Lycopodium*) Some cult as ground-cover, curiosity: *S. kraussiana* (Kunze) A. Braun; *S. lepidophylla* (Hook. & Grev.) Spring, resurrection plant. Hand lens, gen at ± 20×, required for lvs (shape, margin, awn at tip), cones. *S. kraussiana* may be naturalized in CA, differs from native CA taxa in lvs lacking abaxial groove.

- 1. Lf tip awn 0 or inconspicuous
- 2. Lvs of main st not pointed up, under-lvs ± like over-lvs; lvs near tip of sterile shoots gen < 0.4 mm wide; pl pale green aging tan *S. cinerascens*
- 2' Lvs of main st with tips pointed up, under-lvs longer, more curved around st than over-lvs; lvs near tip of sterile shoots often > 0.4 mm wide; pl green aging orange-brown. *S. eremophila*
- 1' Lf tip awn >> lf margin teeth
- 3. Pl in festoons, curly when dry; on, under trees; humid NCo, KR, NCoRO *S. oregana*
- 3' Pl erect, creeping, or mat-forming, not curly when dry; not on, under trees; humid NCo, KR, NCoRO or not
- 4. Pl with ± erect rootless sts arising from ground; lf base hairs on margins, abaxial surface *S. bigelovii*
- 4' Pl without ± erect rootless sts arising from ground; lf base hairs gen on margins only (also on surfaces in *Selaginella asprella*)
- 5. For most sterile lvs of main st, distance from end of abaxial groove to base of awn gen > 1/3 maximum lf width; awns gen entire; 1350–4100 m *S. watsonii*