

## ***Botrychium lineare***

**Family:** Ophioglossaceae  
**Genus:** *Botrychium*  
**Subgenus:** *Botrychium* (syn. *Eubotrychium*)  
**Species:** *Botrychium lineare* W. H. Wagner  
**Common name:** Slender Moonwort  
**Ploidy:** Diploid



**Published description:** A small *Botrychium*, the leaf 6-18 cm long above the upright subterranean stem 0.5-3.0 cm long. Trophophore sessile to stalked up to 1 cm. Blade oblong, 1-pinnate. Pinna pairs 4-6, strongly separated by 2-5 times the width of segments, to moderately ascending, approximately equal in length, except for shorter apical 1-4 pairs of segments. Pinnae mostly straight, slightly upcurved, narrowly linear (narrowest in small plants), often expanded at the truncate apex or rarely linear-spatulate, commonly bifid with linear lobes. Color pale green; texture thick chartaceous, rigid. Sporophore 1-2 times the length of trophophore, with a single major axis. (Wagner and Wagner, 1994)



## Identification

The pinnae of *Botrychium lineare* have the narrowest pinna span of all moonworts, hence the common name, slender moonwort. They broaden scarcely at all toward their outer margin except as they divide, usually into two lobes diverging at an angle of about 45°. Only two other species approach this morphology, both of them closely related to *B. lineare*. *Botrychium campestre* has broader pinnae that are less deeply lobed and a rachis that is broader relative to the total leaf width. Narrow-pinnae forms of *B. ascendens* may be similarly lobed, but the lobes broaden toward an outer margin that is dentate. At maturity the sporophore stalk of *B. ascendens* is usually greater than half the length of the trophophore whereas it is less than half the length of the trophophore in *B. lineare*.

Plants from several localities appear intermediate between *B. lineare* and *B. campestre*. Possibly these are an allotetraploid taxon formed by chromosome doubling following hybridization between these two species. If this is found to be the case, these tetraploid plants may warrant taxonomic distinction.

## Distribution

*Botrychium lineare* is among the least frequently sighted of all moonwort species. It is known from 12 collections prior to Wagner's first sighting of the species in Montana in 1978. It remains known from only 34 sites, more than half of these (18) not known to be extant. The species has not been seen in eastern North America since its collection in Quebec in 1902 and 1947 and in New Brunswick in 1904. Recent documentation of *B. lineare* in the Black Hills of South Dakota and Wyoming along with other eastern species supports possible continued existence of the species in other eastern sites.

In western mountains, *B. lineare* is historically known from California and Utah and currently known from Colorado northward to Washington and Montana. It has recently been found in Alaska and the Yukon Territory. These discoveries indicate the possibility of additional occurrences throughout the mountains of western Canada where it has not heretofore been sought.

Because of its distinctive morphology it is unlikely that *B. lineare* has been overlooked or misidentified more so than other moonworts. Rather, its sporadic occurrence is probably a true reflection of its rarity.

## Habitat

Wagner and Wagner (1994) described one of the Quebec *Botrychium lineare* habitats as “a steep limestone cliff with narrow grassy horizontal terraces” on which the plants were supposed to have grown. The other Quebec site was described by the collector as “a gravelly beach”. The New Brunswick collection lacked details of habitat other than “mountain”.

Habitats of western populations of *Botrychium lineare* are highly varied, including heavily forested sites and grassy meadows, fen-like seeps and gravelly roadsides. The sites agree only in their relatively high elevation or northern latitude. The largest known extant populations near Pikes Peak in Colorado and Glacier National Park in Montana are in sparse to dense meadow and roadside grasses and forbs on gently sloping terrain. In Idaho plants are on high elevation scree slopes with little vegetation. In the most remarkable sites, near Glacier NP and in the Lostine Canyon in Northeast Oregon, plants grow through packed gravel of roadside shoulders and ditches. Along Hurricane Creek, also in northeastern Oregon, plants grow in boulder-laden substrate of an old avalanche meadow. In Alaska and the Yukon it grows along hard-packed dirt trails.

There is some indication that *Botrychium lineare* as well as other moonwort species tend to occur on limestone influenced substrates. For example, one of the Quebec sites was on a limestone cliff, and the two Oregon sites are on either side of a mountain ridge capped with limestone. It may be that the gravel of the roadside sites also contains limestone. This association warrants further study. Minimally, the pH of known sites should be determined (most limestone influenced soils have a neutral pH (pH = 6-8), and other soil elements could be also be determined. Such analysis may serve to disqualify non-calcareous, low pH areas as probable sites for occurrence of *B. lineare*.

Additional photographs of *Botrychium lineare*:



Above photographs by Drake Barton

Photo below right is hybrid between  
*B. lineare* and *B. campestre*

