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## *Hiemobotrychium*, a New Section of *Botrychium* Subgenus *Sceptridium* from the Southeastern United States

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**ABSTRACT.** Ecological, morphological, and anatomical characters support the recognition of a section, designated here as *Botrychium* sect. *Hiemobotrychium*, distinct in the characters described from section *Sceptridium*. It is monotypic and based on *B. lunarioides* (Michaux) Sw.

The evergreen grapeferns, *Botrychium* subg. *Sceptridium*, are represented in the New World by 14 species, half of them found north of Mexico. The most peculiar member of the subgenus is the winter or prostrate grapefern, *B. lunarioides*, a very rare and local species of the southeastern United States (Wagner, 1961). Distinct in many respects from its relatives, it is placed in a monotypic section.

***Botrychium* sect. *Hiemobotrychium* W. H. Wagner, sect. nov.** TYPE: *Botrypus lunarioides* Michaux, *Botrychium lunarioides* (Michaux) Sw.

Folium in serum autumnum et hiemem usque ad maturitatem crescens. Radices 20–30 per plantam, luteo-brunneae. Stipes communis cellulis giganteis internis similibus tracheidarum instructus. Trophophora brevistipitata prostrataque, plerumque 2, deltata, 2–3-pinnata, herbacea. Venatio pinnularum flabellata, dichotoma, sine costa. Primordia foliorum pilis sparsis munita. Axes sporophorum late complanati, succulenti, usque ad 1.4 mm lati.

Leaf growing and maturing during late fall and winter. Roots 20–30, yellow-brown. Common stalk with tracheoidal idioblasts. Trophophores short-stalked and prostrate, usually 2 per plant, deltate, 2–3-pinnate, herbaceous. Pinnule venation flabellate, dichotomous, lacking midrib. Leaf primordia with scattered hairs. Sporophore axes broadly flattened, fleshy, to 1.4 mm wide.

*Botrychium lunarioides* differs from typical members of section *Sceptridium* in the following characteristics: its curious seasonality, the plant wholly underground and dormant for 8 to 9 months of the year, including most of spring, summer, and fall, rather than being essentially evergreen and visible at all seasons as in section *Sceptridium*; in the numerous, yellow-brown narrow roots rather

than few, blackish thick roots; the presence of curious giant tracheidlike cells in the major axes (Arnott, 1960, figs. 1–4) that are lacking in *Sceptridium*; the prostrate, short-stalked trophophores, usually 2 per plant rather than upright, long-stalked trophophores, 1 per plant; the flabellate-dichotomous pinnule venation rather than pinnate pinnule venation; the primordia with few, scattered hairs rather than with numerous, densely matted hairs; and the flattened, very fleshy axes of the sporophore rather than nearly terete, only moderately fleshy axes.

Recent field investigations by Thomas (1978, 1979) have not only produced more localities, but extended the known range considerably. The species is now known from the Coastal Plain and outer Piedmont from the Carolinas to Arkansas and eastern Texas. It is rarely collected because of its unusual seasonality, growing at a time when few botanists are in the field; its flattened fronds being commonly partially covered by adjacent vegetation; and its occurrence in unexpected places, such as weedy roadsides and cemeteries.

Were it not for the somewhat intermediate species, *Botrychium jenmanii* L. Underw., section *Hiemobotrychium* would be a candidate for recognition as a separate subgenus of *Botrychium*. Technically speaking, *B. jenmanii* (Alabama grapefern), an often associated species, conforms with the major features of section *Sceptridium*, even though in a number of respects its characters suggest an affinity to *B. lunarioides*. The hypothesis has been proposed that *B. jenmanii* is the ancient hybrid of *B. biterdatum* (Savigny) Underw. and *B. lunarioides* (Wagner, 1968: 118, 120, fig. 2). *Botrychium jenmanii* commonly occurs side-by-side with *B. biterdatum* and/or with *B. lunarioides*. In northward extent, in eastern North America, *B. biterdatum* reaches as far as Maryland and eastern Pennsylvania, *B. jenmanii* as far as southwestern Virginia, but *B. lunarioides* reaches only as far as South Carolina. Both of the putative parents are diploids with  $n = 45$ ; *B. jenmanii*, on the other hand, with  $n = 90$ , is the only New World polyploid in subgenus *Sceptridium*.

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