

¹⁴C-dating of samples collected during the 1979 expedition to North Greenland

Compiled by **Svend Funder**

Thirty-two radiocarbon age determinations of bivalve shells (30), gyttja (1) and peat (1) are summarised below. All but two of the samples were collected during the GGU geological expedition to the Peary Land region. Two samples comprise contemporary shells from north and north-east Greenland, and were collected earlier.

The samples have been dated at the Carbon-14 Dating Laboratory of the Geological Survey of Denmark and the National Museum, Copenhagen (samples marked K, by courtesy of the Geological Survey of Denmark), the C-14 Laboratory at the Department of Quaternary Geology, University of Lund, Sweden (samples marked Lu, by courtesy of the laboratory and the Department of Quaternary Geology, University of Lund), and the Harwell Carbon 14/Tritium Laboratory, AERE, England (samples marked HAR).

The dates from all laboratories are corrected for isotopic fractionation according to measured values for ¹³C. However, while the laboratory in Copenhagen normalises dates on marine shells to a ¹³C content of 0.0‰ PDB, the dates from Lund and Harwell are normalised to -25‰ PDB. Hence, to make the two sets of ages comparable all dates on marine organisms must be corrected for the oceanic reservoir effect. An attempt has been made to determine the reservoir effect in this area (see below), and although the attempt was not entirely successful, a correction of -150 years has been applied to shell-dates normalised to 0.0‰ PDB, while the correction for dates normalised to -25‰ PDB amounts to -550 years, following the recommendations by Tauber & Funder (1975) for areas to the south of Peary Land. The correction has been applied only to dates younger than 15 000 years.

The Harwell Laboratory calculates infinite ages as 'sample activity + 2 δ', while the laboratories in Lund and Copenhagen use sample activity + 3 δ (R. L. Otlet, S. Håkansson and H. Tauber, personal communication). The former method gives a 95 per cent probability that the sample is older than the age given as a minimum; by the latter method the probability is 99.5 per cent, and the given minimum age consequently lower.

The oceanic reservoir effect in North Greenland waters

Two samples of contemporary shells from this general region have been C-14 analysed by H. Tauber. The samples were supplied by the Zoological Museum in Copenhagen through the kind help of G. Høpner Petersen and K. W. Ockelmann, the results of the analyses appear at the end of the date-list.

The activity of these samples is expressed as per cent of modern, i.e. 0.950 of the activity of the oxalic acid standard, and corrected for isotopic fractionation and decay from the time of collection to 1950.

Unfortunately the available material from this remote area is sparse. From North Greenland I have been able to trace only one sample of shells collected before the onset of nuclear bomb testing in the early nineteen-fifties. This sample proved to be too small to yield a significant result, indeed, the sample showed higher than modern activity. This abnormality

must be explained by the uncertainty in the measurement of the very small sample, although it could also result from slight contamination of the sample by fresh CO₂ (H. Tauber, personal communication). However, the analysis at least indicates that no abnormally high apparent age should be suspected in this area.

The other sample, derived from areas well to the south of Peary land, shows a ¹⁴C deficit of the same size as that encountered in marine organisms further south along the coast (Hjort, 1973; Tauber & Funder, 1975). Therefore the 'sea water correction' applied to dates from these areas is applied also to North Greenland shell dates.

Sample collected by Ole Bennike

GGU 217724: K-3494. Frederick E. Hyde Fjord **4850 ±95 B.P.** ¹³C = **-27.2‰**
Peat, composed mainly of *Drepanocladus* cf. *brevifolius*, from section c. 47 m above sea level. Vøvedal, Johannes V. Jensen Land. 83°02'N, 34°21'W.

Samples collected by Svend Funder and Christian Hjort

GGU 223207: HAR-3567. Frederick E. Hyde Fjord **8400 ±100 B.P.** ¹³C = **+2.6‰**
corr. 7850 B.P.

Shells of *Hiatella arctica* from surface of grey silt with pebbles 52 m above sea level, at Kap Kraka, Johannes V. Jensen Land. 83°03'N, 32°31'W.

GGU 223212: K-3287. Kap Morris Jessup **8450 ±120 B.P.** ¹³C = **+0.6‰**
corr. 8300 B.P.

Shells of *Mya truncata* and *Hiatella arctica* from sandy gravel at top of delta terrace 32 m above sea level. Johannes V. Jensen Land. 83°39'N, 33°31'W.

GGU 223213: K-3405. Kap Morris Jessup **7900 ±115 B.P.** ¹³C = **+0.8‰**
corr. 7750 B.P.

Shells of *Hiatella arctica* from sandy gravel at top of delta terrace 8 m above sea level. Johannes V. Jensen Land. 83°39'N, 33°31'W.

GGU 223215: K-3406. Kap Morris Jessup **8060 ±120 B.P.** ¹³C = **+0.9‰**
corr. 7910 B.P.

Shells of *Hiatella arctica* and *Mya truncata* from sandy gravel along ice wedge depressions in top of delta terrace 15–20 m above sea level. Johannes V. Jensen Land. 83°39'N, 33°31'W.

GGU 223220: K-3407. Kaffeklubben Ø **7900 ±90 B.P.** ¹³C = **+0.6‰**
corr. 7750 B.P.

Shells of *Hiatella arctica* and *Mya truncata* from surface of stratified sand 14–18 m above sea level. Off the north coast of Johannes V. Jensen Land. 83°40'N, 30°38'W.

GGU 223222: Lu-1785. Constable Bugt **39 300 \pm 2600 B.P. $^{13}\text{C} = +1.2\text{‰}$**
 -2000

Shell fragments of *Hiatella arctica* from the surface of, and excavations in, homogeneous silt 8 m above sea level on cliffs at the river. Johannes V. Jensen Land. 83°36'N, 32°00'W.

GGU 223224: K-3288. Constable Bugt **8390 \pm 120 B.P. $^{13}\text{C} = +1.2\text{‰}$**
corr. 8240 B.P.

Shells of *Hiatella arctica* from surface of stony silt 35 m above sea level, east of river. Johannes V. Jensen Land. 83°36'N, 31°58'W.

GGU 223231: K-3289. Kap James Hill **20 450 \pm 420 B.P. $^{13}\text{C} = +0.3\text{‰}$**

Shells and fragments of *Astarte borealis* and *Hiatella arctica* from surface of stratified silt 32 m above sea level. Johannes V. Jensen Land. 83°39'N, 31°03'W.

GGU 223247: HAR-3558. Herlufsholm Strand **26 360 \pm 830 B.P. $^{13}\text{C} = +1.4\text{‰}$**

Shells of *Hiatella arctica* from surface of silt polygons 51 m above sea level, near Donnerprop. East Peary Land. 82°25'N, 20°08'W.

GGU 223248: HAR-3560. Herlufsholm Strand **8980 \pm 110 B.P. $^{13}\text{C} = +2.2\text{‰}$**
corr. 8430 B.P.

Shells of *Hiatella arctica* from surface of raised beach ridge 32 m above sea level, near Donnerprop. East Peary Land. 82°31'N, 20°02'W.

GGU 223249: K-3408. Herlufsholm Strand **6120 \pm 95 B.P. $^{13}\text{C} = +0.7\text{‰}$**
corr. 5970 B.P.

Shells of *Astarte borealis* from surface of stratified sand 12 m above sea level, near Donnerprop. East Peary Land. 82°31'N, 19°50'W.

GGU 223250: K-3409. Herlufsholm Strand **3170 \pm 80 B.P. $^{13}\text{C} = +0.4\text{‰}$**
corr. 3020 B.P.

Shells of *Hiatella arctica* and *Astarte borealis* from surface of grey homogeneous silt 1 m above sea level, north of Kølneæs. East Peary Land. 82°31'N, 19°46'W.

GGU 223255: HAR-3559. Herlufsholm Strand **12 050 \pm 150 B.P. $^{13}\text{C} = -0.1\text{‰}$**
corr. 11 500 B.P.

Shells of *Hiatella arctica*, *Astarte borealis* and *Mya truncata* from surface of stony silt 45 m above sea level, near Donnerprop. East Peary Land. 82°36'N, 20°14'W.

GGU 223259: K-3290. Herlufsholm Strand **>33 000 B.P. $^{13}\text{C} = +1.0\text{‰}$**

Shells of *Hiatella arctica* and *Mya truncata* from surface of, and in, homogeneous sandy silt 55 m above sea level, near Krogerup Bugt. East Peary Land. 82°32'N, 20°20'W.

GGU 223261: Lu-1786. Herlufsholm Strand **35 400** ⁺¹⁶⁵⁰₋₁₃₅₀ B.P. ¹³C = +0.9‰

Shell fragments of *Hiatella arctica* from surface of silty diamicton near Foldedal. East Peary Land. 82°41'N, 22°50'W.

GGU 223263: Lu-1787. Herlufsholm Strand **38 400** ⁺²²⁵⁰₋₁₇₅₀ B.P. ¹³C = +0.5‰

Shells and fragments of *Astarte borealis* and *Mya truncata* from the surface of, and in, stratified sand with pebbles 48–58 m above sea level, near Krogerup Bugt. East Peary Land. 82°34'N, 20°27'W.

GGU 223267: Lu-1788. Kap København **33 700** ⁺¹²⁰⁰₋₁₀₅₀ B.P. ¹³C = -0.4‰

Fragments of *Mya truncata* shells from surface of silty diamicton 135 m above sea level, 4 km inland from the coast. East Peary Land. 82°23'N, 21°04'W.

GGU 223311: HAR-3565. Kap København **36 580 ±1650** B.P. ¹³C = +2.6‰

Shells of *Astarte borealis* from surface of silty diamicton 75 m above sea level, near the coast. East Peary Land. 82°20'N, 21°15'W.

GGU 223312: HAR-3564. Kap København **33 550 ±1370** B.P. ¹³C = +0.5‰

Shell fragments of *Mya truncata* and *Hiatella arctica* from stratified sand and silt 68 m above sea level, 2 km from coast. East Peary Land. 82°21'N, 21°20'W.

GGU 223313: HAR-3566. Kap København **23 860 ±410** B.P. ¹³C = -1.0‰

Shells of *Hiatella arctica* from surface of sand deposit 60 m above sea level, near the coast. East Peary Land. 82°21'N, 21°20'W.

GGU 223321: HAR-3569. Kap Rigsdagen **8470 ±80** B.P. ¹³C = +2.2‰
corr. **7970** B.P.

Shells of *Hiatella arctica* from silt on surface of delta terrace 60 m above sea level. Valdemar Glückstadt Land. 82°01'N, 21°29'W.

GGU 223326: HAR-3568. Kap Rigsdagen **>44 000** B.P. ¹³C = -1.1‰

Shells of *Hiatella arctica* at foot of cliff in silt deposit 87 m above sea level. Valdemar Glückstadt Land. 82°01'N, 21°47'W.

GGU 223329: HAR-3563. Hagen Fjord **7280 ±90** B.P. ¹³C = +0.4‰
corr. **6730** B. P.

Shells of *Mya truncata* from surface of silt deposit 40 m above sea level, at the mouth of a major valley close to the front of Hagen Bræ. J. C. Christensen Land. 81°34'N, 27°14'W.

GGU 223335: HAR-3562. Zig-Zag Dal **7890 ±110** B.P. ¹³C = +2.2‰
corr. **7340** B.P.

Shells of *Mya truncata* from section in stratified sand 50 m above sea level. East of Sjøllandsslette. Valdemar Glückstadt Land. 81°11'N, 22°22'W.

GGU 223339: HAR-3570. Kap Holbæk **6190 ±130 B.P.** $^{13}\text{C} = +0.4\text{‰}$
corr. 5640 B.P.

Shells of *Hiatella arctica* from surface of silt deposit between beach ridges 35 m above sea level. Valdemar Glückstadt Land. 80°41'N, 23°40'W.

GGU 223340: HAR-3561. Prinsesse Ingeborg Halvø **8290 ±90 B.P.** $^{13}\text{C} = +1.9\text{‰}$
corr. 7740 B.P.

Shells of *Hiatella arctica* from silt polygons between beach ridges 49 m above sea level. Kronprins Christian Land. 81°35'N, 16°32'W.

GGU 223342: K-3291. Nakkehoved **>33 700 B.P.** $^{13}\text{C} = -0.5\text{‰}$

Fragments of *Astarte borealis* picked out from small section in silt deposit 56 m above sea level. Kronprins Christian Land. 81°44'N, 13°40'W.

Samples collected by Niels Abrahamsen

GGU 255436: K-3610. Prinsesse Ingeborg Halvø **6430 ±75 B.P.** $^{13}\text{C} = -18.3\text{‰}$

Basal part of clay-gyttja in lake basin, 30–37 cm from sediment surface. Lake water level c. 25 m above sea level. Sample obtained by coring. Kronprins Christian Land. 81°36'N, 16°40'W.

GGU 256550: K-3285. Jørgen Brønlund Fjord **7390 ±110 B.P.** $^{13}\text{C} = -0.4\text{‰}$
corr. 7250 B.P.

Shells of *Mya truncata* and *Hiatella arctica in situ* in silt 26–27 m above sea level, near Kedelkrogelv. Heilprin Land. 82°17'N, 30°05'W.

^{14}C analyses of contemporary shells

GGU 231499: K-353. Danmarkshavn **98.1 ±0.7 % of modern.** $^{13}\text{C} = +0.6\text{‰}$

Mya truncata shells collected by dredging in 1906–1908 at depths up to ten fathoms. The shells have been preserved in alcohol and contained soft tissues. Storm Bugt, Germania Land. 76°45'N, 18°44'W. Apparent age 160 ±60 yr.

GGU 231500: K-354. Jørgen Brønlund Fjord. **106.9 ±9.8 % of modern.** $^{13}\text{C} = +3.5\text{‰}$

Juvenile shells of *Hiatella arctica* collected by dredging down to 10 m depth, and from stomachs of eider ducks, by T. Andersen and P. Johnsen in 1947–1949. The dredged shells contained soft tissues, while those from bird stomachs were empty but paired. The shells have been preserved in alcohol. The sample was extremely small and contained only 2.5 per cent of a normal filling of the counter. Peary Land, 82°08'N, 31°21'W. The apparent age is negative.

References

- Hjort, C. 1973: A sea correction for East Greenland. *Geol. Fören. Stockh. Förh.* **95**, 132–134.
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The Kap Leiper basic dyke and the age of the dolerites of Inglefield Land, North-West Greenland

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This note reports field observations (PRD and JSP) and K/Ar whole-rock dating work (DCR) on dolerite intrusions from south-western Inglefield Land. The stratigraphic relationships of the intrusions and the significance of the K/Ar ages are briefly discussed.

General geology

The Precambrian crystalline basement of North-West Greenland is unconformably overlain by unmetamorphosed and undeformed Proterozoic sediments, with some volcanics, of the Thule Group. This sequence reaches a thickness of several kilometres in the Thule Basin. In Inglefield Land, to the north, the Proterozoic sequence (Rensselaer Bay Formation) is about 200 m thick and thins out completely in the region of Marshall Bugt (fig. 3).

The Thule Group is characterised by appreciable amounts of dolerite material in the form of sills and dykes that form a widespread igneous province from 76°N to the Rensselaer Bugt area of Inglefield Land at about 78°30'N. The K/Ar ages reported on here are from the northernmost dolerite outcrops of the Proterozoic igneous province.

Field relations

Three samples are treated in the present study; one is from a dyke at Kap Leiper, the others are from a pair of prominent sills that occur throughout much of south-western Inglefield Land. Both the dyke and the sills were mentioned by Koch (1933) who also noted that the Kap Leiper dyke represents the most northern dolerite intrusion in North-West Greenland.

The Kap Leiper dyke is only exposed on the coast at the cliff foot. It is about 35 m thick with a vertical outcrop of about 30 m (fig. 4). The dyke forms a small coastal promontory and from its trend and the rather poorly exposed contacts it appears to strike approximately