The intrusion of dykes on Turner Ø and the outer part of Henry Land took place prior to the tilting of these blocks.

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C^{14} content of recent molluscs from Scoresby Sund, central East Greenland

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C^{14} dating of subfossil marine shells presupposes a knowledge of the original C^{14} activity of the organisms while living. Due to the slow turn over of water masses, the C^{14} activity of marine bicarbonate and marine organisms is not the same in all parts of the oceans, but may show marked deficiencies in certain oceanic areas, especially at southern latitudes. In large areas of the North Atlantic the C^{14} activity seems to be fairly uniform and equal to or only slightly lower than that of 'pre-industrial' terrestrial plants (Broecker *et al.*, 1960; Mangerud, 1972; Krog & Tauber, 1974). In certain areas, however, a somewhat lower activity seems to occur; this has been noted for areas along the east coast of Greenland (Fonselius & Ostlund, 1959; Hjort, 1973).

In order to check the magnitude of the C^{14} deficiency in the Scoresby Sund fjord complex, and to obtain some control on previous datings of subfossil shells from this area (Tauber, 1970; Funder, 1971, 1972, 1973) six samples of shells from living bivalves from the area have been subjected to C^{14} analysis. The samples were selected to show a hydrographic cross section through the region, extending from the inner fjord ramifications to the outer coast. Since the subfossil shells are believed to represent shallow water sublittoral communities, recent shells from similar environments (7–25 m depth) were chosen for the analysis. To avoid possible dating errors due to C^{14} produced by nuclear testing, the shells have been selected from the collections of the early expeditions to the area in the period 1892–1933. The shells have been taken from the collections of the Zoological Museum, Copenhagen, and were kindly put at our disposal by G. Høpner

Petersen. Since their collection the animals have been preserved in alcohol, and the analysed shells all had soft tissues adhering to them, showing that they were alive when dredged.

The results of the analyses are shown in the list below, and the locations of the samples appear in fig. 23, which also shows the earlier results obtained in the same region by Washburn & Stuiver (1962), Stuiver (1969), and Hjort (1973). 10–15% of the outer shell material was removed with acid before dating and the C^{14} activity of the shells has been corrected for decay between the time of collection and 1950. The activity is expressed in percentages of the international modern standard (0.95 of the activity of the NBS oxalic acid standard), which is also used as the modern value in age calculations of organic terrestrial material. No correction has been applied for the isotopic fractionation relative to terrestrial plants.

The average activity of the six samples is 98.8% of the modern terrestrial standard, i. e. they show a C^{14} deficiency of 1.2%, corresponding to an apparent age of 100 years. The deficiencies vary from 2.6 to 0.2% but do not allow a clear differentiation between shells from the inner part of the fjords and from the outer coast. The results confirm those previously obtained by Hjort (1973) which, if calculated in the same way, show an apparent average of 155 years for 3 samples. If taken together, the two investigations may suggest slightly higher C^{14} deficiencies for shells from the outer coast than from the inner fjord area, with a mean apparent age of ca. 150 years at the outer coast and ca. 90 years in the inner fjords.

There is some uncertainty about an early analysis from Kong Oscars Fjord which gave an age of 550±70 years (sample Y-606, Washburn & Stuiver, 1962). If the measurement was corrected for isotopic fractionation of shells relative to terrestrial plants the apparent age fits well with those found in this investigation and those reported by Hjort (1973). If the measurement was not corrected for isotopic fractionation admixture of subrecent shells in the sample could be suspected.

A sample of living bivalves collected in the same area in 1961 gave an apparent age of 200±60 years (sample Y-1267), and the difference between the two measurements was explained as the result of uptake of C^{14} from nuclear testing in the intervening period (Stuiver, 1969).

Compared to other parts of the North Atlantic area the samples from central East Greenland show slightly lower C^{14} activities. From the coast and fjords of Norway Mangerud (1972) reported average deficiencies of ca. 0.5% for 10 samples; for shells from the coasts of Denmark, the Faeroe Islands, Iceland and West Greenland, Krog & Tauber (1974) found an average deficiency of only 0.1%.

The lower activity in the shells from central East Greenland is probably due to low C^{14} activity in the Polar Water, which is the dominating component in the water masses at the surface of the central East Greenland fjords. Polar Water is formed as a stable water mass near the surface of the Arctic Ocean from where it flows south along the coast of East Greenland as a surface current (e. g. Kiilerich, 1945). Under the permanent ice cover in the Arctic Ocean the water is cut off from exchange of CO_2 with the atmosphere; decaying C^{14} atoms are therefore not replenished from the atmosphere, and the water masses may attain an apparent age corresponding to the mean residence time under the ice cover.

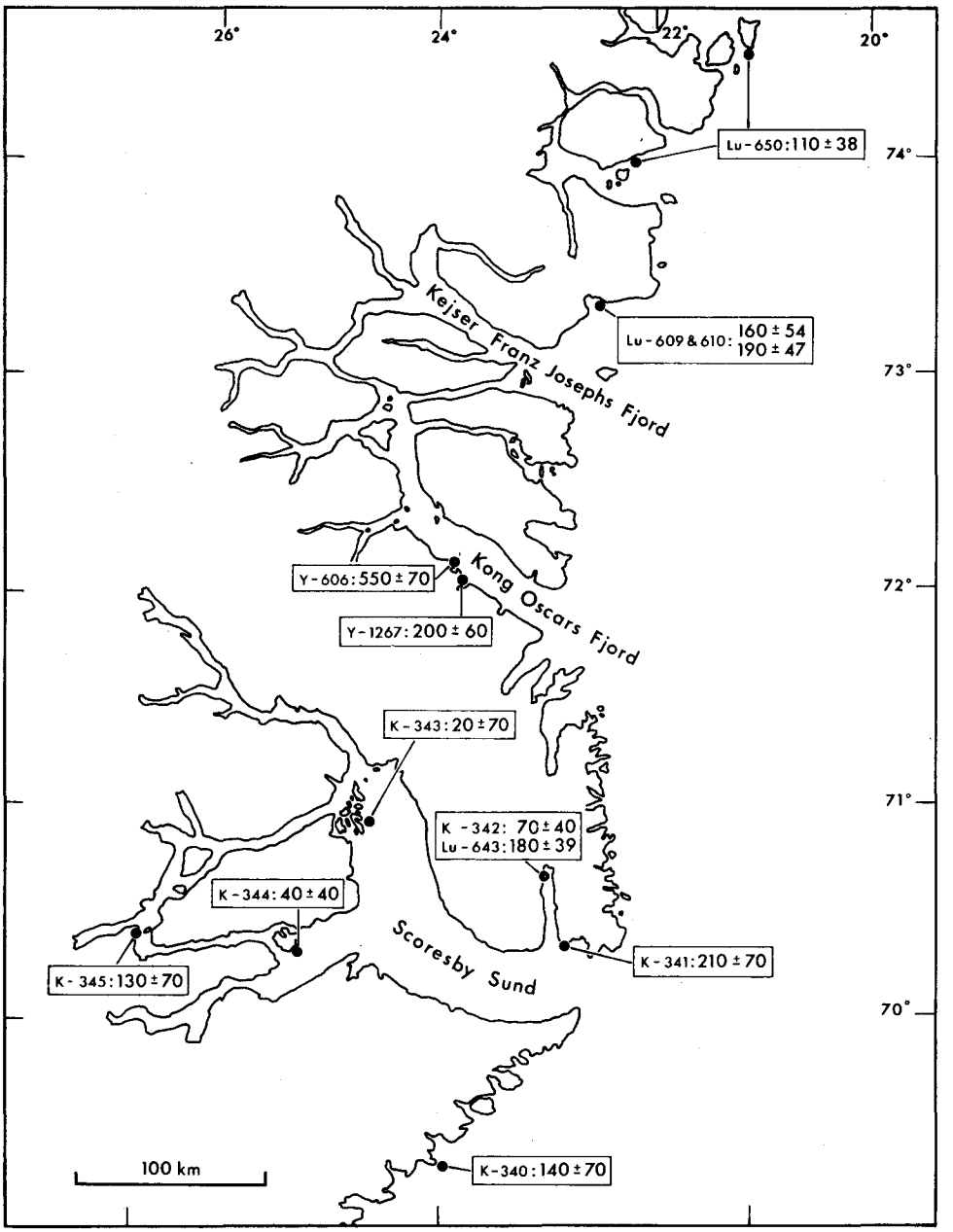

Fig. 23. Map of central East Greenland. Localities and apparent ages are indicated for measured samples in the present paper, in Hjort (1973; Lu-609, Lu-610, Lu-643, Lu-650), in Washburn & Stuiver (1962; Y-606), and in Stuiver (1969; Y-1267).

At the surface of the central East Greenland fjords Polar Water is mixed during the summer with fresh melt water to form a layer of 'fjord water' with a thickness of 5–50 m. Further, the Polar Water may to some extent be mixed with the underlying, more saline Atlantic Water (Ussing, 1934). The C^{14} deficiency in the shells will reflect the resultant apparent age of the mixtures of these water masses, and may therefore show slight variations in time and space. Such variations may explain a part of the difference between the analysis of sample Lu-643, collected in 1899 and showing an apparent age of 180 years (Hjort, 1973), and sample K-342 with the apparent age of 70 years, collected at the same station in 1933.

The results obtained by Hjort (1973) and by us suggest that apparent ages of shells from bivalves living in the fjords and at the coast of central East Greenland between 1892 and 1933 varied from 0 to ca. 200 years, with mean apparent ages of 90 years in the fjord systems and ca. 150 years at the outer coast. Whether this range also applies to subfossil shells cannot be demonstrated with certainty. However, since the general hydrographic pattern is believed to have persisted at least throughout the Holocene, approximately the same range of apparent ages could be expected for that period. When compared to other dates a standard correction of –150 years may therefore be applied to the C^{14} dates of shell material from central East Greenland.

Sample descriptions

GGU 79308: K-340. Kap Dalton 98.3±0.8% of modern

Shells of *Tridonta (=Astarte) elliptica* collected live by S. Jensen in July 1900 at depths of 17–20 m at the coast off Kap Dalton, 69°25′N, 24°05′W. Apparent age 140± 70 years.

GGU 79309: K-341. Kap Hope 97.4±0.8% of modern

Shells of *Tridonta (=Astarte) borealis* collected live by G. Thorson in June 1933 at a depth of 12 m, in the mouth of Scoresby Sund at Kap Hope, 70°27′N, 22°14′W. Apparent age 210±70 years.

GGU 79310: K-342. Hurry Inlet 99.2±0.5% of modern

Shells of *Tridonta borealis* collected live by G. Thorson in July 1933 at a depth of 25 m, at Fame Øerne in Hurry Inlet, 70°49′N, 22°29′W. Apparent age 70±40 years.

GGU 79311: K-343. Bjørneøerne 99.8±0.8% of modern

Shells of *Hiatella (=Saxicava) arctica* collected live by G. Thorson in July 1933 at depths of 6–13 m, Bjørneøerne, 71°08′N, 25°17′W. Apparent age 20±70 years.

GGU 79312: K-344. Hekla Havn 99.5±0.5% of modern

Shells of *Hiatella arctica* collected live by C. Ryder in 1892 at a depth of ca. 8 m, at Hekla Havn, Danmark Ø, 70°27′N, 26°14′W. Apparent age 40±40 years.

GGU 79313: K-345. Rødefjord 98.4±0.8% of modern

Shells of *Cardium ciliatum, Hiatella arctica, Tridonta borealis, Serripes groenlandica* collected live by G. Thorson in August 1933 at depths of 7–35 m, in the bay across Rødeø in Rødefjord, 70°28'N, 27°08'W. Apparent age 130±70 years.

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