

Preliminary diatom content of some Cretaceous formations in Saskatchewan

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Summary

Most of the biostratigraphic work that has been done in Cretaceous rocks in Saskatchewan has been based mainly upon foraminifera and mollusks. A large amount of work has also been published on the palynology of the coal bearing sequences of Alberta and Saskatchewan (Binda and Nambudiri, 2000). However, very little is known about the diatom content of these rocks. With the aim of searching for alternative microfossils that may help to build a new biostratigraphic framework and a clearer stratigraphic biofacies, we are currently seeking to identify and characterize Cretaceous rocks. The formations that have been explored so far include Viking (Albian), Niobrara, Carlile (Turonian/Coniacian) and Battle (Maastrichtian), the latter being the only formation deposited under freshwater conditions (Binda, 1992). The Viking Formation contains a centric diatom more similar to modern fresh and brackishwater specimens while the Battle contains a more diverse flora with centric and pennate diatoms.

Results

The recovery of diatoms has been low in the Viking Formation and no diatoms have been so far recovered from Niobrara and Carlile formations. The Battle Formation, on the other hand, contains a well preserve diatom assemblage. Diatoms from Viking include a centric species (Fig. 1) and those from the Battle include both centric and pennate forms (Fig.2-4).

It is difficult to speculate about the absence of diatoms in the upper Cretaceous in the Western Canada Sedimentary Basin (WCSB). Marine diatoms from Lower and Upper Cretaceous are reported from several sites around the globe. A rich flora has been reported from the Aptian Wallumbilla Formation (Australia) (Nicolav and Hardwood, 1997), from the Upper Cenomanian Kanguk Formation of the Canadian Arctic (Tapia and Hardwood, 2002) and the Moreno Formation in California (Jousé, 1978). Their absence in rocks of the WCSB could be due to poor preservation; radiolarians for instance are scarce within the Canadian Western Interior Seaway because of its shallow bathymetry and dissolution of silica (Pugh et al, 2014).The same may hold true for any diatom assemblages that may exist in the present day WIB.

Lower Cretaceous diatoms recovered so far from the Viking Formation differ from the typical marine species such as *Gladius*, *Stephanopyxis*, *Dactyliosolen*, *Ditylum* etc (Josué, 1978) and look more affine to freshwater and brackish water genera like *Melosira* or *Aulacoseira*, perhaps confirming the brackish water character of the Western Interior Sea (Schröder-Adams, 2013).

Methods

For Viking, Niobrara and Carlile, between 0.2-0.5 gm of sediment were digested in 30 ml of H₂O₂ and left to react for 24 hr and topped with distilled water for a final volume of 80 ml, then a 0.3ml aliquot was mounted in microscopes slides, let dry at room temperature and glued with Zrax, which is a diatom mountant with R.I. of 1.7. For the Battle, we use the slides already prepared by Binda (1992).

Conclusions and future work

Our preliminary results suggest that it may be possible to produce a diatom-based biostratigraphic framework for the Lower Cretaceous rocks of Saskatchewan. Our search continues; it is our intention to explore the Milk River and Bearpaw formations and to continue the taxonomic identification of the diatoms and thus to contribute not only to the biostratigraphy of the province but also to achieve a better understanding of the Cretaceous paleoceanography.

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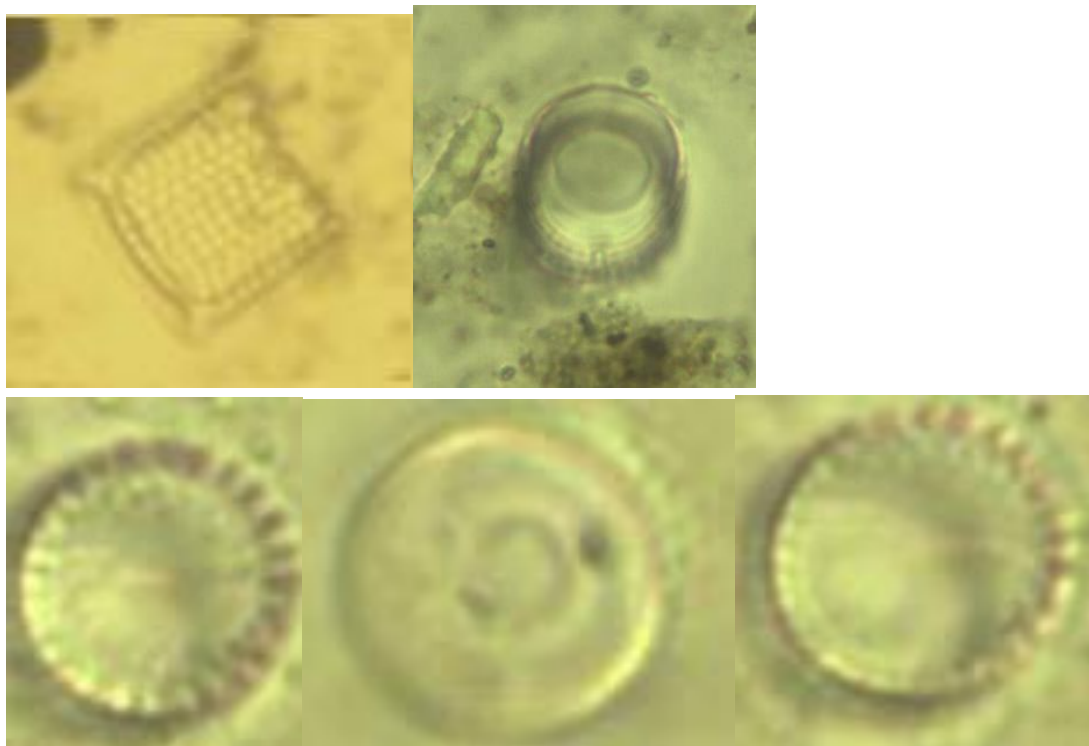


Fig.1. Centric diatoms from Viking Formation x1000. Diameters range from 7 to 11 μ

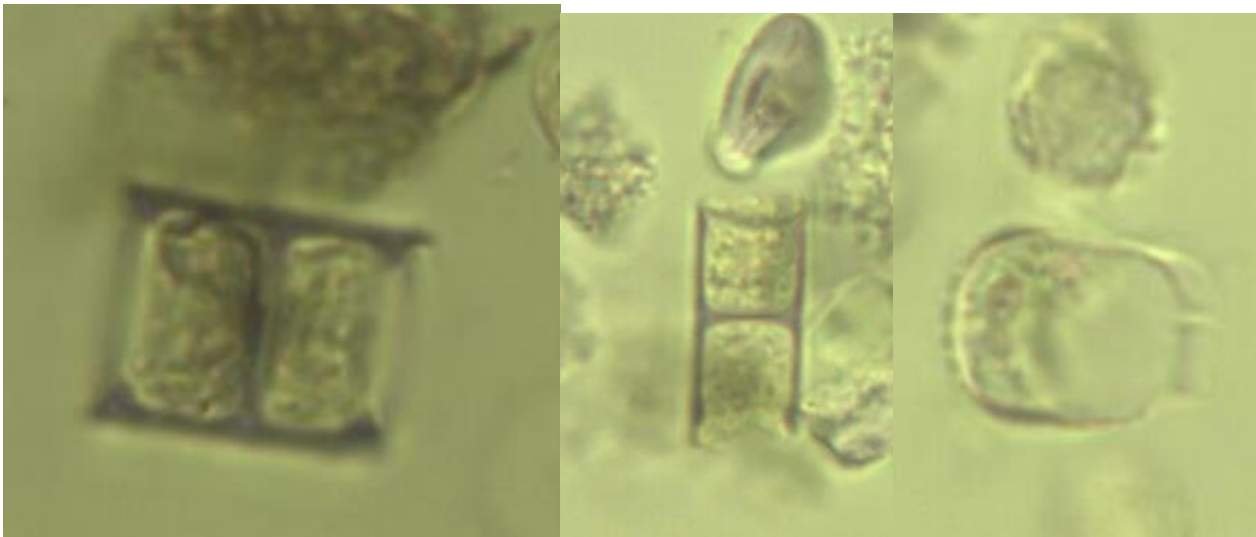


Fig.2. Centric diatoms from Battle Formation, x1000. Diameter 5-10 μ ; height 7-10 μ .

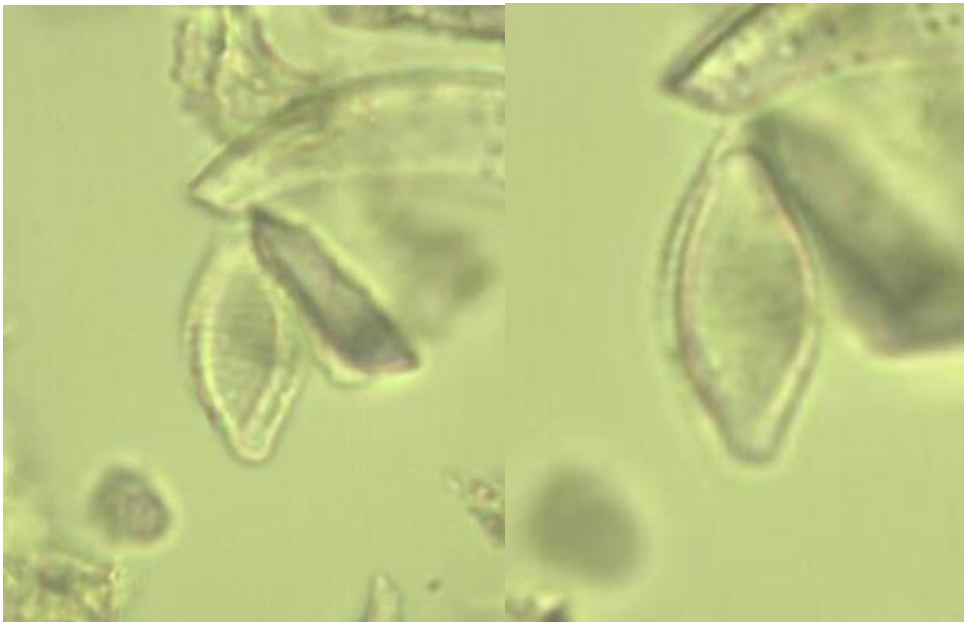


Fig. 3. Pennate diatoms from Battle Formation, x1000. Diatom length 12 μ .

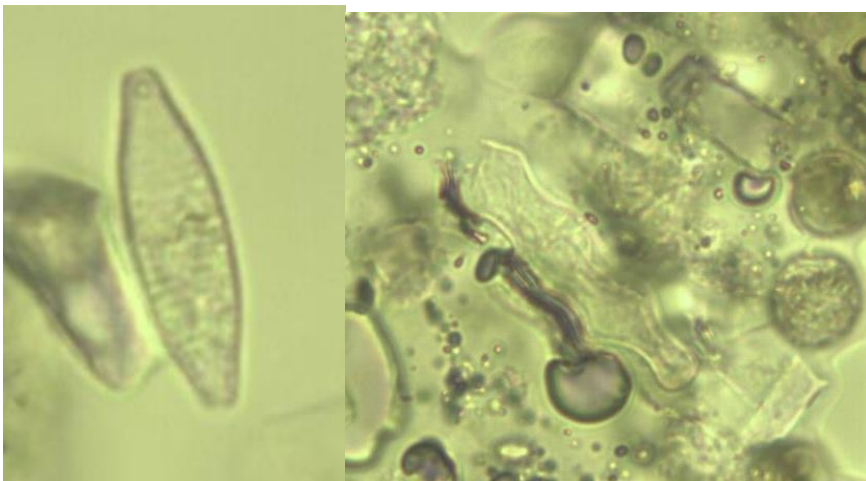


Fig. 4. Pennate diatoms from Battle Formation, x1000, diatom length 12-27 μ .