

Botrychium pumicola

Family: Ophioglossaceae
Genus: *Botrychium*
Subgenus: *Botrychium* (syn. *Eubotrychium*)
Species: *Botrychium pumicola* Colville
Common Name: Pumice Moonwort
Ploidy: Diploid



Published description: Trophophore stalk 0-10 mm, 0.1-0.5 times length of trophophore rachis; blade dull, glaucous, whitish green, deltate, 2-pinnate, 4 x 6 cm, thickly leathery. Pinnae to 6 pairs, overlapping, strongly ascending, distance between 1st and 2nd pinnae not or slightly more than between 2nd and 3rd pairs, asymmetrically cuneate, basal pinna pair often divided into 2 unequal parts, lobed to tip, margins entire, sinuate to shallowly crenate, apex rounded to truncate, venation pinnate. Sporophores 1-3-pinnate, 1-1.5 times length of trophophore, 2n = 90. (W. H. Wagner, 1993).

Identification

Botrychium pumicola is the only moonwort other than *B. simplex* that, in large plants, regularly has the basal pinnae elongated and pinnately divided but with the 2nd and higher pinnae pairs remaining simple and entire to palmately lobed. [In *B. lanceolatum* and its allopolyploid derivatives, the middle pinnae are also elongated and pinnately lobed or divided.] *B. pumicola* also shares with *B. simplex* its basic pinna shape, broadly decurrent attachment to the rachis and broadly rounded trophophore apices.

B. pumicola is most easily differentiated from *B. simplex* by its sessile to very short-stalked trophophore and short sporophore stalk that at maturity does not exceed the length of the trophophore. It also differs from *B. simplex* in having 2 to 4 veins entering the pinna stalk (due to the principal pinna vein dividing in the rachis well before entering the pinna stalk) vs 1 to 2 veins entering the pinna stalk in *B. simplex* (the principal pinna vein divides at the point of entering the pinna stalk) and production of underground gemmae. Other important differences are in spore size, those of *B. pumicola* averaging about 34 micrometers as compared to the unusually large spores of *B. simplex* averaging 46 micrometers and being released in tetrads whereas *B. simplex* and all other moonwort species release spores individually.

Smaller plants of *B. pumicola* that do not have the basal pinnae enlarged can be differentiated from other species with simple fan-shaped pinnae by their broadly decurrent pinna bases with multiple veins as well as by their short-stalked and dense sporophores that release spores in tetrads (four spores attached to one another in a tetrahedral arrangement).

Distribution

B. pumicola has been considered to be limited in distribution to Crater Lake and surrounding area in southwestern Oregon. It was estimated in 1997 to consist of 118 populations, 60% of which contained less than 20 individuals, and a total number of plants less than 15,000 (NatureServe Explorer 2002).

William Bridge Cooke, in 1941, found two plants of *B. pumicola* on Shastina, a secondary cone of Mt. Shasta in California, and described their occurrence as “in a basin near the spur on the south bank of Diller Canyon, west side of Shastina, near timberline” at an elevation of 9027 feet. Subsequent annotations of the specimen by R. T. Clausen and D. Wagner affirmed Cooke’s identification, and hand-written notes, presumed to be those of W. H. Wagner, state “juvenile specimen” and “spores in tetrads”. No annotations have contradicted Cooke’s identification.

Farrar (2004) re-examined the specimen collected by Cooke and found it to conform in all respects to *B. pumicola*. In addition to characters of decurrent, multiveined pinna stalks, nearly sessile trophophore, short-stalked and dense sporophore and spores shed in tetrads, spores of the Cooke specimen average 35 micrometers—a size consistent with the published size of *B. pumicola* (33-36u)

(Clausen 1938) and much smaller than those of *B. simplex*. Cooke's careful description of the site leaves no doubt that the plant was collected on Mt. Shasta in a habitat similar to that of Oregon populations. From the combined evidence, there appears no reason to discount this historic occurrence of *B. pumicola* in California. It should be sought at the site of the original collection in Siskiyou Co. and in similar habitats.

California collection of *B. pumicola*



Oregon plant of similar size



Habitat

Botrychium pumicola typically grows in loose volcanic (pumice) soils, often, at lower elevations, in frost pockets or comparable areas that retain moisture into late spring. Plants occur in relatively open sites with little competing vegetation and in *Pinus contorta*—*Purshia tridentata* forests with substantial herbaceous cover (Amsberry and Meinke 2002).

The habitat in California was described by Cooke as “in a basin near the spur on the south bank of Diller Canyon, west side of Shastina near timberline”.

Additional photographs of *Botrychium pumicola*:

