News from the Plio-Pleistocene Kap København Formation, North Greenland

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The Kap København Formation is situated in North Greenland, at the shores of the Arctic Ocean, in an area which presently has a very sparse flora and fauna. The formation was discovered by S. Funder in 1979 (Funder & Hjort 1980), and subsequently visited in 1980 and 1983, and last summer by the author and Jens Böcher who studies insect remains. Virtually the whole area covered by the formation (about 300 km^2) has now been investigated.

The formation consists of coastal and shallow marine sand and silt, partly deposited in wave dominated deltas. It is till covered, and most sections show glaciotectonic structures. The formation is divided into a homogeneous member A and a more heterogeneous member B (Funder et al. 1984). Member A contains evidence of glaciation in the region.

The sediments contain abundant plant and animal remains. Virtually all major groups of plants and animals are represented, and they provide a detailed picture of the marine, terrestrial and limnic environments. They also, in combination with palaeomagnetic and amino acid data, date the sequence to the Late Pliocene and Early Pleistocene (Abrahamsen &

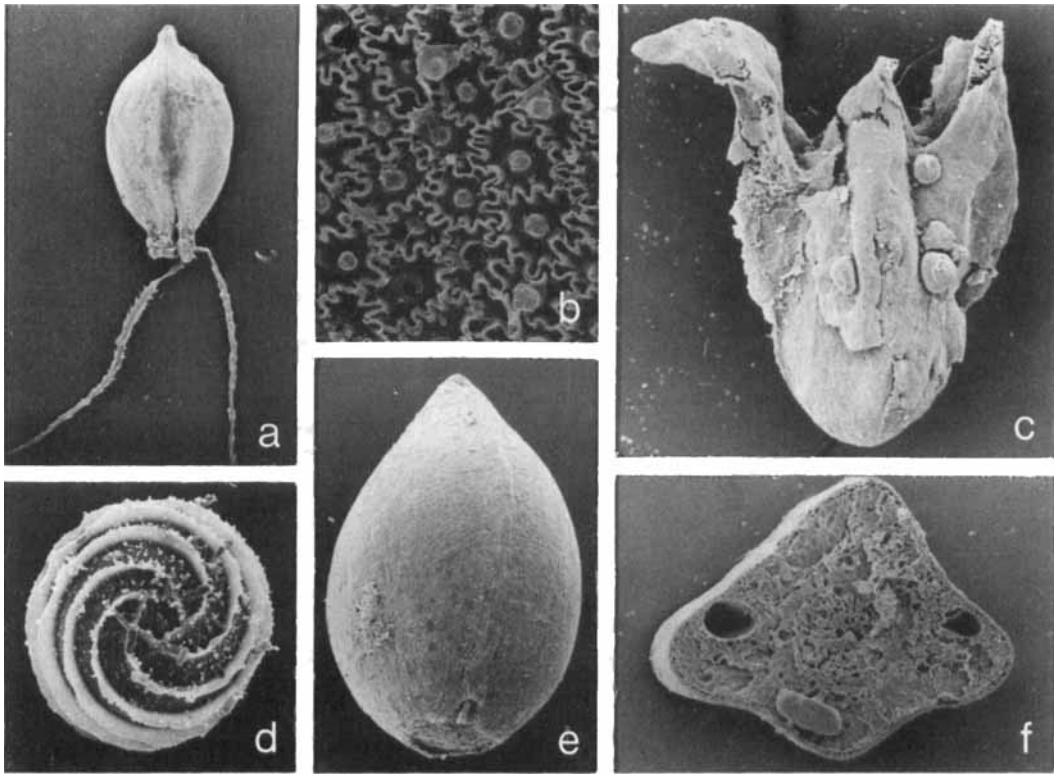

Fig. 1. SEM photographs of some macroscopic plant remains from the Kap København Formation. a: Fruit of *Scirpus microcarpus*, ×24. b: Surface detail of a, ×520. c: Fruit of *Myrica eogale/gale*, ×17. d: Oospore of *Tolypella* cf. *nidifica* (algae), ×100. e: Seed of *Viola* sp., ×28. f: Cross section of *Picea mariana* needle, ×38.

Marcussen 1986; Feyling-Hanssen 1986, 1987; Funder et al. 1985).

In 1986 our major emphasis was on the northernmost sections of the formation. These were not discovered until the end of the 1983 season. We were able to extend the stratigraphy worked out in 1983 somewhat northwards. To the northeast we discovered an isolated exposure of a new facies, shown by amino acid ratios to correlate with the Kap København Formation. Whereas the previously known molluscs are extremely thin shelled – possibly due to lowered salinity – this facies contains a more normal, rather rich fauna, including the snail *Trichotropis bicarinata* which is new to the fossil fauna of Greenland. No extinct mollusc species have yet been identified.

Jens Böcher has found c. 120 species of beetles which are now being identified. Most of them are extant, boreal species which do not occur in Greenland today. Apart from beetles a few other insect groups are represented.

The vascular plants which are studied by the author represent a mixture of boreal and arctic species. The main emphasis has been on macrofossils, of which the largest are tree trunks, up to 18 cm in diameter, but usually less than 12 cm. Tree growth has been proved for *Larix*, *Picea* and *Betula*. Most trees were of stunted growth form. Tree rings are extremely narrow with a mean of c. 1/4 mm. This is comparable to rings from the modern Arctic tree line, although this is situated much further to the south, in a light regime very different from that at Kap København.

Below follow a few brief comments on some of the plant remains, mostly based on the 1986 collections.

Larix (larch) was the most common tree species. The larch remains belong to an undescribed, extinct species which resembles the extant *Larix occidentalis* from western North America, and the extinct species *L. omoloica*, described from the Neogene of Siberia, also tentatively reported from Arctic Canada.

Picea mariana (black spruce) is represented by cones and needles (Fig. 1). Black spruce is presently widely distributed in the boreal forests of North America, where it is dominant in poorly drained soils, especially on permafrost. It is unknown from Neogene floras of Canada.

The 1986 collections also comprise cones and seeds of *Thuja occidentalis* (arborvitae). This species is sensitive to cold winters and dry summers. At present it grows in eastern North America where it scarcely reaches the Arctic tree line.

A single *Myrica* fruit had retained a few resin dots (Fig. 1). The *Myrica* fruits show resemblance to the modern *M. gale* (sweet gale) and the extinct *M. eogale* from the Neogene of Siberia. The winglike bracts are longer than in the modern species, but probably shorter than in the extinct species (Nikitin 1976).

Fruits and seeds of different herbs are also common, as exemplified by *Scirpus* (bulrush, Fig. 1) which grows in wet soil and *Viola* (violet, Fig. 1). *Tolypella* (Fig. 1, Characeae (stonewort)) is a small water plant which grows in alkaline or brackish water. Water plants are usually considered to be good palaeoclimatic indicators, because they disperse rapidly and are independent of soil maturation. However, most are widely distributed, and no Arctic species have evolved.

The Kap København Formation contains some of the oldest records of Arctic plants. *Dryas octopetala* leaves are amongst the most common plant remains. While the flora shows an overall phytogeographic affinity to North America, this species does not grow in central North America today.

Following the 1983 expedition we arrived at a picture of forest-tundra vegetation bordering a seasonally open sea at Kap København about 2 million years ago. The 1986 fieldwork and collections have confirmed this picture, but the taxa list is steadily increasing and the picture is now much more detailed.

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