FINAL REPORT

Natural Heritage and Nongame Research Program, Ecological Services

PROJECT: SURVEYS FOR TWO SPECIES OF MINNESOTA

BOTRYCHIUM 25-30 June 1998

Warren H. Wagner, Jr., Department of Biology and
Herbarium, University of Michigan, Ann Arbor 48109

ABSTRACT

A field project was carried out to analyze the status of two rare species of Botrychium (Ophioglossaceae). Several definite conclusions were reached: (1) the alleged B. pseudopinnatum from Minnesota Point has proved to be merely an unusual form of the common B, matricariifolium. (2) the proper time to study the possible new species that appears to be intermediate between B. multifidum and B, rugulosum is middle to late summer. It is fairly common locally at a site near Gilbert. The University of Minnesota Duluth Herbarium (Olga Lakela Herbarium) provided funds for a workshop-lecture in connection with this Natural Heritage Project, so it was possible to prepare a number of individuals to volunteer for the field study. Resulting from this interaction and the field work, a number of important new discoveries were made, including occurrences of B. lanceolatum, B. pallidum, B. michiganense (still undescribed new species), and a remarkable range extension for the rare western B. ascendens. Another discovery in 1998 involves the rare and elusive B. spathulatum, which was found for the first time by one of the participants. Our knowledge of grapeferns and moonworts has thus been greatly expanded as a result of this project, and we are now contemplating the writing of a new book on the pteridophytes of Minnesota, to include the newly acquired knowledge.

Introduction: Problems of identification and variation arose in connection with two unusual taxa. The first had a resemblance to the rare Botrychium pseudopinnatum, an exceedingly rare species known only from the north side of Lake Superior. The other, which appeared to be a new species, arisen from hybridization between B. rugulosum and B. multifidum. We needed to answer questions about these plants, including associates, habitats, chromosomes, and spores, as well as management goals. In connection with this study, we were asked to present a seminar-workship, sponsored by the Herbarium of University of Minnesota Duluth, as a background for individuals who volunteered to help us in the field.

Materials and Methods: The actual work proved to involve primarily field exploration and studies of populations. The plants were not removed, but leaves were taken, which does no damage to the underground stems and roots. The specimens were carefully compared in the field and later in the laboratory.

Results: We studied known localities plus new ones that we discovered during the research. Since we were able to investigate both the Minnesota Point localities and the localities near Gilbert in only two days (due to the excellent field assistance), we added a third potential locality in Cook County. Also, we profited from the interest generated by this project because various individuals made discoveries on their own before and after our visit.

The high spots are as follows:

1. New localities were revealed, including sites with very rare species new to Minnesota.
2. The materials originally identified as B. pseudopinnatum turned out not to be this species, but unusual variants of the familiar B. matricariifolium.
3. The apparent allopolyploid is represented at the locality near Gilbert by numerous plants, and their distinctness remains obvious. However, we were too early both for spores and for chromosomes so we are planning further work there, probably in July and August in the near future.

4. Some very exciting new finds were made involving very rare species, including a major range extension:
    a. B. lanceolatum. Only two, widely separated localities were found of this species so rare in Minnesota. At each site we found only a single individual.
    b. Only recently described, B. pallidum is a very rare species, but we discovered a few specimens at each of the localities we visited.
    c. The still undescribed species, B. michiganense, was found at a couple of localities, yielding interesting variations.
    d. The most exciting discovery was made after our visit by Mr. Jeff Newman in an old steel and cement site in west Duluth. It involves an extraordinary range extension of hundreds of miles east of the nearest known station. The species itself is very rare and local even in its western metropolis.

The collections we made will be deposited in the University of Minnesota Herbaria, after they have been thoroughly studied. Duplicates were also obtained by members of our group, these also to be deposited in herbaria.

Discussion: We are extremely pleased with the direct as well as indirect results of this project. Not only did we clarify the true nature of the alleged B. pseudopinnatum but we became familiar with the early stages of the possible new species or hybrid involving B. multifidum and rugulosum. For the latter we now have a clearer idea of when to collect chromosome stages and spores. The associated findings concerning B. lanceolatum, B. pallidum, B. michiganense, and B. ascendens. An additional discovery by Audrey Engels of B. spathulatum, new to the state, expands still further our knowledge of these plants in the upper Great Lakes area. With our new acquaintances continuing to scout eastern Minnesota, we fully expect additional discoveries to be made. Evidence is accruing that indicates Minnesota as being a key stage for the investigation of these plants in north central North America. Partially as a result of this work, we are initiating

plans for writing a book on the pteridophytes of Minnesota, which should contain detailed accounts of the occurrence not only of Ophioglossaceae but all of the other free-sporing vascular plants as well. We hope to expand our researches in the state, especially in the northeastern part during the next several years. The present research gives us better ideas of ways and means for conserving the natural populations of these plants. I believe that the proposed OHV park near Gilbert can be developed but avoiding the areas in which the plants grow.

APPENDIX A

Individuals who provided assistance

Audrey Engels

Janet Boe

Karen Myrhe

Sharon Nelson

Jeff Newman

Deborah Pomroy

David Schimpf

Welby Smith

Gary Walton

Lin Gerdes

(others not listed)

APPENDIX B

Three localities where samplings were made

1. MN: Duluth. Minnesota Point. T48N, R13W, Sec 20. St. Louis Co.
Mainly second-growth edges of open areas. 27 June 1998

98031. Botrychium yallidum. Occasional.

98032. B. lanceolatum. Only a single leaf found.

98033. B. michiganense. Rare. Scattered:

98034. B. matricariifolium. Extremely abundant and variable.

2. MN: St. Louis Co. Proposed OHV park near Gilbert. T58N, R17W, SE 1/4 Sec 24. Second growth along and near roads. Edges of woods.

98039a. B. pallidum. Rare and local.

98039b. B. unknown, resembling possible hybrid of B. multifidum and B. rugulosum. Early stages, premeiotic Frequent and scattered.

3. MN: Cook Co.Pancore Lake Road. Two sites near each' other, combined. 470-450 N, 90051' W, Sec 21. Sowbill Camp, compartment C-74. Open shrubby fields, sandy soil, probably old logging landing in jackpine association.

98035. B. michiganense. Mostly scattered, rare.

98036. B. lanceolatum. Only a single leaf found.

98037. B. matricariifoligm. Frequent to common.

98038. Additional variants of-B. michiganense. Scattered, rare.

98039. B. pallidum. Rare

APPENDIX C. Actual expenses

Duluth Trip 26-30 June 1998
Expenses for 2 people

Airfare	2 x 313	626.00
Car to & from airport	50 mi @ .31 =	15.50
Van to Duluth	2 x 46=	98.00
Airline parking		27.00
Gas (for Gary Walton)		11.78
Misc. (tips)		11.00
Hotel		418.15
Meals		542.24
		1749.67

Warren Herb Wagner, Jr.

Florence S. Wagner