

THE LIMESTONE OAK FERN: NEW TO THE FLORA OF MANITOBA

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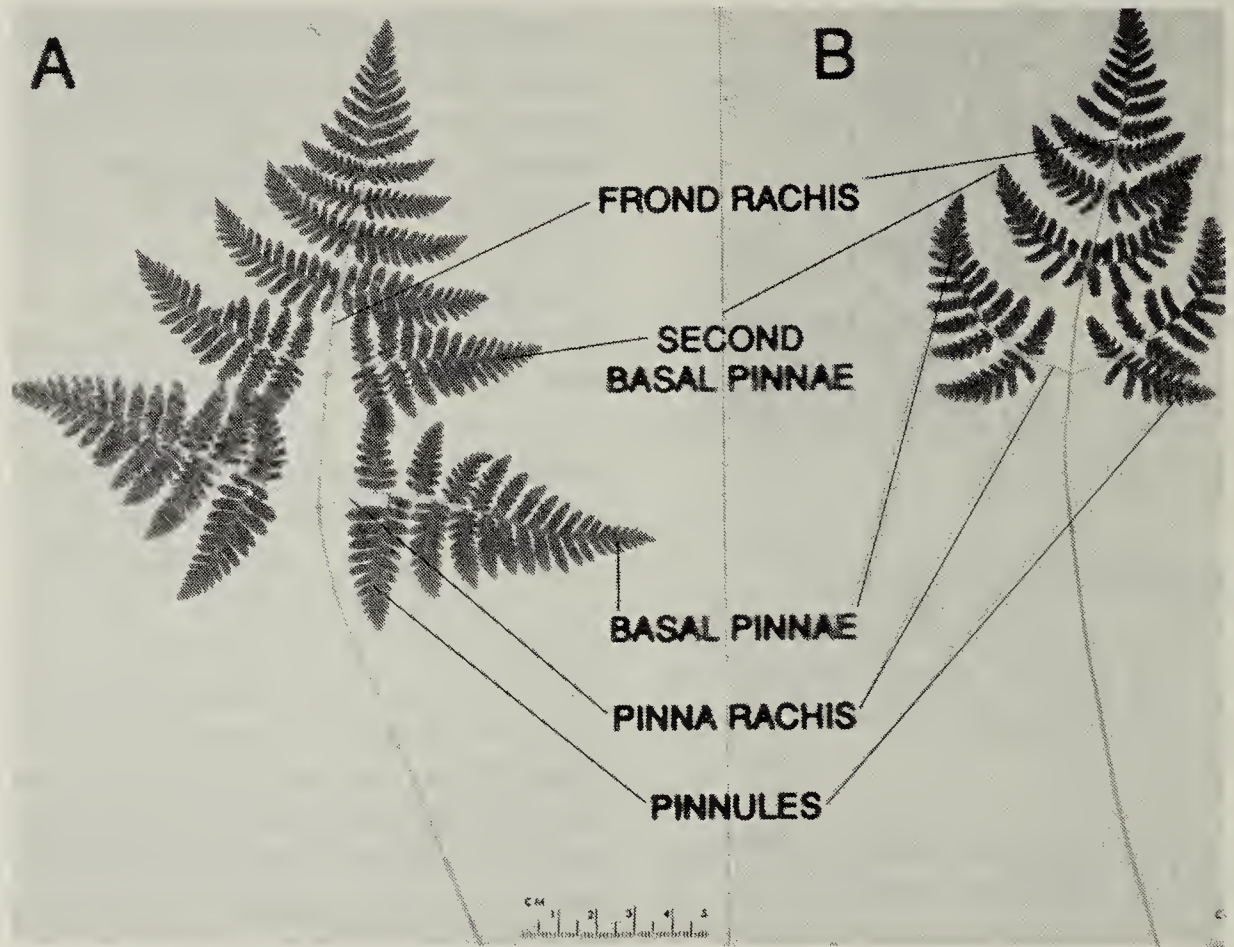


Figure 1. Oak Fern frond silhouettes. A. Limestone Oak Fern
B. Nahanni Oak Fern

To those not acquainted with some of the recent taxonomic literature pertaining to the Oak Fern genus (*Gymnocarpium*), the title of this article will be puzzling indeed.^{3 4 5} Most botanists are familiar with the genus as comprising only two species, the Common Oak Fern (*G. dryopteris* (L.) Newm.) and the Limestone Oak Fern (*G. robertianum* (Hoffm.) Newm.). Prior to Sarvela's worldwide synopsis of the genus,⁴ these two species were regarded as each having a broad distribution in Canada that extended from the Yukon to Newfoundland.⁷ According to Scoggan, the Limestone Oak Fern had

a wide range in Manitoba from Lake of the Woods to as far north as Reindeer Lake.⁶

Sarvela presented a startling revision of what was known as the Limestone Oak Fern in North America. He segregated the species into two taxa: *G. robertianum* s.s. restricted to the east (Newfoundland, New Brunswick, Quebec, Ontario and a few states in the Great Lakes region), and *G. jessoense* (Koidz.) Koidz. ssp. *parvulum* Sarvela — the Nahanni Oak Fern occurring westward from Ontario to Alaska.^{4 5} The Limestone Oak Fern was there

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Figure 2. Limestone Oak Fern fronds growing on limestone outcrop in Interlake region, Manitoba
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y "eliminated" from the flora of Manitoba, and plants that formerly had been referred to that species in the province and westward were identified as the Nahanni Oak Fern.^{3,4,5} Frond silhouettes of these two taxa are shown in Fig. 1 and comparative information for the three species of Oak Fern found in Manitoba is summarized in Table 1. Hybrids between the Nahanni Oak Fern and the Common Oak Fern are present in Manitoba wherever these two taxa occur together. These plants are known as the Intermediate Oak Fern (*G. x intermedium* Sarala). They are intermediate in their frond morphology and glandularity, and can be readily distinguished by their blackish, malformed, abortive spores.

According to its new circumscription, the Limestone Oak Fern has a restricted range and is regarded as a rare species in Canada.¹ Although there are numerous localities for it in eastern Canada, especially in Ontario and Quebec where it is widely distributed, the populations are

small at all verified sites. The following two specimen citations represent the only confirmed records for this newly circumscribed species in Manitoba and are the westernmost localities in North America: 3 mi. n of Cranberry Portage, rock crevices in limestone cliffs, 10 July 1974, K. Johnson J74-45 (MMMN); Interlake region, 37 km n of Grand Rapids, off Hwy. 6, low escarpment in Jack Pine-spruce woods on limestone outcrop, 12 August 1982, M.J. Shchepanek & A.W. Dugal 4762 (BRY, CAN, ILL, LEA, MICH, MIN, MMMN, OAC, SASK, USAS).² Fig. 2 is a photograph of fronds of the Limestone Oak Fern taken at the second locality. This rare fern should be looked for on limestone cliffs and outcrops elsewhere in Manitoba.

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Table 1. COMPARISON OF COMMON, LIMESTONE AND NAHANNI OAK FERN

CHARACTERS	COMMON OAK FERN <i>G. dryopteris</i>	LIMESTONE OAK FERN <i>G. robertianum</i>	NAHANNI OAK FERN <i>G. jessoense</i> ssp. <i>parvulum</i>
Overall frond appearance	ternate	obscurely ternate	obscurely ternate
Frond outline	widely triangular	widely triangular to widely trullate (trowel-shaped)	narrowly triangular to narrowly ovate
Frond texture	lax and delicate	usually firm and robust	firm and robust, or lax and delicate
Glandularity	rachis, lower and upper blade surfaces essentially glabrous (i.e. glandular trichomes very occasional)	rachis, lower and upper blade surfaces densely to moderately glandular	rachis and lower blade surface moderately glandular; upper blade surface glabrous
Aspect of basal pinnæ relative to frond rachis	extended more or less perpendicularly along their entire length	extended more or less perpendicularly along their entire length	strongly curved towards tip of frond
Aspect of pinnules on lower half of basal pinnæ relative to pinna rachis	extended more or less perpendicularly along their entire length	extended more or less perpendicularly along their entire length	strongly curved towards tip of pinna
Condition of second basal pinnæ	almost always sessile with basal pinnules about equal in length to second basal pinnules	usually stalked; if sessile, with basal pinnules usually shorter than second basal pinnules	almost always sessile with basal pinnules about equal in length to second basal pinnules
Ratio of longest basal pinna to blade*	4:5	2:3	2:3
Ratio of longest basal pinnule of basal pinnæ to blade**	1:3	1:4	1:4
Spores	light brown, kidney-shaped	light brown, kidney-shaped	light brown, kidney-shaped
Mean exospore length	34 - 36.2 - 39 microns	34 - 36.6 - 39 microns	32 - 34.2 - 37 microns
Chromosome number	n = 80	n = 80	n = 80
Habitat	commonly found in cool, coniferous and mixed woods, and at base of shale talus slopes; avoids calcareous substrates	calcareous substrates: limestone pavement, outcrops, and cliffs; treed fens	prefers summit of cool shale talus slopes, granite cliffs and outcrops; avoids strongly calcareous substrates
Canadian range	in all provinces and both territories	Manitoba to New Brunswick; Newfoundland	British Columbia to New Brunswick
Rarity	common throughout Canadian range	rare throughout Canadian range	rare in New Brunswick & Quebec

* length measured from junction of rachis and basal pinnæ

** latter length measured as above

the Interlake region and to the respective curators of those herbaria cited above.

¹ ARGUS, G.W. and K.M. PRYER. 1990. Rare vascular plants in Canada — Our natural heritage. Can. Mus. of Nature, Ottawa. In press.

² HOLMGREN, P.K., W. KEUKEN and E.K. SCHOFIELD. 1981. Index herbariorum. Part 1. The herbaria of the world. Seventh edition. W. Junk, Boston.

PRYER, K.M., D.M. BRITTON and J. McNEILL. 1983. Systematic studies in the genus *Gymnocarpium* Newman in North America. *Am. J. Bot.* 70:60.

⁴ SARVELA, J. 1978. A synopsis of the fern genus *Gymnocarpium*. *Annales Botanici Fennici* 15:101-106.

⁵ SARVELA, J., D.M. BRITTON and K.M. PRYER. 1981. Studies on the *Gymnocarpium robertianum* complex in North America. *Rhodora* 83:421-431.

⁶ SCOGGAN, H.J. 1957. Flora of Manitoba. *Nat. Mus. of Can. Bull.* No. 140, Ottawa.

⁷ SCOGGAN, H.J. 1979. The flora of Canada. Part 2. *Nat. Mus. of Natural Sciences*, Ottawa.

SMALL MAMMALS AS PREY FOR BROOK TROUT

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In 1975 and 1976 the Manitoba Department of Natural Resources conducted studies on sea-run Brook Trout (*Salvelinus fontinalis*) in Nine-mile Creek, tributary of the Limestone River which in turn enters the Nelson River some 90 km inland from Hudson Bay. Fifty-five of the trout stomachs examined contained food items of which 8 contained small mammals including 7 voles, (three *Thrichomys* spp., four *Microtus* spp.) and one shrew (*Sorex* spp.).¹

Brook Trout from the Gods River near the mouth of the Red Sucker River (49°19'N, 92°30'W) were milked for food items by Department of Natural Resources staff in early September 1989. Four of the fish were examined for food items (G. H. Strate, pers. comm.) One nearly intact meadow vole (*Microtus pennsylvanicus*) was found.

These observations concur with those of Scott and Crossman suggesting that

small mammals may at times provide a food source for some fish species in certain water systems, particularly in more northerly areas where nutrients are scarce and small mammal populations fluctuate considerably.²

Several small mammal species will readily swim while predatory fish will strike at any reasonably-sized object travelling through the water. These observations suggest that small mammals are likely more vulnerable to fish predation than is generally thought.

¹ GABOURY, M.N. 1980. The biology of brook trout (*Salvelinus fontinalis*) populations in the lower Nelson River area, Manitoba. M. Sc. thesis, Univ. of Waterloo, Ont. 138 pp.

² SCOTT, W.B. and E.J. CROSSMAN. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada, Ottawa. 212 pp.