MEDDELELSER OM GRØNLAND
UDGIVNE AF
KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND
Bd. 161 · Nr. 2

PALEO-ESKIMO CULTURES IN DISKO BUGT, WEST GREENLAND

BY

HELGE LARSEN
AND
JØRGEN MELDGAARD

WITH 23 FIGURES IN THE TEXT AND 5 PLATES

KØBENHAVN
C. A. REITZELS FORLAG
BIANCO LUNOS BOGTRYKKERI A/S
1958

CONTENTS

PREFACE

Though the most thoroughly investigated area in the Arctic, as far as archaeology is concerned, Greenland still presents major problems in connection with the earliest settlement of the country. This may seem rather surprising considering that as a result of the extensive investigations by the Danish National Museum before the Second World War it was generally believed that in the main we had a fairly clear picture of the prehistory of the Greenlanders. The assumption was that, apart from the northernmost part, where traces had been found of an early immigration by Dorset people, Greenland was populated by bearers of the Canadian Thule Culture in the period between the 10th and the 12th cent. A. D. In Greenland they gradually adapted themselves to the new surroundings and, probably also influenced by contact with the Norse farmers, they developed in the 13th—14th cent. a specific Greenland culture, the so-called Inugsuk Culture. From this culture, which was thought to be the earliest in most parts of Greenland, the culture of the present-day Greenlanders developed.

Even before the Danish investigations were completed the conception of the Thule people being the first immigrants to West Greenland was questioned by HENRY COLLINS, who expressed the opinion that the Thule Culture in West Greenland was preceded by the Dorset culture (COLLINS 1934, p. 121). COLLINS based his view on the numerous stone artifacts of non-Thule origin, which had been picked up by private collectors primarily in the Disko Bugt area and which many years ago O. SOLBERG had ascribed to a Greenland "Stone Age" (1907). Meanwhile, because the systematical excavations had revealed no evidence of a "Stone Age" antedating the Inugsuk culture, COLLINS' suggestion was not followed up and many years should elapse before the time was ripe for renewed investigations in West Greenland.

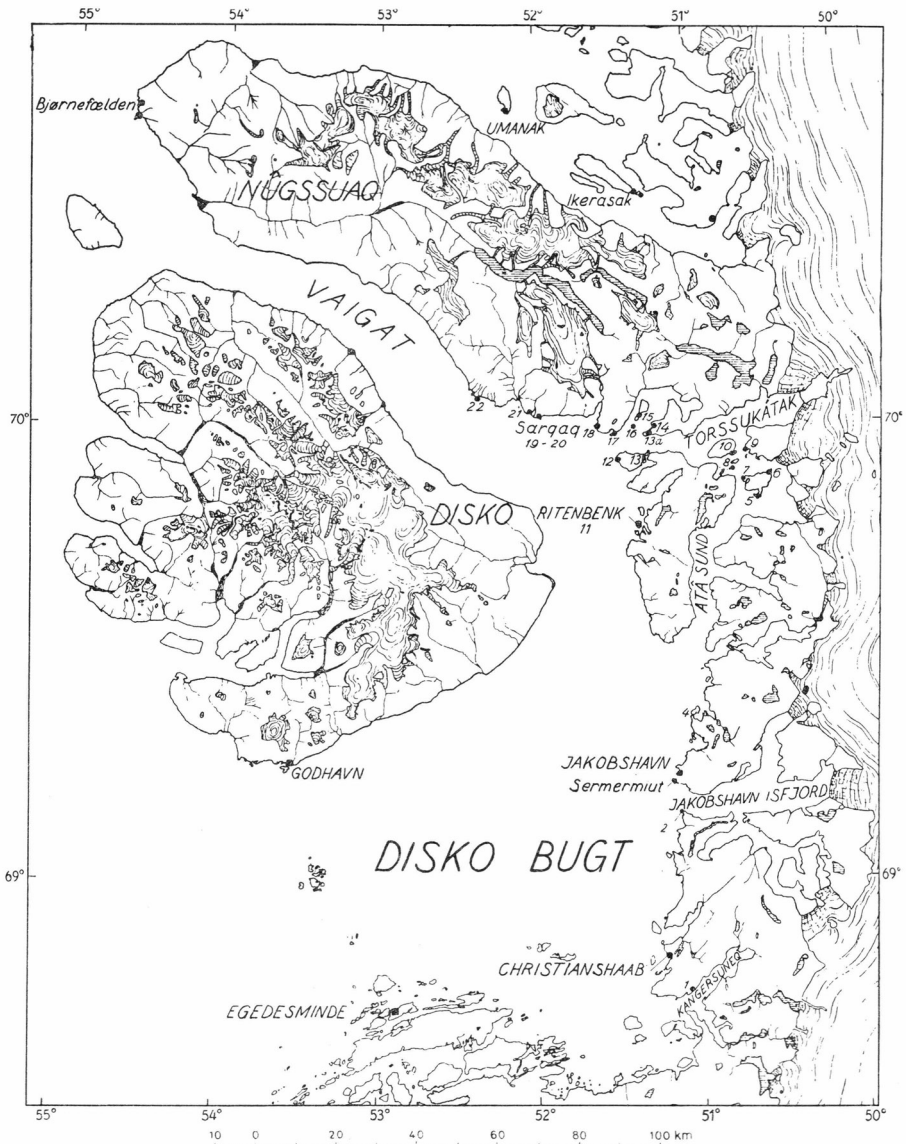
Two archaeological events in Greenland finally prompted the National Museum to send a party to Disko Bugt in 1953. On the Danish Pearyland Expedition 1947—50 EIGIL KNUTH had found stone and bone objects belonging to Paleo-Eskimo cultures on terraces in Peary Land

and East Greenland. Some of these occurred in connection with tentrings, while others were found on gravel terraces without any obvious signs of former habitation (KNUTH 1952). In West Greenland previous investigations have been concentrated on sites with house ruins and if conditions similar to Peary Land and East Greenland exist in West Greenland it may explain why cultures earlier than Thule have not been found there. This supposition was confirmed in 1948 when HANS MOSEGAARD near Sarqaq in the northern part of Disko Bugt found chipped stone artifacts at a place where there were no visible house ruins. The find consisting of 182 artifacts was described by MELDGAARD, who came to the conclusion that the material represented a pre-Thule West Greenland Paleo-Eskimo culture which was closely related to the early Alaskan cultures, Ipiutak, Near Ipiutak, and the Denbigh Flint Complex (MELDGAARD 1952). MELDGAARD explained the Dorset types in the collections described by SOLBERG as a result of later influence from the Canadian Dorset culture.

These finds opened up new perspectives, raised new problems which called for the resumption of systematic investigations in Greenland. A long-termed, extensive project was worked out by the National Museum, and through the Greenland Department the necessary financial support was secured for a period of five years. On June 2nd 1953, the first party consisting of Professor P. V. GLOB from the University of Aarhus, and HELGE LARSEN, JØRGEN MELDGAARD, and GEORGE NELLEMANN from the National Museum left for Disko Bugt, which was selected as the natural starting point for the project. The tasks of the party were: 1) to locate as many Paleo-Eskimo sites as possible, 2) to find remains of Paleo-Eskimo dwellings, 3) to find and excavate a stratified site in the hope of establishing the chronological position of the Paleo-Eskimo culture. The most promising site for the latter investigation being Sermermiut, which has yielded numerous stone artifacts and which is known for its large accumulations of refuse, it was decided that MELDGAARD and NELLEMANN should begin excavations there, while GLOB and LARSEN by motorboat should make a survey of Disko Bugt visiting not only all known archaeological sites but also places the topography of which would seem suitable for Paleo-Eskimo occupation. Having investigated about 60 localities, of which 22 yielded artifacts belonging to Paleo-Eskimo cultures, GLOB and LARSEN returned from their reconnaissance on July 24th. A few days later GLOB returned to Denmark, while MELDGAARD and NELLEMANN, in a vessel belonging to the Greenland Geological Survey, made a trip to Nugssuaq investigating "Bjørnefælden", a stone structure supposed to be of Norse origin, and some Paleo-Eskimo sites. In August the rest of the party returned to Denmark.

In conclusion, I wish to thank the other members of the party for their excellent co-operation, without which it would have been impossible to carry out the program in the short time we had to our disposal. It is largely thanks to Professor GLOB's keen eyes and field experience that we were are able to locate so many sites, and MELDGAARD's and NELLEMANN's exemplary excavation at Sermermiut is fundamental not only for this paper but also for future investigations of the Paleo-Eskimo cultures in West Greenland. We are grateful to all people in Greenland who helped us in various ways, and in particular to the manager of Jakobshavn, Mr. HANS JACOBI. MELDGAARD and I are further indebted to Mr. HENNING SØRENSEN, M. A. for his assistance in determining the stone material. The photographs and plans in the section on Sermermiut are made by MELDGAARD, those of the other sites by me. The photographer of the National Museum, Mr. LENNART LARSEN, has photographed the specimens with his customary skill.

HELGE LARSEN.



Map showing the investigated sites.

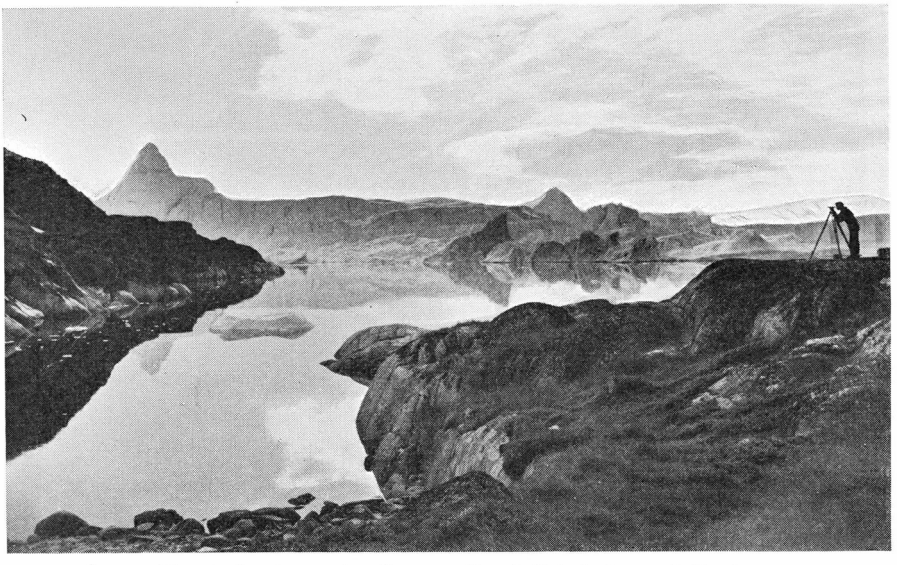


Fig. 1. Ice-bergs in the mouth of Jakobshavn Isfjord.

I. SERMERMIUT AND ITS DIFFERENT PERIODS OF CULTURE

1. HISTORICAL SURVEY

In the very center of the rich hunting grounds of Disko Bugt is what is probably the largest ruin settlement in Greenland: Sermermiut. Situated in the bottom of a small bay at the mouth of Jakobshavn Isfjord, it is separated from this year-round ice-filled fiord only by a low, rocky promontory. The verdure of the gently undulating valley slope contrasts with a jagged and frozen horizon—this is indeed Sermermiut: "The settlement of those living at the glacier ice" (Fig. 1).

Today the access by sea is often difficult even for a kayak. It is known that, in historical time, the larger part of the population used to move to nearby summer camps outside the fiord, hunting-places like the present day town of Jakobshavn 3 kms. to the north. One of several paths from Jakobshavn to Sermermiut runs through the small gorge seen in the foreground on fig. 2. Standing here, an old tale relates, it was once possible in the darkness of the winter night to discern the seams in ones own boot-sole, so much light radiated through the windows of the immense settlement.

The first missionary, Poul Egede, arriving in 1737, was also impressed by the size of Sermermiut: "More than 20 large houses, like a

farm-village"; and he met with an self-assured population. "Did you ever see so many people in one single place?" they asked him (POUL EGEDE, Efterretninger 1788).

The importance of Sermermiut was gradually reduced from the middle of the 18th century. In 1778 it was the settlement of the remaining heathens in the area. In 1803 there are listed 52 inhabitants. The main reason for the depopulation of Sermermiut was probably the establishment of a trading post at Jakobshavn in 1741. A contributing cause, however, may be found in increasing difficulties for open-water hunting in the fiord and at the mouth of the fiord, due to larger production of glacier ice. During a test excavation in the Sermermiut midden in 1909 TH. THOMSEN was told by a Greenland worker that his grandmother's family moved from Sermermiut about 1820, when she was a small girl, because of "the advancing ice" (TH. THOMSEN, unpubl. diary) (see also p. 24).

The last family left Sermermiut around 1850 and today 24 grass-covered ruins can be clearly distinguished on the surface, representing the last centuries of habitation. From the smaller settlements of Igdlumiut and Pitorqaq and from Jakobshavn there is still a good deal of seal hunting carried out in the mouth of the icefiord, and an important supplement to the diet is still the Greenland Halibut, which is caught on hooks especially on the winter ice. A considerable effort was once devoted to this kind of fishing; in february 1739 POUL EGEDE came across a group of Eskimo among the frozen-in icebergs outside Sermermiut and he measured the length of one of the baleen fishing lines to be 728 m.

Even more impressive than the large area covered by house ruins is the thickness of the midden deposits. In 1912 a deposits of 3—4 meters of organic material was recorded by M. PORSILD; since then a considerable area must have been eroded by the sea, because in 1953 the complete accumulation was found to be a maximum of 2.4 meters.

The sandy beach in front of these eroded culture layers has for more than a hundred years been a rich hunting ground for the Danish officials with historical interest. Among the early archaeological collections to come to the Danish National Museum from Greenland, we find already in 1838 a number of 26 stone artifacts labelled "Sermermiut", and reported in Annaler for Nordisk Oldkyndighed, 1838—39, p. 255 ff. (Reports of the Royal Society of Northern Antiqvarians). It is a curious fact now to note that all main types of the two Paleo-Eskimo cultures were already present in this old collection.

Scientific excavations were started in 1909 when TH. THOMSEN from the National Museum during an 8 days' visit excavated 13 sq. meters of the midden deposits. During the years from 1912 to 1916 MORTEN PORSILD made rather extensive excavations at Sermermiut, the material

Fig. 2. Sermermiut seen from north.

from which was recently handed over to the National Museum. As well THOMSEN as PORSILD excavated by layers, but unfortunately there are no reports describing the stratigraphy.

2. DESCRIPTION OF THE STRATIGRAPHY

The purpose of the 1953 investigation at Sermermiut was to obtain stratigraphical evidence in order to test the two postulated Paleo-Eskimo culture stages in West Greenland. Excavations were carried out from July 1—July 28, and the efforts were concentrated on procuring undisturbed profiles where the position of every artifact and piece of refuse would be recorded. After various test diggings two main profiles, A and B, were chosen parallel and close to the exposed midden edge towards the bay. The layers here reached the greatest thickness, and the excavation of deeper layers was facilitated on accound of the thaw while permafrost even late in July started 0.30—0.40 m below the present surface only a short distance from this exposed edge.

In the Neo-Eskimo midden layers the earliest levels observed can be identified as a somewhat modified Thule culture, an early Inugsuk culture dated by MATHIASSEN to the 12—13th century (TH. MATHIASSEN, 1934, p. 168). Remains of this Inugsuk culture as well as Paleo-Eskimo artifacts were found in situ from 0.5 m above present high water level to a height of more than 12 m, but the excavations made it clear that the actual height above sea level of the various deposits at Sermermiut could not be used for chronological purposes. It was obvious, however, that the sea level was lower as well during the Paleo as the Neo-Eskimo occupations; a change that was observed also from most other sites found at Disko Bugt (p. 66).

Profile A consists of a 20 m long vertical cut. The deposits overlaying the sterile gravel surface vary here from 1.80 m to 2.45 m, and the pleasant surprise of the investigation was disclosed when a sequence

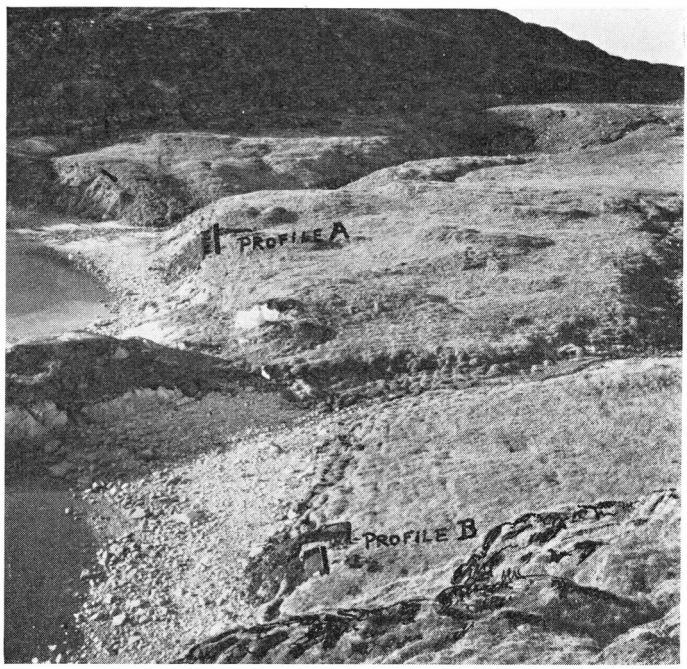


Fig. 3. Sermermiut, the main areas of excavation seen from south.

of up to six distinct layers appeared in the lower part of midden underlying the Neo-Eskimo deposit. In most places this stratigraphy was disturbed, mainly because pits had been dug from surfaces at various levels in the midden during the Neo-Eskimo habitation (often identifiable as the result of house building). In order to simplify the description we shall here confine ourselves to the instructive portion of the profile between the 11 m and the 16 m marks. In fig. 5 is shown the profile 11—14 m, and the framed area between 13 m and 14 m is also illustrated by the photograph fig. 6 in order to give an impression of the character of the Paleo-Eskimo deposits.

The total thickness of the deposits is here approximately 2.10 m. Starting from the bottom, layer A is the virgin soil consisting of gravel (in some places clay) with several stones. On top of this original surface is the layer B, 5—10 m thick, which contains artifacts belonging to the Sarqaq phase of the West Greenland Paleo-Eskimo culture. This layer is a grey-black humus, where remains of grasses with a slight intermixture of gravel and sand from A indicate a vegetation cover that did not

Fig. 4. Sermermiut, Profile A during excavation.

accumulate much during the time of occupation. The artifacts are most frequently found in the lowermost centimeters of this layer. (In this connection it is of importance to note, that nowhere at Sermermiut was the horizon of Sarqaq artifacts found underlaid by turf or other organic deposits, but always directly on a barren surface or in a thin humus layer as described here). In layer B there were found a number of scattered stones, which often exhibited a sooted or cracked surface indicating contact with fire.

There can be drawn no sharp line between layer B and layer C. Layer C is a 10—15 cm thick, only slightly humified brown turf, without intermixture of sand or stones, and with no artifacts. Overlaying this turf is layer D consisting of fine yellow sand, in some places clayish,

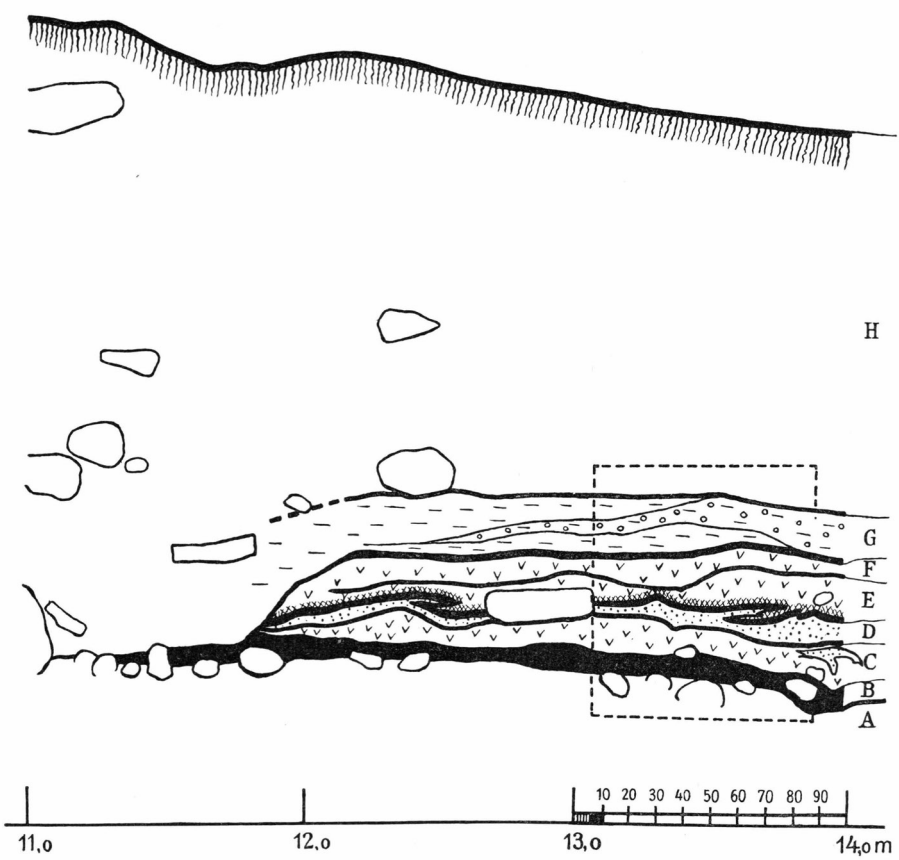


Fig. 5. Sermermiut, Profile A, 11–14 m.

6—12 cm thick. A folding of this layer has taken place later (see p. 15), and a few scattered artifacts were found in the layer. The same complex of artifacts, however, were found concentrated on top of the sand and a few centimeters into the next layer E. Again only stone artifacts are preserved, but they are easely identified as types of the Dorset culture. Also here several soothy stones were found, mostly of fist-size, and in addition a few pieces of charcoal. The thin horizon with Dorset artifacts may indicate that this second habitation has been of a rather short duration, but considering the large amount of Dorset artifacts to be found at most places at Sermermiut this is not necessarily the case. We can only conclude that already early during the formation of layer E the habitation came to an end. Layer E is a 4—16 cm thick, dark brown deposit, in character very similar to the "Sarqaq-layer" B, but with more remains of mosses and other plants preserved.

The upper limit of layer E (i. e. the horizon between E and F) is marked by a very thin sandy layer (to be seen on the photograph fig. 6).

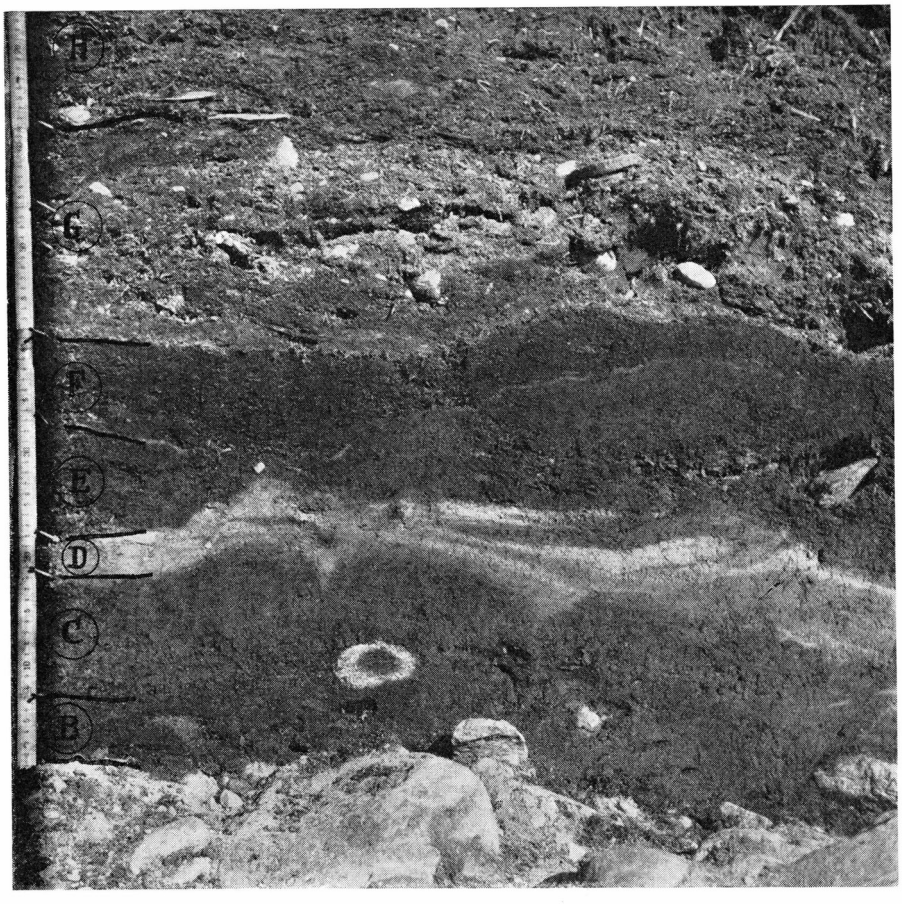


Fig. 6. Sermermiut, Profile A, 13–14 m.

Because of the broken course of this surface line, the abovementioned folding of layer D, including the Dorset level in layer E, shall probably be interpreted as a result of a solifluction that took place after the formation of the upper part of layer E (but before the unbroken surface between F and G was formed).

Layer F is the last formation before the arrival of the Neo-Eskimo. It is a black sphagnum-like turf 8—14 cm thick. Grasses, mosses and small twigs of willows are plentiful but not a single artifact was found. On top of this layer a very pronounced horizon of compressed grasses can be distinguished, a feature that must be explained by the existence of a dryer surface when the accumulation of F was completed.

A grass covered plain then met the new and third group of invaders. The well known habit of these Thule culture people to construct half underground houses brought about the next deposit, layer G, in the

sequence described here. The content of grey turf with stripes of gravel where artifacts from both of the Paleo-Eskimo cultures are scattered, is easy to recognize as a mixture of the whole underlying sequence. The place from where this deposit is derived is seen to the left in the profile (fig. 5), where an oblique cut terminates the unbroken sequence right down the bottom gravel. The content of artifacts in this pit and large building stones clearly reveals the remains of a Neo-Eskimo house.

The last 1.40 m of the deposit in the profile is Neo-Eskimo midden, layer H. Traces of houses can be seen in several levels. The uppermost 20—30 cm is sterile turf formed during the 100 years elapsed since the days of the last occupant—the final seal on the history of Sermermiut.

3. DESCRIPTION OF THE ARTIFACTS FROM SERMERMIUT

The excavations at Sermermiut yielded 404 Paleo-Eskimo artifacts and 2773 pieces of refuse recorded in situ in the profiles described above. Of these artifacts 79 were found in the Sarqaq horizon, and 287 in the Dorset horizon. The remaining 38 artifacts were found in the layers G and H mixed with Neo-Eskimo material. Since both industries are very homogeneous at the various areas at Sermermiut, we shall here again confine the description to a representative and well documented part, i. e. the artifacts from Profile A, between 12 m and 15 m. A total of 78 stone artifacts and 347 pieces of refuse were here found and measured by levelling over an area of 3 m^2, approx. 5 m^3. The types from the two primary culture horizons are shown on Pl. 1, layer B (Sarqaq) in the lower half and layer E (Dorset) in the upper half.

Sarqaq. The content of layer B is: Three burins (Pl. 1, II, 8—10), two of which are much resharpened (9, 10). One resharpening spall from a burin with the lower end obliquely retouched (II, 7). Four small triangular blades (II, 1—4), three of them with straight base, one with a rounded base, two specimens are partly ground. Two symmetrical, tanged blades (II, 5, 6), one of them of flint (5). Three large asymmetrical, tanged blades (II, 11—12). One symmetrical, tanged blade with rounded point (II, 13). One concave side scraper (II, 15). One irregular chip with a cutting edge retouched on both sides (II, 14). Four fragments of large blades.

The material is a silicified slate, angmâq, (see p. 47), except for one artifact of flint (II, 5). The pronounced predilection for this raw material is also evident from the refuse: the same part of layer B yielded 99 chips and all of them were angmâq. In the remaining part of layer B were besides this material only found eight chips of quarzite, three of

flint, and two of rock crystal. Although angmâq is somewhat softer than flint the chipping is often very fine, especially on the smaller projectile points. Practically all blades with a cutting edge are worked all over on both sides.

The artifacts described above are typical of the oldest horizon at Sermermiut, and they may be used as a foundation for the division of the West Greenland Paleo-Eskimo culture into the two postulated phases. However, because of the restricted number of artifacts obtained from this portion of the profile, the assemblage should be supplemented with five additional types found in unmixed stratigraphic layers in the remaining part of Profile A; the symmetrical, slender, oval blade; the asymmetrical, slender, double-pointed blade; the short adze blade; the triangular, convex end scraper made of a long blade (conf. MELDGAARD, 1952, fig. 76. 3, 11, 16, 21).

Dorset. The content of the corresponding Dorset horizon in layer E is: Four asymmetrical, notched blades (Pl. 1, I, 1—3). One asymmetrical blade without notches (I, 6). One "burin-like" implement of angmâq (I, 5). Three convex end-scrapers (I, 4, 8, 9). One rim-sherd of a soapstone lamp with an obtuse corner (I, 7). 38 micro-flakes (I, 10—11), eight of which have retouched "tanged" basis.

The material from which these artifacts are made presents a striking contrast to that of the Sarqaq horizon. Except for one type (I, 5) angmâq was never used. A grey-blue chalcedony is by far the most common raw material; flint and rock-crystal, however, did also play a rôle. The refuse may give the best idea of the proportion: the same part of the Dorset layer yielded 210 stone chips, 179 of chalcedony, 32 of angmâq, 8 of flint, and 2 of rock-crystal.

As in the Sarqaq horizon, a number of types are missing in this restricted part of the Dorset layer. The following types from unmixed, stratigraphic layers may be added to the assemblage mentioned above: the micro-core of flint or rock-crystal with lateral fluting and prepared striking platform (I, 12). The convex end-scraper with flaring edges (I, 13).

In the table pp. 48—49 all the artifacts from Sermermiut are listed according to types.

4. CHARACTERISATION OF THE PALEO-ESKIMO CULTURES AT SERMERMIUT

On the basis of the stratigraphy at Sermermiut it is now possible to characterize the two Paleo-Eskimo assemblages. A division into two stages was attempted in 1952 (MELDGAARD 1952), but the Sermermiut

stratigraphy provides us with the important information that not a single stone artifact from one of the two stages can be dublicated in the other. Because of this distinction we find it justifiable to refer to two cultures, the Sarqaq culture and the Dorset culture.

Sarqaq. The prevailing stone material used in Disko Bugt in the Sarqaq culture is angmâq. The refuse from the unmixed profiles at Sermermiut may give the most illustrating figures: of 1190 pieces there were 1150 of angmâq; i. e. 97 %.

The burin is the dominating tool. The splitting technique by grooving has been universal. Symmetrical blades, often tanged, are characteristic and very common. The majority must be interpreted as projectile points and although some of the smaller specimens may have been arrowpoints, this group can probably be classified as points for spears. Small, slender, triangular blades are frequent, and because of the diminutive size (medium length less than 2 cm) a function as arrowpoints is the only possiblity. There can hardly be any doubt about that the Sarqaq people did know the use of bow and arrow.

The western affinities of this stone industry is obvious. The parallels to various early Alaskan cultures, which were pointed out in 1952 (MELDGAARD 1952, p. 229) can now be emphazised and contrasted to the Dorset culture of the eastern Arctic. Close parallels are also to be found to the stone industry discovered at the Knife River site at Churchill, Hudson Bay (GIDDINGS 1956). Noteworthy is the lack of micro-flakes and the dominance of burins.

Dorset. The Dorset culture of Sermermiut may first and foremost be characterised by the fact that no Sarqaq types were used. The material preferred is a light-coloured chalcedony (approx. 80 %), although darker variants of flint were also used. Angmâq was found suitable primarily for the "burin-like" implements which were used for splitting bone (and wood?). This is the successor of the burin; possibly it was gradually transformed into a drill point (MELDGAARD 1952, p. 228 and fig. 78).

The micro-flake ("lamellar blade") is the dominating Dorset type. A number of these flakes are retouched at the basal end and often tanged. The microflake was most likely an important cutting tool but reflecting on their large number (78 % of the total assemblage) their fragility must also be kept in mind and they are easily made from the fine-grained chalcedony available in the northern part of Disko Bugt.

Next in frequency to the micro-flake are the well-known asymmetrical blades of various rounded and pointed forms. The convex end scrapers are often of a diminutive size, although more heavy scraping tools of stone occasionally were used also (Pl. 1, I, 8). Sermermiut finally yielded in

situ three fragments of a thin-walled, soapstone lamp, two of which have obtuse corners indicated.

The variety and number of artifact types represented in the Dorset culture of Disko Bugt is modest. We do feel the need of the dominating material: bone. However, the stone industry is sufficient to establish the identity with the more representative Dorset material from Canada. Evidently the material from Sermermiut can be considered a limited "stage" within the Dorset culture, and it was most likely a rather early stage (see below).

Archaeological Dating of Sarqaq and Dorset. A comparison of the Paleo-Eskimo artifacts from Sermermiut with those found on raised beaches in the Igloolik area in arctic Canada is not possible in detail, because the material is only published in preliminary reports (MELDGAARD 1955). Meanwhile, some indications of the probable dates can be pointed out.

The Sermermiut-Sarqaq can hardly be derived from any horizon in the Igloolik Pre-Dorset material as represented on the raised beaches from 54 meters to about 30 meters above present sea level. At Igloolik there is for example a general use of micro-flakes, and the characteristic slender, lanceolate Sarqaq blades are lacking. Assuming that Sermermiut-Sarqaq is either older or younger than the sequence from 54—30 meters at Igloolik it is necessary to accept an age of at least 4000 years[1]), or a considerably later date. A minimum age may be given by Dorset Period I, which was initiated at Igloolik's 22 meter level. The extensive grinding on Sarqaq artifacts, which is comparable to the grinding of Paleo-Eskimo artifacts from Alaska like those of the middle layer of Cape Denbigh overlaying the Denbigh Flint Complex and C-14 dated 1460 $\pm$ 200—2016 $\pm$ 250 years old (JOHNSON 1951), strongly favor the lower date. On archaeological basis, however, Sarqaq can hardly be placed more accurately than somewhere within the first mill. B. C.

The Sermermiut-Dorset is easier to correlate with the Dorset periods of the Igloolik area. In Period III is a transition of the lamp shape from rectangular to oval. In Sermermiut two of three lamp fragments found exhibit an obtuse corner indicating a contemporaneity with Period III. Another guide is the characteristic wide, triangular, and concave based blade, which did not developed until Period IV, and which apparently never reached Disko Bugt. The general impression is that the bearers of Sermermiut-Dorset entered Disko Bugt at a rather early stage of the development of the Dorset culture in arctic Canada, i. e. before the "classical" Dorset stage as represented in Period IV at Igloolik, but after the early Dorset period characterized by an extensive use of

[1]) The 52 m level at Igloolik has been dated at C_{14} laboratory at Copenhagen to 3700 $\pm$ 300 years old.

slate. Period III has not been C_{14}-dated, and we can only make a rough estimate of the age based on the height above sea level. Also the 8 meter level (Dorset V) has now been C_{14}-dated: 600 $\pm$ 150 years. If the rate of upheaval has been fairly constant, which does seem to have been the case in this area, then the Igloolik stage corresponding to Sermermiut-Dorset would be approximately 1500 years old.

5. INTERPRETATION OF THE STRATIGRAPHY

The stratigraphy of Sermermiut is of evident importance to the chronology of the early Eskimo cultures in the eastern Arctic. The Dorset culture is here for the first time found unmixed in a stratigraphical sequence with sterile layers separating the artifacts from those of the Thule culture. But furthermore an earlier stage of the West Greenland Paleo-Eskimo culture was definitely proved to exist: the Sarqaq culture. However, besides the establishment of an archaeological sequence, various information in relation to the vegetation history of the Disko Bugt area can apparently be deduced from the macroscopic remains in Profile A.

A necessary consequence is to determine whether the sequence in profile A is a restricted local phenomena. To the south of the central and high part of Sermermiut Field A, where Profile A is situated, there is a large, sloping, and rather swampy area where no Neo-Eskimo artifacts, houses or tent rings were found. Apparently the ground here has never been suited for camping during the Neo-Eskimo period. Both of the Paleo-Eskimo cultures, however, are represented in this area, described as Field B. The deposit in a profile 8 m long, which was layed out 105 m south of Profile A, varied in thickness from 0.85 m to 1.15 m. In this "Profile B" a sequence of 4 layers, B—C—D—E, can be distinguished on top of the bottom gravel (fig. 7).

The Sarqaq artifacts were found right on top of this gravel and in the lowermost part of layer B, which is a highly humified turf filled with willow twigs and roots, approximately 20 cm thick and of dark brown colour. The following layer C is 0.20—0.30 cm thick and consists of a light-brown sphagnum with no cultural remains and no willows. Towards the north this layer gradually passes into clayish sand. Overlaying C is a sphagnum layer similar to B, but willow twigs and roots are less plentiful. In a thin horizon in the bottom of this layer D, which is 8—14 cm thick, Dorset artifacts were found together with a few compressed and badly preserved animal bones, mostly of seal. The top layer E, 25—30 cm thick, is light coloured sphagnum except for the uppermost darker part, which is more humified, indicating the growth has stopped or slowed down. No remains of willows were found in layer E, and no willows are growing there today.

This sequence at Profile B confirms the observations from Profile A, and besides furnished us with some new information. The rich content of rather large willow twigs in layer B is worth noticing, and the spagnum-sandy clay layer C indicates moist conditions between the two Paleo-Eskimo habitations. Moist conditions were, however, more pronounced during the formation of the top layer E some time after the Dorset occupation. Most of this top layer can probably be correlated with the pre-Thule layer F in Profile A, which means that very little accumulation has taken place since the advance of the Thule culture, as indicated also by the more humified upper portion of the layer; conditions became

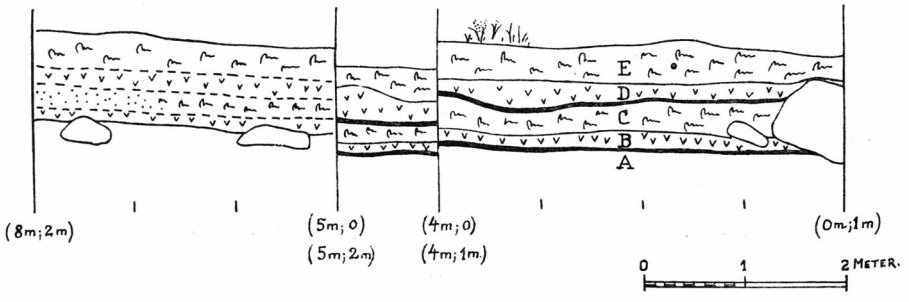


Fig. 7. Sermermiut, Profile B.

more dry. The whole sequence can most likely be paralleled with the pre-Thule layers in Profile A, although it has the double thickness, a fact which may be explained by compression in Profile A due to the overlaying Neo-Eskimo midden.

An attempt to reconstruct the development at Sermermiut on the basis of this macroscopic investigation can now be presented. A barren valley bottom existed at Sermermiut at the time of the arrival of the first Sarqaq people. Due to more moist and possibly warmer climatic conditions a vegetation layer of various grasses and of willows then spread in the valley, apparently already during the period of Sarqaq habitation (since the artifacts are in part found in layer B).

For a period of uncertain length their culture flourished in this part of Disko Bugt, but after they disappeared the same climatic conditions must have prevailed for some time. The climatic conditions then became even more moist, and possibly also colder; peat layers were formed and the willow shrubs disappeared from the valley bottom (C, in Profile A, and C in Profile B). Then again the grass spread and willows appeared indicating a change to dry conditions, and we find the Dorset people settling.

It is not possible to say, how long this occupation lasted; we can only observe that climatic conditions did not force the willows and the

grass to disappear until some time after the settlement was abandoned. But judging from the solifluction of the habitation layer the climate apparently became colder some time after the last Dorset families had camped at Sermermiut. Another evidence pointing in the same direction is the presence of partly preserved bones, also indicating that permafrost made its appearence[1]). This permanently frozen soil probably contributed to the formation of spaghnum peat (Profile A, layer F, and Profile B, layer E), which moreover seems to mark a renewal of wet conditions. This period came to an end about the time when the Thule people invaded Sermermiut, or shortly before, and these Neo-Eskimos built their permanent winter houses on the higher, now grass covered areas at Sermermiut (Field A), but stayed away from the lower streches (Field B) which remained swampy although the more dry climate started the humification there; the now intensified permafrost, that preserved all organic material from the very beginning of the Neo-Eskimo period, also prevented the drainage in Field B.

6. CULTURAL PERIODS AND CLIMATIC CHANGES IN DISKO BUGT

Turning to the previously known evidences of climatic changes in "postglacial" Greenland we find the most reliable information in the diagrams of the pollen analyses. Thus, the investigations in 1932 and 1937 of the development of the vegetation after the last glacial period carried out in the interior of Godthaab Fjord in SW Greenland by JOHANNES IVERSEN have made it possible to devide the pollen diagrams into five well defined zones (IVERSEN 1953). The three latest zones can apparently be synchronized with the vegetational development of northern Europe and of North America. In connection with the evidences from Sermermiut period IV and V are of special interest. The 4th period is the warm period in Greenland. The beginning of the 5th period, which is marked by the deterioration of the climate, is supposed to coincide with the RY II horizon about 500 A.D. A later and further deterioration took

[1]) Another evidence of deterioration of the climate after the Dorset occupation, was found by investigating a profile of midden layers at the present settlement of Sarqaq (2 miles east of the "classical" Sarqaq site). In the sequence of this midden no Sarqaq artifacts were found, but a 2—6 cm thick strata with Dorset artifacts appeared 2,10 m below the present surface on top of a gravel beach only slightly higher than the highwater level. This culture layer consisted of a black, humified turf. It is of importance to note, that several animal bones were found in this Dorset layer, and in a better state of preservation than the few bones found at Sermermiut. A thin compressed horizon of grasses and willow twigs separates the culture layer from a 0,35 cm thick deposits of sphagnum peat where no cultural remains were found. The remaining part of the sequence is Neo-Eskimo midden.

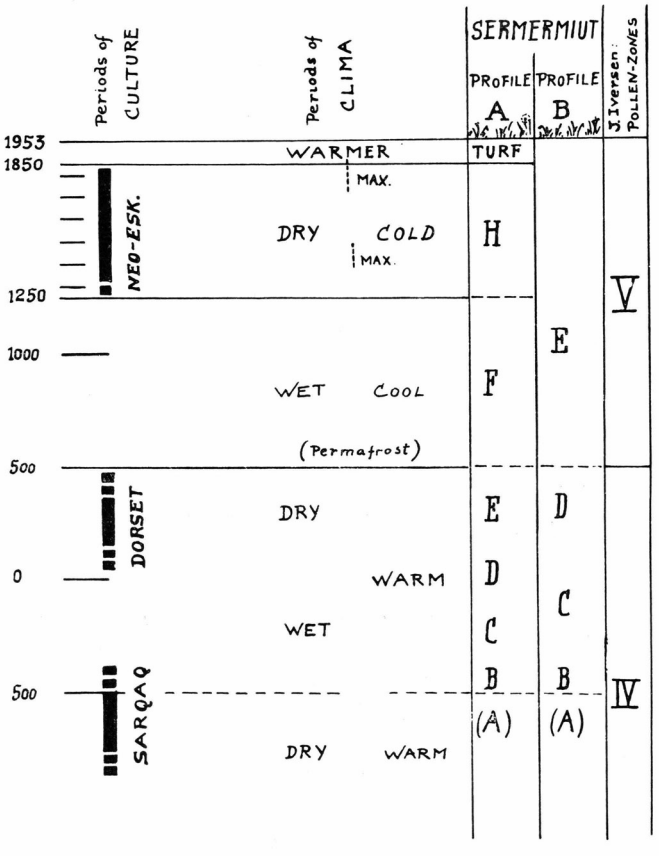


Fig. 8. Periods of culture and climate at Sermermiut.

place shortly before the disappearance of the Norse colonies in the Western-Settlement, as seen in the diagrams. The climate after this latest deterioration was more dry, i. e. continental; the summer temperature, however, probably did not change much (IVERSEN 1934, p. 352).

In the schematic arrangement of culture stages in Disko Bugt, as comprised in fig. 8, both of the Paleo-Eskimo cultures are placed in IVERSEN's warm period. The fact that the Sarqaq horizons are always found directly on virgin soil or in part in the lowermost vegetational deposit is the reason for placing Sarqaq around the beginning of a stage marked by a wet climate. The most pronounced change towards moist conditions observed in Scandinavia and Iceland during IVERSEN's Period IV is the well-known climatic deterioration named RY III ("Recurrence Surface") and dated to approximately 500 B. C. (GRANLUND 1932). Although this change could not be traced in IVERSEN's sequence in the Godthaab area it seems reasonable to correlate this radical and extensive deterioration with the initial growth of peat and

various other types of vegetation during the Sarqaq period at the settlements of Disko Bugt, because the tentative archaeological dating of Sarqaq indicates that the settlement took place in the 1st mill. B. C.

The Dorset culture in Disko Bugt as found in Sermermiut has been placed before 500 A. D., i. e. earlier than IVERSEN's colder Period V. The fact that a rather thick layer of peat was deposited above the Dorset horizon in the Sermermiut profile (A, layer E) before the time when the effects of the permafrost can be traced may indicate a time span of several centuries between Dorset and RY II. However, considering also the partly preserved bone material, the Dorset stage is tentatively placed in the centuries immediately before 500 A. D. An alternative attempt to correlate the evidence of a beginning permafrost with the deterioration in the 13th cent. is hardly possible, because we know that the Norsemen did not meet the Dorset people in West Greenland three centuries earlier, but only found "archaeological traces", and the archaeological dating of artifact-types from Sermermiut-Dorset indicates that the period of habitation was within the first half of the first mill. A. D. (approx. 1500 years old).

Also the Neo-Eskimo habitation at Sermermiut was influenced by changes in climate, and the abandonment of the site seems partly to have been caused by the effects of glacial advance. Our observations of the deposits of Neo-Eskimo middens at Sermermiut do not tell us whether the habitation was continuous during the period from approximately 1300 to 1800, but there are no evidences, like sterile layers or old vegetation surfaces, to show any interruption.

Apparently the deterioration did not reach its maximum at the beginning of the period. When visiting Jakobshavn and Sermermiut in 1909, TH. THOMSEN wrote in his note-book an interesting information from an old Greenlander whoes grandmother left Sermermiut about 1820 as one of the last inhabitants: "They are said to have left the settlement because of the advancing ice" (Archives of the National Museum). The ice referred to must be the ice floating in the fiord, and if we follow up this indication of a relatively late maximum of glacial activity in Jakobshavn Isfjord we find several supporting evidences. In a letter from the manager of Jakobshavn, HANS ROSING, dated 1831 there is a long description of this "extraordinary strange fiord" (Archives of the National Museum). It is said, i. a.: ". . . the immense amount of ice in the fiord has been increasing very much during the last 50 years according to informations from old Greenlanders". ROSING also mentions: "a large is and where the Greenlanders used to go caribou-hunting 60 years ago", (probably Nunatarssuaq, see fig. 9), "at that time the glacier-edge was also much smaller and farther away, whereas now it has almost reached this island". And finally: "An old woman still living here (at Jakobs-

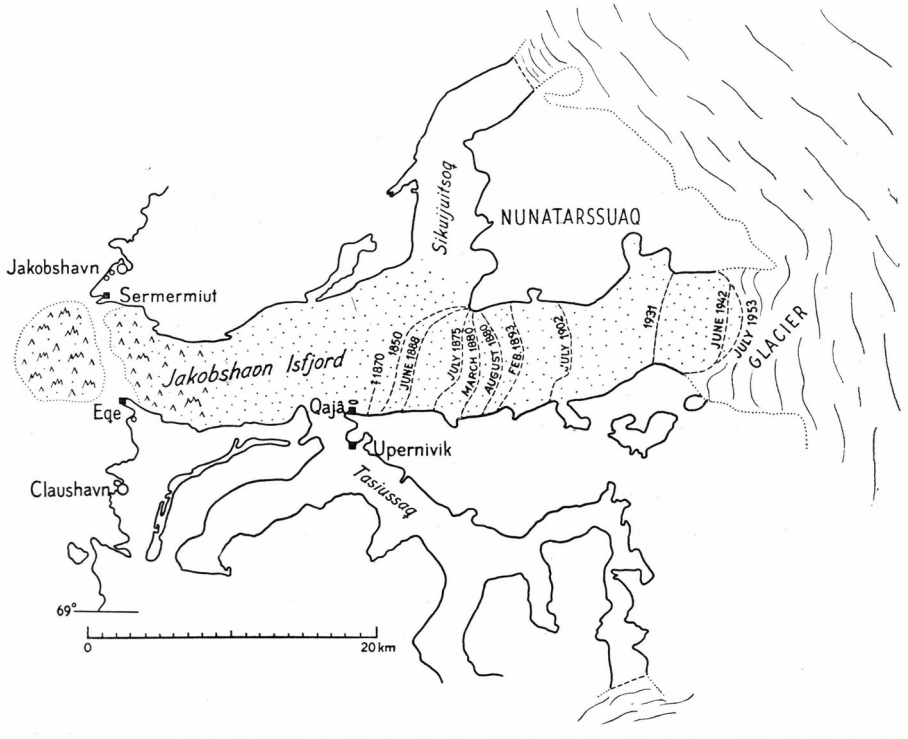


Fig. 9. Map of Jakobshavn Isfjord. Glacier limits from Engell (1902) and Geodætisk Institut (1931, and air photos 1942, 1953).

havn) knew, when she was young, another old woman who told her that, when she was a young girl, there were practically no icebergs in the fiord, but the water was so open that the Dutchmen with their large vessels went into the fiord. Up along the coast of the fiord the Greenlanders lived in their tents, and in the winter there were houses of which ruins still can be seen at least one "miil" (approx. 10 km) from the mouth".

Especially the information of Dutch vessels going into the fiord is of interest, because today it is impossible even for a small boat to go a distance of more than a few kilometers from the mouth except at very exceptional occasions. The only ruined settlement known in the fiord is Qajâ, which is situated on the south coast 17 km from the mouth (see fig. 9)[1]). The Dutchmen never attempted any trade of importance with the natives in this area around the icefiord after the wellknown sea-battle of Maklykout (Jakobshavn) in 1739. Consequently we must assume at least that in certain periods, in the early 1700 the icefiord was almost

[1]) Th. Mathiassen (1934, pl. 11) reports another settlement, Inugsuk, known to have been inhabited as late as 1793; just east of Qajâ. Pointing out the location on the map the Greenlander must have mistaken the site for one south of Eqe.

free of ice. From the other remark it is indicated that from around 1780 to 1830 the glacier-edge is advancing, and that the amount of ice in the fiord is increasing.

Another statement supporting these informations is found in the journal of the geologist K. L. GIESECKE (GIESECKE 1910, p. 95), who in the year 1807 remarks about Jakobshavn Isfjord: "... Dem ungeachtet nimmt diese unbeschreibliche Eisbrükke im festen Lande mit jedem Jahre augenscheinlich zu und wird mit der Zeit den grössten Theil der Westküste bedecken. Im Iisefjord selbst sah Assistent ANDREAS DALAGER vor mehreren Jahren noch Überbleibsel alter Grönlandischer Winterhäuser, welche nun unter dem Eise begraben sind". The truthfulness of this observation of the well reputed DALAGER about having seen house-ruins later on buried under the ice shall probably never be verified, not much is left to be found even if the coast is now free again.

Finally an important description is given by P. O. WALLØE, assistant at Christianshaab, who in 1747 in January made a sledge trip to the inner part of the icefiord (Diary published in Danish 1927 by L. BOBÉ). WALLØE arrived from Christianshaab through Tasiussaq to the sound where Tasiussaq opens into Jakobshavn Isfjord (see map fig. 9), and here three houses[1]) inhabited by Greenlanders, who "make their living only from seals they can get hold of through the breathing-holes" (WALLØE 1927, p. 29). "One day we went up to see the ice, and this was a terrible sight to see the ice lying in large and firm walls upon the mountains. It also went down along the sides of the mountains to the level country, where it extends and increases in width; towards the west are pushed everything which can be moved or is lying on the surface, like stones however large they might be, and also moss, grass, soil, and things like that, thus having all over in front of it a high mound; so if nothing else prove the growth, this apparently is proof enough. The Greenlanders accompanying us up here pointed out to us some spots of land which were situated in between the ice and completely surrounded by it. They told that once they had been hunting there, but now they could not come there because of the growing ice. One rather large island[2]) was still close to the land and could be reached from the east-side, where there were a lot of hares and ptarmigans; but only few years later I came to the same place, and there was in the meantime a great change, because the ice had advanced across the center of the island and one could not go there any longer.

Farthest out at the fiord was an old woman living with a Greenland family[3]), ... when asked about her age she answered that she did not

[1]) Two of these houses probably were the settlement Upernivik.

[2]) i. e. nunataq.

[3]) Probably at the settlement Eqe.

know, but, said she, I have lived so long, that I remember very well the time when in this fiord, where there are now so many and large ice-bergs, there were none, but one could sail very far up into the fiord".

From these accounts we thus get concordant informations about a considerable advance of the Jakobshavn glacier, and also about a still increasing amount of ice in the fiord, from about 1700 to 1831.

Since H. RINK's observations of the position of the glacier-edge in 1850—51 (the first scientific investigation), the glacier seems to have been in general retreat (ENGELL 1904), although A. E. NORDENSKIÖLD's information, saying that the edge is "not many hundred alen" (1 alen — ca. 2 feet) east of the old settlement Qajâ, indicates that if the edge was not actually advancing in the intervening 20 years at least, it must have been rather stationary[1]. Some limits of the glacier-edge during the last 100 years are indicated on the map, fig. 9.[2]) The settlement of Qajâ, which unfortunately could not be visited in 1953, is an important point in this attempt to discuss climatic changes. Besides the description of Qajâ by NORDENSKIÖLD (NORDENSKIÖLD, 1871, p. 1020) an interesting report concerning this site exists in the form of a number of letters from the Manager of Claushavn, CARL FLEISCHER, to Professor JAPETUS STEENSTRUP. In 1871 FLEISCHER carried out an excavation at Qajâ at the request of Prof. STEENSTRUP who was interested in comparative material for his Danish "kitchen-middens", and the resulting artifacts and description are now in the National Museum. STEENSTRUP had in a lecture in 1869 published his pioneer work on stratigraphy in peat bogs, and apparently he had instructed FLEISCHER to be aware of possible "layers", because in the letters we find described a sequence including two "layers of kitchen-midden", no. 1 and no. 2, separated by a layer of turf with no artifacts. In the lower midden, no. 1, was found nothing but stone artifacts and some "soft" bones (including seal and walrus); in midden no. 2 there were several bone artifacts, none of stone, and a lot of bones of various animals (including whale). FLEICHER himself concludes that a stone age must have existed at the earlier period of habitation. In other words, here we have, 82 years before our Sermermiut-profiles, described and realized a stratigraphy with layers of Paleo-Eskimo and Neo-Eskimo origin—which should perhaps make me modify some opening remarks about Sermermiut.

There can be no doubt about that the glacier-edge was very close to the ruins of Qajâ in 1850 and 1870, according to RINK a few kilometers at the most, which is a short distance compared to the following retreat

[1]) NORDENSKIÖLD's observation is, however, not approved by later investigators of the ice-edge (ENGELL, 1904).

[3]) From 1942 to 1953 the glacier edge has only retreated at the central part in a cut approx. 0.8 km deep.

of 20 km until today. From the description of the well preserved ruins and the stratified middens, which included artifacts now identified as belonging to Sarqaq, Dorset, and Inugsuk culture, and probably also to the 17th cent., we know that at no period during the time of occupation at Qajâ, i. e. for at least 2500 years, did the glacier advance farther—otherwise the site would have been destroyed[1]).

The consequence must be to conclude that as late as around 1850—1870 the Jacobshavn glacier reached its maximum extension for at least 2500 years. This result may be compared to THORARINSSON's observations from Iceland, where in 1830—50 there was a strong advance where "some glaciers reach their maximum in historical times", although "most of the glaciers reach their maximum extension so far in historical or even post-glacial times" already in 1730—60 (THORARINSSON 1943). In Norway FÆGRI concludes that the glaciers investigated by him culminated with the maximum advance around 1750, but "there was only a slight recession until 1850" (FÆGRI 1948). D. B. LAWRENCE's investigations at Juneau Icefield in Alaska shows that the Juneau glaciers advanced to maximum positions in early to middle 18th cent., but this recession was slow until about 1870, then faster. The Juneau Icefield also indicates, according to LAWRENCE, that no greater advance had occurred for "at least several thousand years" (LAWRENCE and ELSON 1953)[2]).

The changing of the sea-level is also a factor which profitably can be included in a discussion on climatic changes in Disko Bugt in relation to prehistoric habitation. It has often been observed that "old house ruins" are now frequently found partly submerged in West Greenland. Comparing the types of ruins and the midden deposits from the various periods of habitation it appears as if all of them, from Sarqaq time up to ca. 1900, may be found submerged, except one group of ruins which can be dated to approximately 1500—1650. These ruins, from the time

---

[1]) The often related legends of the Greenlanders about a previous "Sound" across Greenland, which frequently are located to Jakobshavn Isfjord and even indicated on early maps (EBERLIN, 1888) shall probably be seen in the light that the Greenlanders after the Danish Colonisation in the 18th cent., when questioned, arrived at somewhat excessive conclusions based on their knowledge that "on our fiord was much longer and it is steadily growing shorter".

[2]) A supporting evidence in West Greenland, of more general extent, can be deduced from information about the northern limit of the codfish. Archaeological finds from Sukkertoppen District dated 1650—1700 (Utorqait) and 1700—1750 Ũmánat) contain bones of codfish (MATHIASSEN, 1931). In 1852 H. RINK says that codfish "especially before 1820 were present in large numbers" (RINK, 1857, I, p. 140). Today codfish is found as far north as the Thule district, after the northern limit having moved from Julianehaab and Frederikshaab districts 1917, passing Sukkertoppen district 1922 and Christianshaab district 1931 (JENSEN and FRISTRUP, 1950, p. 32).

between the disappearance of the Norsemen to the period of the whalers, are in the northern part of West Greenland generally situated at a height above high-water mark and at a distance from the beach, which must be considered "ordinary" for Eskimo winter houses. Although only a few houses from this period are dated by excavations (MATHIASSEN 1934, p. 169), the houses of this type, which MELDGAARD has observed in Disko Bugt, Egedesminde district and Holsteinsborg district, (characterized by a rather small house room, more or less rectangular shaped, and with no build-out kitchen like in the previous period) are never below an adequate height above present sea-level.

THERKEL MATHIASSEN has published his observations on the position of the Neo-Eskimo settlements in relation to present sea level in a summarizing survey (in: GABEL-JØRGENSEN 1940, p. 8—10). MATHIASSEN concludes that the sinking which is now taking place along the west coast began in the 17th cent., but he has never observed houses of the mediaeval Inugsuk culture in West Greenland broken down by the sea. Considering the submergence of partly contemporary Norse ruins in as well the Godthaab area as in the Julianehaab area, where several ruins are now half under water (inclusive the Sandnes church in the Godthaab area with a late, gothic addition), it seems necessary, however, to maintain a subsidence to a present lower level also of the settlements from approximately 1200—1500 (ROUSSELL 1941, p. 15).

The subsidence going on in West Greenland in our days is (mainly) an isostatic movement caused by the pressure of ice. It is a phenomenon often mentioned in the literature and with consequences f. ex. to harbour-works. The rate of submergence is in places estimated to an average of 1 cm a year. If the above presented observations of a maximum extension of the ice around 1850 are correct, and we accept this to be more than a local trait, then the submergence still continuing in our period of so-called recent climatic improvement may be correlated to this maximum.

The corresponding "recessed" position of the settlements around 1500—1650 may in this case be explained as a result of conditions parallel to a preceeding maximum of climatic deterioration. This maximum may be placed in the 14th or 15th cent., but probably in the 15th cent., since the effect of this relatively smaller maximal glaciation otherwise hardly would have been felt up to after 1600[1]).

Having now in Disko Bugt an indication of two effective maxima after the beginning of the deterioration in the 13th cent., our background

[1]) LAUGE KOCH's thorough study of climatic changes in Greenland since the 10th. cent., based mainly on literary sources relating to ice distribution in the sea, concludes in an earlier maximum of deterioration viz. 1200—1400, with less severe conditions until 1600 (KOCH, 1945).

for understanding the changing possibilities for human occupation from Inugsuk time to the present day has deepened.

Some additional information related to the various climatic fluctuations during the long period of habitation in Disko Bugt also seems to emerge from this, for an anthropologist rather venturous encroachment into the field of glaciology. *For the time being the observations tend to show that at no period since before Sarqaq-time was the climatic conditions less favorable to the Eskimo settlers than around 1850, and neither were climatic conditions less favorable before the 13th century than they are today.*

In the same way the occurrence of permafrost at Sermermiut after RY II ab. 500 A. D. provides us with an indication of temperatures when the "warm period" has come to an end and the last Dorset inhabitants had disappeared from the settlement. Today the line of permafrost is rapidly moving north in West Greenland and is presently reported to be somewhere between Frederikshaab and Godthaab (lat. 62°—63°). Usually a mean annual temperature of ÷ 5° C. is said to coincide with the southern limit of permafrost today, but because this limit is what may perhaps be termed a "retarding" limit due to the climatic improvement, and in Disko Bugt the permafrost was initiated after a long warm period with hardly any permanently frozen soil in deeper layers, we must conclude that the mean annual temperature probably was heigher than ÷ 5°C. at the beginning of the period of the cooler climate[1]).

The Dorset culture of Disko Bugt in the preceeding period consequently was favored by a climate at least as warm as we find it in southernmost Greenland today, but because dry conditions indicate a continental climate we must assume that although the summers meant much open water, ice-hunting in the remaining part of the year would have been possible. In the case of the Dorset culture, from where no traces of boats are known it may be of further interest to note that under these climatic conditions they had excellent possibilities for hunting inland during the summer.

Summarizing the results from the Sermermiut investigation the following may be said about the two Paleo-Eskimo cultures:

The Sarqaq culture as well as the Dorset culture seems to have flourished in a period of rather warm climate of continental character, separated in time by a period of more moist conditions from 500 B. C. to about 0. Both cultures were probably favoured by warm summers with much open water and by winters without very much snow. Having

[1]) The fact that vegetable fibres (like peat) hold on to frost, and moisture promotes permafrost, and we in the Sermermiut profile find a moist period indicated, only supports the assumption that the mean annual temperature was not lower than — 5° C.

no evidences from archaeological finds in Greenland or Canada of the use of boats, it is of interest to note that they had excellent possibilities under these conditions for inland hunting during the summer season. For such hunting the Sarqaq people possessed the bow and arrow, whereas the Dorset people probably made use of the spear. In the remaining part of the year the occupation of the Sarqaq people is obscure to us, although from the situation of the settlement it must be assumed that hunting of sea animals were important to them. The information about life in the winter season of the Dorset people is not much more elucidating (except for the bones of seal) if based only on the stone artifacts preserved, but we may infer from the corresponding Dorset stage in arctic Canada that ice-hunting was developed (MELDGAARD 1955).

Both of these Paleo-Eskimo cultures disappeared from Sermermiut before or at the beginning of a change to a period with increased precipitation, which may mean that snow conditions became more difficult. Other factors were probably contributory if a sudden change of climate took place, f. inst. would the lack of the large seal-oil lamp for heating and the dependence on wood for fuel have been critical, especially to the Dorset culture, when a cooler climate was initiated.

JØRGEN MELDGAARD.

II. THE PALEO-ESKIMO SITES AND THEIR CONTENTS

1. DESCRIPTION OF THE SITES

Igdlorssuatsiait (1).[1])

Igdlorssuatsiait, the first Paleo-Eskimo site GLOB and LARSEN came across on their reconnaissance trip, is situated near the entrance to Kangersuneq, a wide fiord 6 miles south of Christianshaab. Here as in other places along its northern shore the rather straight coastline is broken by a low, rocky point which makes a good shelter for small boats whether the wind is blowing into or out of the fiord. Connecting the point with the gently sloping hills is a 30—40 m wide terrace the innermost part of which is almost horizontal and 4.33 m above sea-level. On the surface of the terrace, which consists of sand and fine gravel with spots of low vegetation, were found a number of stone chips, three burins, two small stone blades, and a triangular endscraper. The significance of this site is, however, that we for the first time in West Greenland were confronted with remains of Paleo-Eskimo dwellings.

Lying in a row 25—30 m from the beach, respectively 17 and 32 m apart and covered by 5 cm of drift-sand were three pavements of hand-sized stones which were brittle or broken and blackened by fire, and among and on top of which were found stone chips, ashes, and a few artifacts. These floors or fireplaces were irregular in outline and covered an area of respectively 2 by 1 m, 2.40 by 2.15 m, and 1.80 by 1.80 m (fig. 10). The artifacts found in them were, in I: one half of a circular, rather crude stone lamp and a large, symmetrical stone point of Sarqaq-type; in II: a burin, a triangular endscraper, and a lanceolate, partly rubbed arrow point with serrated edges; in III: a wide-based flint knife blade with side notches, and three micro flakes. Judging from the appearance one is inclined to consider the three pavements as contemporaneous but this supposition is contradicted by the artifacts, those from I and II being Sarqaq types while Dorset types were found in III. Considering the small number of artifacts and the situation of the pavements so

[1]) The figure in brackets also occurs on the map (p. 8).

Fig. 10. Igdlorssuatsiait I.

close to the surface, we prefer not to make any definite statements but only establish the fact that the site has been frequented by people of the Sarqaq as well as of the Dorset culture. Meanwhile, small as it is, the find was of great importance as it gave us the clue as to where to look for Paleo-Eskimo sites and what to look for. It later turned out that Igdlorssuatsiait had all the characteristics of a West Greenland Paleo-Eskimo site, the situation on a low terrace at the base of a rocky point and with fireplaces or floors of handsized stones.

Eqe. (2)

On the south side of Jakobshavn Isfjord, directly opposite Sermermiut, is the now abandoned settlement, Eqe, which at the time of MATHIASSEN's visit in 1933 still had six inhabited houses (MATHIASSEN 1934, p. 19). All what is left of Eqe is an enormous midden which undoubtedly contains a wealth of archaeological material, but which lack of time prevented us from investigating. West of the midden, close to the rocky point which forms the entrance to the icefiord, is a gentle, grassy slope part of which has been washed away by the sea. Here a test ditch revealed a dark culture layer containing stone chips. It rested directly on bare rock and was superimposed by a thick layer of peat which contained rather well preserved animal bones. No artifacts were found in the ditch, but a short distance away, in a place where most

Fig. 11. Tuperssuit from west.

of the soil had been washed away, a patch of soil appeared to contain fire-cracked stones, obviously the remains of a fireplace, and a considerable number of artifacts. Characteristic of the find is the predominance of Dorset types and the corresponding high percentage of chips of flinty material as compared to those of angmâq. Noticeable among the Dorset types are: 8 knife blades with wide base and side notches, a burin-like implement, 13 micro-flakes, and a micro-core. Only two specimens can with certainty be ascribed to the Sarqaq culture, a burin, and a symmetrical, slender knife blade.

Tuperssuit. (4)

Just north of the outpost Rodebay, at the narrow strait which separates the island, Pamiua, from the mainland, is a place called Tuperssuit where the people from Rodebay for many years have been cutting sod and peat for fuel. As a result of this activity very little is left of the vegetation which once covered this rather uneven slope (fig. 11). In most places low, green grass has replaced the original vegetation but other parts are completely denuded of vegetation exposing either black patches of soil or the bare rock. Loose stones are scattered over the entire slope and wherever the peat has been removed, particularly where there were accumulations of stones, one could pick up numerous stone chips and some stone artifacts. In three places the peat-cutting had exposed fireplaces, but except for one the digging

had completely obliterated all traces of the dwellings to which they belonged.

One of the fireplaces, however, was placed in a shallow depression in the rock, part of which seemed to have formed walls or foundation for walls in some sort of a dwelling (fig. 12). Except for a few stones wedged in between the rocks there were no other traces of walls, but a considerable number of head-sized and larger stones in the depression

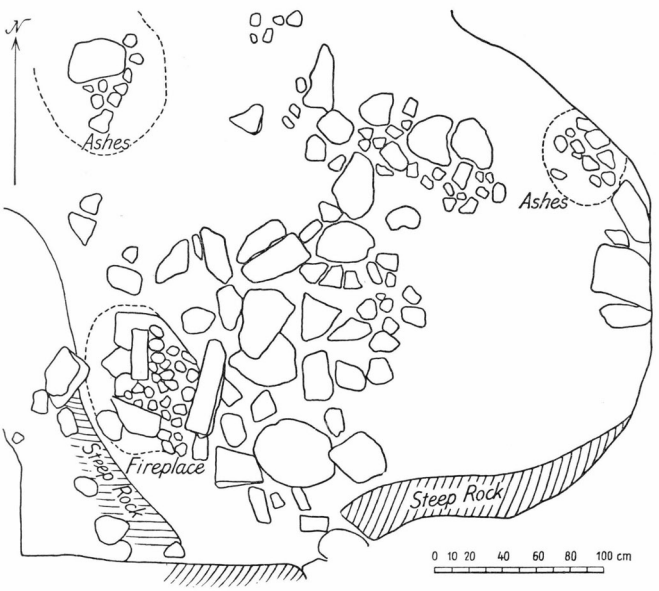


Fig. 12. Tuperssuit I.

might at one time have surrounded the depression as a wall or a stone ring. Whatever the interpretation of the large stones might be it was obvious that they were not in their original place because in many cases they were lying on top of flagstones which formed a floor around the fireplace. Outside this paved area the bare rock, almost horizontal and level with the flagstones, formed the rest of the floor. The flagstones rested on black dirt which filled out a hollow in the rock and which contained most of the artifacts found in this site. The fireplace was particularly interesting. It was placed in the southwest corner of the floor and consisted of three rectangular, rather flat stones placed on edge and at right angles to each other. Inside this frame were ashes and, like eggs in a nest, a heap of hand-sized, rounded stones, blackened and cracked from being heated in the fire (fig. 13). Why have these stones been heated? One explanation is that they have been used for bringing water to a boil, a method known for instance from Alaska (Larsen and Rainey 1948, p. 36). Without fire-resistant cooking pots (not a single

Fig. 13. Tuperssuit I, fireplace.

potsherd of stone or clay has been found in Paleo-Eskimo sites in Greenland) the heating of water in skin or wooden containers with hot stones is virtually the only practicable method, assuming of course that cooking was practised. Mr. JUNIUS BIRD has suggested another explanation, namely that the stones were placed in the fireplace in order to preserve the heat. In either case the use of the stones is a new culture trait in Greenland. "Cooking stones" in smaller numbers were also found in the northeast and the northwest corners of this "dwelling" and in both places the earth around them was scorched. Unfortunately nothing can be said about the size or shape of this "dwelling". An area of 3.8 by 3.2 m was excavated and tests made outside it did not reveal any demarcation.

Pl. 2 illustrates the most characteristic of the 83 specimens found in this dwelling. The find is particularly interesting because it contains only Sarqaq types and not a single Dorset type. As in the Sarqaq find described by MELDGAARD the partly rubbed angle burin is with 18 specimens the most frequently occuring implement (Nos. 1—5). In addition there were eight burin spalls (Nos. 7—9), and the unpolished object, no. 6, might be an unfinished burin of which no spalls have been struck. Next in importance is another characteristic Sarqaq type, the concave side scraper (Nos. 10—12) of which eight were found, most of them made from a beautiful green or multicolored, banded jasper. No. 13 is a long endscraper and no. 14 a sidescraper of green jasper. Other well-known Sarqaq types are the asymmetrical knife blades (Nos. 15—16)

Fig. 14. Igdluluarssûp talerua from west.

and the projectile points (Nos. 17—20) of which no. 18 is an extremely thin, partly rubbed arrow point with finely serrated edges. Pumice used as whetstone (No. 21) occurs here for the first time in Greenland, but are very common in Paleo-Eskimo finds in Alaska (LARSEN 1950). No. 22 is a small soapstone lamp, the only complete lamp found in 1953. In accordance with these Sarqaq types the stone refuse consists of 461 pieces of angmâq and only 31 pieces of flint and related minerals.

In addition to the find described above 80 specimens were found at Tuperssuit, near the two other fireplaces and scattered on the surface. The majority of these are Sarqaq types; only two micro-flakes indicate the presence of Dorset people at this site.

Igdluluarssûp talerua. (7)

Traces of Paleo-Eskimo activity were found in three places on the island Igdluluarssuit at the north end of Atâ Sund, 1) at the southernmost point (5) where a sidescraper and some stone chips were picked up on a gravel plain about 3 m above sea level, 2) at the northeast corner (6) where a few artifacts and stone refuse were found in connection with a fireplace containing fire-cracked stones and situated about 4 m above sea level.

The main site was, however, Igdluluarssûp talerua at the northwest corner of the island, known from MATHIASSEN's visit in 1933 (MATHIASSEN

1934, fig. 3). On the north side of the isthmus, at the base of the rocky, northwest point of the island, is a slightly sloping plain of fine gravel and sand, the lower edge of which is being cut away by the sea (fig. 14). At the very edge and partly taken away by the sea were three pavements of hand-sized stones, some of them marked by fire. The pavements, which were covered by a five to ten cm thick sod layer, formed a row parallel to the beach. They were irregular in outline, about 2 m apart, and respectively 3 by 4 m, 2 by 3.5 m, and 6 by 6 m. In their general appearance they are reminiscent of those from Igdlorssuatsiait. We know now that the fire-marked stones have come from a fireplace and we presume that they other stones form part of a floor.

A total of 97 specimens were found among the stones in the three pavements. Most of them were Sarqaq types like burins (11 specimens), arrow points, knife blades, and projectile points, but there were also Dorset types like 16 micro-flakes, three micro-cores, and an endscraper with flaring edges. This mixture of Sarqaq and Dorset types was also reflected in the refuse which contained 506 pieces of angmâq and 204 of flinty material. Also in this find was a piece of pumice which had been used as a whetstone.

Other Paleo-Eskimo sites south of Torssukátak.

A burin and some Dorset types were found on the surface of a gravel plain on the easternmost of the islands in *Kangerdluatsiaq* (8). The plain was less than 1 m above sea level.

At *Pisigsarfik* (9) (MATHIASSEN 1934, p. 24) near the rocky point 3 m above sea level and under a heavy sod layer were found a rounded endscraper and some stone chips.

The most prolific site was *Ilerfît* (10), a Neo-Eskimo site described and illustrated by MATHIASSEN (1934, p. 26, fig. 4). Stone refuse and artifacts were found scattered next to and on the rocky point east of the small bay along which the ruins are situated. Not more than 0.5 m above sea level were flat stones lying in black, greasy soil in which stone artifacts and refuse were abundant. At the base of the point the Paleo-Eskimo layer was covered by a later Neo-Eskimo midden containing much organic material. Of the identifiable specimens 75 are Sarqaq, 10 Dorset types. As usual burins were predominating with 27 specimens and 9 burin spalls, and of other Sarqaq types there were 12 slender, symmetrical blades and 9 concave sidescrapers. Here too was found a piece of pumice and in addition another familiar Alaskan type, a stone sinker with four notches, the first of this kind ever found in Greenland. The Dorset types found on the point were a micro-core, 8 micro-flakes, and a trapezoid endscraper.

From the outpost of *Ritenbenk* (11) comes the first Dorset harpoon head found in West Greenland (fig. 22). The harpoon head which is of walrus ivory and of the latest type was bought from a small Greenland boy who said he had found it in a midden in Ritenbenk itself. An excavation of the midden did not reveal any trace of Paleo-Eskimo culture; the bottom layer which belongs to the Inugsuk culture rested on pure gravel.

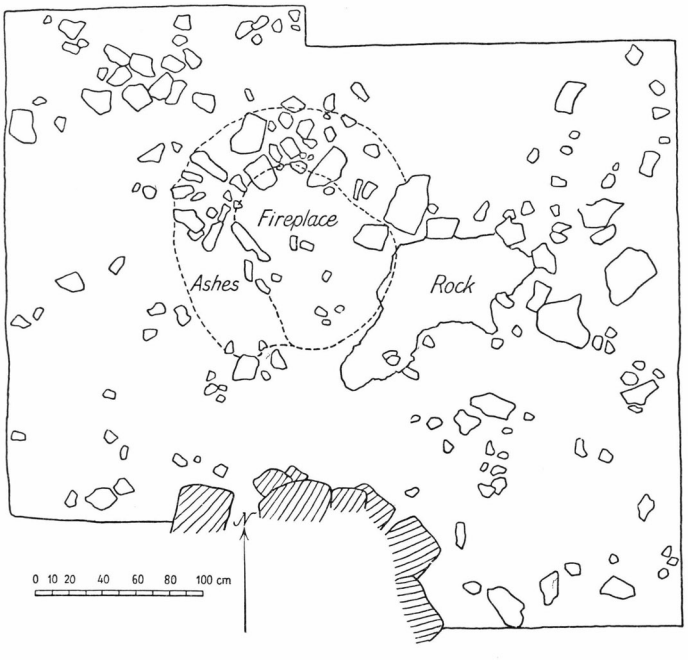


Fig. 15. Igdlorssuit I.

On the island of *Oqaitsoq* at the northern end of Arveprinsens Ejland were found stone chips at *Niaqornaq* (12) (MATHIASSEN 1934, p. 28) under a heavy layer of sod, and at the narrow strait, *Ikerasánguaq* (13), the remains of a pavement like at Igdlorssuatsiait and Igdluluarssûp talerua.

Igdlorssuit. (14)

Investigations at Igdlorssuit, one of the largest sites in Disko Bugt and well-known from MATHIASSEN's excavations in 1933 (MATHIASSEN 1934, p. 127—162), proved that this place also had been occupied by Paleo-Eskimo. Stone chips were found in various places particularly near the base of the low, rocky point northwest of the main settlement (MATHIASSEN 1934, Pl. 13). Here, on a gravel plain 2.05 m above sea level between the three excavated house-ruins XII, XIII, and XVIII and just north of Grave 9, an area of about 20 square meters was cleared of the

sparse vegetation of heather revealing a culture layer containing stone implements and refuse, a number of flat stones and a fireplace with ashes of burnt heather. The culture layer was in most places found directly beneath a 7 to 13 cm thick layer of sod, but in the northwestern corner of the excavated area the sod and the culture layer were separated by gravel apparently washed in from the north. The culture layer, varying in thickness from a few to 10 cm, rested on gravel or, in one place, on solid rock. Ashes were found over an area of about 2 by 1.8 m in the middle of the excavated area, but the actual fireplace with a thick layer of black ashes covered about 1.5 by 1 m. On the fireplace itself were only a few small stones, but just outside it were a considerable number of flat stones lying so close together that they formed a pavement. Other flat stones were scattered over the cleared area singly or up till 10 in a group. The culture layer petered out towards the edges of the excavated area and without any clear demarcation it was impossible to determine the shape and actual size of this dwelling or camping place. It is worth noticing that the culture layer extended under Grave 9 (fig. 9).

Of a total of 74 identifiable stone specimens 50 were Sarqaq types, half of them burins, and 23 Dorset types including 21 micro-flakes, one micro-core, and an endscraper with flaring edges. Of the refuse 503 pieces are of angmaq and 104 of chalcedony and similar materials.

Two samples of charcoal from the fireplace have been dated by the C-14 dating laboratory in Copenhagen, K-144 to 3370 $\pm$ 150 years old and K-146 to 3140 $\pm$ 140 the average of the two samples being 3250 $\pm$ 110.

About 100 m north of the ruin-group XII, XIII, and XVIII another find of stone implements was made in an accumulation of stones close to the shore and just above the high-water mark. In addition to some large stones, which might be part of a stone ring, there were some flat stones and at least two fireplaces with hand-sized, fire-cracked stones. The whole construction was so disturbed that it was not found worth while to make a systematical excavation. 36 identifiable implements were found, 19 of them Sarqaq types of which 12 are burins. In addition the find contained 11 micro-flakes and three burin-like implements. Of the refuse 197 pieces were of angmâq and 115 of chalcedony and other hard minerals.

A sample of ashes from one of the fireplaces was measured by the Copenhagen Carbon-14 Dating Laboratory giving an age of 920 $\pm$ 120 years. Regarding the C-14 dates from Igdlorssuit it should be kept in mind that the measured samples are from fireplaces close to the surface, that the corresponding archaeological material consists of a mixture of Sarqaq and Dorset types and that the dated samples might contain ashes from driftwood. It is of course tempting to connect the earliest figures with the Sarqaq culture and the late with Dorset; though we

Fig. 16. Qerqertaq, Qarsorsâ from north.

must not exclude the possibility, the figures should *not* be used in connection with the two cultures *unless* they are verified by later measurements of better documented samples.

Qeqertaq. (15)

It was with great expectations we approached *Qeqertaq*, next to Sermermiut the best known finding place for stone artifacts in Greenland, but even though we collected almost 200 specimens in a few hours we did not find what we were hoping for: undisturbed culture layers and remains of Paleo-Eskimo dwellings. Stone artifacts and refuse were found about a mile north of the outpost Qeqertaq and around the harbour of the outpost, but the main Paleo-Eskimo settlement seems to have been at *Qarsorsâ*, a low, rocky point or peninsula which forms the southernmost tip of the island Qeqertaq and which, as indicated by the name, has some resemblance to a fish hook. It is a rather uneven plain in which the low, barren rock in many places breaks through the sparse vegetation of grass, heather, and willows. The whole character of the vegetation in connection with the many scattered stones and denuded spots revealed that the area has been used extensively for sod digging, and in addition it was obvious that the sea at certain occasions had washed over the lower parts. This state of affairs offers the archaeologist good possibilities of finding artifacts which with numerous stone chippings were exposed in the bare spots. But it was also a disadvantage, because all this activity had disturbed or completely destroyed the remains of dwellings and

camping places which at one time must have been there. The only evidence left of former habitation was traces of fireplaces in the form of hard, blackened spots of gravel cemented by burnt blubber.

Judging from the samples of artifacts and stone refuse picked up on the surface this site has been frequented primarily by Dorset people. Of the 113 identifiable artifacts 98 are Dorset types, viz. 72 micro-flakes, 2 micro-cores, 11 knifeblades with side-notches, 6 endscrapers with flaring edges, and 3 burin-like implements. Among the few Sarqaq types were 3 burins, a concave sidescraper, and some oblong, slender knifeblades. This preponderance of Dorset types is reflected in the stone refuse which consists of 627 pieces of chalcedony, jasper and related minerals against 267 pieces of angmâq.

Dorset types were also predominant on *Qeqertârssuk* (16), a small island south of Qeqertaq, but due to the fact that Qeqertârssuk is now the favourite gathering place for sod, of the people of Qeqertaq, no undisturbed culture layers or dwelling remains and only a few artifacts were found.

One of the rare spatulate blades found at *Nugaq* (16 A), south of Igdlorssuit.

A rather cursory investigation was made at *Igdlutsiait* (17), a small, grass-covered site with a Neo-Eskimo ruin at the entrance to *Torssukátak*, and a collection was made containing 67 identifiable artifacts most of them Sarqaq types, a considerable number of fragments, and some refuse with angmâq as the predominating material. In the easternmost part of the grassy area the stone implements were found in coarse sand or fine gravel resting on solid rock and under a Neo-Eskimo midden containing bones and other organic materials. Noticeable in the find are a notched stone sinker and a piece of pumice with a longitudinal groove. This site as well as several others around the former outpost *Ikorfat* are on the verge of disappearing in the sea. A very good example of this is *Akúnâq* (18) where stone artifacts and refuse are abundant under a thick, Neo-Eskimo midden as well as on a rocky point and the stone reef which connects the latter with the mainland. It was quite obvious that not very long ago the now barren reef had been higher, wider, and habitable. The find from Akúnâq is a mixture of Sarqaq and Dorset types.

Sarqaq. (19—20)

Sarqaq, which has given name to the earliest known culture in West Greenland, is today one of the most thriving outposts in Disko Bugt and remains of former habitation along the coast west of the outpost indicate that through centuries this area has been rather densely populated. No archaeological remains were found at the present outpost, but in

Fig. 17. Sarqaq Niaqornârssuk from east.

in the cove immediately west of it were house ruins and middens of which the latter were investigated by MELDGAARD and NELLEMANN during their trip to Umanak district. In this cove, which we named Sarqaq East, a test excavation was made in the thick midden deposit, the stratigraphy of which has been described on p. 22. In the bottom of the midden a Dorset horizon was found of which 4 m² were excavated. Of the 15 specimens found here, 11 are micro-flakes, one burin-like implement of an unusual type (pl. 5, fig. 8), a fragment of a ground blade of angmâq similar to pl. 5, 26, and a small core of rock crystal. 866 pieces of refuse were found, 766 of them of chalcedony.

It was in an adjacent cove still further west that MOSEGAARD found the artifacts which were described by MELDGAARD (1952). The locality, by the natives of Sarqaq called *Niaqornârssuk*, consists of a rather narrow, grassy plain sloping gently towards the cove which is flanked by rocky points (fig. 17). The situation for a Paleo-Eskimo site was ideal and numerous stone artifacts and chips scattered over the entire area clearly indicated that it had been frequented by Paleo-Eskimo. Meanwhile, later occupation and, as indicated by the many loose stones and the vegetation, sod-digging have caused so much disturbance that the hope of finding undisturbed deposits soon had to be abandoned. Excavations were made in two places that seemed promising, but the remains appeared to be too disordered to give an idea of the original construction.

The excavations yielded a number of specimens which with those found in several test pits add 228 specimens and 252 pieces of refuse

to the collection made by MOSEGAARD. Of 50 identifiable specimens found within an area of six square meters around a fireplace, 47 are Sarqaq types. Of these more than half are burins (20) and burin spalls (5), and of other types may be mentioned ten slender, symmetrical blades, three concave sidescrapers, and a piece of pumice with a longitudinal groove. The two specimens which have not been classified as Sarqaq are a completely polished, asymmetrical knife blade and a chipped knife blade with narrow base and side-notches.

Of 70 specimens found elsewhere on the site, 54 have been classified as Sarqaq and are by and large of the same types as mentioned above with burins and burin spalls outnumbering the others. The types not falling within the Sarqaq category are six micro-flakes, a micro-core, three completely polished blades, and a trapezoid endscraper. 238 pieces of stone refuse are rather large, irregular chips of angmâq and 14 of chalcedony and quartz. It thus appears that although Sarqaq types are by far the more numerous, Sarqaq-Niaqornârssuk is not a "pure" site but that it in addition to the original occupation shows traces of later habitation.

Igdluluarssuk. (21)

About two miles northwest of Sarqaq-Niaqornârssuk is another cove which like the latter is flanked by rocky points. An old settlement, *Igdluluarssuk*, consisting of eight house ruins and occupying the western part of a slightly sloping, sandy plain has been described by MATHIASSEN (1934, p. 33—34). No remains of habitation were visible in the eastern part which in places was covered by heather, willows, and Betula nana, but hidden under the densest growth were a number of head-sized and larger stones which, after the removal of the vegetation and a 10—15 cm thick layer of sod, appeared to belong to two old dwellings lying close together (fig. 18). They were situated 17—26 meters from the high water mark and 1.54—2.22 m above it, covering an area of about 40 square meters.

In the northernmost dwelling (I) the fireplace was the most conspicuous feature. It was situated in the middle of an oblong area blackened by fire and ashes and filled with hand-sized, fire-cracked stones, and consisted of head-sized stones placed on edge. In the southwest corner of the dwelling was what seemed to be another fireplace with fire-cracked stones, and northwest of the main fireplace was a row of flat stones which might be part of a pavement. The extension of the construction could only be determined by the presence of sterile sand and the absence of stone chips outside it.

Dwelling II, which adjoins dwelling I at its southeast corner, is better preserved. In addition to the fireplace it had a partly double row

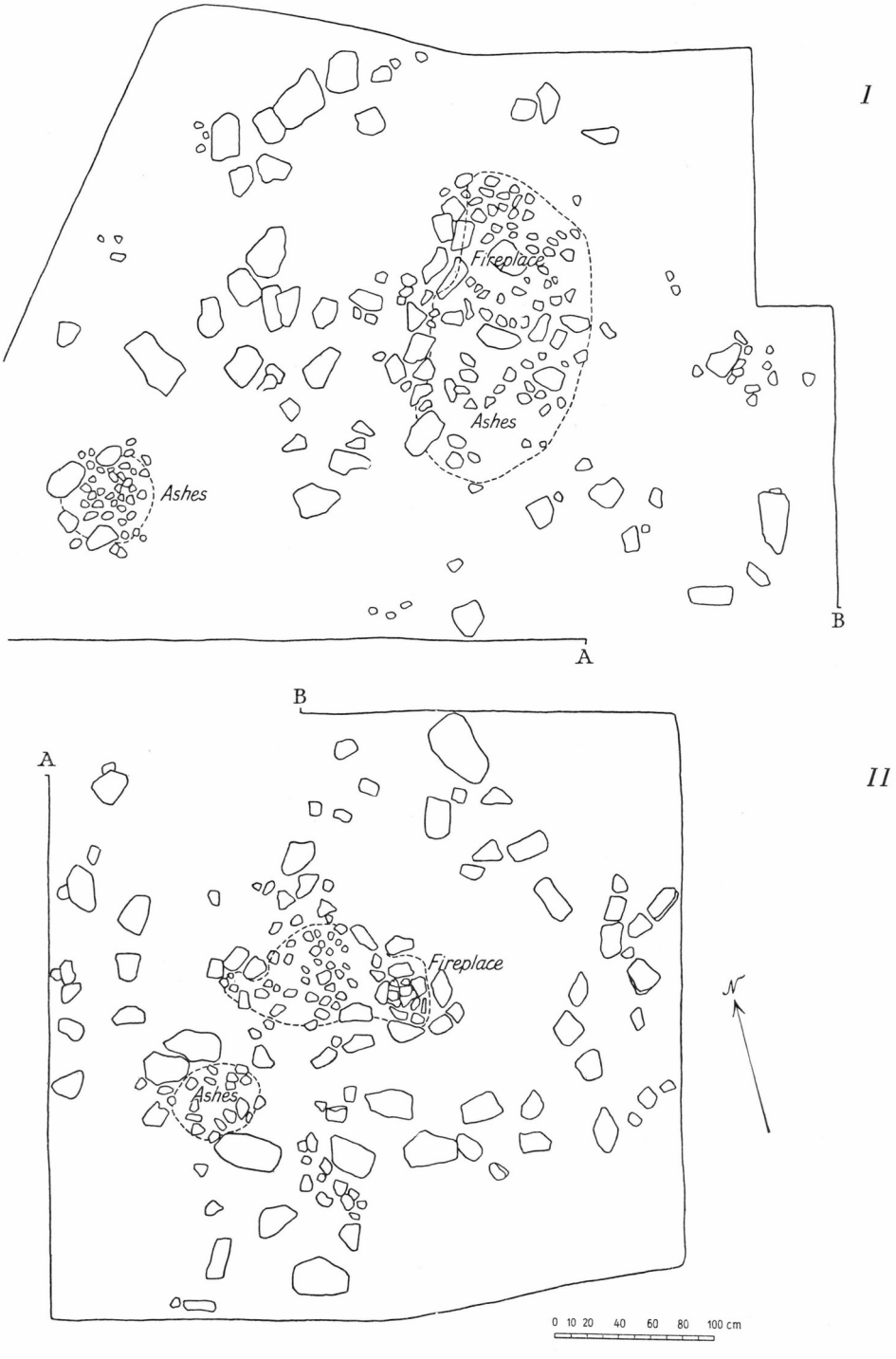


Fig. 18. Igdluluarssuk I and II.

of rather large, angular stones which might be the remnants of a wall or at least has formed the edge of the dwelling. This seems to have been oblong, rounded and possibly wider in front than at the back. Extending from what we consider the front wall, which is facing the sea, are other stones which might indicate where the entrance has been. The fireplace, to the east of the centre of the dwelling, was extremely well preserved with larger, flat stones standing on edge or slanting outwards forming a shallow bowl the bottom of which was paved with smaller, flat stones. A number of "cooking stones" were lying in this bowl while others were scattered over a blackened area west of the fireplace. A third collection of "cooking stones" were found in a smaller, fire-marked area west of the "entrance".

Whether these constructions originally were parts of tents or houses is impossible to decide; but however scanty informations they may yield, they still represent the earliest and best preserved dwelling remains hitherto found in West Greenland. That they do belong to the earliest culture known is indicated by the, unfortunately very few, artifacts found in them, viz. in I.: three burins, a burin spall, two heavy, chipped knife blades, and a symmetrical, slender blade and in II.: a specimen of the last type. When we to these Sarqaq-types add that of the stone refuse in I. 394 pieces are of angmâq and 8 of flinty material, and in II. 117 are of angmâq and 2 of flint we may be reasonably certain that the two dwellings belong to the Sarqaq culture.

2. DESCRIPTION OF THE ARTIFACTS

The investigations in Disko Bugt in 1953 yielded a total of 1956 specimens of which 1184 have been classified, while the balance consists of unclassifiable fragments mostly of bifacially chipped blades. In addition to the artifacts the refuse from the manufacture of the implements was collected in most of the investigated sites. In the following we will discuss the classification of the implements and the occurrance of the types outside the investigated area; their distribution according to the investigated sites is given in tabular form on pp. 48—49. As it appears from the table the Sarqaq types have been placed first on the list and the Dorset types last. It should be noticed, however, that certain types, likes sidescrapers, adze blades, and lamp sherds, which occur in both cultures, are listed with the Sarqaq types.

The raw material.

As already mentioned (p. 16) the material of which the implements have been made is of great significance in this part of Greenland. For some reason the two people that occupied West Greenland before the

Thule immigration had a different preference regarding the raw material they chose for the manufacture of their stone implements. Certain minerals, like jasper and rock crystal, were used equally by both, but when it comes to hornstone and chalcedony the difference is so conspicuous that it is possible to decide, on the refuse alone, whether a site has been occupied by Sarqaq or Dorset people.

For hornstone, the favourite material of the Sarqaq people, we have for various reasons chosen to use the Eskimo word, *angmâq*, which according to KLEINSCHMIDT's dictionary is the name of "a hard, flintlike, usually bluish stone, which in former times was used for arrow points, knives etc." (KLEINSCHMIDT 1871, p. 35). Most likely the word covers all flinty stones used for artifacts, but, as SOLBERG says, it is a convenient term and it has been used in the literature and in museums since the first half of the 19th century (SOLBERG 1907, p. 33). The main reason for using this word is, however, that MATHIASSEN has used it in his pioneer works on Greenland archaeology, so one can with good right say that the word angmâq has been adopted into the language.

Angmâq is a silicified slate which, among other places, occurs in the basalt area on both sides of the Vaigat. Here an infiltration of solutions containing silicium, probably from the decomposed basalt, has hardened the slate to such an extent that it often has lost its original characteristics, such as its schistosity, and aquired those of flinty materials, such as conchoidal fracture. The result is a material which is easely chipped, probably not as hard as flint but also less brittle, and it is receptive to a high polish. It occurs in many colour variations from light bluish to dark grey or even black and in various shades of brown. It is the same material which in the black variety was used extensively in Ipiutak and other Alaskan cultures particularly for tools with ground edges, as f. inst. adze blades.

Angmâq was also used by the Dorset people in Disko Bugt but to much less extent than by the Sarqaq people. This appears clearly from the table pp. 48—49 in which the percentage of angmâq in the refuse is shown. The figures, which are the result of a count of all flakes and spalls resulting from the manufacture of stone implements, indicate that in pure Sarqaq finds close to 100 % of the refuse is of angmâq, while there is much less angmâq in the Dorset finds. In these finds chalcedony is predominant. The chalcedony, which also occurs in the basalt regions, is usually milky-white but the colour may vary considerably. In order to emphasize the significance of the most common form of chalcedony we have used the term flint on the greyish or brownish materials, though they might actually be chalcedony.

	Igdlorssuatsiait I	Igdlorssuatsiait II	Igdlorssuatsiait III	Igdlorssuatsiait, scattered finds	Eqe	Sermermiut A Layers A–B (Sarqaq)	Sermermiut A Layers E–F (Dorset)	Sermermiut A Layers G–H	Sermermiut B Sarqaq layer	Sermermiut B Dorset layer	Sermermiut, scattered finds	Tupersuit I
Burins (Pl. 3, 1—7)	..	1	..	3	1	4	..	1	1	..	15	18
Burin spalls (Fig. 19)	..	..	..	..	..	..	..	..	..	..	1	8
Endscrapers, triangular (Pl. 3, 8—12)	..	1	..	1	..	2	..	..	..	..	4	..
– , oblong (Pl. 3, 13—14)	..	..	..	..	..	..	..	..	1	..	2	1
– , rounded (Pl. 3, 15—17)	..	..	..	..	..	..	..	..	..	..	2	..
Sidescrapers, concave (Pl. 3, 18—24)	..	..	..	..	..	1	..	..	..	..	5	8
– , straight or convex (Pl. 3, 25—28)	..	..	..	..	1	..	..	1	1	1	3	1
Blades, asymmetrical, tanged (Pl. 4, 1—3)	..	..	..	..	..	2	..	..	..	..	4	2
– , – , double pointed (Pl. 4, 4—5)	..	..	..	..	..	..	..	..	..	..	..	..
– , – , transveral edge (Pl. 4, 6—9)	..	..	..	..	..	..	..	..	1	..	2	2
– , symmetrical, small, lanceolate-triangular (Pl. 4, 10—14)	..	1	..	2	..	5	..	..	..	..	9	5
– , – , slender (Pl. 4, 15—26)	..	1	..	..	1	3	..	..	1	..	10	2
– , – , large	1	..	..	..	..	2	..	..	..	..	6	..
– , – , spatulate (Pl. 4, 27)	..	..	..	..	..	1	..	..	..	..	1	..
Awls or bodkins (Pl. 3, 29—30)	..	..	..	..	..	..	..	..	..	..	1	..
Pumice (Pl. 2, 21 and fig. 20)	..	..	..	..	..	..	..	..	..	..	..	1
Stone sinkers (Fig. 20)	..	..	..	..	..	..	..	..	..	..	..	..
Adze blades	..	..	..	..	..	..	..	..	..	..	1	..
Lamps and lamp sherds (Pl. 2, 22)	1	..	..	..	..	..	1	..	..	1	3	1
Burin-like implements (Pl. 5, 1—8)	..	..	..	..	1	..	1	..	..	5	1	..
Endscrapers, flaring edge (Pl. 5, 9—12)	..	..	..	..	1	..	1	1	..	2	2	..
– , trapezoid (Pl. 5, 13—17)	..	..	..	..	3	..	1	..	..	11	1	..
– , heavy (Pl. 1 I, 8)	..	..	..	..	..	..	2	..	..	..	1	..
Blades, chipped, notched (Pl. 5, 18—25)	..	..	1	..	8	..	4	..	..	5	5	..
– , polished (Pl. 5, 26—28)	..	..	..	..	1	..	..	..	..	..	2	..
Micro-flakes (Pl. 5, 29—33)	..	..	3	..	13	..	48	..	..	168	16	..
– -cores (Pl. 5, 34—36)	..	..	..	..	2	..	..	..	..	6	4	..
Refuse (percentage of angmâq)	53	97	33	93	57	97	13	..	100	61	..	94

Tuperssuit II	Tuperssuit III	Tuperssuit, scattered finds	Igdluluarssuit, N-E corner	Igdluluarssuit, south corner	Igdluluarssûp talerua	Kangerdluatsiaq	Pisigsarfik	Ilerfît	Igdlorssuit I	Igdlorssuit II	Igdlorssuit, scattered finds	Qeqertârssuk	Qeqertaq, Qarsorsâ	Qeqertaq, north	Qeqertaq, harbour	Nûgâq	Igdlutsiait	Akúnâq	Sarqaq, East	Sarqaq, Niaqornârssuk	Sarqaq, scattered finds	Igdluluarssuk I	Igdluluarssuk II	Total
4	..	16	..	..	11	1	..	27	26	12	..	1	3	..	1	..	15	..	..	20	13	3	..	197
1	..	..	..	..	3	..	..	9	7	..	..	..	..	..	..	..	..	..	..	5	5	1	..	40
2	..	3	1	..	..	..	..	3	2	..	..	..	1	..	..	..	3	1	..	3	1	..	..	28
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	..	..	1	..	..	2	..	..	..	..	..	..	1	1	..	..	3	..	..	10
2	..	..	..	..	2	..	..	9	6	..	..	1	1	1	..	..	5	..	..	3	8	..	..	52
1	1	..	..	1	2	1	..	8	..	..	..	..	..	..	..	..	3	1	..	3	2	..	..	31
..	..	..	..	..	2	..	..	..	1	..	..	..	1	..	..	..	1	..	..	..	3	..	..	16
1	1	..	..	.	..	..	..	4	..	..	..	..	1	..	..	..	1	..	..	1	..	..	..	9
1	..	2	..	..	2	..	..	..	2	1	1	..	2	..	..	..	1	1	..	..	1	..	..	19
3	..	2	..	..	6	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	35
1	..	..	..	..	5	..	..	12	4	1	..	..	3	..	..	..	6	2	..	10	17	1	1	81
..	..	..	..	..	3	..	..	..	..	2	..	..	..	..	..	..	1	..	..	..	1	2	..	19
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	..	..	5
..	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	5
..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	2
..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	1	..	..	5
..	..	..	..	..	..	..	..	..	1	3	..	..	2	1	..	..	11	..	..	1	3	..	..	29
..	..	..	..	..	..	..	..	..	..	3	..	1	3	..	1	..	..	..	1	..	..	..	..	17
..	..	..	..	..	1	1	..	..	1	..	1	..	7	..	2	..	2	..	..	..	..	..	..	22
..	..	..	..	..	..	1	..	1	..	..	..	4	3	2	..	..	1	1	..	..	2	..	..	31
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	1	..	..	..	..	1	1	11	1	..	..	..	..	..	1	..	..	..	39
..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	1	1	3	..	..	10
2	..	..	..	..	16	3	..	8	21	11	10	1	72	4	15	..	13	1	11	..	6	..	..	442
..	..	..	..	..	3	..	..	1	2	..	..	4	2	..	..	..	..	1	2	..	1	..	..	28
..	..	..	78	91	71	48	40	..	83	63	30	58	30	6	..	..	41	88	12	..	95	98	98	1184

The Sarqaq types.

Burins.

From the description of the sites and from the table it appears that burins are by far the most common type of implement in the finds of Sarqaq culture. The significance of this implement is further emphasized by the fact that it does not occur in what we consider pure Dorset finds and consequently, wherever it occurs, it is indicative of the presence of Sarqaq culture.

The typical Sarqaq burin is made of angmâq; only 19 out of 197 specimens are of other materials such as jasper (9), flint (5), chalcedony (4), and rock crystal (1). They vary in length from 1.7 to 4.9 cm, in width from 0.8 to 2.0 cm, and in thickness from 0.2 to 0.6 cm. They are rather uniform in shape and execution. The great majority are chipped on both sides except for the upper (working) part which is ground; the edges are sharp. Only three specimens of chalcedony and the one of rock crystal (Pl. 3, 2) show no grinding and only one of chalcedony is only chipped on one side (Pl. 3, 1). The amount of grinding on each burin ranges from traces of grinding near the upper edge to a high polish which may cover as much as half of the implement. The upper, smooth edge is more or less slanting from the corner where the spall or spalls have been struck off, the other corner being either sharp (Pl. 3, 3) or rounded (Pl. 3, 4). The number of spalls that have been removed may be counted because each spall leaves a scar, one a little higher than the next (see Pl. 2, 5 and MELDGAARD 1952, fig. 78). As many as eight spalls have been struck off one burin.

There are only very few variants from the typical Sarqaq burin. In addition to the exceptions mentioned above there is one double-burin with spalls removed from both ends (Pl. 3, 5) and eight specimens have the appearance of chisel or two-sided burins (Pl. 3, 6—7). The difference between the latter and the majority of the Sarqaq burins, which may be designated as corner or angle burins, is probably not functional but simply due to the fact that the craftsman for some reason has ceased to remove spalls from one corner and has continued from the other corner.

Regarding the function, we consider it most likely that the Sarqaq burins have primarily been used for splitting antler and ivory and we also believe that they have been hafted. The burin has probably been placed in a short handle of antler or ivory, possibly similar to the Eskimo composite knife handle or the partly split type of the Ipiutak culture (LARSEN and RAINEY 1948, pl. 8, figs. 10—14). In making the parallel grooves for splitting the antler or ivory, the craftsman held the burin with its sides parallel to the groove, using the point sharpened by the burin blow for cutting. With the thin, smooth implement he was thus able to cut narrow, deep grooves with only slightly slanting walls.

Outside of West Greenland the typical thin and partly ground Sarqaq burin has been found in the Angmagssalik district in East Greenland (MATHIASSEN 1933, fig. 30, 11—12 and pl. 9, 7—8), indicating that the Sarqaq people has spread at least that far. Burins have also been found further north on the east coast of Greenland (MELDGAARD 1952, fig. 78, 6—7 and KNUTH 1952, fig. 14, 4—7) all the way up to Peary Land (KNUTH 1954, fig. 103, 10—12 and 1952, fig. 10, 9), but these burins are all of flinty materials, not ground and thicker than the majority of the Sarqaq specimens. They are, however, reminiscent of those from Sarqaq which are made of harder materials and have probably been used in the same way. The same kind of burins as in Northeast Greenland occurs all the way from Greenland to Alaska as f. inst. at Button Point, Baffin Island (MELDGAARD 1952, fig. 78, 12—13) in the Igloolik area (MELDGAARD 1955, fig. 9), in northernmost Manitoba (GIDDINGS 1956, fig. 80, 1—10), in northwestern Canada (MACNEISH 1956, pl. II), in Brooks Range, Alaska (IRVING 1953, pl. 1, 12—13), and at Cape Denbigh (GIDDINGS 1951, fig. 59a, and 60a).

The surface treatment and the size are features which characterize these American burins in contrast to the Paleolithic and Mesolithic burins of the Old World, which are generally larger and without chipping on the face. Compared to the Old World burins, the American burins seem to represent a higher developed and probably later form of this implement. The Sarqaq burin, and particularly those made of angmâq, is an even more refined form and more advanced in the sense that it cuts a narrower groove and, on account of the grinding, offers less resistence. Unless typical Sarqaq burins are found outside of Greenland we must assume that this type developed in West Greenland, possibly on account of the abundance of angmâq which lends itself better to grinding than flint and similar materials.

Burin spalls. Slivers or spalls that have been removed from burins were found in a number of 40. Of these 24 are of angmâq, six of flint, six of jasper, and four of chalcedony. They range in length from 1.0 to 2.7 cm and in thickness from 0.1 to 0.2 cm, usually increasing in thickness from base to point. They are rectangular in cross section with exception of the first spalls to be struck which are triangular.

As GIDDINGS has recently pointed out some burin spalls are not only a product of the resharpening process but "have a function of their own" (GIDDINGS 1956, p. 262 and 265). Because GIDDINGS had called our attention to the fact that the basal end (where they break off) of some of the burin spalls from Cape Denbigh and Knife River showed sign of retouch, our specimens were re-examined, whereby it appeared that eight of them have very fine retouch at the base. As shown in fig. 19 of spalls

enlarged two times the base forms a short straight or slanting cutting edge. We are of opinion that the retouch was produced on purpose, f. inst. by scraping the spall on a stone. A short, sharp edge like this could have been used for engraving. As the majority of the Sarqaq burin spalls lack this retouch, probably because angmâq is not hard enough, we can be sure that the spalls are primarily the result of the resharpening

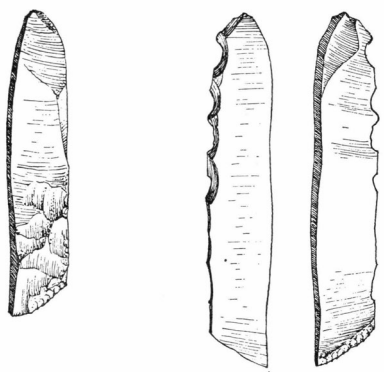


Fig. 19. Burin spalls. 2:1

process and that the use of some of them as special tools is secondary. This very specific treatment of the burin spalls is a clear evidence of the relationship between the Sarqaq culture and ancient cultures in Alaska.

Endscrapers.

The endscrapers of the Sarqaq culture may be divided into three types which, with exception of a few transitional specimens, are easily distinguishable. In contrast to the endscrapers of the Dorset culture only one specimen is made from chalcedony, the rest being of angmâq, jasper, and flint. They all have a convex scraping edge in one end, are trimmed on the upper surface and very little or not at all on the reverse side.

Triangular endscrapers. The most common type with 28 specimens is triangular in outline and ranges in shape from true triangles to forms with rounded corners and wider in the rear end. The great majority are trimmed over the entire upper surface while a few specimens have two longitudinal flakes taken off leaving a low ridge in the middle (Pl. 3, 8 and 10). The scraping edge is usually rather steep, one specimen has a ground scraping edge. About one half of the specimens has no trimming at all on the under surface while the other half shows a slight retouch along one or both side edges. 13 specimens are made of angmâq, 14 of flint and jasper, one of chalcedony and they range in size from 0.18 by 0.18 cm to 2.7 by 4.8 cm.

Though triangular endscrapers have been found elsewhere in the Eskimo area, f. inst. in Peary Land (KNUTH 1952, fig. 10, 17), on Southampton Island (COLLINS 1956, Pl. IX, 2—3), and in Alaska (GIDDINGS 1951, fig. 62) the Sarqaq endscrapers of this category have a stamp of their own which is probably due to local development. The most characteristic are those in shape of isosceles triangles.

Oblong endscrapers. Five endscrapers distinguish themselves by their size and shape and have probably served a purpose different from the other types. They are all of angmâq and range in size from 7.3 by 3.4 cm to 4.8 by 3.6 cm. They are flat, have straight side edges and a straight or slightly curved scraping edge. The upper surface has only trimming along the edge, for the rest it consists of rather large, original flake scars. Except for traces of the edge-trimming the under surface is left untouched. Pl. 2.13 deviates from the others by the slightly convex side edges and by more trimming on the upper surface. This type has not been found outside of Disko Bugt.

Rounded endscrapers. As the preceding type, the scrapers of this category are made from oblong flakes but have a rounded scraping edge. The type has been described by MELDGAARD as hoof-shaped (1952, p. 223 and fig. 76, 20) and three of our specimens are actually hoof-shaped, though not as thick as the one illustrated by MELDGAARD. The rest approches this form except one which is more pointed. Despite the variation in shape, we believe that the ten scrapers we have classified as rounded have been used for the same purpose. Seven of them are made of angmâq, two of jasper, one of flint, and they vary in size from 3.2 by 1.6 cm to 5.8 by 2.4 cm. Three of them have been trimmed only along the edges, the balance over the entire upper surface, while the under surface usually is left untouched.

Only a few endscrapers of this type have been reported from other sites in the American Arctic and Subarctic, viz. from Manitoba (GIDDINGS 1956, fig. 78, 11) and from Alaska (GIDDINGS 1951, fig. 62, 1 and LARSEN and RAINEY 1948, pl. 18, 3, 6—10). The specimens from Ipiutak show the greatest resemblance; no. 3 is almost identical to the Sarqaq specimen illustrated by MELDGAARD, and the Ipiutak endscrapers type 2 (Nos. 6—10) are strongly reminiscent of those from Disko Bugt.

Sidescrapers.

This class includes tools made from mostly oblong flakes on which the original flake surface is usually left untouched, while the upper surface has been chipped along one or both edges and in many cases over the entire surface. The classification has been made according to the

shape of the scraping edge which may be concave, straight or convex. There is a significant difference between the concave sidescrapers and the rest in that the former represent a distinct type with characteristic features which occur on all or virtually all specimens, while the others seem to be accidental flakes which have been chipped along one or two edges with no intention from the side of the craftsmen to give them a definite shape.

Concave sidescrapers. This type is one of the most common and most characteristic stone tools in Greenland. The type is not confined to the Sarqaq culture but occurs also, though in Disko Bugt apparently less frequent and in aberrant forms, in the Dorset culture. We will first describe what we consider Sarqaq specimens. Of the 52 specimens in the collection 18 are made of flint, 13 of angmâq, 12 of jasper, 5 of rock crystal, and 4 of chalcedony. It is noticeable that unusually many specimens are made of materials with bright colours like those of green jasper. They vary in size from 6.2 to 2 cm with the majority being 3 to 4 cm long. Characteristic of the concave sidescrapers is the fact that the usually steep scraping edge is confined to the upper half of the tool which looks like a more or less curved beak, while the lower half is wider and has the appearance of a handle or a wide tang. That this part in many cases actually has been inserted in a handle is indicated by the fact that of the 40 specimens in which the lower part is preserved 14 have "basal grinding", that is the sharp edges have been smoothed by grinding, and that the bulb of percussion on the under surface in 16 cases has been removed.

That brings us to the question of the function of this tool. As it appears from Pl. 3, 18—24, which show its range of variation, the common feature is the more or less beak-shaped upper part. It seems natural to assume that this part has been used for smoothing curved surfaces, as on shafts for arrows and heavier weapons in accordance with the curvature and length of the scraping edge. 36 specimens have the scraping edge to the right and 16 to the left and it is of course tempting to connect this with right and left-handedness, but the number of specimens which in that case should have been used by left-handed persons seems to be too large. A more likely explanation is that the right-sided scrapers were used for scraping away from a person, while scraping in the other direction would require a left-sided scraper. Whether a craftsman used both kinds or whether it was a matter of preference is of course impossible to say. While a number of these implements have been used only as scrapers, there are others which might have served a double purpose, namely those with a pointed "beak" as f. inst. Pl. 3, 19—22. Not only has the point been made with great care, but in some cases it also shows sign of wear as if it has been used for scratching og engraving. We must of course not

exclude the possibility that some of them were used exclusively as gravers. Of the aberrant forms Pl. 3, 23, has two scraping edges in one end and Pl. 3, 24 a concave scraping edge in each end. Three specimens of chalcedony from Qeqertaq and Qeqertarssuk and probably belonging to the Dorset culture deviate somewhat in shape from the Sarqaq specimens and are also less carefully made.

In addition to West Greenland, concave sidescrapers of the "beaked" type occur in finds from Angmagssalik (Mathiassen 1933, pl. 9, 4—6), Knud Rasmussens Land (Larsen 1938, pl. 3, 6), Northeast Greenland (Larsen 1934, pl. 1, 11 and p. 83; Glob 1935, pl. 6, 43; Bandi and Meldgaard 1952, pl. 1, 6), North Greenland (Knuth 1952, fig. 10, 10 and 1954, fig. 103, 9) and the Thule District (Holtved 1944, pl. 2, 20). Outside of Greenland it is known from Newfoundland (Lloyd 1896, pl. XI, 1—3 and Wintemberg 1939, pl. VI, fig. 2, 33—34), Labrador (Leechman 1943, pl. XXIX, B, fig. 6 and p. 370) and Alaska (Collins 1937, pl. 41, 22). Though concave sidescrapers in the Ipiutak find exceed all other stone implements in number there is not a single specimen of the "beaked" type. There might, however, be a connection between this type and the Ipiutak gravers, type 1 (Larsen and Rainey 1948, pl. 19, 1—6).

Straight and convex sidescrapers. As already pointed out, the sidescrapers of this category lack the uniformity which characterizes the concave sidescrapers. They are simply flakes which have been trimmed along one or two long margins so that they may be used as scrapers. Of the 31 specimens only six have been chipped over the entire upper surface; four of these, similar in shape to Pl. 3, 25, seem to have been given an intentional form very much like the Ipiutak double-straight sidescrapers (Larsen and Rainey 1948, pl. 17, 17—22). Also Pl. 3, 26 is reminiscent of Ipiutak sidescrapers (ibidem, pl. 17, 1—6). The others are more accidental in appearance and of little comparative value. They range in length from 5.3 to 3.2 cm and are made of angmâq (16), flint (7), chalcedony (5), jasper (2), and quarts (1).

Bifacially chipped blades.

If we include all fragments blades chipped on both faces are the most common artifact in our collection of the Sarqaq culture. There are, however, so many unidentifiable fragments that only 184 lend themselves to classification. Except for a few distinct types, the range of variation and the number of transitional forms are so great that a classification in many cases must be rather arbitrary. They can be divided into many types, but we have preferred to limit the number to seven allowing each type a wide range of variation. As criterion for our classification we have attached importance to the function as well as the shape.

In general, it may be said about these blades that they are, with a few exceptions made from angmâq. The chipping is usually very fine and covers the entire surface but specimens less carefully made and with the original flake surface more or less untouched do occur. Grinding on the faces as well as basal grinding occurs frequently, particularly on two of the types. Another feature characteristic of the projectile points is minute serration of the edges.

Asymmetrical, tanged blades. The 14 specimens of this type are all of angmâq and range in length from 3.2 to 10 cm. They are pointed in one end, have a wide base, a convex cutting edge, and a more or less straight back. The "tang" is usually not as pronounced as in Pl. 1, II, 11—12, but in most cases only faintly indicated (Pl. 4, 1—2). That the lower part actually has served as a tang which was inserted in the end of a handle is evident from the fact that four specimens have basal grinding, that is, the lower part of both edges have been smoothed. Three specimens have only marginal chipping. There can be no doubt that the blades of this category have served as knife blades. No blades comparable to these have been found outside West Greenland.

Asymmetrical, double pointed blades. This rather heterogenous group differs from the preceding in that the blades are pointed or rounded in both ends. The 9 specimens range in size from 4.0 by 2.4 cm to 8.8 by 2.8 cm and are with exception of one specimen made from angmâq. Three specimens have traces of grinding on one or both faces, Pl. 4, 4 also on the lower part of both edges. This basal grinding and probably also the fact that the lower part of the blade is not discoloured seem to indicate that it has been inserted in the end of a handle. The other specimens, however, have probably been used as sideblades. Although the group as such is too small in number and too heterogenous to be used for comparison, it is worth noticing that it shows the greatest resemblance to the Ipiutak sideblades (LARSEN and RAINEY 1948, pl. 12) and Pl. 4, 4 to the Ipiutak endblades type 2 (ibidem, pl. 14, 7—12).

Blades with transversal edge. As far as shape and size are concerned this is one of the most uniform and also one of the most characteristic of the Sarqaq types. It is roughly triangular in outline though some like Pl. 4, 8 have a definite tang, indicating that the blade has been hafted. Opposite the tang or the upper corner is the transversal cutting edge, which forms an obtuse or right angle with the front edge and an acute angle with the rear edge. While the edges are carefully chipped the faces are in some cases unworked and expose the original flake surfaces (Pl. 4, 9). Signs of wear or grinding may be found on the transversal as well

as the front edge. All specimens are made of angmâq. Regarding the use of this implement we have no better explanation to offer than SOLBERG, who suggested that it was a woman's tool used as a sewing knife as well as a boot creaser (SOLBERG 1907, p. 43). To our knowledge this type has not been found outside West Greenland.

Small, symmetrical, lanceolate-triangular blades. This is another of the uniform and characteristic types of the Sarqaq culture. The 35 specimens range in length from 1.6 to 3.2 cm. They are all made of angmâq and are with the exception of the unfinished specimens ground on both faces, some of them almost to the edge. The base is straight or concave (only one, Pl. 1, II, 4 has a rounded base) and the slightly convex edges meet in an often very sharp point. The edges are usually furnished with extremely fine serration. That these blades have been used as arrowpoints can hardly be doubted and they have most likely been placed in arrowheads of antler or ivory.

The type occurs also in the Angmagssalik district (MATHIASSEN 1933, pl. V, 33), but from Greenland we have to go as far as Ipiutak to find a close parallel. The Ipiutak specimen in question (LARSEN and RAINEY 1948, pl. 35, 20) does not have serrated edges and it is the only Ipiutak arrowpoint with ground faces, but all Ipiutak arrowpoints are of the same general shape as those of the Sarqaq culture. The serration is a significant feature which we find again in Alaska in the Denbigh Flint Complex and in the Trail Creek caves, in northern Manitoba (GIDDINGS 1956, fig. 80, 11 and 25), and in Newfoundland (HARP 1953, pl. 1, B).

Slender, symmetrical blades. This group, comprising 81 specimens, is the largest and most heterogenous as far as shape and size are concerned; yet, attemps to subdivide it invariably result in a number of transitional, unclassifiable forms. They range in size from 2.8 by 0.9 cm to 7.1 by 1.9 cm and in shape from pointed-oval or rhomboid to lanceolate and spindleshaped (Pl. 4, 15—24). There are, however, indications that they have served the same purpose, viz. as projectile points. 21 specimens have a distinct tapering tang set off from the body by rather faint shoulders or a small knob on each side. On five specimens the tang is wider than the blade which seems to have been resharpened (Pl. 4, 26). The part of the blade which has been inserted in a shaft is in many cases recognizable by the fact that the edges on the lower part of the blade are straight in contrast to the rest, where they are curved. The straight part is usually ground; 19 specimens in all show basal grinding. Traces of grinding on one or both faces occur on 22 specimens, while the original flake surface is visible in 18 specimens. Five specimens have finely serrated edges like Pl. 4, 17. Only eight specimens are of flinty material, the rest are made of angmâq.

As pointed out by MELDGAARD (1952, p. 229), it is in Alaska that we find the closest and most numerous parallels to these Sarqaq blades. The rhomboid form thus occurs in Near Ipiutak (LARSEN and RAINEY 1948, pl. 80, 1—14) and Platinum (LARSEN 1950, fig. 56 B, 4—6), the more slender, lanceolate forms in Ipiutak (LARSEN and RAINEY 1948, pl. 14, 1—16), and the small, spindle-shaped in the Denbigh Flint Complex (GIDDINGS 1951, fig. 61 a, 2, 5 and 6), though in the Sarqaq culture without the diagonal flaking. Another Alaskan feature is the serrated edges, which as mentioned above also occurs in northern Manitoba and Newfoundland.

Large, symmetrical blades. 19 specimens have been classified as large because they exceed all other blades in size. They are all of angmâq and except for one all incomplete. The complete specimen is 9.5 cm long and 2.3 cm wide. The fragments are generally wider and probably parts of blades like those illustrated by SOLBERG (1907, pl. 11). They have presumably served as lance blades. The type is specific for West Greenland.

Spatulate blades. Five blades, all made from angmâq, have been classified as spatulate on account of their wide rounded tip and the tapering tang. Two of them have basal grinding, indicating that they have been hafted. They range in length from 5.6 to 8.2 cm, are chipped on both faces, and have sharp edges. In contrast to the other symmetrical blades, this is not a projectile point but probably some sort of a knife blade. Only a blade from Ipiutak (LARSEN and RAINEY 1948, pl. 14, 12) shows some resemblance with the Sarqaq specimens; otherwise the type is unknown outside of West Greenland.

Awls or bodkins.

The collection contains many examples of the exceptionally fine chipping technique of the Sarqaq people but the extremely thin and regular awls or bodkins, which are unequalled anywhere, mark in our opinion the height of their technical achievements. They are of angmâq, finely chipped over the entire surface, and are either left in that state (Pl. 3, 29) or they have been polished afterwards (Pl. 3, 30). In the first case the cross section may be quadrangular or pointed-oval, in the second case they are round. The point is very sharp. The two illustrated specimens are the longest of the four in our collection, the other two seem to have been broken.

On account of the sharp point we have interpreted them as awls or bodkins, though it seems strange that the Sarqaq craftsmen have gone through the trouble of making an implement of stone which other people on a similar culture level would have made of bone or antler. It is of

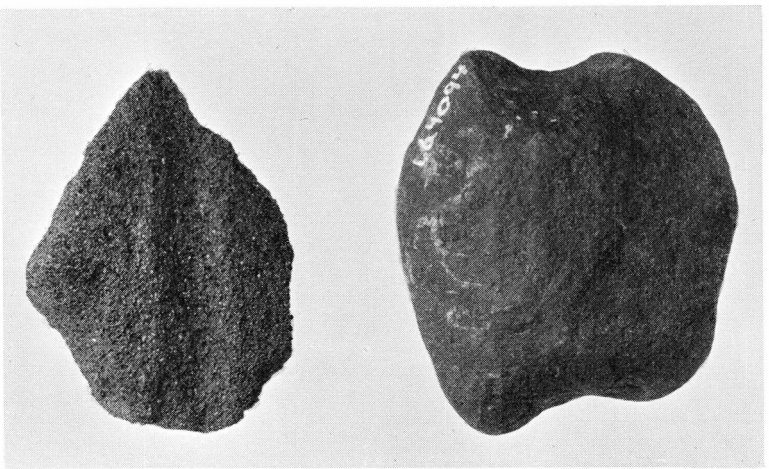


Fig. 20. Pumice and notched stone.

course possible that the implement was made for a purpose which required a very hard point, or perhaps was stone, in this case angmâq, their favourite material. Their skill in working it was so great that they did not mind a little extra effort. None of our specimens were found in stratified layers, so despite the technical evidence we could not be absolutely certain that they belonged to the Sarqaq culture until MELDGAARD, in 1956, got a specimen in a pure Sarqaq find in Holsteinsborg district. The type has not been found outside of West Greenland.

Pumice.

Pieces of pumice rubbed on one or more surfaces were found for the first time in Greenland. Pl. 2, 21 is the smallest of the five specimens in the collection, the largest is 7.1 by 5.1 cm. The four larger pieces have a longitudinal, broad groove similar to the groove in the arrowshaft-smoothers, f. inst. in the Ipiutak and Near Ipiutak cultures (LARSEN and RAINEY 1948, pl. 10, 11 and pl. 81, 12). Narrow grooves in one of the specimens indicate that this has also been used for other purposes, possibly for sharpening needles or other pointed objects. Pumice is said to have been used in Greenland in historic times for rubbing skin (CRANZ 1770, p. 167), and in Alaska it was used extensively in historic as well as in prehistoric times (LARSEN and RAINEY 1948, p. 86).

Stone sinkers.

Notched stones are another Alaskan culture element which has not previously been found in Greenland. Of the two specimens, both rounded pebbles of crystalline rock, one has a notch in each end, while the larger one has an additional notch in each side. They were probably

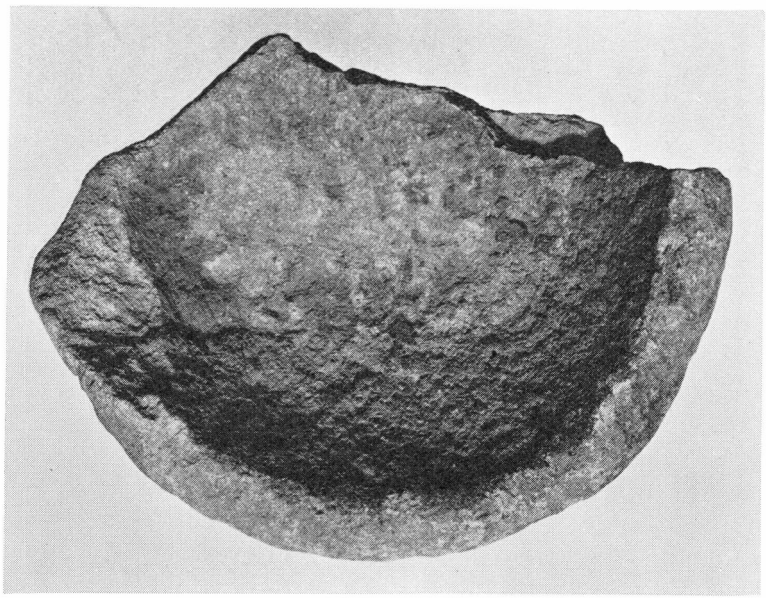


Fig. 21. Lamp from Igdlorssuatsiait.

used as sinkers for fish hooks or net. We cannot be absolutely certain that they belong to the Sarqaq culture but the many other Alaskan trait in the Sarqaq culture and the fact that one comes from the almost pure Sarqaq find at Ilerfît make it most likely. Notched stones occur in great numbers in archaeological finds in Alaska.

Adze blades.

The collection contains five adze blades, all of angmâq, and ranging in size from 8.0 by 3.4 cm to 2.9 by 2.7 cm. They have roughly chipped surfaces and a ground, steeply bevelled straight or slightly convex edge similar to those illustrated by SOLBERG (1907, pl. 8, 2—3). Because there is no recognizeable difference between one specimen found at Qeqertaq and most likely belongs to the Dorset culture and another from the Sarqaq site and because no adze blades were found in stratified layers at Sermermiut we are unable to distinguish between adze blade from the two cultures.

Lamps.

Only one complete lamp was found, namely the small, saucershaped soapstone lamp from Tupersuit (Pl. 2, 22). Even if it is only a toy, which its size seems to indicate, it is significant on account of its shape and the fact that it was found in a pure Sarqaq assemblage. With this lamp as a model there is good reason to believe that the large fragment of a

round lamp from Igdlorssuatsiait I (fig. 21) originally was circular in outline. It is made of mica schist, is 16.1 cm wide, 2.3 cm thick at the rim, and 1.2 cm at the bottom of the rather deep basin. Another heavy lamp of similar material and 2.5 cm thick was found in Igdlorssuit II.

As already mentioned (p. 17), the fragment of a soapstone lamp found in the Dorset layer in profile A of the Sermermiut midden does not have an evenly rounded basin; but the bottom forms an obtuse angle with the sides thereby indicating a relationship with the four-sided lamps found by MELDGAARD in the Igloolik area and belonging to the III period of the Dorset culture. The sherd is 1.1 cm thick in the middle and slightly thinner at the rim. Another soapstone sherd, 5 by 5.4 cm, with the same suggestion of four-sidedness in the basin was found in Igdlorssuit II. It is 0.9 cm thick in the middle and decreases in thickness towards the rather sharp rim. The thin rim is characteristic of a number of lamp sherds of soapstone, most of them with a very flat basin. From Igdlutsiait there are 11 sherds which are parts of at least three, flat lamps which differ only in size and thickness. The largest, which has been at least 15 cm in diameter is 1.3 cm thick, the smallest 0.5 cm thick. We find the same difference in size, thickness, and shape of rim in soapstone sherds from Sarqaq Niaqornârssuk. Two very small, oblong lamps from Igdlorssuit I and Qeqertaq are obviously toy lamps.

Apart from the round Sarqaq type and the "four-sided" Dorset lamps we are unable to decide to which culture the other lamp sherds belong.

The Dorset types.

Burin-like implements.

This group includes 17 chipped and ground implements made from light to dark grey angmâq. As it appears from Pl. 5, 1—8 they vary considerably in shape, but because they, possibly with exception of two or three, have had the same function we find it natural to consider them as a unit. When we have adopted the term "burin-like" from COLLINS (1950, p. 25) it is because we, as he does, believe that at least the majority of them have been used as burins and represents a later development of the true burins. Like the Sarqaq burins they have a sharp corner which probably was used for cutting grooves in antler, ivory, and bone, but this corner has been made by grinding and not by a burin blow. The corner in question is at the upper end of the front edge (to the left on the illustrated specimens) which is ground to a plane. The lower part of the implement is chipped to form a tang, with a usually slanting base and straight or slightly concave sides indicating that the tool has been hafted. The blade part is usually triangular in cross section with the sides slanting from the flat front edge towards the rear edge which in most

cases is sharp and chipped. On a few specimens the blade part is completely ground (Pl. 5, 2). Where the tip is not broken as a result of use it is ground flat or, rarely, bevelled from both sides, in both cases forming a right or an acute angle with the front edge. One specimen (Pl. 5, 8) is wedge-shaped with a short, sharp edge at the tip. A few other aberrant forms should be mentioned, such as Pl. 5, 5 with an oblique front edge and Pl. 5, 7 which is pointed and has five ground facets near the point. It is difficult to see how this and another specimen with four facets near the tip could have been used as burins, it seems more reasonable to assume that they are drill points.

This implement has not been found outside Greenland in its typical, three-sided form. It is known from Angmagssalik (MATHIASSEN 1933, pp. 64 and 89—90, fig. 30, 9—10, and pl. 7, 19—20) but not further north. It is, however, possible to find parallels to certain Greenland forms among the burin-like implements found in Canada, Labrador, and Newfoundland. For instance Pl. 5, 6 shows great resemblance to a specimen from the T1 site at Native Point, Southampton Island (COLLINS 1956, pl. X, 2) and COLLINS' general description of the burin-like implements from the site fits our specimen to the slightest details. The specimens described by WINTEMBERG from Newfoundland (1940, pp. 314—16 and pl. XVI, fig. 1, 1—7) are unfortunately too poorly illustrated to be used for a direct comparison, but his description fits the specimens in our collection which have more or less parallel sides and a bevelled rear edge. A close resemblance is also found between some of our specimens and burin-like implements found by MELDGAARD in 1954 in the earliest Dorset sites in the Igloolik area. It should also be mentioned here that burin-like implements have been found in Alaska (COLLINS 1937, pl. 39, 19—22, and LARSEN and RAINEY 1948, pl. 47, 16).

Endscrapers.

There are three natural, easily recognizable types of endscrapers in the Dorset material. Except for one, unique type, these scrapers are well known and widely distributed forms, for the most part made of chalcedony. The scraping edge is usually steep and well made but otherwise they have received less surface treatment than the Sarqaq endscrapers.

Endscrapers with flaring edge. 22 specimens have a wide, convex scraping edge and a narrow, square or tapering body that presumably has been inserted in a handle. They range in size from 1.5 by 1.8 cm to 2.6 by 2.7 cm and are made from chalcedony with the exception of three of flint. A characteristic feature is the chipping under the extending corners of the scraping edge and along the side edges on the under

surface. Only four specimens have been chipped on the entire upper surface. The type is common in finds of Dorset culture but occurs also in Alaska (Larsen and Rainey 1948, pl. 18, 5).

Trapezoid endscrapers. The type is less uniform in shape and size and is more carelessly made than the preceding type. They vary in shape from roughly triangular to almost square but the majority is definitely trapeziform. There are several very small specimens, the smallest being 1.3 by 1.5 cm, and only three atypical specimens of which the largest is 4.8 by 2.1 cm. Five of the 31 specimens are of flint, the balance of chalcedony. The scraping edge is usually very steep and convex, three specimens have a straight scraping edge. The under surface is usually left untouched with the bulb of percussion visible in the rear end. Chipping on the upper surface is in most cases limited to the scraping edge and a slight retouch along the margins, though a few have been trimmed over the entire surface. The type is too indistinct to be used for comparison.

Heavy endscrapers. Three unusually large endscrapers were found in the Dorset layer at Sermermiut. Two of them are like pl. 1, I, 8 of angmâq and about the same shape while the third is shorter and heavier and made of flint. They are partly chipped on the upper surface, while the original flake surface forms the reverse side. No other scrapers of this type have been found neither in nor outside of Greenland.

Chipped, notched blades.

This group comprises 39 blades chipped on both faces and with two more or less pronounced basal notches for hafting. 23 of them are made from chalcedony, four of angmâq, and the rest of flint. They range in size from 2.6 by 1.5 cm to 5.8 by 2.4 cm. The basal part or tang is usually as wide as or even wider than the blade part; only a few specimens have a narrow tang like Pl. 5, 24—25. The base is straight or, more rarely, concave and has been thinned by chipping. Most of the blades are pointed, though not with a very sharp point, and two specimens (Pl. 5, 18—19) are blunt with parallel edges. The great majority is asymmetrical with one convex and one straight or concave edge. In some cases one edge has a finer chipping than the other, which probably means that this has been used as cutting edge. From these features we must draw the conclusion that the blades of this category have served as knife blades.

Chipped blades with basal notches are well known outside of West Greenland. They occur in Angmagssalik (Mathiassen 1933, fig. 30, 2—3), Northeast Greenland (Larsen 1934, pl. 3, 31) Peary Land (Knuth 1952, fig. 10, 1), Thule district (Holtved 1944, pl. 2), and in most Dorset finds in Canada, Labrador, and Newfoundland.

Polished blades.

Ten blades polished on both faces are believed to belong to the Dorset culture because one specimen has been found in the Dorset site at Sarqaq East and another at Eqe, which is predominantly Dorset. Of the ten specimens, all made of angmâq, two are slender with a longitudinal ridge like Pl. 5, 26, one is like Pl. 5, 28, one has two wide side-notches like the chipped, notched blades, while two have a single edge. The material is insufficient and too poorly documented to be used for comparison and clarification of the cultural position of these blades.

Micro-flakes.

In the West Greenland Dorset culture the micro-flakes (also called micro-blades and lamellar flakes) take the place of the burins in the Sarqaq culture as the most common type and are by far the best indicators of the presence of Dorset culture. They occur in all investigated sites containing Dorset culture and in some places in considerable numbers. Struck from small, prepared cores they are all rather short, very narrow, extremely thin, and often slightly curved with two or three longitudinal flake scars on the back. As a natural consequence of the process of manufacture a large proportion of the flakes must be rejects, but a careful examination through a magnifying glass reveals that many of them have been retouched. 78 specimens were found to have fine retouch on both edges near the bulbar end or around it, resulting either in a pair of wide and very shallow notches or a tang, which in both cases indicates that the flakes have been hafted. Almost all of these specimens have use-retouch on one or both edges of the blade indicating that they have been used, probably as knife blades. Of the 78 specimens nine are of rock-crystal, the rest of chalcedony, and the complete specimens range in size from 4.2 to 2.2 cm in length and from 1.0 to 0.4 in width. In addition to these, many flakes have scars in one or both edges, but it is impossible to decide if it is accidental or the result of use.

Though micro-flakes occur in virtually all Dorset finds as well as in early finds from Alaska and therefore are of small comparative value, the tanged or notched flakes are apparently rare within the Eskimo territory. They do occur in the T1 site at Native Point, Southampton Island, where micro-flakes also are the most common of all implements, and, according to COLLINS' description and the illustrations, in exactly the same form as in Disko Bugt (1956, p. 70, Pl. IV, figs. 19—21 and 23—25). We must, however, not exclude the possibility that a closer examination of micro-flakes from earlier Dorset finds might reveal that the type has a wider distribution than it appears today.

Micro-cores.

In most finds containing cores and flakes the cores are scarce and never occur in the number one should expect from the number of flakes, and the finds from Disko Bugt are not an exception. It is true that these finds contain more cores in proportion to flakes than any other; 28 cores as compared to 442 flakes is actually a fair number, but the comparison halts, because of the 28 cores only three are of chalcedony, the material of which more than 80 % of the flakes are made, while the majority are of rock-crystal, of which material there are relatively few flakes. This strange situation calls for an explanation, and it seems as the only reasonable explanation is that at least some of the specimens of rock-crystal are either not cores at all or they have served another purpose in addition to being used for the production of flakes. The fact is that the cores in our collection may be divided into two types. Half of them have a wide striking-platform which in most cases is almost at right-angles to the surface from which the flakes are struck. One specimen (Pl. 5, 34), the only one of jasper, is an exception with an angle of only 30—40°, but it has the same wide striking-platform as the others. The other half of the cores, all of rock-crystal and most of them of oblong or even quite thin crystals, have a short striking-platform which makes an acute angle with the surface from which the flakes are struck. Where the two surfaces join is a short, sturdy edge which might have been used for scraping or cutting. This function might have been secondary, but we may not exclude the possibility that it is the main or even sole purpose of this implement. In support of this assumption we may mention first that the flake scars in many cases are short and irregular, which means that the corresponding flakes have been useless, secondly that some of the crystals are so thin that only one or two flakes could be removed from them, which would hardly be worth the effort of making the striking-platform. If these specimens of rock-crystal actually are scrapers or knives rather than micro-cores the number of these will be limited to 14, which is still a considerable number in comparison with other finds.

3. SUMMARY

The investigations at Sermermiut proved beyond any doubt the existence of two different and independent Paleo-Eskimo cultures, the Sarqaq and the Dorset culture, before the Neo-Eskimo, bearers of the Thule culture, occupied Disko Bugt. Because the three culture-bearing horizons at Sermermiut were separated by sterile layers, it seems most likely that at least this part of Greenland was unoccupied in the period between the Sarqaq and the Dorset occupation and again

after the Dorset culture had disappeared. While we have no further proof of the latter, the total absence of Sarqaq types in the Dorset finds supports the assumption that the Sarqaq people had left this region before the Dorset people arrived.

In addition to Sermermiut, remains of the two Paleo-Eskimo cultures were found in 22 localities in the eastern part of Disko Bugt between Kangersuneq south of Christianshaab and Atanikerdluk on the south coast of Nugssuaq. With very few exceptions the sites were situated on gravel or sand terraces a few meters or less above sea level and at the base of a rocky point. The reason for settling near these points is probably that the rock served as look-out for seals, preferably in the spring when they were basking on the ice. Furthermore the ice is liable to crack outside such a point and seals will gather along the crack. For these reasons we are inclined to believe that these sites were spring-sealing places. Another possibility should be mentioned, namely that in case the people had boats, of which we know nothing, it would almost always be possible to find a sheltered place to land on one side of the point or the other.

It seems as if the same places have attracted the Sarqaq as well as the Dorset people because on all sites except two, Igdluluarssuk and Sarqaq, we found remains of both cultures. From an archaeological point of view this is rather unfortunate because, the remains being very close to the surface, we usually found a mixture of Sarqaq and Dorset types. Consequently, we were in most cases unable to decide whether the remains of dwellings, if there were such, belonged to one culture or the other. Another great inconvenience for our investigations was former peat or sod-cutting. The three most prolific and promising sites, Tuperssuit, Qeqertaq, and Sarqaq Niaqornârssuk were also the favourite peat and sod-cutting places for the residents of the neighbouring village, and the result is that the remains of former dwellings or camping places were disturbed or completely destroyed. The fact that the ancient sites apparently often are and have been used for peat and sod-cutting explains why Sarqaq and Dorset types often occur in much later archaeological deposits and have caused the former misconception regarding their age. The explanation is probably that the stone implements very often are imbedded in the sod or peat and if this has been cut to be used for building or as fuel the implements may very easily end up in a house of much later date.

Despite the unsatisfactory conditions for archaeological work we succeeded in finding remains of three dwellings which, we can be sure, belong to the Sarqaq culture, and in addition a number of more or less disturbed remains of dwellings and fireplaces with a mixed content of artifacts. The Sarqaq dwellings were the two at Igdluluarssuk

and one at Tuperssuit. As it appears from the descriptions and illustrations there was not enough left to give a clear picture of the original construction. The best preserved, Igdluluarssuk II, shows an oblong, not even complete, ring of head-sized and larger stones with one or two fireplaces inside, and we must assume that Igdluluarssuk I also has been surrounded by a stone ring. The idea that immediately suggests itself is that they are tentrings and that the stones have supported a covering of skin, but we are left in the dark regarding the superstructure. The oblong shape and the construction of the fireplace as a "firebox" are reminiscent of the elliptical tentrings KNUTH found in Peary Land and in Northeast Greenland (1952, pp. 28—30), but the absence in Disko Bugt of their characteristic "mid-passage" probably means that there is no connection between the dwelling remains in the two areas. In Tuperssuit I there were indications of a regular stone wall which might suggest a dwelling of more permanent character, but on the other hand it may be purely accidental.

Of the dwelling remains with a mixed assemblage of artifacts, Igdlorssuit I did not contribute much to our knowledge of the Paleo-Eskimo dwellings. The fireplace with a thick layer of ashes and the surrounding flagstones indicates the presence of a dwelling, but we do not know its shape and size.

Pavements of hand-sized and larger stones were found in several places along with artifacts. The presence of fire-cracked and blackened stones and ashes show that they have connection with fire and they are most likely fireplaces. Actually the central part of Igdluluarssuk I corresponds in appearance to these pavements, although these lack the stone-lined "fire-box". The difficulty in explaining these fireplaces lies in the fact that no other arrangement of stones was found in connection with them. It is possible, however, that they are outdoor fireplaces and not part of dwellings. We are unable to say whether they were made by the Sarqaq or the Dorset people, or whether both people made them, because at Igdlorssuatsiait there were two with Sarqaq types and one with Dorset, and the others had a mixed assemblage of artifacts.

The fact that we did not find any clear evidence of permanent habitation may mean either that the investigated sites were only inhabited part of the year, f. inst. for spring-sealing, or that these people did not make more solid constructions. Though the information we gathered about the Paleo-Eskimo dwellings in Disko Bugt are rather limited, we did learn from our survey where to look for Paleo-Eskimo sites and what to look for, a result from which future investigations in West Greenland may benefit. Also of some significance is the evidence of the extensive use of hand-sized stones in connection with cooking, whether they were used as "boiling stones" or for heat preservation.

The absence of stone or clay cooking pots, which cannot be accidental, speaks in favour of the first, and if heather, which flares up and burns out fast, has been used extensively for fuel, the stones would be very useful to preserve the heat. The use of such "fire-stones" has not been mentioned before in connection with arctic cultures, while boiling with stones is well known from Alaska.

The stratigraphic evidence and the knowledge of the distribution of the types of artifacts in the two Paleo-Eskimo cultures which we obtained through the excavations at Sermermiut add considerably to the significance of the finds from the other sites. Actually, without the information we have from Sermermiut these finds would be of small value in a description and interpretation of the two cultures in question. With our present knowledge, however, we can distinguish between the types of artifacts of the two cultures, and by adding them to those found at Sermermiut we get a considerably larger number of specimens, a wider range of variation, and more types.

As far as the Sarqaq culture is concerned the investigations added further support to the interpretation of this culture given by MELDGAARD in 1952, namely that it is "closely related to the earliest Eskimo cultures in Alaska". The relationship is obvious from the general appearance of the artifacts, which in shape as well as in chipping technique are strongly reminiscent of those from Alaskan Paleo-Eskimo culture. To this we may add that we repeatedly must turn to Alaska in order to find close parallels to the Sarqaq types, above all to the large number of bifacially chipped blades which are characteristic of the Sarqaq culture as well as of Ipiutak and related cultures. To the parallels mentioned by MELDGAARD we may now add arrowshaft smoothers and whetstones of pumice, notched stone sinkers, and the use of basal grinding.

In his list of Alaskan traits in the Sarqaq culture MELDGAARD mentioned the micro-core, but we have learnt from our investigations that this type does not belong in the Sarqaq culture, and its presence in the first find from Sarqaq is due to the fact that Sarqaq Niaqornârssuk, from where it came, is not a pure Sarqaq site but contains some Dorset specimens. The absence of the core and flake industry in the Sarqaq culture undoubtedly means that this culture is later than the Denbigh Flint Complex. An indication in the same direction is the fact that the great majority of the Sarqaq burins are ground and those from the Denbigh Flint Complex are not.

Despite the many and close parallels with Ipiutak and related cultures these cannot be parental to the Sarqaq culture for the simple reason that they are too late to possess burins. Actually, the culture from which the Sarqaq culture originated has not yet been described, though we have indications of its existence. As already mentioned (p. 19)

it is possible that it may be found among the cultures which overlay the Denbigh Flint Complex at Iyatayet, and it is also possible that it is represented in the Trail Creek caves which contained remains of cultures or culture phases which bridge the gap between the Denbigh Flint Complex and Ipiutak. In these we find finely chipped flint blades with serrated edges and the knowledge of burins (LARSEN 1953, p. 606). No true burins were found in the caves, which only have served as shelters for caribou hunters, but several broken flint blades have been used as burins, which was evident from the scar after burin blows.

Outside Alaska the Knife River site in northernmost Manitoba shows the closest affinities to the Sarqaq culture, as already pointed out by GIDDINGS (1956). Significant is the presence of burins and implements made of burin spalls, of bifacially chipped blades with serrated edges, and of sideblades, to which must be added the absence of the core and flake industry. The main difference is the fact that none of the Knife River specimens show any sign of grinding, which seems to indicate a greater age than the Sarqaq culture.

In his discussion of the Knife River site GIDDINGS emphasizes the large proportion of burins and burin spalls in comparison to other artifacts in the Denbigh Complex, Knife River, and Sarqaq in contrast to sites with Dorset culture in which burins are rare (1956, p. 265). In our collection more than 1/3 of all identifiable Sarqaq specimens are burins and burin spalls, and in a single find, at Sarqaq Niaqornârssuk, they make up more than half of the artifacts. This seems to imply that when a people uses burins they are used to a great extent, and may later be found in considerable numbers, while on the other hand a very small percentage of burins in a find may raise the question whether they actually belong in the find or are intrusive. With our experience from Disko Bugt in mind we are inclined to believe that some of the parallels to the Sarqaq types which occur in "Dorset" finds from the eastern Arctic, particularly in Labrador and Newfoundland, indicate that these finds are not pure Dorset culture, but contain artifacts which belong to a culture that has come from Alaska and of which the Knife River and Sarqaq sites are easily recognizable manifestations.

While working on the initial find from Sarqaq, MELDGAARD noticed the presence of Dorset types in the museum-collections from Disko Bugt and concluded from this that "The west Greenland culture was apparently after the Sarqaq phase to some extent influenced by the Canadian Dorset" (MELDGAARD 1952, p. 229). We know now that it was not a question of influence, but a new culture that had entered Greenland. Its relationship to the Canadian Dorset has been discussed by MELDGAARD (p. 19), who on the basis of his own excavations in the Igloolik area places the Sermermiut Dorset, and with it the Dorset manifestations

dealt with here, as an early stage of the Dorset culture, prior to the "classical Dorset", or his Period IV. To this we may add that the Disko Bugt Dorset shows close affinities to the T 1 site at native Point, Southampton Island, which has been radiocarbon dated to 2.000 ± 230 years. The absence in the former of the chipped, triangular blades, which are so characteristic of the T 1 site, and the fact that the Disko Bugt Dorset contains a number of forms of the "burin-like implement" that does not occur in the T 1 site may indicate a difference in age. Comparisons with other Canadian Dorset finds are not feasible until the various stages of the Dorset culture are clearly defined and we are able to distinguish between pure and mixed finds.

In conclusion we must consider our finds in relation to other Paleo-Eskimo finds in Greenland. In the first place MELDGAARD and NELLEMANN found unmixed Sarqaq culture at Ikerasak in Umanak district, and GLOB a row of stone rings with Sarqaq culture at Godhavn on Disko. On a reconnaissance trip in 1956 MELDGAARD located Paleo-Eskimo sites in Egedesminde and Holsteinsborg districts, and scattered finds of artifacts from the southern part of West Greenland indicate the presence of Sarqaq as well as Dorset culture. It was undoubtedly remains of one or both of these cultures that the Norsemen found when they first came to Greenland.

We also find remains of both cultures in the Angmagssalik district indicating an immigration from Southwest Greenland, but the absence further north of the "burin-like implement" seems to indicate that the Disko Bugt Dorset here has reached its northernmost extension. It is questionable, however, whether the Sarqaq culture penetrated further north. Concave sidescrapers of Sarqaq type occur all the way north to Peary Land, and burins have been found in Scoresby Sund, in Young Sund, and in several places in the northeasternmost corner of Greenland, but we are here faced with the possibility that they have come from the north, where there are manifestations of two Paleo-Eskimo cultures, described by KNUTH as Independence I and Independence II (1956, p. 77 and fig. 3). Independence I is characterized by the occurrence of rather large burins without any trace of grinding and the presence of the core and flake industry. The combination of these two elements is reminiscent of the Denbigh Flint Complex, from which it deviates by the absence of the many small, minutely chipped flint implements that are characteristic of the Denbigh Flint Complex. There can, however, be no doubt that Independence I represents the earliest culture yet found in Greenland, in other words an immigration which antedates that of the Sarqaq people. Independence II is a Dorset culture corresponding to one of the early periods in the Igloolik area and at least in part to the

T 1 site at Native Point. Whether it is earlier or contemporary with the West Greenland Dorset culture has yet to be decided.

Dorset culture has also been found in the Thule district, but here the presence of the triangular harpoon blade with concave base and other types characteristic of the "classical" Dorset leave little doubt that it is later than the Dorset culture in Disko Bugt. That adds one more immigration to Greenland so that we now must count on at least five independent immigrations beginning with Independence I, then Sarqaq, which is followed by Independence II and the West Greenland Dorset, "classical" Dorset, and the Thule culture.

The investigations of the earliest cultures in Greenland have just started and much field work is still needed before we can write the last chapter of its prehistory. That not even Disko Bugt is thoroughly investigated was evident when a small boy handed us an ivory harpoon head he had found in Ritenbenk (fig. 22). It is typical of the "classical" Dorset culture, but so far the only specimen from West Greenland representing this culture. How it got there is just one of the many problems in Greenland which still remain to be solved.

HELGE LARSEN.

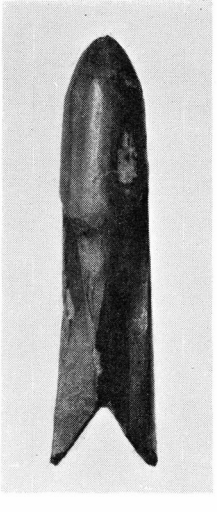


Fig. 22. Dorset harpoon head from Ritenbenk.

LIST OF ILLUSTRATIONS

BIBLIOGRAPHY

M. o. G. = Meddelelser om Grønland.

Ahlmann, Hans W:Son, 1953. Glaciärer och Klimat i Norden under de senaste Tusentalen År. Norsk Geografisk Tidsskrift, Bd. XIII, 3—8, p. 56—75, Oslo.

Annaler For Nordisk Oldkyndighed, 1938—39. København.

Bandi, Hans-Georg and Jørgen Meldgaard, 1952. Archaeological Investigations on Clavering Ø, Northeast Greenland. M. o. G., 126, 4, København.

Collins, Henry B., 1934, Review of: Therkel Mathiassen, Inugsuk, a Mediaeval Eskimo Settlement in Upernavik District, West Greenland, and Therkel Mathiassen, Ancient Eskimo Settlements in the Kangâmiut Area. In American Anthropologist, N. s. 36, No. 1, pp. 118—124.

1937, Archeology of St. Lawrence Island, Alaska. Smithsonian Miscellaneous Collections, Vol. 96, No. 1. Washington.

1950. Excavations at Frobisher Bay, Baffin Island, Northwest Territories (Preliminary Report). Annual Report of the National Museum of Canada for the Fiscal Year 1948—49, Bulletin 118, pp. 18—43. Ottawa.

1956. The T 1 Site at Native Point, Southampton Island, N. W. T. Anthropological Papers of the University of Alaska, Vol. 4, No. 2, College.

Cranz, David, 1770. Historie von Grönland. 2 Aufl. Bd. I—III. Barby.

Eberlin, P., 1888. Sundet, der i gamle Dage skal have gaaet tværs over Nordgrønland. Geografisk Tidsskrift, Bd. 9, p. 73—75, København.

Egede, Poul, 1788. Efterretninger om Grønland. Kiøbenhavn.

Engell, M. C., 1904. Undersøgelser og Opmaalinger ved Jakobshavn Isfjord, 1902. M. o. G. 35.

Fægri, Knut, 1948. On the Variations of Western Norwegian Glaciers during the last 200 Years. Assoc. Int. Sci. Assemblée gen., Oslo 1948. Tome 2, comm. neige et glaciers, p. 293—303.

Gabel-Jørgensen, C. C. A., 1940. Tidal Observations made at Nanortalik and Julianehaab in 1932—34. M. o. G. Bd. 107, 2, København.

Giddings, J. L. Jr., 1951. The Denbigh Flint Complex. American Antiquity, Vol. 16, No. 3, pp. 193—203. Salt Lake City.

1956. A Flint Site in Northernmost Manitoba. American Antiquity, Vol. 21, No. 3, pp. 255—268. Salt Lake City.

Giesecke, K. L., 1910. Karl Ludwig Gieseckes Mineralogisches Reisejournal ûber Grönland, 1806—13. 2 udg. M. o. G. 35, København.

Glob, P. V., 1935. Eskimo Settlements in Kempe Fjord and King Oscar Fjord. M. o. G. 102, No. 2. København.

Granlund, E., 1932. De svenske högmossarnas geologi. Stockholm.

Harp, Elmer, Jr., 1953. New World Affinities of Cape Dorset Culture. Anthropological Papers of the University of Alaska. Vol. 1, No. 2, pp. 37—54. College.

HOLTVED, ERIK, 1944. Archaeological Investigations in the Thule District. M. o. G. 141. 2. København.

IRVING, WILLIAM, 1953. Evidence of Early Tundra Cultures in Northern Alaska. Anthropological Papers of the University of Alaska, Vol. 1, No. 2, pp. 55—85. College.

IVERSEN, J., 1934. Moorgeologische Untersuchungen auf Grönland. Medd. Dansk Geologisk Forening, 8, 341. København.

1952—53. Origin of the Flora of Western Greenland in the Light of Pollen Analysis. Acta Oecologica Scandinavica. Vol. 4, Fasc. 2, pp. 85—103.

JENSEN, AD. S. and BØRGE FRISTRUP, 1950. Den arktiske klimaforbedring og dens betydning for Grønland. (With English Summary). Geografisk Tidsskrift. Bd. 50, pp. 20—47. København.

JOHNSON, FREDERICK, 1951. Radiocarbon Dating. Memoirs of the Society for American Archaeology, No. 8. Salt Lake City.

KLEINSCHMIDT, SAM., 1871. Den grønlandske Ordbog. København.

KNUTH, EIGIL, 1952. An Outline of the Archaeology of Peary Land. Arctic, Vol. 5, No. 1, pp. 17—33. Montreal.

1954. The Paleo-Eskimo Culture of Northeast Greenland Elucidated by Three New Sites. American Antiquity, Vol. 19, No. 4, pp. 367—381. Salt Lake City.

1956. Danmark Fjord. Fra Nationalmuseets Arbejdsmark, pp. 71—78. København.

KOCH, LAUGE, 1945. The East Greenland Ice. M. o. G. 130, 3. København.

LARSEN, HELGE, 1934. Dødemandsbugten, an Eskimo Settlement on Clavering Island. M. o. G. 102, 1. København.

1938. Archaeological Investigations in Knud Rasmussens Land. M. o. G. 119, 8. København.

1950. Archaeological Investigations in Southwestern Alaska. American Antiquity, Vol. 15, No. 3, pp. 177—186. Menasha.

1953. Archaeological Investigations in Alaska since 1939. The Polar Record. Vol. 6, No. 45. Cambridge.

LARSEN, HELGE and FROELICH G. RAINEY, 1948. Ipiutak and the Arctic Whale Hunting Culture. Anthropological Papers of the American Museum of Natural History. Vol. 42. New York.

LAWRENCE, D. B. and JOHN A. ELSON, 1953. Periodicity of Deglaciation in North America since the late Wisconsin Maximum. Geografiska Annaler, Vol. XXXV. Stockholm.

LEECHMAN, DOUGLAS, 1943. Two New Cape Dorset Sites. American Antiquity, Vol. 8, No. 4, pp. 363—75. Menasha.

LLOYD, T. G. B., 1874. Notes on Indian Remains Found on the Coast of Labrador. Journal of the Royal Anthropological Institute of Great Britain and Ireland, Vol. 4, pp. 39—43. London.

MACNEISH, R. S., 1956. The Engigstciak Site on the Yukon Arctic Coast. Anthropological Papers of the University of Alaska. Vol. 4, No. 2, pp. 91—111. College.

MATHIASSEN, THERKEL, 1931. Ancient Eskimo Settlements in the Kangâmiut Area. M. o. G. 91, 1. København.

1933. Prehistory of the Angmagssalik Eskimos. M. o. G. 92, 4. København.

1934. Contributions to the Archaeology of Disko Bay. M. o. G. 93, 2. København.

MELDGAARD, JØRGEN, 1952. A Paleo-Eskimo Culture in West Greenland. American Antiquity, Vol. 17, No. 3, pp. 222—230. Salt Lake City.

1955. Dorset Kulturen. Kuml. Årbog for jysk arkæologisk Selskab. (With an English Summary) pp. 158—177. Aarhus.

NORDENSKIÖLD, A. E., 1871. Redogörelse för en Expedition till Grönland År 1870. Kgl. Vet.-Akad. Förh., No. 10. Stockholm.

RINK, H., 1857. Grønland geografisk og statistisk beskrevet. Bd. I. København.

ROUSSELL, AAGE, 1941. Farms and Churches in the Mediaeval Norse Settlements of Greenland. M. o. G. 89, 1. København.

ROWLEY, GRAHAM, 1940. The Dorset Culture of the Eastern Arctic. American Anthropologist. N.s. Vol. 42, No. 3, pp. 490—499. Menasha.

SOLBERG, O., 1907. Beiträge zur Vorgeschichte der Osteskimo. Videnskabsselskabets Skrifter, II, Hist-Fil. Klasse, Nr. 2. Oslo.

THORARINSSON, S., 1936. Vatnajökul. Geografiska Annaler. Stockholm.
1943. Oscillations of the Iceland Glaciers in the last 250 Years. Geografiska Annaler, Vol. XXV, p. 1—54. Stockholm.

WALLØE, P. O., 1927. Peder Olsen Walløes Dagbøger, 1739—53. L. Bobé ed. Det grønlandske Selskabs Skrifter, V, København.

WINTEMBERG, W. J., 1939—40. Eskimo Sites of the Dorset Culture in Newfoundland. American Antiquity, Vol. 5, No. 2, pp. 83—102; Vol. 5, No. 4, pp. 309—333. Menasha.

Færdig fra trykkeriet den 1. marts 1958.

PLATES

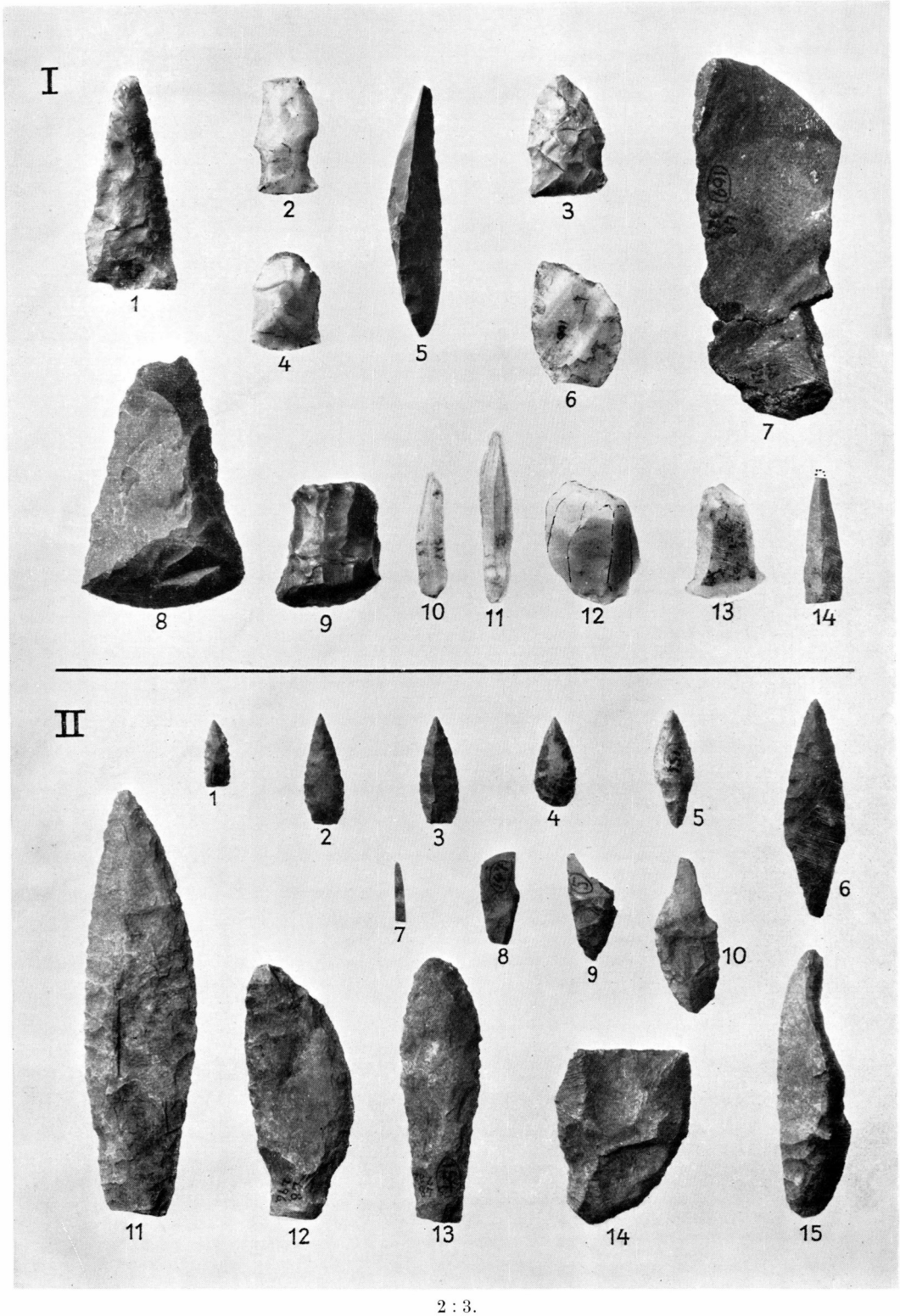
Plate 1.

I. (*Dorset culture*).

1.	Blade, chipped, notched	L8. 333	Sermermiut A, layer E
2.	– , – , –	L8. 334	— , —
3.	– , – , –	L8. 342	— , —
4.	Endscraper, trapezoid	L8. 312	— , —
5.	Burin-like implement	L8. 324	— , —
6.	Blade, asymmetrical	L8. 335	— , —
7.	Lamp sherd	L8. 329	— , —
8.	Endscraper, heavy	L8. 332	— , —
9.	–	L8. 341	— , —
10.	Micro-flake	L8. 343	— , —
11.	—	L8. 340	— , —
12.	Micro-core	L8. 77	— B, layer D
13.	Endscraper, flaring edges	L8. 2	— , —
14.	Burin-like implement	L8. 73	— , —

II. (*Sarqaq culture*).

1.	Blade, symm., small, lanc.-triang...	L8. 289	Sermermiut A, layer B
2.	– , – , – , — ..	L8. 288	— , —
3.	– , – , – , — ..	L8. 294	— , —
4.	– , – , – , — ..	L8. 377	— , —
5.	– , – , slender	L8. 269	— , —
6.	– , – , –	L8. 293	— , —
7.	Burin spall	no. numb.	— , —
8.	Burin	L8. 295	— , —
9.	–	L8. 290	— , —
10.	–	L8. 268	— , —
11.	Blade, asymm., tanged	L8. 287	— , —
12.	– , – , –	L8. 296	— , —
13.	– , spatulate	L8. 282	— , —
14.	Sidescraper	L8. 277	— , —
15.	– , concave	L8. 265	— , layer A

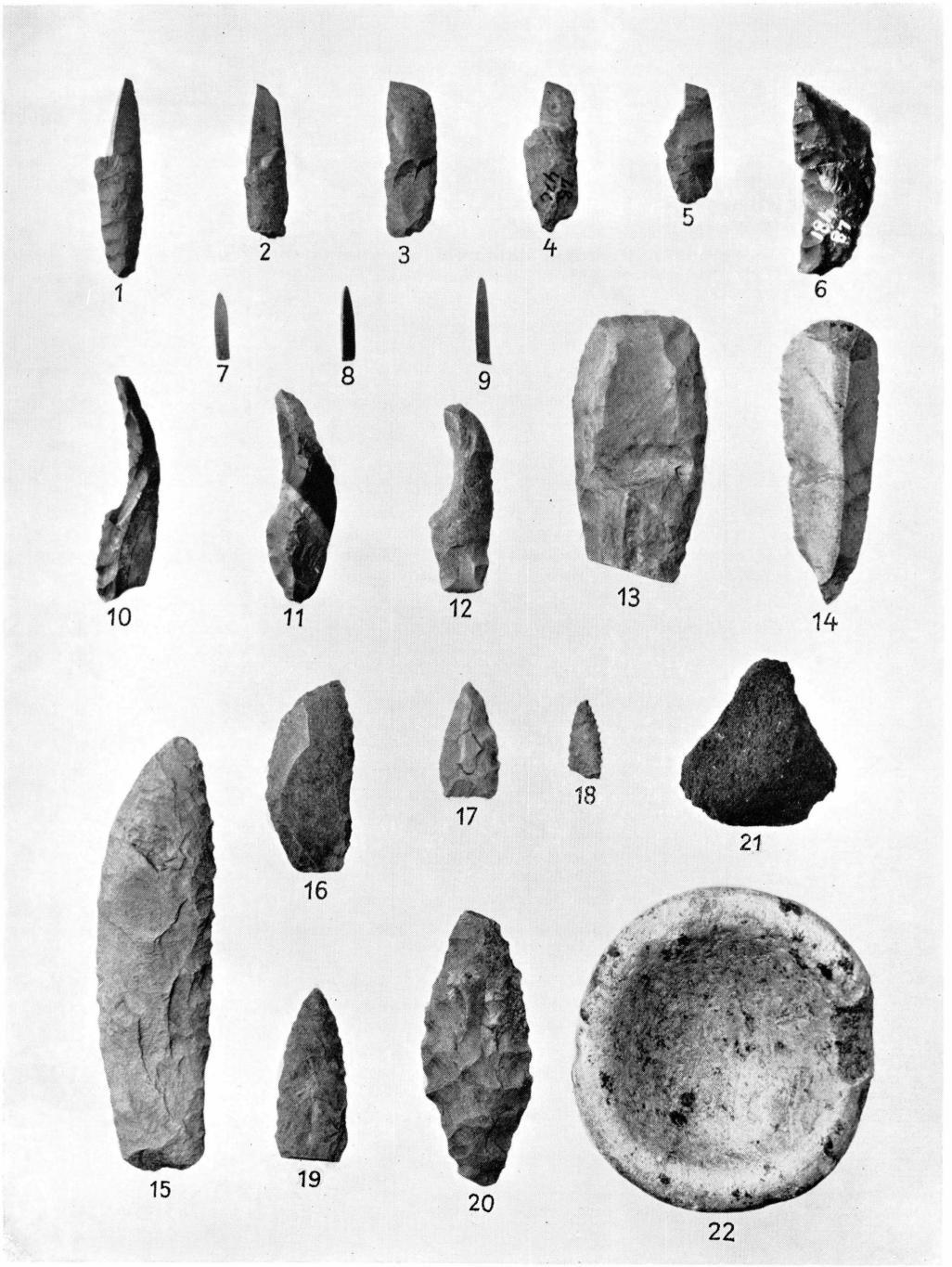


2 : 3.

Plate 2.

(*Sarqaq Culture*).

1.	Burin	L8. 476	Tuperssuit I
2.	–	—	—
3.	–	—	—
4.	–	—	—
5.	–	—	—
6.	– ?	L8. 481	—
7.	Burin spall	L8. 480	—
8.	—	—	—
9.	—	—	—
10.	Sidescraper, concave	L8. 484	—
11.	– , –	L8. 483	—
12.	– , –	L8. 485	—
13.	Endscraper, oblong	L8. 499	—
14.	Sidescraper, straight	L8. 502	—
15.	Blade, asymm., tanged	L8. 491	—
16.	– , – , –	L8. 492	—
17.	– , symm., small, lanc.-triang.	L8. 494	—
18.	– , – , – , —	L8. 495	—
19.	– , – , slender	L8. 496	—
20.	– , – , –	L8. 493	—
21.	Pumice	L8. 501	—
22.	Lamp	L8. 500	—

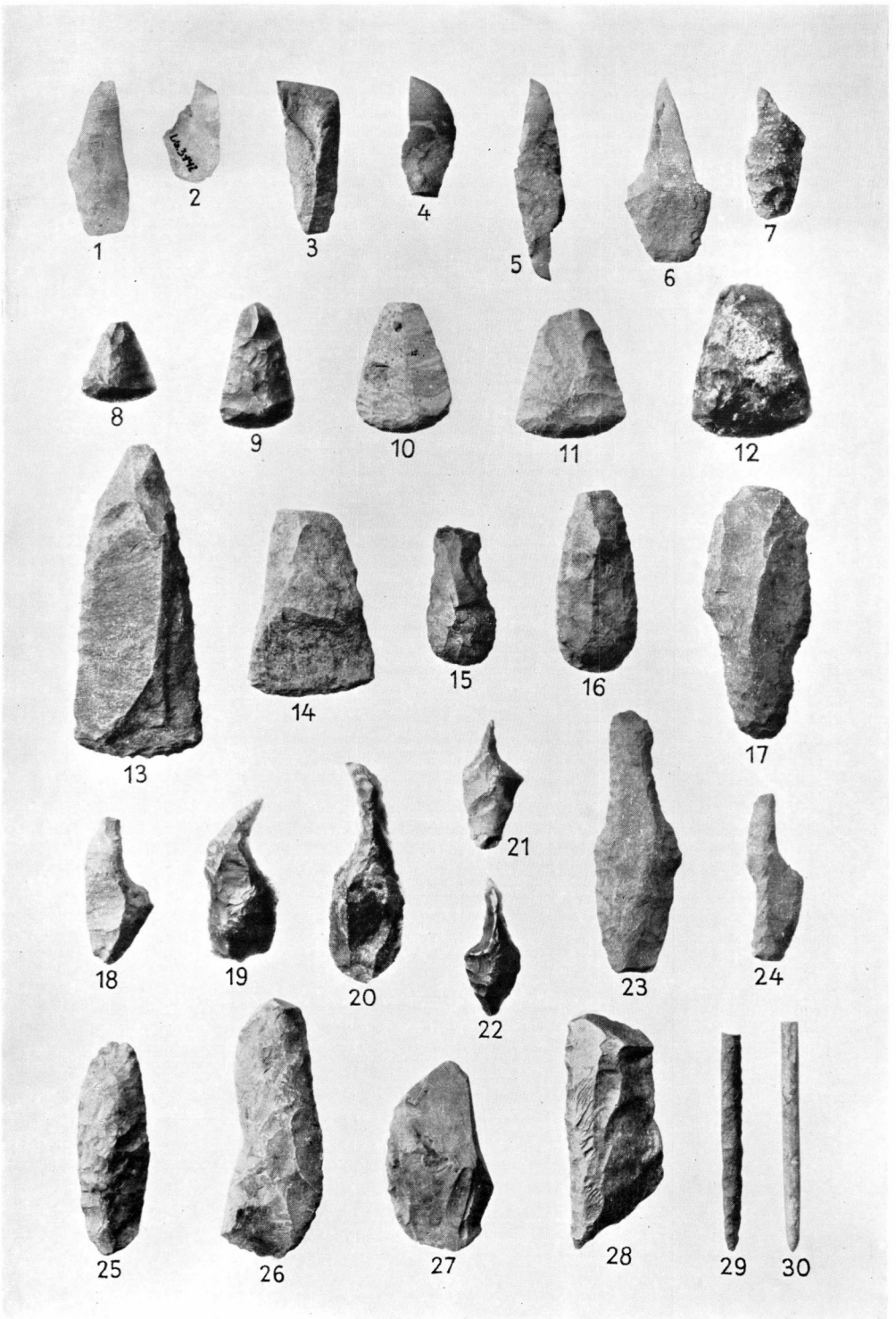


2 : 3.

Plate 3.

(*Sarqaq Culture*).

1.	Burin	L6. 4491	Igdlorssuit I
2.	–	L6. 3942	Ilerfît
3.	–	L6. 4138	Sarqaq N. I
4.	–	L6. 4135	—
5.	–	L6. 4009	Igdlutsiait
6.	–	L6. 3945	Ilerfît
7.	–	L6. 4495	Igdlorssuit I
8.	Endscraper, triangular	L6. 4502	—
9.	– , –	L8. 205	Sermermiut, sc. f.
10.	– , –	L9. 66	Igdlorssuatsiait, –
11.	– , –	L6. 3952	Ilerfît
12.	– , –	L8. 523	Tuperssuit II
13.	– , oblong	L8. 200	Sermermiut, sc. f.
14.	– , –	L8. 132	— , B, layer B
15.	– , rounded	L6. 4053	Igdlutsiait
16.	– , –	L6. 4288	Sarqaq N., sc. f.
17.	– , –	L6. 4549	Igdlorssuit II
18.	Sidescraper, concave	L6. 3955	Ilerfît
19.	– , –	L6. 3957	–
20.	– , –	L8. 460	Igdluluarssùp talerua
21.	– , –	L6. 4300	Sarqaq N., sc. f.
22.	– , –	L6. 4299	—
23.	– , –	L8. 461	Igdluluarssùp talerua
24.	– , –	L8. 416	Sermermiut, sc. f.
25.	–	L6. 3985	Ilerfît
26.	–	L8. 535	Tuperssuit III
27.	–	L6. 3986	Ilerfît
28.	–	L8. 235	Sermermiut, sc. f.
29.	Awl or bodkin	L8. 563	Tuperssuit, sc. f.
30.	—	L8. 173	Sermermiut, –

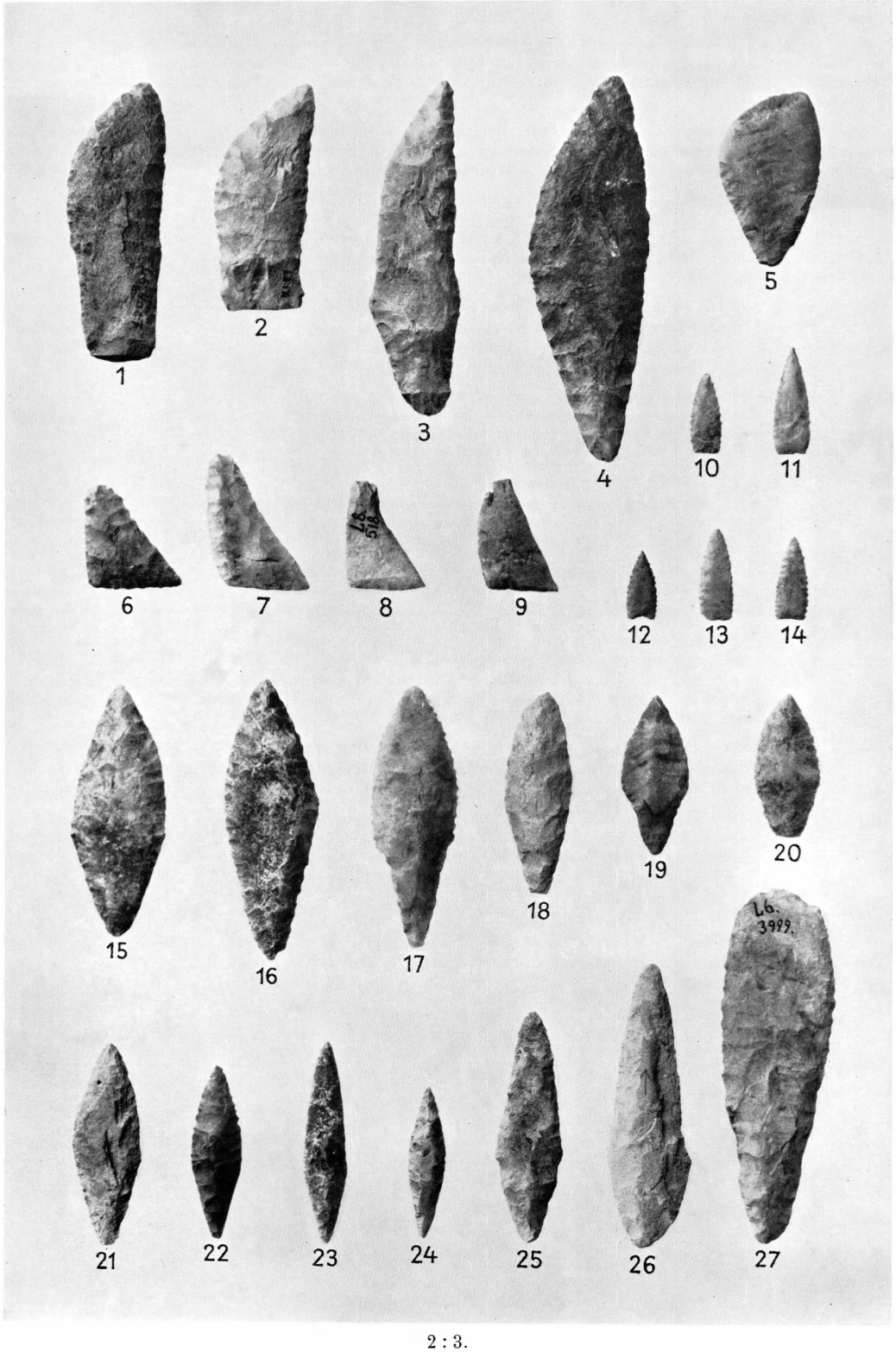

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30

2 : 3.

Plate 4.

(*Sarqaq culture*).

1.	Blade, asym., tanged	L6. 4067	Igdlutsiait
2.	– , – , –	L8. 171	Sermermiut, sc. f.
3.	– , – , –	L8. 216	— , –
4.	– , double pointed	L6. 4160	Sarqaq N. I
5.	– , – –	L6. 3969	Ilerfît
6.	– w. transversal edge.....	L6. 4572	Igdlorssuit,, sc. f.
7.	– —	L8. 544	Tuperssuit, –
8.	– —	L8. 518	— II.
9.	– —	L6. 4263	Sarqaq N. sc. f.
10.	– , symm., small, lanc.-triang...	L8. 455	Igdluluarssûp talerua
11.	– , – , – , — ..	L8. 192	Sermermiut, sc. f.
12.	– , – , – , — ..	L8. 191	— , –
13.	– , – , – , — ..	L8. 465	Igdluluarssûp talerua
14.	– , – , – , — ..	L9. 67	Igdlorssuatsiait, sc. f.
15.	– , – , slender	L6. 3963	Ilerfît
16.	– , – , –	L8. 450	Igdluluarssûp talerua
17.	– , – , –	L8. 207	Sermermiut, sc. f.
18.	– , – , –	L6. 3963	Ilerfît
19.	– , – , –	L6. 4168	Sarqaq N. I
20.	– , – , –	L6. 4062	Igdlutsiait
21.	– , – , –	L6. 3963	Ilerfît
22.	– , – , –	L6. 4230	Sarqaq N., sc. f.
23.	– , – , –	L8. 451	Igdluluarssûp talerua
24.	– , – , –	L6. 4063	Igdlutsiait
25.	– , – , –	L6. 4267	Sarqaq N., sc. f.
26.	– , – , –	L6. 3965a	Ilerfît
27.	– , – , spatulate	L6. 3999	Nûgâq

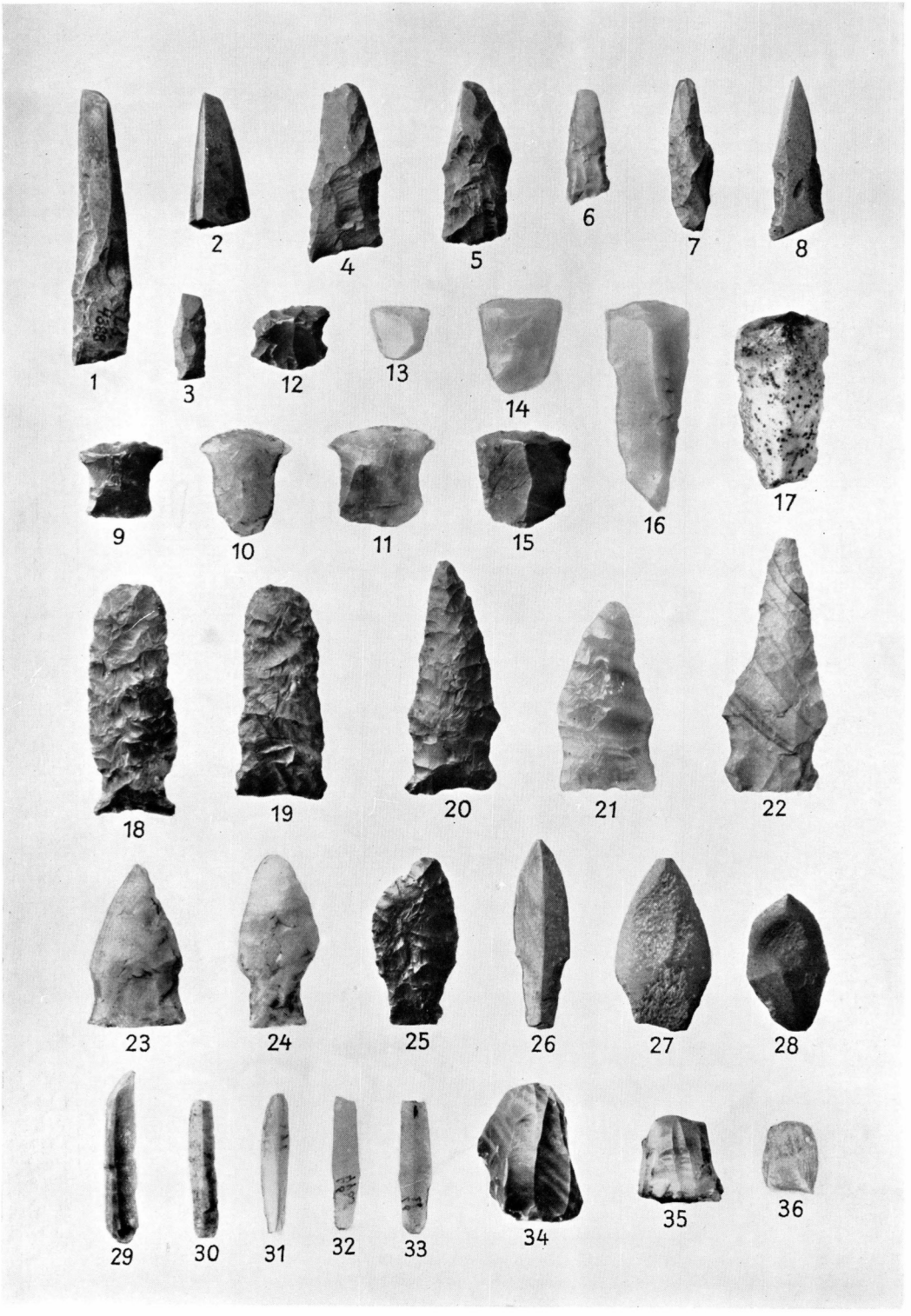

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
L6. 3999.

2 : 3.

Plate 5.

(*Dorset culture*).

1.	Burin-like implement	L6. 4388	Qeqertaq, Qarsorsâ
2.	—	L6. 4543	Igdlorssuit II
3.	—	L8. 74	Sermermiut B, layer D
4.	—	L6. 4389	Qeqertaq, Qarsorsâ
5.	—	L8. 114	Sermermiut B, layer D
6.	—	L6. 4477	Qeqertârssuk
7.	—	L6. 4390	Qeqertaq, Qarsorsâ
8.	—	L6. 4334	Sarqaq East
9.	Endscraper, flaring edge	L6. 4393	Qeqertaq, Qarsorsâ
10.	– , —	L6. 4029	Igdlutsiait
11.	– , —	L6. 4531	Igdlorssuit I
12.	– , —	L8. 459	Igdluluarssûp talerua
13.	– , trapezoid	L9. 89	Eqe
14.	– , –	L8. 163	Sermermiut B, sc. f.
15.	– , –	L6. 4356	Akúnâq
16.	– , –	L6. 4402	Qeqertaq, Qarsorsâ
17.	– , –	L6. 4399	– , –
18.	Blade, chipped, notched	L8. 423	Kangerdluatsiaq
19.	– , – , –	L6. 4375	Qeqertaq, Qarsorsâ
20.	– , – , –	L8. 67	Sermermiut B, layer D
21.	– , – , –	L6. 4376	Qeqertaq, Qarsorsâ
22.	– , – , –	L9. 62	Igdlorssuatsiait III
23.	– , – , –	L9. 77	Eqe
24.	– , – , –	L8. 154	Sermermiut B, sc. f.
25.	– , – , –	L6. 4216	Sarqaq N. I.
26.	– , polished	L6. 4277	Sarqaq sc. f.
27.	– , –	L6. 4276	—
28.	– , –	L6. 4068	Igdlutsiait
29.	Micro-flake	L6. 4405	Qeqertaq, Qarsorsâ
30.	—	—	– , –
31.	—	—	– , –
32.	—	—	– , –
33.	—	L8. 26	Sermermiut B, layer D
34.	Micro-core	L8. 472	Igdluluarssûp, talerua
35.	—	L9. 90	Eqe
36.	—	L6. 4534	Igdlorssuit I


1
2
4
5
6
7
8
3
12
13
14
16
17
9
10
11
15
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

2 : 3.