

BOTRYCHIUM VIRGINIANUM AND ITS FORMS.

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BOTRYCHIUM VIRGINIANUM.

In 1905,¹ an account was given by me of a peculiar form of our Virginia plant. It showed a forking sporophyll, which phenomenon does not appear to be so unusual, for I have observed a number of similar cases since that time. The unusual, however, about the plant was the presence of two fertile pinnæ on one of the sterile segments (branches). The plant was collected in the woods along Chesapeake Bay, some 30 miles east of Washington. Along with typical specimens grew some very small plants which were referred to the small form of the species or *B. gracile* Pursh.

In 1907, while botanizing near Chevy Chase, Maryland, I came upon a rather large colony of the species and found also a large number of smaller plants growing under the shade, so to speak, of plants of normal size. The smallest fruiting specimen which I could find measured 10 cm. in height. The branches of the sterile frond measured about 2 cm. in length while the fertile frond somewhat exceeded this measure. The spore-bearing part alone (i. e., exclusive of the stalk) measured only 5 mm. The largest specimen of *B. virginianum* which I have collected in Maryland, measures about 70 cm. in height, while the sterile branches are 20 cm. or more and the pinnæ 6 cm. more or less in length. Much larger specimens may exist, but I give measurements only of those which I have collected and which are preserved in my own herbarium. The size of the plant seems to depend largely on its age and the perennial root appears to last many years. The variation, therefore, of the species in Maryland and Virginia (fruiting specimens alone being considered at this time) appears to lie between 10 and 70 cm., so far as the height of the plant is concerned. It is apparent that *B. gracile* Pursh (*B. virginianum* var. *gracile* Presl) is only a young fruiting plant of our typical *B. virginianum*.

One of the earliest records of our Virginia plant is found in the works of Morison² where it is under the name:

Lunaria botrytis elatior Virginiana pinnulis tenuissimis, etc.

¹ *Torrey* 5: 160. *f. 1.*

² *Pl. Hist.* 3: 595. *sect. 14. pl. 4. f. 5. 1799.*

The plant was sent to England by the pioneer of Virginian botany, John Banister.

Gronovius and Linnæus referred it to the genus *Osmunda* in *Flora Virginica*.

The range given for the species by Professor Underwood¹ is: "In woods, Nova Scotia to British Columbia, Florida and Arizona. Also in Europe and Asia."

It is comparatively easy to clear up the history of a species when we are in a position to study the living individuals. If, on the other hand, we are limited to fragmentary material, as was often the case with the old botanists, it is not at all surprising that such simple, diminutive forms as the early fruiting fronds of *B. virginianum* were given a distinct name or referred to the species as a variety.

If we examine material from other parts of America as, for instance, the region from Mexico southward into Peru, we are confronted with the same difficulty as the earlier botanists, for the material from the Latin-American countries, besides being scant, shows a much greater range of variation than do the plants from the United States. With an insufficiency of material, therefore, and with practically no knowledge of the living plants, we can do little except to describe the herbarium material at hand and to attempt to refer it to forms already known. The record given by Linnæus² of his *Osmunda virginiana* (*Botrychium virginianum*) reads:

Osmunda scapo caulino solitario, fronde supra decomposito.

Osmunda fronde pinnata caulina, fructificationibus spicatis. *Gron. virg.* 196.

Osmunda asphodeli radice. *Plum. fil.* 136. t. 159. *Pet. fil.* 168. t. 9. f. 2.

Habitat in America.

From the above it is apparent that the concept of the species as held by Linnæus has not changed. It is doubtful also if he ever saw Plumier's plant. The account of this fern points clearly to *B. virginianum* or some close ally, but the figure is not of our plant in all its details. It should be stated also that the botanical artists of two centuries ago often disregarded the details and a striking result of this license is seen in the earliest representations of our handsome *Adiantum pedatum*. We cheerfully make allowance for the artist's fancy when we read Cornut's description of the plant, for in the description we find that very element, the treating of plants as living beings, which is necessarily of the most importance in the make up of any book on botany. Plumier³ gives an account of the plant of which the following is a part:

"Je trouvay cette Plante dans les forests de l'Isle Saint Domingue, où j'en ay veu une autre espèce tres semblable, mais dont les feuilles étoient plus émoussées, un peu moins découpées & bordées d'une dentelure tres-delicate.

¹ Small, Fl. Southeast. U. S. 3. 1903.

² Sp. Pl. 1064. 1753.

³ Trait. Foug. 136. pl. 159. 1705. (Parallel columns of French and Latin text.)

“Monsieur Sarrazin tres-habile Medecin, sçavant Anatomiste & Botaniste du Roy dans le Canada, envoya de ce même Pais, ces deux mesmes especes à Monsieur Vaillant aussi Botaniste du Roy, & tres-expert Anatomiste. Il luy manda en même temps que les Sauvages appelloient ces deux mêmes plantes *l'Herbe aux Serpens*, y ayant recours d'abord qu'ils en ont esté mordus, pour remedier à leur morsure par l'application de cette Herbe.”

It should be noted that Clayton¹ gave as the vernacular name in Virginia for this plant “Fern-Rattle-Snake-root,” a translation probably of the Indian name for which the French version is “l'Herbe aux Serpens” as given above.

Professor Underwood and Mr. Benedict² record three species of *Botrychium* from the West Indies: *B. virginianum*, *B. jenmani*, and *B. underwoodianum*. No definite locality is given for the first species, so we may conclude that it is not a local plant even in the West Indies. The second species is known only from Jamaica. The third is also known from Jamaica and Haiti (?). In Plumier's illustration³ there is a portion of a frond which appears to represent a second species of which he speaks in the text. The latter plant he describes as having “les feuilles plus émoussées, un peu moins découpées & bordées d'une dentelure tres-delicate”—a description which suggests *B. underwoodianum* or some close ally. His *Osmunda Asphodeli radice* received the name *Osmunda cicutaria* in 1798.⁴ It is represented as having the stalk of the fertile segment inserted nearly midway between the root system and the lowermost sterile pinnæ (or branches), a condition which probably led the earlier authors to regard the illustration as being representative of a distinct species.

Swartz⁵ accepted the species upon the authority of Savigny and also cites Plumier's illustration, showing the low insertion of the fertile segment. That such a condition actually existed in Plumier's plant from Santo Domingo is probable, from the fact that I have observed a single instance of this sort in a Jamaican specimen. Prantl⁶ in his review of the Ophioglossaceae refers *B. cicutarium* Swartz to *B. virginianum*. His statement with respect to the latter species, “Pedunculus e basi laminae vel rarius e petiolo oriundus,” might lead us to believe that he had also observed instances wherein the condition represented in Plumier's plate existed, but we have no direct proof that such was the case.

BOTRYCHIUM DICHRONUM.

Professor Underwood described this species⁷ from material collected by Mr. W. N. Clute at Morces Gap, Jamaica, at an altitude of 1,500 meters. The description of the species fits also *B. virginianum* in all particulars except two. From the latter *B. dichronum* is said

¹ Gronov. Fl. Virg. 196. 1739.

⁵ Syn. Fil. 171. 1806.

² N. Amer. Fl. 16¹: 3-10. 1909.

⁶ Ber. Deutsch. Bot. Gesell. 1: 350. 1883.

³ Trait. Foug. 136. pl. 159.

⁷ Bull. Torrey Club 30: 45. 1903.

⁴ Savigny in Lam. Encycl. 4: 650.

to differ in its peculiar short panicle and "especially in its persistent sterile leaf which remains fresh until the new one is fully developed, the plant thus having two growing leaves at the time of maturity, to which allusion is made in the specific name." All the West Indian material accessible to me has shown the above characteristics, and I have not seen any specimens referable to typical *B. virginianum*.

BOTRYCHIUM BRACHYSTACHYS.

In describing this species¹ Kunze makes the following observation:

Die Kürze der fruchtbaren Fieder, welche nur an einem von 12 untersuchten Exemplaren etwa zur Hälfte über das sterile Laub hervorragte, an allen übrigen kürzer war, ist allerdings das auffallendste Unterscheidungszeichen; möchte aber für sich *allein* nicht zur Begründung einer eigenen Art hinreichen.

From the above it is apparent that the concepts of *B. dichrosum* and *B. brachystachys* agree as to the comparative length of the fertile segment. Although the author of the latter species did not consider this character as sufficient in itself to base a species upon, nevertheless in all specimens which I have examined it appears constant, and all² except one specimen show the persistent leaf.

All the West Indian and the Central American records for the plant show that it belongs to the Temperate Zone. The Panama material collected by Mr. William R. Maxon is by far the best and the most interesting. All the specimens show the persistent sterile segment. In one (no. 675552), collected "on moist forested slopes of Cerro de Lino, above El Boquete, Chiriqui, Panama, altitude 1,300 to 1,560 meters," the fertile segment is inserted at the base of the sterile branches, measuring 20 cm. in length (the stalk included) and exceeding the sterile branches by 2 to 3 cm. only. The entire plant measures 44 cm. Another specimen (no. 675968) shows a forking fertile segment equaling in length the central branch of the sterile part, which is 22 cm. long. The entire plant measures 71 cm., while the persisting frond measures 60 cm. in length.

The most interesting of Mr. Maxon's specimens is one (no. 675988) presenting several peculiarities, as shown in plate 102. Only the upper portion of the plant was collected. The fertile segment emerges from the common stalk about 3 cm. below the branching of the sterile segment, thus proving in a measure the possibility of the condition represented in Plumier's plate. It measures 41 cm. in length, the distance from the point of insertion to the lowermost pinnæ being 17 cm. These are bipinnate and measure 17 cm. in length. The

¹ *Linnaea* 18: 305. 1844.

² U. S. National Herbarium nos. 826306, 830774 (Guatemala, alt. 1380-1550 meters, coll. von Türckheim); no. 830770 (Guatemala, alt. 1,800 meters, coll. J. D. Smith); and from western Panama, no. 677413, alt. 1,000-1,300 meters, coll. Pittier; nos. 675552, 675610, 675968, 675969, and 675988, alt. 1,300-1,700 meters, coll. Maxon.



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BOTRYCHIUM CICUTARIUM (SAVIGNY) SWARTZ.

upper portion (16 cm.), with the exception of a few pinnules, is sterile, a condition which I have never before observed. (PLATE 102.)

EXPLANATION OF PLATE 102.—A specimen collected in humid forest along the upper Caldera River, near "Camp I," Holcomb's trail, above El Boquete, Chiriqui, Panama, altitude 1,450 to 1,650 meters, March 22 to 24, 1911, by William R. Maxon, no. 5569 (U. S. Nat. Herb. 675988). Scale slightly less than $\frac{1}{2}$.

Mr. C. G. Pringle collected a specimen ¹ of nearly typical *B. virginianum* in the State of Hidalgo, Mexico. In this plant the fertile segment (including the stalk) is 31 cm. long, while the middle branch of the sterile segment is only half as long, a condition normal (at least in older plants) in typical *virginianum*. There is no trace of a persisting sterile leaf.

The South American and Old World material in our collections in Washington is too scant and fragmentary to permit much discussion. In one specimen ² from Ecuador, however, the fertile segment is inserted about 1 cm. below the lowermost sterile pinnæ, and in another specimen on the same sheet the position of the fertile segment is normal. A further discussion of extra-North American plants belongs properly to botanists who are able to avail themselves of collections rich in European and Asiatic material and to those who have had the opportunity to botanize in South America.

CONCLUSION.

The foregoing review of North American material seems to justify the recognition of two species, which may be distinguished as follows:

Plants with persistent leaves and with fertile segments equaling or somewhat exceeding the sterile segment.

Botrychium cicutarium (Savigny) Swartz, Syn. Fil. 171. 1806.

Osmunda cicutaria Savigny in Lam. Encycl. 4: 650. 1797.

Botrychium virginicum β *mexicanum* Hook. Bot. Misc. 3: 223. 1833.

Botrychium brachystachys Kunze, Linnaea 18: 305. 1844.

Botrychium dichrosum Underw. Bull. Torrey Club 30: 45. 1903.

Plants without persistent leaves and with long-exserted sporophyll (in older plants).

Botrychium virginianum (L.) Swartz, Journ. Bot. Schrad. 1800²: 111. 1801.

Osmunda virginiana L. Sp. Pl. 1064. 1753.

Botrychium gracile Pursh, Fl. Amer. Sept. 656. 1814.

The excellent material collected by Mr. Maxon gives us a good insight into the very variable *B. virginianum* group and helps us to distinguish the two forms proposed by botanists long ago. It would save much confusion and add much to the credit of botany if only such material could be considered in plant descriptions.

¹ U. S. Nat. Herb. no. 461872.

² U. S. Nat. Herb. no. 50754.