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Institut für Kristallographie und Petrographie,
Eidg. Technische Hochschule,
Sonneggstrasse 5,
8006 Zürich,
Switzerland.

C^{14} dating of Survey material carried out in 1975

General compilation by **Anker Weidick**

Sixty-six radiocarbon age determinations of shell samples (63) and gyttja (3) from North-West, West, North-East and East Greenland are summarised below. All the material was collected during GGU field work except shells Lu-930 from Store Koldewey, North-East Greenland which came from the Danmark Expedition of 1906–1908. Collections of Quaternary material from this expedition have been recently kindly donated to GGU by the Zoological Museum, University of Copenhagen.

The samples have been dated at Isotopes Inc., Westwood, New Jersey, U.S.A. by J. Buckley (marked I), at the Carbon-14 Dating Laboratory of the Geological Survey of Denmark and the National Museum, Copenhagen by H. Tauber (marked K), at the Radiocarbon Dating Laboratory, Department of Quaternary Geology, University of Lund, Sweden (marked Lu) and at the Carbon-14 Dating Laboratory of the University of Helsinki, Finland by H. Jungner (marked Hel). The Finnish and Swedish data have been published earlier by Donner & Jungner (1975) and Håkansson (1975) respectively.

The samples are located by coordinates taken from the Danish Geodetic Institute 1:250 000 map series.

Samples collected in the Thule district, North-West Greenland by Peter R. Dawes

GGU 166125: I-8894. Olrik Fjord **18 990±280 B.P.**

Shells of *Chlamys islandica*, *Hiatella arctica* and *Mya truncata* collected in grey silt at *c.* 2.5 m above sea level. North side of Olrik Fjord, 77°09′N, 66°53′W.

GGU 166121: I-8895. Olrik Fjord **5240±100 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from grey marine silt terrace at *c.* 5.6 m above sea level. Locality as above.

GGU 166122: I-8896. Olrik Fjord **5550±100 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from grey marine silt at *c.* 9.3 m above sea level. Locality as above.

GGU 166123: I-8897. Olrik Fjord **5765±100 B.P.**

Shells of *Mya truncata* and *Hiatella arctic* from terrace of grey silt at *c.* 14.8 m above sea level. Locality as above.

GGU 166124: I-8898. Olrik Fjord **7065±110 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from terrace in grey silt at *c.* 20.5 m above sea level. Locality as above.

Samples collected in southern West Greenland by Anker Weidick

GGU 168456: I-8489. Qingup nunâ **8095±130 B.P.**

Shells of *Astarte borealis* collected from a recent beach ridge. The shells were derived from older clay deposits forming the substratum under the present high tide level. Bay at west end of Qingup nunâ, 64°10.4′N, 52°04′W.

GGU 168466: I-8490. Rypeø **9355±140 B.P.**

Shells of *Hiatella arctica* and *Mya truncata* from 3–4 m high coastal cliff. The shells were situated in 20–30 cm of gravel over clay and under 0.5 m of boulders which form the surface of the cliff. Surface consists of beach ridges. Rypeø near Godthåb, 64°07.4′N, 51°42′W.

GGU 168459: I-8491. Nipisat Sund **8785±130 B.P.**

Shells of *Hiatella arctica, Astarte borealis* and *Mya truncata* from marine clay close to upper high tide mark. South side of Nipisat Sund north of Eqalúnguit, 64°11′N, 51°57′W.

GGU 168444: I-8492. Nipisat Sund **8640±130 B.P.**

Shells of *Mya truncata* from a 4–5 m high cliff. Shells in gravel in the uppermost part of the cliff, overlying fine sand and clay. On the surface of the coastal cliff beach ridges at 5–6 m above sea level. North side of Nipisat Sund, north of Qôrnuatsiaq, 64°12′N, 51°58′W.

GGU 168425: I-8493. Marraq **9460±140 B.P.**

Shells of *Hiatella arctica, Mya truncata* and *Macoma calcarea* from an 8 m high coastal cliff. Shells found in upper 5 m sand with blocks with basal plates of *Balanus* sp. Sand resting on basal clay-silt. Marraq in Nordlandet, 64°13′N, 51°57′W.

GGU 168433: I-8494. Imartuneq (Sangujat kûat) **8640±130 B.P.**

Shells of *Mya truncata* from base of a 4 m high coastal cliff. Shells found in clayey silt 1 m below high tide mark. The clayey silt is overlain by sands and gravel. Imartuneq (Sangujat kûat), Nordlandet, 64°16′N, 51°56′W.

GGU 168434: I-8506. Imartuneq (Sangujat kûat) **8715±130 B.P.**

Shells of *Mya truncata, Chlamys islandica* and *Mytilus edulis* from transitional layer in a 4 m high coastal cliff between lower laminated silt and upper fluviatile sand 2–3 m above sea level. Imartuneq (Sangujat kûat), Nordlandet, 64°16′N, 51°56′W.

GGU 168435: I-8507. Imartuneq (Sangujat kûat) **6220±110 B.P.**

Shells of *Mya truncata* from base of a 5 m high cliff in clay, overlain by fine sand and sand. Imartuneq (Sangujat kûat), Nordlandet, 64°15.8′N, 51°57′W.

GGU 168407: I-8508. Maluto **8715±130 B.P.**

Shells of *Chlamys islandica* from an 18 m high coastal cliff in clay. Shell horizon in 15 m above sea level at transition from lower clay-silt to upper sand. Maluto, Godthåbsfjord, 64°17.6′N, 51°44.5′W.

GGU 168412: I-8509. Maluto **8855±130 B.P.**

Shells of *Hiatella arctica* and *Mya truncata* from cliff in beach ridge plain 27 m above sea level. Maluto, Godthåbsfjord, 64°16.3′N, 51°40′W.

GGU 168486: I-8510. Imarngit **8320±130 B.P.**

Shells of *Mya truncata* from shell layer over silt and overlain by 1 m fine sand in cliff 2–3 m above sea level. Imarngit, Nordlandet, 64°18′N, 52°03′W.

GGU 168487: I-8565. Imarngit **9860±140 B.P.**

Shells of *Hiatella arctica* from lower clay in coastal cliff at 1 m above sea level. Silt overlain by 2 m gravel. Imarngit, Nordlandet, 64°18′N, 52°04′W.

GGU 168499: I-8566. Sarfat kûat **9230±135 B.P.**

Shells of *Mya truncata* in cliff of a stream. Shells occur in clayey silt overlain by 2 m fine silt and covered by a thin veneer of gravel. Approximately 20 m above sea level. South of Sarfat kûat, Nordlandet, 64°19.5′N, 51°53′W.

GGU 168500: I-8567. Sarfat kûat **9400±140 B.P.**

Shells of *Mya truncata, Chlamys islandica* and *Balanus* sp. from fine sand horizon overlain by 1–2 m gravel and sand. Shells taken close to cliff base at approximately 28 m above sea level. North of Sarfat kûat, Nordlandet, 64°20.4′N, 51°53′W.

GGU 168404: I-8568. Kanasut **8525±130 B.P.**

Shells of *Mya truncata* in cliff of clayey silt covered by thin veneer of shell carrying gravel at approximately 30 m above sea level. Kanasut, Godthåbsfjord, 64°22'N, 51°44'W.

GGU 168491: I-8595. Natsilik **8320±130 B.P.**

Shells of *Mya truncata* from upper parts of 2 m high cliff of gravel facing southern end of Natsilik lake. Samples from 1–2 m above sea level. Natsilik pârdlerssuaq (Natsilik lake), Nordlandet, 64°22'N, 52°00.4'W.

GGU 168114: I-8596. Amitsuarssuk **6670±110 B.P.**

Shells of *Mya truncata* and *Chlamys islandica* from basal clayey silt under sand and gravel in foreset beds in 16 m high delta. Sample taken at the silty layer 1 m above sea level. Amitsuarssuk on Kapisigdlit peninsula, Godthåbsfjord, 64°32.2'N, 50°28'W.

GGU 168109: I-8597. Pâtusôq **7420±110 B.P.**

Shells of *Chlamys islandica* from clayey gravel-silt at 7–8 m in coastal cliff. Deposit overlain by gravel to 10 m above sea level and underlain by clay. Pâtusôq on Kapisigdlit peninsula, Godthåbsfjord, 64°34'N, 50°40'W.

GGU 168107: I-8598. Itive **8205±130 B.P.**

Shells of *Chlamys islandica* from a 10 m high coastal cliff in moraine-like clayey silt at 5–7 m above sea level under a veneer of gravel over 7.5 m above sea level. Itive in the Kapisigdlit peninsula, 64°35'N, 50°48'W.

GGU 168111: I-8599. Majuala **7200±110 B.P.**

Shells of *Hiatella arctica, Chlamys islandica* and *Mya truncata* in silty clay in a 2 m high coastal cliff. Majuala, inner part of Godthåbsfjord, 64°45'N, 50°09'W.

Samples collected in central West Greenland by Joakim Donner

GGU 148401: Hel-359. Unarrat kangerdlua **4070±130 B.P.**

Shells of *Balanus* sp. at a depth of 0–50 cm from gravel of beach ridge at 7.8 m above sea level. Unarrat kangerdlua, Egedesminde, 68°39'N, 52°02'W.

GGU 148402: Hel-360. Niaqornaq **6110±140 B.P.**

Shells of *Balanus* sp. at a depth of 0–50 cm from gravel of beach ridge at eastern end of Niaqornap tasia at 15.3 m above sea level. Niaqornaq, island of Aumat, Kangâtsiaq, 68°34'N, 52°58'W.

GGU 148404: Hel-361. Niaqornaq **5440±130 B.P.**

Shells of *Balanus* sp. at a depth of 0–60 cm from coarse gravel of beach ridge at western end of Niaqornap tasia at 21.8 m above sea level. Niaqornaq, island of Aumat, Egedesminde, 68°34'N, 52°59'W.

GGU 148405: Hel-341. Niaqornaq **8330±200 B.P.**

Shells of *Hiatella arctica* at a depth of 50–75 cm from beach gravel to the south of the eastern end of Niaqornap tasia at 42.2 m above sea level. Niaqornaq, island of Aumat, Kangâtsiaq, 68°34′N, 52°58′W.

GGU 148405: Hel-455. Niaqornaq **7800±260 B.P.**

Shells of *Mya truncata*. Same locality as preceding sample.

GGU 148406: Hel-362. Kánala **8970±170 B.P.**

Shells of *Hiatella arctica* from below 20 cm of about 50 cm of beach ridge gravel with cover of sand 18.5 m above sea level. Northern shore of island of Kánala, Egedesminde, 68°36′N, 52°34′W.

GGU 148407: Hel-342. Kánala **6800±165 B.P.**

Shells of *Mya truncata* from about 50 cm of surface gravel of beach ridge, 21.4 m above sea level. Northern shore of island of Kánala, west of Kangerdlua, Egedesminde, 68°36′N, 52°32′W.

GGU 148408: Hel-363. Kûkasiup qáqâ **7150±210 B.P.**

Shells of *Balanus* sp. at a depth of 10–50 cm from beach ridge gravel at 17.2 m above sea level. Kûkasiup qáqâ, 3 km east of Nivâq, Christianshâb, 68°37′N, 52°21′W.

GGU 148409: Hel-343. Nûgârssuk **5340±145 B.P.**

Shells of *Mya truncata* at a depth of 1.7–4.7 m from *c.* 3 m high cliff of a terrace of silt that merges into fine sand at the surface. Bay 1 km, south of Nûgârssuk in Nivâp suvdlua, Christianshâb, 68°38′N, 52°16′W.

GGU 148410: Hel-344. Nûgârssuk **6300±160 B.P.**

Shells of *Chlamys islandica* washed out from basal part of terrace, at 0–1.7 m above sea level. Same locality as preceding sample.

GGU 148412: Hel-365. Nûgârssuk **5330±210 B.P.**

Shells of *Balanus* sp. at a depth of 0–50 cm from beach ridge gravel in southern part of the peninsula at 8.7 m above sea level. Nûgârssuk in Nivâp suvdlua, Christianshâb, 68°39′N, 52°15′W.

GGU 148413: Hel-345. Nûgârssuk **8550±190 B.P.**

Shells of *Hiatella arctica* at a depth of 0–50 cm from beach ridge gravel in northern part of the peninsula at 15.3 m above sea level. Nûgârssuk in Nivâp suvdlua, Christianshâb, 68°39′N, 52°15′W.

GGU 148413: Hel-436. Nûgârssuk **6100±160 B.P.**
Shells of *Balanus* sp. Same locality as preceding sample.

GGU 148414: Hel-364. Nûgârssuk **6220±160 B.P.**
Shells of *Balanus* sp. at a depth of 0–50 cm from beach gravel south-east of the peninsula at 28.9 m above sea level. Nûgârssuk in Nivâp suvdlua, Christianshâb, 68°39′N, 52°15′W.

GGU 148414: Hel-437. Nûgârssuk **8630±200 B.P.**
Shells of *Hiatella arctica*. Same locality as preceding sample.

GGU 148416: Hel-347. Qerqatavâqikasik **7010±170 B.P.**
Shells of *Mya truncata* from underneath a cover of sterile sand at a depth of 60–85 cm of beach ridge gravel above even surface of permafrost at 24.3 m above sea level. Qerqatavâqikasik island, south of Ikamiut, Christianshâb, 68°36′N, 51°53′W.

GGU 148415: Hel-346. Qeqertamiut **7160±170 B.P.**
Shells of *Balanus* sp. at a depth of 25–75 cm from beach sand and gravel at 43 m above sea level. Qeqertamiut island, south of Ikamiut, Christianshâb, 68°36′N, 51°51′W.

GGU 148420: Hel-329. Lersletten **7880±150 B.P.**
Shells of *Mya truncata* and *Macoma calcarea* from surface of extensive even plain of marine clay at 50 m above sea level. Lersletten, south of Sydostbugten, Christianshâb, 68°31′N, 51°39′W.

GGU 148419: Hel-368. Lersletten **7880±250 B.P.**
Shells of *Mya truncata* and *Macoma calcarea* from upper part of clay cliff at 50 m above sea level. Facing Sydostbugten, south of island of Portussut kangiliat, 68°31′N, 51°38′W.

GGU 148417: Hel-366. Qeqertasugssuk **6790±160 B.P.**
Shells of *Mytilus edulis* at a depth of 0–20 cm from beach ridge gravel 40.3 m above sea level. Peninsula in eastern part of island Qeqertasugssuk, Sydostbugten, Christianshâb, 68°33′N, 51°29′W.

GGU 148417: Hel-438. Qeqertasugssuk **6460±210 B.P.**
Shells of *Hiatella arctica* at 40.3 m above sea level. Same locality as preceding sample.

GGU 148418: Hel-367. Qeqertasugssuk **6040±150 B.P.**
Shells of *Mytilus edulis*. 0–50 cm from beach sand, poor in shells, 29.0 m above sea level. Same locality as GGU 148417.

GGU 148426: Hel-371. Akugdlît **6690±160 B.P.**

Shells of *Balanus* sp. at a depth of 0–75 cm from sandy gravel of beach ridge close to old cemetry at 37.9 m above sea level. Akugdlît, abandoned settlement in Sydostbugten, Christianshåb, 68°39′N, 51°15′W.

GGU 148426: Hel-454. Akugdlît **6560±210 B.P.**

Shells of *Hiatella arctica*. Same locality as preceding sample.

GGU 148425: Hel-370. Sâtut **6680±160 B.P.**

Shells of *Mya truncata* at a depth of 0–50 cm from beach gravel at 18.9 m above sea level. Western Sâtut, south of island of Akugdlît, 68°38′N, 51°10′W.

GGU 148421: Hel-369. Orpigsôq **7210±170 B.P.**

Shells of *Mya truncata* from southern part of a 10.7 m high cliff face of clay terrace that reaches 14.1 m above sea level. Zirphaea Pynt, Orpigsôq, 68°37′N, 50°52′W.

GGU 148422: Hel-328. Orpigsôq **5930±130 B.P.**

Shells of *Chlamys islandica* from clayey sand (*Pecten*) layer above clay in middle part of cliff section at 14.1 m above sea level. Same locality as preceding sample.

GGU 148423: Hel-330. Orpigsôq **5040±140 B.P.**

Shells of *Zirphaea crispata* from the northern point of a 12.4 m high cliff face of gravel terrace that reaches 12.9 m above sea level. Stratigraphically the topmost layer in cliff section of Zirphaea Pynt. Same locality as GGU 148421.

Sample collected in North-East Greenland by the Danmark Expedition, 1906–1908

Lu-930 **> 40 400 B.P.**

Shells of *Mya truncata, Hiatella arctica, Macoma calcarea, Clinocardium ciliatum, Serripes groenlandica, Tridonta borealis, Natica* sp., *Nucula* sp. and *Portlandia arctica* from clay on bedrock at 120+ m. Southern part of Store Koldewey, 76°10′N, 18°35′W. Originally described by Jensen (1917); date published in Håkansson (1975).

Samples collected in East Greenland by Svend Funder

GGU 148302: K-2417. Moskusoksefjord **8110±120 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* collected on surface of silt deposit at 45–48 m above sea level. Hoelsbo, Moskusoksefjord, 73°43′N, 23°25′W.

GGU 148331: K-2375. Stordalen **5350±100 B.P.**

Clay with gyttja and autochthonous moss remains from a core of lake sediment. The sample represents the lower 3 cm of a 1.7 m thick gyttja deposit. At the mouth of Stordalen, Hudson Land, 73°40′N, 22°04′W.

GGU 148388: K-2376. Bontekoe Ø **9360±110 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from the surface of a silt deposit 31 m above sea level. Southern Bontekoe Ø, 73°06′N, 21°23′W.

GGU 148391: K-2377. Bontekoe Ø **28 370 $^{+1050}_{-930}$**

Shell fragments of *Mya truncata, Hiatella arctica* and *Astarte crenata*. Collected on surface of soliflucted silt deposit 86–90 m above sea level. Western Bontekoe Ø, 73°09′N, 21°26′W.

GGU 148396: K-2378, Mesters Vig **15 610±200 B.P.**

Clay with gyttja and autochthonous moss remains from core of lake sediment. The sample represents the lower 3 cm of a 1 m thick gyttja deposit. Contamination of the sample is suspected. Bjørnesø, Mesters Vig, 72°09′N, 23°40′W.

GGU 148717: K-2379. Brogetdal **8400±130 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from surface of silt deposit 47–49 m above sea level. Mouth of Brogetdal, Strindberg Land, Nordfjord, 73°43′N, 24°37′W.

GGU 148718: K-2418. Brogetdal **8690±130 B.P.**

Shells of *Hiatella arctia* from a cliff section 26 m above sea level. The shells were found *in situ* in layered sand. Mouth of Brogetdal, Strindberg Land, Nordfjord, 73°43′N, 24°37′W.

GGU 148723: K-2380. Waltershausen Gletscher **8070±100 B.P.**

Shells of *Mya truncata, Hiatella arctica* and *Macoma calcarea* collected on cliff section 29–31 m above sea level. The shells were found *in situ* in layered sand composing a terrace with a top surface at 39 m above sea level. At the south-west corner of the front of Waltershausen Gletscher, Nordfjord. 73°47′N, 24°23′W.

GGU 148725: K-2381. Kap Ovibos **8230±130 B.P.**

Shells of *Mya truncata* and *Hiatella arctica* from surface of sand deposit at 60 m above sea level. Kap Ovibos, Strindberg Land, 73°53′N, 24°25′W.

GGU 148728: K-2419. Geologfjord **4240±100 B.P.**

Shells of *Mya truncata, Hiatella arctica* and *Macoma calcarea* from surface of dislocated marine deposit at 12–13 m above sea level. Andrée Land at the head of Geologfjord, 73°55′N, 25°47′W.

GGU 134018 B: K-2512. Milne Land $4610 \pm 90 < C^{13}: -20.0‰$

Clay gyttja from core of lake sediment. The sample represents the interval 154–165 cm in a 200 cm thick deposit of lake gyttja. (Compare GGU 134018 (A): K-1743 from same core, Funder, 1971). Bramgåssø, western Milne Land, 70°31'N, 28°02'W.

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New instruments for geological photo-interpretation and mapping

Keld S. Dueholm

Geological photointerpretation and photogrammetry

Aerial photography is now an integrated part of topographic mapping. Half a century ago photogrammetric methods revolutionised the production of topographic maps, mainly because all contour drawing and measuring of details were transferred from the field to the laboratory. Based on very few field observations, a detailed and very accurate topographic map can be drawn from aerial photographs by photogrammetric methods. Thus, for an area that would require many weeks of field work to produce a satisfactory topographic map, the same result can be achieved in the photogrammetric laboratory in a single day. In addition, accuracy can be very high. For instance, for a map at the scale 1:50 000 an accuracy on the ground better than 0.5 m can be reached by photogrammetric methods.

Seen photogrammetrically, the drawing of geological maps and the measurement of geological structures do not principally differ from the problems involved in topographic mapping provided of course that the geology can be interpreted or mapped on the photographs. In this respect, it is generally known that the geological exposure offered in Greenland is generally good. Experience in the photo-interpretation of Tertiary plateau basalt areas on Disko in central West Greenland, and Lower Palaeozoic limestone and clastic sediments and Quaternary marine, fluviatile and glacial deposits on Hall Land, North Greenland, has been very positive.

Peculiarly, photogrammetric methods have not become so popular with geologists. Geological interpretation of aerial photographs, together with the measurement of some struc-