high-latitude glaciation commenced more than 3 m.y. ago.

Three climatic units are distinguished.

The oldest, *Unit III*, consists of Mn- and Fe-rich Foraminifera-poor sediments. Calcareous Foraminifera, in part corroded, are thick-shelled forms. Arenaceous Foraminifera (*Glomospira gordialis, Cyclammina pusilla,* and *Alveolophragmium subglobosum*) dominate the benthic assemblages. Lower than present sedimentation rates could account for the selective solution of the less resistant calcareous tests and the impoverished character of the fauna.

Unit II, deposited between 3 and 0.7 m.y. ago, is poor in Fe and Mn oxides, and Foraminifera. It contains one Foraminifera-rich layer; the predominant foraminifer in this layer is temperate-subarctic, euryhaline *Globigerina quinqueloba* ($O^{18/16}$ determinations). This species occurs with sinistral *Globigerina pachyderma* throughout Unit II. Fragile calcareous benthonic Foraminifera (*Stetsonia horvathi, Sphaerodina bulloides* and *Bolivina* sp. A n. sp.) periodically abound, constituting up to 88% of the fauna. Concentration of thin-walled benthonic Foraminifera suggests that the near absence of planktonic forms was due to adverse environmental conditions rather than to dissolution of the less resistant tests.

It is assumed that the Arctic was free of permanent pack-ice during the deposition of Units II and III.

Unit I was deposited within the last 0.1 m.y., a time of conspicuous climatic fluctuations as indicated by the temporal variations in fauna and in mineral/fauna ratio. Beds rich in Foraminifera and in Mn and Fe oxides alternate with layers poor in both Foraminifera and Mn and Fe oxides. The former represent conditions similar to present (permanent pack-ice cover) and contain sinistral *G. pachyderma* almost exclusively. *G. quinqueloba* attains high frequencies at the beginning and end of some of these cold periods. In the Foraminifera-poor beds, deposited during pack-ice-free intervals, sinistral *G. pachyderma* is accompanied by *G. quinqueloba;* other low-latitude Foraminifera are present in a few places. Pteropods (*Limacina helicina*) are preserved principally in core tops.

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STRATIGRAPHY OF BEAUFORT FORMATION ALONG WESTERN MARGIN OF CANADIAN ARCTIC ISLANDS

The Beaufort Formation of Late Tertiary (probably late Miocene-early Pliocene) age occupies the western parts of the Arctic Islands bordering the Beaufort Sea. It extends from southern Banks Island on the south to Meighen Island on the north.

The best exposures of the Beaufort Formation, which are on northwestern Banks Island, can be lithologically subdivided into 2 or possibly 3 units separated by erosional unconformities. The lowest unit consists of a basal medium-fine cross-stratified sandstone followed by clay, woody peat, and a second clay zone. Each of these subunits is successively truncated by erosion on the east. The middle unit is characteristically light-colored gravel and coarse sand with minor amounts of uncompressed wood. This unit is overlain (in erosional contact) by darker, coarser gravels with abundant wood lenses. The two upper units correspond to the Beaufort Formation as defined on Prince Patrick Island, whereas the lower unit represents strata not known from that island. Elsewhere the strata can be assigned to either the upper or lower unit.

Mineralogically, the lowest unit is composed of about 70% quartz, 25% chert, and 5% others (shale chips predominantly). The middle unit consists of 60% quartz, 30–35% chert, and 5–10% others (predominantly shale). The upper unit consists of about 50% quartz, 35–40% chert, and 10–15% others (predominantly shale). The quartz is polycyclic whereas the chert and the shale are monocyclic. Paleocurrent data indicate that the straits between the islands developed in post-Beaufort time.

Megafossils belonging to *Picea, Pinus, Larix,* Alnus, 14 species of Bryophytes (identified by M. Kuc), and about 30 pollen and spore species have been identified. These indicate that at the time of deposition of the Beaufort, the climate was very similar to that of the Great Lake region today.

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BERING SEA BASALTS: THEIR SEQUENCE AND ORIGIN

Late Cenozoic volcanic rocks in the Bering Sea region include both slightly undersaturated tholeiitic basalts and highly undersaturated nepheline basalts. The two kinds of basalt are interspersed in time and space. On Nunivak Island volcanism was episodic, and most of the volcanic episodes included both highly alkalic and tholeiitic eruptions. At 3 places on Nunivak Island and at numerous other places in the Bering Sea volcanic province, nepheline basalt cones and flows underlie tholeiitic flows and indicate that highly alkalic volcanism commonly preceded tholeiitic volcanism.

Study of the vents and flows shows the nepheline basalts erupted more violently and consequently were much richer in gases than the tholeiite basalts. This fact and the volcanic sequence suggest that the nepheline basalts represent early formed products of partial melting which would normally contain a relatively large proportion of the gaseous elements.

The occurrence of lherzolite inclusions (generally considered to be fragments of mantle material) in most of the nepheline basalts and in tholeiite at Nanwaksjiak Crater, together with the close association of the 2 types of basalt, suggests a common mantle origin.

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TECTONIC DEVELOPMENT OF BERINGIA, LATE MESOZOIC TO HOLOCENE

Beringia—northeastern Siberia, western Alaska, and the separating shallow Bering Sea—is dominated by an M-shaped structure comprising the Alaskan and Chukotkan oroclines, and a broader intervening flexure that is submerged on the continental shelf. The Beringian flexures were evidently initiated during the Jurassic Period, possibly in conjunction with early rifting in the Atlantic. In Beringia curvilinear basins developed and filled with terrigenous and volcanic sediment. Near the end of the Cretaceous new stresses crumpled and uplifted these basins. The great transcurrent faults of Alaska and Beringia were initiated at this time. We also speculate that the Aleutian-Komandorsky Ridge (and adjacent trench?) formed at this time, signifying a southward shift (from continental margin to ridge) in the site of ocean-continental crust interaction.

Beringia stood high during the Paleogene; sediment accumulated only in subsiding parts of the Bering continental margin and in rather restricted basins at the apices of the Alaskan and Chukotkan oroclines.