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THE HABITAT OF THE OSTRICH FERN (*MATTEUCCIA STRUTHIOPTERIS*) IN NOVA SCOTIA AND PRINCE EDWARD ISLAND[1]

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Seventy-two stands of *Matteuccia struthiopteris* were located in Nova Scotia and Prince Edward Island. Associated species of trees and shrubs were recorded, and the soil was analyzed. *M. struthiopteris* is not associated with any particular plant species, but rather with specific edaphic characteristics—good drainage, a high water table, and a pH above 5.0. In areas where the soil is extremely acid (pH≤4.5), this fern is restricted to alluvial habitats.

Soixante-douze peuplements de *Matteucia struthiopteris* furent réperés en Nouvelle-Ecosse et à l'Ile-du-Prince-Edouard. Les différentes espèces d'arbres et d'arbutes associées à ces peuplements furent inventoriées et le sol analysé. *M. struthiopteris* n'est associée à aucune espèce particulière de plantes; cependant, elle est associée à certains caractères édaphiques particuliers: un bon drainage, un niveau hydrostatique élevé et un pH superieur à 5.0. Dans les régions où l'acidité du sol est extrême (pH≤4.5), cette fougère est restreinte aux habitats alluviaux.

Introduction

Matteuccia struthiopteris (L.) Todaro (Ostrich fern) has an almost circumboreal distribution in the northern hemisphere (Hulten 1968). In North America it occurs south to Maryland, north to every province of Canada, and north and west to Alaska (Tryon & Tryon 1982).

Along the St. John River valley, New Brunswick, young croziers or "fiddleheads" of *M. struthiopteris* have been eaten traditionally as a spring vegetable. With the introduction of the frozen product, and the subsequent expansion of the market, interest has increased in the potential for crop management and cultivation. Over the past two decades a few, very limited studies of wild stands have been conducted in Maine (Gabrielson 1964) and New Brunswick (Roberts-Pichette 1971), areas which have had an active fiddlehead industry. Subsequently, we examined the habitat of ostrich fern outside these areas of commercial exploitation, in the neighboring provinces of Nova Scotia and Prince Edward Island.

Methods

Seventy-two populations of *M. struthiopteris* were located during spring and summer of 1981, 62 in Nova Scotia, and 10 in Prince Edward Island (Appendix). Generally, five soil samples per site were taken to a depth of 10 cm. These were analyzed at the Soils and Crops Branch, Nova Scotia Department of Agriculture and Marketing. Organic matter was assessed by loss on ignition, and pH was measured from solutions of soil:water (1:1). The Bray method (0.05N NH_4Cl, 0.1N HCl) was used to measure phosphate. Potassium, calcium and magnesium were extracted with 1N ammonium acetate, the potassium being measured by atomic emission and the other two by atomic absorption. In addition, a qualitative assessment of presence and type of tree and shrub cover was done at each site.

Results and Discussion

All but four of the 72 populations of *M. struthiopteris* occurred along the margins of streams, brooks, or rivers. In these riparian sites, the fern was mainly in wooded

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intervales, but it also occurred along margins of cultivated fields, on open gravel, and in one instance in a boggy area with *Sphagnum* spp. and other characteristic wetland species. The non-riparian populations were on Cape Split and the slopes of Mount Thom. Although the plants at these sites were not obviously associated with running water, there was seepage from a high water table. These four sites also differed from the others in having a much higher percentage ($\bar{x}$=30% vs. $\bar{x}$=9.7%) of organic matter in the soil. The occurrence of *M. struthiopteris* in such habitats suggests that to classify these plants as rheophytes would be incorrect. True, Ostrich ferns withstand flooding, but they neither require flooding nor are limited solely to areas which are periodically inundated, unlike most rheophytes (van Steenis 1981). It is also worth noting that fern populations in such habitats as gravel banks, bog and wooded upland were quite large.

In Nova Scotia, the occurrence of *M. struthiopteris* is largely restricted to the northern and western parts of the province (Fig 1), where the soil is less acid (pH 4.5 to neutrality) than Gibraltar soils (pH < 4.5) of the Atlantic Coastal Plain (Roland & Smith 1969; MacDougall & Nowland 1972). The soil types associated with the Ostrich fern were predominantly local Orthic-humo-ferric Podzols, although there were nine sites with Grey Wooded soil, and one with Orthic Regosol soil (MacDougall & Nowland 1972). Organic soils were not found at any of the sites.

Similarly, in Prince Edward Island, *M. struthiopteris* occurred on diverse, well-drained and local Orthic Podzols (Anon. 1966) with no correlation between distribution and specific soil type. The Ostrich fern is common in creek bottoms in Prince County clay regions. Farther east, in Queens and Kings counties where it is

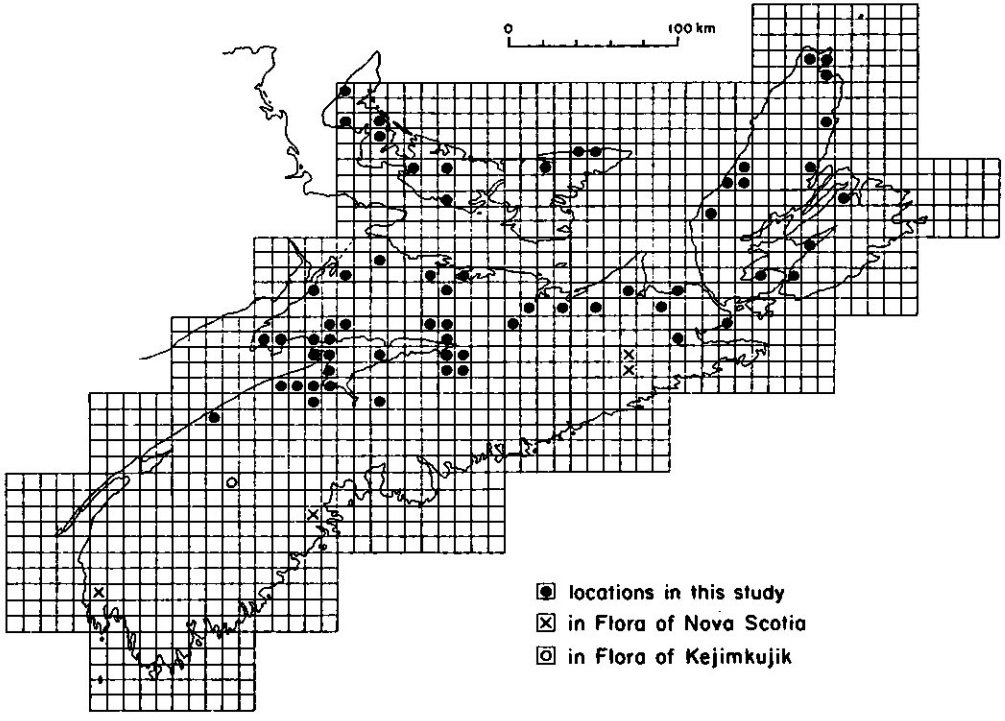

Fig 1 Locations of habitats studied (solid circles—one dot represents one or more sites found within a grid square), including some sites listed in the literature: Roland and Smith, 1969; (circles), and Roland, 1980 (crosses).

less common, it is restricted to larger streams with flood deposits (Erskine 1960).

The wide range of soil pH (4.9 - 7.5) and the usually slightly acid values of the sites ($\bar{x}$ = 5.8) argue against claims of a calcicole nature for this fern (e.g. Fernald 1921). Divergent pH values in stands of *M. struthiopteris* have also been recorded elsewhere, in Maine (Gabrielson 1964) and in New Brunswick (Roberts-Pichette 1971). Other edaphic properties, such as content of magnesium (109±31 ppm), calcium (1143±723 ppm), phosphorus (71±44 ppm) and potassium (156±62 ppm) varied considerably between sites.

Matteuccia struthiopteris is more common in the northern part of Nova Scotia. Wild stands of the fern were sought but not observed in Digby, Yarmouth, Shelburne, Lunenburg, Queens and Halifax counties which are covered in the main, by rather acid soils (pH≤4.5). There are records (Fig 1), however, from Kejimkujik National Park (Roland 1980), the Tusket Valley, the LaHave River near Bridgewater, and the St. Mary's River near Glenelg (Roland & Smith 1969). The first three sites are on soils of slightly higher pH than those generally found in the Atlantic Coastal Plain area, but the St. Mary's River site is a typical acid podzol. In this last case the local pH level is probably higher than the surrounding soil type would suggest, possibly because of the periodic deposition of alluvium. This was observed at the other sites of *M. struthiopteris*, along the rivers of eastern Prince Edward Island, and in several sites on siliceous soils in Nova Scotia (e.g. Barnhill River, Cumberland Co.; Jumping Brook, Victoria Co.).

In 70 of the 72 sites, *M. struthiopteris* was found with some tree or shrub cover, but did not appear to be singularly associated with any particular species or group of species (Table I). Previously, this fern had been reported associated with trees and shrubs associated with *Alnus* and *Ulmus* in Finland (Söyrinki & Saari 1980), the Federal Republic of Germany (Englert 1970; Rasbach *et al.* 1978), Maine (Gabrielson 1964), and New Brunswick (Roberts-Pichette 1970). In British Columbia, however, and the Caucasus, *M. struthiopteris* has also been found where species of *Picea* are dominant (Taylor & MacBryde 1977; Walter 1974). Porfirev (1975) reported it in association with other dominants such as broad-leaved cedar, Manchurian ash, and linden. A tabulation of the different ecotopes and vegetation found with *M. struthiopteris* led him to conclude that Ostrich fern was an indicator of mesotrophic conditions, whether found on mountain slopes, along floodplains,

Table I Tree and shrub species found with *Matteuccia struthiopteris in the 72 sites investigated*

Species	No. of Sites	Species	No. of Sites
Alnus rugosa (DuRoi) Spreng.	31	*Pyrus malus* L.	5
Ulmus americana L.	23	*Tsuga canadensis* (L.) Carr.	5
Acer saccharum Marsh.	22	*Alnus crispa* (Ait.) Pursh	4
Acer rubrum L.	17	*Amelanchier wiegandii* Nielsen	4
Prunus virginiana L.	17	*Cornus stolonifera* Michx.	4
Acer spicatum Lam.	16	*Quercus borealis* Michx.	4
Betula alleghaniensis Britt.	15	*Betula populifolia* Marsh.	3
Salix L. spp.	14	*Picea rubens* Sarg.	3
Abies balsamea (L.) Mill.	11	*Sambucus* L. spp.	3
Fraxinus americana L.	10	*Ostrya virginiana* (Mill.) K.Koch	2
Picea glauca (Moench) Voss	7	*Picea mariana* (Mill.) BSP	2
Betula papyrifera Marsh.	5	*Pinus strobus* L.	1
Crataegus L. spp.	5	*Populus grandidentata* Michx.	1
Populus balsamifera L.	5	*Populus tremuloides* Michx.	1

or, occasionally, in swamps. Our results support a similar conclusion. There seems to be little direct correlation between occurrence of Ostrich ferns and tree/shrub vegetation. *M. struthiopteris* appears to be associated with well-drained soils, high water table, and moderate pH.

The potential for commercial exploitation of stands of Ostrich fern in Nova Scotia and Prince Edward Island is very limited, as the populations at most of the sites were generally too small to be exploited profitably on a continual basis. There are, of course, some larger stands throughout both provinces, but it is our opinion that a fiddlehead industry could not be supported from present wild resources.

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Appendix

Study sites in Nova Scotia and Prince Edward Island

NOVA SCOTIA: *Annapolis:* Oak Hollow Brook, *Kings:* Cornwallis River, Elderkin Brook, Ryan Brook, Near Cape Split, Hiking trail to Cape Split, Trail to Cape Split, Mill Creek, White Water, Rockland Brook, Berwick, Greenwich, Deep Hollow Road, Gaspereau River, *Hants*: South Maitland, Rennie's Brook, Meander River, *Colchester*: Beaver Brook, Stewiacke River, Chiganois River, Great Village River, Green Creek, Debert River, Folly River, Mattatall Brook, Annandale, Brookfield, *Cumberland*: West Moose River, Parrsboro, Jeffers Brook, West Diligent River, Fowler Brook, McRitchie Brook, Barnhill River, St. George's River, Shinimecas River, Wallace River, *Pictou*: Mt. Thom, Union Center, Pinetree, Marshy Hope, *Antigonish*: Brierly Brook, Pomquet River, Tracadie River, *Guysborough*: Meadow Brook, Ogden, *Richmond*: Dundee, The Points West Bay, Soldier's Cove, *Cape Breton*: Big Pond, Scotch Lake, *Victoria*: North River Bridge, Ingonish River, Middle Aspy River, Wilkie Brook, Jumping Brook, *Inverness*: Lake O'Law, Margaree Forks, Gillisdale, Big Cove River, Glendyer Station, Fordview. **PRINCE EDWARD ISLAND:** *Prince*: Northam, Enmore River, Mount Royal, Roseville, Dunk River, *Queens*: New Glasgow, DeSable River, *Kings*: Morell River, Naufrage River, Glencorradale.