

PALEONTOLOGICAL EVIDENCE RELATING TO THE DISTRIBUTION AND PALEOENVIRONMENTS
OF THE EUREKA SOUND AND BEAUFORT FORMATIONS, NORTHEASTERN
BANKS ISLAND, ARCTIC CANADA

Project 650003

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Abstract

Recent discoveries of vertebrate, invertebrate and plant fossils near Nangmagvik Lake, northeastern Banks Island, N.W.T., confirm the presence of marine strata in the local Paleogene Eureka Sound Formation and indicate a wider distribution of the Neogene Beaufort Formation than previously believed.

Résumé

Les récentes découvertes de vertébrés, invertébrés et plantes fossiles près du lac Nangmagvik, au nord-est de l'île Banks, (T.N.-O.), confirment la présence de strates marines dans la formation locale paléogène d'Eureka Sound et indiquent une distribution plus large de la formation néogène de Beaufort que celle que l'on avait supposé auparavant.

Introduction

In the course of a continuing paleontological investigation of upper Cretaceous and Tertiary terrestrial deposits of the Canadian Arctic Archipelago, field research was conducted on Banks Island in July 1982. This work was undertaken to follow up on recent indications from mapping and sedimentological analyses (Miall, 1979) that northern Banks Island would be an appropriate region for the discovery of remains of terrestrial organisms in the upper Cretaceous and Paleogene Eureka Sound Formation. This formation has yielded a significant vertebrate fossil record on Ellesmere Island (Dawson et al., 1976; West and Dawson, 1978). Work in one area in the northeastern parts of Banks Island led to some reinterpretations of formational distributions and of habitats represented.

Acknowledgments

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Results

The area examined is in the vicinity of Nangmagvik Lake and north of Desert Creek (between approximately 74°07' to 74°12' north latitude and 119°55' to 120°25' west longitude; see Fig. 1). Exposures referred by Miall (1979, p. 44-48) to an upper, cyclic member of the Eureka Sound Formation were examined on both sides of Nangmagvik Lake (Fig. 1, sites A and B). Fossil wood occurs, both in lignite deposits and in sideritic lenses, as does other plant debris, including some leaves. West of Nangmagvik Lake (Fig. 1, B),

a thin band of unconsolidated brownish grey sand, no more than 3 m thick and extending about 20 m along strike, yielded shark teeth and steinkerns of pelecypods and gastropods. Some of the teeth retain delicate basal cusps, indicating that they were preserved with little, if any, reworking. The sharks were odontaspids, bottom-feeding marine forms having a stratigraphic range of late Cretaceous to Recent. The invertebrates include both gastropods and pelecypods. One snail species, a naticid, is abundant. The clams found include a large venerid, a tellenid-like species, and a corbiculid. These four species together suggest a slightly brackish, shallow water marine situation.

Although earlier workers (Troelson, 1950; Tozer, 1963, p. 92-95; West et al., 1975) generally regarded the Eureka Sound Formation as a largely nonmarine unit, recent, more detailed studies (West et al., 1981) have demonstrated the presence of considerable thicknesses of marine rocks in the formation. The mollusc and shark fossils in the upper part of the Eureka Sound Formation near Nangmagvik Lake confirm this conclusion.

Farther west (Fig. 1, C), deposits referred by Miall (1979) to the cyclic member of the Eureka Sound Formation consist largely of unconsolidated sand, both massive and well bedded, with finer silt beds. As Miall noted for the cyclic member, plant rootlets and other plant debris occur at numerous levels within these deposits. However, one of their most characteristic features is the presence of large, apparently unaltered logs and pieces of wood (Fig. 2). The deposits also yielded a well preserved cone of *Picea banksii* (Fig. 3), a positive indicator of the Neogene Beaufort Formation (Hills and Ogilvie, 1970). The preservation of this delicate cone shows that it was found in place and had not been reworked. The deposits containing the cone and the logs, which also are characteristic of the Beaufort Formation, occur topographically at between 190 and 280 m elevation and are higher stratigraphically than rocks clearly belonging to the cyclic member of the Eureka Sound Formation on both sides of Nangmagvik Lake.

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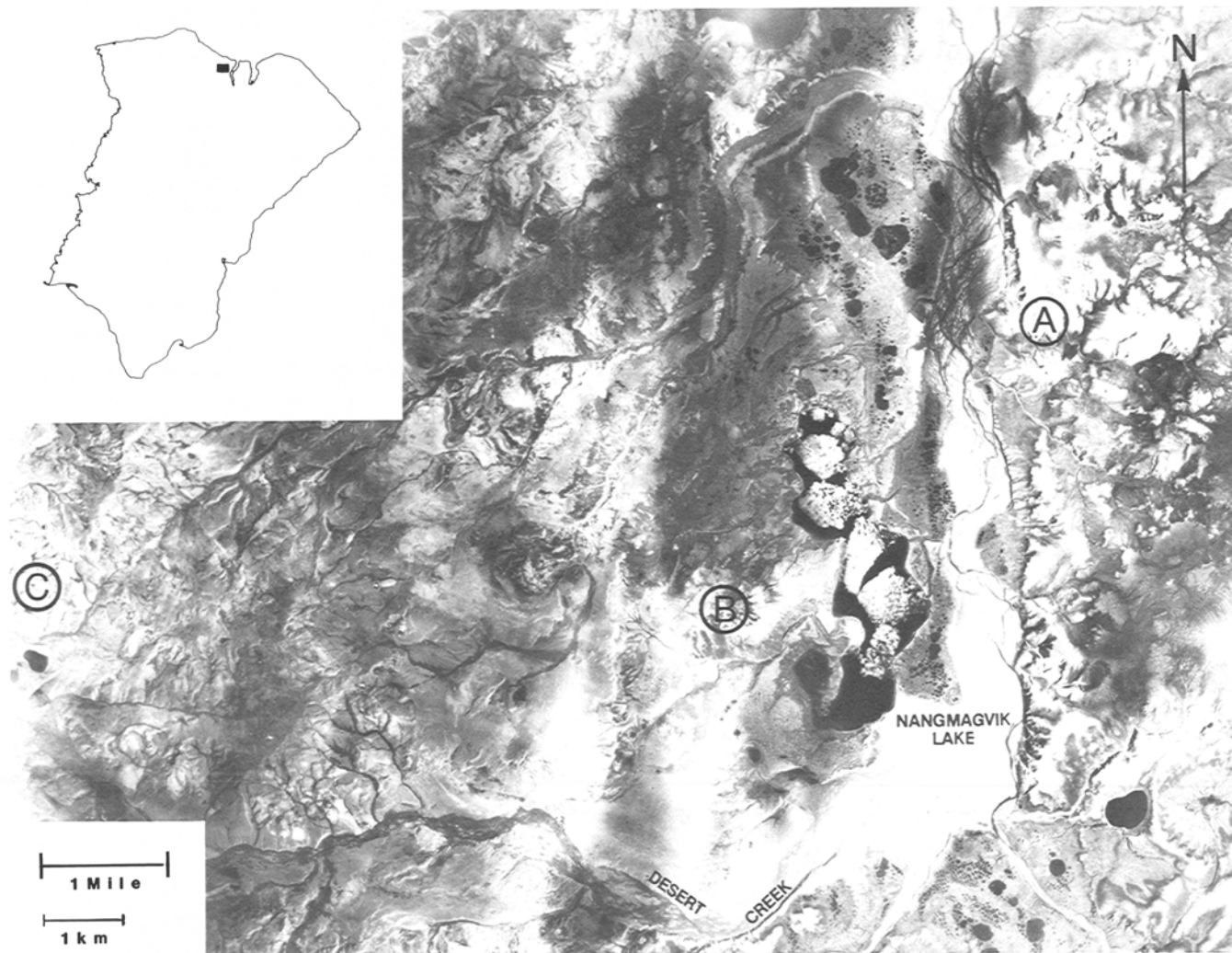


Figure 1. Aerial photograph of Nangmagvik Lake — Desert Creek area, northeastern Banks Island. Reproduced from Department of Energy, Mines and Resources Aerial Photograph A-17379-26. Insert shows location of photographed area on Banks Island. A, site with fossil plants in cyclic member, Eureka Sound Formation; B, site with molluscs and vertebrates, Eureka Sound Formation; C, site with plants in Neogene deposits.

The stratotype of the Beaufort Formation on Prince Patrick Island (Tozer, 1956) consists of about 80 m of unconsolidated, monotonous sandstone. Our paleontological investigations near Desert Creek and Nangmagvik Lake suggest an outcrop thickness for the Beaufort Formation there of about 90 m, similar to thicknesses reached by the formation in northwestern Banks Island (Miall, 1979, p. 55).

The local contact between the Beaufort Formation and the Eureka Sound Formation was not seen; it apparently occurs in a flat, tundra-covered area west of Nangmagvik Lake. Thus, the formation assignments made here are based on lithology, fossil content and relative stratigraphic position.

The thick Beaufort Formation section noted in 1982 lies directly upon the north-northeast trending axis of the synclinal structure marking the axis of the Northern Banks Basin (Miall, 1979). It therefore appears that this structure plays a major role in preserving more of the Beaufort Formation than was appreciated previously.

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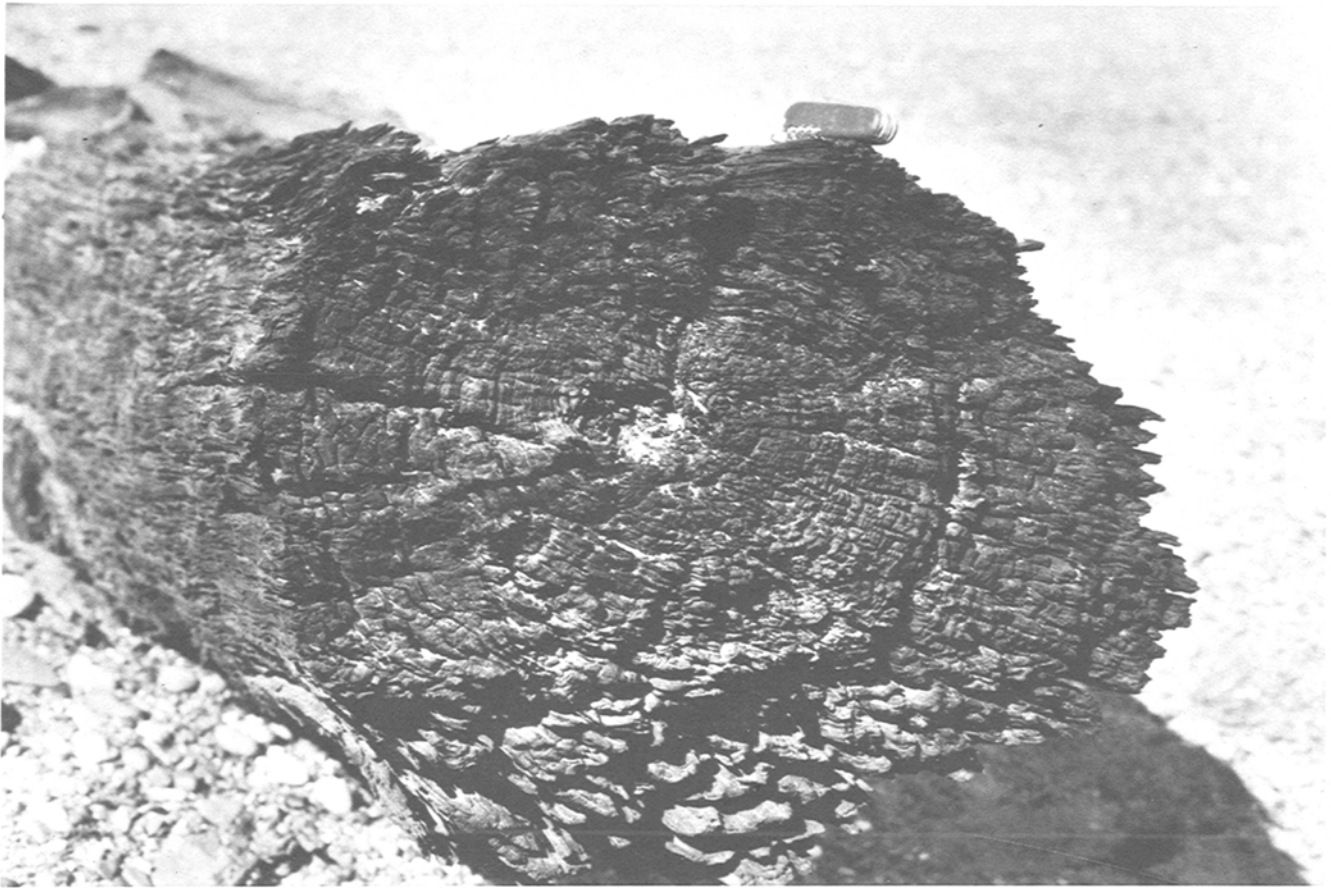


Figure 2. Closeup of log eroding out of Neogene deposits, Locality C. Pocket knife for scale.

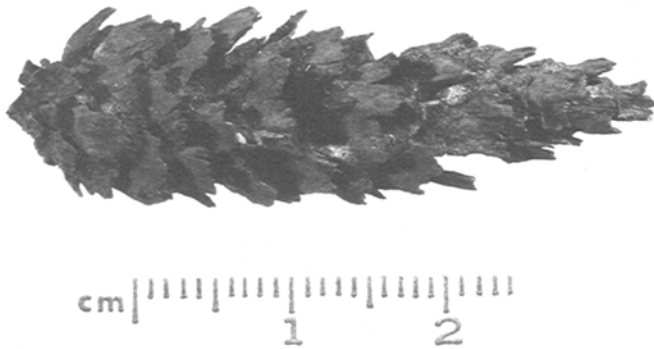


Figure 3. *Picea banksii* cone found at Locality C.

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