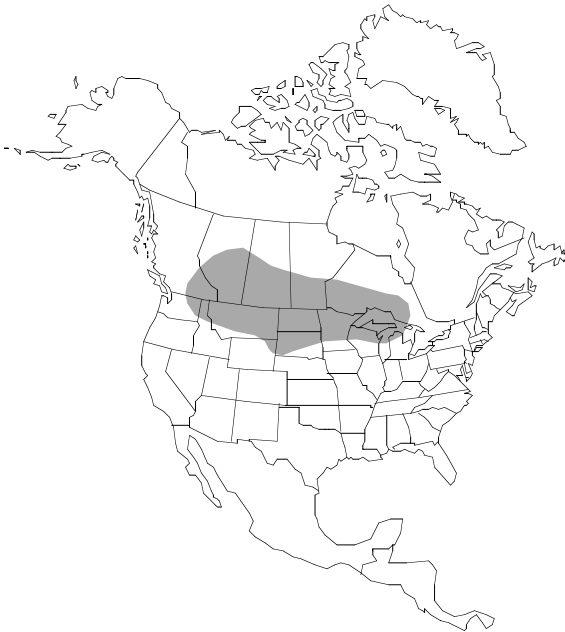


Botrychium michiganense

Family:	<i>Ophioglossaceae</i>
Genus:	<i>Botrychium</i>
Subgenus:	<i>Botrychium</i> (syn. <i>Eubotrychium</i>)
Species:	<i>Botrychium michiganense</i> sp. nov. Ined. Farrar et al.
Common name:	Michigan Moonwort
Ploidy:	Tetraploid



Published description: Similar to *Botrychium hesperium* but tending to have narrower and more exaggerated basal pinnae. Trophophore sessile to short-stalked. Pinnae above the first pair short, adnate, scarcely dissected on upper margin. Sporophore divided into three main axes. Young or dwarfed specimens may have more or less linear pinnae, and their basal pinnae may not be exaggerated (modified from Wagner and Wagner 1990). Apparently tetraploid (Farrar 2001).



Identification

Botrychium michiganense is most similar to *B. hesperium* and was initially considered to be an eastern extension of plants of *B. hesperium* in the treatment of *Botrychium* in Flora North America (Wagner and Wagner 1993). Wagner and Wagner (1990) recognized morphological differences between eastern and western plants but were not able to attribute these to a genetic basis until they encountered the two taxa growing together in eastern Washington in 1996. The Wagners then concluded that the Great Lakes Area plants were of a distinct species and chose the name *Botrychium michiganense* to be applied to this new species.

Botrychium michiganense differs most strongly from *B. hesperium* in its usually unstalked to short-stalked (<2mm) trophophore and its abrupt transition from the elongated and deeply dissected basal pinnae to the distinctly smaller and scarcely dissected second pinnae pair. In the northern Rocky where the two species co-occur, *B. hesperium* var. *fenestratum* further differs from *B. michiganense* in having pinnae and pinnules overlapping or nearly so.

The typical variety of *B. hesperium* in the southern Rocky Mountains has little to no dissection in pinnae above the first pair and only shallow and narrow dissection in its basal pinnae. Except for its longer trophophore stalk this typical variety of *B. hesperium* closely resembles *B. michiganense* and was the source of the original confusion of the two species. The typical variety of *B. hesperium* is seldom expressed where the species co-occur.

B. pedunculosum has a prominent trophophore stalk that is usually equal to or greater than the distance between the 1st and 2nd pinnae pair. Frequent occurrence of sporangia on the basal trophophore pinnae and a decidedly pink stripe down the common stalk further distinguish *B. pedunculosum*.

B. pinnatum has a sessile trophophore and sometimes shows abrupt transition to nearly undissected suprabasal pinnae, but is easily distinguished from *B. michiganense* by its lustrous (not glaucous) surface and its pinnately (not ternately) divided sporophore.

The asymmetrical dissection of pinnae above the first pair, with much deeper cutting on the lower side distinguishes *B. michiganense* from the eastern bipinnate species *B. matricariifolium* and *B. pseudopinnatum*. (See discussion under *B. matricariifolium* and the table at the end of this treatment.)

Distribution

Plants of *Botrychium michiganense* have been confirmed from Michigan, Minnesota and Ontario in the Lake Superior region, the Black Hills region of South Dakota and eastern Wyoming, northwestern Montana, eastern Washington, Waterton Lakes in Alberta, and the Cypress Hills in Saskatchewan. Collections of *B. hesperium* from the northern Rocky Mountains in the US and Canada not examined

in this study need to be re-examined for possible misidentification or mixed collections containing *B. michiganense*.

Habitat

In the Lake Superior region *B. michiganense* grows in sparsely vegetated sand dunes and in open canopy woodlands. In the Black Hills it occurs in open meadows and in old logging roads in open canopy forests. In the Rocky Mountains it grows among grasses and forbs in open meadows.

Additional photographs of *Botrychium michiganense*:



Morphological characters separating *B. michiganense* from *B. matricariifolium* and the northern 'fenestrated' form of *B. hesperium*.

Character	<i>B. michiganense</i>	<i>B. matricariifolium</i>*, <i>B. hesperium</i> var. <i>fenestratum</i>** or both***
Transition from basal to 2nd pinna pair	Abrupt in size Abrupt in degree of dissection	Usually proportional in size*** Always similar in degree of dissection***
Dissection of basal pinnae	Sinuses (division between pinnules) narrow and angular	Sinuses broad and rounded* Narrow and rounded**
Dissection of supra-basal pinnae (pinnae above the first pair)	Little or none	Similar to basal pinnae***
Symmetry of supra-basal pinnae	Dissection greater and often limited to lower side	Both sides similarly cut***
Pinna outline	Elongate to narrowly ovate-elliptic Supra-basal pinnae often little broadened beyond sessile base	Broadly ovate-elliptic Supra-basal pinnae*** broader than their sessile to short-stalked base***
Trophophore stalk	0 – 2 (3) mm, usually sessile	0 – 10 (15) mm, usually stalked* 0 – 5 (10) mm, usually stalked**
Sporophore branching	Stiff, dense	Lax, open* Stiff, dense**
Habitat	Open canopy woodlands and meadows	Closed canopy woodlands to open meadows* Open meadows **