

Mosquito Fern

Two New Records in British Columbia

by Trevor Goward

The Mexican Mosquito Fern (*Azolla mexicana*) is something of an anomaly among Canadian pteridophytes: an annual fern that floats in water.

At only 1 to 2 cm across, the Mexican Mosquito Fern more closely resembles a liverwort than a fern (Figure 1). Even so, this species is often hard to overlook, owing to its habit of forming dense vegetative colonies. Not unlike Duckweed (*Lemma* spp.), with which this mosquito fern often grows, these colonies may cover large expanses in the sheltered bays of ponds and lakes. By late summer, the tiny, scale-like leaves have turned a deep brick red, and so render the colonies even more conspicuous.

The Mexican Mosquito Fern is also not unlike a lichen, for it too has entered into a permanent symbiotic association with another organism. In this case, the other member of the relationship is actually a cyanobacterium called *Anabaena azollae*. The fact that *A. azollae* provides a ready source of nitrogen for the mosquito fern has allowed it (the fern) to colonize nitrogen-poor aquatic habitats not usually associated with pteridophytes.

The major portion of the Mexican Mosquito Fern's range in North America lies in the U.S. and Mexico; in Canada it is rare. Just how rare may be gauged from the fact that a recent study (Brunton 1983, 1986) turned up only four Canadian localities — all of them within about 35 km of one another on the south shore of Shuswap Lake, near Sicamous, in south-central British Columbia. The purpose of this note is to document two additional Canadian localities.

These new localities are located in south-central British Columbia on the floodplain of the North Thompson River, approximately 60 and 80 km northwest of the closest Shuswap Lake localities. The more southerly station lies about 15 m west of Highway 5, 1 km south of Darfield (51° 18' N, 120° 12' W), whereas the more northerly is 50 m east of the highway, 7.4 km north of Little Fort (51° 30' N, 120° 11' W). Both are ponds, situated at roughly 400 m above sea level; both ponds are clearly visible from the highway.

The regional climate in this portion of British Columbia is slightly less humid than at Shuswap Lake.

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According to Lloyd et al. (1990a, 1990b), the Darfield locality belongs in the Interior Douglas-fir Zone, whereas the Little Fort site is transitional between the Interior Douglas-fir Zone and the Interior Cedar-Hemlock Zone.

The ponds are small and roughly crescent-shaped, and are surrounded by wet meadows. Both are small remnant oxbows, occupying depressions in what were once channels of the North Thompson River (Figure 1). The Darfield pond is perennial, though the Little Fort pond dries up each year in late September or October, and fills again in early May. During the summer months, both ponds measure about 75 m by 15 m and are about 1 to 2 m deep. At high water, however, they may temporarily measure as large as 200 m by 85 m.

I first collected the Mexican Mosquito Fern at the Little Fort locality on 30 August 1982 (Goward 82-1506, in herb. GOWARD). The reddish carpets

were noticed that year by other local residents, though no one I spoke with recalled having seen them previously. This observation at first inclined me to wonder if the species was a recent arrival at this site. I have since discarded this hypothesis, however, noting that this fern fluctuates widely in abundance from year to year; when sparsely developed it may be easily overlooked.

After its initial discovery, the Mexican Mosquito Fern recurred annually at the Little Fort site until 1985, when severe drought caused the pond to dry up much earlier than usual. Drought conditions persisted during the following three summers, and by 1988 I had assumed — erroneously — that the mosquito fern had permanently disappeared from the North Thompson. I did not visit the site in 1989, but in 1990, following two years of wetter weather, it reappeared in its former abundance, and I made a further collection: Goward 90-1281 (in herb. GOWARD). It was also present in 1991, though in much lower numbers. In October of 1991, I collected the Mosquito Fern for the first time at the Darfield site: Goward 91-2193 (in herb. GOWARD). Both sites supported copious populations of this species during the summer of 1994.

Different from most other pteridophytes, the Mexican Mosquito Fern produces two kinds of spores: microspores and megaspores. These function as reproductive packages for the species. Having overwintered in the mud at the bottom of the pond, they eventually float to the surface again, where they initiate sexual reproduction and so produce a new generation of mosquito ferns (Figure 2). Though microspores (sometimes referred to as



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Figure 1. Watch for *Azolla* in quiet shallow backwaters in the southern interior of the province.

the “male” spores) are said to occur commonly in this species, megaspores (the “female” spores) are rather rare, and have apparently not been reported from Canadian collections (Brunton, pers. comm. 1991). In this connection, it is noteworthy that the North Thompson collections bear both types of spores.

The Mexican Mosquito Fern is now officially listed as threatened in British Columbia (Conservation Data Centre 1994), as in Canada as a whole (Brunton 1986). This status reflects both the paucity of sites and their susceptibility to disturbance. The North Thompson localities are apparently no more secure than other Canadian localities. Potential threats include herbicides, accumulating salt from winter road de-icing programmes, and leakage of diesel oil or gasoline in the event of an accident on the adjacent highway. Though little can be done to reduce the last of these threats, the North Thompson sites surely deserve protection against salt and herbicides.

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LITERATURE CITED

Brunton, D. F. 1983. Status Report on the Mosquito Fern, *Azolla mexicana*, a threatened species in Canada. (Unpublished report to) Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ont.

—. 1986. Status of the Mosquito Fern, *Azolla mexicana* (Salviniaceae), in Canada. *Canadian Field-Naturalist* 100: 409-413.

Conservation Data Centre. 1994. British Columbia Conservation Centre native vascular plant tracking list. (May 4, 1994). Victoria, B.C.

Lloyd, D., K. Angove, G. Hope & C. Thompson. 1990a. *A Guide to Site Identification and Interpretation for the Kamloops Forest Region*. Part 1. B.C. Ministry of Forests, Victoria, B.C.

—, — & —. 1990b. *A Guide to Site Identification and Interpretation for the Kamloops Forest Region*. Part 2. B.C. Ministry of Forests, Victoria, B.C.

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Figure 2. *Azolla* resembles tiny, maroon, floating doilies.