
**Life and times of some Late Cretaceous-Early Tertiary
polar forests from northwest Ellesmere Island,
Arctic Canada**

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During the Mesozoic to Early Cenozoic, greenhouse climate phase forests grew well within the polar circle. These unique polar forest ecosystems flourished in a warm, high-latitude environment where trees were subjected to months of unbroken winter darkness followed by continuous daylight in the summer and elevated atmospheric CO₂ levels. Analysis of these polar forests is important because they provide a long-term context for the response of modern boreal forest ecosystems to future global climate change; as one scientist succinctly put it, “the past is the key to the future”.

In this paper, new Late Cretaceous to Early Tertiary fossil plant sites are described from Emma Fjord and Phillips Inlet, NW Ellesmere Island (paleolatitude of ~78°N). The fossil sites occur in the Campanian/Maastrichtian to Danian Hansen Point Volcanics of the Eureka Sound Group, Sverdrup Basin. This stratigraphic unit is interpreted as originating in a volcanically disturbed, alluvial plain/peat mire setting close to the margins of the paleo-Arctic Ocean. Moderately diverse assemblages of megafloora (wood and foliage) and palynoflora occur. Thin section studies of anatomical features in five silicified and calcified fossil wood specimens indicate the presence of three conifer families in this high-latitude environment, the Taxodiaceae, Pinaceae, and Cupressaceae. Foliage assemblages are dominantly composed of taxodiaceous conifers together with cupressaceous conifers, ginkgos, angiosperms, and ferns. Taxodiaceous conifers were probably the main source plants for the common amber remains at the two sites. Biometric analysis of tree trunks suggests that the forest canopy was in the order of 15–25 m high. Growth ring studies indicate a cool temperate climate with high year-to-year variability. Traumatic rings indicate the occurrence of sharp frosts towards the end of the growing season. Abundant charcoal remains suggest that these polar forests were frequently disturbed by wildfire, perhaps related to local volcanism.