

ON THE OCCURRENCE OF
MINERISPORITES MIRABILIS IN SITU

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This paper is the second in a series describing the Wannagan Creek flora. The Wannagan Creek site is located in the upper portion of the Tongue River Formation of Paleocene age in the NW $\frac{1}{4}$ Sec. 18, T.141.N., R.102.W., Billings County, North Dakota. The specimens described below are part of an extensive floral and faunal collection that has been recovered by The Science Museum of Minnesota over the past several years. The Science Museum collection comes from a very pale brown, clayey silt interbedded with many thin and discontinuous lignitic layers. The lithology corresponds to that which is described by Jacob (1972) as being representative of a floodplain and back-swamp environment. The regional setting at the time of deposition was that of a fluvial-deltaic sequence developed at or near base level around the Williston basin, and draining the rising Rocky Mountains to the west (Royse, 1972).

Members of the Isoetaceae are represented in the fossil record as far back as the Triassic (Bock, 1962), and have been reported from the Cretaceous (Saporta, 1894) and Tertiary (Brown, 1962, 1939). While not a common fossil, they are, nonetheless, reasonably well known, and have been described in some detail. The Wannagan Creek specimens (figs. 1 and 2) consist of deformed corms associated with flattened and twisted leaf impressions which together possess sufficient detail for them to be assigned to *Isoetites horridus* (Dawson) Brown. Sporangia are present on both specimens, but are more abundant and obvious on one (fig. 1) than the other (fig. 2). P76.26.1 (fig. 1) consists of a flattened corm with a diameter of 33 mm, bearing on its flanks a number of leaf scars (ls on fig. 1) arranged in a spiral phyllotaxy. At the apex of the structure are a number of elongate megasporangia ranging in length from 2.7 to 3.5 mm and from 1.4 to 1.8 mm in width (average 2.9 x 1.6 mm). The sporangia have from 20

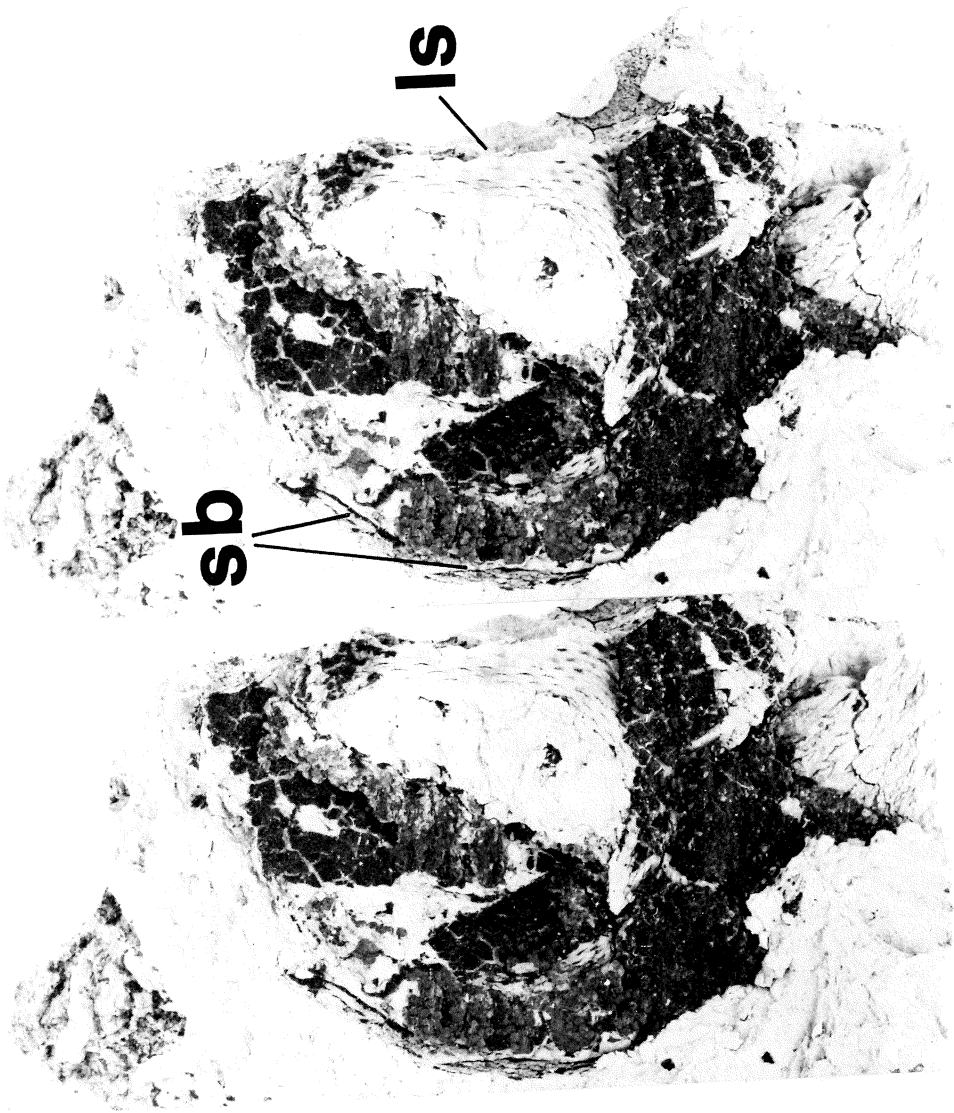


Figure 1.
Stereo pair of SMM P76.26.1, *Isoetes horridus* (Dawson) Brown. ls, leaf scars; sb, sporophyll base. X3.

to 37 megaspores visible. Embedded with the megasporangia on the apical hemisphere is a mass of carbonaceous material interpreted as being the remains of previous seasons' sporophylls and of suberized cortical material such as occurs on modern *Isoetes*. No trace of a ligule or velum could be distinguished, although several flattened sporophyll bases can be seen (sb on fig. 1).

The more distal portions of the leaves (sporophylls) are preserved primarily as impressions, and can be seen best in the second Wannagan Creek specimen, P76.26.2 (fig. 2). They are about 1 mm wide and have apparently entire margins. The spatulate leaf tips referred to by Brown (1962) were not found.

Spores isolated from the megasporangia (figs. 3 and 4) conform to the type *Minerisporites mirabilis* (Miner) Potonié. Miner (1935) first described the species from coals of the Fort Union Group in Carbon County, Montana. Although Miner made reference to the similarities between the spores and those of *Isoetes*, he assigned no biological affinities to them and placed them in the organ genus *Selaginellites*. Potonié (1956) re-assigned the type to a new form genus *Minerisporites*, basing his decision to do so in part on the use of *Selaginellites*, which was erected to receive vegetative structures similar in form to modern *Selagnella*, for spores. Potonié suggested that *Minerisporites mirabilis* be assigned biological affinities with the Selaginellaceae. Subsequent authors have either suggested no relationships (Gunther and Hills, 1972) or have retained Potonié's original assignment of biological affinities (Singh, 1964).

The spores recovered from megasporangia of *Isoetes horridus* (figs. 3 and 4) are described as follows: trilete megaspores ranging from 456 to 612 microns in longest equatorial dimension; equatorial outline of the central body subtriangular to nearly circular; equatorial zona widest at the junction of the trilete mark and the equatorial region giving the spore an overall triangular outline; trilete mark surmounted by a high tectum extending to the apices of the equatorial zona; exine irregularly reticulate with rounded muri; muri of the reticulum strongest toward the equator, becoming lower as the reticulum extends onto the tecta.

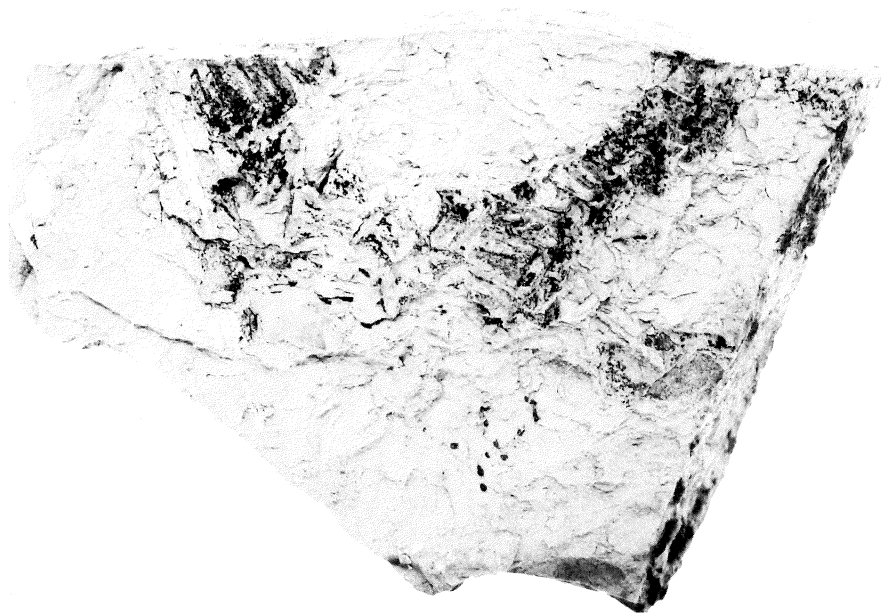


Figure 2.
SMM P76.26.2, *Isoetites horridus* showing impressions of leaf fragments. X3.

It is suggested, on the basis of the foregoing, that *Minerisporites mirabilis* be assigned affinities with the Isoetaceae. To my knowledge, this is the first report describing these megaspores *in situ*, and it confirms Tschudy's (1976) estimate of the facies representation of *Minerisporites mirabilis*. The present-day monotypic family Isoetaceae consists of 64 species of emergent aquatic, amphibious, or terrestrial plants of wet places. The group has apparently occupied a fresh water/terrestrial habitat from the beginning. Bock's specimens from the Triassic, Brown's (1962) from the Fort Union, and those described in the present report are all recovered from the same type of fluvial-lacustrine complex.

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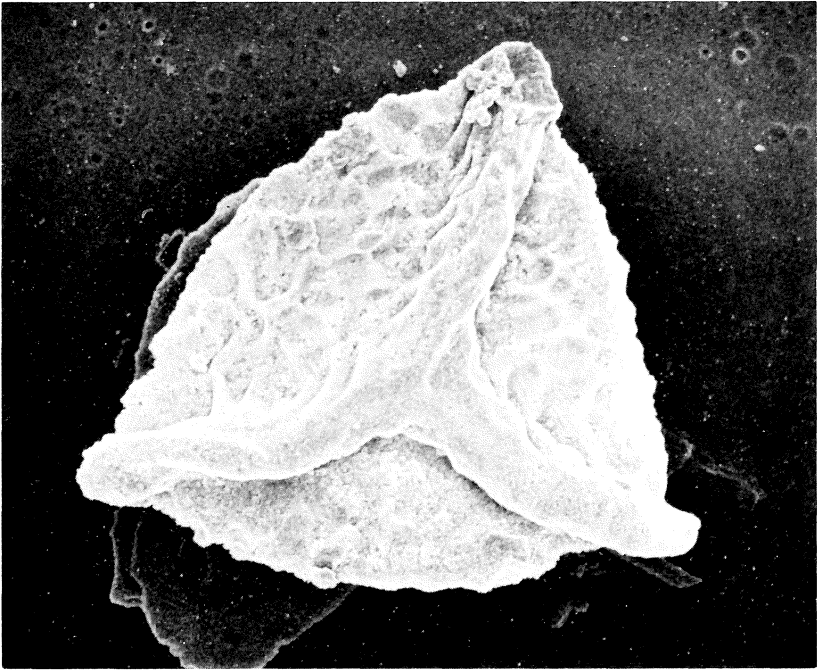


Figure 3.
Electron scan micrograph, proximal surface of *Minerisporites mirabilis*
(Miner) Potonié. X150.

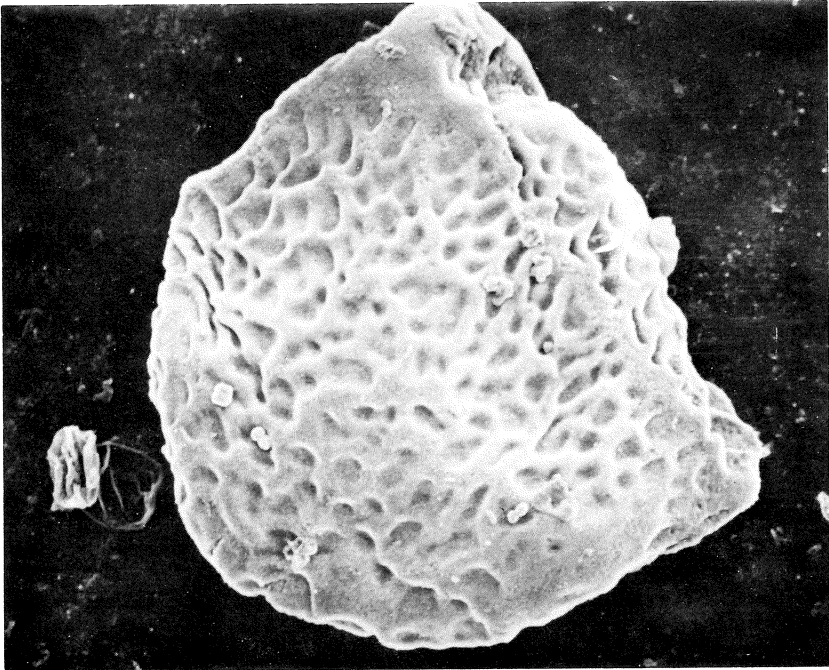


Figure 4.
Electron scan micrograph, distal surface of *Minerisporites mirabilis*
(Miner) Potonié. X150.

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