

ISOËTACEAE QUILLWORT FAMILY

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Perennial herbs, heterosporous. ROOTS adventitious, arising from between the stem lobes, unbranched or branched. STEMS usually 2-lobed, stout, short, fleshy, cormlike, with reduced internodes, lobed. LEAVES usually numerous, deciduous, appearing tufted, linear, tapered to the sharply pointed tip, glabrous, hollow (with 4 longitudinal chambers) with a single midvein, the base broadened and convex (spoon-shaped), bearing 1 sporangium in a shallow pit on the adaxial (inner) side and a thin scale (ligule) adjacent and distal to the sporangium. SPORANGIA of 2 types, usually on the same plant, thin-walled, lacking an annulus, breaking open irregularly through decay, partially covered along the margin by a flap of tissue (velum), some with numerous megaspores, others with numerous microspores. MEGASPORANGIA with 50–300 megaspores. MEGASPORES relatively large, much bigger than the dust-like microspores, trilete, globose. MICROSPORANGIA with 150,000 or more microspores. MICROSPORES monolete, bean-shaped. GAMETOPHYTES reduced, developing inside the spores, the archegonia and antheridia protruding from the spore wall. —1 genus, ca. 150 spp., nearly worldwide.

Isoëtes L. Quillwort

Characters of the family. (Greek for “equal” and “year” [evergreen]).

Species of quillworts are often overlooked in the field, because of their superficial similarity to some aquatic species of grasses, sedges, and rushes.

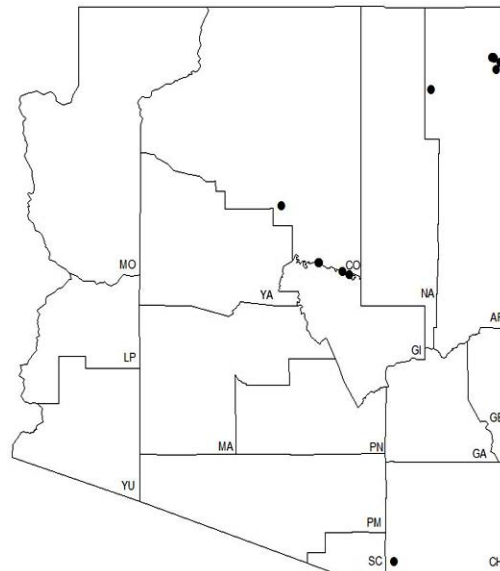
Isoëtes bolanderi Engelm. (for Henry N. Bolander, American botanist). Bolander’s Quillwort (Fig. 2). —Submerged aquatics. LEAVES 4.5–19(–24) cm long, usually somewhat stiff but flexible, tapered abruptly to the sharply pointed tip. SPORANGIA 4–12 mm long, ellipsoid, the wall often with fine brown-streaks. VELUM covering less than 1/2 of the sporangium. MEGASPORES 0.3–0.5 mm in diameter, white, rugulose or tuberculate. MICROSPORES 20–30 µm long, grayish

brown, spinulose. $2n = 22$. —Ponds and lakes (Fig. 3): Apache, Cochise, and Coconino cos. (Fig. 1); 1900–2700 m (6000–8900 ft); Jul–Sep; WA to MT, s to CA, WY, and NM; w Can.

This species is quite uncommon in Arizona. Populations in a few ponds along the Mogollon Rim in Coconino County have not been seen in recent decades due to the lowering of the local water table, but the spores are long-lived and the species may reappear if conditions change. Plants in the Lukachukai Mountains of Apache County still appear relatively secure. The single historical specimen from the Huachuca Mountains originally was referred to var. *pygmaea* (Englem.) Clute, a small-leaved form not recognized by most current botanists. It has not been relocated in Cochise County in modern times.

LITERATURE CITED

TAYLOR, W.C., N.T. LUEBKE, D.M. BRITTON, R.J. HICKEY, and D.F. BRUTON. 1993. *Isoëtaceae*. Pp. 64–75. In: Flora of North America Editorial Committee (eds.). *Flora of North America North of Mexico*. Vol. 2. Oxford University Press, New York.



Isoëtaceae Figure 1. Distribution of: *Isoetes bolanderi*



Isoëtaceae Figure 2. *Isoëtes bolanderi*, closeup of plant.



Isoëtaceae Figure 3. *Isoëtes bolanderi*, habitat in shallow water.