

Geological Education: Protecting Ontario's Ancient Fossil Record: Schreiber Channel Provincial Nature Reserve and Kakabeka Falls Provincial Park

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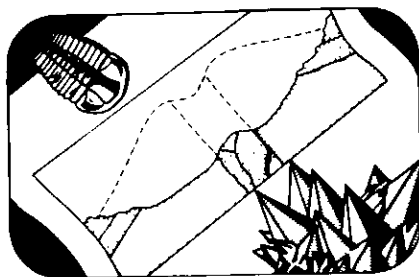
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Features



Geological Education

Protecting Ontario's Ancient Fossil Record: Schreiber Channel Provincial Nature Reserve and Kakabeka Falls Provincial Park

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Introduction

On March 7th, 1979, Schreiber Channel Provincial Nature Reserve was established under The Provincial Parks Act by Ontario Regulation 151/79. The Nature Reserve was established to protect a highly significant Precambrian bedrock and fossil site. In March of the previous year the Minister of Natural Resources approved the Master Plan for Kakabeka Falls Provincial Park (Ontario Ministry of Natural Resources, 1978). The Master Plan includes a Nature Reserve zone established to protect a complementary Precambrian bedrock and fossil site. According to Hofmann (1971, p. 45) these fossil sites contain "by far the best

known, best preserved, and most diverse assemblage of microfossils in the Precambrian of North America".

Geological Setting

Schreiber Channel Provincial Nature Reserve encompasses 13 hectares on the north shore of Lake Superior, 6 km west southwest of Schreiber, Ontario (Fig. 1). Archean metavolcanic rocks are exposed as andesitic pillow lavas in the eastern, western and northern portions of the Nature Reserve. The most significant bedrock and fossil site is located on the shoreline. Here, the Middle Precambrian, basal conglomerate member (Kakabeka conglomerate) of the Gunflint Formation unconformably overlies the Early Precambrian metavolcanics (Fig. 2). This dramatic contact represents an erosional interval of up to 500 Ma. The Kakabeka conglomerate is distributed sparsely throughout the region but is probably displayed best at this site. The lower algal chert member of the Gunflint Formation conformably overlies the Kakabeka conglomerate (Fig. 3). The algal chert is internationally known for its microfossil assemblage.

The major fossil site described by Barghoorn and Tyler (1965) and Schopf and other (1965) is a narrow band of

algal chert approximately 37 metres long and 8 metres wide. Small stromatolitic mounds consisting of black, white and grey chert, surrounding, in most cases, a boulder nucleus, are found in the outcrop. The boulders originate from within the basal conglomerate and the mounds range in size from a few centimeters to an observed 0.8 metres in diameter (Hofmann, 1969, p. 6). The fractured outcrop surface disappears southwest beneath the waters of Lake Superior.

Kakabeka Falls Provincial Park is 32 km west of Thunder Bay on the Kaministiquia River. In the Nature Reserve zone, Archean granite is overlain unconformably by the Kakabeka conglomerate. The conglomerate is overlain conformably by the fossil-bearing, lower algal chert member of the Gunflint Formation. Microfossils from this 10 hectare locality are found within thinly bedded layers of chert and carbonate. The Nature Reserve zone contains several fossil forms not found at Schreiber Channel Provincial Nature Reserve (Barghoorn and Tyler, 1965). Additional chert-carbonate and tuffaceous shale members of the Gunflint Formation also are well exposed in the Park, within the Kaministiquia River gorge.

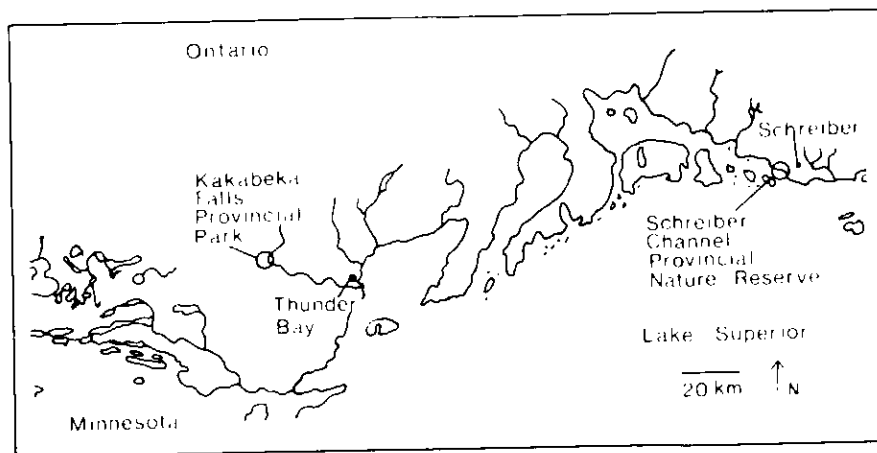


Figure 1
Location Map.



Figure 2
Unconformable contact between the Archean metavolcanics and the Proterozoic Kakabeka Conglomerate. The lens cap sits on a younger diabase dyke.

The Gunflint microbiota are extremely significant. Their entire assemblage consists of sixteen taxa which fall into blue green algae, budding bacteria and unknown affinity categories. The taxa of the first two categories also have been recorded at a few localities in Australia and northern Canada. The taxa of unknown affinity are found only in the Gunflint Formation. Awarmik and Barghoorn (1977, p. 128) suggest that these forms probably represent morphological "experimentation" during a time when the earth's atmosphere was changing from one low in oxygen to one in which there were significant amounts of free oxygen. The Gunflint microfossils evolved within a shallow subtidal environment approximately 1.6 Ga ago.

Protective Management

Provincial Nature Reserves are one of six park classes established under The Provincial Parks Act (1978). Nature Reserve zones are areas designated within the other Provincial Park classes. Nature Reserves and Nature Reserve zones are selected to protect Ontario's distinctive natural features. They are protected and managed for low intensity recreation, outdoor education and scientific research. The sensitivity of the natural features within a Nature Reserve or Nature Reserve zone is the primary criterion used to define allowable use.

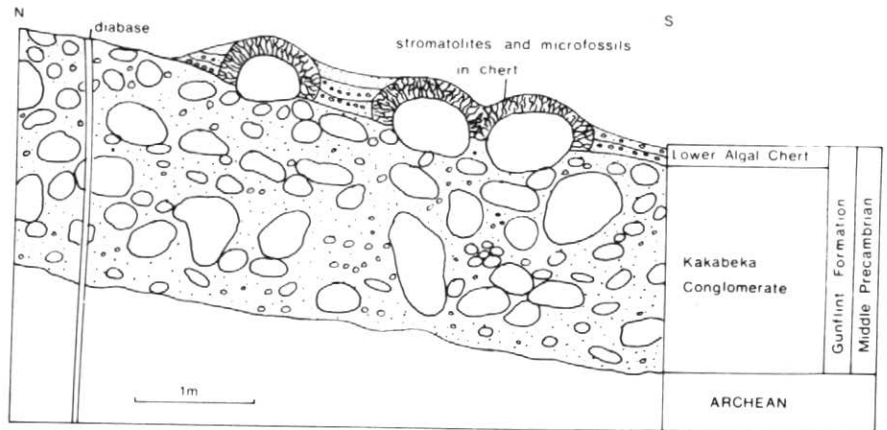


Figure 3
Vertical section illustrating the occurrence of stromatolite bioherms as encrustations on boulders of the Kakabeka Conglomerate (modified from Hofmann 1969).



Figure 4
Stromatolite bioherms in outcrop at Schreiber Channel Provincial Nature Reserve.

Schreiber Channel Provincial Nature Reserve will be managed to protect its significant geological features and to maintain the natural integrity of the outcrop. In the past, the relative inaccessibility of this site has not prevented amateur and professional collectors from removing rock and microfossil samples. This collecting, coupled with the limited size of the outcrop, has endangered this valuable exposure. In future, indiscriminate collecting will be prohibited. However, collecting for viable scientific research will be permitted. A collecting policy for the Nature Reserve will be established by way of a Master or Management Plan.

The Master Plan also will determine the need for and location of access points, interpretive displays, signs and trails. A low key interpretive programme will link Schreiber Channel Provincial Nature Reserve to the Nature Reserve zone in Kakabeka Falls Provincial Park. The interpretive programme will stress the need to protect the significant outcrops and will help to inform the public about conditions during the Precambrian. The emphasis of the interpretive programme will be placed at Kakabeka Falls thereby minimizing the use and potential destruction of the Schreiber Channel site.

Summary

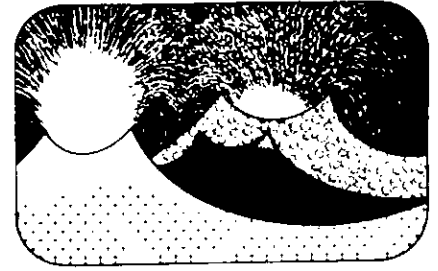
Ontario's Provincial Park system plays an active role in protecting natural features. This protection is achieved in part through Provincial Nature Reserves and Nature Reserve zones. Such parklands are selected to represent the distinctive landforms and natural habitats of the Province.

Schreiber Channel Provincial Nature Reserve and a Nature Reserve zone at Kakabeka Falls Provincial Park were established to protect two highly significant Precambrian bedrock and fossil sites. These sites will be protected and managed for outdoor education and scientific research.

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Pyroclasts

Ward Neale

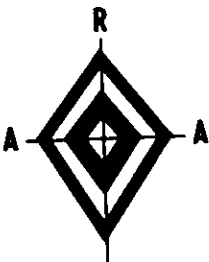
Another Lady-Like Step Forward

Norah (Neen) Allman's recent election as Vice-President of the Geological Association of Canada will delight many and surprise few or none. It was the logical next step up the ladder for a vivacious active person who has been increasingly prominent in the affairs of geoscience for the past five years. Also, recently, we have become accustomed to names such as Pauline Moyd, Sharon Bachinski, Barbara Mioduszezowska and Charlotte Keen appearing on mastheads, councils and important committees. Hard to believe that less than a decade ago our few prominent women were only allowed to be seen, not heard (although Madeleine Fritz did break through the sound barrier on occasion!). Then followed the days when Neen Allman was maintaining that women had the right to go underground on geological field excursions. And remember Judy Moody who had the affrontry to state that the alleged inability to lift oil drums was merely a red-herring used by chauvinists to bar women from employment in field geology? We seem to have come a long way quickly and quietly. Where will this insidious infiltration bring us?

Towards a Complete Sex Change?

Men still greatly outnumber women as students in our geology and geophysics departments. Possibly this is because there are so few female professors to act as beacons, only 8 out of a total of 465 faculty members in the geosciences. The undergraduate male:female ratio is changing fast, however, and both New Brunswick and Queen's reported that geology enrolments in their B.Sc. programs included 40 per cent women last year. Queen's additionally noted that their rigorous engineering geology option attracts 25 per cent women.

The dramatic changes will stem not from enrolment but from type of employment according to Leslie Chorlton, field geologist with the Newfound-



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